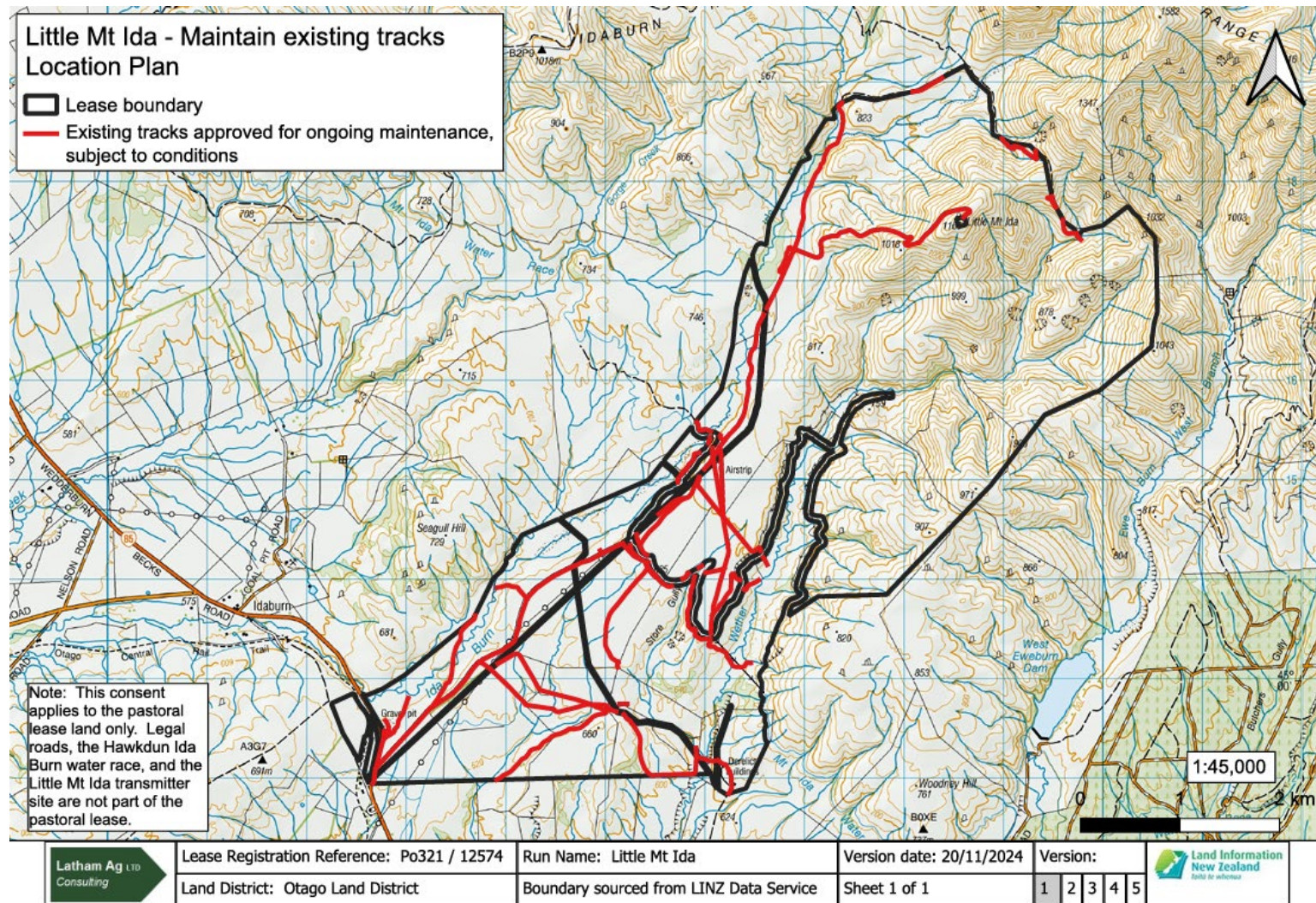


## Operational Area – Maintain Existing Tracks





## Culverts & Fish Passage

*Summarised from the New Zealand Fish Passage Guidelines (structures up to 4m) by National Institute of Weather and Atmospheric Research, Department of Conservation and the New Zealand Fish Passage Advisory Group.*

Culverts are to be sized, installed and maintained to minimise erosion and prevent sediment entering waterways, and to meet the following key objectives for the passage of fish and other aquatic species:

- Maintain continuity of instream habitat.
- Minimise alterations to stream alignment and gradient.
- Maintain water velocities and water depths within a range equivalent to adjacent stream reaches.
- Minimise constraints on bank-full channel capacity resulting from the culvert.
- Avoid vertical drops.
- Provide an uninterrupted pathway along the bed of the structure.

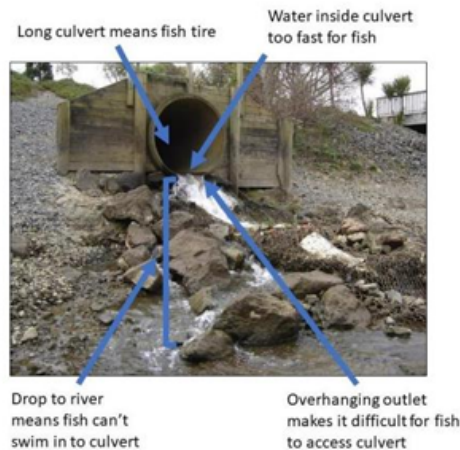


Figure 2-1: Example of a culvert that impedes fish movements.



Figure 3-2: An example of a stream simulation culvert design.

*Except...* Providing for unimpeded fish passage is advantageous for most fish, but some of New Zealand's native freshwater fish are impacted by exotic species and benefit from having a safe refuge area. If there are known populations of non-migratory galaxias and mudfish upstream, and predatory exotic fish such as trout downstream, there may be benefits to preventing passage for the latter, for example with a perched culvert.