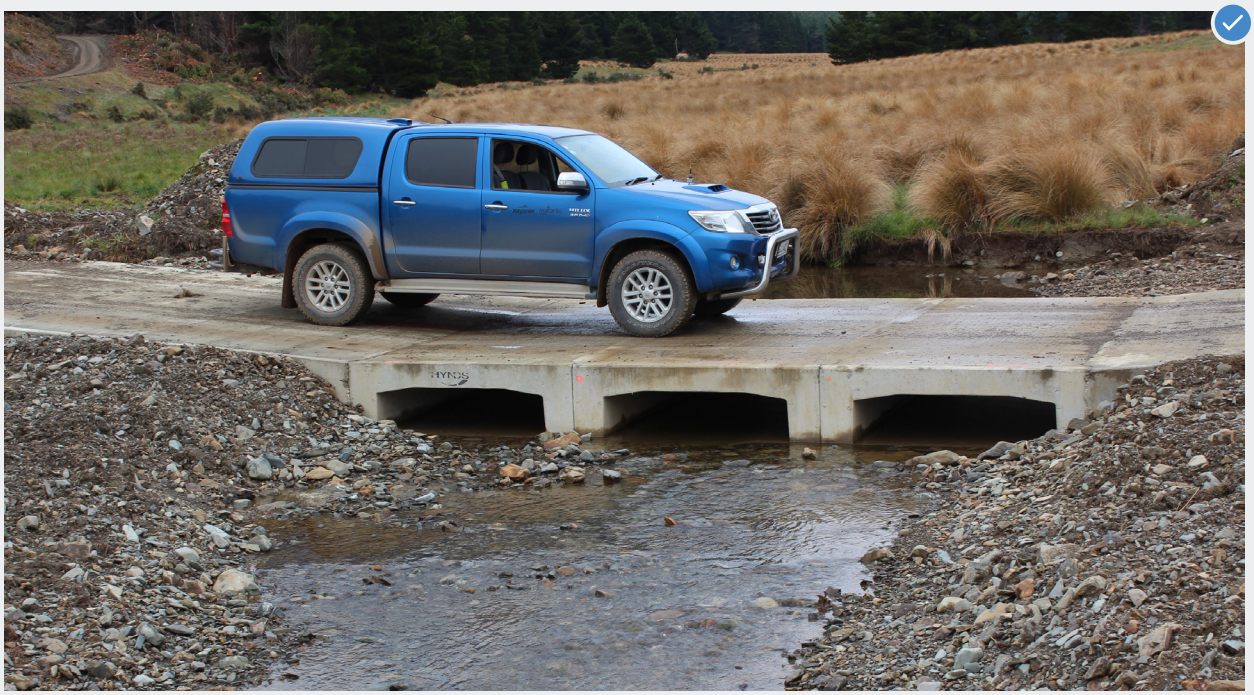
Forest Practice Guide

Non-Regulatory

Crossings
3.2 Drift Deck River Crossings

Drift decks are *river* crossing structures designed for flood water to overtop the structure carriageway. They can be a series of open bottomed inverted "U" precast concrete components, or a series of rectangular concrete box segments. Each box segment is secured to the adjacent box segment for the length of the structure. Those with an open bottom typically need a concrete base or piers for support and as an anchor. Alternatively, cast in-situ piers with precast concrete bridging slabs may be employed.

The design may allow for the open bottom and concrete bridging slabs to be removed for use at a different site. When the crossing is no longer required, the slabs can be lifted from the *river* bed and re-used elsewhere, leaving the piers in place for the next harvest rotation.



A well-constructed drift deck.

Please refer to the 'how to use' section of the introduction at http://docs.nzfoa.org.nz/forest-practice-guides/ for advice on how to use this guide.

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A Where and when to use

1. Where a ford may generate fine *sediment*, where there will be more than 20 axle crossings per day, where a single *culvert* to carry the full design flood flow is impractical, or where a bridge is too expensive or has other design challenges.
2. Drift decks can accommodate significantly larger flows than battery *culverts* due to their shape, and do not obstruct fish passage. They are a cost-effective alternative to a battery *culvert*.
3. Can be used over the top of an existing concrete ford, to ensure intensive traffic use can occur without impacting on water quality.

B Where not to use

Not applicable for this FPG.

C Design

1. To reduce scour of the approaches, locate the crossing on a straight section of a *river*, if possible.
2. Ensure the approaches are perpendicular to the *river* to avoid water being directed to either end of the structure.
3. Ensure the carriageway height is above base to moderate flows to pass through the deck, to limit crossing closure.
4. Ensure the approaches have suitable gradient and transitions so that vehicles are not grounded, especially low loader transporters.
5. Determine the correct type and size of the drift deck sections for the site.
6. Calculate the flood design and use engineering formulae to determine the required *culvert* size (refer to Schedule 2 of the NES-PF for design flood flow calculators and or https://stream-explorer.niwa.co.nz). Consult with a forest engineer, hydrologist or other specialist to help with design and construction, if necessary. Given the costs and risks involved, it is recommended that flood design calculations are peer reviewed.
7. A building consent will be required if the height of the structure is greater than 1.5 m above the *river* bed.

D Construction

1. Ensure any installation specifications and procedures are followed.
2. Construct in suitable weather and in low water flow.
3. Check for any fish spawning timing constraints under the NES-PF.
4. Limit earthwork disturbance to the immediate construction site, which will include an area upstream and downstream of the crossing site.
5. Minimise the need for machinery to operate in flowing water.
6. Wet or curing concrete must not be in contact with flowing water. Cement is a contaminant and is toxic to invertebrates and fish. When pouring concrete, the water channel will need to be temporarily diverted.
7. Divert water flow around where the piers are to be constructed, if these are used. This is essential for the foundation work to reduce the risk of contaminants entering water and to minimise discharge of *sediment*. Elevated *sediment* discharge levels will occur during construction, but must not occur for more than eight consecutive hours.
8. Protect the drift deck inlets and outlets. Inlets are more challenging to protect from large woody debris as this cannot be deflected as easily as for a battery *culvert*. Where necessary, armour outlets with rip rap, *reno mattress*, or other energy dissipating structures.
9. Limit *sedimentation* entering the *river* from the approaches by:
    a. Diverting road surface water from the drift deck approaches, as close as practicable to the structure, and ideally within 10 m. To limit *sediment* entry into the *river* use stormwater and *sediment* control measures such as *berms*, *cut-outs*, water table drains and *culverts*, *flumes* and *sediment* traps. Build these above the annual flood flow level.
    b. Avoiding long steep road approaches, as these are ongoing sources of *sediment*.
    c. Using clean gravel on approaches where the existing road surface could create a *sedimentation* problem.

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D Construction continued

Open bottomed structures

10. Construct on a suitable foundation slab or piers.
11. Construct level bearing pads at locations to match the drift deck unit's size.
12. Check regularly during and on completion of construction. If the work does not meet the design plan and standards then initiate corrective actions.

E Maintenance

1. Prepare a routine maintenance plan including heavy rainfall response measures.
2. Check drift decks after a heavy rain event or flood flows as they can require regular maintenance, especially to inlets and outlets. Fix any issues promptly.

F Other methods

1. Bridges are alternative measures.

G Technical specification guidelines

1. Use dowel condition techniques as specified – drill holes at each joint location, align drift deck units at the correct centres, insert dowels, then grout.
2. Join the sections (Hynds have a proprietary attachment system).
3. Complete the deck by fixing timber kerbing.

National Environmental Standards for Plantation Forestry

Particular relevant provisions for crossings are Regulations 38 – 49.

Refer also to the Department of Conservation **Fish Passage Guidelines**: https://www.doc.govt.nz/nature/habitats/freshwater/fish-passage-management/nz-fish-passage-guidelines/

Contact

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