Natural England Commissioned Report NECR140

New Forest SSSI Geomorphological Survey Overview

Annex A: Black Gutter Bottom Restoration Plan - SSSI Unit 35

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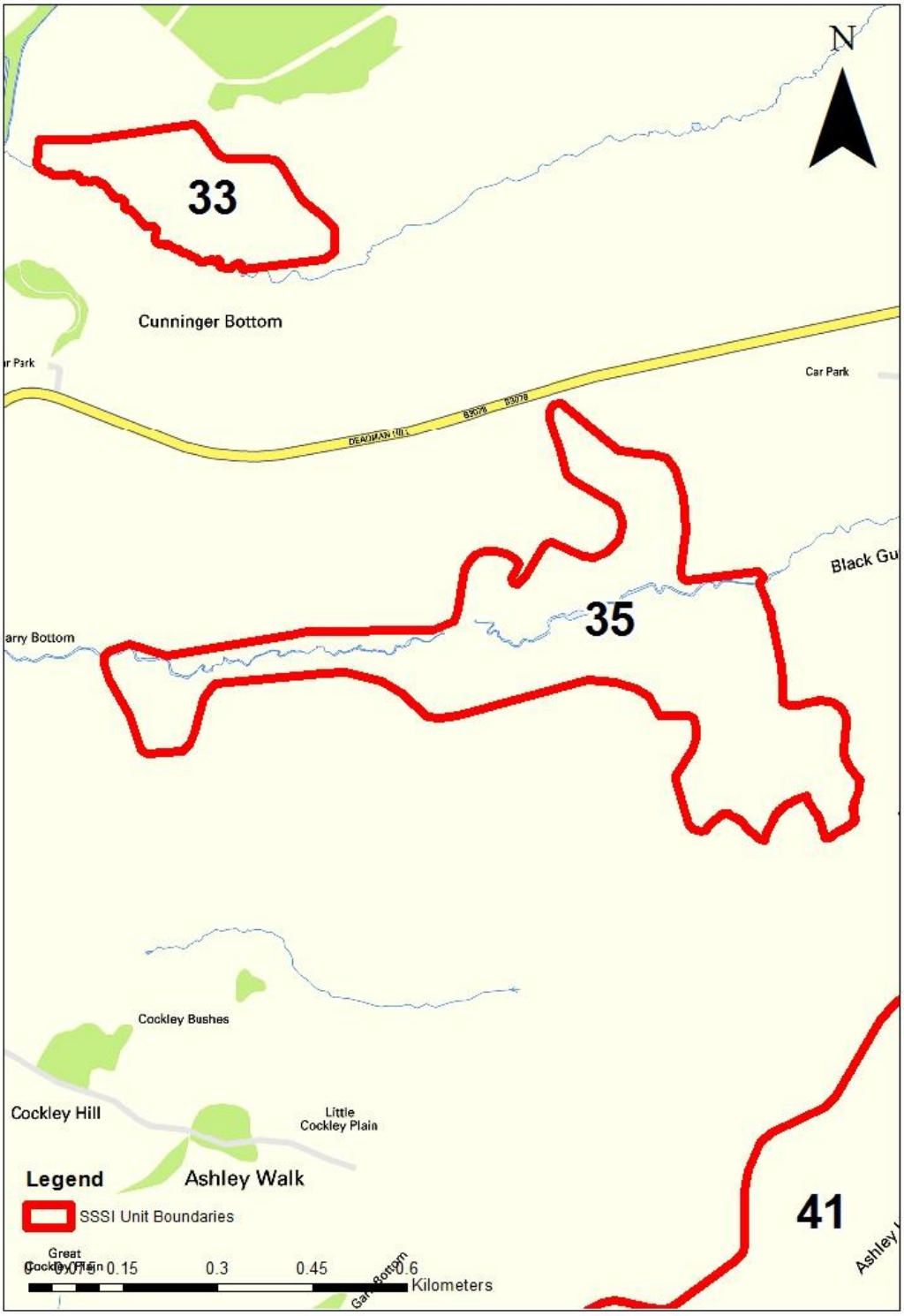
1 Black Gutter Bottom Restoration Plan - SSSI Unit 35

1.1 Introduction

Black Gutter Bottom (Unit 35) has Black Gutter flowing from East to West through the unit (Figure 1-1). The SSSI unit is considered to be in unfavourable recovering condition. It is approximately 23.47ha in size.

The unit is predominantly made up of dry, grassy heath with areas of seepage mire on the valley slopes to the north of Black Gutter.

Figure 1-1: SSSI Unit 35 location (flow direction is right to left)



1.2 Current hydromorphic conditions and issues

A summary of the hydromorphic conditions of Unit 35 is given below in Table 1-1.

Table 1-1: Hydromorphic conditions of unit 35

Geomorphological Assessment Area		Black Gutter
Site name		Black Gutter Bottom
Size (ha)		23.5
SSSI unit(s)		35
Channel Condition	River type (s)	Mildly active single thread with multi thread / anastomosed / multi branch sections where spreads across floodplain, making it difficult to determine a dominant channel
	Responsiveness	Low / moderate - Anastomosed sections are robust, single thread sections more responsive but still low gradient, low / moderate gravel supply, no evidence of significant straightening (minor in upstream section)
	Sediment delivery, type and mobility	Some smaller gravel bed sections and silted sections particularly where spreads. Pond acting as a silt trap.
	Main source of water	Upstream source (Black Gutter Bottom) and Leaden Hall
	Aquatic vegetation	The stream is well vegetated, particularly in the more ponded, poached sections. Aquatic vegetation consists of Floating Sweet-grass, Bog Pondweed, Fennel Pondweed, Creeping St John's-wort, and *Juncus* species (M29).
	Drainage damage	Little - some evidence of natural drains entering a palaeo channel and joining the main channel further downstream
	Morphology	Riffles / runs, pools where single thread sections have narrowed and local increase in gradient but composed of small gravels, otherwise mainly passive
	Incision	Little
	Engineering	Pond possibly artificial
	Bank activity	Watercourse wider and more multi-branch than OS map suggests and generally bank activity is minimal
	Flow type (s)	Good connectivity to floodplain so flows are spread. No significant impacts on natural flow regime
Floodplain Condition	Valley type	Wide floodplain
	Main source of water	Overland flow and out of bank flows
	NVC communities	M29, M21a, H2, M16a
	Key habitat types	Wet heath, Acid dry heath, Marshy grassland, Scrub, Valley mire, Soakway, Scattered bracken
	Drainage	Reasonable, no obvious artificial influence
	Scrub / tree encroachment damage	Some areas of gorse. Some stands of Holly trees with heavily grazed grassland beneath
	Palaeo features	No obvious evidence on site, some identified with LIDAR
	Floodplain connectivity	High
	Poaching and grazing pressures	Significant grazing damage
Generic restoration options		Channel blocking to improve floodplain connectivity in some areas. Fill in pond.
Additional comments		

The stream within SSSI Unit 35 is mainly passive single thread channel (Figure 1-2) with some sections of multi branch / anastomosed networks where floodplain connectivity is improved and gradients are reduced (Figure 1-3). There are generally low inputs of gravel to the stream locally and from upstream sources, with limited bank erosion. Some sections display a weak riffle - pool sequence and gravel bed condition is improved where significant narrowing has occurred in single thread section (Figure 1-5).

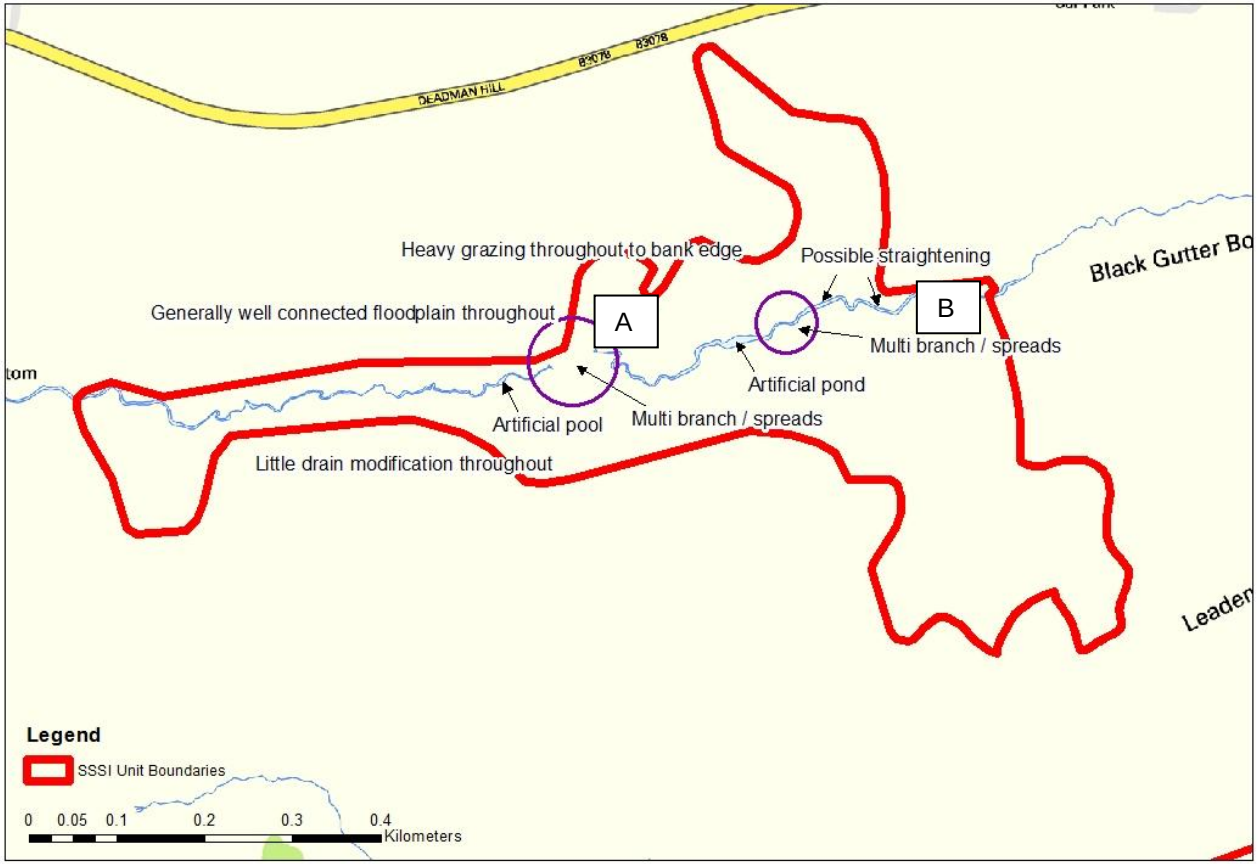
Figure 1-2: Passive single thread channel characteristics

Figure 1-3: Multi branch / anastomosed sections

Figure 1-4: Narrowed channel exposing gravel bed

The source of the stream is Black Gutter Bottom and Leaden Hall. Figure 1-5 summarises the existing hydromorphology and pressure impacting unit 35.

Figure 1-5: Current hydromorphic conditions and pressures



The stream has a generally low gradient, particularly in the multi-thread / branched sections (Figure 1-5 - A) where there is no clear dominant channel and spreads over a wide area. In the single thread sections, the gradient is still low, with only minor local increases at riffles where flows are energetic enough to uncover clean gravels. This is assisted by channel narrowing at the riffles (Figure 1-4). Outside of these locally energetic areas, the bed is generally silt dominated due to the low gradients (Figure 1-6). As a result of the generally low gradients and in combination with little incision, bank erosion is limited.

Figure 1-6: Silty bed

There is little evidence of significant channel straightening, either from the audit or the LIDAR. Only minor sections have been identified in the upper section of unit, shown in Figure 1-5 - B. This, in combination with no bankside embankments, limited evidence of historic dredging (aside from the pond) and limited artificial drainage, means that incision is not an ongoing process and flows are well connected to the floodplain meaning energy is spread over a wide area, often finding flow routes between *Molinia caerulea* tussocks (Figure 1-7).

In some locations the single thread channel is more disconnected than others resulting in drier floodplain areas with associated impacts on vegetative assemblages (see section 1.4).

Figure 1-7: Water spreading over wide area (Soakway)

The flow and drainage lines in Appendix A confirm that there is little evidence of significant artificial drainage within this unit. There are very few straightened drains and both the audit and LIDAR confirm no presence of embankments along either the main channel or the drains.

Some of the flow lines in the mid to upper sections of the unit appear to join a palaeo channel before rejoining the main channel further downstream. This is unlikely to be impacting the flow regime significantly however.

There are no significant gravel shoals or features within this unit, with morphologic units limited to riffles and runs where there are minor increases in gradient locally.

Fine sediment inputs to the channel are increased due to poaching and grazing up to the channel banks. Several points are used by cattle for crossing and drinking and this may have been a reason for the creation of the pond in the upper section of the unit (Figure 1-8). The pond is acting as a sediment sink and is disrupting the continuity of sediment and flow downstream.

Figure 1-8: Artificial pond

There are no natural woody debris features along the channel due to the surrounding vegetation type. Therefore, restoration options to improve floodplain connectivity further through the single thread sections of the watercourse are likely to involve channel blocking using consolidated silty berms (which naturally occur through the reach) alongside channel infilling. These will create short lengths of impounded watercourse and multi-branched networks that will improve floodplain connectivity / wetting.

Some minor palaeo channels have been identified in Figure 1-10. These have been identified from the audit and supplied LIDAR. Reconnecting these is unlikely to provide significant hydromorphological and ecological gains.

1.3 Probable channel development

The channel is presently relatively stable as a result of limited incision, straightening, embanking and good floodplain connectivity.

Continuing process are likely to involve further silt deposition (some of which will be flushed through during higher flows) that could lead to bed raising and channel narrowing in the medium to long term. Channel narrowing may also expose further areas of gravel bed in the single thread sections of the unit. Fine sediment inputs will remain heightened as a result of surrounding land use and grazing, due to the limited buffer strip between the floodplain and the channel. It is unlikely the nature and distribution of existing features will change significantly over the next decades due to the generally low energy conditions within the unit.

1.4 Current ecological conditions

The unit consists predominantly of dry heath with some areas of seepage mire on the northern valley slopes. The dry heath contains extensive patches of scattered Bracken *Pteridium aquilinum* and Gorse *Ulex europaeus* scrub. There are also extensive areas of wet heath.

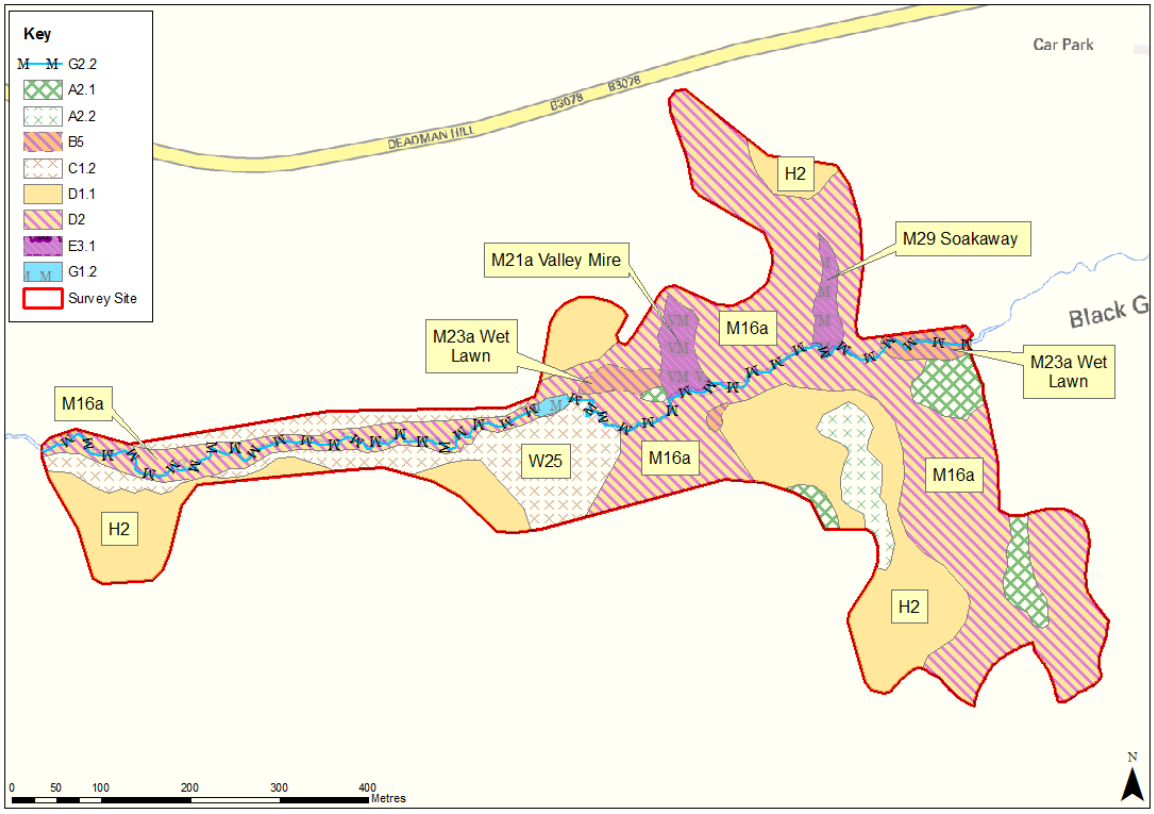
Adjacent to the watercourse in places, there is heavily grazed, marshy grassland, particularly in association with stands of ancient Holly *Ilex aquifolium* trees where livestock have congregated. These coppices are traditionally managed for livestock within the New Forest and the stools are

clearly of great antiquity. However, in some places these grazed lawn areas did not contain a high proportion of wetland species and appeared relatively dry and were bordering on becoming acid grasslands.

The watercourse contained a variety of aquatic vegetation including Bog Pondweed *Potamogeton polygonifolius*, Floating Sweet-grass *Glyceria fluitans*, Fennel Pondweed *Potamogeton pectinatus* and Marsh St. John's-wort *Hypericum elodes.*

Figure 1-9 shows the Phase 1 Habitat Map for Unit 35.

Figure 1-9: Phase 1 Habitat Map



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1.5 Restoration plan proposals

A summary of the current pressures, unmitigated impacts and restoration proposals is given in Table 1-2 and shown in Figure 1-10.

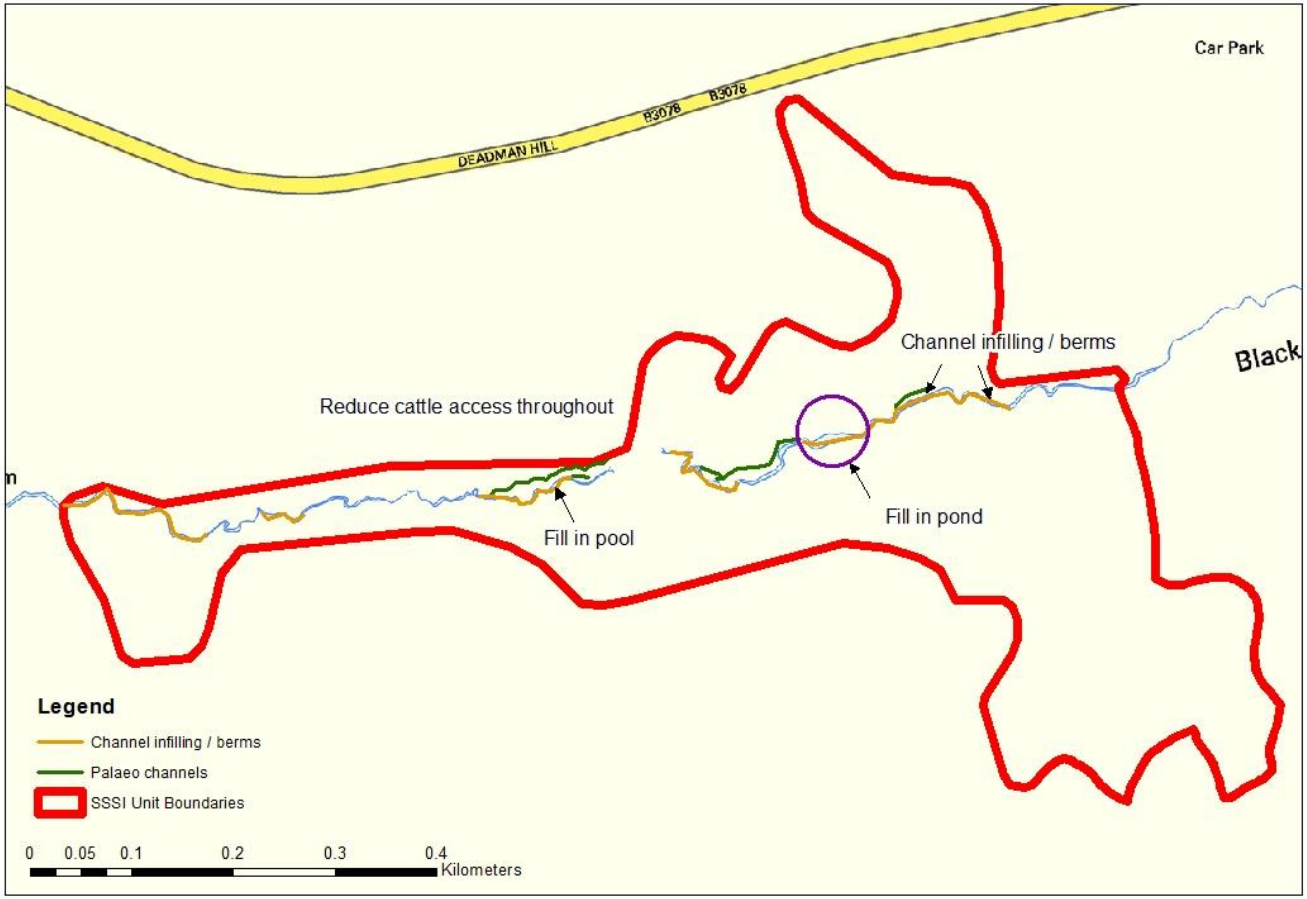
The key hydromorphological and ecological gains associated to the proposed restoration measures are:

- Bed and associated water level raising through channel infilling and blocking using heather bailing or consolidated berms) to create spreading sections of channel and to improve floodplain diversity;
- Water level raising will improve groundwater levels locally;
- Restored natural flow and sediment regime through artificial pond infilling.

Table 1-2: SSSI Unit 35 proposed restoration measures

Pressure	Impact	Restoration proposal	Hydromorphic improvement	Ecological improvement	Constraints / issues
Artificial drainage	High flows impacted. Sediment transfer impacted. Water table lowered locally.	Artificial pond and pool infilling	Restore a natural flow and sediment regime. Reduces flood peaks. Removes the sediment sink.	Improve diversity of in-channel habitats and restoration of wetland habitats around them. Retain integrity of the M21a mire system.	May require import of material. Pond may be a designated feature preventing possibility of infilling although appears species-poor.
Floodplain drying	Reduction in wetland habitat (quality and quantity)	Channel blocking using heather bailing or berms and channel infilling	Further multi-branch / spreading sections. Improved floodplain connectivity / wetting.	Increase in quality and quantity of wetland habitat within floodplain especially M29 soakways which are a very important feature of the New Forest mire systems.	May require import of material. Reduction in grazing
Riparian grazing	Fine sediment production. Disruption to woody species recruitment.	Exclude livestock	Encourages riparian hydromorphic diversity	Improve diversity of riparian habitats (*Molinia* mire)and promote the growth of bog woodland (W4b) in suitable locations.	Some grazing is likely to be maintained. Removal of grazing or exclusion by fences is culturally unacceptable

Figure 1-10: Proposed restoration measures for SSSI Unit 35



1.6 Design considerations

The current hydromorphic condition of the channel is considered to be reasonable given existing processes and controls. Further improvements could be made through improved floodplain connectivity, which is likely to improve vegetative diversity.

Channel infilling should use either heather bailing or other materials suitable to existing conditions, i.e. vegetated, consolidated berms.

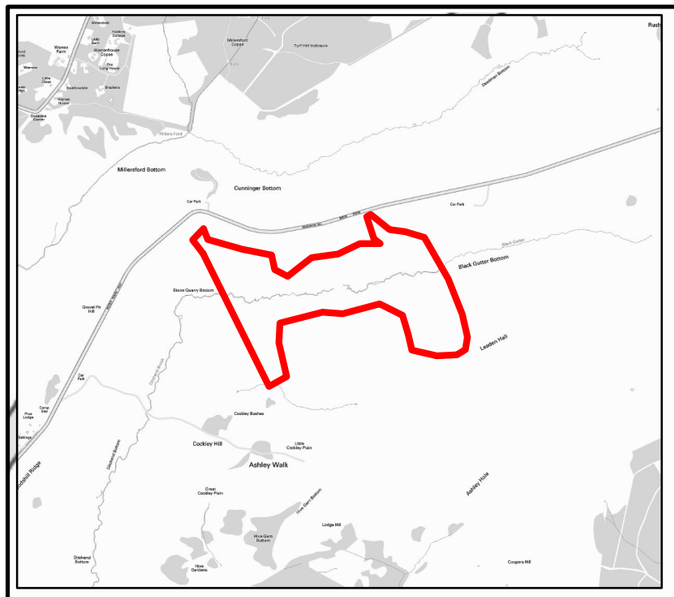
1.7 Restored channel and monitoring requirements

It is anticipated that the proposed restoration works will improve floodplain connectivity and reduce fine sediment inputs to the channel. This should provide a wetter floodplain. Morphologic change is likely to involve creation of a multi-branched / spreading channel network. This could be monitored qualitatively with automated time lapse photography at key restoration point to record daily images of flow types, morphology and vegetation character. This could be undertaken alongside two-yearly reconnaissance audits to determine hydromorphological change over the entire reach, which fixed point photography will not cover. The daily photographic records should be analysed to estimate and record the parameters detailed in Table 1-3.

Table 1-3: Monitoring parameters, frequency and suggested approaches for the Unit 35.

Parameter	Approach	Frequency	Approximate cost
Morphologic unit change	Time lapse camera / audit	Daily (Annual statistical summary)	Capital 2 x £200 Half yearly downloading £200 Annual summary £300 Two - yearly reconnaissance audit £500
Flow change	Time lapse camera / audit	Daily (Annual statistical summary)	
Sedimentology	Time lapse camera / audit	Daily (Annual statistical summary)	
Vegetation change	Fixed point camera survey	Biennially	
	Fixed point quadrat survey	Biennially	Survey £350 Analysis £500
	Fixed point aquatic macrophyte survey		
NB. Costs assume downloading and site visits as part of wider field campaign.			

Appendix A - Artificial drains and flow lines - SSSI Unit 35

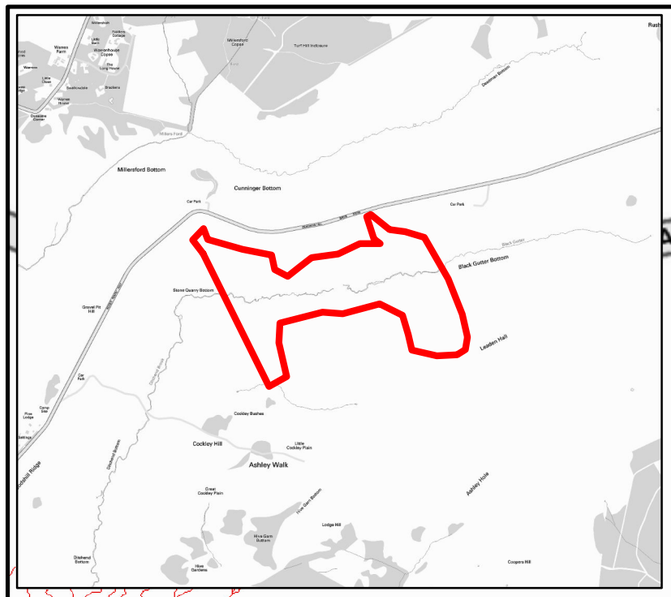


SSSI 35: Black Gutter Bottom

Stone Quarry Bottom

Ditchend Brook

0 50 100 200 Metres



SSSI 35: Black Gutter Bottom