

Controlled activities – Guidelines for watercourse crossings on waterfront land

These guidelines relate to the design and construction of watercourse crossings and ancillary works, such as roads on waterfront land. Crossings have the potential to disrupt the hydrologic, hydraulic, and geomorphic functions of a watercourse affecting flows, bed and bank stability and the ecological values and functions of the riparian corridor.

The department has published a number of guidelines about different types of controlled activities that can be found on the [department's website](#). The guidelines for riparian corridors may provide additional information.

The construction of watercourse crossings is a controlled activity under the *Water Management Act 2000* (WM Act). The department administers the WM Act and is required to assess the impact of any proposed controlled activity to ensure that no more than minimal harm will be done to waterfront land as a consequence of carrying out the controlled activity.

Waterfront land includes the bed and bank of any river, lake or estuary and all land within 40 metres of the highest bank of the river, lake or estuary.

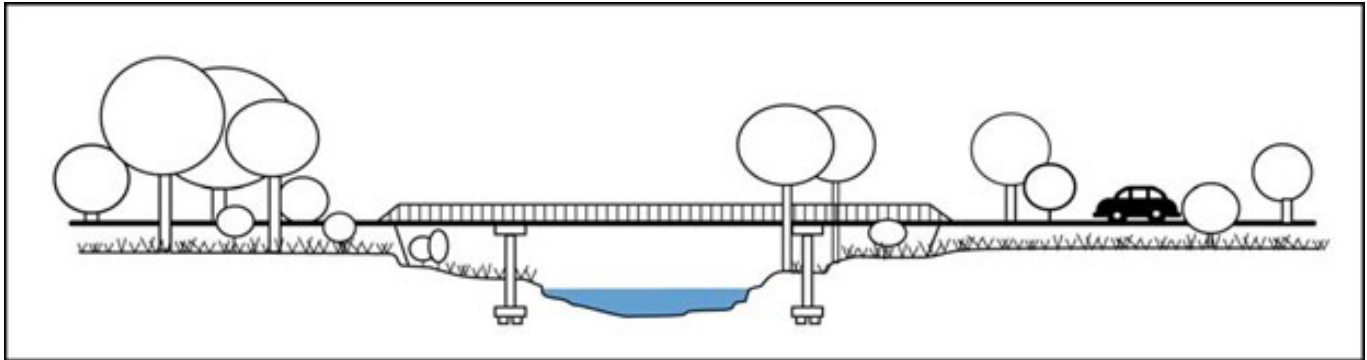
This means that a controlled activity approval must be obtained from the department before commencing the controlled activity.

Minimising the impact of watercourse crossings

The design and construction of works or activities within a watercourse or adjoining waterfront land should protect and enhance water flow, water quality, stream ecology and existing riparian vegetation. Impacts on the hydrologic, hydraulic and geomorphic functions of a watercourse should also be minimised.

Bed level crossings or bridges which fully span the watercourse channel provide the best opportunities for maintaining channel functions, as illustrated in Figure 1. However, alternative structures such as box culverts which can achieve equivalent riparian functions may also be considered in accordance with the department's [guidelines for riparian corridors](#).

Figure 1: Bridge crossing over watercourse and riparian corridor



Considerations for the design and construction of watercourse crossings

The design and construction of crossing structures should consider, but not be limited to:

- Identifying the width of the riparian corridor in accordance with the department's guidelines for riparian corridors.
- Considering the full width of the riparian corridor and its functions in the design and construction of crossings. Where possible, the design should accommodate fully structured native vegetation.
- Minimising the design and construction footprint and extent of proposed disturbances within the watercourse and riparian corridor.
- Maintaining existing or natural hydraulic, hydrologic, geomorphic and ecological functions of the watercourse.
- Demonstrating that where a raised structure or increase in the height of the bed is proposed there will be no detrimental impacts on the natural hydraulic, hydrologic, geomorphic and ecological functions.
- Maintaining natural geomorphic processes:
 - Accommodate natural watercourse functions.
 - Maintain the natural bed and bank profile.
 - Ensure the movement of sediment and woody debris is not inhibited.
 - Do not increase scour and erosion of the bed or banks in any storm events.
 - Avoid locating structures on bends in the channel.
 - Where bed degradation has occurred, address bed degradation to protect the structure and restore channel and bed stability.

- Maintain natural hydrological regimes:
 - Accommodate site hydrological conditions.
 - Do not alter natural bank full or floodplain flows or increase water levels upstream.
 - Do not change the gradient of the bed except where necessary to address existing bed and bank degradation.
 - Do not increase velocities by constricting flows, for example filled embankments on approaches.
- Protect against scour:
 - Provide any necessary scour protection, such as rock rip-rap and vegetation.
 - Ensure scour protection of the bed and banks downstream of the structure is extended for a distance of either twice the channel width or 20 metres whichever is the lesser.
 - If cutting into banks, protect cuttings against scour.
- Stabilise and rehabilitate all disturbed areas including topsoiling, revegetation, mulching, weed control and maintenance in order to adequately restore the integrity of the riparian corridor.

Bridges – additional design considerations

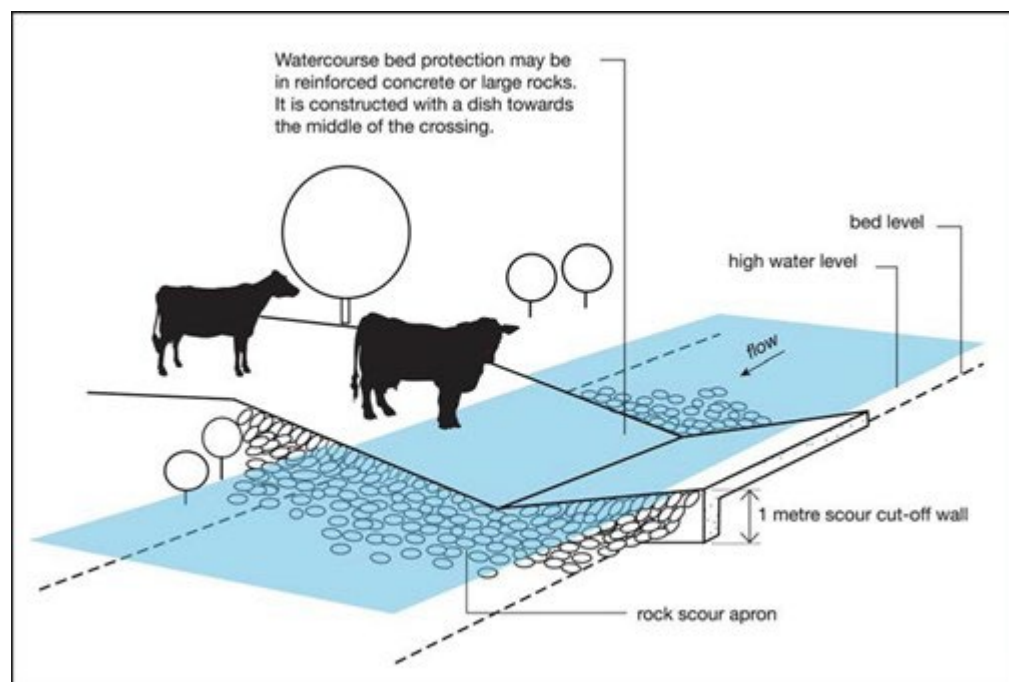
- Ideally, bridges shall be elevated and span the riparian corridor.
- Bridge piers or foundations should not be located within the main channel of the watercourse.
- The bridge design must be certified by a suitably qualified engineer.

Causeways or bed level crossings – additional design considerations

- The deck of the crossing shall be at the natural bed elevation.
- The crossing should have a vertical cut-off wall on the downstream side of the crossing to a minimum depth of one metre and minimum width of 100 millimetres.
- Approaches to crossings should be sealed and incorporate appropriate roadside drainage, such as stabilised table drains where necessary.

Figure 2 shows an example of a splash crossing.

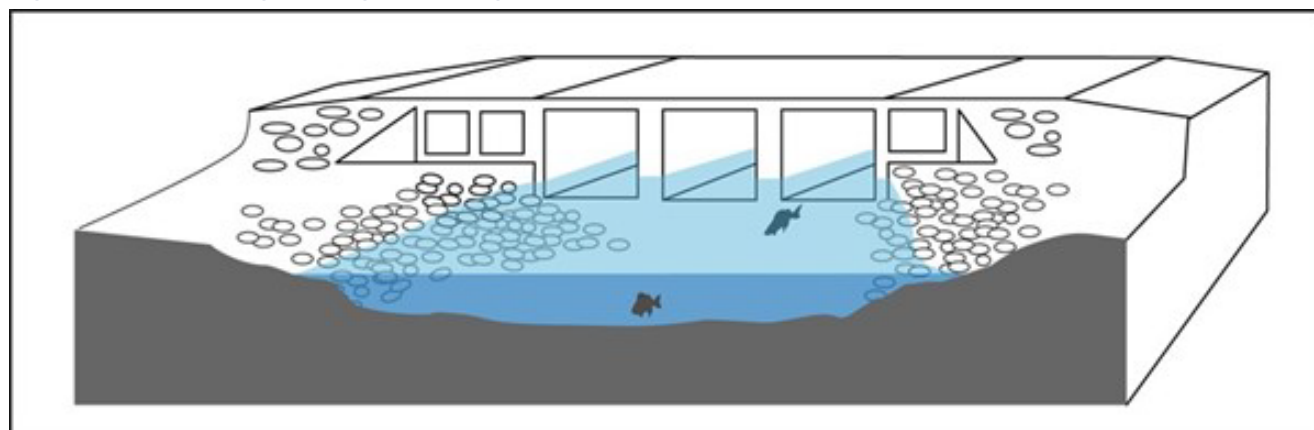
Figure 2: Splash crossing for livestock and vehicles on small intermittent watercourses



Culverts – additional design considerations

- Box culverts (Figure 3) are preferred to pipes.
- Align culverts with downstream channel.
- Incorporate elevated dry cells and recessed wet cells with the invert at or below the stable bed level.
- The culvert design must be certified by a suitably qualified engineer.

Figure 3: Road crossing allowing fish passage



Information to be submitted for assessment

When seeking approval for watercourse crossings, the department will rely on the above information to undertake its assessment and to determine if the activity should be approved. All works and activities should be designed by suitably qualified persons.

The following additional information may also be required:

- Detailed design drawings which include a surveyed plan, cross sections across the watercourse and a long section of the watercourse, showing proposed works relative to existing and proposed bed and bank profiles and water levels. The cross-section should extend to the landward limit of the identified riparian corridor. All plans must include a scale bar.
- Detailed crossing design plans should include a location plan, plan view, elevation view and cross-section of the proposed crossing structure.
- Detailed report of pre- and post-construction hydraulic conditions. The report should address - bank full discharge, velocity, tractive force or sheer stress, afflux (modified RTA method is acceptable), and Froude and Manning 'n', relative to the proposed structure.
- Plans showing the extent and designs of permanent bed and bank stabilisation works necessary for scour protection. See the department's [guidelines for instream works](#).
- A vegetation management plan prepared in accordance with the department's [guidelines for vegetation management plans](#).
- Sediment and erosion control plan.
- A site management plan incorporating a works schedule, sequence and duration of works, contingencies such as in case of flooding, erosion and sediment controls and proposed monitoring and reporting periods.
- Costing of all works including materials and labour and stages of works including crossing construction and rehabilitation.
- Copies of other relevant approvals, for example, a landowner's or development consent.

Maintenance period

Applicants will also need to provide for a maintenance period of between 3 and 5 years after practical completion of each stage or until site is stable. The maintenance period will depend on the scope, size and level of risk. Engineering certification may be required at the end of the maintenance period. Maintenance should include sediment and erosion control, replacement of any works and areas damaged or destroyed by flows and flooding or vandalism and any other requirements

necessary to ensure a naturalised stable watercourse system is functioning by the end of the maintenance period.

Security deposit may be required

Applicants should note that if the likelihood of significant impact on the watercourse or waterfront land is identified, security (as bank guarantees) may be required before the controlled activity is commenced. The amount of security is usually based on the costings provided.

More information

For more information about controlled activities on waterfront land, visit the department's website at water.dpie.nsw.gov.au/our-work/licensing-and-approvals/controlled-activity-approvals

Copies of the acts and associated regulations are available on the NSW Government legislation site at legislation.nsw.gov.au

If you think you need to make a controlled activity application, our easy-to-use online support tool Water Assist can help you. Visit water-assist.dpie.nsw.gov.au