Good practice guide for minimising impacts on the natural heritage during construction.

This guide shows examples of good and poor practice examples for hydro construction.

The guide is equally applicable to other forms of development, such as track construction for wind farms.

This is not a detailed ‘how-to’ guide but is a visual guide to assist with avoiding impacts on the landscape, vegetation and watercourses.

Contents

- Intakes
- Tracks, pipeline and drainage
- Turbine House
- Tailrace

Intake considerations:

Access and turning circles

Wing walls and rock armouring

Pipe work

Handrails and ancillary structures


Erosion risk
Difficult access to intake. High risk of erosion, and run-off to the watercourse.
The landscape will remain scarred for a long period of time, which can be bad for PR.

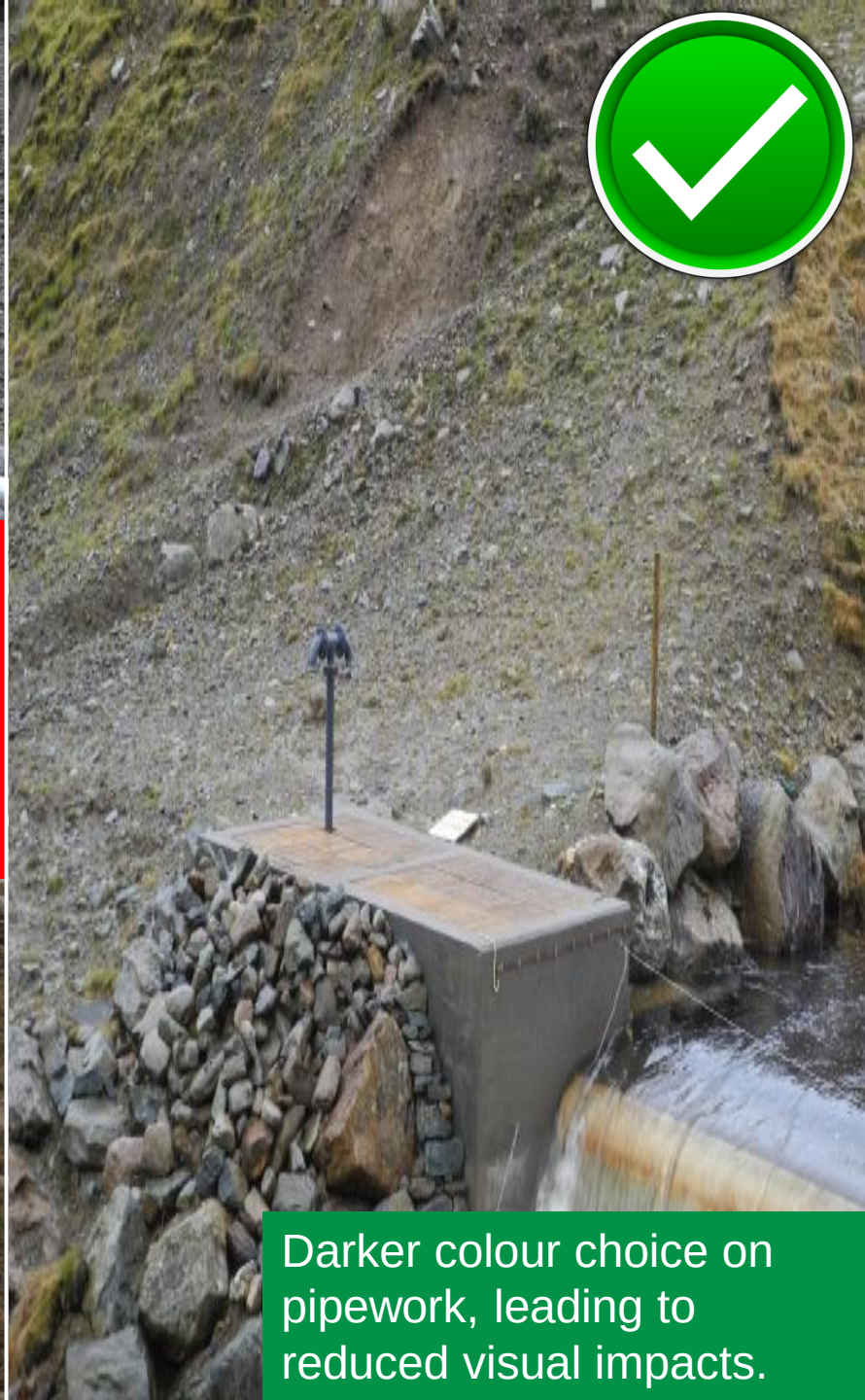
Too large, exposed turning circle / access to weir. This will be prone to run-off and erosion. The water course could be polluted with silt run-off.


Scale and placement of individual rocks in the rock armouring fits landscape and protects bank.
Vehicle access and turning circle not required. Minimal landscape and visual impacts. Limited land disturbance, and quick reinstatement will be good for habitats.

Infrastructure such as this concrete box can clutter the intake area, and increase visual impacts. Consider sensitive screening with soils and turves.

Rock armouring and well placed turves ‘camouflaging’ exposed wing walls.

Contrasting paint colour to the natural surroundings draws attention to infrastructure and leads to landscape and visual impacts.



Darker colour choice on pipework, leading to reduced visual impacts.

Handrails and other up-standing structures are contributing to visual clutter. Are they all needed or could they be a different colour / material more fitting for the local landscape e.g. wood?


Lack of handrails, reduces the visual impacts.

Tracks, pipeline and drainage considerations:

Culverts – cross track, pipe exposure, ponding

Track side drains, silt traps and fencing, and discharge points

Verges

Track material - storage

Cut batters on routes

Reinstatement

Bridge design

Protection from grazing

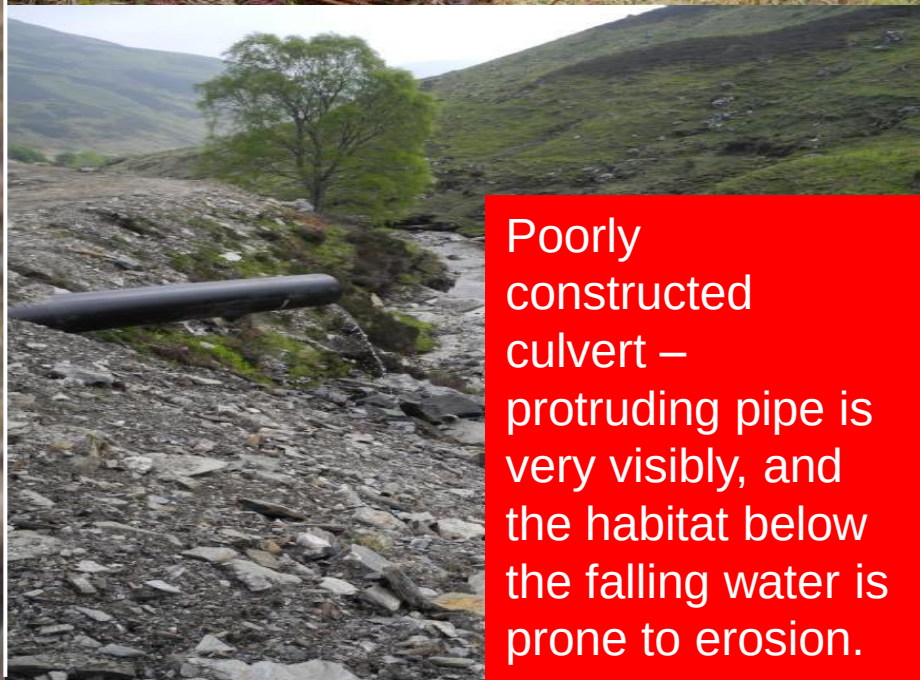
Markers along tracks


Well constructed cross drain, likely to require minimal maintenance.

These red pipes are sitting proud of the track leading to visual impacts. Erosion of the path is likely in this poorly constructed state.

Poorly constructed culverts / cross drains should be buried, and the verges reinstated.

Poorly constructed culvert – protruding pipe is prominent. The discharge is likely to erode the habitat below.



Poorly constructed culvert – protruding pipe is very visibly, and the habitat below the falling water is prone to erosion.


Well constructed culvert. Pipe is submerged below the stream bed, with good reinstatement of surrounding habitat.

Water management has failed on this area of the site. Machines should not be running through pools, and alternative tracks, causing more habitat disturbance, are being opened (to the right of the pool). Excess dirty water, ponding on the track, is risking a silt pollution incident in the river, and SEPA enforcement action. A settlement lagoon should be located in an area away from the river to take the dirty water off the tracks.


Erosion occurring across track that will deepen in time without ongoing maintenance.
Poor road-side ditch construction under-cutting the vegetation above on this steep cut.


Good practice – shallow angles in ditch and cut. Vegetated sides will further slow flows of water.
Poor practice – no check dams in ditch to slow water and help reduce silt and erosion.
Place check dams in ditch to slow flows and help filter out silt.


Check dam in run of track side drainage. This will slow flows and contribute to maintaining good water quality.

The peat cut here is too steep, and will dry out quickly and erode into the water below.

This silt trap is good practice, having a pinned straw bale for catching silt. It could be further wrapped in sheeting to help catch silt. However, it could be overwhelmed by washout from the over steep cut above.

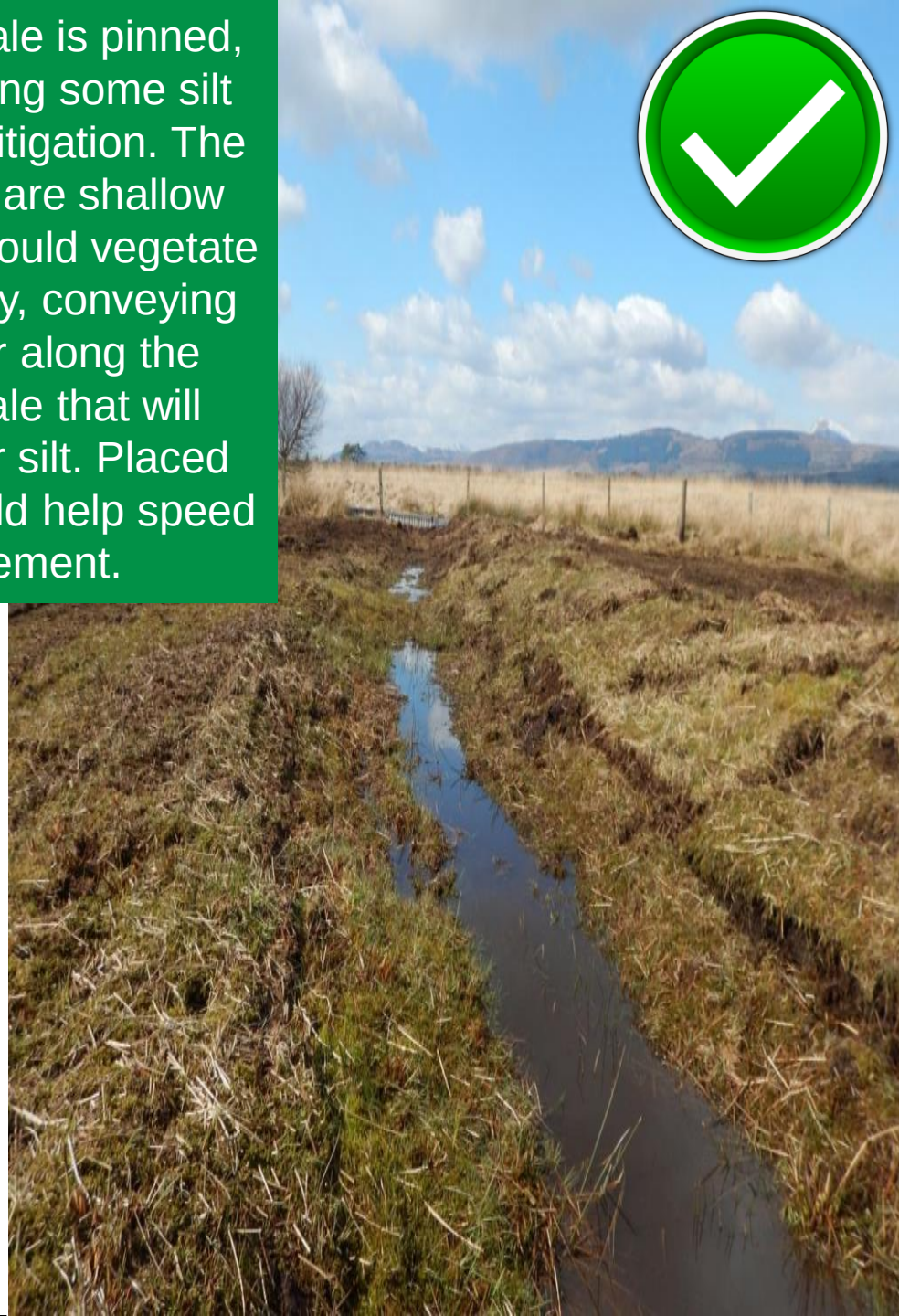

This is now overflowing silty water into the burn.


Example of poorly maintained silt fencing mitigation – not pinned or maintained properly.

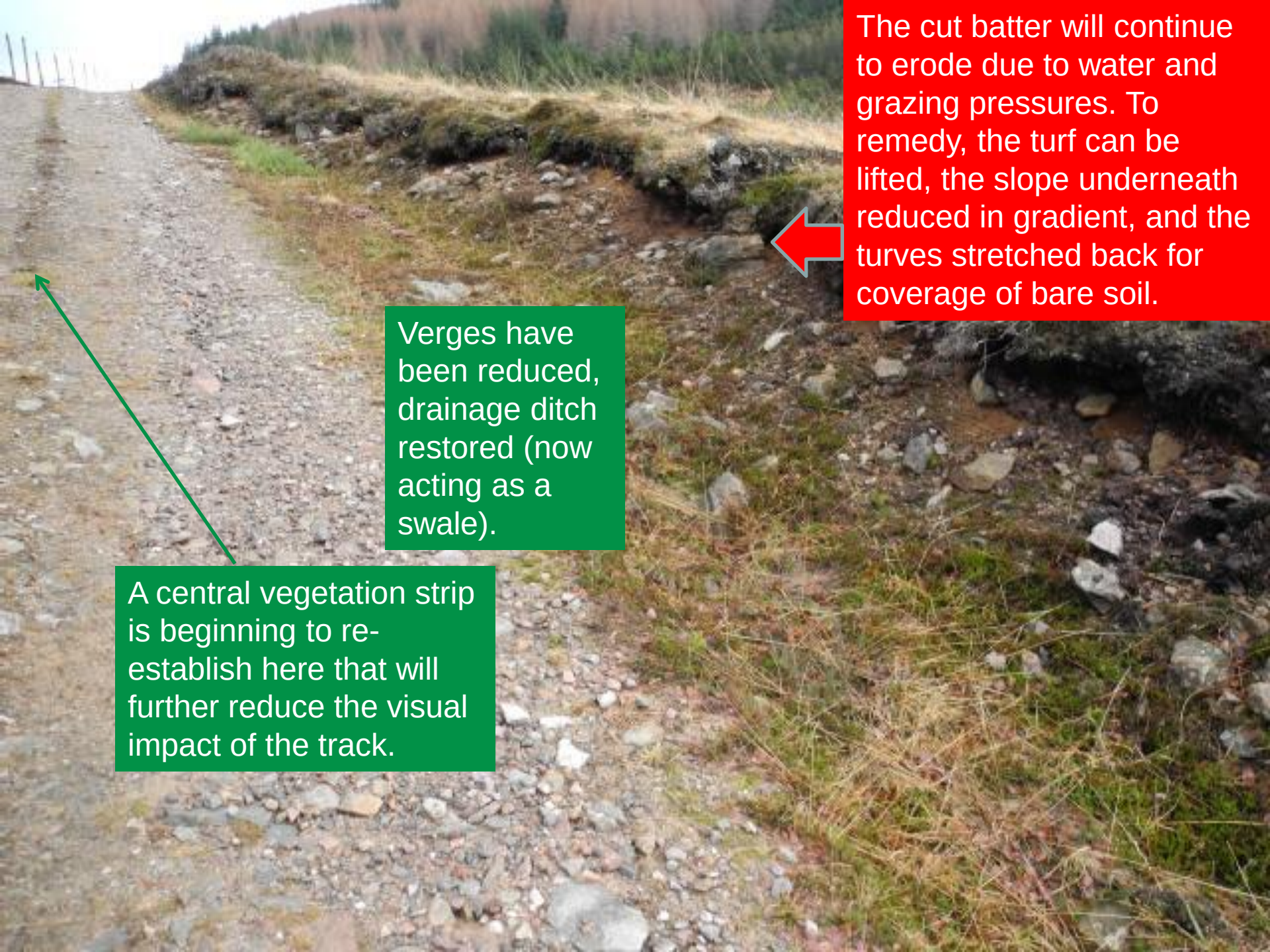

Ineffective silt fencing overwhelmed, not big enough and at risk of being washed away.

Poor practice settlement pond – no silt mitigation, too precarious above main river. Essentially, this is a direct discharge to the river, with potential enforcement consequences. The track above the pond, and hillside are at risk of landslip.

This hay bale is pinned, and providing some silt pollution mitigation. The ditch sides are shallow and this should vegetate successfully, conveying clean water along the formed swale that will further filter silt. Placed turves would help speed up reinstatement.




Too much peat exposure, leading to drying out and loss of carbon.
Poorly constructed drain – this will prove tricky to reinstate, and will continue to erode. The ditch could be completely restored using peat and turfs, and the steep edges re-profiled, although it will require careful digger work.
Lack of availability of turves could hinder reinstatement of habitats.


The cut batter will continue to erode due to water and grazing pressures. To remedy, the turf can be lifted, the slope underneath reduced in gradient, and the turves stretched back for coverage of bare soil.
Verges have been reduced, drainage ditch restored (now acting as a swale).
A central vegetation strip is beginning to re-establish here that will further reduce the visual impact of the track.

A lack of reinstatement has led to erosion on the bank, and the pollution of the watercourse from silt run-off.


Soil, here, is being poorly managed. Material is likely to slip and erode easily.
Disturbed soils should be reinstated with turves as the construction activities proceed so that soils are left bare for a minimum time. Turves need to be properly stored, moist, to allow re-use.


Soil and turves are poorly managed and valuable reinstatement material is being lost.
Peat soil will dry out, and material likely to slip and erode easily. Difficult to reinstate these verges to achieve good habitat.


Soil storage area on ‘floating’ compound. The soils can be stored segregated here, and the ground reinstated following use.


Tracks should be routed to avoid such severe cuts. Green engineering solutions should be considered to remedy this issue.
This cut face is too steep and reinstatement attempts will prove very difficult. Turves will be unlikely to take on this slope. This face will be prone to a large amount of erosion.

Compaction of the reinstated turves allows better connection with the subsoil and water table, and provides suitable condition for turf reinstatement.


Good restoration of track centreline and verges. Stock have been kept off this track to allow the vegetation to recover.

Coir matting reducing erosion issues and providing a stable slope for re-vegetation. The steep slope has been ‘shored’ up with well placed boulders to reduce land slip potential.

Turves reinstated the right way up, but may need more compaction to help connect with underlying hydrology and achieve good, functioning habitat.

Reinstated habitat over track. Good, random boulder placement (lichen vegetation upwards), and managed turves (maintaining viable vegetation) being placed and lightly compacted, bare ground. The bare soil has seed stock within that will allow re-growth.

Reinstated pipeline following contours to help it blend into the landform. Some areas of vegetation will not fully cover, but this will match the surrounding habitats.


Good practice would have placed the penstock under the bridge to be less visible.

Bridges don’t always have to be hi-tech. Un-tracked access to intakes can be made by quad bikes making use of low profile infrastructure.

Innovative ideas can often solve ‘show-stopping’ issues. This ‘board walk’ track was developed at post construction stage following the discovery of rare plant species.

Consider short to medium term, electric deer or stock fencing to protect reinstated habitats from grazing animals.


Markers may be a requirement of health and safety, but can also be designed to fit with their setting.

Turbine house considerations:

Roof material and colour

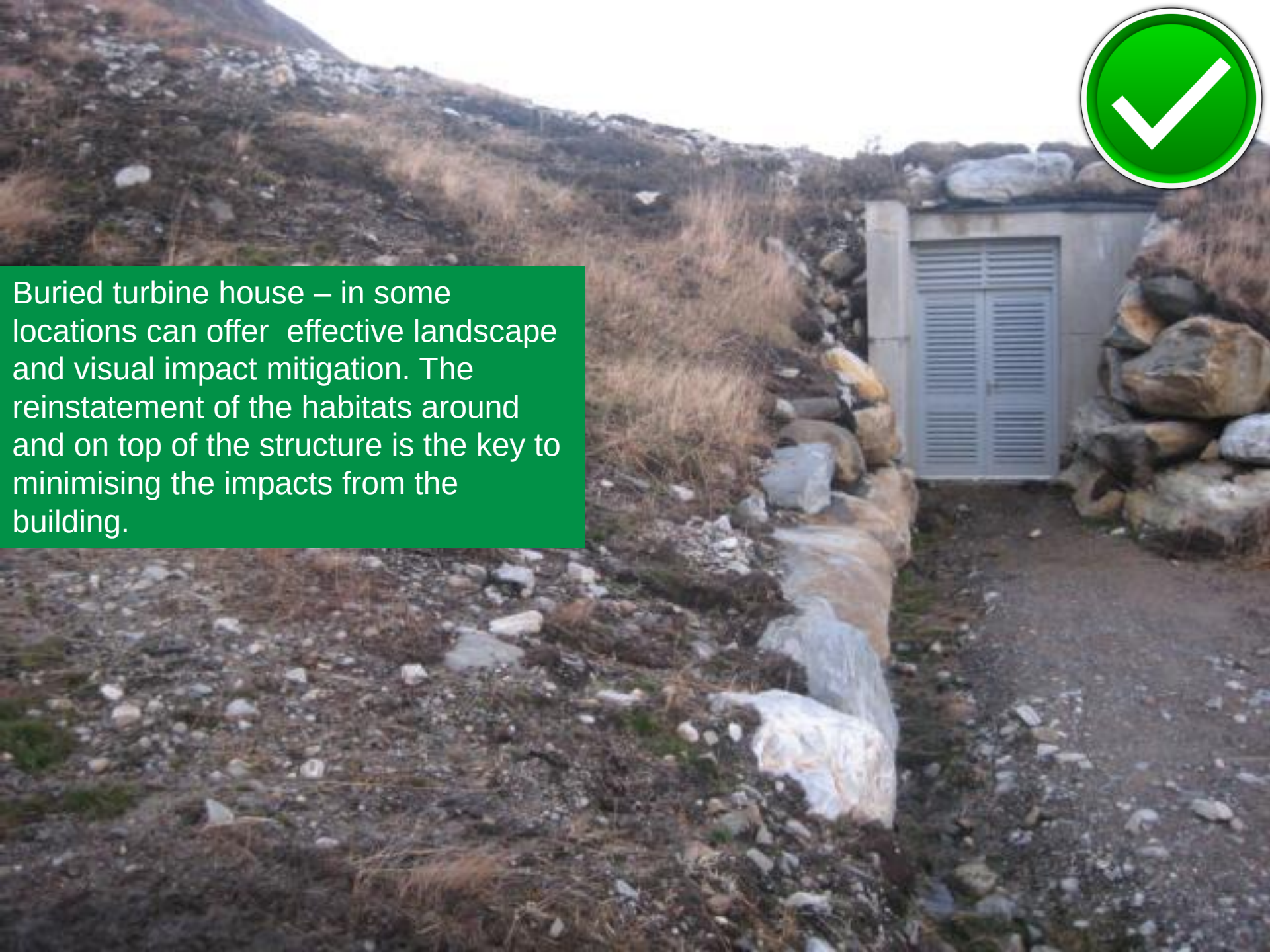
Finish on walls and doors – material, colour etc.

Buried houses

Ancillary infrastructure

The grass roof helps reduce visual impacts to some extent, particularly from higher viewpoints. The timber cladding will fade in time. Different dark-coloured doors could help further reduce effects. The amount of hard-standing could be reduced to lessen landscape and visual impacts.

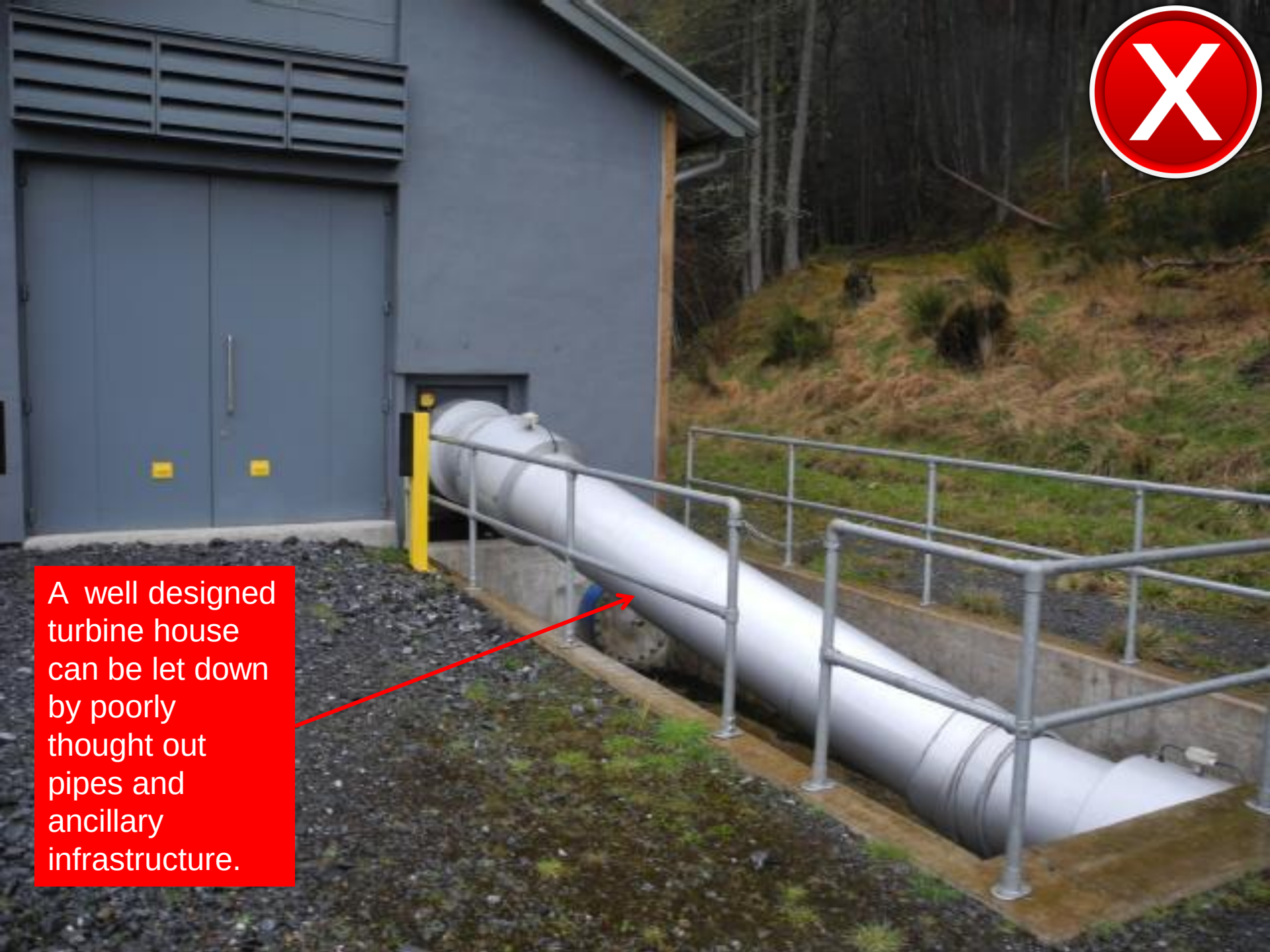
The finish and attention to detail on this building helps minimise visual and landscape impacts.



Buried turbine house – in some locations can offer effective landscape and visual impact mitigation. The reinstatement of the habitats around and on top of the structure is the key to minimising the impacts from the building.


Ancillary components can detract from good turbine housing siting and design, especially if not considered fully at planning stage.

Other infrastructure components, like this external box can take away from the good turbine housing siting and design, especially if not considered fully at planning stage.


A well designed turbine house can be let down by poorly thought out pipes and ancillary infrastructure.

Tailrace

Discharge design

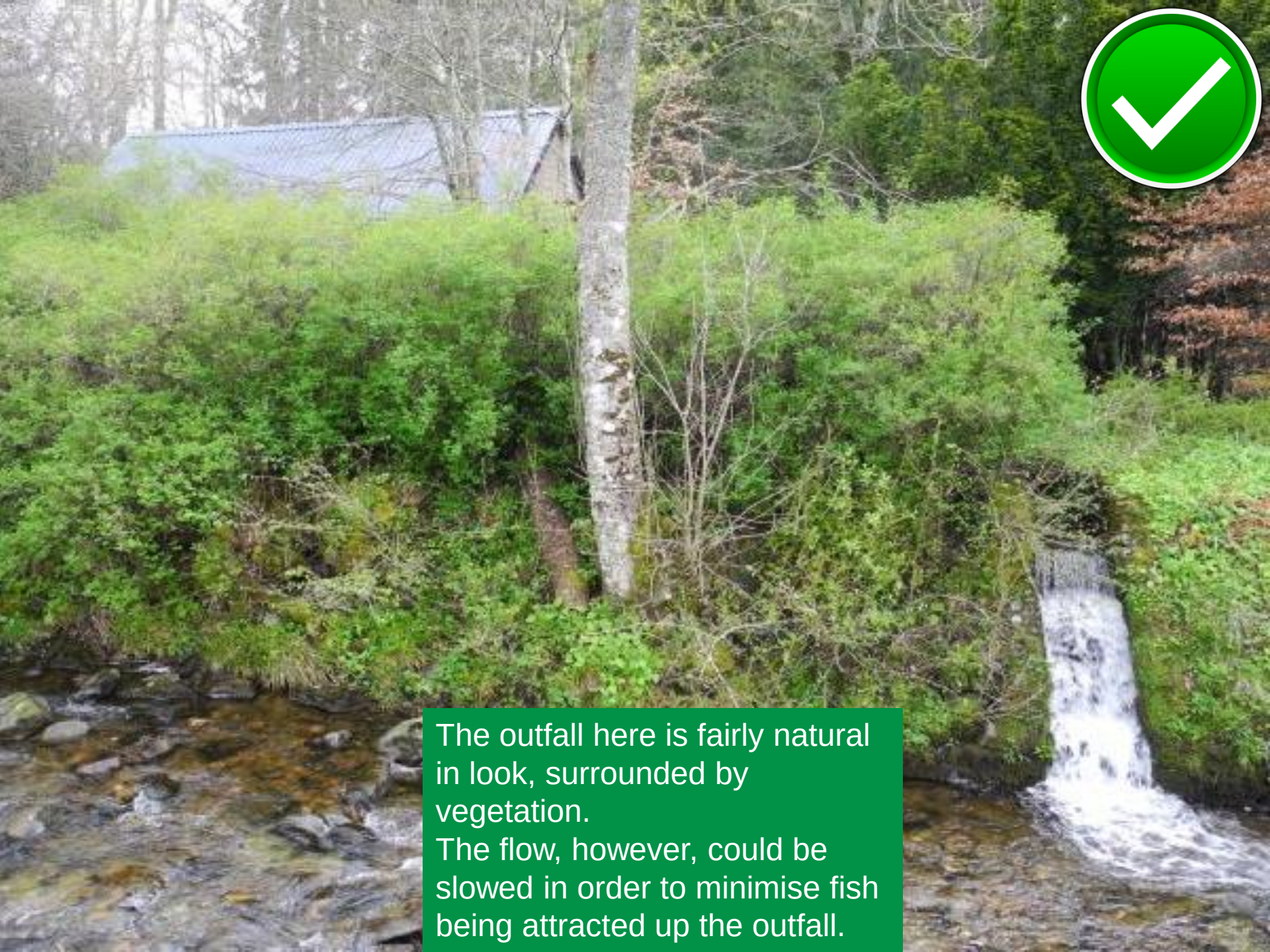
Fencing and handrail

Screen

Concrete and pipe use

Hidden, low profile outfall with good practice wall and vegetation cover to hide infrastructure.

The wing walls of this outfall are causing a visual impact. Consider camouflaging with local stone.



The outfall here is fairly natural in look, surrounded by vegetation.
The flow, however, could be slowed in order to minimise fish being attracted up the outfall.

Appropriate, local stone and design on this tailrace minimises visual impacts. More stone and less concrete would improve the design.

Pollution Hotline
0800 80 70 60

Further guidance:

- Guide to Hydropower Construction Best practice
- Good practice during Wind Farm Construction
- Constructed Tracks in the Scottish Uplands

- https://www.nature.scot/