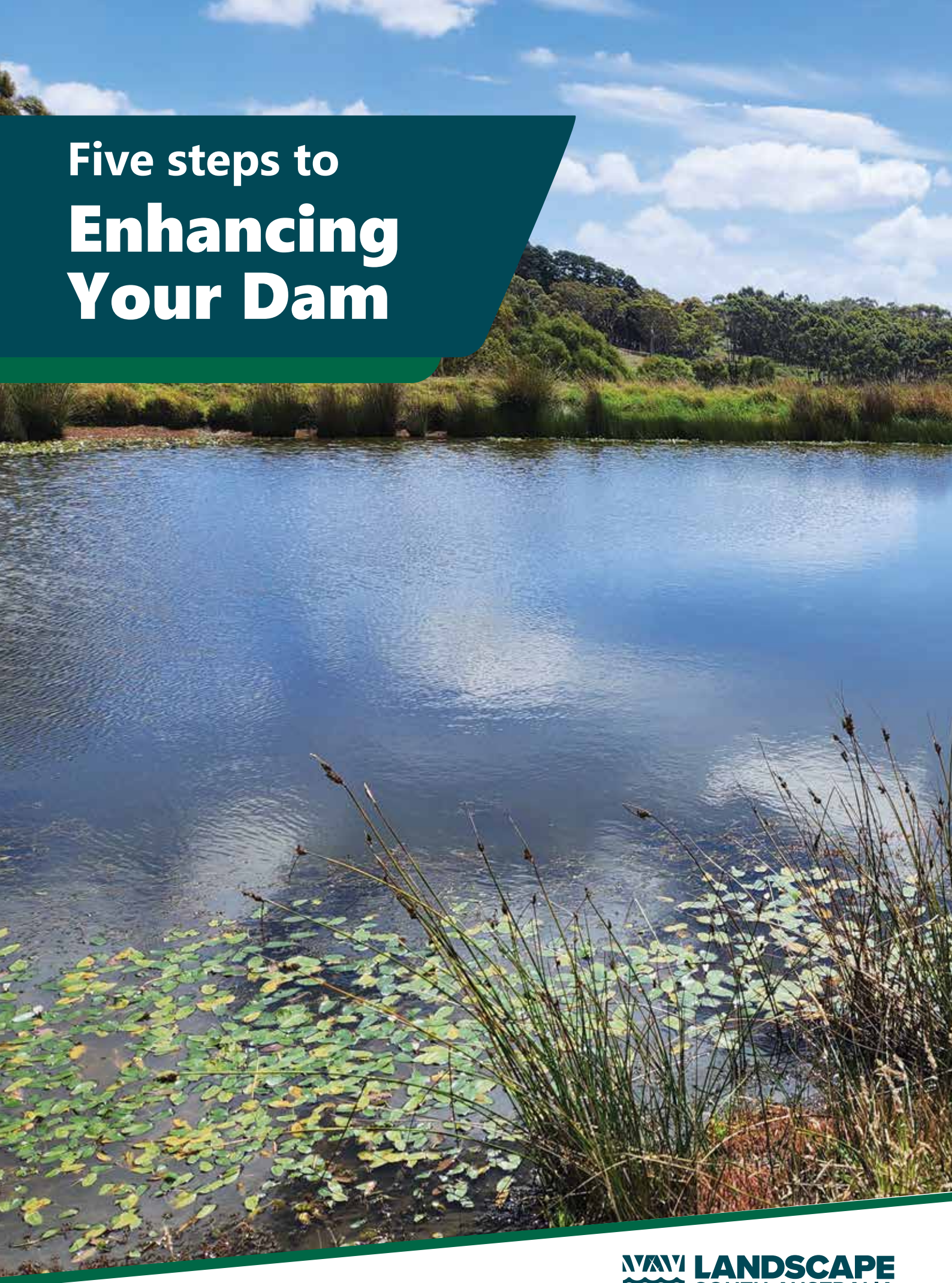
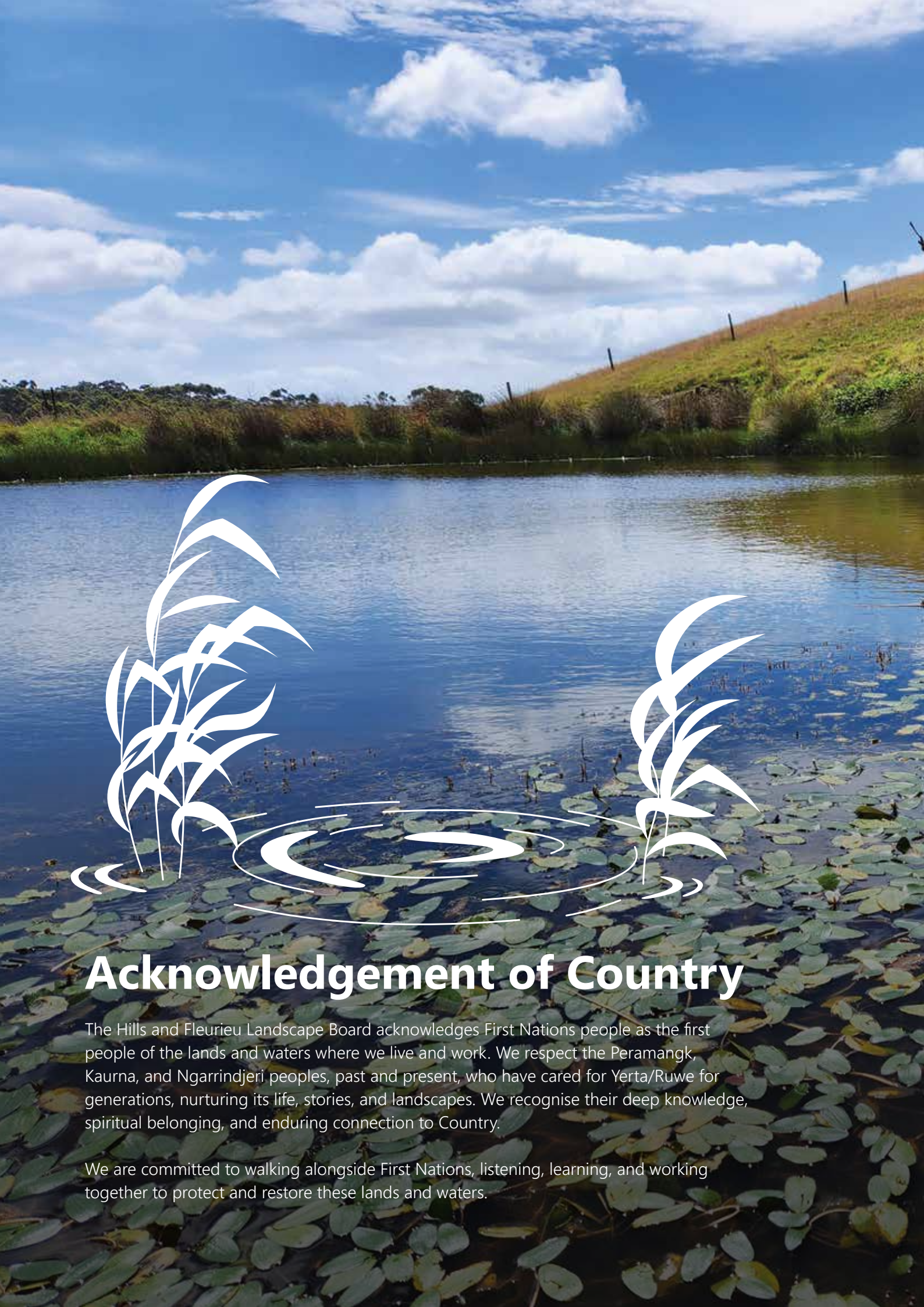


Five steps to Enhancing Your Dam

LANDSCAPE SOUTH AUSTRALIA HILLS AND FLEURIEU



Acknowledgement of Country

The Hills and Fleurieu Landscape Board acknowledges First Nations people as the first people of the lands and waters where we live and work. We respect the Peramangk, Kaurna, and Ngarrindjeri peoples, past and present, who have cared for Yerta/Ruwe for generations, nurturing its life, stories, and landscapes. We recognise their deep knowledge, spiritual belonging, and enduring connection to Country.

We are committed to walking alongside First Nations, listening, learning, and working together to protect and restore these lands and waters.

What is dam enhancement?

Dam enhancement is about improving the overall health of a dam, through measures that improve water quality, increase biodiversity and native habitat, and support the health of livestock. This can benefit both the local environment, and the productivity of your farm.

Enhancement activities include:

- management of livestock access to avoid erosion and nutrient runoff
- planting native vegetation around the water body to create a buffer for runoff and help filter nutrients entering the water
- the addition of features that will increase habitat for local native wildlife.

Contents

Introduction

Why enhance dams?

Regular inspection and maintenance is vital if you have a dam on your property; but there are many benefits to carrying out enhancement activities too. With good planning, the benefits are significant, and costs don't have to be high.

Stock can become bogged and cause erosion in unfenced dams.

Improving farm productivity

- Stock can often become bogged at the dam edge when water levels are low, and can cause erosion to the dam wall and spillway. Excluding livestock access to the dam reduces the time and effort required to manage the animals if they get bogged. It also helps prevent erosion and pugging.
- Native vegetation around a dam can improve nutrient cycling and water filtration, as well as supporting pollination.
- When water quality is improved, stock are drinking cleaner water, which assists with digestion and temperature regulation. More palatable water encourages higher consumption, which in turn improves food consumption and results in steady weight gains.
- Studies have found that farm dams without natural filtering processes contain higher nitrates, which can lead to an increase in methane emissions from stock drinking the water.
- Strategically placed vegetation can also reduce prevailing winds, and in turn evaporation by 20-30%, which makes a big difference to water storage and security.

Dams without stock fencing can lead to nutrient build up and less palatable water.

Supporting biodiversity

- The Hills and Fleurieu region is home to both the Mt Lofty Ranges biodiversity hotspot (one of only 15 hotspots in Australia), and the nationally significant Fleurieu Peninsula swamps. The swamps are not only natural filters for both groundwater and surface water, but are home to a high number of rare and threatened plant species and provide habitat for many vulnerable animal species too. By enhancing dams in these regions in particular, we can provide greater protection for these species and prevent further habitat loss.
- Dam enhancement can greatly benefit native species including frogs, native fish, lizards, and birds. This is especially true where the surrounding landscape has been cleared and degraded to a high extent.
- Fencing and vegetating dams helps to increase overall species richness, and leads to better ecosystem function.

Dams in the Hills and Fleurieu

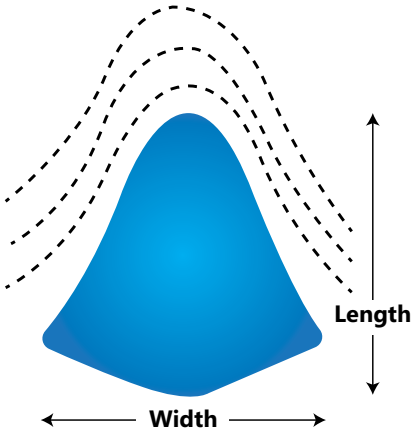
- 90% of all dams in the Mt Lofty Ranges region are less than 5 megalitres in size.
- Less than 2% of dams in our region are 25 megalitres or larger, yet these hold around 30% of all dam volume.
- Farm dams act as a physical barrier to surface water flows, unless a low flow bypass is installed. This is recommended for all dams over 5 megalitres in our region. Low flow bypasses include drains and pipelines which can divert water back to its normal course of flow.
- Overall native fish and water bug condition in the region is declining. If left unaddressed, aquatic ecosystems will continue to degrade, with localised species loss and declining diversity and resilience. Good dam management and enhancement can play a significant role in addressing this.

STEP 1

Plan to succeed

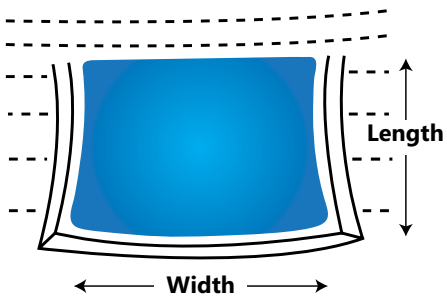
Manage expectations, permits and approvals

Before you start any enhancement work, it's important to have a good plan. You may choose to follow each step in this guide, or you may choose different activities to enhance your dam, depending on your situation. For example, if you don't have any stock accessing the dam, you can still improve your water quality and surrounding biodiversity by following Step 4 and 5 to plant native vegetation and create wildlife habitat in and around the water.



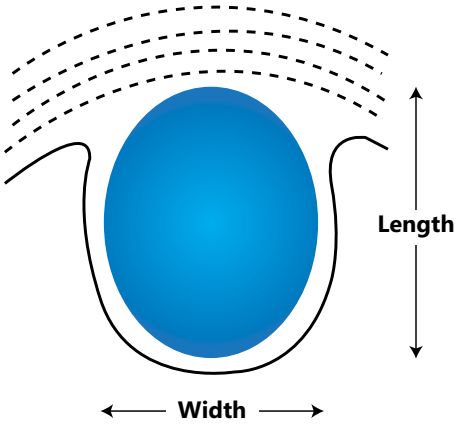
Triangular

surface area = $\frac{\text{width x length}}{2}$



Rectangular

surface area = width x length



Round

surface area = 0.8 x width x length

Calculating the volume of a farm dam

To calculate the volume of a farm dam you will need to measure the surface area and the maximum depth of the dam in metres. To calculate the surface area of your dam decide on the shape of the dam from the options above.

Step 1. Decide on the shape of your dam from the options above

Step 2. Measure the relevant width and length at top water level and enter those on the recording sheet.
All dimensions need to be recorded in metres.

Step 3. Measure the maximum depth of the dam and enter on the recording sheet.

Step 4. Use the formula relevant to the dam shape above to calculate surface area (SA) in square metres of each dam and enter the SA on the recording sheet.

Step 5. Using the following formula, claculate the volume in cubic metres.
All shapes - volume = 0.4 x surface area x depth
Enter the results on the recording sheet.
Note: The conversion factor 0.4 takes into account the slope of the sides of the dams.

Step 6. Divide this volume by 1,000 to convert cubic metres to megalitres and enter on the recording sheet. This is the dam capacity in megalitres (ML)

Recording Sheet

Width (m)

Length (m)

Depth (m)

Surface area (SA)

Volume (cubic metres)

Volume (ML)

Once you know what you would like to achieve, take some time to make a few notes on the following to help you form a plan.

Water use and access

Water use planning is an important starting point. Consider the size of your dam and and how much water it holds at times of lowest and highest rainfall. The diagram on page 6 can help with calculating volume. (From rural-living-handbook-bro.pdf)

Next think about what you currently use the water for, and how much you are using on average each day. If you are using the dam to water livestock, the greatest benefits are realised if stock are excluded from accessing the dam. Consider:

- Are you prepared to establish alternative watering points (e.g. stock troughs?)
- Do you have an existing reticulated watering system, or would you need to install extra equipment (including pipes and pumps?)
- Alternatively, would you prefer to allow stock to access just one designated area of the dam?

Budget

Allocating a budget for enhancement work is important, as it will help you determine your priorities and keep things realistic. It can also assist with project planning and establishing timeframes.

For example, fencing to exclude livestock and setting up a reticulated watering system can be more costly activities, but they need to be done before any revegetation work takes place. By planning what activities you need to do, in which order, you can get a clearer picture of how much it will cost to get started.

Getting quotes for any major work will help guide your decisions and refine your plan.

Enhancing your dam can improve water quality.

Timing of activities

Once you have worked through this guide and know which activities you would like to undertake, it is important to work out the best timing for work to be done. You can then create a schedule to help with your planning.

Some key considerations on timing include:

- Fencing is usually best done in autumn or spring, to avoid overly wet or dry conditions.
- Revegetation of some species should be done in winter, but for submerged plants or those on the dam edge, they will need to be planted when the water level is low enough to allow access.

Permits

Some activities around dams and watercourses require a Water Affecting Activity (WAA) permit. This is to minimise negative impacts on surrounding areas, and ensures you receive the right advice on how to go about the work. To double check whether this applies to you, visit the **Water affecting activities** page on our website.

For fencing, a permit is not required as long as you are following the Current Recommended Practice for this activity. This can also be found on our website.

Local landscape board staff can let you know what approvals are needed

STEP 2

Fencing to exclude stock

"Our dam is the lifeblood of our farm- fencing out heavy footed animals, and allowing natural recovery from erosion and soil degradation, will have benefits across so many areas of our farm."

-Katherine Mitchell, landholder (Inman Valley)

If you've done much fencing before, you'll know a good plan is essential. If not, don't worry- we have included lots of information here to help! There are a number of different considerations including materials, labour, and access required for equipment to do the job. If you've had stock drinking out of the dam up until now, you'll also need to decide on the best option for alternative watering points.

- Start with a map or aerial image of your dam, and pencil in where you would like the fence to go. Make sure it is at least 10m back from the dam wall.
- It's a good idea to incorporate any large paddock trees or areas of native vegetation that might be close by within the fenced area. This will boost the overall biodiversity of the site.
- It's also worth fencing off inflow areas that feed into the dam. Our **Five Steps to a Thriving Watercourse** guide has some great design options to help with this.
- The type of fencing you will need depends on what type of animals you are excluding. For example, for sheep we would generally recommend waratah box fencing; whereas for keeping cattle out, single strand wire should suffice. If unsure, you can check with your local landscape board.
- It is a lot cheaper if the fence can be constructed with the assistance of a tractor and attachments. If it must be done by hand the cost will be a lot higher. Likewise, it's cheaper if the fence is a rectangle, square or triangle. Every change in alignment adds additional costs associated with strainer assemblies. Gates are an additional cost, particularly if placed in the middle of a run of straight fence.
- Costs for material and labour do vary, so it's worth getting a few quotes.
- A more detailed guide on how to fence your dam, including what materials to use, can be found on our YouTube channel, in a video called **Fencing your dam- Planning**.

Fencing off your dam to exclude stock can help improve water quality.

To ensure stock still have access to water after fencing your dam, there are a few different options you might consider. These are outlined below.

1. **Redirect dam water to tanks or troughs**. This will require some extra planning to ensure you have a good reticulation system.

    - Think about how many stock you have, and do some research on their daily water requirements. This will help you understand how many troughs you need, and what shape and materials will be best suited to your property. There are some handy links to help you on our **Rejuvenate your Dam** webpage.

Type of stock	Daily consumption (L/head)		Annual consumption (L/head)
	Summer	Winter	
Sheep			
Lactating ewes	9	7	2 880
Dry sheep	7	4.5	2 070
Irrigated pasture	3.5	2	990
Lambs			
Dry pasture	2.5	1	630
Irrigated pasture	1	0.5	310
Cattle			
Grazing (<550kg)	45	30	13 500
Grazing (>550kg)	67.5	45	20 700
Lot feeding	94	60	27 200
Calves	25	15	7 200
Milking	70	45	20 700
Dry cows	45	30	13 500

From Farm Water, Hislop D. CB Agricultural College, 1998.
Or Farm Water AgGuide Appendix 3, table 27, p 125

- How much and what type of pipe work will be required to move water from the dam to tanks or troughs? Pipe diameter is really important over longer runs due to friction, so it's important to do some research on the best solution for your property.
- What is the topography like? Will you need to pump water uphill, and how much pressure will you need to do this? What kind of flow will you need? Most pumps have a graph showing trade off between flow at different pressures and height measures.
- Would you prefer to use a solar or electric pump? Electric pumps can be cheaper, but you will need to make sure there is access to a power source and a back up option in the case of power failure.
- If you have a large property, placing a few troughs in different paddocks and spreading them out can be worthwhile. This ensures more even pasture access.

To keep out kangaroos, use highly tensioned fencing with no gaps underneath.

2. **Allow access to a deeper part of the water through a hardened access point**. This is a fenced area where stock can still enter the water to drink, without causing erosion or pugging to other areas of the dam. Some tips for this include:

    - Make sure the access point is well away from the inflow and spillway, and not located too close to the dam wall.
    - It is worth including a ramp lined with gravel or stones, to control erosion and ensure no sediment enters the water. This is also safer for stock.
    - A gate at the entrance to the access point can help you control stock access to the dam. For instance, during times of high rainfall, you might find that the water level is naturally higher and stock can access the water without needing to enter the dam.

Credit: Sustainable Farms, Australian National University, www.sustainablefarms.org.au

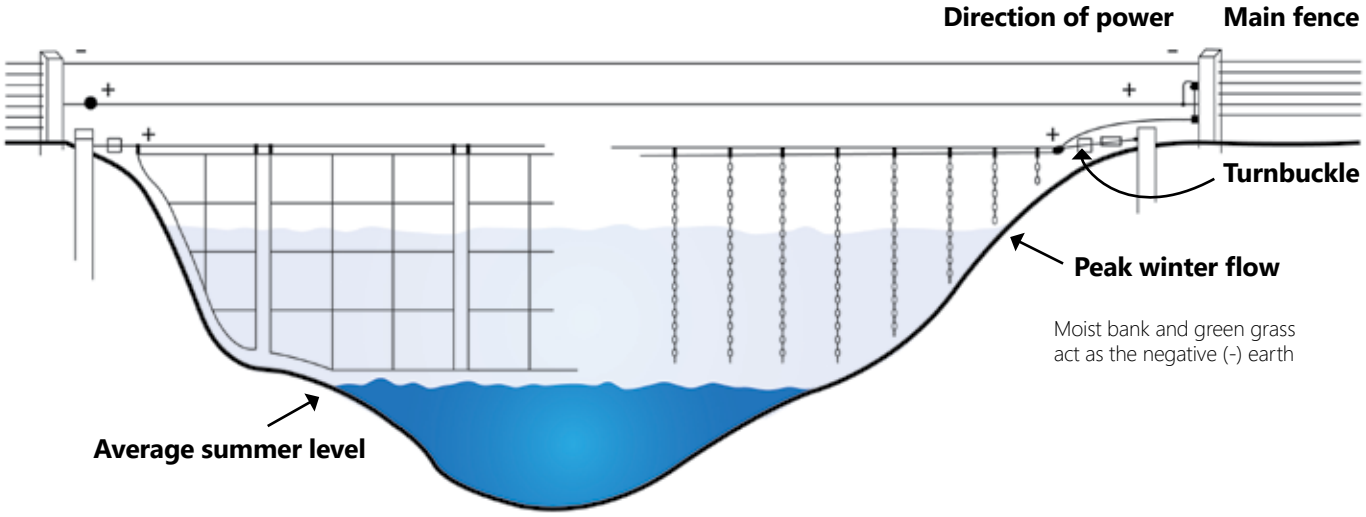
Consider fencing materials and siting, including how easily the fence can be installed.

Watercourse fencing design options

Fencing designs adapted from Upper River Torrens Landcare Group - Datasheet - Watercourse Fencing

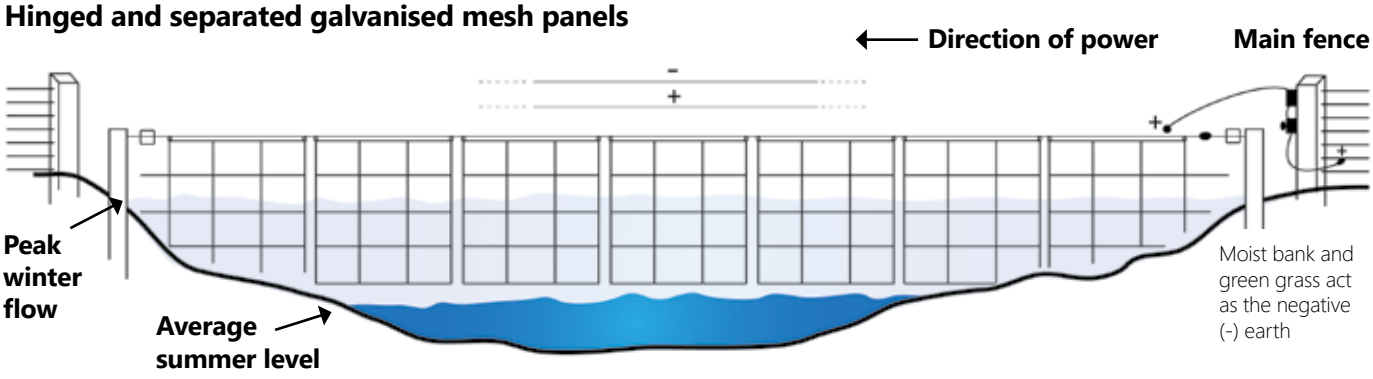
Permanent fencing for deep, stable channels

Suited to deep, narrow crossings. **Hinged galvanised mesh panels or galvanised chain.** Steel cable (6, 4, 8, 10 or 12mm) is used to carry the fence. This is anchored with engineering eye bolts and turnbuckles or tractor strained chain assembly to maintain tension (turnbuckles may not be suitable for straining more than 25 metres). A wire, holding the mesh or chains apart, carries the positive (+) pulse.



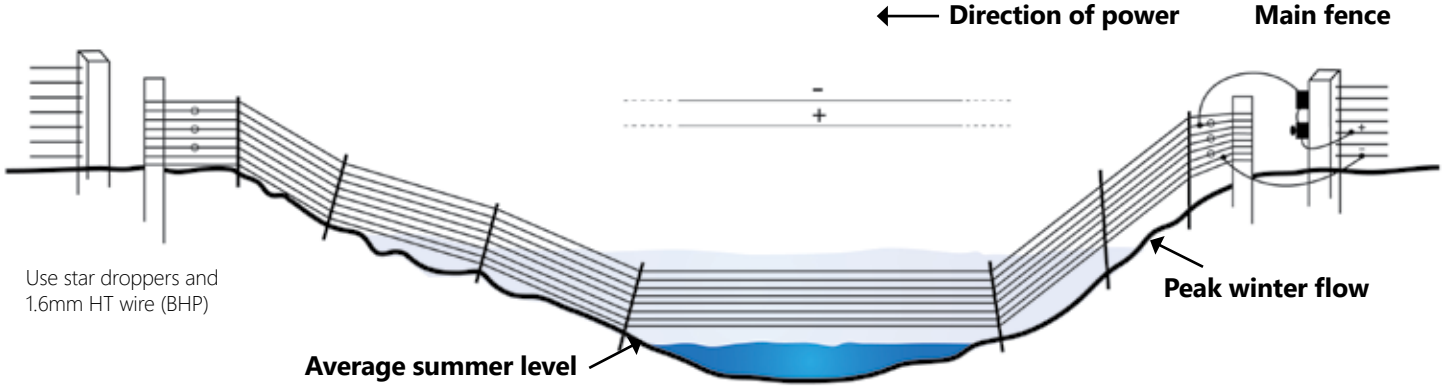
Semi-permanent fencing, which can respond to sudden changes in flow

Suited to wide, flat crossings, including fords
Hinged and separated galvanised mesh panels



Semi-permanent fencing with easily installed and removed sections

Suited to uneven crossings. Wire each section or couple of sections separately. The joins then become the breakaway points. Hand strain.

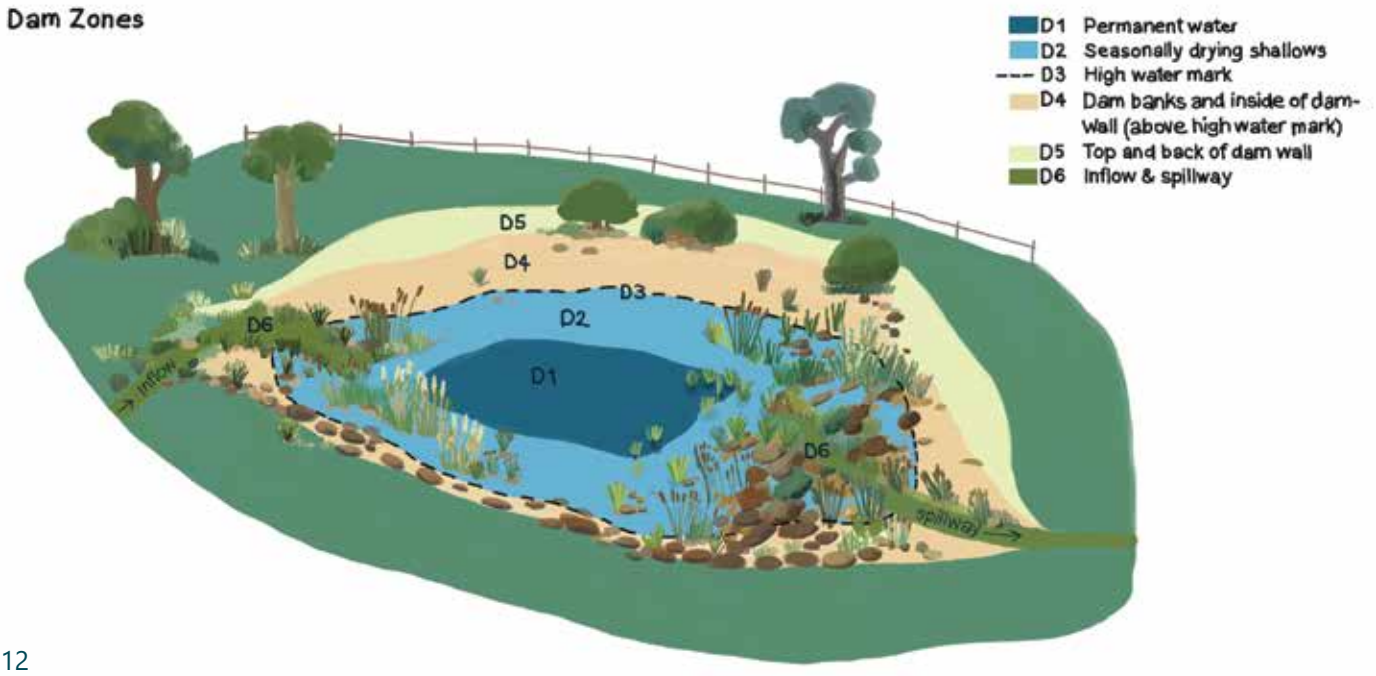


STEP 3

Revegetation and planting design

Planting native vegetation in and around your dam is an important step in dam enhancement. Not only will this have environmental benefits, but there can be marked improvements to your water quality and the productivity of your farm too. There are a few things to think about when revegetating in and around your dam, but the good news is that it's not difficult and doesn't have to be too costly.

- You will need to select local native plant species to place in and around your dam. Check out our **Five Steps to Revegetation Guide** for some tips- you'll find it on our website.
- Grasses, sedges and reeds can be planted on the banks to help filter nutrients and improve water quality. Have a look at our **Sedge and rush planting guide** to find out which species are best.
- Also plant sedges and grasses in inflow areas and the spillway to reduce soil erosion and prevent sediment and nutrients entering the dam. Avoid planting trees and larger shrubs here as their roots can cause issues down the track, and they create shade which slows the growth of other plants.
- For aquatic species, refer to our brochure on **Water Plants of the Adelaide Hills and Fleurieu**.
- It's also a good idea to include a selection of shrubs and groundcovers, which can help stabilise the soil and prevent erosion.
- As a guide, shrubs should be planted 2-3 metres apart, and trees 5-6 metres apart. Remember, don't plant trees on your dam wall as this can lead to destabilisation of the bank over time and increase the risk of a breach.
- Generally, it's best to avoid species such as banksias and sheoaks as these are highly susceptible to kangaroo damage.
- On the side of the dam that gets most sunlight and summer wind, plant trees and shrubs about 10 metres above the high water mark. This will create protection from wind, help reduce evaporation, and provide shelter for native wildlife.
- It can be helpful to make a plan based on the different zones of your dam, and what is already there. See the diagrams and guidelines below.
- If your dam isn't fenced, you will need to consider how to protect your plants while they are establishing. Refer to our **Five Steps to Thriving Revegetation guide** for some tips.



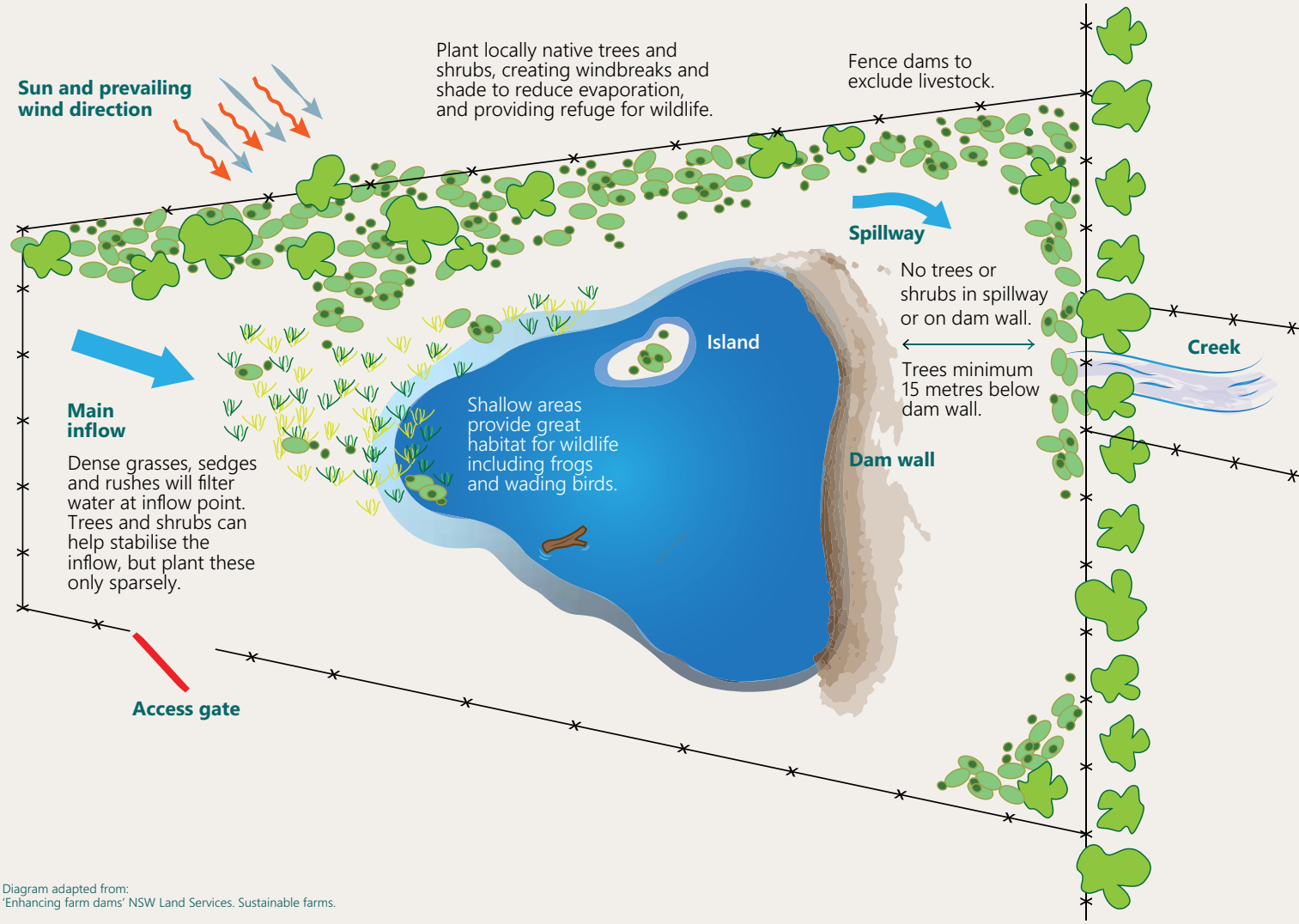


Diagram adapted from:
'Enhancing farm dams' NSW Land Services. Sustainable farms.

- **Inflow**- plant with grasses, sedges, rushes and a few optional small sparse shrubs (not too many). This will slow down water movement, absorbing nutrients and filtering water before it enters the dam.
- **Margin**- area between water edge and high water level. This can fluctuate a lot, so consider this when you are planting. Ground covers, herbs, sedges, reeds and rushes- focus on species that won't colonise too much- other natives will come up here and we want to encourage biodiversity.
- **Shallow water**- sedges and semi-aquatic plants. Need to be able to survivewetting and drying cycles.
- **Deep water**- cooler water, more palatable to livestock. Submergent plant species and open water floating plants.
- **Dam wall**- don't plant anything too big, need to be able to properly identify faults. No deep-rooted plants (trees or shrubs). Ground covers with fibrous roots- e.g. wallaby grass.
- **Spillway**- high ground cover to prevent erosion. Frequently dry conditions, species that are tolerant of different conditions. Want to slow flow but don't block it.
- **If you do have existing trees** or larger vegetation in your spillway, it is worth considering removing some.

STEP 4

Creating habitat to support biodiversity

Dams provide many opportunities to create valuable wildlife habitat and boost biodiversity. This can have a positive flow-on effect for your property; including increased resilience to fires and high rainfall events, as well as benefits to soil health and fertility.

climbing galaxia

- A great way to create habitat for aquatic wildlife is by adding fallen timber or floating islands to your dam. These may need to be tied down, depending on their weight, so they don't float away. Sustainable Farms NSW has produced a helpful video called **How to build a wildlife island on your farm dam**. You can view this on their website.
- Logs, branches and rocks can also be added around the edge of the dam to create habitat for native birds, reptiles and small mammals.
- Other tips include using deep rooted perennial grasses around your property to improve overall soil health, and reducing the use of pesticides and fertilisers during wet periods if possible. This will help decrease runoff into your dam and keep the water healthy.
- If you are interested in adding fish to your dam, make sure you seek expert advice on which species are best suited to local conditions. It's also good to check that the species you select won't have damaging impacts on the surrounding environment.

Mountain galaxias

Native fish in farm dams

- Permits from PIRSA are required to possess, control and release native fish.
- If you are interested in releasing native fish in your dam, it is recommended to contact your local Landscape Board or Nature Glenelg Trust and ask about threatened fish surrogate programs. These programs include threatened native fish species such as purple spotted gudgeon and pygmy perch.
- Ideal surrogate dams are those free of exotic and predatory fish, with aquatic and fringing vegetation (such as sedges and rushes) and good water quality.
- Before releasing native fish in your dam, ensure the type of fish is suitable for your area.
- You will also want to make sure that the dam remains full enough to support native fish throughout various times of year. In the event that the dam does dry up or water levels become critically low, do you have the means to refill the dam from a suitable source?
- It's worth considering the overall health and habitat quality of your dam before releasing any native species there. Consider: does aquatic vegetation grow in the water to provide food and shelter habitat for fish? Do livestock have access to the dam? Is the dam shallow or deep? This will determine the rate of evaporation, as well as fluctuation in water temperature.

Well placed logs and native vegetation can provide valuable wildlife habitat'.

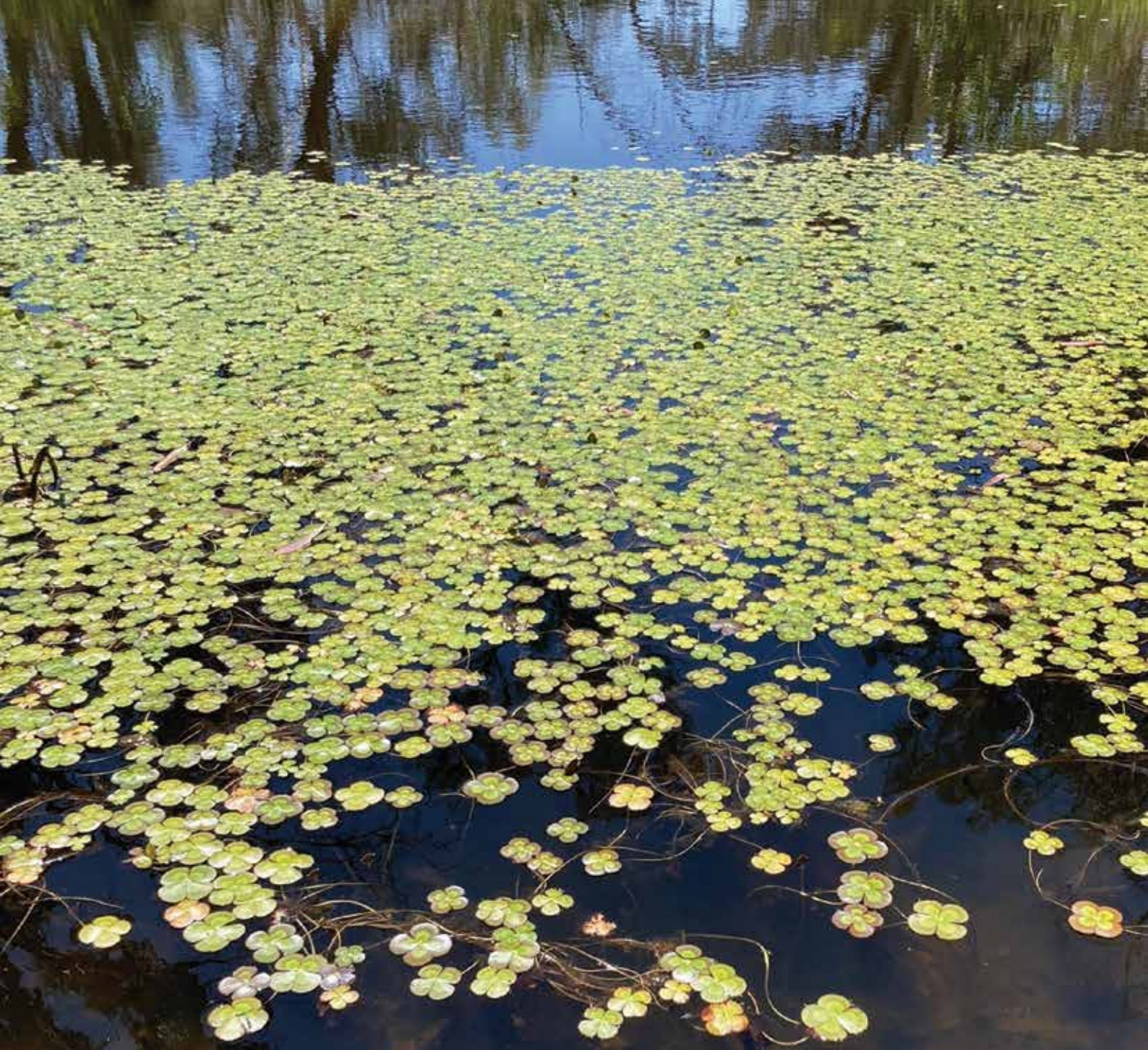
STEP 5

Monitoring and maintaining your dam

It's important to regularly inspect your dam to ensure potential issues are detected early. This also means maintenance can be carried out much more cheaply and easily. Ideally, routine dam inspections should be done throughout the year; but it's particularly crucial in summer when levels are lower, and before and after significant rainfall. The Department for Environment and Water has produced a **dam inspection guide and checklist** to help you know what to look for- check it out on their website.

- Regularly check fences to ensure they are intact and haven't been impacted by falling trees, extreme weather events or any other factors. Make sure livestock and other animals are not able to access fenced areas.
- Weed control is an important consideration for your revegetated area. You will need to do this more regularly for the first few years post planting, until natives have become larger and better established.
- Photo point monitoring is a simple and effective way to track the impacts of your revegetation work. This involves regularly taking photos from the same position to detect vegetation changes over time. Ideally, set up photo points before beginning work on site. Choose camera positions that won't be obscured once your vegetation grows. You can see our **Photopoint monitoring factsheet** for more tips.
- Another way of tracking impacts is through wildlife monitoring. You can do this by setting up a wildlife camera near your dam to find out which native species are using the area as habitat- to find out how, watch our video on **Setting up a wildlife camera**.
- It can also be useful to monitor changes to water quality, through carrying out tests before and after enhancement work has occurred. You will need to decide early on which factors to test for, so you can establish good baseline data. Of interest may be salinity levels, turbidity, presence of algae or contaminants, or concentration of particular nutrients including nitrogen oxide. Levels can be tested by bringing in a sample to your nearest landscape board. Make sure to use a clean glass or plastic container that holds at least 500ml, and rinse the container thoroughly first. For other tests, you will need to send off a sample for lab testing. The Australian Water Quality Centre offers a dam water testing service, or you can research other labs near you.

Weed control is important for at least the first three years after planting native species.



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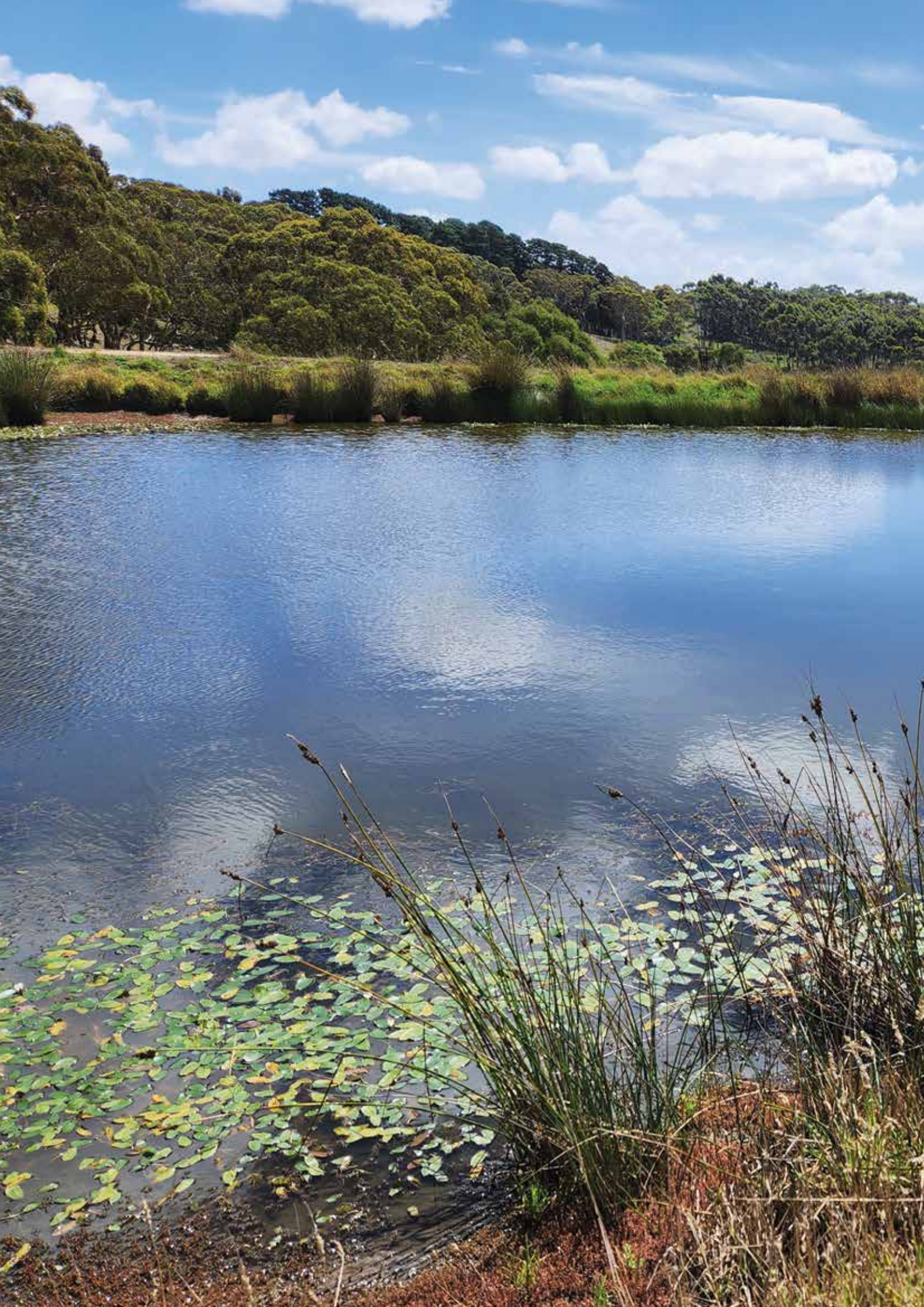

Would you like to learn more?

For a full suite of links and additional information, tools and references aligned to the topics in this guide, please visit the dams page on our Landscape Hills and Fleurieu website at landscape.sa.gov.au/hf

Enhancing your dam is a simple, effective way to boost productivity, protect your water supply, and support the surrounding environment. From fencing to revegetation, each step helps improve water quality, reduce maintenance issues, and create habitat for native wildlife.

These improvements don't have to be costly or complex. With a bit of planning and the right support, small changes can make a big difference to your farm and the local landscape. Healthier dams mean healthier stock, reduced erosion, and stronger long-term water security.

Now's the time to take action. Whether you're just starting out or ready to take the next step, help is available. Explore the resources on our website, speak with your local Landscape Board, and connect with other landholders who are already seeing the benefits.

Your dam can do more—make it work smarter for you and your land.

LANDSCAPE SOUTH AUSTRALIA HILLS AND FLEURIEU

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