Source to Tap Forestry Pilot How-To Guide: Settlement Area

The INTERREG VA Source to Tap project aims to develop sustainable, catchment-scale solutions for the protection of rivers and lakes, which are the main sources of our shared drinking water. Forestry activities, such as harvesting on peaty soils, increase the risk of soil erosion.
Small drains provide rapid pathways for sediment-laden water, which can lead to fluctuations in colour and turbidity at downstream Water Treatment Works.

The Forests for Water pilot tested measures (in addition to existing forestry best practice) to reduce sediment runoff into the catchment. Source to Tap took advantage of the natural topography and carried out minor groundworks to construct a settlement area downstream of a harvested forestry site near Pettigo in Co. Donegal.

Aim

The settlement area was designed to receive overflow from the adjacent watercourse. Here, the water would slow down, causing suspended sediment to settle on the bottom of the settlement area. This prevents it from being washed downstream.

Suitability

This measure is suitable for forest drains and or unclassified streams and as the size of the settlement area can be tailored to the size of the watercourse, it could be made suitable for larger flows provided there was a suitable location.

However, it is not normally considered best practice to divert a classified stream and so care should be taken to determine whether or not a stream is classified and if in doubt to liaise with the relevant agencies before any work is undertaken.

During construction, access by a three tonne+ excavator is necessary. The Source to Tap pilot minimised construction and disturbance to the site by using the natural topography of the land. An appropriate area near to the target stream is essential.

A pre-existing borrow pit was located next to a watercourse. The pit was formed into a settlement area using earth walls. To allow water in during high flows, a trench was dug on the upstream edge. An outlet from the settlement area was created by leaving a gap in the earth wall at the bottom of the sump.

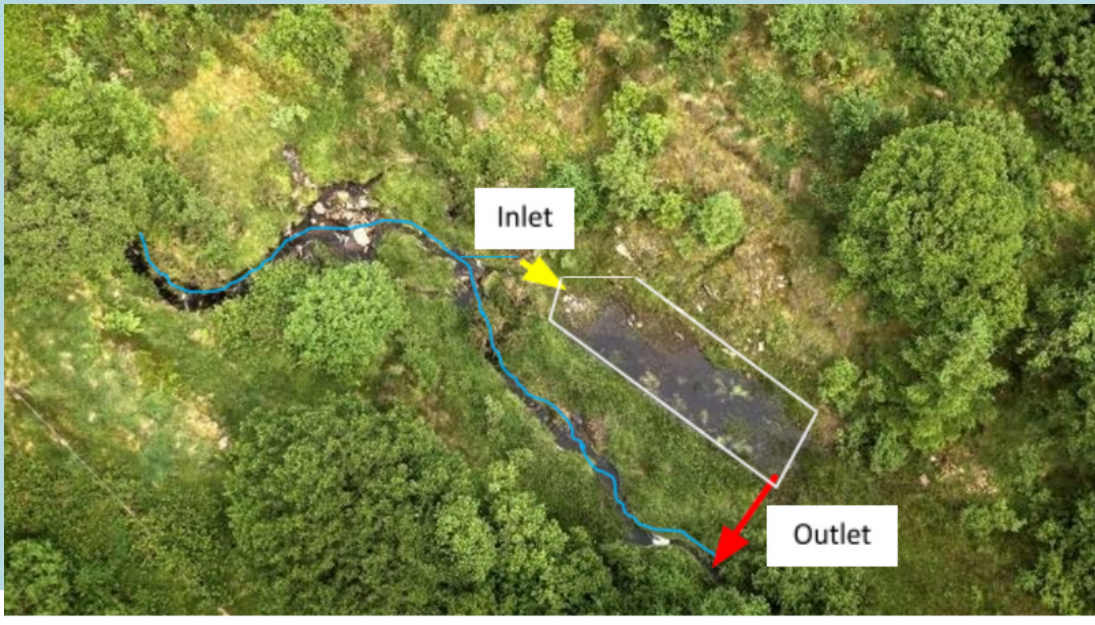

Figure 1: View of Source to Tap settlement area

Equipment Required

- Excavator (three tonne or larger)
- Log or timber for outlet (1m length by 15cm diameter or similar)
- Supply of stones to dam river to desired height at inlet
- Spade

Construction

1. Location – The settlement area constructed in this pilot was easy to implement due to the existing topography of the land. A low basin or borrow pit adjacent to (and the same height as) the river is most suitable. This keeps excavations to a minimum and ensures water in the area will be retained.

Figure 2: Area chosen for settlement area

2. Design – The design of the settlement area should be in accordance with the size, shape and flow of the river. Give careful consideration to the inlet height to allow overflow into the settlement area during high flows.
Likewise, ensure the outlet is built to a height that enables sufficient pooling of water in the settlement area.

3. Base Construction – A flat base of the settlement area is achieved using a three tonne (or larger) excavator. A flat, compressed base reduces the risk of additional sediment being released by the construction process.
The base should be deeper at the inlet, with a shallow slope upwards towards the outlet. This shape will best slow the flow.
It would be preferable to allow the settlement area to become covered with vegetation before it is 'connected' to the watercourse to prevent sediment loss.

4. Earth Walls form the boundary between the settlement area and the watercourse. Top these with the vegetation stripped from the settlement area base. The earth walls should be compacted (using the digger bucket) and at least 50cm wide so that they retain structural integrity when holding pooled water. Deeper water requires wider walls.

Figure 3. Outlet log (used as a weir) shown during flood conditions

5. Inlet and Outlet – The inlet is a connecting trench from the watercourse to the settlement area. The base of the inlet should be level with the low flow water level of the stream.
This allows water to flow into the settlement area during higher flows. Built at the opposite end of the area, the outlet will need to be slightly lower than the earth wall to prevent water from flowing over the top of it. Finally, installing a log or timber weir can prevent erosion to the base of the outlet channel.

Outcomes

Regular inspection of the inlet/outlet was conducted to ensure that the settlement area was functioning correctly.
On average, the settlement area attenuated 69% of suspended sediments.

Figure 4: Finished settlement area (watercourse in foreground and settlement area in background) after heavy rainfall

Disclaimer

The views and opinions expressed in this document do not necessarily reflect those of the European Commission or
the Special EU Programmes Body (SEUPB).

Relevant forestry standards at the time the pilots were undertaken include in Northern Ireland, the UK Forestry Standard 4th edition and Forestry Commission Practice Guide 'Managing forestry operations to protect the water environment' and in Ireland the 2019 Standards for Felling & Reforestation issued by by Forest Service (DAFM)

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