WSCC Riparian Toolkit Visual Guide

Introduction

To support the WSCC Town and Parish Riparian Toolkit, this document provides images and notes towards the good practice of ordinary watercourse remediation and management that would be the responsibility of a riparian landowner. Whilst this document aims to cover a range of ditches and watercourses in various conditions and locations, it is not an exhaustive list of what can be found within your area.

Generally, maintenance to open watercourses and ditches should include:

- **Remove overgrowing vegetation, debris and litter.**
  This allows for a clear and unobstructed flow, prevents blockages downstream and ensures the ditch can make good use of its capacity.
  In some circumstances, hedges and trees next to a ditch can creep in over time. It is good practice, therefore, to keep such vegetation cut back from the ditch. Works to hedges and trees should only be undertaken outside of birdnesting season.

- **Dig-out silt accumulation from the bottom of the ditch and around the inlets and outlets of any connecting pipes and culverts.**
  This helps ensure the ditch can make good use of its capacity and prevents restrictions that can limit flow or damage and alter the embankments.
  Silt removed from a watercourse is an excellent material for adding to flower beds. Silt can hold onto nutrients like clay can. However, due to its larger particle size, silt is better able to provide aeration than clay soils, which makes the nutrients in silt more available to plants.
  Silt Soil Characteristics And How It Affects Plants | Gardening Know How

- **Maintain some vegetation growing on the banks.**
  This helps to support the embankment from erosion and helps to filter and clean water. Embankment vegetation, however, should be kept as short as possible to ensure capacity and a free flow of water, whilst also allowing open access for any inspections, maintenance or works.

The example cases contained within this document show watercourse ditches in various conditions. The possible concerns identified in each case is listed, and there is a further list of suggested, non-exhaustive, measures that could help remedy the identified concerns.

It is the advice of West Sussex County Council that any works to ditches and watercourses undertaken by anyone other than the riparian owner must have the prior consent of the landowner/s. In addition, to keep people safe, any such works should comply with all appropriate UK Health and Safety Legislation and Regulations. Watercourse remediation work should be supported by a full assessment of the risks and a documented plan of the method of safe working applied, which should be shared, understood, and fully adhered to by anyone involved with, and undertaking, the work, prior to the works commencing.

1. Roadside Ditch.

Concerns:

- Litter restricting flow with risk of downstream blockage.
- Debris restricting flow with risk of downstream blockage.
- Overgrown vgetation restricting flow.
- Siltation limiting capacity.
- Blocked/restricted culvert connections restricting flow.
- Uneven profile restricting flow and promoting errosion.



The highly blocked/restricted nature of this ditch is causing water to overflow into the road and erode the embankments. Upstream and downstream culverts are completely blocked with silt, litter and debris too

Suggested remedial actions:

- If an assessment of risks identifies the need, arrange traffic management to ensure a safe working environment.
- Remove and appropriately dispose all litter and debris.
- Cut back all vegetation from within the channel, remove and appropriately dispose.
- Excavate out all deposits and silt from the bed of the ditch, remove and appropriately dispose.
- Excavate bed to ensure invert of ditch is at same level of any connected culverts.
- Inspect any connected culvert headwalls and address any problems or concerns.
- Excavate, fill and smooth the embankments to ensure a regular profile along ditch length.
- Rake the embankments and dress with native grass seed as necessary.

2. Brick Culvert Headwall.

Concerns:

- Litter restricting flow with risk of downstream blockage.
- Debris restricting flow with risk of downstream blockage.
- Overgrown vgetation restricting flow.
- Siltation limiting capacity.
- Blocked/restricted culvert connections restricting flow.
- Broken headwall.



There is no way for water to drain into the culvert as it is buried under soil and silt. The brick headwall also appears to be broken and will require fixing before it contributes further to the blockage.

Suggested remedial actions:

- Remove and appropriately dispose all litter and debris.
- Cut back all vegetation from within the chanel, remove and appropriately dispose.
- Excavate out all deposits and silt from headwall and ensure invert of ditch is at same level of the connected culvert.
- Inspect the culvert headwall and address any problems or concerns (brickwork appears broken in the above image).

3. Field Boundary Ditch 1.

Concerns:

- Litter restricting flow with risk of downstream blockage.
- Debris restricting flow with risk of downstream blockage.
- Encroaching hedge creeping into ditch restricting flow.



The ditch is in reasonably good order with a clean sloping embankment profile and short vegetated sides. However, the hedge in the background of the image appears to be encroaching into the ditch bed. Litter has also collected within the ditch, which will pose a risk of blockage downstream where water discharges into a culvert.

Suggested remedial actions:

- Remove and appropriately dispose all litter and debris.
- Cut back the encroaching hedge, remove cutings and appropriately dispose.
- Check for any accumulation of silt and remove as necessary.

4. Field Boundary Ditch 2.

Concerns:

- Debris restricting flow with risk of downstream blockage
- Overgrown vegetation restricting flow
- Likely Siltation limiting capacity
- Likely Blocked/restricted culvert connections restricting flow



This is a typical example of a field boundary ditch, where a hedge should be located at the top of the embankment on the field side. In this example the hedge has crept into the ditch, which will be causing a restriction to flow and will prevent future inspection and maintenance.

Suggested remedial actions:

- Remove and appropriately dispose all litter and debris.
- Cut back all vegetation from within the channel, remove cuttings and appropriately dispose.
- Excavate out all deposits and silt from the bed of the ditch, remove and appropriately dispose.
- Excavate bed to ensure invert of ditch is at same level of any connected culverts.
- Inspect any connected culvert headwalls and address any problems or concerns.

5. Woodland Ditch.

Concerns:

- Debris restricting flow with risk of downstream blockage.
- Siltation creating no capacity and causing overland flow.
- Blocked downstream culvert preventing flow.



A culvert, just downstream of this image of a watercourse, has been blocked for some time. This has allowed for water and detritus to accumulate here and fill the watercourse channel with silt, soil and debris. Flooding of land downstream is being exacerbated by the condition of this watercourse.

Suggested remedial actions:

- Remove and appropriately dispose all litter and debris.
- Cut back all vegetation from within the channel, remove and appropriately dispose.
- Excavate out all deposits and silt from the bed of the ditch, remove and appropriately dispose.
- Excavate bed to ensure invert of ditch is at same level of any connected culverts.
- Inspect any connected culvert headwalls and address any problems or concerns.

6. Ditch.

Concerns:

- Unknown maintenance and managemnt plan.



A well-maintained watercourse ditch. The further embankment is retained with stone (stone revetment). This ditch requires only a routine inspection and maintenance programme and remedial action as and when required.

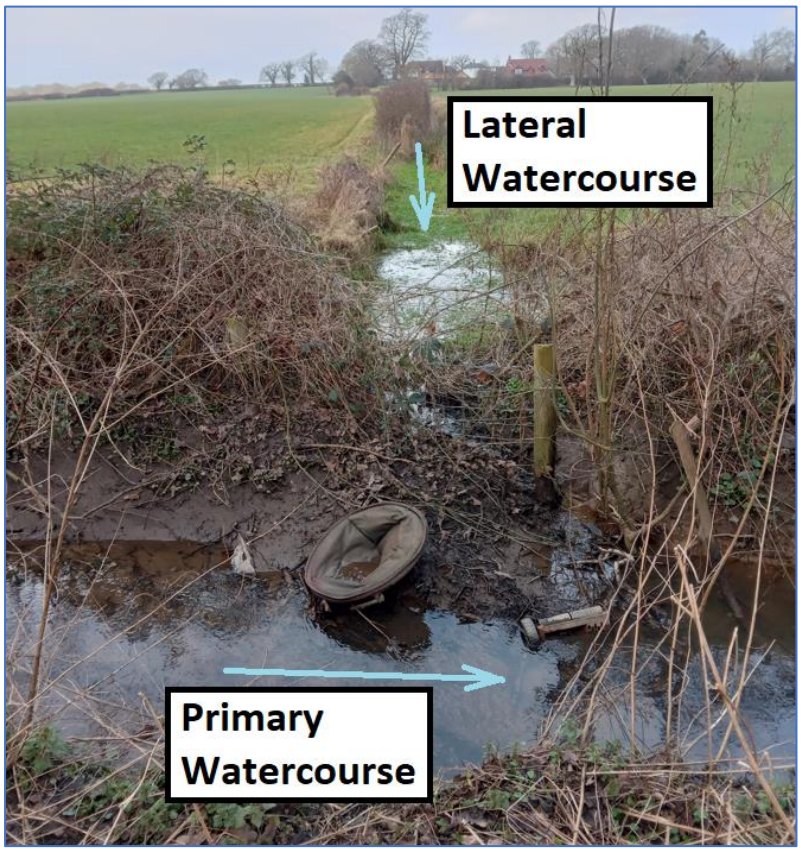
Suggested remedial actions:

- Periodically monitor silt depth.
- Follow a planned vegetation cutting regime.
- Remove any self-seeded plants and trees as they arise.

7. Rural Ditch.

Concerns:

- Litter restricting flow with risk of downstream blockage.
- Debris restricting flow with risk of downstream blockage.
- Siltation limiting capacity.
- Blocked/restricted discharge from lateral ditch into primary ditch.
- Overgrown vegetation restricting flow within lateral ditch



Both watercourses are free flowing. However, debris and litter has accumulated where a lateral watercourse discharges into a primary watercourse. This appears to have slowed flows and allowed silt and further debris to accumulate, narrowing the primary watercourse width and elevating the bed height. In addition, a hedge appears to be creeping into the bed of the lateral watercourse.

Suggested remedial actions:

- Remove and appropriately dispose all litter and debris.
- Cut back vegetation from within the channel, remove cuttings and appropriately dispose.
- Excavate out all deposits and silt from the bed and embankment of the ditch, remove and appropriately dispose.
- Excavate primary bed and lateral to ensure inverts of ditches match.

8. Urban Ditch 1.

Concerns:

- Possible future collapse of vertical concrete revetment.
- Uneven profile restricting flow and causing errosion.



The vertical concrete revetment is beginning to fall in towards the watercourse. It is likely to fall in at some point in the future. The position of the structure will be reducing the available cross-section area for the channel to carry water. In addition, the tilting movement of the concrete wall may be being exacerbated by water being able to flow around the back of the structure and erode the bank from behind. The broken nature of the wall has allowed space for vegetation to take root, and this will likely exacerbate the deterioration of the wall.

Suggested remedial actions:

- Cut back all vegetation, remove and appropriately dispose.
- Employ the knowledge, skills and experience of a hydraulic and geotechnical civil engineer to advise on appropriate methods to stop and remedy the collapse of the vertical concrete revetment.

9. Urban Ditch 2.

Concerns:

- Materials placed upon the top of a watercourse embankment.



The property owner has used the area behind their garden fence to store gardening tools and equipment. Unfortunately, this area is at the very top of a watercourse, and there is a risk that these items could fall in from high winds or high water level flows. Material like this falling into the watercourse channel will quickly become snagged on vegetation that may grow within or adjacent to the watercourse. This will immediately begin to trap more debris until a significant blockage is formed. It may also be possible that material that has fallen in could float and become trapped on a downstream trash screens, increasing flood risk elsewhere and the maintenance requirements of others.

Suggested remedial actions:

- Materials to be removed from the top of the embankment and stored where there is no risk of falling in.

Further tips:

- Unless a silt trap, catch pit, or other structure has been specifically installed, the invert (bed) of a ditch should be at the same level as the invert of any connecting culvert (pipe) to allow a continuous flow.

- Try to maintain, where possible, a sloping angle to the embankment. This will allow for water to drain easily from surrounding land into the watercourse and will encourage vegetation root growth to support the bank and reduce erosion.

- Do not leave any debris, cuttings or materials on top of an embankment, as this can easily get blown or washed back into the watercourse.

- When clearing a length of watercourse, it is generally better to start downstream and work up. This ensures that the downstream parts of a watercourse are clear for any sudden release of water from upstream clearance work.

- Litter picking, digging small accumulations of silt by spade, cutting vegetation with shears, and mowing grass by hand, would be considered small works. This will need to be covered by all appropriate UK Health and Safety Legislation and Regulations and be supported with appropriate and fully understood risk assessments and method statements.

- Machine excavations, embankment profiling, tree cutting and hedge strimming, would be considered larger works, and this should be undertaken by a landscaper with appropriate knowledge, skills and experience. This will need to be covered by all appropriate UK Health and Safety Legislation and Regulations and be supported with appropriate and fully understood risk assessments and method statements.

- The remediation of any retaining structures, revetments, culverts, and trash screens, should only be undertaken by a suitably skilled and experienced civils construction company, along with the supporting knowledge, skills and experience of a suitably qualified hydraulic and geo-technical engineer. This will need to be covered by all appropriate UK Health and Safety Legislation and Regulations and be supported with appropriate and fully understood risk assessments and method statements.

- Any works to an ordinary watercourse that can alter the flow, such as damming, diverting, restricting the flow, either temporarily or permanently, will require Ordinary Watercourse Consent from The West Sussex Lead Local Flood Authority. Ordinary watercourse land drainage consent - West Sussex County Council