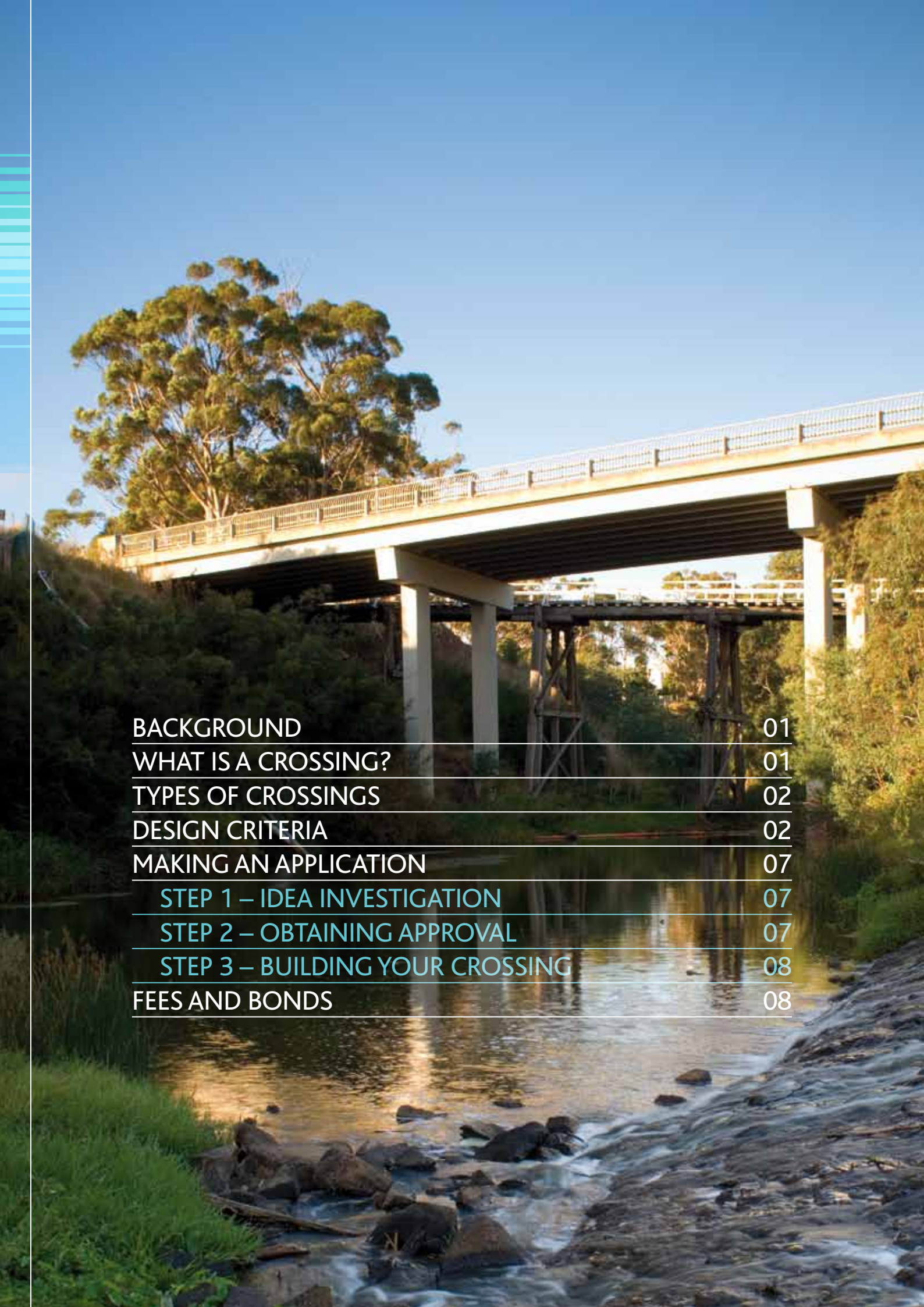


A photograph of a stone archway, likely a bridge or culvert, looking out onto a wooded area. The arch is made of dark grey stone blocks. The view through the arch shows a stream flowing through a grassy area with trees in the background. The trees have green and yellow leaves, suggesting autumn. The sky is bright and clear.

CONSTRUCTING WATERWAY CROSSINGS

A guide on building road (Bridge/Culvert) crossings
across Melbourne Water's waterways and drains



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BACKGROUND

Melbourne Water manages a network of 1,400 kilometres of stormwater drains and over 350 retarding basins and wetlands, as well as the 8,400 kilometres of rivers and creeks that ultimately receive the stormwater and take it out to Port Phillip and Western Port.

As the caretaker of river health in the Port Phillip and Westernport region we manage:

- › rivers and creeks
- › floodplains – the land surrounding rivers and creeks that can sometimes experience flooding
- › the regional drainage system – drains and channels that carry rainwater to rivers and creeks.

WE AIM TO:

- › make sure our rivers, creeks and wetlands are popular places to visit
- › have healthy rivers and creeks with more native animals and plants
- › provide a safe level of flood protection for communities
- › work with communities to protect our rivers and creeks
- › protect water quality and meet state environment protection targets
- › make sure urban development does not harm our rivers and creeks
- › base long-term decisions on research and monitoring
- › achieve a balance between social, economic and environmental outcomes.

To help us achieve this aim, Melbourne Water approval is required prior to construction of any road crossing (bridge/culvert) works occurring on waterways/channels.

This brochure is a general guide to help if you are considering constructing a new crossing, or making changes to an existing crossing over a waterway, eg. a creek, river, stream, or channel.

WHAT IS A CROSSING?

A crossing is any bridge or culvert passing over a creek, river, stream or formed channel. Approval from Melbourne Water must be obtained prior to any commencement of any works on the waterway.

You should also check with your local council to find out if you are required to get a planning permit before construction.

There are also multiple types of crossings that Melbourne Water approves, depending on what purpose they will be used for and the waterway/drain characteristics. The guiding principles in determining a crossing type consist of:

- › Environmental impacts
- › No increase in flood levels to surrounding properties
- › Maintenance access
- › Safety and risk criteria

Melbourne Water
approval is required
prior to construction of
any road crossing

TYPES OF CROSSINGS

Single span crossing (Diagram A+B)

These crossings are the largest and cater for cars and other motor vehicles. Generally we will consider a single span bridge as long as the support structures – abutments – are beyond the top of the waterways banks.

Culvert Crossing (Diagram C+D)

These crossings consist of box or circular culvert(s) within the waterway secured with concrete and rockwork. These can be used for all types of traffic, from cattle and tractors to road vehicles. Culvert designs may be considered appropriate, but it is largely dependant on the waterway characteristics. For example, if riparian vegetation will be disturbed then a culvert is not appropriate.

Pedestrian Crossing

These crossings cater for pedestrians and cyclists and are smaller than road crossings. Like a road crossing, the main type of pedestrian crossing considered is a single spanning structure with abutments¹ outside the banks of the waterway. (See *shared path guidelines for design criteria*).

High Flow Channels

(with an associated underground pipe)

Only a single span type bridge will be considered. For residential/commercial/public purposes, crossings will need to meet the 1 in 100 year flood level design or other safety criteria.

DESIGN CRITERIA

for various types of vehicular crossing for residential/commercial/industrial purposes:

1. Spanned Bridge crossings

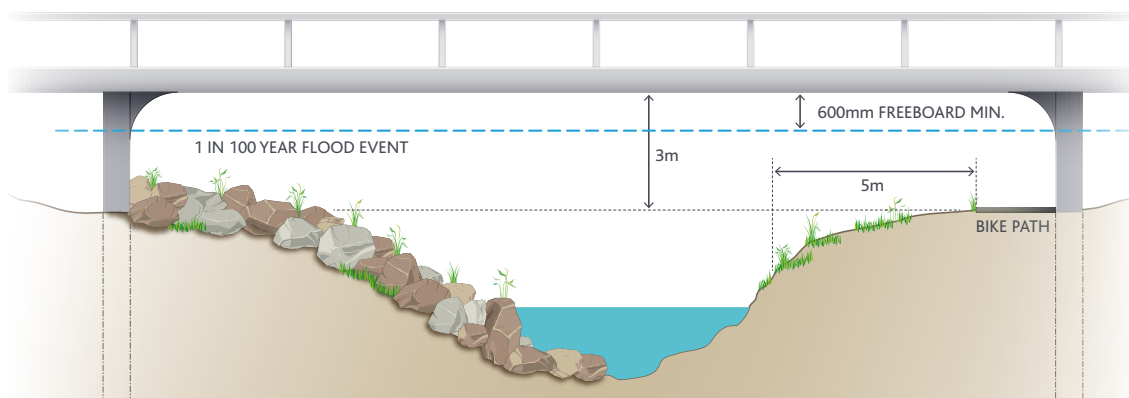
A spanned bridge crossing must be above the 1 in 100 ARI and allow at least 600mm freeboard² to the underside of the bridge beam, unless otherwise agreed too.

For some minor waterways, a height below the flood level, subject to meeting the safety criteria, may be considered. This could also be dependant on providing signage, depth markers and alternate access.

Bridge abutments – the point where the bridge joins with the land – must be setback at least 5m from the top of bank, unless otherwise agreed. The amount of setback required depends on the waterway profile and the size of the waterway. The 5m setback is required because of possible erosion of the waterway banks over time.

For maintenance purposes, the underside of major bridges must be set with a minimum vertical clearance height of 3m unless otherwise agreed to.

As a minimum as well as satisfying the 1 in 100 year level or $V \times D$, the structure (being the underside) must not be set below the top of bank and with 1 metre height clearance from top of the bank for minor bridges.

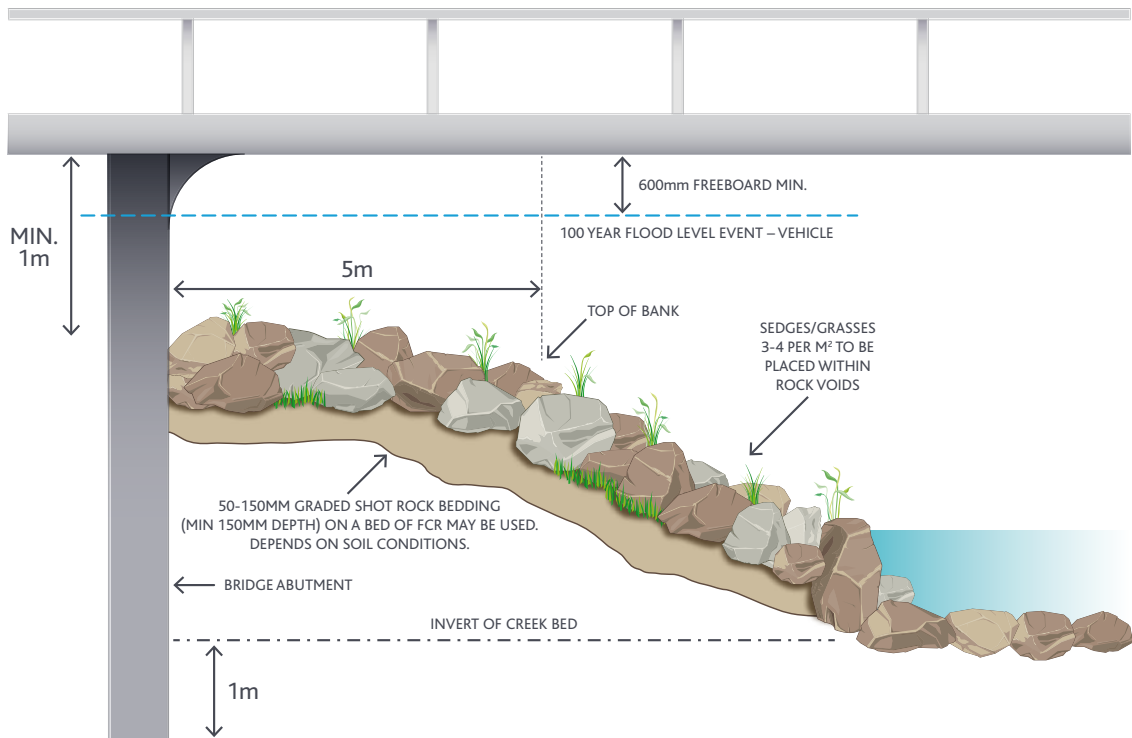


A

General overview of a single span bridge showing the heights, bridge supports and rock work. This diagram is a guide only.



An example of a large single span bridge where the bridge supports are outside of the waterway.



B

A close up view of Diagram A showing more detail with dimensions and rock work.

- 1 An abutment supports the ends of a bridge superstructure. Any intermediate supports are known as piers.
- 2 Freeboard – the amount of watertight surface between a given level of a waterway and the lowest possible entry point during flooding or large waves.

DESIGN CRITERIA (cont.)

2. Culvert crossings (Circular & Box)

The pipe sizing must meet the 1 in 10 ARI² or capacity of creek:

It must also satisfy the safety criteria for flows over the culvert. The safety criteria are:

- > Depth: $D \leq 0.35\text{m}$
- > Velocity: $V \leq 1.5\text{m/s}$
- > $D \times V \leq 0.35\text{m}^2/\text{s}$

As a 'rule of thumb' the minimum for a circular pipe size is 1200mm diameter for maintenance purposes. For acceptance of smaller pipe sizes, additional information will be required for Melbourne Water to assess. This will include creek characteristics, creek capacity and maintenance accessibility.

Also, a culvert must not increase the 1 in 100 year ARI flood levels to any other property, and the flood level must remain at least 600mm below any existing floor level on the subjects property.

Please note: culverts will not be considered where a high-flow channel exists above an existing Melbourne Water underground pipe.

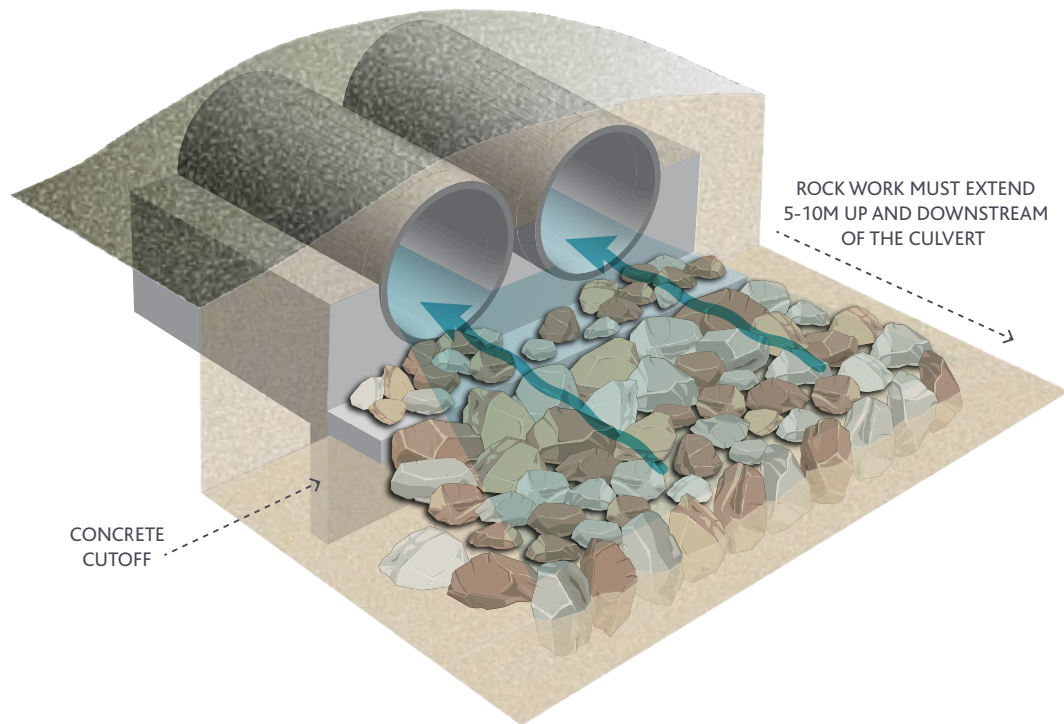
3. Existing Crossings

In the event that any existing crossing is to be used for residential/industrial/commercial function, it will be necessary to upgrade the crossing as per the criteria above.

Any existing bridges or culverts that are to be reconstructed must meet Melbourne Water's current criteria for the specific purpose.

A box culvert crossing that is suitable for residential purposes, like a driveway.





C

Circular pipe culvert, showing rock work and the cutoff. This is a guide only.



D

Culvert crossing, showing the fish passage, rock work and it illustrates the alternative style of embankments – rock or grass. This is a guide only.

³ ARI (Average Recurrence Interval) – is a statistical measurement indicating the average recurrence interval over an extended period of time, and is usually required for risk analysis and also to dimension structures so that they are capable of withstanding an event of a certain return period. It is usually referred to as the 1 in 10 or 100 flood level.

DESIGN CRITERIA (cont.)

3. Stock or maintenances purposes

Crossings (culvert or free span) might be considered at a lower level (providing there are no increases in flood levels to surrounding properties). Please note, the structure will not be considered for any other purposes other than stock or maintenance access.

As a minimum, the underside of the deck structure must not be set below the top of bank and have a height clearance of 1m from top of the bank.

5. Other general Design Criteria

Rockwork – should extend up to 10m upstream and downstream to minimise erosion. For culverts this may extend to 10m and greater. Rockwork should include large perimeter/toe rocks with various sized infill rocks.

Concrete cutoffs – need to be provided on culvert crossings at the upstream end with a minimum depth of 1m. This cutoff extends down into the bed of the waterway and helps to make sure that water doesn't erode the foundations of your crossing.

Landscaping/Revegetation - appropriate planting and re-grassing shall be provided for stabilisation, filtration and beautification of the disturbed areas.

Fish Passage – culvert crossings should make allowance of fish migration through a barrier. See the "Fish Passage through Culverts" in section 3.3.19 of DSE's Technical Guidelines for Waterway Management and page 22 of Melbourne Water's Constructed Waterways in Urban Development Guidelines.

Future development and infrastructure, such as shared paths, gas mains etc, must allow for a 5m setback from the top of the bank and 3m overhead clearance between the existing ground level and the underside of the proposed crossing. (See diagram B) Taking future projects into account at the time of design can help to avoid potential costly alterations later on. Please discuss with your local council or utility company (sewer, water supply, gas etc) for any future proposed works that may affect your design.

This is a stock crossing showing the appropriate rock work. It is only suitable for maintenance and stock uses as it does not meet the safety criteria other uses.



MAKING AN APPLICATION

When making an application to Melbourne Water for approval for a crossing over a waterway, we suggest following the steps outlined over the coming pages.

It is highly recommended that you first contact your local council and any other authorities that maybe affected by your proposal as Planning Permits or other legislative requirements may be necessary.

STEP 1 – idea investigation

It can save you time and money to write to Melbourne Water outlining your proposal. Before you talk to an engineer to draw up detailed plans, we suggest sending us a set of conceptual plans that show the location and what you have in mind. We can generally give you feedback and advice about whether your idea is possible, and make some recommendations that can help the process once you do get to the engineer.

What are conceptual plans? – These are your ideas sketched and supported with some additional information:

- › Measurements of the cross section/creek profile
- › Location of underside of bridge to Australian Height Datum (AHD) (must satisfy ARI levels) – where applicable
- › Exact location of works (include melways reference if known)
- › Location of abutments/piers in regard to top of bank
- › Photo's of the proposed site
- › Extent of Rock Work to be used (see photo)
- › Conceptual design – eg a rough sketch of what you wish to build
- › Any existing crossings etc
- › Preliminary environmental (flora & fauna) assessment

STEP 2 – Obtaining Approval

To obtain approval, the following Melbourne Water standard guidelines must be met.

These guidelines are for the purposes of residential/ industrial/commercial/public vehicular crossing of waterways. For any other types not covered in these guidelines, please contact Melbourne Water to discuss.

The preferred type of crossing considered is a single span structure with abutments outside the banks of the watercourse. Culvert designs may be considered appropriate, but it is largely dependant on the waterway characteristics.

Please note, it is your responsibility to check with the local Registered Aboriginal Party or AAV for any Heritage or Aboriginal Artefacts.

At the design stage you will need to submit plans from a qualified engineer that should include:

- › Detailed design plans
- › Location of bridge abutments in relation to top of bank
- › Height of bridge to Australian Height Datum (AHD)
- › Survey plans indicating bank cross section/profiles
- › Hydraulic assessment
- › Environmental assessment
- › Any other requirements as advised from step 1.

Please note that additional requirements may be applicable, as this is a guide. Upon satisfaction of the application and supplied information, a formal approval with applicable conditions will be provided.

STEP 3 – Building your crossing

Upon receipt of formal approval of the Design Drawings, a letter of conditional approval will be provided by Melbourne Water. However, prior to the commencement of construction, there are a number of additional items are required:

- › Completed acceptance form and relevant fees/bonds
- › Agreement to be completed and signed:
 - A legally binding agreement must be entered into between Melbourne Water and the owner for liability and maintenance purposes. The agreement indemnifies Melbourne Water from any claims of injury, damage or public liability arising from the construction and ongoing maintenance of the crossing.
- › A permit to work must have been issued to carry out works on/within Melbourne Water assets.
 - A Permit to Work can only be issued subject to the contractor performing Melbourne Water’s recipient training. Please contact Melbourne Water’s Asset Services Team on 9235 1414 (with the details of the contractor) to arrange training, providing at least 21 days notice.
- › Submission of SEMP

Prior to starting any construction, a Site Environmental Management Plan (SEMP) must be submitted to Melbourne Water. The SEMP must address the following:

- Sediment and silt management controls
- Vegetation management techniques
- Method of construction/works.

An example of an SEMP can be found in Melbourne Water’s Land Development Manual at the following link:

http://ldm.melbournewater.com.au/content/site_management_plan/site_management_plan.asp

Prior to commencement of construction, a Work Method Statement and a Task Risk Assessment must be submitted outlining the general construction technique to be adopted. The statement must address the following:

- Process for machinery to access the creek
 - Diversion of flows for low and high flows
 - Evacuation procedure during times of high flows
- › Safety & Risk Assessment.

Fees and Security Bonds

All applications will attract an application/ inspection fee, security bond, valuations and any legal fees, etc. Fees and bond amounts are subject to change. Please see Melbourne Water’s website for current fees and bonds.

http://www.melbournewater.com.au/content/planning_and_building/construction_near_melbourne_water_assets/fees.asp



CONTACTING MELBOURNE WATER

If you require further information, please contact Melbourne Water's Asset Services for further assistance.

Asset Services Enquiries

9235 1414

assetservices@melbournewater.com.au

www.melbournewater.com.au

Click on Planning and Building and then Construction near Melbourne Water assets

Note: These guidelines are regularly updated to reflect the latest information, so please always make sure you are using the latest version to ensure your project meets our requirements.

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