Natural England Commissioned Report NECR140

New Forest SSSI Geomorphological Survey Overview

Annex O: Ferny Croft South Restoration Plan - SSSI Unit 426

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1 Ferny Croft South Restoration Plan - SSSI Unit 426

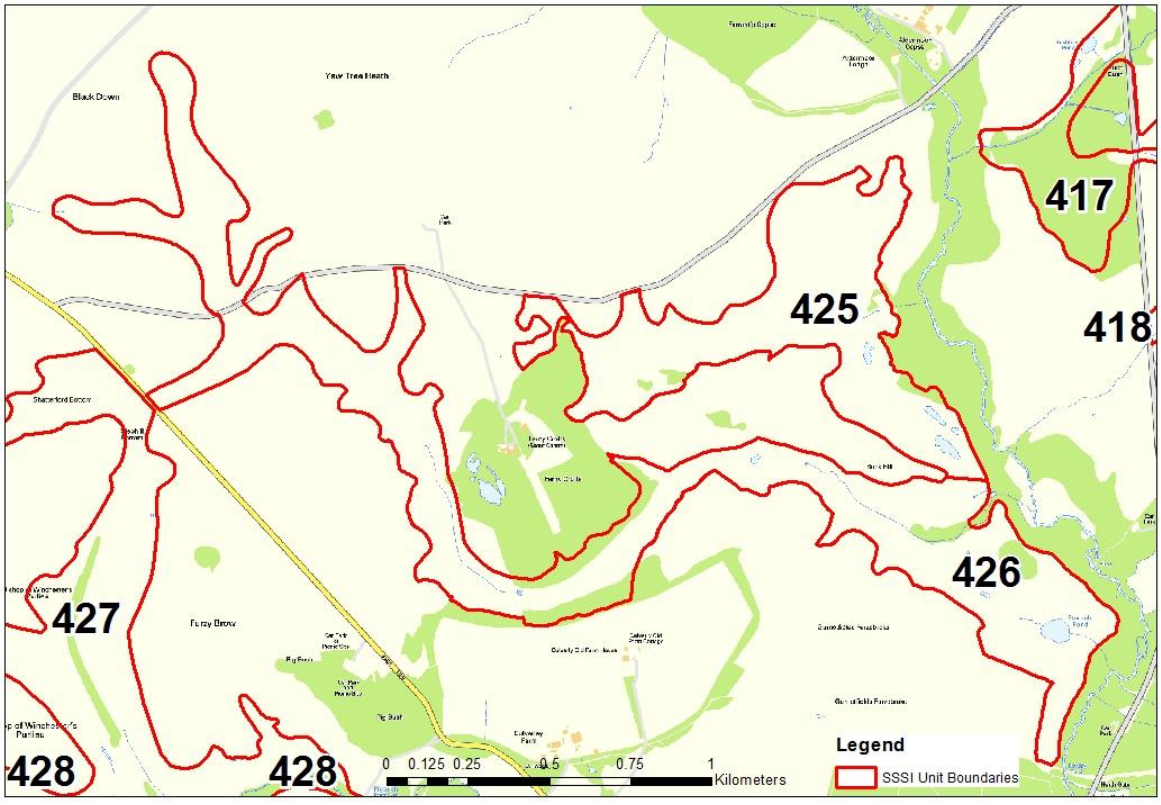
1.1 Introduction

Ferny Croft South (Unit 426) has mire and stream characteristics and eventually drains into Beaulieu River, just downstream of Starpole Pond (Figure 1-1). It is considered to be in unfavourable recovering condition. It is approximately 85ha in size.

The unit consists of a combination of various habitats including wet heath, valley bog, both broad-leaved and mixed woodlands, Purple Moor-grass mires and areas of open water. The unit as a whole is not under severe grazing pressure, however, the area south of Starpole Pond is becoming increasingly subject to scrub encroachment.

There is connectivity between Unit 426 and Unit 425 where flow from Unit 425 enters 426 downstream. It is unlikely that the restoration proposals for Unit 426 will significantly impact the functioning of Unit 425.

Figure 1-1: SSSI Unit 426 location (flow direction is left to right)



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1.2 Current hydromorphic conditions and issues

A summary of the hydromorphic conditions of Unit 426 is given below in Table 1-1.

Table 1-1: Hydromorphic conditions of unit 426

Geomorphological Assessment Area	Ferny Croft South
Site name	Ferny Croft South
Size (ha)	85
SSSI unit(s)	426

Channel Condition	River type (s)	Passive single thread and spread characteristics
	Responsiveness	Low to moderate - low to moderate gradient, few gravels, mix of single thread and spread / multi thread floodplain flow, well connected to floodplain
	Sediment delivery, type and mobility	Low upstream gravel supply with limited local sources (gravel only identified in sporadic areas of the single thread sections, mostly silty bed where one dominant channel
	Main source of water	Upstream source (Black Down), drains, seepage and overland flow
	Aquatic vegetation	At the time of the survey the channel was flooded, however Bog Pondweed and Creeping St John's-wort were evident
	Drainage damage	Some artificial, small drains at d/s end of reach. Drain close to SSSI 425 looks straightened, generally ok condition, no embankments
	Morphology	Few gravel features, mostly occupies small interfluves across a confined floodplain area
	Incision	No significant incision
	Engineering	Single log jams partially successful in holding back water to increase floodplain wetting, but now failing. Possibly some historic deepening / dredging although no embankments
	Bank activity	Low - as mostly spread across a multi-thread network, bank activity is minimal
	Flow type (s)	Flows impacted by drainage network. Road and drains impact natural flow routes at u/s end of reach. Improvements to flow spreading could be made.
Floodplain Condition	Valley Type	Wide floodplain
	Main source of water	Seepage, drains / overland flow, out of bank flows
	NVC communities	M24, M21a, M29, H2, M16a, W4b
	Wetland types	Valley mire, Wet heath, Marshy grassland, Dry heath, Broadleaved woodland, Mixed woodland, Open water,
	Drainage	Overland flow routes look relatively natural, some smaller drain impacts at downstream end and road influences upstream connection.
	Scrub / tree encroachment damage	Tree/scrub encroachment into wet heath
	Palaeo features	Little
	Floodplain connectivity	Moderate to high - generally good connectivity although could be improved in some areas through channel blocking
	Poaching and grazing pressures	Significant grazing damage
Generic restoration options	Infill artificial drains, further channel blocking / infilling to hold back water and increase floodplain wetting, improve pipe under road	
Additional comments		

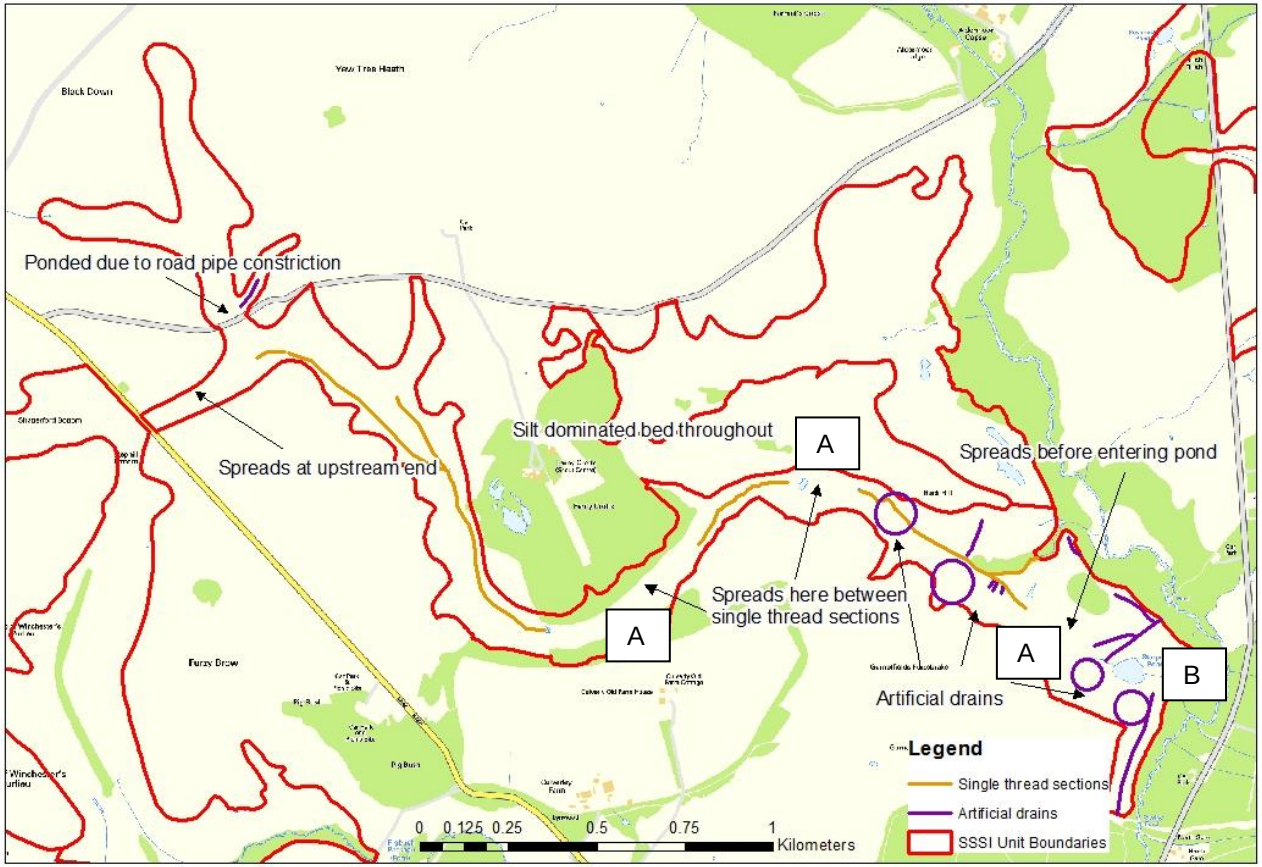
The stream within SSSI Unit 426 is a passive single thread channel (Figure 1-2), switching to sections of poorly differentiated multi branch / spreading networks where floodplain connectivity is improved and gradients are reduced (Figure 1-3). There are generally low inputs of gravel to the stream both locally and from upstream sources, with limited bank erosion and the dominant material on the channel bed is fine sediments / silt (Figure 1-4).

Figure 1-2: Passive single thread channel characteristics

Figure 1-3: Multi branch / spreading sections with Soakways

The source of the stream is Black Down. Figure 1-4 summarises the existing hydromorphology and pressure impacting unit 426.

Figure 1-4: Current hydromorphic conditions and pressures



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The stream has a generally low gradient, particularly in the poorly differentiated multi-thread / spreading sections (Figure 1-4 - 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 occasional gravel bed sections are exposed. Outside of these local poorly energetic areas, the bed is generally silt dominated due to the low gradients limiting transport of delivered fine sediment (Figure 1-5). As a result of the generally low gradients and in combination with little incision, bank erosion is limited. The changeable nature of the spreading network is highly dependent on water level, providing an environment for species tolerant of periodic inundation, restoration therefore needs to consider management of appropriate water levels.

Figure 1-5: Silty bed

Evidence suggests that there has been little straightening of the main channel, however it is possible that the single thread sections may have been artificially deepened in the past. This does not appear to be significant and floodplain connectivity remains reasonable in the single thread sections. Therefore, incision is not a significant ongoing process within this unit and flow energy is spread across a wide area (Figure 1-6).

Figure 1-6: Water spreading over wide area in *Molinia* Mire (M25a)

The LIDAR and drainage lines in Appendix A show that there has been artificial straightening / ditching of flows lines and drains flowing into the main channel (Figure 1-7), these areas are also highlighted in Figure 1-4. This may have been a contributing factor to the formation / maintenance of the single thread sections, where flows are concentrated at one point, creating conditions favouring a dominant channel and giving enough excess energy to maintain a single thread channel rather than promoting siltation, similar to the spreading sections within this unit. This flow concentration has also resulted in drier floodplain sections as this flow would normally be spread over a wider area.

The Starpole Pond is likely to have been artificially created and stores water before entering the Beaulieu River downstream (Figure 1-4 - B and Figure 1-8).

Figure 1-7: Straightened / dug drain in wet heath habitat (M16a)

Figure 1-8: Starpole Pond surrounded by Molinia Mire (M25a)

The road at the upstream end of the SSSI unit provides a barrier to flow routes downstream, with water ponding behind it before flowing through a small pipe under the road (Figure 1-9).

Figure 1-9: Pipe underneath road with grazed lawn (M23a) either side of it

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.

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 reach scale channel blocking using heather bailing or possibly consolidated silty berms alongside channel infilling. These will create short lengths of impounded watercourse and multi-branched / spreading networks that will improve floodplain connectivity / wetting. Existing restoration attempts in some locations, for example log blocks, are failing (Figure 1-10).

Figure 1-10: Failing log block at base of valley mire (M21a)

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 in the long term. 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. The artificial drainage network will continue to maintain single thread channel characteristics where these concentrate flow in some locations.

1.4 Current ecological conditions

The unit contains a variety of heathland and mire habitats. The eastern section of the unit consists of a Purple Moor-grass *Molina caerulea* dominated heathland community (M16a) with Gorse *Ulex europaeus* and Bracken *Pteridium aquilinum* dominated scrub present on higher ground (W23 and W25 respectively). Starpole Pond itself contains scattered Molinia tussocks throughout the shallower areas. North of Starpole Pond is a conifer woodland surrounded by broadleaved woodland (outside of the unit) with a Bracken under layer, which is encroaching further into the unit in some places.

Moving westward the site becomes increasingly waterlogged within the valley bottom with more characteristic mire species emerging including Bog Myrtle *Myrica gale* and *Sphagnum* sp. (M25a) There are several smaller pools containing Bog Pondweed *Potamogeton polygonifolius* with *Sphagnum* and *Molinia* 'mats'. The valley edges across this section are obviously drier and contain heath communities with Deer-grass *Trichophorum cespitosum* and Common Heather *Calluna vulgaris* present. These areas are also interspersed with scrub encroachment from both Bracken and Gorse.

Water has collected in the valley bottom right across the site and typical surrounding habitats consist of a heather-Molinia mosaic. Several areas along the waterbody are bordered by Willow *Salix* sp.

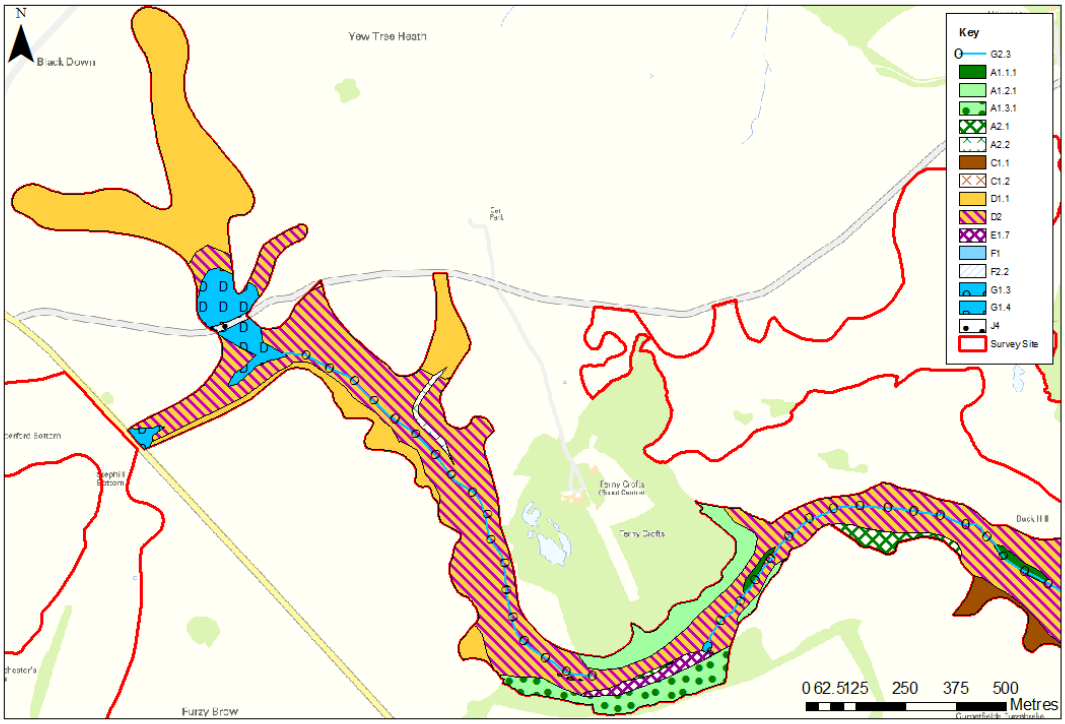
In the mid section of the unit, close to Ferny Crofts, the habitat becomes increasingly bog-like with Bog Myrtle and *Sphagnum* tussocks present, with some drier areas colonised by Bracken stands.

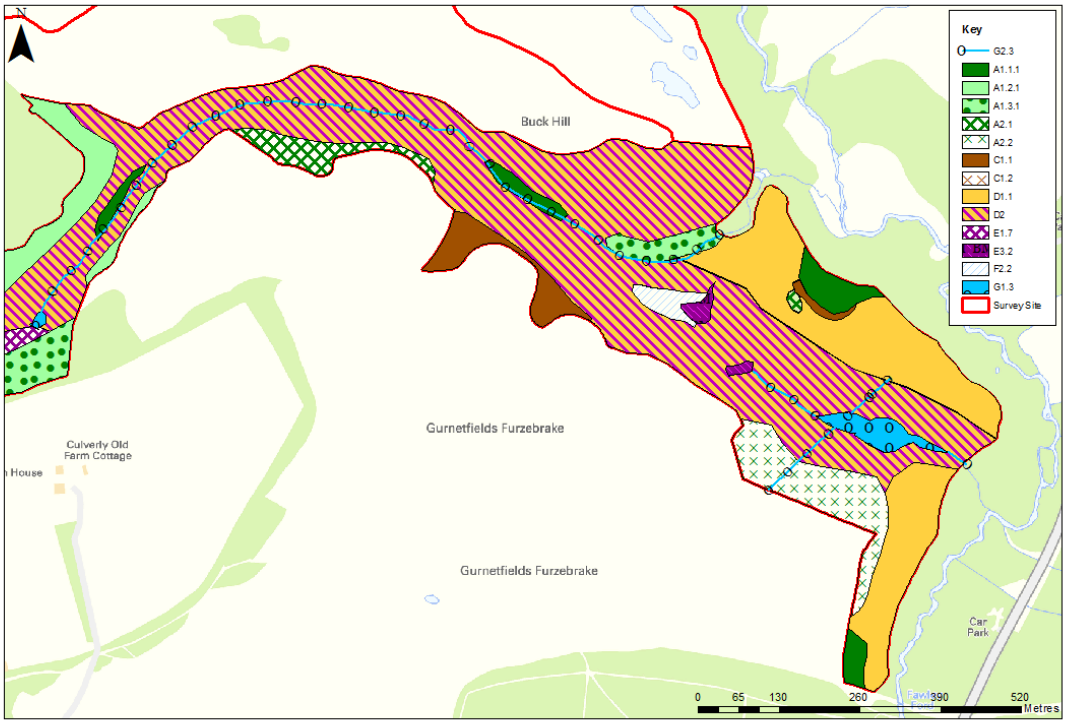
The eastern section of the unit is similar again, with water collecting in the valley bottom creating a valley bottom mire habitat in immediate surrounding area; however these areas are small and limited. The higher ground in dominated by drier heath communities.

A small unit section, Denny lodge is separated from the main unit section by a road. This area is extremely wet with water pooling near the roadside. As the gradient increases away from the road, the habitat becomes increasingly drier with heather and Purple Moor-grass communities developing.

No invasive species were recorded at this unit and the site does not appear to be badly damaged by grazing, even though grazing pressure is evident across the unit. Figure 1-11 shows the Phase 1 Habitat Map for Unit 426.

Figure 1-11: 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 1-12.

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

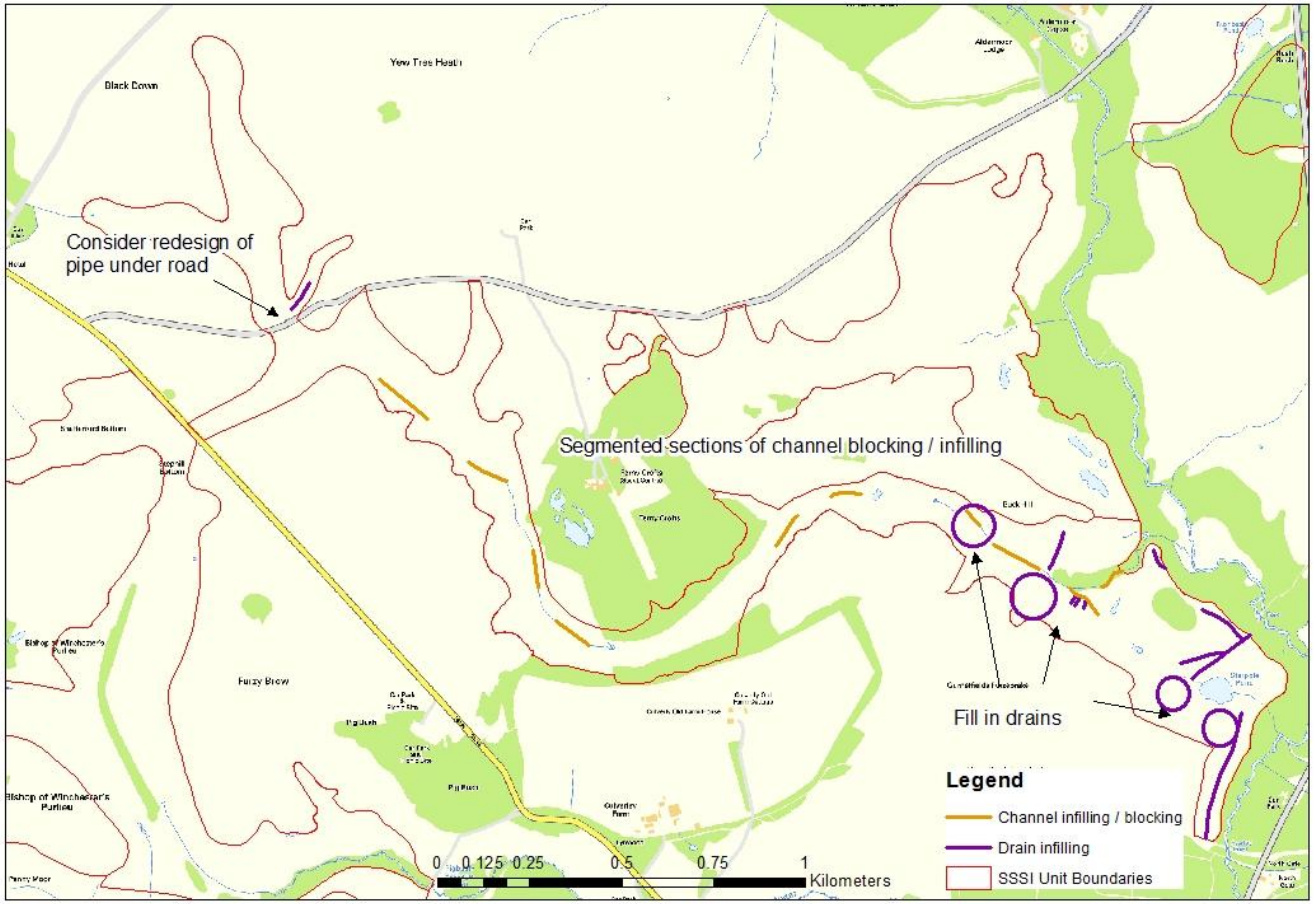
- Bed and associated water level raising through channel infilling to create spreading sections of channel and to improve floodplain diversity;
- Water level raising will improve groundwater levels locally;
- Subdued natural flow regime reinstated as a result of artificial drain infilling.

Table 1-2: SSSI Unit 426 proposed restoration measures

Pressure	Impact	Restoration proposal	Hydromorphic improvement	Ecological improvement	Constraints / issues
Historic dredging	Single thread channel creation.	Main channel blocking and infilling using heather bailing or fine sediment / silty berms (stabilised with vegetation)	Raise water levels locally to improve floodplain connectivity and create more spreading sections, replacing the single thread sections.	Creating additional Soakways (M29) and sustaining the valley mire (M25a, M21a) habitats alongside the watercourse and at the valley heads respectively.	Will require import of significant amounts of material. Channel blocking may cause a barrier to fish, a fish pass may be required although this is very unlikely Cultural objections
Artificial drainage	High flows impacted. Sediment transfer impacted. Water table lowered locally.	Artificial drain infilling	Restore a natural flow and sediment regime. Reduces flood peaks.	Would create a reduction in flow allowing more aquatic and wetland vegetation species to colonise both the banks and watercourse itself integrating these habitats where they are currently disconnected.	May require import of material with associated risk of introducing invasive species Cost
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.	Will raise water levels in the floodplain and encourage the recolonisation of degraded areas by M25a *Molinia* mire.	May require import of material with attendant risks - see above. Cost Loss of grazing Cultural objections
Riparian grazing	Fine sediment production. Disruption to woody species recruitment.	Exclude livestock	Encourages riparian hydromorphic diversity	Restoration of wet grassland, potentially to mire habitats (M25a) and the recovery of overgrazed dwarf shrubs stands. Will complement other works. Increased floristic	Some grazing is likely to be maintained. Culturally unacceptable

Pressure	Impact	Restoration proposal	Hydromorphic improvement	Ecological improvement	Constraints / issues
				diversity of ground flora on floodplain.	
River crossings	Disruption to natural flow regime.	Replace road pipe with more suitable structure such as a concrete circular culvert with potentially associated fencing	Natural flow regime reinstated	Improve diversity of in-channel habitats. Will limit ponding around structures allowing more natural wetland communities to develop	Structures will need to be fit for the purposes of vehicles crossing Fencing may be culturally unacceptable

Figure 1-12: Proposed restoration measures for SSSI Unit 426



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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 associated to a wetter environment.

Channel infilling and berm creation should use materials suitable to existing conditions, i.e. vegetated, consolidated berms. This could be undertaken in segmented sections to negate the need to fill the entire single thread lengths. The impounding influences of the filled / blocked section should result in natural infilling upstream (Figure 1-12).

The major straightened / modified drainage channels are identified in Figure 1-12. Other minor modifications could be considered for infilling and Appendix A should be used for reference.

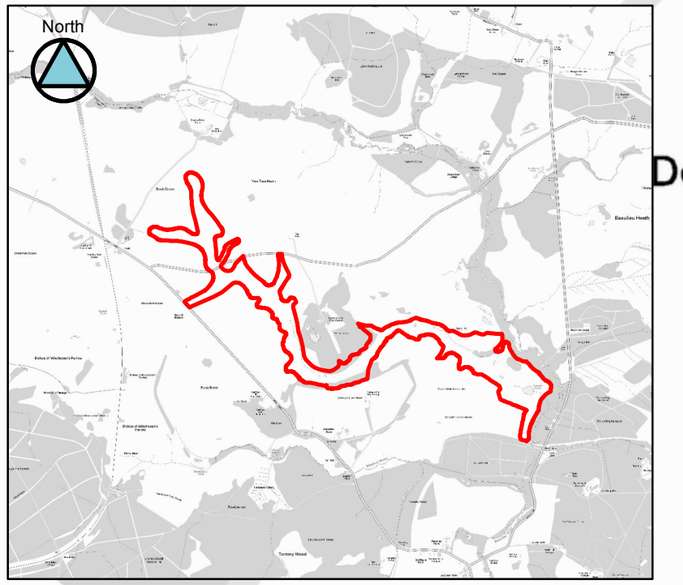
1.7 Restored channel and monitoring requirements

It is anticipated that the proposed restoration works will improve floodplain connectivity. Morphologic change is likely to involve bed raising and the 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 426.

Parameter	Approach	Frequency	Approximate cost
Morphologic unit change	Time lapse camera / audit	Daily (Annual statistical summary)	Capital 5 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 426



SSSI 426: Ferny Croft South

Yew Tree Heath

Down

Car Park

Car Park

B3056

Hotel

0 50 100 200 300 Metres

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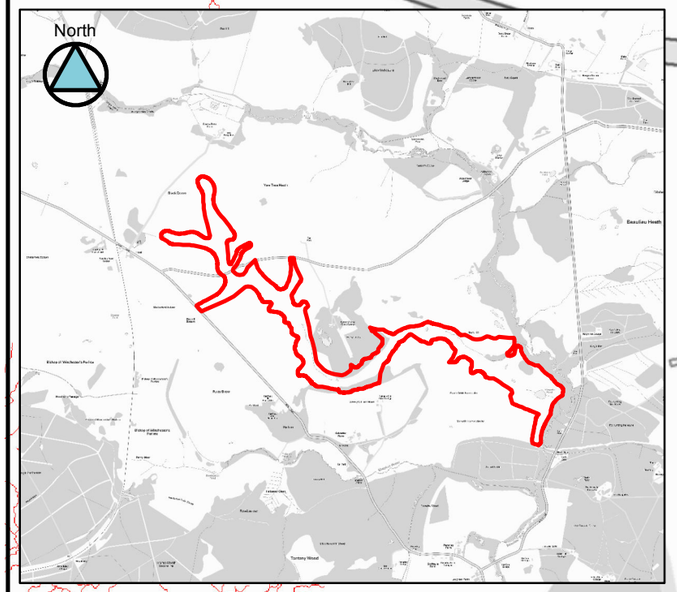

SSSI 426: Ferny Croft South

Ferny Crofts
(Scout Centre)

Ferny Crofts

Gurnetfields Furze

0 50 100 200 300 Metres

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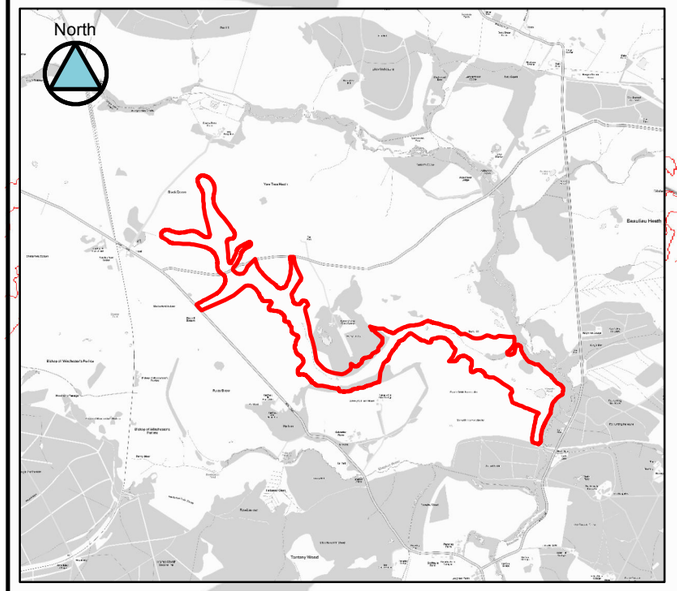

SSSI 426: Ferny Croft South

Buck Hill

Gurnetfields Furzebrake

Gurnetfields Furzebrake

King's H

Car Park

Ford

Starpole Pond

Car Park

Fawley Ford

0 50 100 200 300 Metres

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