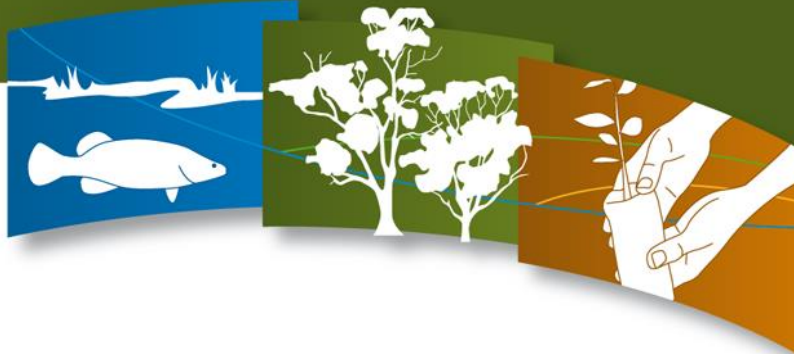


Works on Waterway Guidelines

Drop Structures



Connecting Rivers, Landscapes, People

Introduction

Drop structures or grade control structures are required to stabilise stream beds to:

- Protect public infrastructure, such as roads.
- Minimise / prevent the loss of private land.
- Minimise erosion and subsequent transfer of sediments.

There has been extensive and successful work in the past to stabilise gully erosion with concrete structures, and more recently rock chute structures. Rock chute type structures are now preferred as they are flexible and readily adjust to the stream profile and environment.

The types of structures include:

- Rock chutes
- Concrete drop or chute structures

Potential Waterway Impacts

The potential waterway impacts include:

- Interruption to sediment flow.
- Erosion downstream of the structure.
- Restriction to the passage of fish and other aquatic organisms past the structure.
- Creates a break in the riparian corridor.
- Long term stability of structure and waterway.

Assessment Criteria

Rock Chutes

Rock chutes may be installed to control headward erosion in streams. They are normally designed in accordance with the Catchment and Creek gully erosion guidelines (<https://www.catchmentsandcreeks.com.au/docs/Gully3-1.pdf>).

Acceptable works are shown below in Table 1.

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Drop Structures

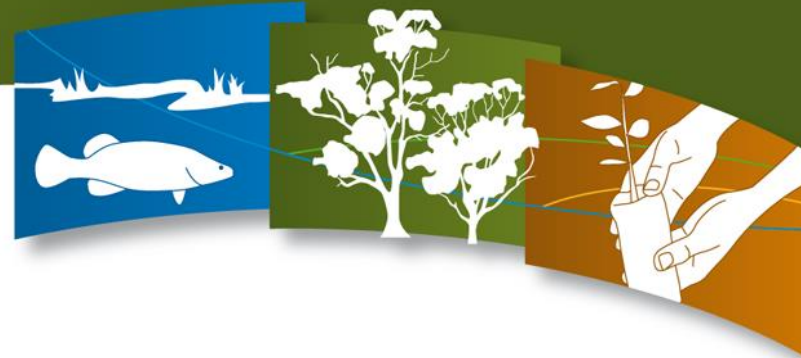


Table 1: Acceptable Works for Rock Chutes

Criteria	Waterway Category	Acceptable Works
Height		1 metre preferred limit
Downstream slope	Class 1, 2 and 3	1:18 maximum
	Class 4	1:5 maximum
Downstream apron elevation		At or below downstream bed level
Downstream apron length		3 metres minimum
Rock size D ₅₀		300 to 500 mm
Rock thickness 2* D ₅₀		600 to 1000 mm, keyed min. 600 mm into foundation
Rock Cutoff		1 metre deep under and up each side
Bank protection		Extend at least 33% of bank height, or at least 1 metre above crest.

Stream Classification

Provision for fish passage can be achieved by using flat batter slopes and dishing the crest and apron with a 300 mm dip in the centre. Incorporating large rocks staggered along the length of the chute is also useful. Alternatively, a separate fishway channel could be incorporated into one side of the structure. It should be noted that the design of these works are continuing to be developed and some flexibility and innovation should be allowed. The classification of streams are outline in Table 2.

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Drop Structures

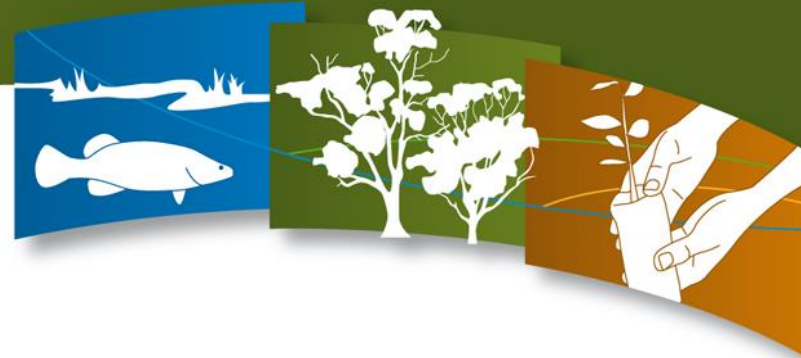


Table 2: Stream Classification based on stream characteristics

Classification	Stream Characteristics
Class 1 - Major fish habitat	Large named permanently flowing stream. Aquatic vegetation present. Known fish habitat.
Class 2 - Moderate fish habitat	Smaller named permanently or intermittent flowing stream. Aquatic vegetation present. Known fish habitat.
Class 3 - Minimal fish habitat	Named or unnamed watercourse with intermittent flow.
Class 4 - Unlikely fish habitat	Named or unnamed stream with flow during rain events only.

Geotextiles

Geotextiles or filter cloth are often used as a filter layer under rock beaching. Care is required in its application as in some cases it can de-stabilise the works due to uplift pressures if water flows under the fabric. Filter cloth can also impede the establishment of vegetation.

Concrete Drop Structures

Reinforced concrete type structures are to be designed by a suitably qualified and experienced consultant to meet current Australian Standards. The design of the structure should be based on Hydrologic and Hydraulic design guidelines from Melbourne Water (<https://www.melbournewater.com.au/planning-and-building/developer-guides-and-resources/standards-and-specifications/hydrologic-and>).

The structure needs to operate successfully for the range of flows that can be expected at the site from base flow to the 1% AEP flood flows. Note, that this does not mean the structure is sized for the 1% AEP flood events.

The works shall include suitable bed and batter protection.

The applicant is to provide hydraulic design details.

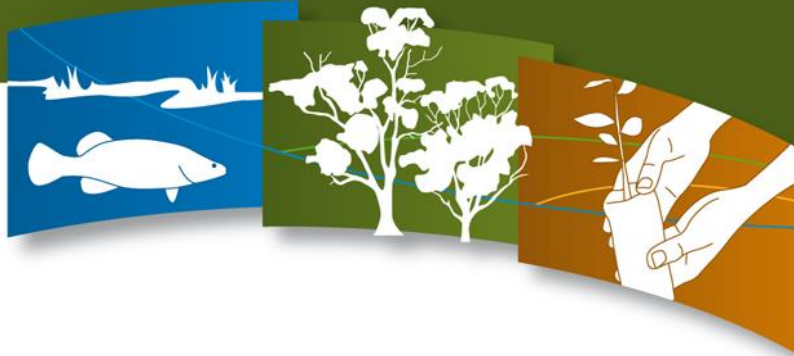
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Works on Waterway Guidelines

Drop Structures



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The structure shall include provision for fish passage for stream categories 1, 2 and 3. The fishway could be a concrete vertical slot type or a rock chute depending on the drop height, stream flows and site characteristics. The applicant should submit the fishway design details with the application.

The structure shall include adequate concrete cut-offs under and on each side to minimise the risk of seepage flow paths undermining the structure.

Public Safety

Drop structures can pose a risk to the public. Where necessary, fencing should be adequate to restrict public access and control stock access.