

## **Roeburndale Woods WEG**

# **Flood action plan for Backsbottom Farm March 2019**

prepared by Dr Rod Everett

**Context -Water Environment Grant 2018 Saving Roeburndale Woods** (Approved 25 Feb 2019)

**Project management** - Sarah James, Lune Rivers Trust and Dr Rod Everett, Backsbottom Farm.

### **Type of Project**

Demonstration sites and farm advice for landowners on the River Roeburn plus funding for implementation of measures to combat acute erosion protection Roeburndale Woods SSSI and helping to maintain the Good Ecological Status of the River Roeburn by controlling the input of silt and sediment.

### **Wider Objectives**

- \*Part of wider catchment strategy to work with partners to prevent deterioration of our waterbodies.
  - \*Part of wider catchment strategy to manage flood risks at a landscape scale.
  - \*Has support of 34 Living Lune catchment partners.
  - \*Engages farming communities.
  - \*Complements Natural Flood Management work with wider benefits to society reducing flood damage within the Wenning sub-catchment and downstream through Hornby, Caton and Lancaster.
- Roeburndale Woods is a SSSI which runs along the banks of the River Roeburn. There have been 6 major floods between 2015 and 2017 which take away trees and huge quantities of sediment. The threats are to Roeburndale Woods SSSI (loss of trees and soil) and the River Roeburn through the input of the same.

### **This project will:-**

- \*Safeguarded SSSI woods, and contiguous woodland, Improved water quality , through decrease in sediment, silt and bank erosion helping maintain WFD Good Ecological Status.
- \*create demonstration sites to show how erosion can be controlled by a range of measures.
- \*provide farmers with advice and individual plans to combat this erosion and protect the woodlands.
- \*fund the implementation of interventions to control/prevent erosion.

## **Climate change and extreme flooding.**

Climate Predictions suggest that we may get a combination of much wetter and drier weather.

Our weather is changing and taking Natural Flood Management (NFM) measures will help to ameliorate the damage to Roeburndale and the downstream communities.

Many previous floods have caused extensive damage to the area.

See next page and [www.riverroeburn.uk](http://www.riverroeburn.uk) for photos and past events of the River Roeburn Including Wray flood in August 1967.

The intention of NFM measures is to reduce the peak river flow and spread it over a longer time period.

See the sharp peak hydrograph for 11 October 2017 flood representing a typical River Roeburn flood event.

The River Roeburn is a spate river with an extreme of the extensive Wray flood damage over a short period of less than 3hours caused by a rainfall of around 120mm in 90 minutes in 1967.

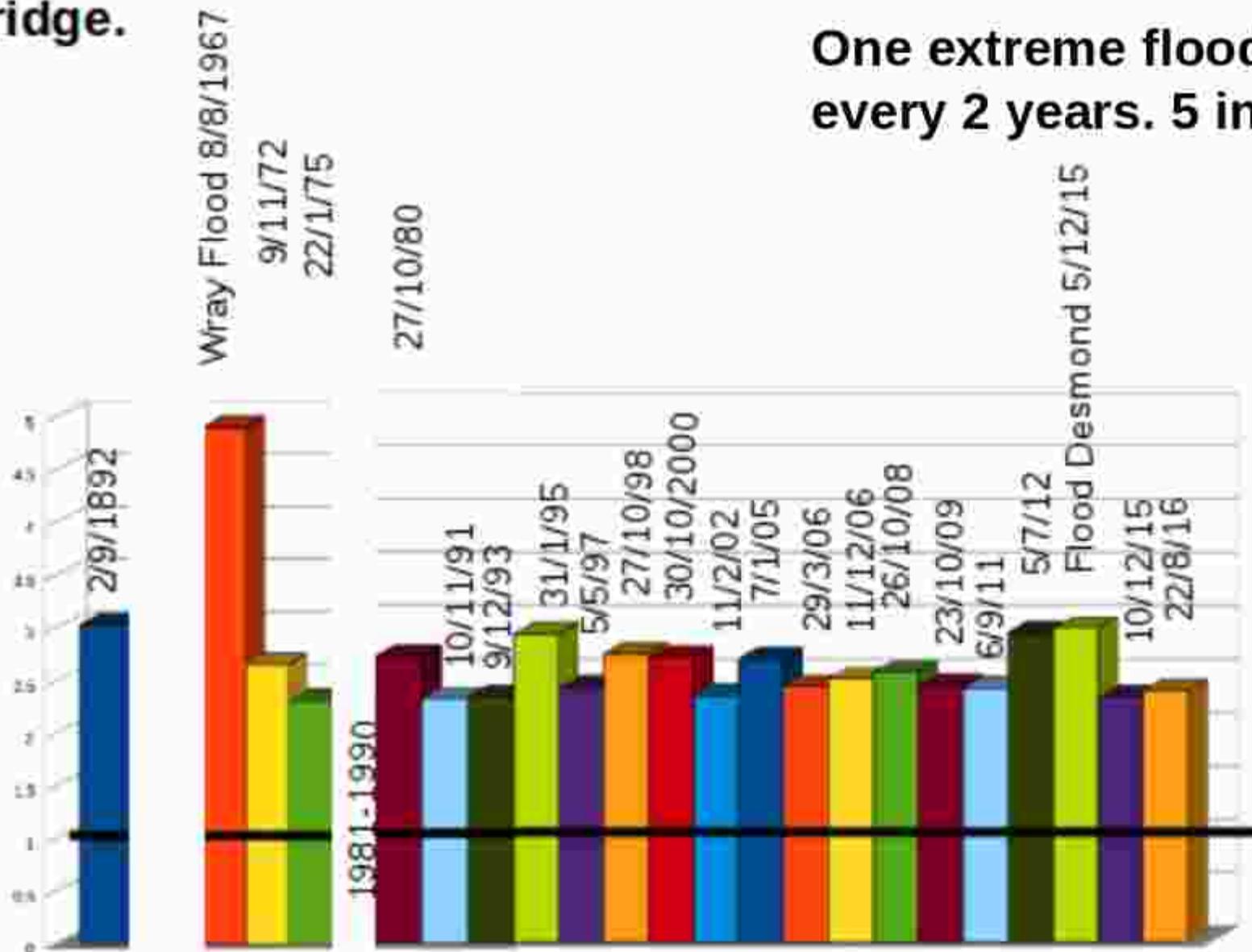
UKCP18 Climate Change projects a greater chance of hotter drier(41-57% drier) summers and Warmer Wetter (22-33% wetter) winters by 2070.

Hot ground repels cooler rainwater creating a near 100% runoff

During 2017 and 2018 Steams have dried up in the summer that have never been dry before.

**Wray river levels for the Hindburn and Roeburn showing major flood levels over 2.3 metres high. Black line shows average high 0.9m. Full records from 1970 with missing dates 1981-1990. Wray Flood level height due to trees backing water by Mealbank Bridge.**

**One extreme flood on average every 2 years. 5 in last 2 years**





Backsbottom Farmhouse washed away 8 Aug 1967. Bill and Alice Brown were rescued from the bedroom above the kitchen. It was a 5 bedroom farmhouse with hay barn and shippon attached. In the yard there were other buildings such as machinery sheds and hen house.

The bridge next to the house and the sheep pens including lambs went as well. Lost 1 pig, 1 heifer, 45-50 lambs and a sheep dog.

"The river just boil over the garden – like milk boiling in a pan."(Bill Brown)



# River levels on Hindburn at Wray 6-13 Oct 2017

Peak flow 2.3 m. Flood Desmond 5/12/2015 peak 2.9m



11/10/17



12/1017

— Typical Low — Measurement — Typical High



## **Flood Management proposals**

The following maps show actions that can be taken at  
Backsbottom Farm  
to reduce peak flood flows in future extreme rainfall  
conditions.

These proposals prepare the farm as a good demonstration area for understanding Natural Flood Management.

Under WEG there will be 3 farmer training events.

Chris Barlow from Cumbria University is bringing a school to visit as part of developing a flood education curriculum

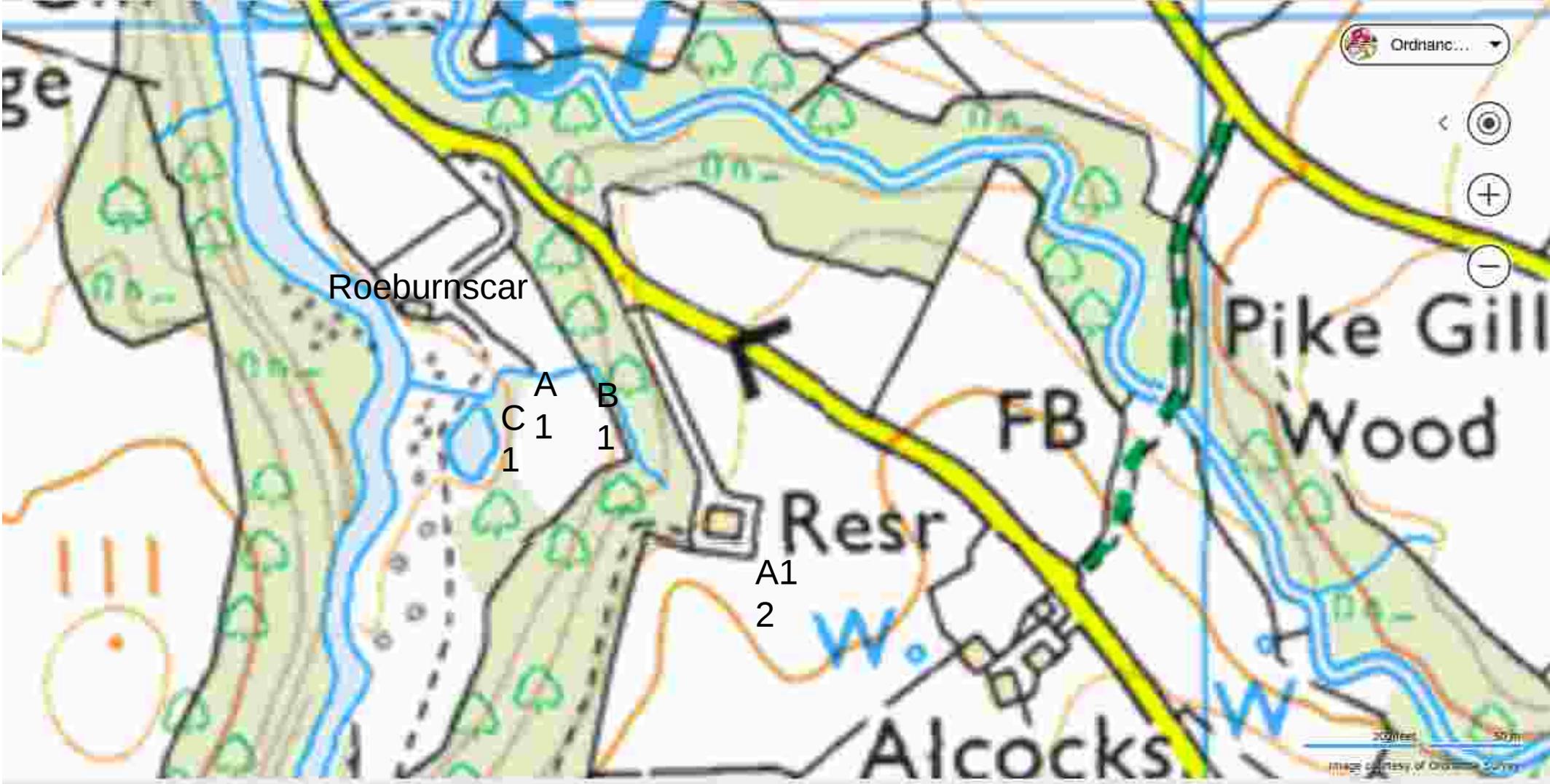
Each map has letters A,B,C etc relating to each action.

With each letter there is a number eg A1. This means action A for farm 1 which is Backsbottom Farm, Roeburndale West. (Number for other farms are at the end of this report.)



Map of Roeburndale showing contours, woodlands and the River Roeburn and Tributaries.

Outhwaite wood is part of Roeburndale Woods SSSI.



A1. 2 small woody check dams in stream

B1. 2 small ponds with leaky upper dam in wood (may have been historical pond)

C1. Create low flow diversion to pond to prevent drying up. Contains great crested newt

A12. Examine neighbours field to find source of flood water



B1 Stream that can be slowed with 2 small dams with leaky overflow. Top left.

A1 Stream that can be slowed by 2 woody check dams. Below left

C1 Stream needs diverting to pond when very low flow to protect pond with crested newt from drying out.





**Stone or log check dams helping to slow the flow and spread water during flood events.**





More examples of leaky check dams.





Check dams using living willow grow their own replacement materials.





F1. Area of landslip from Storm Desmond caused by diversion ditch on footpath.

E1. Potential area for holding water. There is an old wall that could be used as barrier for water.

D1. Two small streams that could be slowed by small Woody Debris check dams x 4.

C12. Neighbours: In extreme events water flows through wall at East side of field then some goes N to stream and most makes its way over the field to run down footpath. Potential area for keyline plough and taking water into soil and towards stream.

B5. Water floods to west in this field. Potential Keyline plough to stream in North or swale or trees

B12. Potential for 2 leaky wood check dams.

A5. This stream could easily be slowed by 3 check dams.



E1 Area to be flooded with stone check dam.  
This will hold back flood water in extreme rainfall conditions.

D1 2 streams can be held back with check dams x 4. Bottom photos.



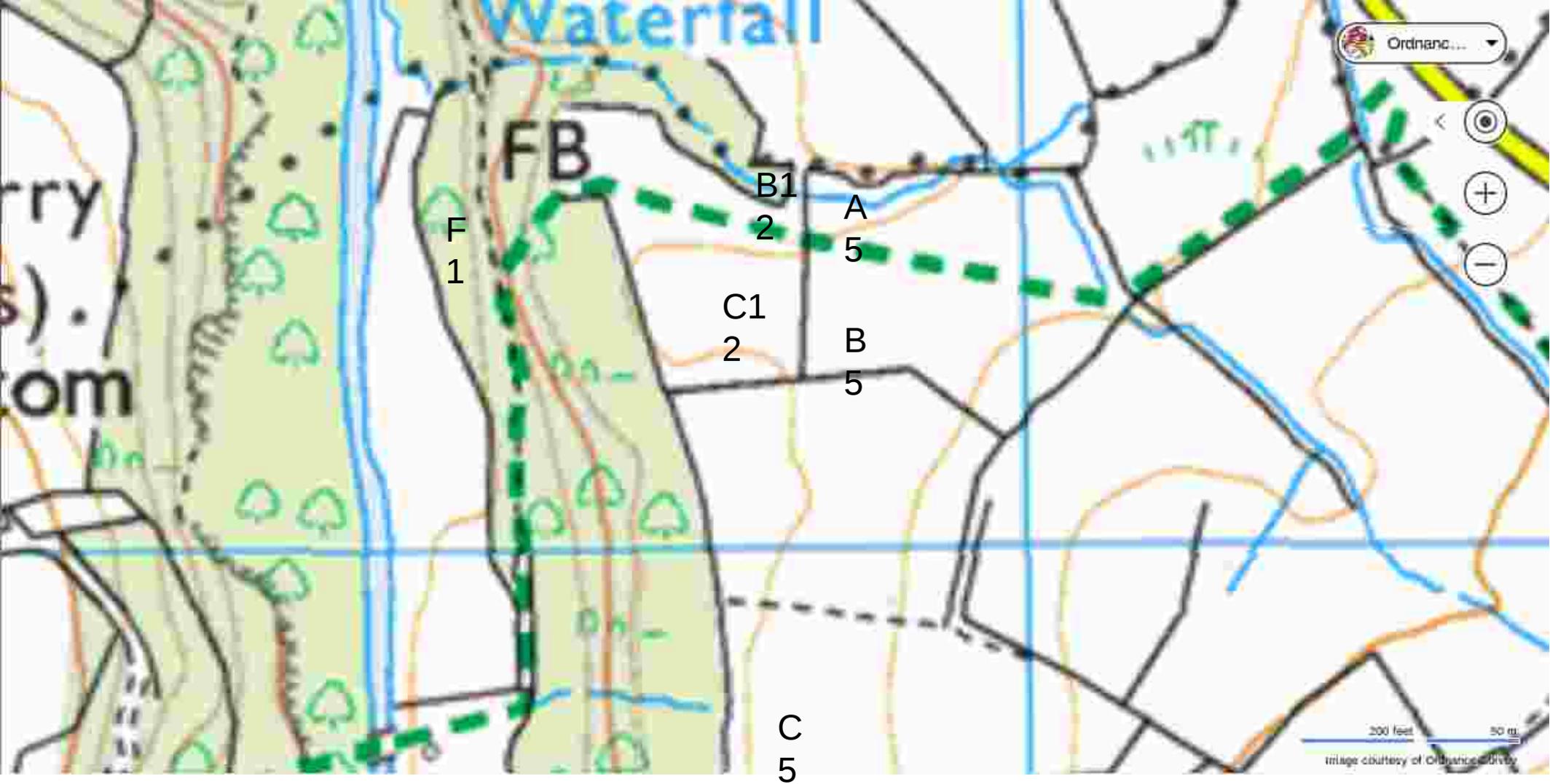


F1 Landslip caused by flood Desmond Dec 2015. Caused by water movement on C5 and B12. Swales, tree planting or keyline subsoiling would prevent this. Top left

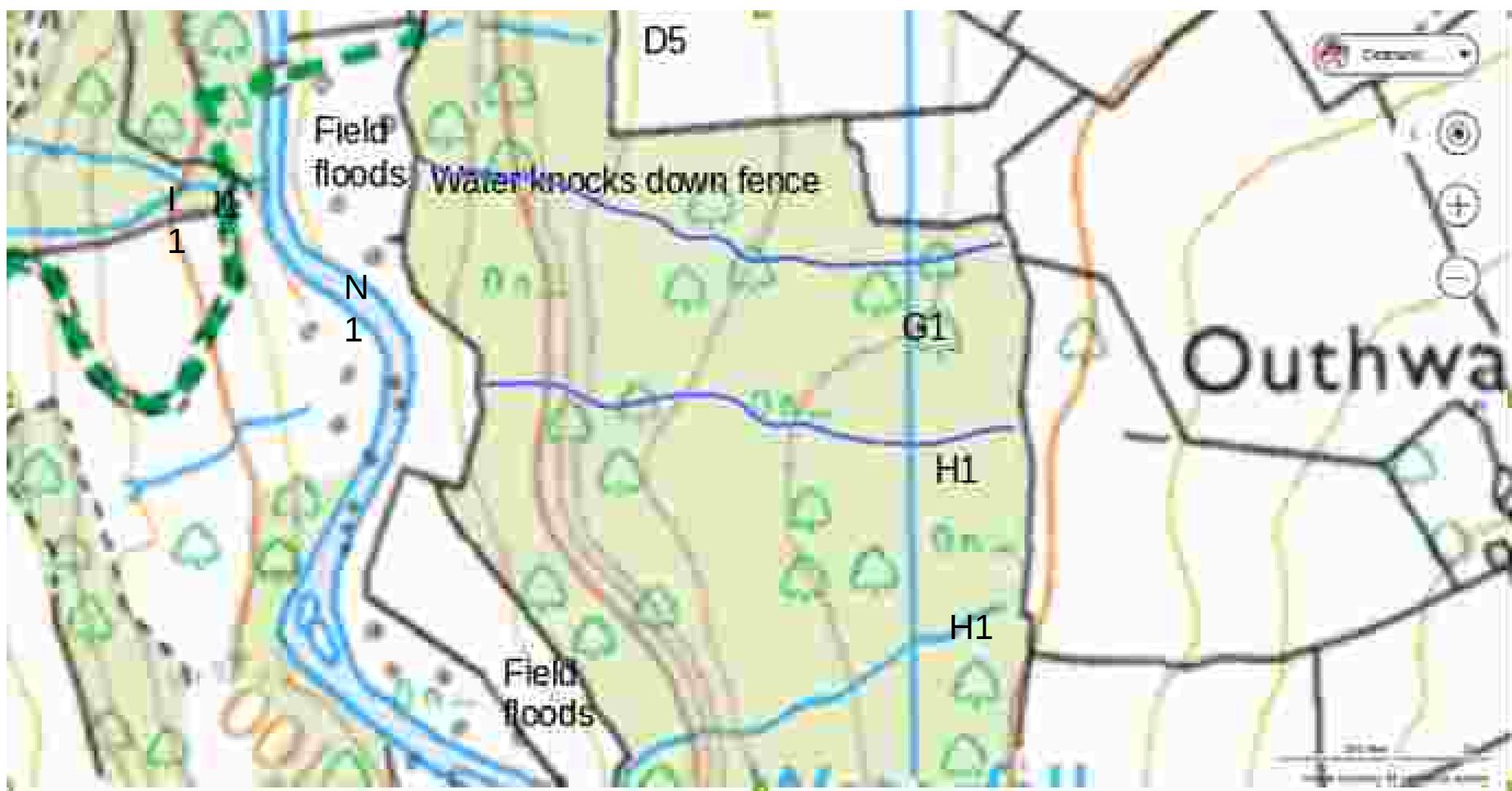
On Neighbours land  
B12 Potential area for 2 woody check dams,  
reducing flow at D1 and E1.

A5 Potential for 3 woody check dams  
reducing  
flow at D1 and E1.





C5. Spring in field. There may be potential for small woody dam near woodland edge  
F1 Flood Desmond Landslip.



D5. There may be potential for slowing down in field.

G1. Good location for small woody debris dams to slow and spread water.

H1. Good location for small woody debris dams to slow and spread water.

I1. In flood culvert under track gets blocked with twigs and water flows into gate way. Below the culvert the stream is a deep gully into river. This stream can be slowed down on Whitmoor.

N1 After flood Desmond 2015 3 large rock vanes and a horseshoe shape were put into The river to reduce bank erosion and put the main river flow away from the banks.

This is called In River Training and has worked well. Similar vanes are proposed for K1.



Place where G1 streams washes out fence-  
Top left.

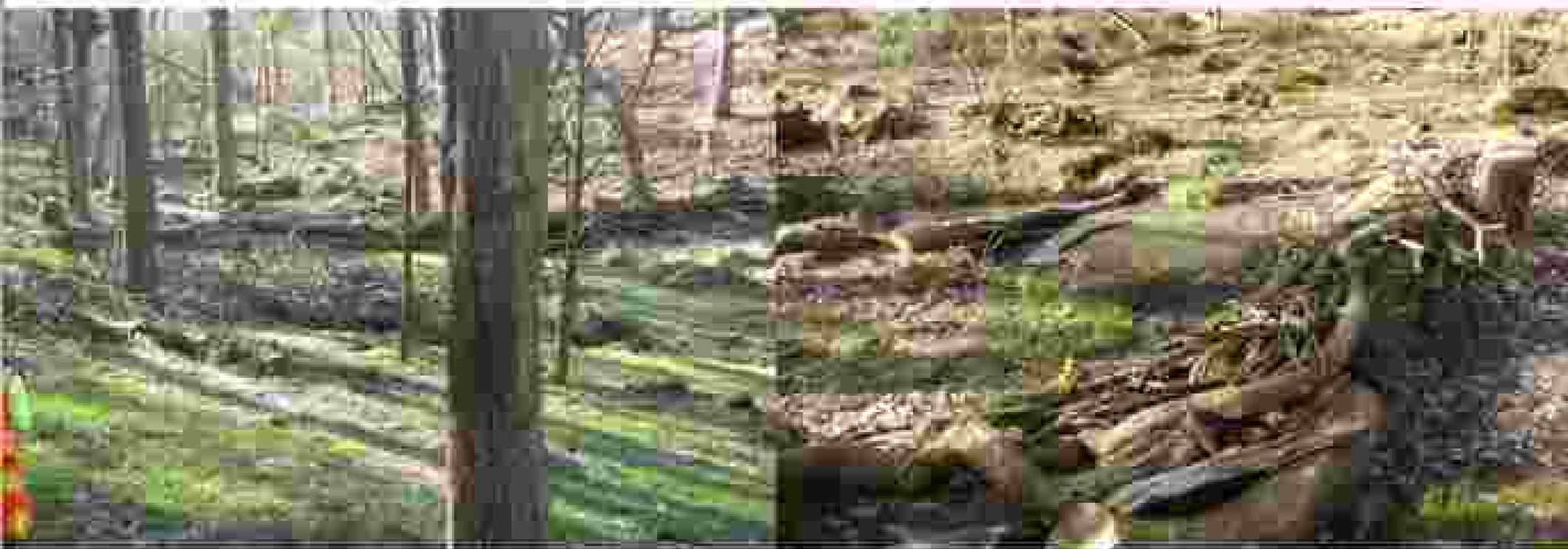
G1 where 3x woody debris would help  
slow the flow. Bottom Left

H1 Place where 3x woody debris would  
slow  
the flow. Bottom right.





Woody checkdams and ditches filled with branches in a woodland setting. These slow and spread the flow and help it sink into the woodland floor. The amount of water reaching the main river is reduced.





N1 Top left. This shows a vane of rocks coming out from the bank and angled up Stream. These capture rocks against the bank and divert the main water flow towards the centre of the river.

There are 3 of these put in to protect the bank.

Bottom left. This shows a horse shoe shape of that pulls the main water flow into its centre and deepens the river. This has helped pull the river away from an eroding bank.



These make a good demonstration of In River Training.



J1. This area floods from Laneshaw Gill from Whitmoor. In events when there is warm dry ground and then heavy cold rain this area floods with a lot of stones from the eroding gill K2,3,4,5. Laneshaw Gill is a wooded gill that is eroding badly with regular landslips. On part of the Southern edge of the woodland the landslips have undermined the fencing.

H5. Stream badly gullied. Investigate if there is any NFM potential higher up stream.

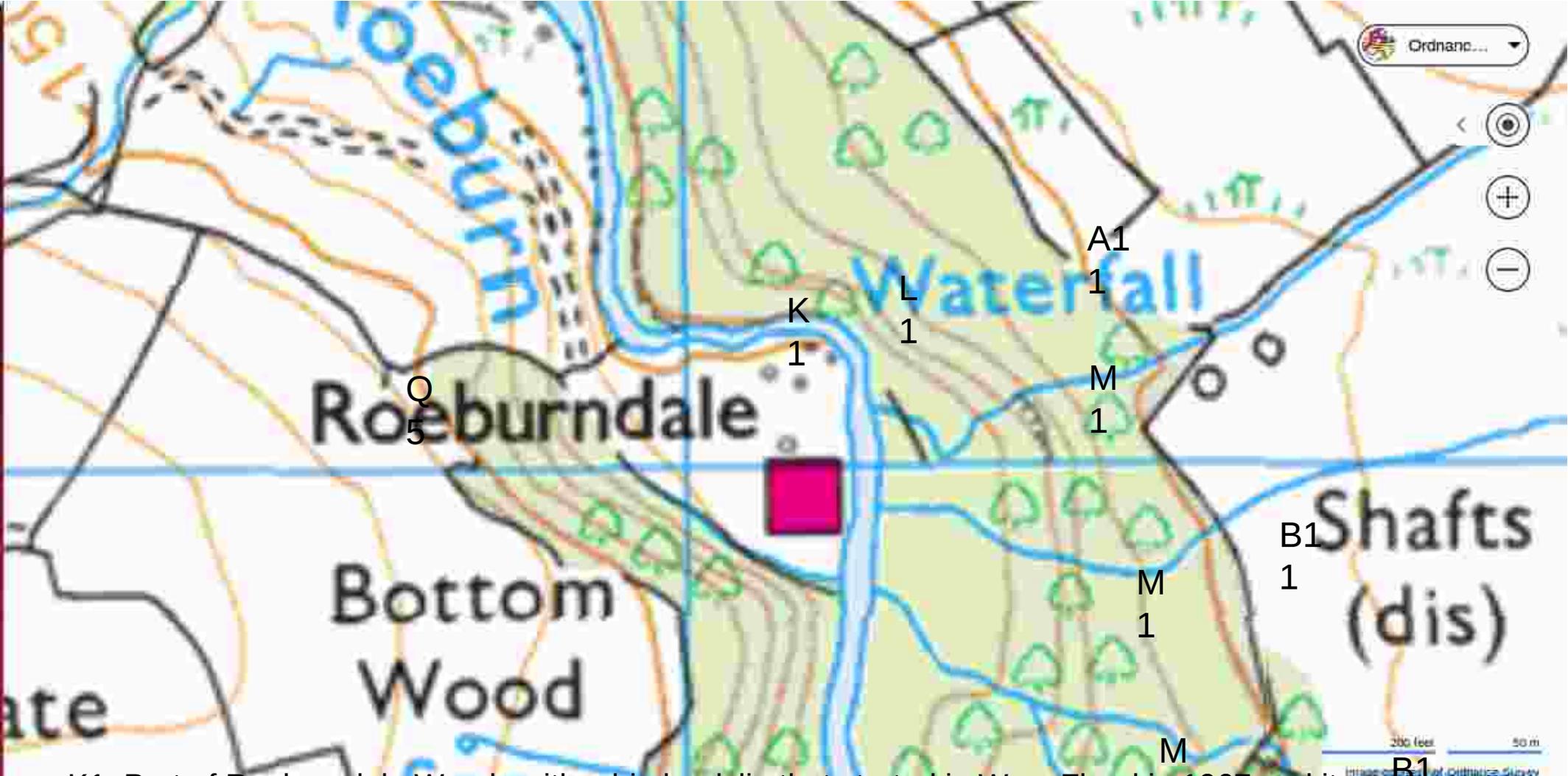
CS1 The current fencing along the riverside is collapsing into the river..Considering fencing off an area about 8 metres back from the river bank and removing grazing. This area could be planted with trees to be pollarded in the future (avoiding heavy roots systems collapsing into the river). This area could be extended to CS2 where the land above the woodland is landslipping slowly. If left as it is, a future extreme rain event could collapse this area of woodland into the river. It is hoped that this will be part of new Countryside Stewardship Scheme.



01 Wet flush that runs into an area prone to landslip. Make into a series of small ponds.



CS2 Area collapsing into river. Plant up this collapsing area with alder and fence from livestock. In longer term coppice trees to reduce weight that will contribute to this area landslipping.



K1. Part of Roeburndale Woods with a big landslip that started in Wray Flood in 1967 and it is still eroding with water coming from above L1 and it is additionally being undercut by the river below as it sweeps around the corner. At the bottom of the slope In River Training with a vane of large rocks will encourage the river to move away from the base of the landslip. Once stabilized this should grow trees and be help more firmly.

L1. Is a footpath that in extreme rain events becomes a rushing stream. Explore the potential for slowing its flow either in the woodland or more preferable in the fields to the East. (A11).

M1 Thes 3 streams become rushing torrents in flood and cause some bank erosion. Explore the potential for slowing the flow upstream B11.

O5 Slope is landslipping regularly. Explore the potential for slowing flow on neibours field above.

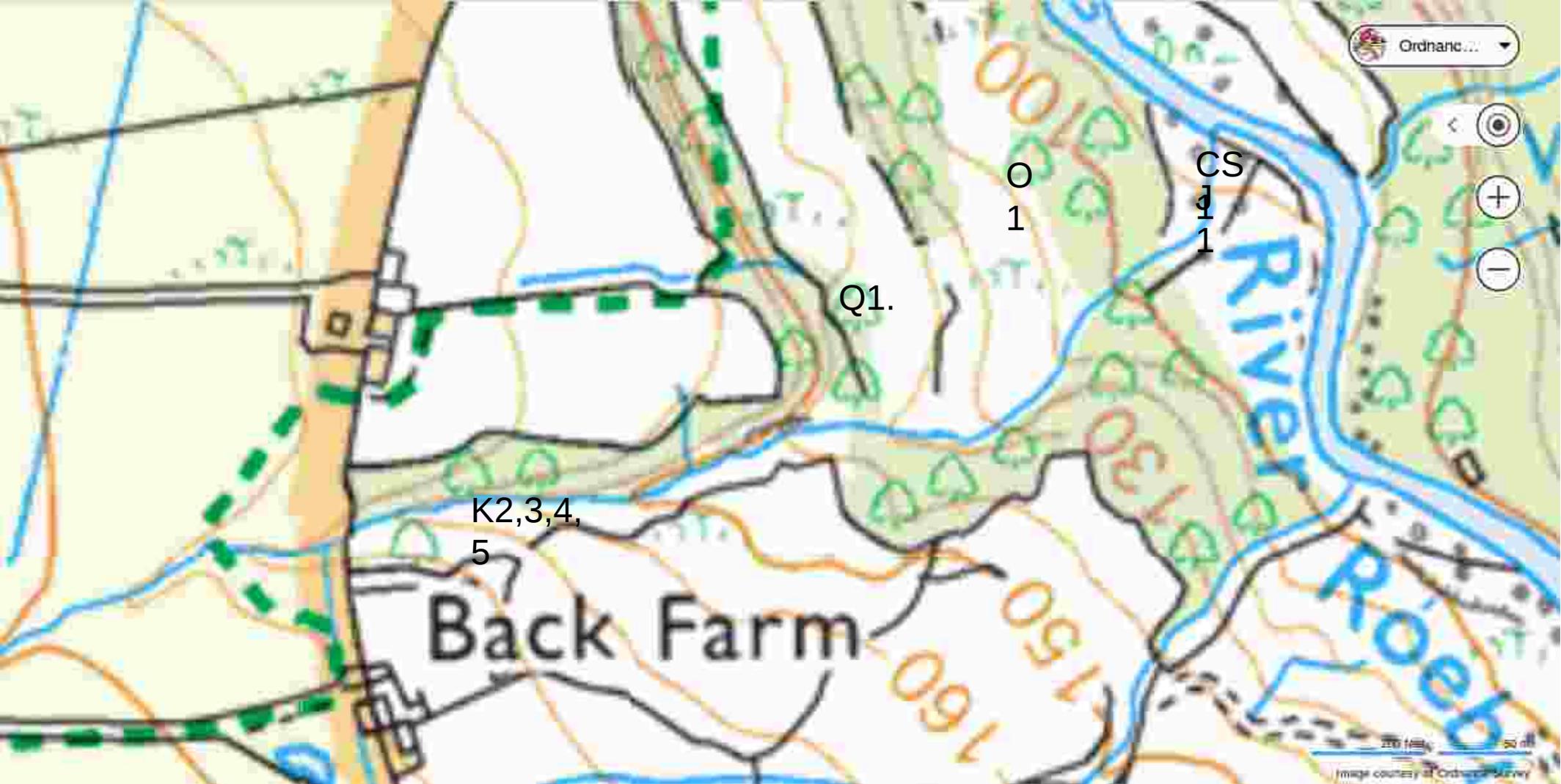
200 feet 50 m  
 Image © Crown Copyright, Ordnance Survey



K1 A large landslip that started in Wray flood 1967. This is slowly establishing alder trees in places. The base of the landslip is being undercut by the river. Proposal to build 3 rock vanes for In River Training to pull the river away from the bottom of the bank. Top left.

L1 Footpath during a storm in Nov 2017 (bottom right). This over flows in 2 places that contribute to erosion of K1. One is shown bottom left. The proposal is to divert this stream down an old packhorse track where it will do no damage. Investigate to see if this flow can be reduced in neighbours field A11.





K2,3,4,5 Landslipping woodland becoming a deep gully. Potentially taking trees and boulders into the river if a big landslip occurs.

Q1. Stream floods regularly and has damaged the fence and the nutrient content has caused nettles to grow in the downstream field.

O1. There is a wet rushy ditch that makes its way NEE and has contributed to landslips of the river bank in 1967 and other extreme events. This would make into a series of small ponds with an additional raised leaky dam area that would help steady the flow of extreme rainfall events

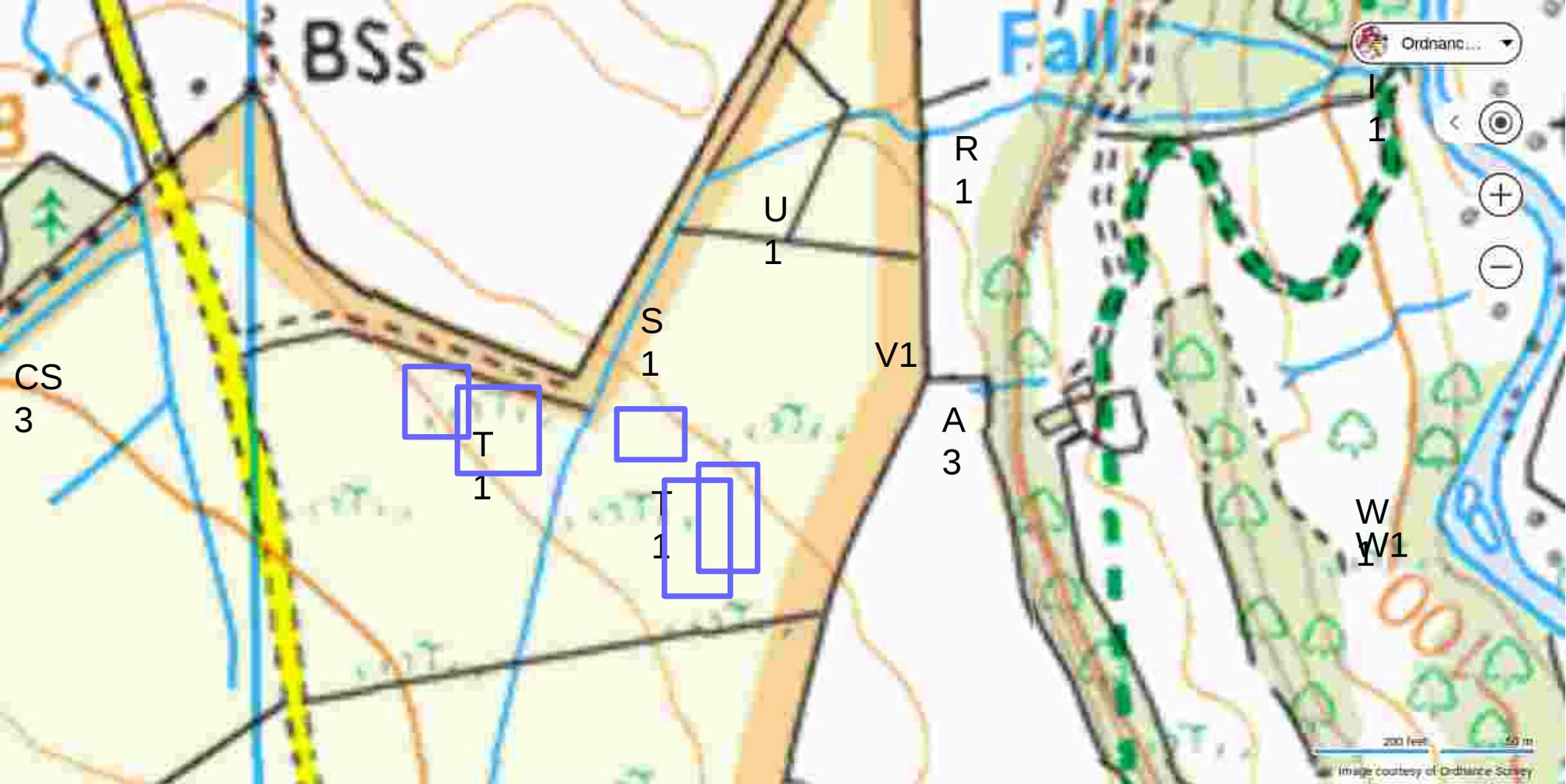


K2,3,4,5 Top left -Erosion in Laneshaw Gill

Bottom left CS1 fence collapsing into river.  
Proposal to plant up area with trees up to 8 m  
from river bank.

Top Right J1 Laneshaw Gill as it enters the  
river

This stream's banks are eroding with the  
flooding and movement of rocks down the  
gill.





W1 2 areas that are normally damp but flow with water in extreme conditions and cause landslip.

Proposal to make small stone check dam at each point and plant upside with about 4m<sup>2</sup> of trees (small Leaved lime and shrub eleagnus.) These blocks will be sheep fenced.

A3 Some flooding near the Middle Wood Centre comes from here. Water needs observing In flood conditions.

V1 is a drainage ditch that has had alder logs placed in it about 3 years ago to slow the flow. This is now growing sphagnum and is a good demonstration..

R1 One stone check dam, and 2 wood checkdams were made here 2018. The access to these by educational visitors needs improving and surfaced with gravel.

S1 This has 2 woody check dams built in 2018. 2 additional check dams with the bottom of the higher one being at the same level as the top of the one below will help demonstrate best practice. This technique creates a flat water surface with no erosion and is essential for

check dams on steeper land.

Higher up this drainage ditch 2 earth blockages with rushes have created small ponds and slow the flow.

T1 This is an area of contour swales that can catch around 70% of maximum rain and then slow, spread and sink it into the ground. Trees have been planted on the downslope side to help the water infiltrate and top up the ground water. An area for overflow from the stream into the swales should be built to divert high flow water to the swale.

At present the swales are separated where there are sheep tracks. Proposed new

u  
le

this water to spread along the full





S1 2 woody check dams built in 2018  
Top and bottom left.

V1 Alder log slowing the flow and growing  
sphagnum moss. Bottom right.





W1 Area (Top Left) that runs water in extreme rainfall conditions. This causes erosion and potential landslip below (bottom left)

W1 Another area to North where the land is slipping is similar.

W1 (Bottom Right) An adjacent area landslipping from wet stream above. Proposal to create a small stone check dam with lime trees and eleagnus shrubs planted in small block above to slow the flow. Good sheep fencing and a water gate will

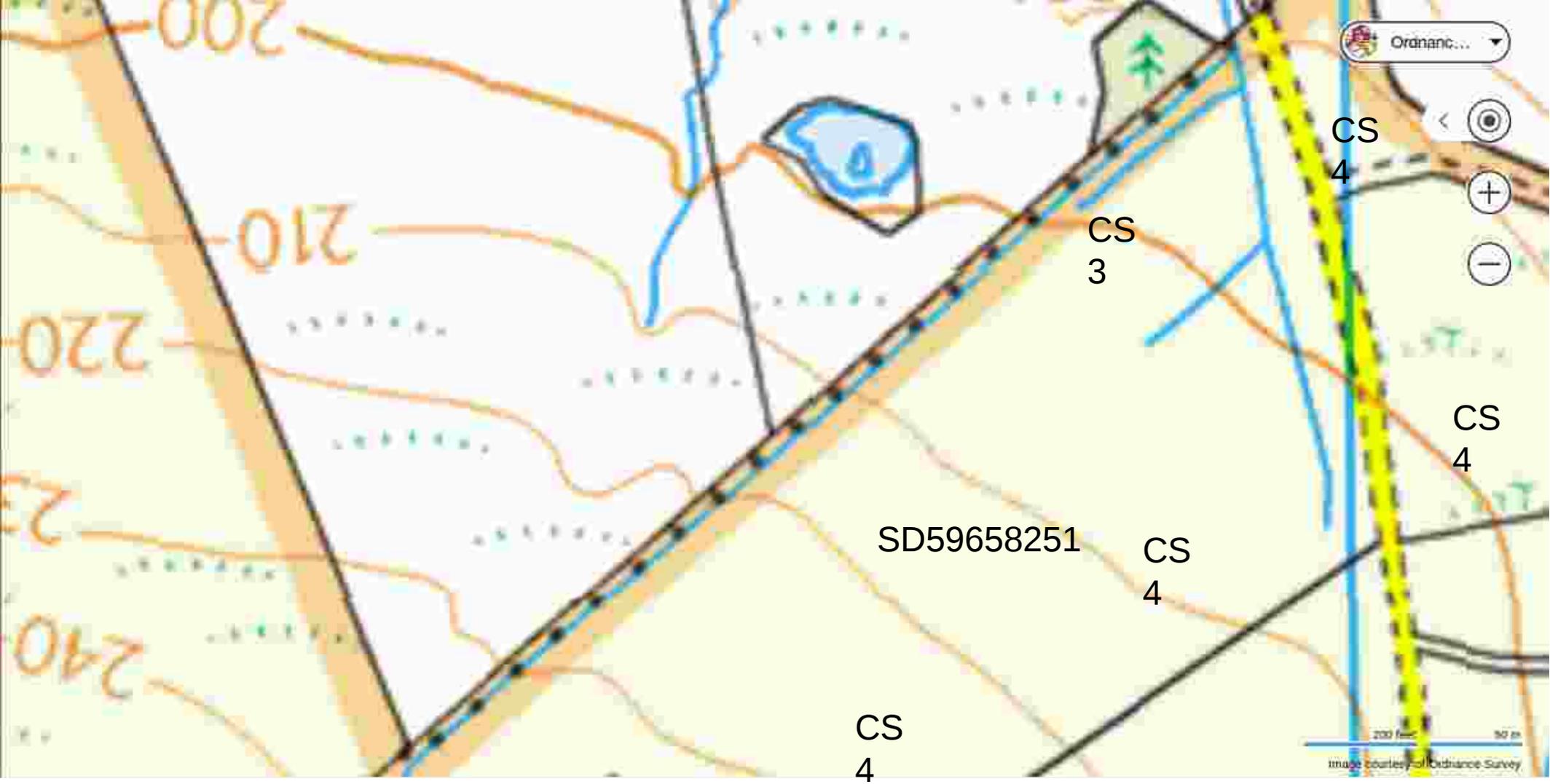




I1 Stream that runs off the Whitmoor area with swales and check dam. This would make a good area for monitoring stream flow.

Bottom photo shows where this stream enters river with a gully below the track.





CS3. Old drainage grips. Explore potential for blocking some of these where they have developed into a deep narrow gully.

CS4. Well developed blanket bog slows and sinks heavy rainfall events.

On the West side of the road they help prevent flooding in Farleton and they need to be maintained in good condition by maintaining a reduced stock number. Long term annual payments would help ensure the blanket bog remains in a good condition.

Higher Tier Countryside Stewardship is being sought to help with this.

This area to the West of the road does not fit in the Roeburndale Woods WEG scheme and will hopefully become part of a Countryside Stewardship Scheme.

Tussocks of blanket bog with sphagnum moss and dwarf shrubs such as heather, bilberry, crossleaved heath and cranberry hold around 80% of their volume in water.



CS4 Areas of blanket bog that hold water in the tussocks of sphagnum, heather and bilberry and slows the flow.

It is hoped that this area will get into a Higher tier Countryside Stewardship Agreement to help protect the blanket bog. New scapes or small ponds will add to this by attracting more snipe, curlew and maybe redshank. This tussocky area is a favourite with the barn owls hunting for voles.

Hen harriers are often seen in this area and It is hoped that one day they might nest here.



CS5. Potential for 3 Wood check dams to slow the flood water and the lowest one will divert extreme flood water into a level contour swale (darker blue) to slow spread and sink.

CS6. When the swale is full then it will be designed to over flow into rushy area and eventually either sink or return back to the stream.

CS4. Well developed blanket bog with tussocks of sphagnum moss, cotton grass, heather crossleaved heath, bilberry and cranberry. This area holds a lot of water in the sphagnum. This helps cool the ground and encourages the water to infiltrate (at 4C water is at it's most dense.) The roughness of the surface slows the flow of flood water.

\*\*This Area is not in the Roeburndale Woods WEG scheme but is important to prevent Farleton Beck from flooding and damaging Farleton village as it did in 1967. It is hoped

Soil structure.

Good soil structure is important to help water infiltrate into the ground and replenish the ground water. Backsbottom farm has a rich soil with many earthworms and a good soil structure. In some places compaction by sheep grazing has reduced the soils ability to hold water and the micro- biota is reduced. Organic matter could be improved which will support a rich community of fungi, bacteria, protoza and nematodes.

A researcher at Leeds University is surveying on Backsbottom and Barkin Gate farms looking at the effect of anthelminthics on soil organisms

Experimenting with compost teas, effective micro organisms, herbal teas and fungi preparations will help to develop a richer more resilient soil.

It is hoped that Daniel Tyrkiel, who has trained with Elaine Ingham in

## WEG Roeburndale Farmers list

1. Rod Everett Backsbottom farm Owner and farmer.
2. Richard and Hazel Preece, Thornbush
3. David Ibbotson, Little Scar
4. John +Jill Harpley, Back Farm
5. Malcolm + Irene + Jack + Joe Woodhouse Barkingate Farm
6. Shiela +Ruben Lord (helps Stuart Mashiter 14), Lower Salter
7. Thomas +Barbara Woodhouse, Middle Salter
8. Graham Ibbotson, tenant Higher Salter and Grazing of Mallowdale fields and fell.
9. Richard Johnson, Winder Farm
10. Karl Oyston, Owner Manor Farm, Claughton
11. Alan + Margret Wright + Stephen Wright Stauvin Farm
12. Thomas and David Wright Alcocks Farm
13. Morris Longton and other family members owner Outhwaite Farm; Alan Wright (11)and Malcolm Woodhouse(5) run livestock on different parts of farm.
14. Stuart Mashiter, Harterbeck Farm
15. G. Gordon, Park House
16. Graham Wright, John + Karen Wright Bellhurst
17. David +Issac + Dorothy Woodhouse, Scale Farm.
18. Aubrey Chard and his sister - tenants, Haylott Farm
19. Rob Foster Agent for Grosvenor Estates Abbeystead - Owners of Mallowdale Farm and Higher Salter
20. David Battersby, Hornby Castle Cottage - Owner Goodber Common
- 21 John and Pat Stavely Hoskins Farm Wray