

HOW TO INSTALL A DAM SYPHON SYSTEM

What is it?

A syphon system is an ancient method for reticulating water, using gravity to pull water up and over a reservoir or dam wall then down to a lower level in the landscape. It requires no power to operate and is a simple, low pressure and inexpensive way to move water out of a dam of any size or volume.

Having a syphon system significantly enhances the value of your dam as a resource, in that it allows the provision of a stock watering point away from the dam itself. This enables the dam to be fenced off from stock, which will improve water quality and security and improve the biodiversity health of your property.

Benefits to you:

1. **Deliver clean water to a trough**, allowing you to fence off your dam from stock and revegetate the area.
2. **Control dam water levels** during high flow periods. This reduces the risk of spillway erosion and failure of the dam wall.
3. **Provide some water for ecosystems** downstream at strategic times of the year.
4. **Easily drain your dam** for desilting or when water quality is compromised, for example, an outbreak of blue green algae.

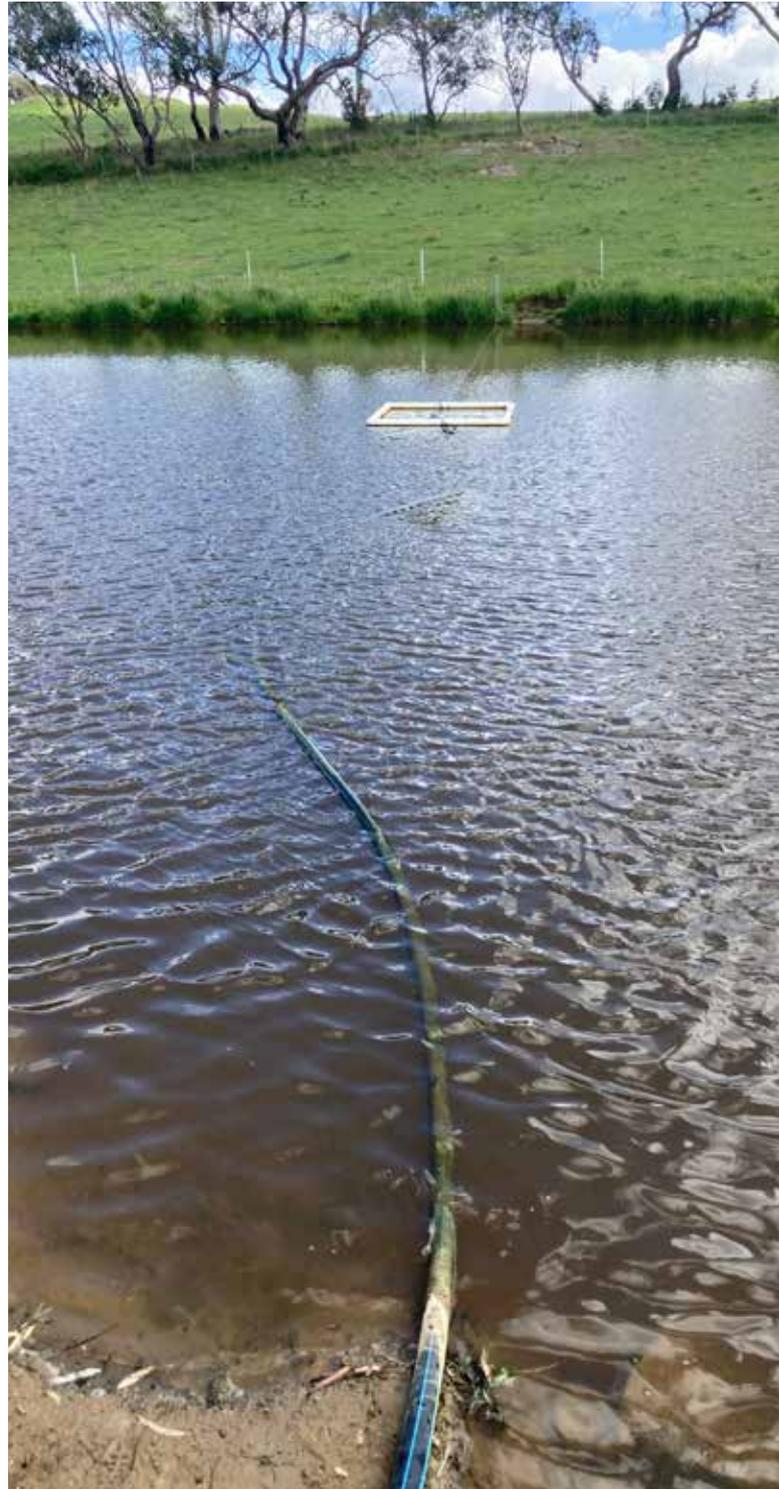
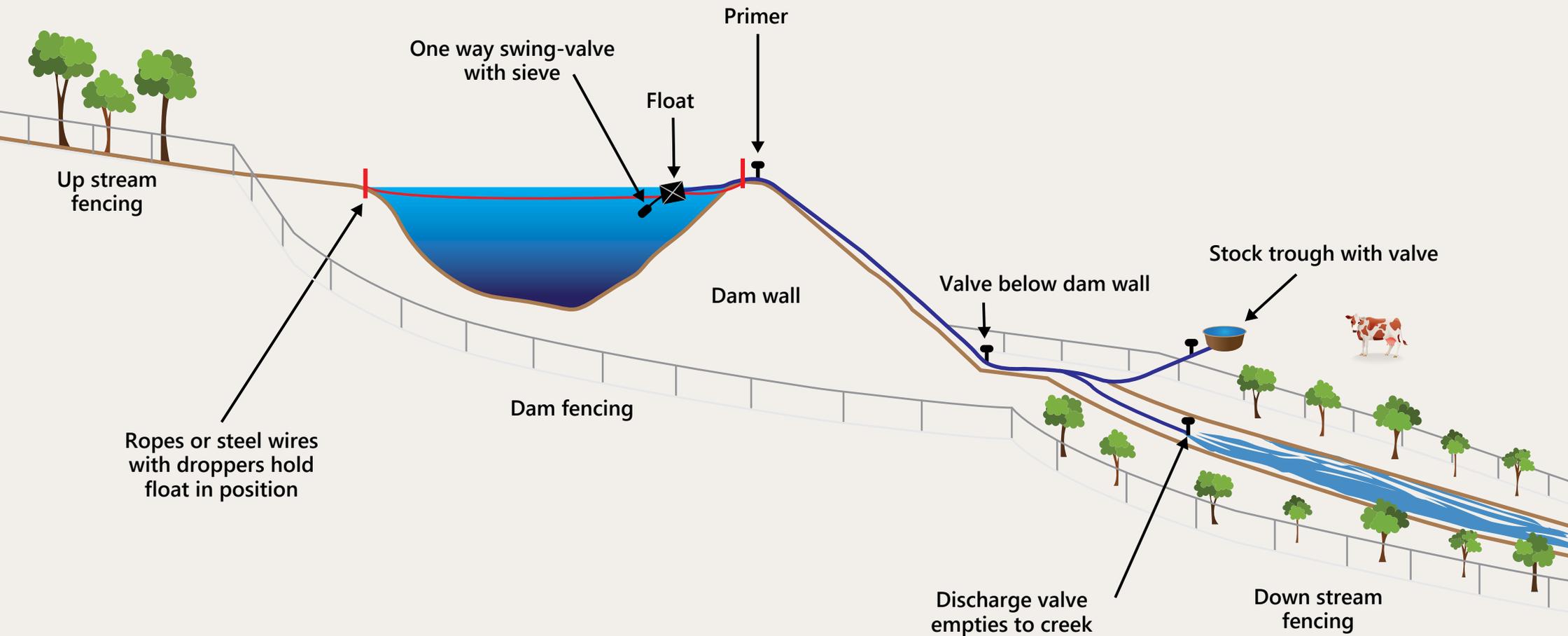


Diagram of dam syphon system



Constructing, installing and priming the system

A dam syphon system is made up of a poly pipe attached to a one way valve suspended in the dam water by a float. The pipe goes up and over the dam wall and has an in-built primer on the top of the dam wall to make it easy to fill the pipes with water to start the syphon process.

Below the dam wall, the pipe can have two outlets, one to deliver water to a stock trough and the other to deliver water to the downstream watercourse. Providing environmental flows to your creek will greatly improve the health of the

watercourse particularly in late autumn and early winter before your dam normally starts overflowing. If you have water reticulation parts on hand, for example, poly pipe, connectors and ball valves, then setting up this syphon system will be relatively inexpensive. If you need to purchase the parts, expect the system to cost roughly \$500, plus the cost of a stock-trough if needed.

All materials can be purchased from a rural store.

When to install: you can install a syphon at any time, but it's preferable to do this when the dam is full. This avoids wading in mud!

1 Poly pipe requirements

For this project you will need lengths of poly pipe which connect all the various components of the system together. The system is under low pressure so green-line rural poly pipe is all that is required but blue-line high pressure pipe can also be used. The diameter of the pipe will depend on the flow rate you require. The larger the pipe, the higher the flow rate.

How to estimate the lengths of poly pipe required:

Inside the dam

Your pipe will need to be the length of the distance between where the float is positioned in the dam and where the primer on top of the dam wall is positioned.

The outside wall of the dam

You will need a length of pipe which can run the distance from the primer on top of the dam wall to the ball/gate valve and T piece located below the dam wall. The best place to locate the ball/gate valve is very close to the dam/watercourse fence below the dam wall so it can be accessed easily from either side of the fence.

Below the dam

- You will need a length of pipe which can run the distance from the above mentioned T piece to the stock-trough.
- You will also need a piece of pipe which runs the distance from this T piece to the discharge point in the watercourse.

Note: As you put the system together, check that all connections are joined correctly and tightly – any air leaks will stop the system from working.

2 Making the float

Materials needed

- 1x four metres of 90mm storm water PVC
- 4x 90mm storm water PVC elbows
- 1x PVC glue
- Hacksaw
- 2x four metres of chain to secure the intake pipe to the float

How to assemble

- a) Cut the 90mm PVC pipe into four equal lengths (1 metre each).
- b) Glue together with the four PVC elbows using the PVC glue to make a one metre square of pipe. See photo below.
- c) Attach the chain to the float so that it can be used to secure the intake poly pipe to the float. This can be done by creating an internal cross with the chain inside the PVC pipe square (see bottom image page 4).

Float construction



3

Connecting the float to the poly intake pipe

Materials needed

- 1x the constructed float, as described in step 2.
- 1x length of poly pipe (as calculated for inside the dam, page 3) to connect the float to the top of the dam wall primer.
- 1x swing-check valve to allow one way flow from the dam. This type of one way valve is much more reliable than a poly one-way valve with a spring as it is less prone to objects such as yabbies getting caught in the valve which will instantly terminate the syphoning process.
- 1x sieve/shroud to attach to the swing-check-valve to prevent yabbies, leaves and other debris entering the swing-check valve and intake pipe.
- Poly pipe connectors to join the intake pipe to the swing-check valve and to the sieve/shroud.

How to connect

- a) Connect the sieve/shroud to the swing-check-valve.
- b) Attach these parts to one end of the poly pipe.
- c) Cut the other end of the pipe to the correct length (where it joins the top of dam wall primer).
- d) Secure the intake pipe (swing-check valve end) to the float with the float chain. Allow enough length of pipe (eg 50cm) to hang down into the water so when the float is in position, air cannot be sucked into the pipe.



Intake pipe parts with check valve and sieve



Intake pipe attached to the float

4

Positioning the float in the dam

One important component of the system is the float which suspends the intake pipe in the top 30cm of the dam water. Finding the best location for the float is important to protect the dam from emptying in the event of a pipe leak. Therefore the best location for the float is as close as possible to the primer on the dam wall (to minimise the length of pipe needed) and positioning it at the lowest dam water level that you are comfortable with. For example, if you don't use/ need much water from the dam and it isn't a major issue if you lost most of the water to a leak, you could position the float closer to the lowest water level of your dam. If the opposite was true then the position of the float would need to be closer to the edge of your dam.

Materials needed

- 2x 1.65m steel star droppers/posts
- 2x lengths of rope or wire (each approximately half the diameter of the dam) to attach the float to the star droppers and secure it in position

How to position the float

- a) Tap in the two steel droppers just above the high water level on opposite sides of the dam. Be sure that there are no underground services close by. At this stage only tap in the droppers so that they can be moved if needed.
- b) Attach the float ropes/wires to opposite sides of the float.
- c) Hold on to both ropes/wires then carefully throw the float into the water (with the intake pipe securely attached).
- d) Attach one of the ropes/wires to one steel dropper.
- e) Holding the other rope/wire, walk around the edge of the dam to the second steel dropper and attach the rope/wire to it.
- f) You may need to adjust the positions of the droppers to ensure that the float is in the correct position.
- g) Knock in the droppers.
- h) Tighten the rope/wire to allow just enough length for changes in water level so that the float stays in the same location in the dam.



5

Installing the primer on the top of the dam wall

Materials needed

- 1x poly T piece
- 1x ball or gate valve
- 1 x poly BSP riser (optional)
- 1.65m star dropper (optional)
- 1x outdoor polyethylene glue eg Loctite®
- 1x robust tent peg
- Poly pipe connectors

How to assemble and position the primer

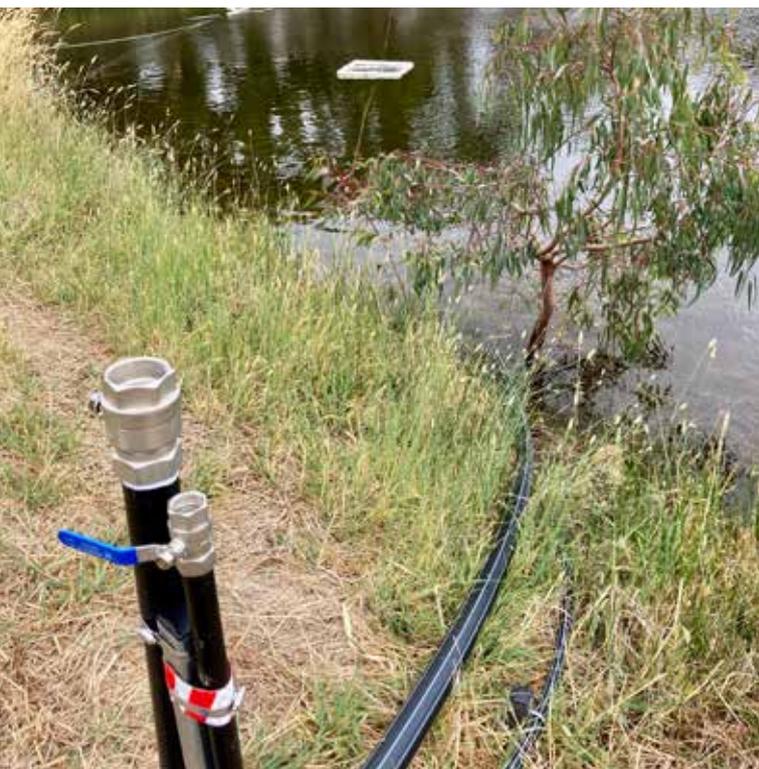
This very simple primer allows easy filling of the pipes on either side of the primer. Opening the primer valve also allows depressurisation of the pipes which allows easier disconnection of the pipes/connectors if needed.

The primer is the most likely place where connections may not seal permanently and over time this might allow air to leak into the system and cause the syphon to fail. To prevent this from happening, permanently attach the primer connections in place by gluing all connections together.

If you prefer standing when filling the primer it is optional to include a 900mm BSP poly riser to connect between the T piece and the ball/gate valve. If you use the riser, it will need to be attached to a knocked in star dropper. Make sure that no underground services are in the vicinity.



Dam wall primer



Primer attached to riser on dam wall

- a)** Identify the location on top of the dam wall where you want the primer to be located.
- b)** Either connect and glue the 900mm long poly BSP riser between the middle outlet of T piece on one end and ball/gate valve at the other end (optional) or just connect and glue the ball/gate valve to the middle outlet of the T piece.
- c)** Connect and glue the end of poly intake pipe to one of the remaining T piece outlets.
- d)** Knock in a robust tent peg over the intake pipe close to the T piece to secure the primer in place on top of the dam wall.
- e)** Ensure that the intake pipe runs straight up the slope on the inside of the dam wall to the primer and there are no bends where air can collect.

6

Connecting the primer to the valve near the base of the dam wall

Materials needed

- 1x length of poly pipe as calculated above.
- 1x ball/gate valve
- 1x poly T piece
- 1x robust tent peg
- Poly pipe connectors

How to connect

- a)** Connect and glue the poly pipe to the remaining outlet on the primer T piece.
- b)** Knock in a second robust tent peg over the pipe close to the T piece to secure the primer in place on top of the dam wall.
- c)** Run the poly pipe down the outside of the dam wall at least to the base of the wall. Again make this length of pipe as short as possible to reduce priming/filling time and ensure that the pipe runs down the outside of the dam wall with no bends where air can collect.
- d)** Preferably run out the pipe to the fence closest to the base of the dam wall so that the valve can be accessed from both sides of the fence.
- e)** Cut the pipe and connect a ball/gate valve to the end of pipe.
- f)** Connect a T piece to the other side of the ball/gate valve.
- g)** This ball/gate valve needs to be closed before priming the system. This minimises the total length of pipe that needs to be filled with water. Once the system is primed, this valve can be opened to allow the syphon to start working.



Ball valve below dam wall

7

Connecting a stock-trough

Materials needed

- 1x length of poly pipe as calculated in section 1
- 1x Ball/gate valve
- 1x stock trough
- Road-base rubble
- Trenching tools
- Poly connectors

How to connect

- Choose an appropriate site to position the stock-trough in the grazing paddock below the dam wall that isn't too far from the dam. Too much pipe friction can terminate the syphon flow. Avoid any low lying ground and avoid positioning close to the creek below the dam. Ideally the creek should also be fenced off from to protect it from livestock.
- Dig a trench at least 15cm deep across the grazing paddock to the stock-trough site to bury the poly pipe so it is not damaged by livestock.
- Connect the poly pipe to one of the outlets on the T piece attached to the ball/gate valve near the base of the dam wall.
- Run out the poly pipe into the trench in the grazing paddock to meet up with the stock-trough site.
- Refill and compact the trench.
- Create a compacted base area for the stock-trough with rubble.
- Position the stock-trough in place.
- Connect a ball/gate valve to the stock-trough intake so that water flow to the stock-trough can be easily turned off and on.
- Connect the poly pipe to this ball/gate valve on the stock-trough.



Stock trough with valve pit

8

How to bypass the spillway and divert water to the creek

Providing environmental flows can improve the health of your creek, particularly in late autumn and early winter. A spillway bypass also enables you to reduce the volume of water in your dam if your spillway is eroded and allows you to reduce pressure on your dam wall in peak flow periods.

Materials needed

- 1x length of poly pipe as calculated in section 1
- 1x ball/gate valve
- Poly connectors

How to assemble

- Choose an appropriate site to discharge dam water into the creek close to the bottom of the dam wall. Too much pipe friction can terminate the syphon flow. A rocky discharge location is best to avoid erosion.
- Connect the poly pipe to the other outlet on the T piece attached to the ball/gate valve near the base of the dam wall.
- Run out the poly pipe to your chosen discharge location in the creek.
- Connect a ball/gate valve to the end of the pipe to control the discharge.
- To calculate how much water to release for environmental flows, measure the flow from the discharge valve over 30 seconds, then multiply this by 2880. This will give you the volume released in 24 hours. Multiply by the number of days you intend to release and this will give you the environmental flow total volume. For example if 10L is released in 30 seconds and you want to release water in May, June and July (90 days), then 2.6 mega litres will be released in total.



Environmental flow into creek

9

Priming the system

- a) Make sure the ball/gate valve near the base of the dam wall is closed.
- b) Disconnect the pipes attached to the T piece on the other side of the ball/gate valve at the base of the dam wall.
- c) Open the primer ball/gate valve at the top of the dam wall.
- d) Pour/pump water into the primer to fill the two poly pipes on either side of the primer. This can be done with a ute fire unit or even using a bucket and funnel. Allow the air that is in the pipes to bubble out of the primer at the same time as filling. Expect that for a 32mm diameter pipe, it will take 6-8 bucket loads of water if the priming pipes are not too long.
- e) Close the primer ball/gate valve at the top of the dam wall.
- f) Open the ball/gate valve at the base of the dam wall. This should start the syphoning process and drag water through the swing check valve and into the intake pipe then over the dam wall. You should see a good stream of water flow out of the disconnected pipe at the base of the dam wall.
- g) If the water flow diminishes and then stops, there is either an air pocket somewhere in the pipes or air is entering the system from a connector that hasn't been joined securely. Check that the pipes run straight up and down the dam wall with very little bend, the dam intake pipe is positioned at least 15cm below the water surface and that the primer connections are tight.
- h) Repeat steps a) - f).
- i) Once there is a good flow of water being syphoned over the dam wall, close the ball/gate valve at the base of the dam wall to stop the flow.
- j) Reconnect the two pipes to the T piece attached to the ball/gate valve at the base of the dam wall.
- k) Open the valves at the stock-trough and the creek discharge site to test the flow.
- l) **Please be aware that troughs serviced by syphoned dam water should be checked daily when first installed, especially if the head pressure (difference in height between the trough and dam surface water level) is less than 10 metres.**



Filling primer



Filling primer on a riser

Enjoy the convenience of being able to regulate your dam water levels, provide clean water to stock and share some water with the environment!

If you're unsure where to start or would like to discuss setting up a system, our staff at Landscapes Hills and Fleurieu are happy to help with advice and troubleshooting. Please phone our office on 8391 7500.



LANDSCAPE
SOUTH AUSTRALIA
HILLS AND FLEURIEU

landscape.sa.gov.au/hf