Gravity Low-Flow Device
Maintenance Guide

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Overview of Gravity Low-Flow Devices

Gravity low-flow devices are structures that enable small flows to pass around dams to support catchment health. They consist of an inlet structure, a bypass pipe, and an outlet.

The device inlet intercepts water flowing into the dam and funnels a small proportion (low-flows) around the dam, returning them to the natural watercourse downstream of the dam. The amount of flow passed around the dam is controlled by an orifice at the inlet. The size of the orifice is based on the dam's total upstream catchment area and its flow and rainfall characteristics. The device only diverts low-flows around the dam; medium and high flows pass over the device and into the dam as normal.

Flows for the Future devices are designed by qualified engineers and constructed by experienced civil contractors. They are intended to be simple, reliable, durable and low maintenance. In general, this entails inspecting the device and performing minor maintenance (where necessary) three times per year.

A gravity low-flow device.

Gravity Low-Flow Device Components

The photos below show a typical installation, however, each device is customised to fit the landscape and your device may differ slightly in appearance.

Inlet channel:

The inlet channel (and pit) collects low-flows and directs them into the bypass pipe. The channel has a grated cover that is easily removable.

Wing walls:

Most devices have wing walls on each side to help direct low-flows into the inlet.

Scour protection:

The area immediately downstream of the channel is lined with loose rock. This helps to dissipate the energy of water as it passes over the inlet and prevents erosion.

Inlet pit:

The inlet pit forms the junction between the channel and the bypass pipe. The depth of the pit allows sediment to settle out before entering the pipe, so that it can be removed. The pit is fitted with a removable grate. Caution should be used when lifting the pit grate as snakes and other animals may be present.

Trash screen:

Inside the pit is a trash screen which traps debris to prevent it from blocking the orifice and entering the bypass pipe. The screen is also designed to enable small animals (such as frogs and lizards) to climb out.

Inlet orifice:

The inlet pit also houses the calibrated orifice (round hole) through which low-flows are directed into the bypass pipe. The orifice cap can be removed to allow access to the bypass pipe.

Bypass pipe:

The bypass pipe carries water from the inlet around the dam to the outlet. The pipe is set at a continuous grade and operates via gravity. It is designed to be self-cleaning and blockages are rare. The pipe may have inspection points (marked with a post) from which the pipe can be accessed for flushing.

Device outlet:

Low-flows collected at the inlet are delivered back to the waterway at the device outlet. The outlet is generally marked with a wooden post and consists of a small basin with rock protection to prevent scouring.

Outlet flap:

The end of the bypass pipe is fitted with a hinged flap. The flap is designed to open and close in response to flow. This flap helps to prevent vegetation and animals from entering the pipe.

Maintenance Guide

Gravity low-flow devices are designed to be self-cleaning, and to operate passively. However, we recommend that you check your device regularly to ensure it is functioning correctly and to undertake maintenance as required.

The frequency at which your device will require maintenance will depend on the surrounding conditions. As a general guide we recommend that you inspect your device at least three times per year, for example:

- **In April - before the flow season.**
- **In July - midway through the flow season.**
- **In October - at the end of the flow season.**

Additionally, it is a good idea to check your device after very large flow events. Checking the device regularly will reduce the chance of blockages and help ensure that low-flows are passing downstream and contributing to catchment health.

A fenced gravity low-flow device - photo taken looking downstream towards the dam.

Maintenance Checklist

When inspecting your device there are three key aspects to check:

1. Check that flows can freely ENTER the device.
2. Check that flows can freely EXIT the device.
3. Check the general integrity of the structure.

A gravity low-flow device - photo taken looking upstream.

Suggested Equipment

Safety measures should be implemented when undertaking inspection and maintenance of gravity low-flow devices. Note that snakes, spiders and other hazards may be present and due caution should be taken.

Personal protective equipment (PPE) should be worn at all times while undertaking inspection and maintenance. The type of PPE required will depend on your specific site conditions. A list of general equipment that may be required includes:

- Long sleeve clothing and thick pants
- Protective boots
- Protective gloves
- Eye protection
- Sun protection
- Trowel
- Shovel
- Weed control equipment
- Small crow bar
- Hand held brush

1. Ensure that flow can freely ENTER the device:

- Clear excess sediment that may have accumulated upstream of the inlet to prevent it from entering the device or altering the flow path into the device.
- Manage excess vegetation immediately upstream of the inlet (through slashing or weed control) to ensure that low-flows are not diverted around the device.

- Open the channel and pit grates using a lever such as a small crow bar.
- Clear debris from the grates using a small brush, and deposit the debris on the banks away from the inlet.

- Remove the trash screen from the pit and brush off any accumulated debris onto the bank.
- Check the orifice to ensure that it is clear of debris so that water can pass through it freely.

- Remove sediment and debris from the pit and channel using a trowel (deposit it away from the device so that it isn't carried back into the pit).

- Ensure that the trash screen and grates are replaced securely after cleaning.

Sediment management

The devices are designed to be able to pass a moderate amount of sediment. However, excess sediment input can overwhelm this ability and lead to blockages or the need for additional maintenance. Maintaining ground cover upstream of the device and fencing the device from stock will help to limit the amount of sediment entering the device.

2. Ensure that flow can freely EXIT the device:

- Check that the hinged flap at the outlet can open and close freely in response to flow, and that no rocks are obstructing it.

- Water should flow freely from the outlet - indications that the pipe may be blocked include a lack of flow from the outlet during flow events, and water pooling in the inlet pit.
- If you suspect the pipe is blocked there are two methods to clear it:

OPTION 1:

The orifice cap can be temporarily removed to allow more flow to pass through the bypass pipe. This will likely be sufficient to clear the blockage.

OPTION 2: The bypass pipe can be flushed with a pressurised hose (such as used in standard fire-fighting equipment). Flushing can be done from the device inlet or inspection points (where fitted), depending on the suspected location of the blockage.

- To flush the device from the inlet, remove the orifice cap and insert the hose into the bypass pipe.

- To flush the device from the inspection point, remove the cover and open the cap, then insert the hose into the bypass pipe.

- Ensure that the cap and cover are replaced securely after flushing.

3. Check the integrity of the structure:

- All components of the device should be present and functional.
- There should be no cracks or holes in the wing walls, channel, or pit.
- There should be no signs of undercutting along the wing walls or the front of the inlet.
- Low-flows should not be able to outflank the device.
- There should be no evidence of erosion at the inlet or outlet.

If any issues are identified they should be addressed as soon as possible to prevent further damage and to ensure that the device is able to pass low-flows downstream.

Thank you for your ongoing commitment to improving catchment health by passing low-flows around your dam.

If you have any questions relating to the Flows for the Future Program or the operations and maintenance of your device please contact us.

Contact us:

Department for Environment and Water

Flows for the Future

Email: F4F@sa.gov.au

Phone: (08) 8391 2109

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