trent rivers trust

Conserving and enhancing the rivers of the Trent catchment for people and wildlife

Charnwood Natural Flood Management Scoping Study

Final Report

August 2019

Executive Summary

This study aims to assess the feasibility of natural flood management (NFM) intervention within the catchments of the Black Brook and Wood Brook. The study is part of a larger landscape project called The Chronicles of Charnwood which aims to celebrate its internationally important geology, connect people to its history and secure a sustainable future for the area.

A desk study using SCIMAP and GIS methods was undertaken to inform site walkovers in the Black Brook and Wood Brook Catchments. During the site walkovers, potential NFM opportunities were mapped with landowner liaison taking place to gauge the acceptability of NFM intervention within the landholdings. Following the site walkover, GIS analysis allowed for the potential water storage of interventions to be calculated as well as their catchment size.

Each opportunity identified was ranked High, Medium or Low based on the potential runoff, potential for water storage, landowner acceptability and the potential for wider benefits to be gained such as habitat creation or water quality improvements.

In total, 18 opportunities were identified in the Black Brook catchment with 13 of these being ranked as high priority. Within the Wood Brook catchment, 14 opportunities were identified with 7 ranked as high priority. A mixture of interventions were suggested including bunds, wetland creation, leaky barrier installation, storage ponds and cross slope woodland.

If implemented, the NFM opportunities identified would store water during high flow events and help to reduce overland flow within both catchments. Additionally, habitat creation and water quality improvements would be gained as a result of the interventions.

Contract

This report describes the work commissioned by Julie Attard of The National Forest Company. Josh Wells and Alan Graham of Trent Rivers Trust completed this work. Kim Jennings of Trent Rivers Trust managed this project.

Prepared by……Josh Wells MSc BSc

Project Manager

……..Alan Graham

Design Lead

Reviewed by……..Kim Jennings MSc BSc MCIEEM

Senior Catchment Manager (East)

Purpose

This document has been prepared as a Final Report for the National Forest Company on behalf of the Charnwood Forest Regional Park Partnership. The Trent Rivers Trust accepts no responsibility or liability for any use that is made of this document other than by the Client for the purposes for which it was originally commissioned and prepared.

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Revision History

Revision Reference / Date	Amendments	Issued to
Draft Report V1.0 / August 2019		Julie Attard, NFC
Draft Report V2.0 / August 2019	Edits from NFC	TRT
Final Report V2.0 / August 2019	Addressed edits from NFC including typos and page numbers. Appendices and Table 3 & 4 updated. Photographs included.	Julie Attard, NFC

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Contents

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Abbreviations

GIS	Geographical Information System
GPS	Global Positioning System
NHLF	National Heritage Lottery Funded
LiDAR	Light Detection and Ranging
NFM	Natural Flood Management
SuDS	Sustainable Urban Drainage Systems
TRT	Trent Rivers Trust

1 Introduction

1.a Project Background

This study is part of a larger landscape project called The Chronicles of Charnwood. The project aims to celebrate its internationally important geology, connect people to its history and secure a sustainable future for the area.

To bring about this change in Charnwood Forest, the partners in the Charnwood Forest Regional Park submitted a successful bid to National Heritage Lottery Fund (NHLF) for a Landscape Partnership Scheme, which celebrates the area's internationally important volcanic legacy. The funding will enable and encourage people to explore the rich landscape and diverse heritage. It will also provide engagement opportunities for residents and visitors, while contributing to the local economy. The project also aims to coordinate management at a landscape-scale to make Charnwood's heritage more resilient to growing pressures.

The project will be delivered under three themes: 'Explore Charnwood', 'Understand Charnwood' and 'Care for Charnwood'.

Delivery of natural flood management and water quality improvements is one of nine projects within the 'Care for Charnwood' theme:

"*We will provide a step change in the restoration of Charnwood's heritage and put more sustainable management practices into place through organisations working together, use of community enterprise and volunteering, income generation and improved training and skills. This will help make the landscape more resilient in the face of growth pressures, providing more and enhanced green infrastructure, better management of heritage and people to prevent loss and deterioration and more local buy in to help protect the area in the long-term*."

The purpose of this scoping study is to identify opportunities to carry out Natural Flood Management (NFM), river restoration, buffer wetland creation and bank protection measures in the Wood and Black Brooks in Charnwood as part of the two-year HLF Development Phase.

1.b Project Location

The project study site was the Black Brook and Wood Brook catchments, both are set within the Charnwood Forest. The Black Brook and Wood Brook catchments have an area of approx. 15.4km^2 and 5.0km^2 respectively. Both catchments feature clay loam soils with slow or impeded permeability (Landis, 2019). Both catchments have a mixture of land uses including arable, grazing and woodland.

For both brooks, areas of the catchment with an urban setting were removed from further analysis due to the spatial nature of NFM, which is better suited to the upper catchment. The area upstream of the Black Brook reservoir was removed as the reservoir is capable of storing large quantities of water, so any interventions upstream of this would have a limited

impact of peak flows below the reservoir. Figure 1 andFigure *2* show the study site areas which remained for further analysis.

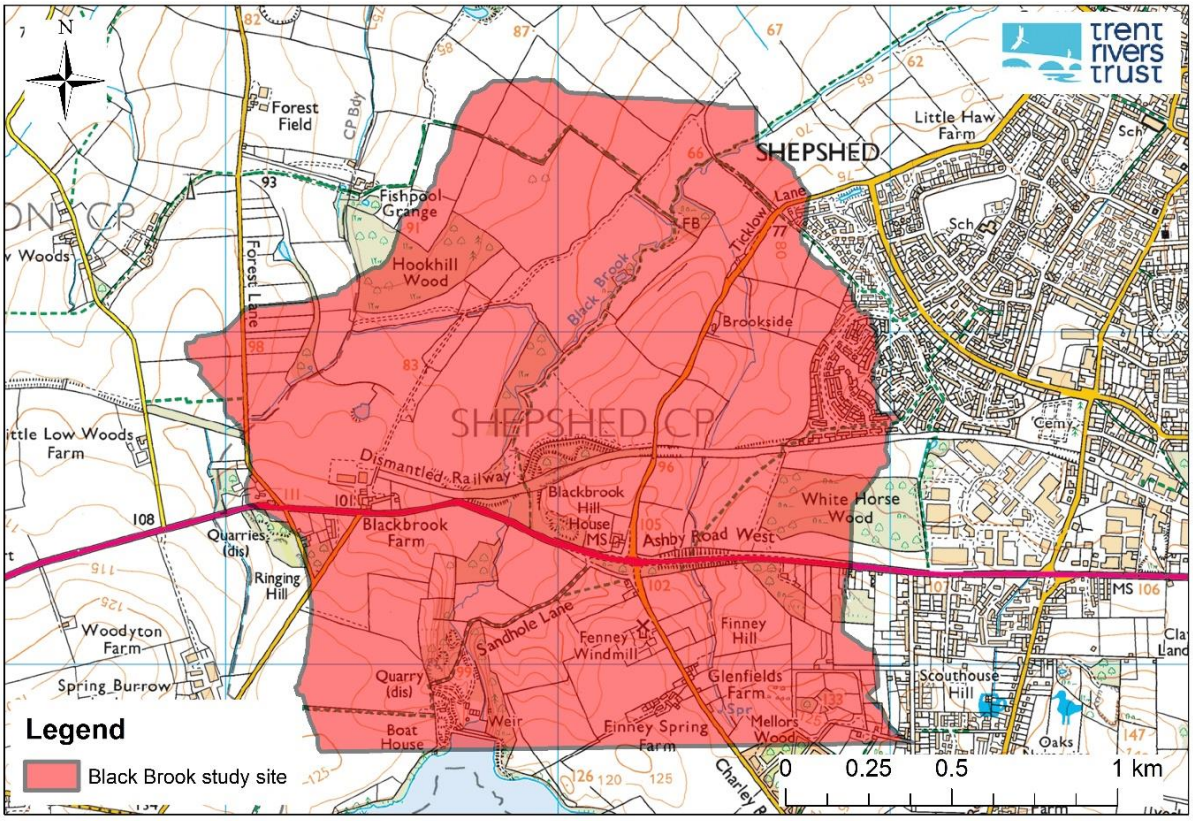


Figure 1: Black Brook study area

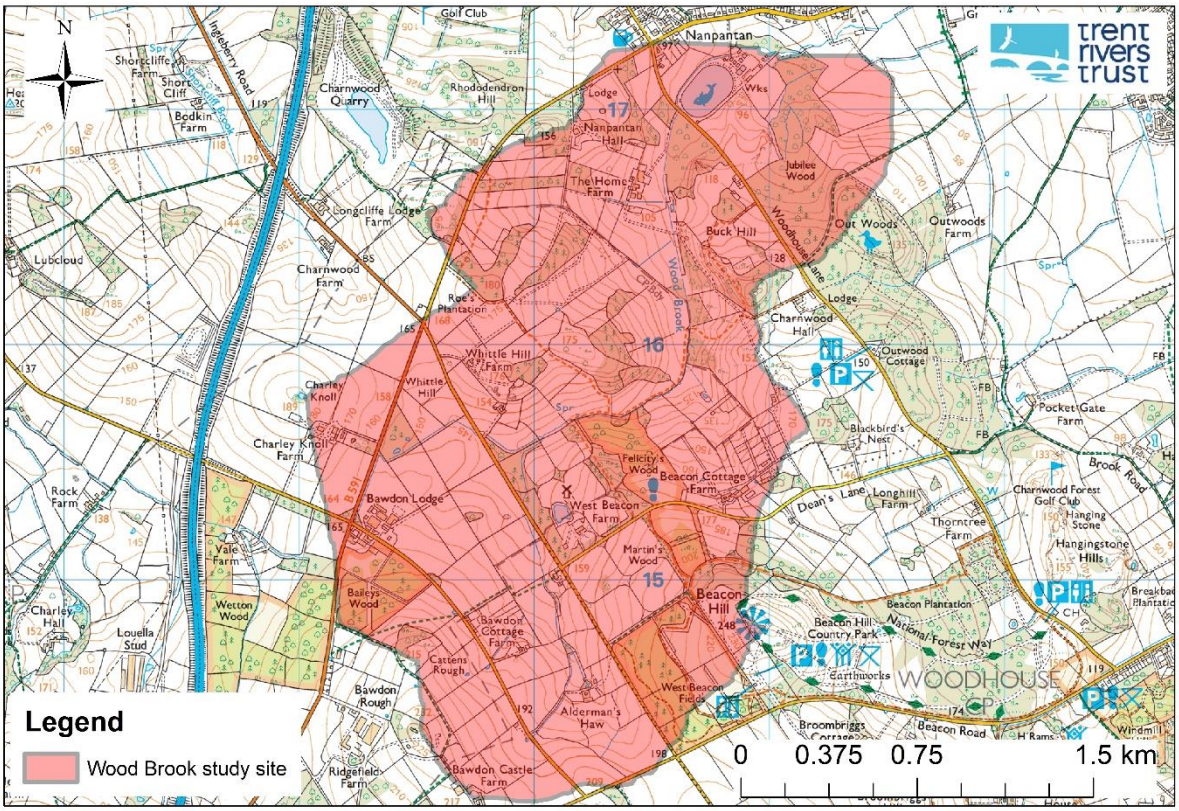


Figure 2: Wood Brook study area

2 Methodology

2.a Desk- based Assessment

The first stage of the methodology was a desk based study. SCIMAP was used to map flow connectivity within each study site. SCIMAP is a tool developed by Durham University which maps the risk of sediment inputs and flow connectivity within a catchment. Blue areas within the results represent areas with higher flow connectivity. A flow accumulation model was created within ArcGIS to show flow paths in greater detail. Once areas of flow connectivity and flow accumulations were identified, a site walkover was planned. Although SCIMAP and the flow accumulations were used to inform the site walkover, where possible, the whole study site was walked to identify further NFM opportunities.

2.b Data Collection

Data were collected using a heldheld Garmin GPS. Where an opportunity was identified, the position was marked with a waypoint. Corresponding notes where taken and where needed, a basic field sketch was drawn. The waypoints were downloaded into ArcMap for further GIS analysis.

2.c Data Analysis and Prioritisation

For each opportunity identified, detailed flow accumulations were created. This analysis displays the runoff paths across in finer detail and so informs an intervention location. A catchment area for the intervention was then calculated and, using a basic rainfall-runoff calculation, a runoff volume was also calculated. Standard percentage runoff was obtained through the HR Wallingford Greenfield Runoff Estimation tool (HR Wallingford, 2019).

If applicable, the water storage volume of the intervention was calculated within ArcMap. First, 0.5m contours were drawn. The storage feature inundation extent was then digitised assuming that the intervention will have a maximum height of 1m. Previous experience suggests that bunds will not exceed this height due to stability concerns. The resulting flood extent was then used to extract an area from the LiDAR data. The volume of the resulting surface was then calculated to give an indicative volume of storage.

The volume of runoff into a feature was calculated using a basic rainfall runoff equation shown below. Standard percentage runoff was obtained from HR Wallingford UK SuDS (HR Wallingford, 2019). A rainfall event of 20mm was applied. This method assumes that 20mm of rainfall fell instantaneously, and so does not take into account temporal rainfall patterns.

Runoff (m^3) = rainfall (m) x catchment area (m^2) x standard percentage runoff

Prioritisation was conducted using four factors: the volume of runoff calculated, the storage potential, landowner willingness and the potential for wider benefits e.g. water quality improvement and habitat gains. For each intervention, these factors were considered and interventions prioritised as Low, Medium or High.

2.d Design

Wetland and bund NFM interventions were designed using a combination of site maps, flow accumulation maps, field sketches and LiDAR data. From this data, the planform extent of each intervention was mapped. For bunds, it is important that the bunds extend wide enough to capture multiple flow paths. For wetlands, the catchment size has to be great enough to provide a water source which will maintain the wetland and enhance biodiversity.

Leaky barriers design considered the passage of baseflow, stream ecology and the stability of the structure. Each leaky barrier was designed to let low flows pass unimpeded so that a barrier to fish is not created. Barriers are to be dug into the banks to increase stability. Where possible, *in situ* trees should be used as downstream supports to minimise movement. Where this is not possible, wooden stakes may be used instead.

Leaky barriers need to be far enough apart as to not flood the next leaky barrier upstream, if water storage is to be maximised. Specific location of leaky barriers is variable due to on site factors such as tree roots, bank erosion and the location of infrastructure. It is important that a competent contractor is used, who is familiar with stream morphology, so that the interventions are not placed within unsuitable locations. During the Black Brook and Wood Brook walkovers, it was noted that the watercourses featured riparian woodland. This will increase the wood input into the channel and so will help the constructed barriers to maintain their long term sustainability. If leaky barriers are installed on watercourses where riparian woodland is not present, it is recommended that riparian planting takes place.

Cross slope woodland was designed using the flow accumulation method. Woodland location was chosen in areas which would intercept the greatest number of flow paths. From observations on the site visit, steep gradient grazing land was chosen as it offers the ideal location for this type of intervention.

2.e Methodology Limitations

Some assumptions were made during the data analysis method. First, it was assumed that the bund has a vertical face, in reality it will be sloped. Second, the method assumed that no excavation will take place within the bund. During construction, soil from within the storage area is often used and so the method would underestimate the storage capacity of the feature in this case. However, the results give an indication of the possible storage capacity and so are used to inform the prioritisation of interventions.

Some areas could not be accessed during the site walkovers due to difficulty obtaining access permissions. However, this was only a small proportion of each Brook.

3 Results

3.a Black Brook Results

3.a.i *Desk-based Assessment*

Results from SCIMAP analysis are shown Figure 3 with flow accumulation analysis shown in Figure 4. When assessing the results for the Black Brook catchment, the area between Forest Lane and Blackbrook Farm was identified as a possible flow path. This site was investigated further during the site walkover.

South of Sandhole Lane was also found to have a flow path present. This flow path is significant, with the topography being steep and valleys present.

Along the Black Brook itself, multiple flow accumulations were identified for further assessment during the site visit (see Figure 4). However, many of these flow accumulations were found to be existing ditches rather than overland flow paths.

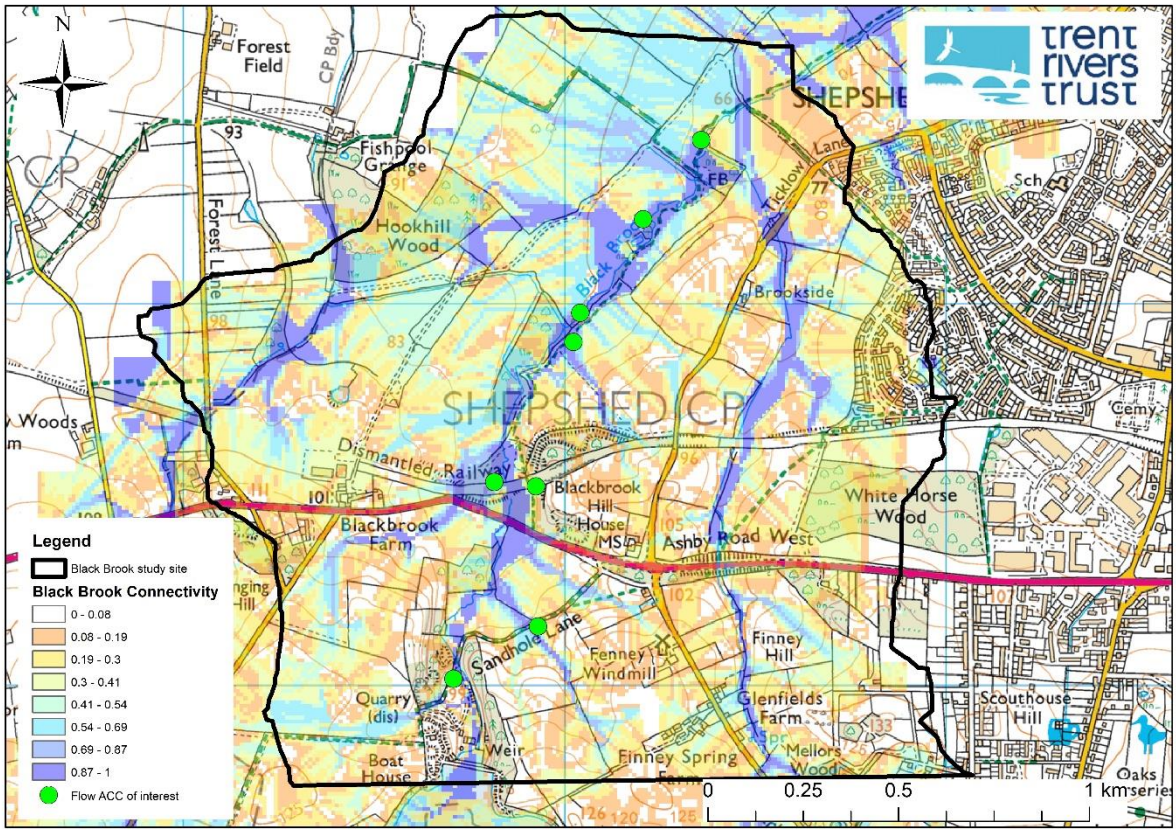


Figure 3: SCIMAP analysis of the Black Brook Catchment

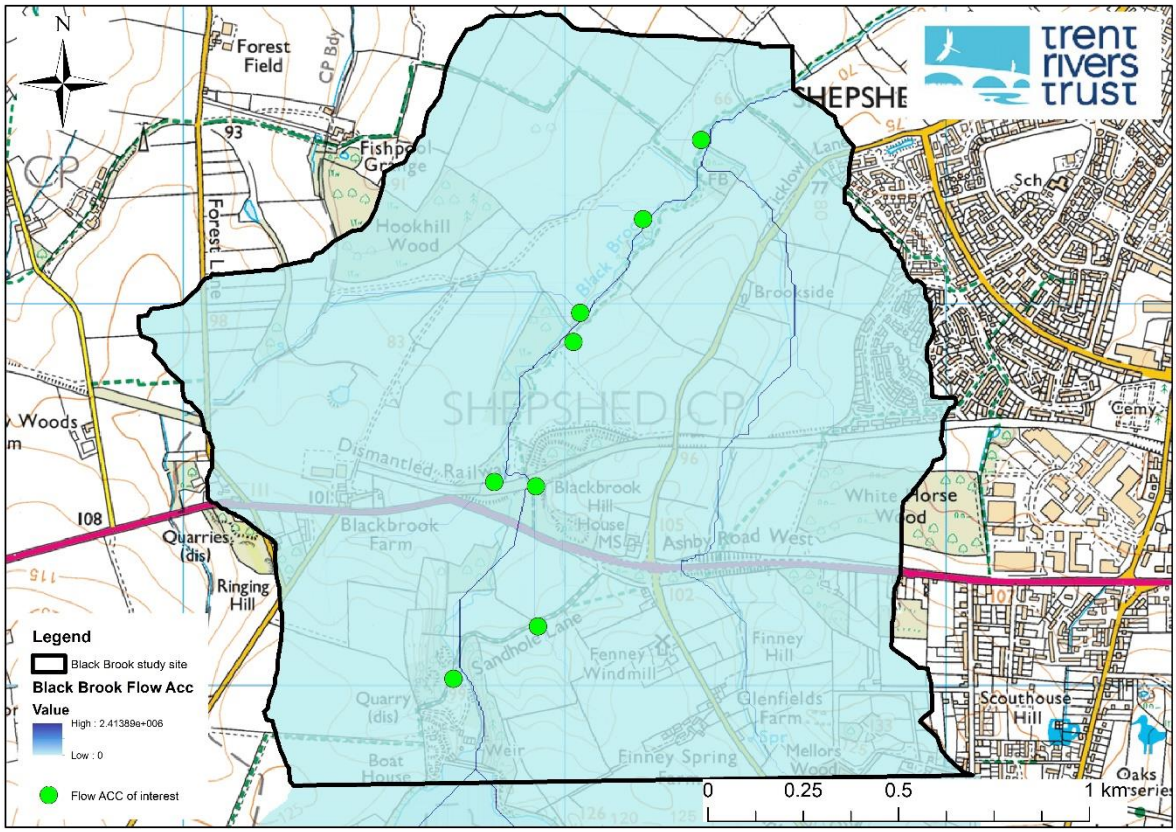


Figure 4: Flow accumulation analysis of the Black Brook Catchment

3.a.ii *Site Survey and GIS analysis*

During the site survey of the Black Brook study site, 18 locations were identified as opportunities for NFM intervention (see Table 1). Of these, 13 were prioritised as High, with 2 Medium and 3 Low (see Figure 5).

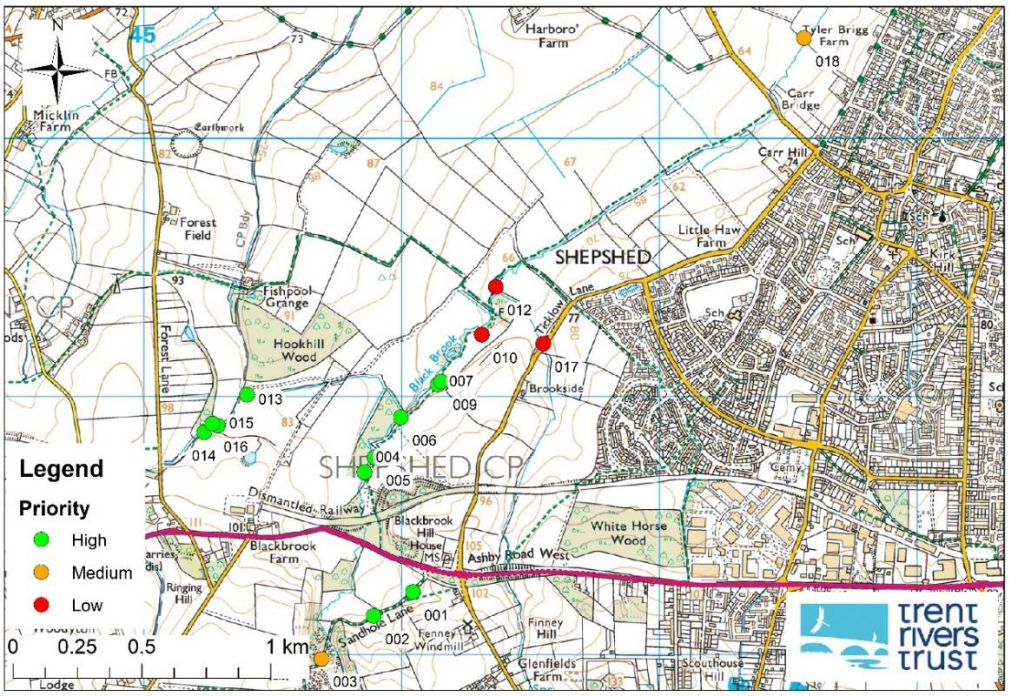


Figure 5: Prioritisation of NFM opportunities within the Black Brook Catchment.

Both sites 1 and 2 have a significant flow accumulation present, and offer the potential for bunds to be constructed to temporarily retain water. These bunds were estimated to have a high storage potential and the landowner was receptive.

Sites 4, 5 and 6 were identified as areas where leaky barriers could be installed within the Black Brook itself. These areas, if leaky barriers were installed, have the potential to increase floodplain reconnection. Wood from the site could be used to construct the barriers.

Sites 7 and 9 could be incorporated into one work plan. Site 9 would suit wetland creation due to the water input from the ditch that runs from the east. Wetland vegetation was present here but this area could still be enhanced. Site 7 was identified as a possible bund location as it has a reasonable catchment size and high estimated water storage capacity. Moreover, soil excavated during the wetland construction at Site 9 could be used to create this bund.

Sites 13, 14, 15 and 16 offer an excellent opportunity for natural flood management intervention. Site 16 has a woodland land use and sits within a hollow. Constructing a bund at this site would create a significant amount of water storage, whilst increasing the habitat diversity of the site. Leaky barriers could also be installed at sites 13-15 as part of this work.

Site 18 was classified as Medium as the landowner could not be contacted during this study. However, the watercourse here has a limited buffer zone, is straightened and has no riparian trees. The creation of a buffer zone, which includes trees to increase shading, would

increase the habitat diversity along this reach of the Black Brook whilst increasing soil infiltration and channel roughness.

Table 1: Black Brook Catchment opportunities (corresponding with Figure 5).

Name	x	y	Intervention type	Catchment size (m^2)	Estimated storage (m^3)	Priority
1	446045	318242	Bund	36383	380	High
2	445892	318149	Bund	133353	1659	High
3	445690	317982	Leaky barriers in hollow			Medium
4	445856	318706	Leaky barriers			High
5	445896	318764	Leaky barriers			High
6	445998	318919	Leaky barriers			High
7	446141	319046	Bund	61375	1185	High
9	446155	319058	Wetland	20444	90	High
10	446312	319239	Leaky barriers			Low
12	446366	319425	N/A			Low
13	445400	319006	Leaky barriers			High
14	445235	318860	Leaky barriers			High
15	445288	318887	Leaky barriers			High
16	445266	318895	Bund	293795	2968	High
17	446551	319204	Leaky barriers			Low
18	447562	320389	Buffer zone			Medium

3.b Wood Brook Results

3.b.i *Desk-based Assessment*

The results from SCIMAP analysis of the Wood Brook are shown in Figure 6 with flow accumulation results shown in Figure 7. Both figures show that areas around Home Farm have significant flow paths. This area has steep topography and woodland present with a grazing land use.

Northeast of Bawdon Lodge was found to have a flow path present. The flow paths here represent two inflow ditches which connect to the Wood Brook. The landowner was accepting of a visit to this site for further assessment.

Areas to the north of Beacon Hill were found to have significant flow accumulations (see Figure 7). However, the landowner could not be contacted and so a site survey was not undertaken at this location.

Figure 6 shows that Jubilee Wood has a high risk of water connectivity as a result of overland flow. The site is woodland land use with some ponds present. It was concluded during the site visit that this area is already actively storing water and so further intervention was not needed.

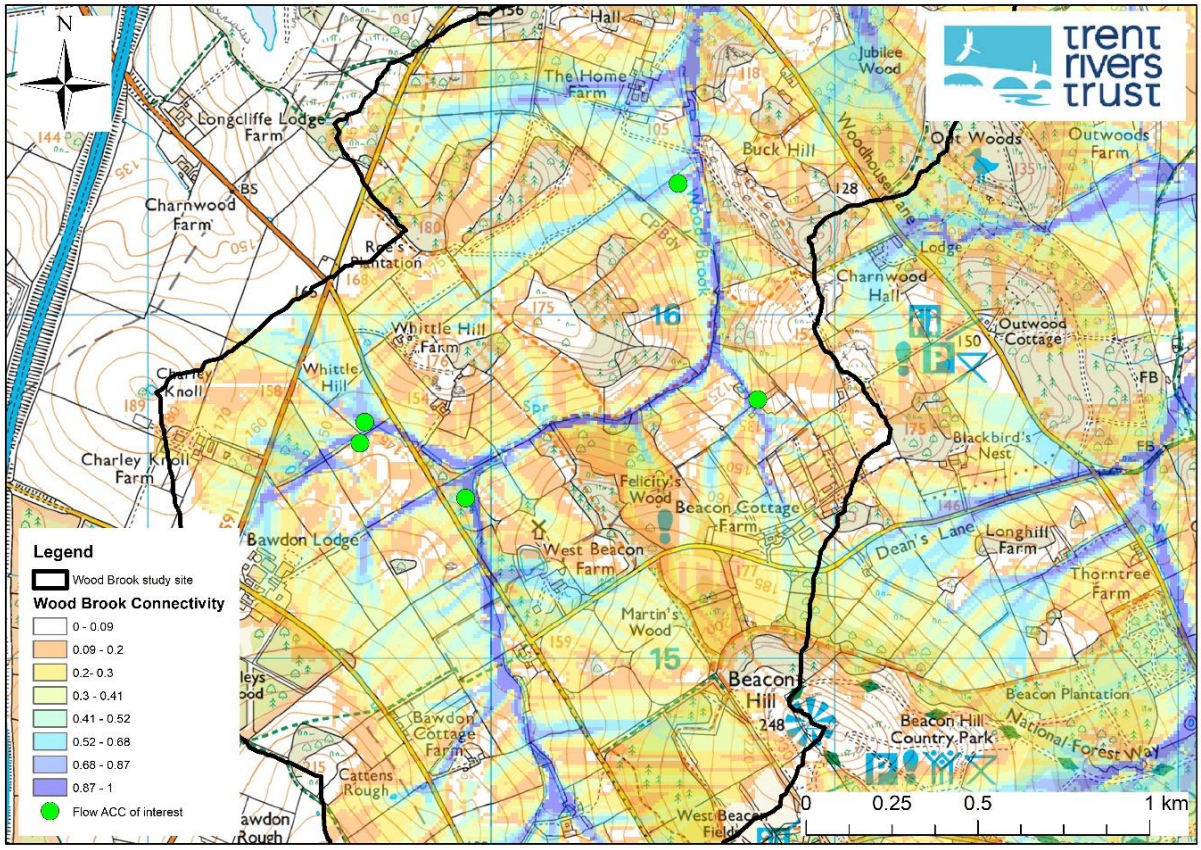


Figure 6: SCIMAP analysis of the Wood Brook Catchment

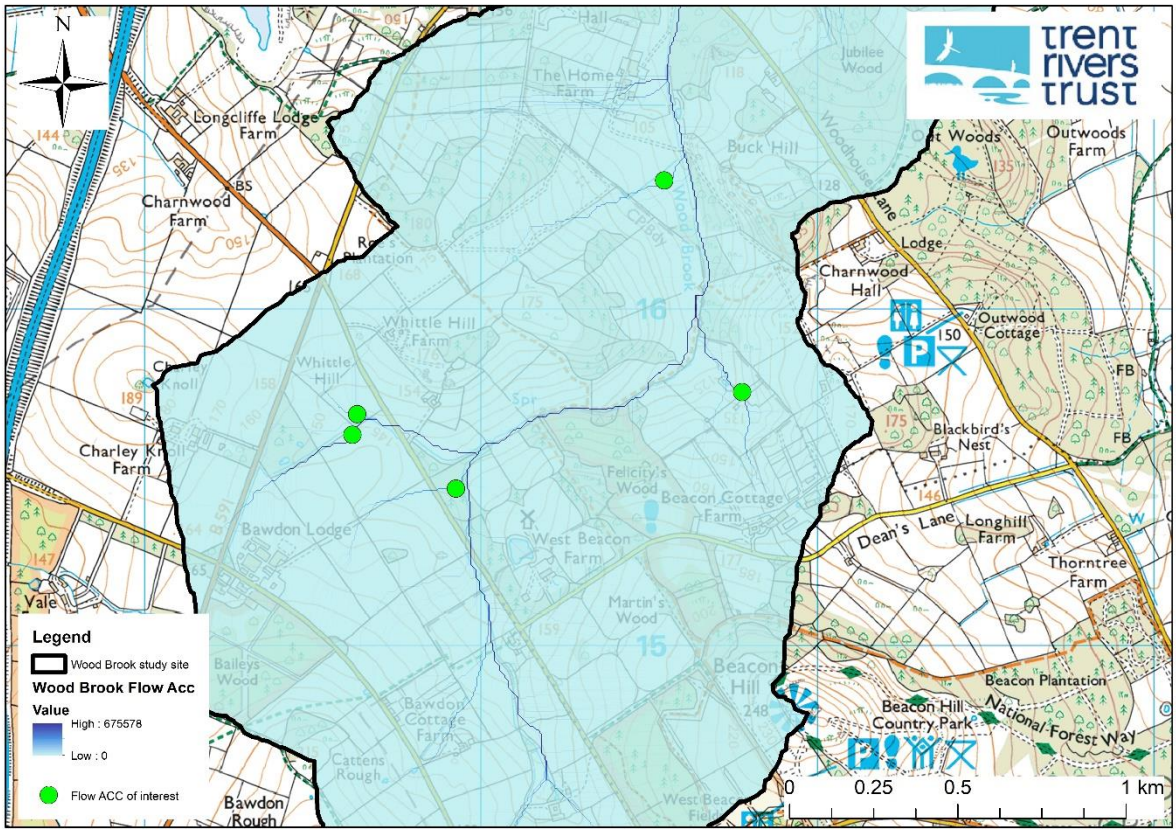


Figure 7: Flow accumulation analysis of the Wood Brook Catchment

3.b.ii *Site Survey and GIS analysis*

Within the Wood Brook Catchment, 14 sites were identified as having potential for NFM and so required further GIS analysis (Figure 9). Of these 7 were considered to be High priority, 5 Medium and 2 Low (

Table *2*).

The catchment features steep topography with a grazing land use. As shown in Figure 8, the area to the west of Wood Brook has the potential for overland flow generation down the slope towards the Wood Brook. Therefore, sites 19, 22, 27 and 31 have all been identified as areas where cross slope woodland planting would be beneficial.

Site 21 offers good opportunity to reconnect the Wood Brook with its floodplain. If leaky barriers were to be installed within this channel reach, during high flows, water would be forced out of channel and onto the woodland floodplain. Not only would this increase the storage capacity of the channel, but the roughness of the channel would be increased.

Site 29 offers an excellent opportunity to create a larger storage area which would be connected to the watercourse. During the site visit, the landowner was positive of towards these interventions. Furthermore, the landowner was willing for Site 30 to be converted into a wetland area with reed beds. This would act to slow the flow of water towards the Wood Brook, but would also enhance the quality of the water coming from this tributary.

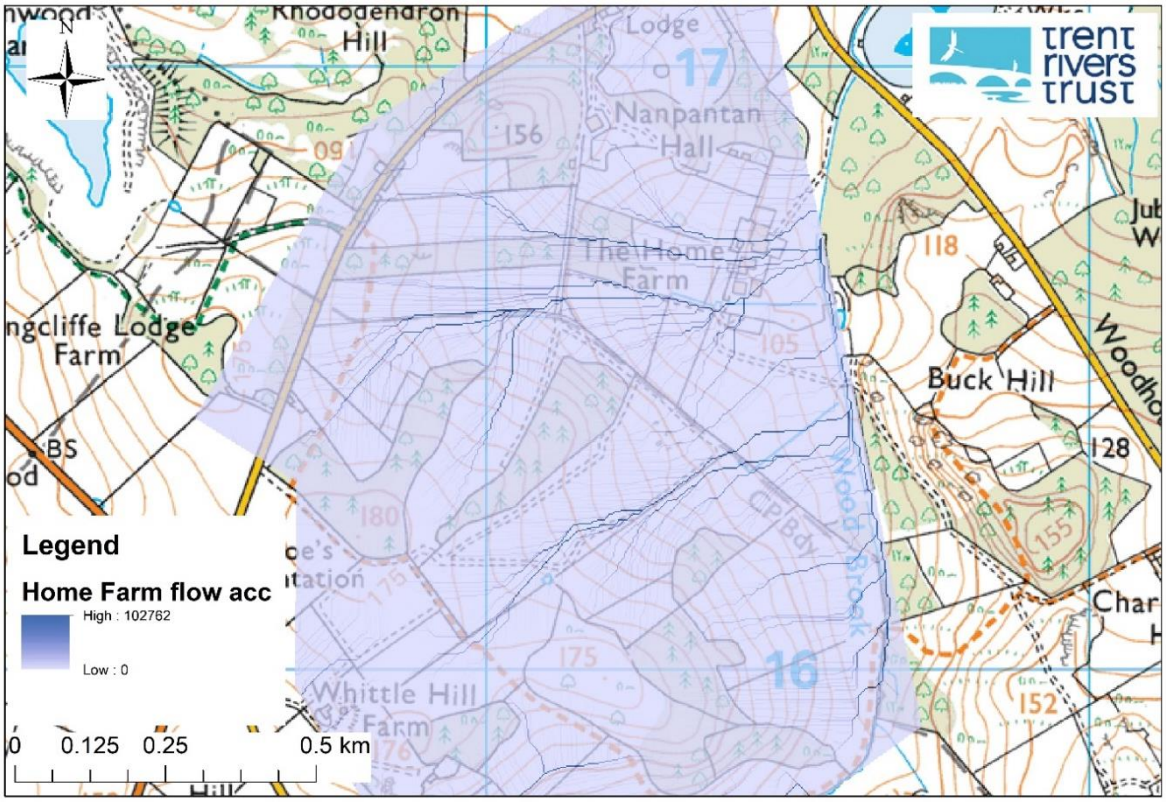


Figure 8: Detailed flow accumulation analysis within the Wood Brook study area.

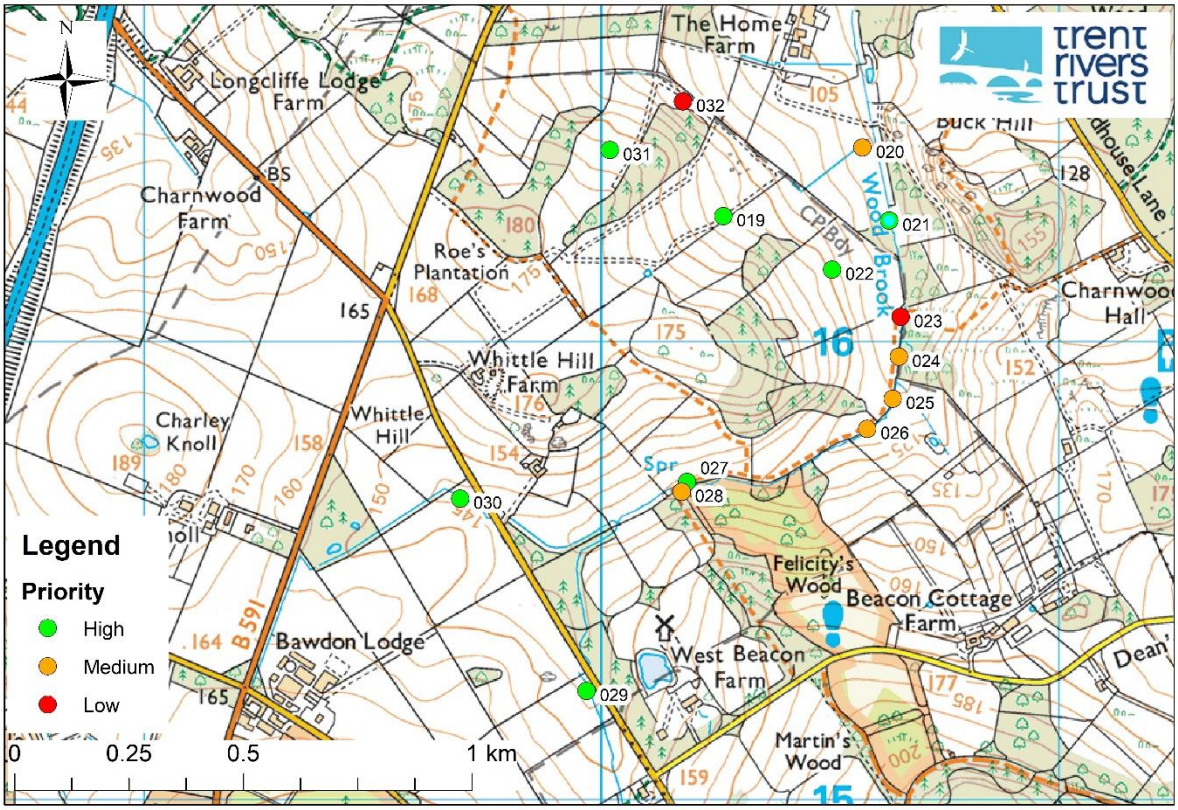


Figure 9: Prioritisation of NFM opportunities within the Wood Brook Catchment

Table 2: Wood Brook Catchment opportunities (corresponding with Figure 5).

Name	x	y	Intervention type	Catchment size (m^2)	Estimated storage (m^3)	Priority
19	450267	316274	Cross slope woodland			High
20	450571	316424	Offline pond		120	Medium
21	450629	316264	Leaky barriers			High
22	450505	316157	Cross slope woodland			High
23	450655	316054	Offline Pond	25623	140	Low
24	450650	315967	Leaky barriers			Medium
25	450637	315875	Leaky barriers			Medium
26	450581	315809	Leaky barriers			Medium
27	450187	315694	Cross slope woodland			High
28	450176	315672	Wetland	12213	70	Medium
29	449960	315334	Online storage pond	1165100	1544	High
30	449692	315657	Wetland	589175	359	High
31	450019	316418	Cross slope woodland			High
32	450179	316524	Pond			Low

4 Recommendations

The recommended priority options (both High and Medium) for each watercourse are summarised below. The costs are approximate estimates only, but do take into account materials, construction and permitting costs. The options detailed in Table 3 and Table 4 are all located in areas with willing landowners. The design reference corresponds to High priority options only and refers to the relevant outline design in Appendix A.

Table 3: Black Brook priority options summary

Location number	Option	Approx. Total Cost	Option Benefits	Priority	Design Reference
1	Bund	£4k	Offers a significant amount of storage and would help to temporarily attenuate water flowing down the slope.	High	A-1
2	Bund	£4k	Offers a significant amount of storage and would help to temporarily attenuate water flowing down the slope.	High	A-1
3	Leaky barriers	£2.5k	A flow path was identified here and a hollow in the land was found. However, the landowner could not be identified and so further detail could not be given at this time.	Medium	B-2
4,5,6	Leaky barriers	£4k	The leaky barriers will attenuate water, increase channel roughness and can improve habitat diversity through channel geomorphological changes.	High	B-2
7	Bund	£4k	This bund has the potential to intercept an overland flow path and has a large potential storage capacity.	High	A-2
9	Wetland	£3k	This option will attenuate water whilst creating habitat and water quality improvements. If constructed with option 7, the soil from excavation could be used within the bund	High	A-2
13,14,15	Leaky barriers	£3.5k	The leaky barriers will attenuate water, increase channel roughness and can improve habitat diversity through channel geomorphological changes.	High	B-2
16	Bund	£6k	This bund offers a significant amount of storage within land which may be of lower value to the farm. A significant flow path can be intercepted using this a bund at this location.	High	A-3
18	Buffer zone	£2.5k	This reach of channel has been straightened and has no riparian buffer zone. Riparian tree planting would increase the infiltration of water into the soil as well as increase channel roughness. A buffer zone, which includes trees, would help to improve water quality as well as increase channel shading.	Medium	

Table 4: Wood Brook priority options summary

Location number	Option	Approx. Total Cost	Option Benefits	Priority	Design Reference
19, 22, 27,31	Cross slope woodland	£6k	Cross slope woodland planting would increase soil infiltration on steep gradient slopes which in turn would intercept the flow paths identified within the analysis. Woodland planting would provide habitat as well as corridors between the existing woodlands.	High	A-5
20	Offline pond	£3k	This area is rough land. An offline pond would provide water storage and habitat diversity.	Medium	B-2
21	Leaky barriers	£3k	This option would increase floodplain inundation frequency within the woodland, therefore increasing channel roughness during high flow events. The leaky barriers would also increase habitat diversity within the channel.	High	A-4
24,25.26	Leaky barriers	£5k	The leaky barriers will attenuate water, increase channel roughness and can improve habitat diversity through channel geomorphological changes.	Medium	B-2
28	Wetland	£3k	The creation of a wetland at this site would attenuate water whilst providing habitat diversity and water quality improvements.	Medium	A-6
29	Online storage pond	£7k	This site offers an opportunity to temporarily attenuate water during high flow events. The landowner of this site was receptive but would like the design to consider the possibility of drinking water storage for cattle.	High	A-7
30	Wetland	£3k	The creation of a wetland at this site would attenuate water whilst providing habitat diversity and water quality improvements.	High	A-8

5 Conclusion

Both the Black Brook and Wood Brook study sites have been found to be suitable for a mixture of NFM interventions. These measures would temporarily attenuate water during high magnitude rainfall events. Furthermore, wider benefits such as water quality improvement and habitat gains can be achieved if NFM measures are implemented in combination across each catchment.

Options 1, 2, 7, 16 and 29 offer the greatest water storage potentials and all feature significant flow accumulations. Therefore, these interventions should be prioritised going forward as they offer the greatest benefit in terms of potential stream discharge reduction.

Cross slope woodland and wetland options identified as high priority in both catchments, offer opportunities to enhance water quality and habitat within both catchments, whilst increasing surface roughness and soil infiltration. These interventions offer the greatest benefit to habitat enhancement and water quality and so should also be prioritised.

Leaky barrier opportunities increase channel roughness and store water upstream during high flows. These interventions are often low cost, especially if wood on site is used for construction. Moreover, leaky barriers do not require farmland to be disturbed and so can be a quick win for NFM projects. Site 21 in particular should be prioritised as this site offers an excellent opportunity to increase floodplain inundation frequency and create a wet woodland.

References

HR Wallingford, 2019, *Greenfield runoff rate estimation* [Online], Available at: https://www.uksuds.com/drainage-calculation-tools/greenfield-runoff-rate-estimation [Accessed 1/8/19].

Landis, 2019, *Soilscapes map* [online], Available at www. http://www.landis.org.uk/soilscapes [Accessed 1/8/19].

Appendices

Appendix A: Outline Designs for High Priority sites

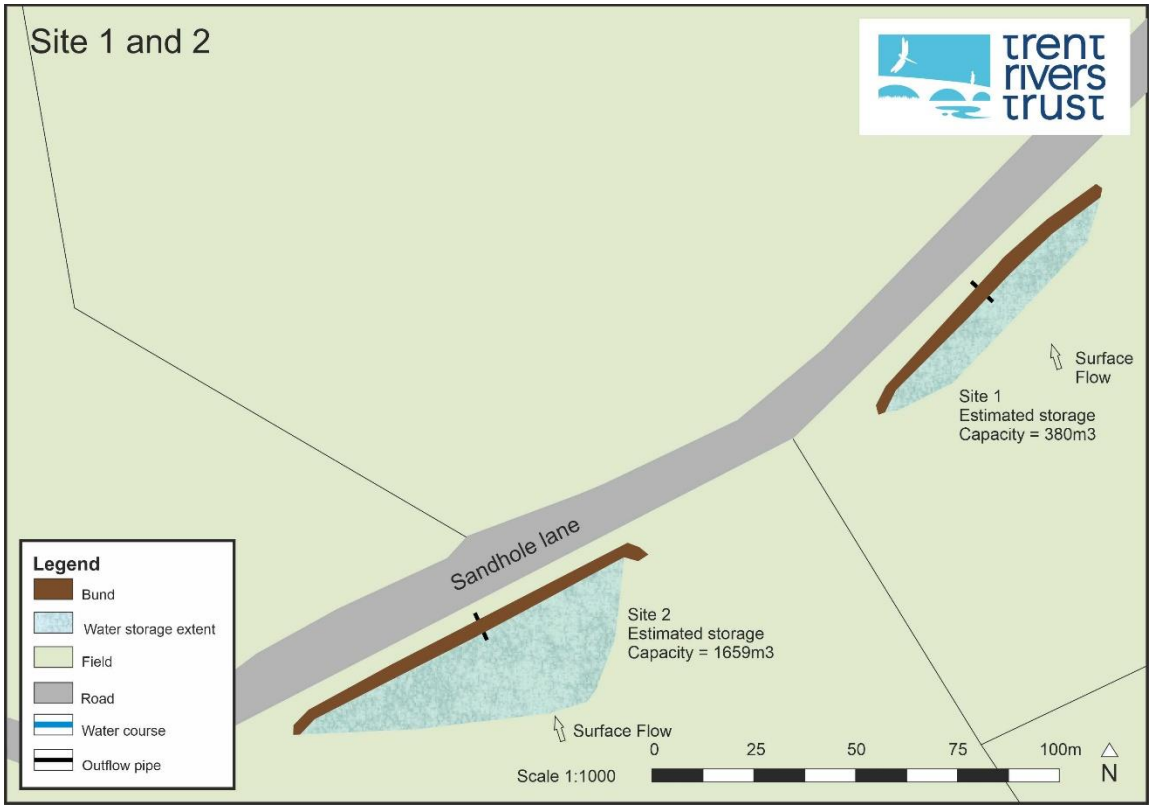


Figure A-1: Site 1 and 2 outline design

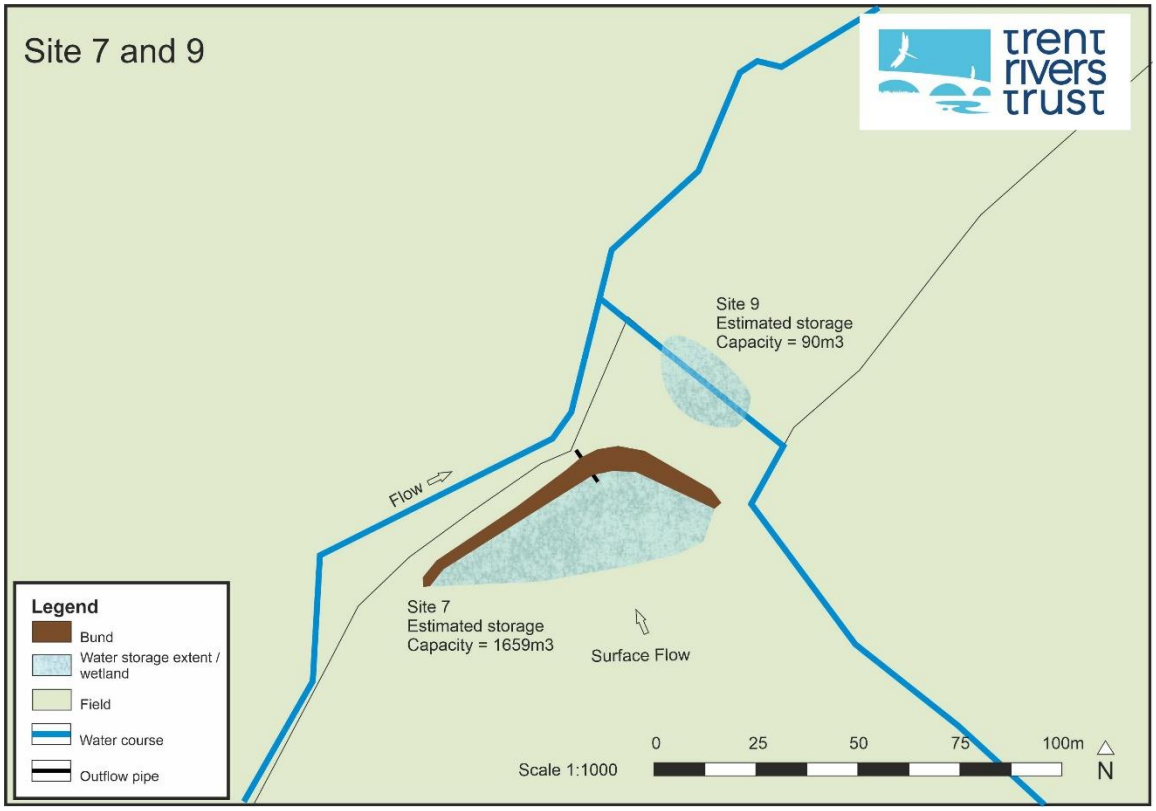


Figure A-2: Site 7 and 9 outline design

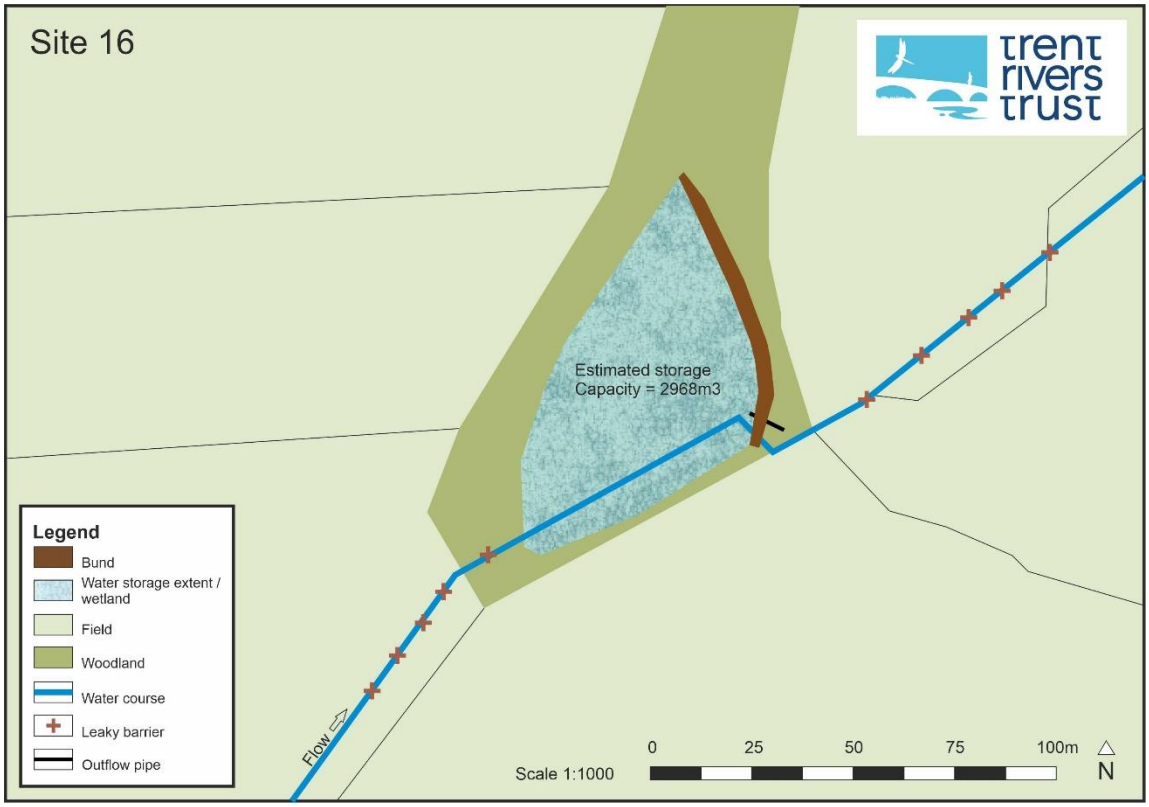


Figure A-3: Site 16 outline design

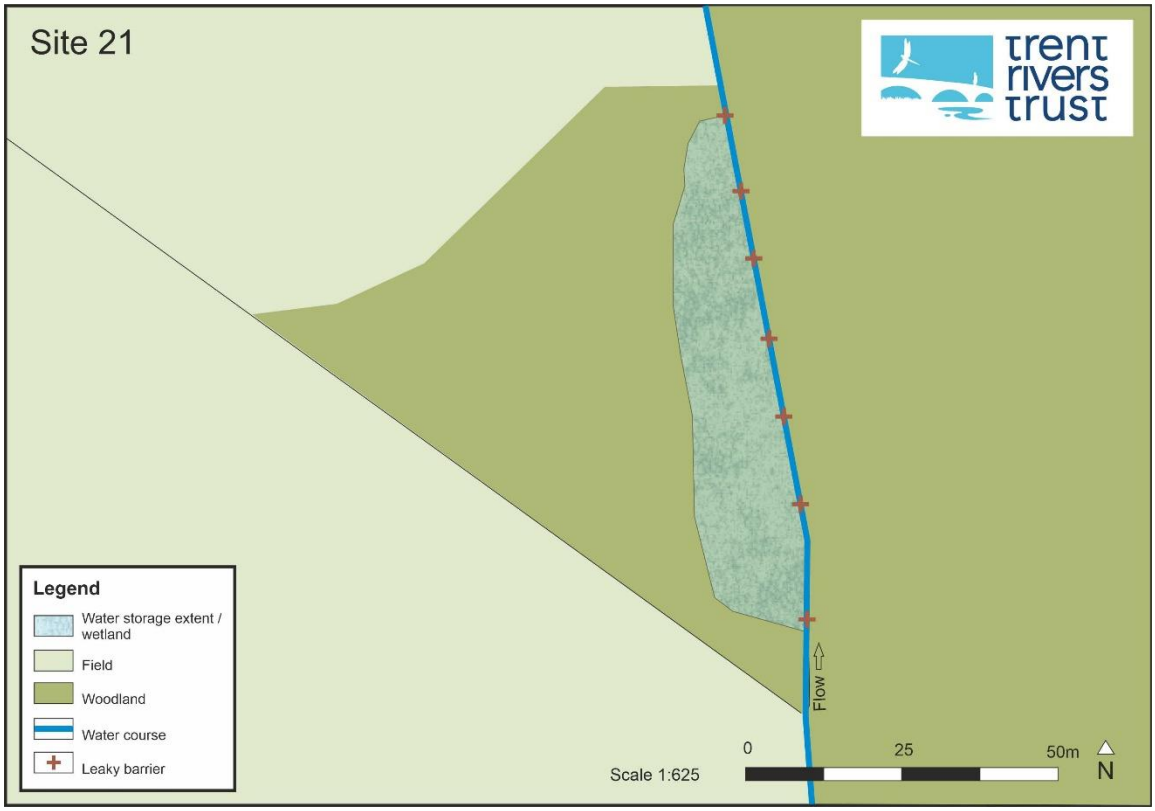


Figure A-4: Site 21 outline design

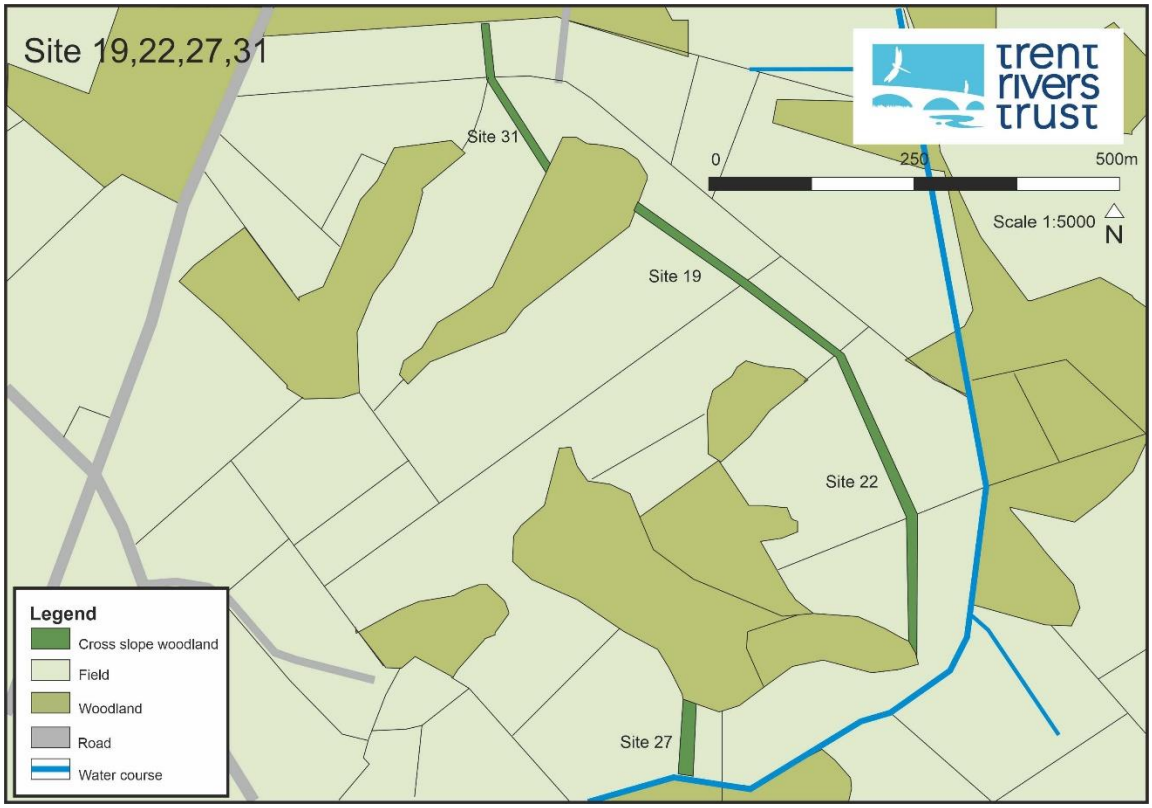


Figure A-5: Sites 19, 22, 27 and 31 outline design

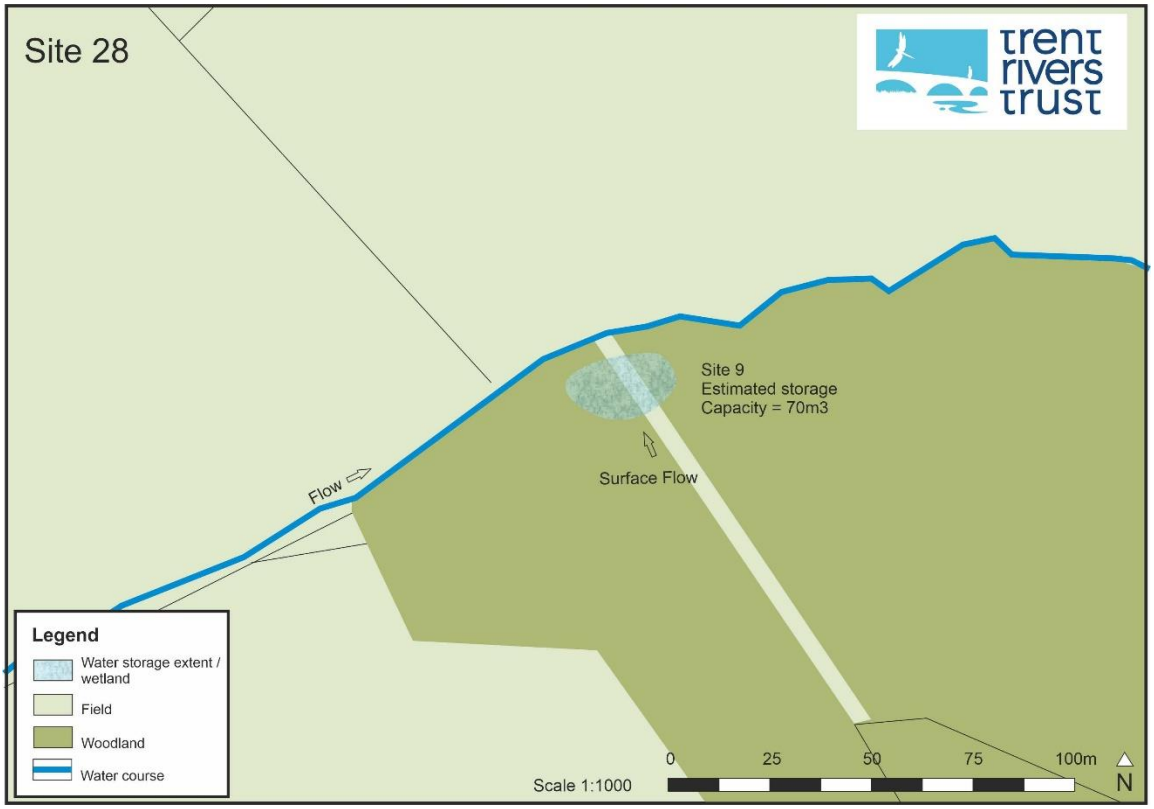


Figure A-6: Site 28 outline design

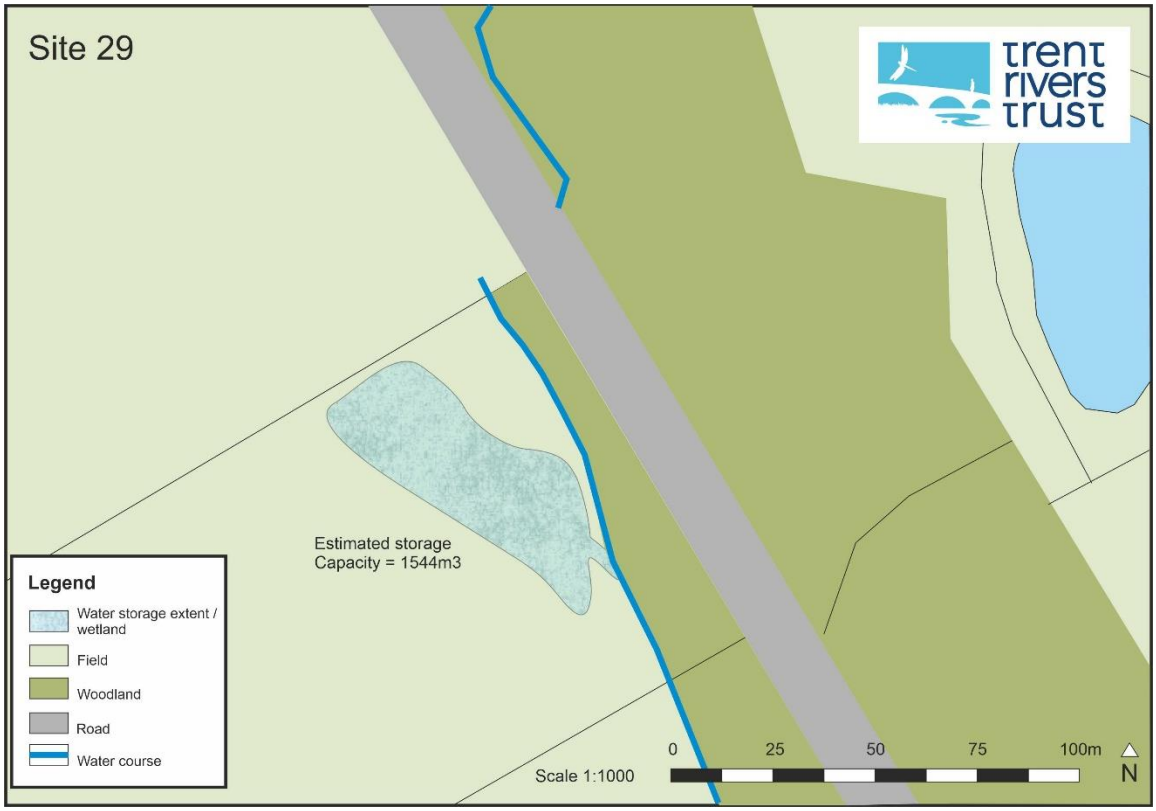


Figure A-7: Site 29 outline design

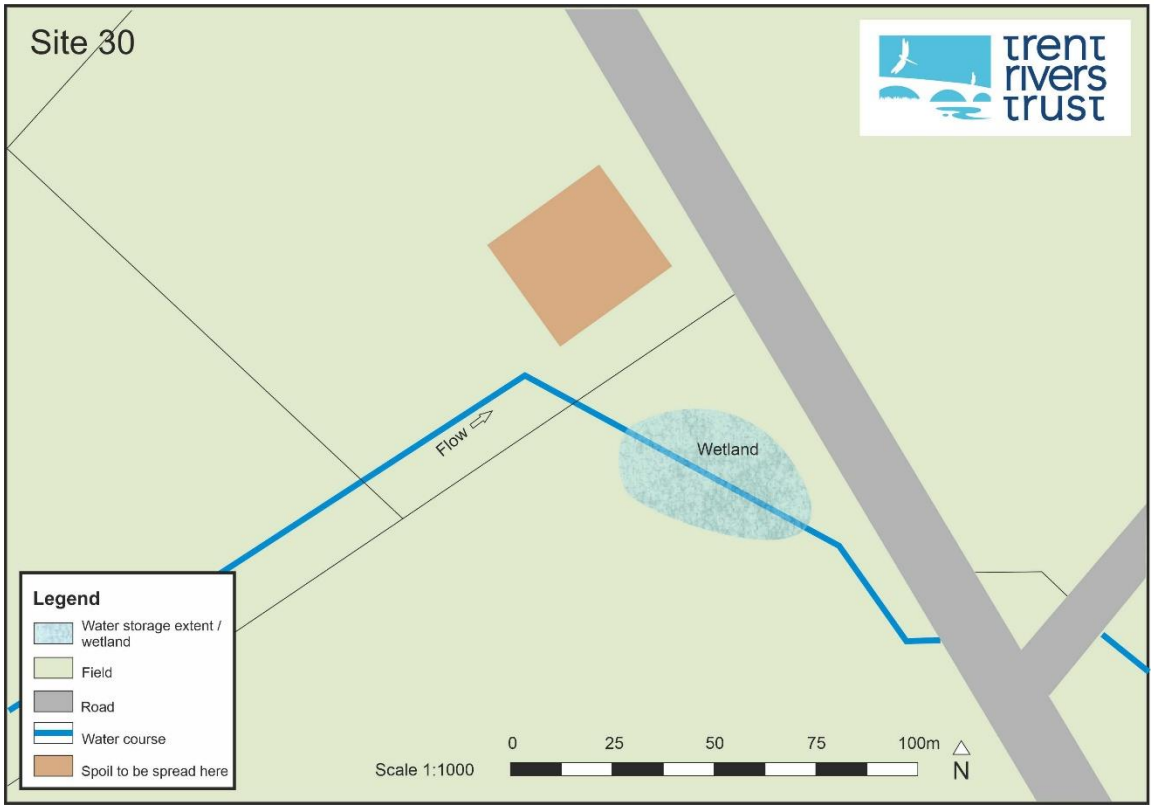


Figure A-8: Site 30 outline design

Appendix B: Cross Section Examples

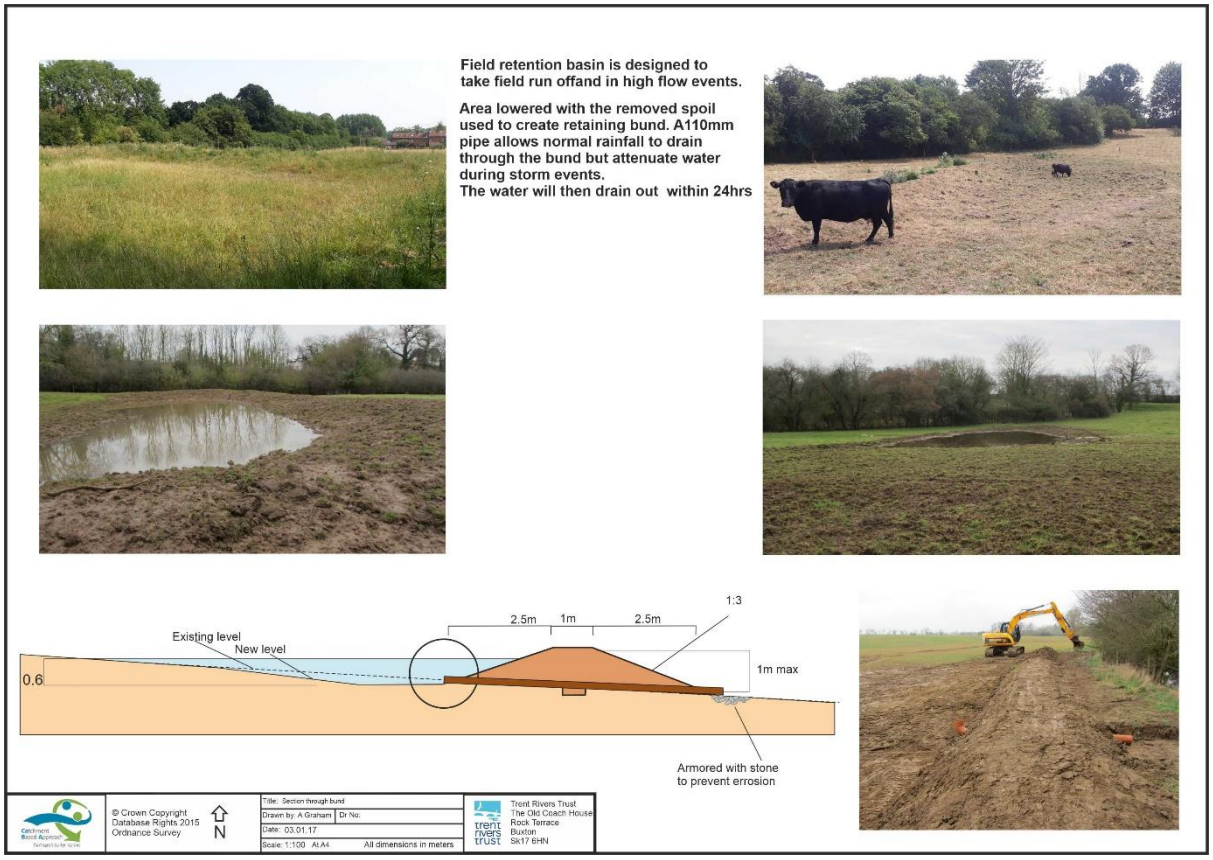


Figure B-1: Bund Cross Section Example

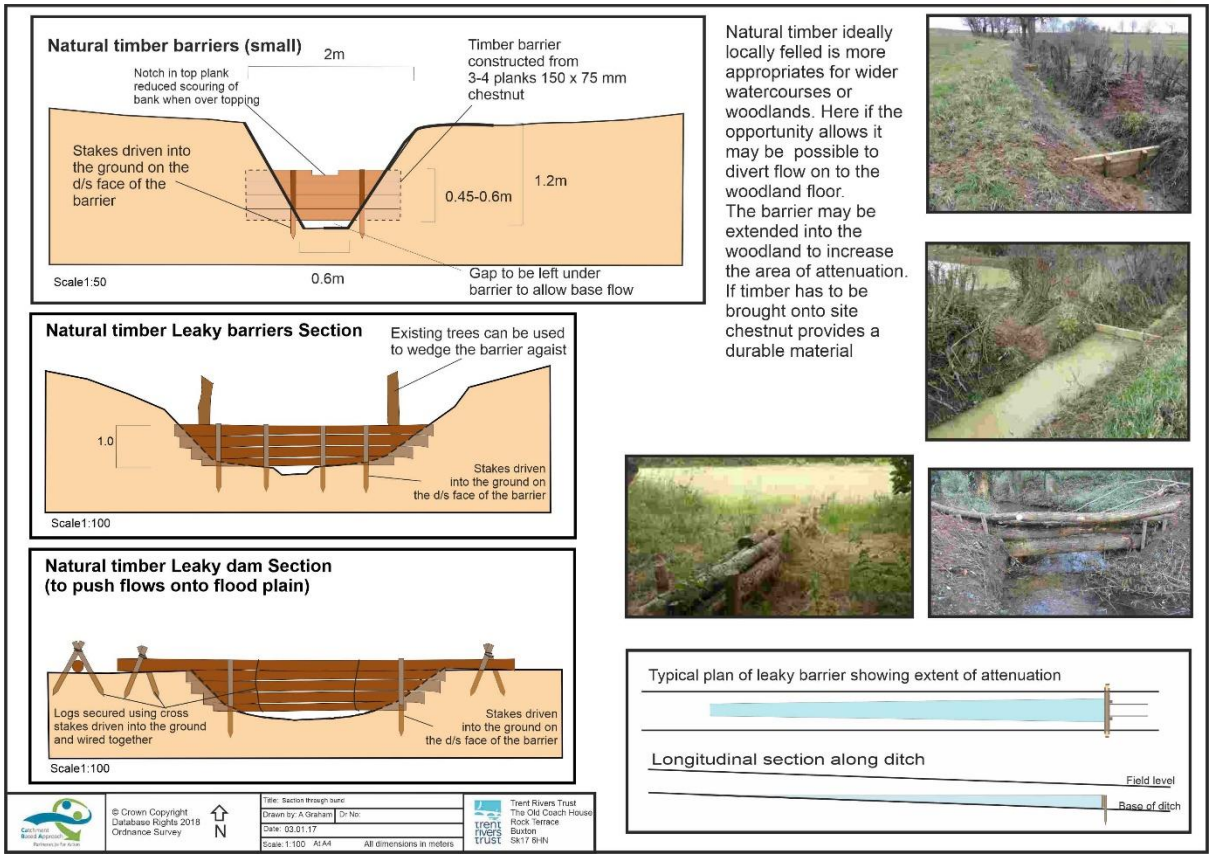
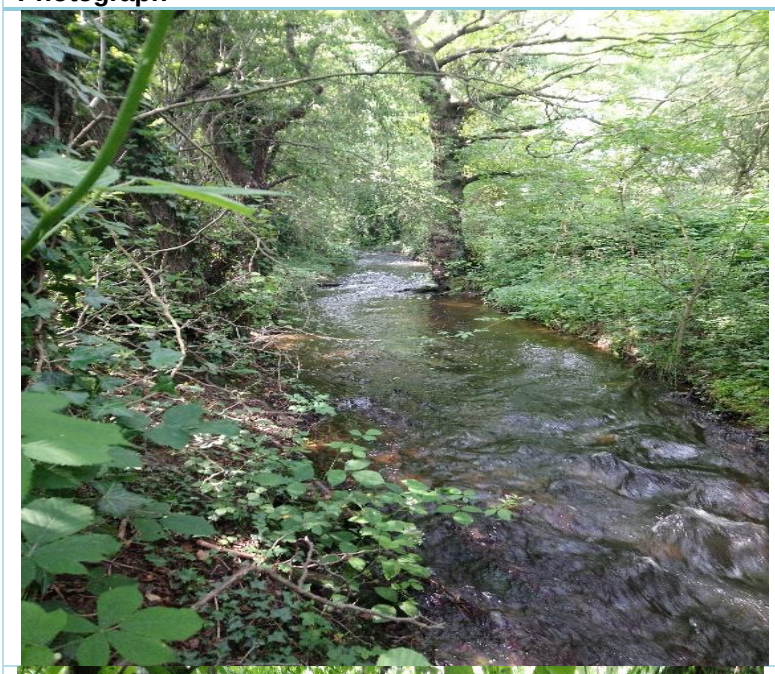


Figure B-2: Leaky Barrier Cross Section Example

Appendix C: Site Photographs

Table C-1: Black Brook site photographs

Photograph	Details
	Black Brook close to site 4. Image taken looking downstream.
	Black Brook close to site 4. Image taken looking downstream.

Photograph	Details
	Black Brook just upstream of site 7. Image taken looking downstream.

Photograph	Details
	Site 16 looking upstream of the ditch. Indications of ponding were found at this site.

Table C-2: Wood Brook site photographs

Photograph	Details
	View from Home Farm looking up towards site 31.
	Watercourse flowing to site 30. A planted wetland is proposed at this site.

Appendix D: Classification of intervention priority

The classification scores of each intervention are shown in Table D-1 below. Each variable is rated from 0-3 based on values explained in Table D-2. Summative scores indicate priority with 0-4 = L, 5-8 = M and 9-12= H. Intervention 17 has been allocated L due to low landowner willingness. A flowpath score of 0 indicates an unviable intervention and so L is automatically allocated.

Table D-1: Prioritisation scoring of interventions

Name	Type	Catchment size (m2)	Rainfall (m)	Standard percentage runoff	Runoff (m^3)	Estimated storage (m^3)	Flowpath significance	Storage potential	Wider benefit	Landowner willingness	Total score	Priority
1	Bund	36383	0.02	0.47	342	380	3	2	2	2	9	H
2	Bund	133353	0.02	0.47	1254	1659	3	3	2	2	10	H
3	Leaky barriers in hollow	54528	0.02	0.47	513		2	2	2	2	8	M
4	Leaky barriers						3	2	3	2	10	H
5	Leaky barriers						3	2	3	2	10	H
6	Leaky barriers						3	2	3	2	10	H
7	Bund	61375	0.02	0.47	577	2122	2	3	2	2	9	H
9	Wetland	20444	0.02	0.47	192	90	2	1	3	3	9	H
10	Leaky barriers						1	1	1	1	4	L
12	N/A						0				0	L
13	Leaky barriers						3	2	2	3	10	H
14	Leaky barriers						3	2	2	3	10	H

Name	Type	Catchment size (m2)	Rainfall (m)	Standard percentage runoff	Runoff (m^3)	Estimated storage (m^3)	Flowpath significance	Storage potential	Wider benefit	Landowner willingness	Total score	Priority
15	Leaky barriers						3	2	2	3	10	H
16	Bund	293795	0.02	0.47	2762	2968	3	3	2	3	11	H
17	Leaky barriers						3	2	2	1	8	L
18	Buffer zone						2	2	3	1	8	M
19	Cross slope woodland						3	3	3	3	12	H
20	Offline pond					120	1	1	3	3	8	M
21	Leaky barriers						3	3	3	3	12	H
22	Cross slope woodland						3	3	3	3	12	H
23	Offline pond	25623	0.02	0.47	241	140	0				0	L
24	Leaky barriers						3	1	2	2	8	M
25	Leaky barriers						3	1	2	2	8	M
26	Leaky barriers						3	1	2	2	8	M
27	Cross slope woodland						3	3	3	3	12	H
28	Wetland	12213	0.02	0.47	115	70	2	1	3	2	8	M
29	Online storage pond	1165100	0.02	0.47	10952	1544	3	3	3	3	12	H

Name	Type	Catchment size (m2)	Rainfall (m)	Standard percentage runoff	Runoff (m^3)	Estimated storage (m^3)	Flowpath significance	Storage potential	Wider benefit	Landowner willingness	Total score	Priority
30	Wetland	589175	0.02	0.47	5538	359	3	2	3	3	11	H
31	Cross slope woodland						3	3	3	3	12	H
32	Pond						0				0	L

Table D-2: Values used for scoring variables

Variable	1	2	3
Runoff	0-100	101-1000	1000+
Storage	0-200	201- 500	500+
Wider benefits	Low	Medium	High
Landowner willingness	Low	Medium	High