Gravity low flow devices

Flows for the Future program

Gravity low flow devices offer a simple solution to restoring more natural flow patterns in waterways. Dams block flow in waterways, only releasing water when they are full and spilling. Gravity low flow devices support catchment health by directing a portion of flow into the downstream watercourse with minimal impact on landholder water security.

How a Gravity low flow device works

A gravity low flow device is a passive structure that directs critical low flows around a dam. The device consists of an inlet sump, an underground pipe and gravity to pass water.

An orifice size based on the dam's upstream catchment area regulates the amount of water passed around it.

The inlet sump is installed upstream of the dam in the natural watercourse. As inflow passes over the sump, a small portion of flow (called 'low flow') is directed around the dam and into the natural watercourse downstream.

Medium and high flows pass over the inlet sump and into the dam as normal (see diagram over page). For most dams, installing a device does little to change annual water storage volume.

Gravity low flow devices have operated successfully in South Australia for over 20 years. More than 420 sites now pass low flows across the Eastern Mount Lofty Ranges.

By restoring a portion of natural flow with a device, landholders play a crucial role in maintaining water quality, improving ecosystem health, and safeguarding sustainability across catchments and communities.

Gravity low flow devices

- **No cost to landholder**
- **Easy to maintain**
- **Delivers a small portion of the flow back to the waterway**
- **Dam fills normally in medium to high rainfall events**
- **More than 420 sites in the Eastern Mount Lofty Ranges passing low flows**

Components of a gravity low flow device

Image above. The inlet of a gravity low flow device.

Image above. Capturing inflows via a grate and sump, a small portion (low flows) passes through the orifice into a pipe.

Image above. Water travels around the dam via a trenched pipe to an outlet point.

Image above. Outlet point where low flows are released into their natural flow path.

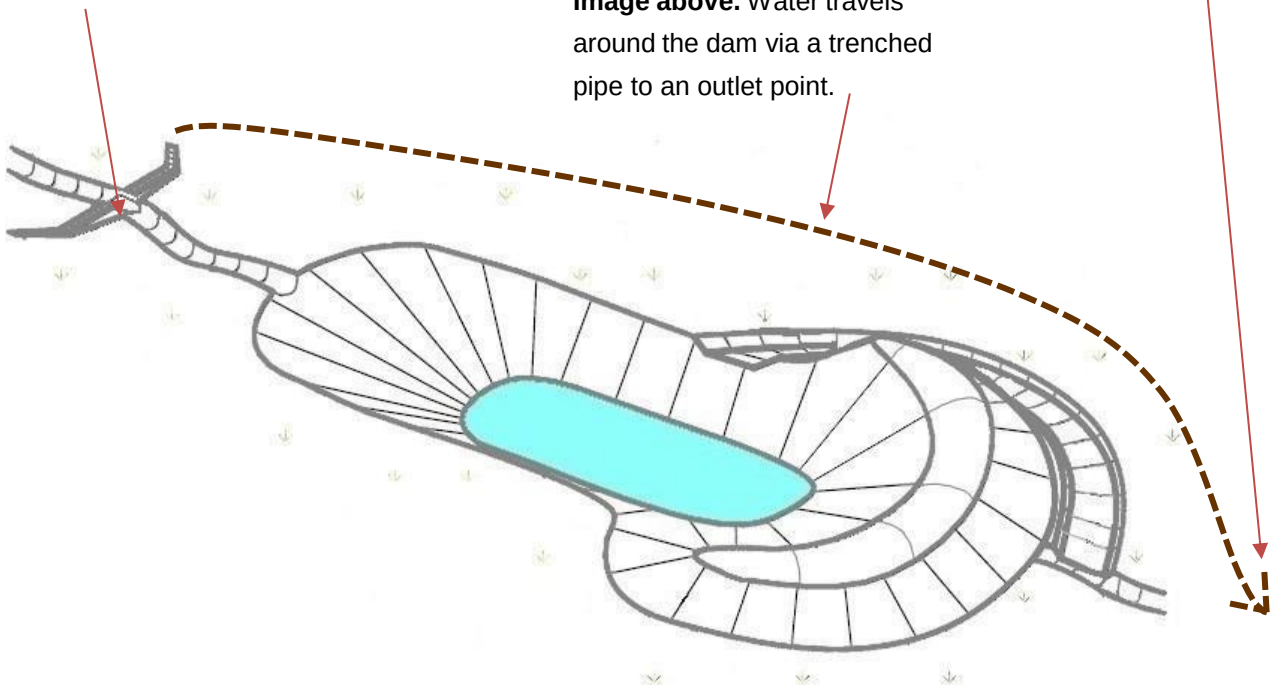

Figure above. a typical gravity low flow bypass system.

Device construction

All Flows for the Future devices are designed by qualified engineers, and constructed by experienced contractors. Gravity low flow devices are intended to be simple, reliable, and durable. The inlet sumps are concreted into the landscape, and pipework is laid below ground. Devices include scour protection to withstand high volumes of flow.
Considerations during construction include:

- Preservation of native vegetation.
- Minimising erosion and sedimentation.
- Fencing options to isolate the device from livestock if desired.

Every device is customised to meet unique site characteristics and landholder needs.

Calculating the low flow portion

How do we ensure water security for landholders while providing the environment with the minimum that it needs? We use 'Threshold Flow Rates' (or 'TFRs') for each point in the catchment. The TFR determines the orifice size for the device to return the required low flow portion to the catchment downstream.

Because flow patterns vary between catchments, TFRs are determined by measuring real ecosystem and flow data at different sites in the Mount Lofty Ranges. This data is then associated with particular zone characteristics like rainfall, soil infiltration rate and extent of forestry, forming the basis for our TFR calculations.

The TFR for an individual dam is based on the upstream catchment area. While bigger dams are often a more significant barrier to flows, their size per se doesn't determine how much flow needs to be passed.
The intention of passing low flows is that some flow passes (or partly passes) at critical times in the season but larger volumes flow into the dam at wetter times when the flow rate exceeds the TFR.

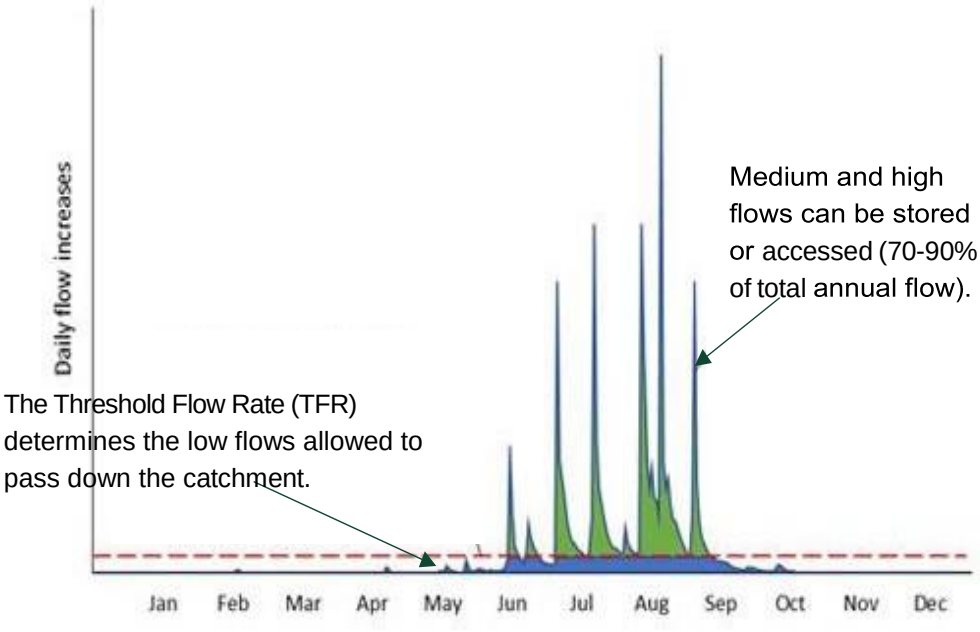

Figure above. Medium and high flows pass over the device and into the dam while flows up to the Threshold Flow Rate (regulated by the orifice size) are carried via a pipe to the downstream catchment.

Image gallery. Gravity low flow devices in the Eastern Mount Lofty Ranges

Image above. Gravity device inlet with a low profile sits in the dam inlet.

Image above. A grated gravity inlet device with sump and orifice set into the pipe system.

Image above. Medium and high flow events pass over the device and into the dam.

Image above. Outlet point for low flows with rock protection to prevent scouring and erosion. **Image left.** Device fencing option.

For more information

Phone 8391 2109

Email F4f@sa.gov.au