Natural England Commissioned Report NECR140

New Forest SSSI Geomorphological Survey Overview

Annex F: Long Beech Restoration Plan - SSSI Unit 112

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1 Long Beech Restoration Plan - SSSI Unit 112

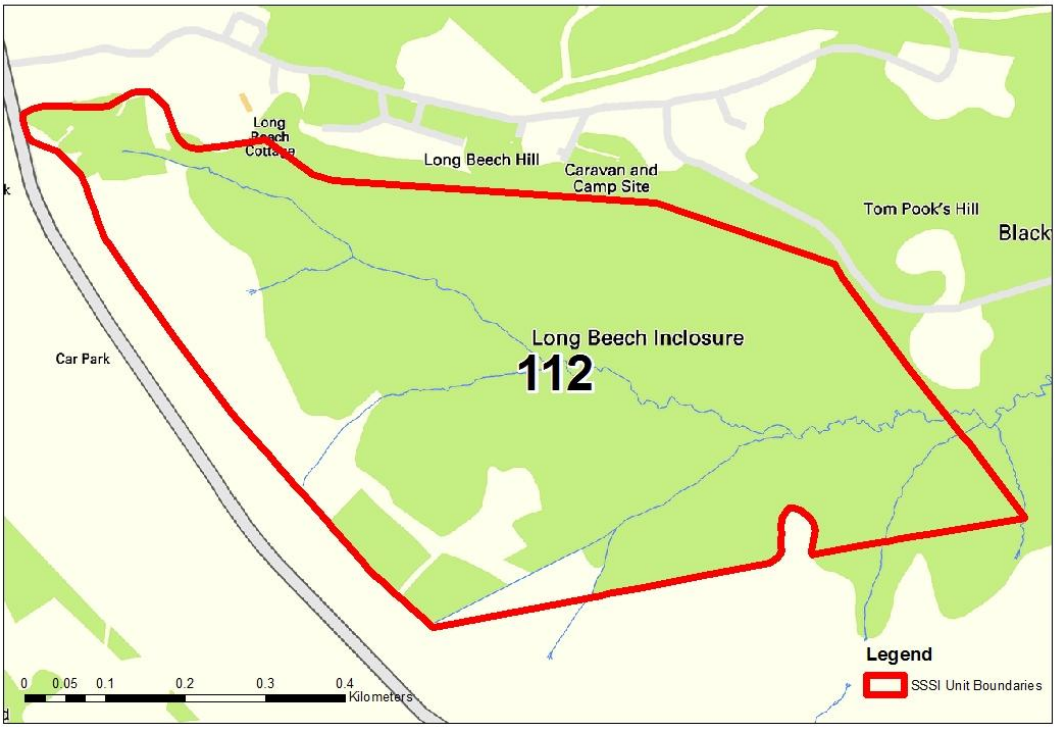
1.1 Introduction

Long Beech (Unit 112) incorporates the upper reaches of Colemeer Gutter (Figure 1-1). The stream runs from west to east through the unit. It is considered to be in unfavourable recovering condition and is approximately 43.62ha in size.

This unit consists predominantly of broadleaved woodland dominated by Oak *Quercus robur* and Beech *Fagus sylvatica*, with some areas of conifer plantation. Within the western edge of the unit are areas of acid grassland, dry heath and mire.

The SSSI unit is classified as a mire to stream transition unit. A ecohydrology unit survey report has also been produced for the unit. Although the site is described as a transition site there is not a continuum between the small mires in the east of the site and the stream which was the focus of the geomorphological survey, as they are separated by an area of woodland. As a result there is limited cross over between the two surveys.

Figure 1-1: SSSI Unit 112 location (flow direction is east to west)



1.2 Current hydromorphic conditions and issues

A summary of the hydromorphic conditions for unit 112 is given in Table 1-1.

Table 1-1: Summary of hydromorphic conditions for unit 112

Geomorphological Assessment Area		Long Beech Inclosure
Site name		Long Beech
Size (ha)		43.6
SSSI unit(s)		112
Channel Condition	River type (s)	Active single thread
	Responsiveness	Moderate - steep to moderate gradient (particularly at upstream end), modified flow regime (drains), straightening, some gravels, tree clearance (historic)

	Sediment delivery, type and mobility	Some local gravel supply but limited upstream source, limited gravel features, incision a factor
	Main source of water	Upstream source (Long Beech Inclosure) and drains
	Aquatic vegetation	Limited in-channel vegetation due to overshading of woodland. Some aquatic vegetation present in open sections where tree felling and damming has taken place. Species present include Floating Sweet-grass, Bog Pondweed, Common Reedmace
	Drainage damage	Right bank drains incised, straight and embanked
	Morphology	Debris jams common, limited in-channel diversity due to lack of gravel and incision, some embryonic riffles / run / glides and pools in m/s and d/s sections where less incision. Very few gravel bar features
	Incision	Yes - incision in main channel (upper and middle reaches) and mild in drains
	Engineering	Footbridges, wooden weirs (potentially installed to manage incision)
	Bank activity	Bank collapse associated to incision common particularly in u/s section. Some lateral activity in m/s and d/s sections
	Flow type (s)	Flows impacted by upstream and local drainage network. Flood peaks concentrated in channel.
Floodplain Condition	Valley type	Narrow v-shaped valley
	Main source of water	Drains / overland flow, out of bank flows
	NVC communities	W14, U4, H2, M21a, M29
	Key habitat types	Broadleaved Woodland, Coniferous plantation, Recently felled woodland, Acid dry heath, Dry grassland, Mire
	Drainage	Drains impacted by embankments and straightening. Natural drainage impacted through artificial drainage network.
	Scrub / tree encroachment damage	Floodplain consists of woodland although some felling has taken place and further felling would create more open areas
	Palaeo features	None identified
	Floodplain connectivity	Poor - incision has reduced floodplain connectivity
Generic restoration options		Manage incision and raise bed levels and improve in channel hydromorphic features through debris jams and channel infilling, restore modified drains
Additional comments		

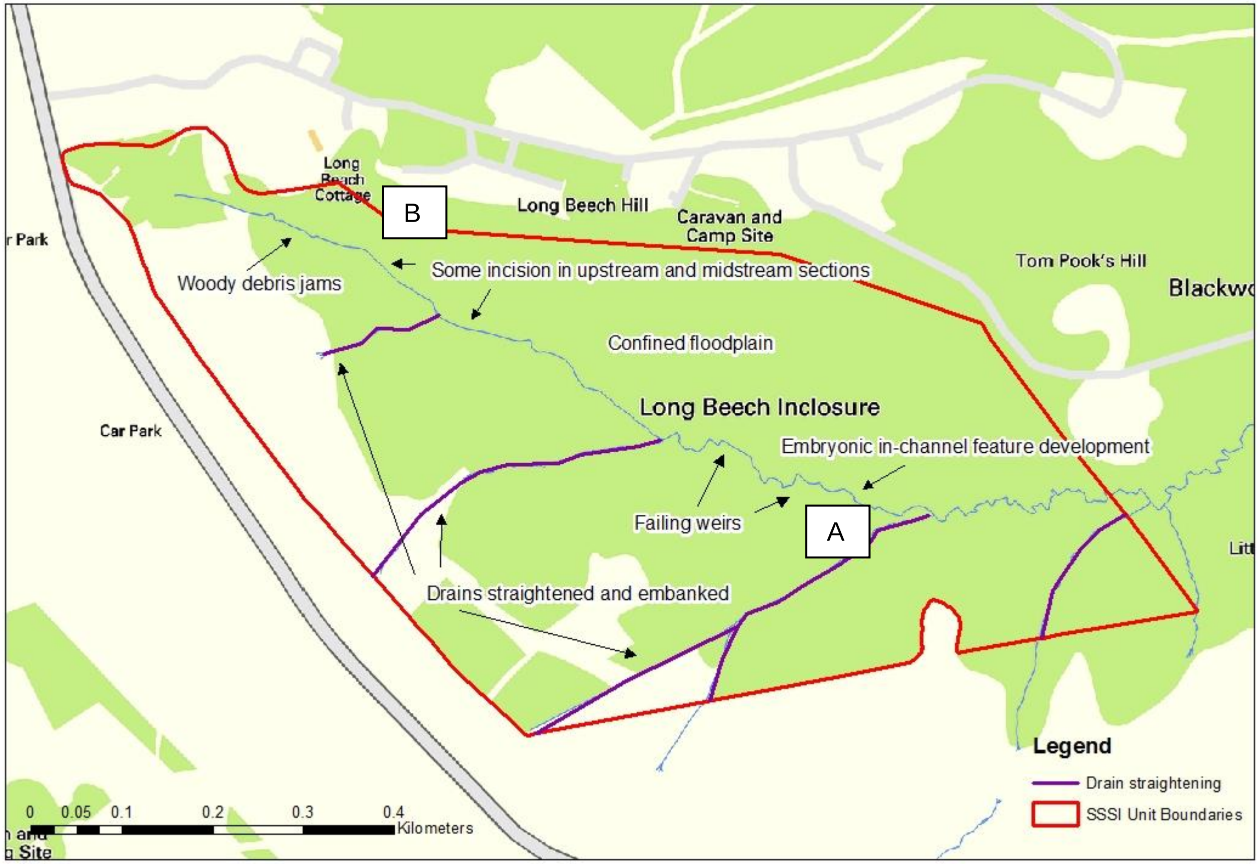
The stream within SSSI Unit 112, Colemeer Gutter, is an active single thread channel (Figure 1-2). The stream is within a relatively confined valley with relatively steep sides, restricting lateral activity to a narrow active band. This has resulted in a poorly developed marginal floodplain (Figure 1-3).

Figure 1-2: Active single thread channel characteristics

Figure 1-3: Steep banks and confined floodplain, showing some incision

The main sources of water for the Long Beech site include the Long Beech Inclosure upstream and surrounding drains. There is some local supply of gravel but the upstream source is limited. Figure 1-4 summarises the existing hydromorphology and pressures impacting unit 112.

Figure 1-4: Current hydromorphic conditions and pressures



Colemeer Gutter has a moderate gradient in the mid to lower reaches (Figure 1-4 - A) and a steeper gradient in the upper reaches (Figure 1-4 - B), where it is narrower.

It was not apparent during the survey that significant straightening of the main channel has occurred in the past. As a result, there are no obvious embankments (constructed from in-channel arisings) along the bank tops of the main channel throughout the unit. Therefore, artificial straightening is unlikely to be a reason for the moderate incision seen along the middle and upper reaches.

The major drains within this SSSI unit show evidence of past straightening and over-deepening, with some sections of embankments along the bank tops. Other minor flow routes and drains do not appear to have been significantly modified, as shown in the flow line maps in Appendix A. The modifications to the main drains marked in Figure 1-4 are likely to be concentrating flows at local points in the main channel, leading to elevated erosive conditions. This is likely to be a contributing factor to the moderate incision within this unit (Figure 1-3). The modified drainage regime, concentrating flows in the main channel, leads to energetic flow conditions that increase erosive energy potential.

The well wooded riparian corridor (Figure 1-5) has largely prevented excessive lateral erosion, hence erosive energy is focused on some bed incision. This has resulted in variable disconnectivity from the floodplain, although the v-shaped valley means that connectivity levels would naturally be reduced. There are some small floodplain areas at a lower level where improved connectivity may result in multi thread channel development (Figure 1-6). The lowered bed level will have impacted groundwater levels locally however, resulting in drier areas within the floodplain. Widespread incision has also been prevented through the frequent occurrence of natural woody debris jams within the channel (Figure 1-7 and Figure 1-8).

Figure 1-5: Wooded riparian corridor

Figure 1-6: Lower, flatter floodplain areas

Figure 1-7: Natural woody debris feature

Figure 1-8: Natural woody debris feature

The gravel supply to the unit, and from local bank sources, is restricted and gravels are not abundant enough to create and sustain large gravel features. Riffle, pools, gravel bars and berms are generally only small, embryonic features throughout.

The development of gravel features is also controlled by the incision in the middle and upper reaches of the channel and the limited connectivity to the floodplain. However, this unit is considered to be a transporting reach, due to the gradient and surrounding topography, therefore significant gravel features are unlikely to naturally occur within the channel.

Wooden weirs are located within the midstream section of the unit (Figure 1-9 and Figure 1-10). These were potentially installed to prevent incision by impounding water and raising water levels locally. Some of these are failing (Figure 1-9).

Figure 1-9: Wooden weir structure

Figure 1-10: Wooden weir structure

1.3 Probable channel development

The Fleet Water is a responsive system due to the moderate / steep gradient, mild to moderate gravel supply and artificial drainage modification. Whilst the channel banks are considered to be robust due to the well wooded riparian corridor, incision of the channel bed is likely to continue resulting in increased floodplain disconnection, and lowered groundwater levels that will result in floodplain drying. Over time, this will alter the nature of the riparian vegetation community.

Although this is considered to generally be a sediment transfer reach, gravel feature development is considered to be below natural levels and incision is likely to prevent these features recovering suitably, particularly as supply of gravel is also limited.

1.4 Current Ecological Condition

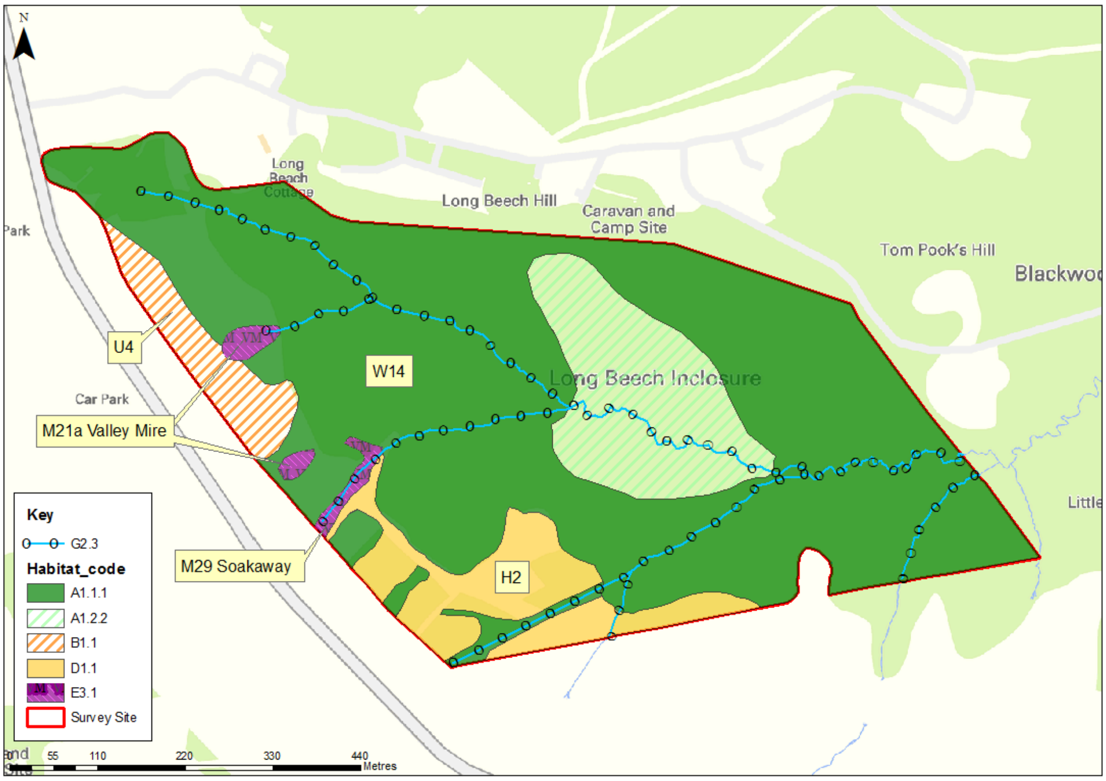
The unit consists predominantly of broadleaved woodland dominated by Oak and Beech (W14). Within the shrub layer, Holly *Ilex aquifolium* is frequent and the ground layer is dominated by Bracken *Pteridium aquilinum.* Within the centre of the site there is an area of conifer plantation, and adjacent to the watercourse, felling of conifers *has taken place* and resulted in areas of grazed grassland.

At the time of the survey the watercourse contained very little aquatic vegetation. Some aquatic vegetation was present in the more open sections where tree felling and damming has taken place. Species present included Floating Sweet-grass *Glyceria fluitans*, Bog Pondweed *Potamogeton polygonifolius* and Common Reedmace *Typha latifolia*

Within the western edge of the unit there is an area of quite extensively grazed acid grassland and also areas of dry heath with scattered Bracken cover. There are also some small areas of species-rich mire containing Cross-leaved Heath *Erica tetralix* and Bog Myrtle *Myrica gale* (M25a) and in the wetter areas, White Beak-sedge *Rhynchospora alba* and Deergrass *Trichosporum germanicum* (M21a).

Figure 1-11 shows the Phase I Habitat Map for Unit 112.

Figure 1-11: Phase 1 Habitat Map



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:

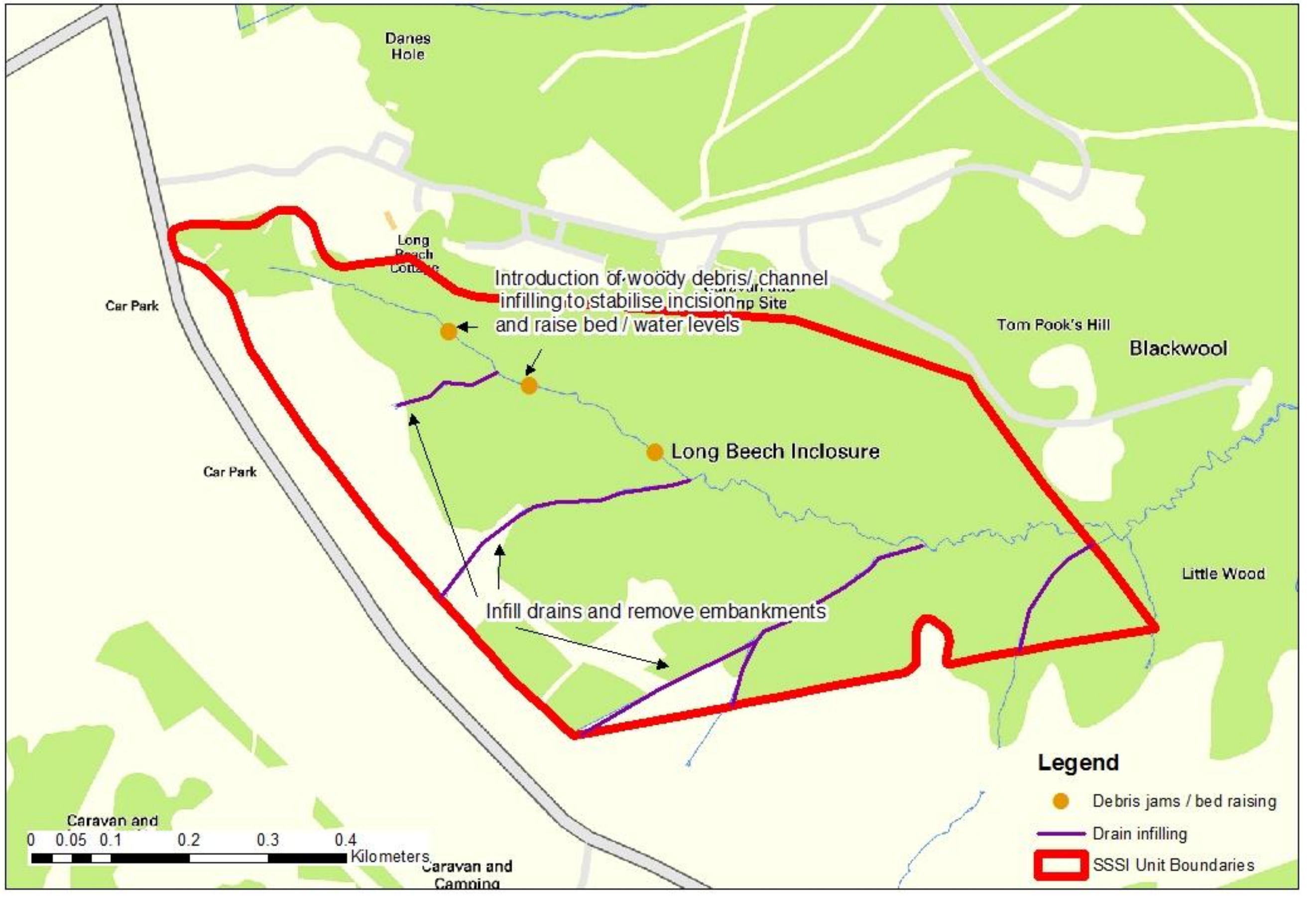
- Bed and water level raising through debris jam and morphologic feature enhancement will improve the hydromorphic diversity and reduce incision;
- Water level raising will improve groundwater levels locally and reduce floodplain drying;
- Increased extent and improved quality of wetland habitats including mire, heath and grassland.

Table 1-2: SSSI Unit 112 proposed restoration measures

Pressure	Impact	Restoration proposal	Hydromorphic improvement	Ecological improvement	Constraints / issues
Altered sediment dynamics / incision	Long term river response, cut and fill activity. Enhanced in-channel energy levels. Disconnected sub-channels. Loss of in-channel features.	Infilling of the main channel through morphologic unit reinstatement and debris jam installation. Restore connectivity.	Will raise surface and groundwater levels, lower energy levels in the main channel, reducing incision. Debris jams naturally occur along the reach, use local materials. Will create in-channel diversity. Reduces fine sediment inputs. Slows gravel movement. Stabilises small in-channel features.	Promote the growth of M25a *Molinia* mire where this has suffered from drying-out in the past. Will create an increased number of ecological niches for exploitation by invertebrates and other organisms. In channel bars will vegetate over in seral succession.	Considerable amounts of material may be required to raise bed levels. Likely to require significant tree felling to allow access for works. Debris jams may form a barrier to fish, however, due to their ephemeral nature, a fish pass is unlikely to be required.
Embanking	Enhanced in-channel energy levels. Disconnected sub-channels.	Embankment removal - main channel and drains	Reconnect the floodplain, reducing incision rates and improving in-channel hydromorphic conditions. Drain embankment material could be used to infill drains. Slows gravel movement. Stabilises in-channel features.	Improve diversity of in-channel and floodplain habitats. Opportunities to increase and/or improve areas of grassland, mire and heath Reconnect channel with floodplain features and promote Soakways.	Drains may also require infilling to restore natural flow regime and reduce incision. May require some felling of trees.
Artificial drainage	High flows impacted. Water table lowered locally.	Drain infilling	Restore a natural flow regime, reducing incision in the drain and channel network. Reduces flood peaks.	Improve diversity of in-channel habitats. Will encourage the recovery of the mire systems within the unit,	May require import of material. Cultural objections

Pressure	Impact	Restoration proposal	Hydromorphic improvement	Ecological improvement	Constraints / issues
			Reduces fine sediment inputs. Slows gravel movement. Stabilises in-channel features.	especially the M21a mires in the headwaters.	
Forestry	Significant impact on low flow regime. Flow quantity, quality, variability. Increases water temperature. Fine sediment dynamics Water table impacts.	Phased removal inc. Ring barking and in channel 'half-felling'.	Reduced risk of drying, improved hydromorphic diversity, lowered risk of in-channel fine sediment accumulation	Increased floristic diversity of ground flora on floodplain as a result of release resulting from increased light levels. Restoration of wetland habitats through re-wetting of adjacent areas of floodplain and re-occupation of palaeo channels	Large-scale removal of conifer species is unlikely to be feasible or economically viable Cultural objections.

Figure 1-12: Proposed restoration measures for SSSI Unit 112



1.6 Design considerations

The channel is unlikely to completely stabilise as a result of the proposed restoration, however, retaining the dynamism of the channel should be an objective of the restoration plan and maintaining the sediment transfer characteristics of the channel which downstream areas are likely to rely on.

Debris jams must extend into the adjacent banks to ensure longer term functioning.

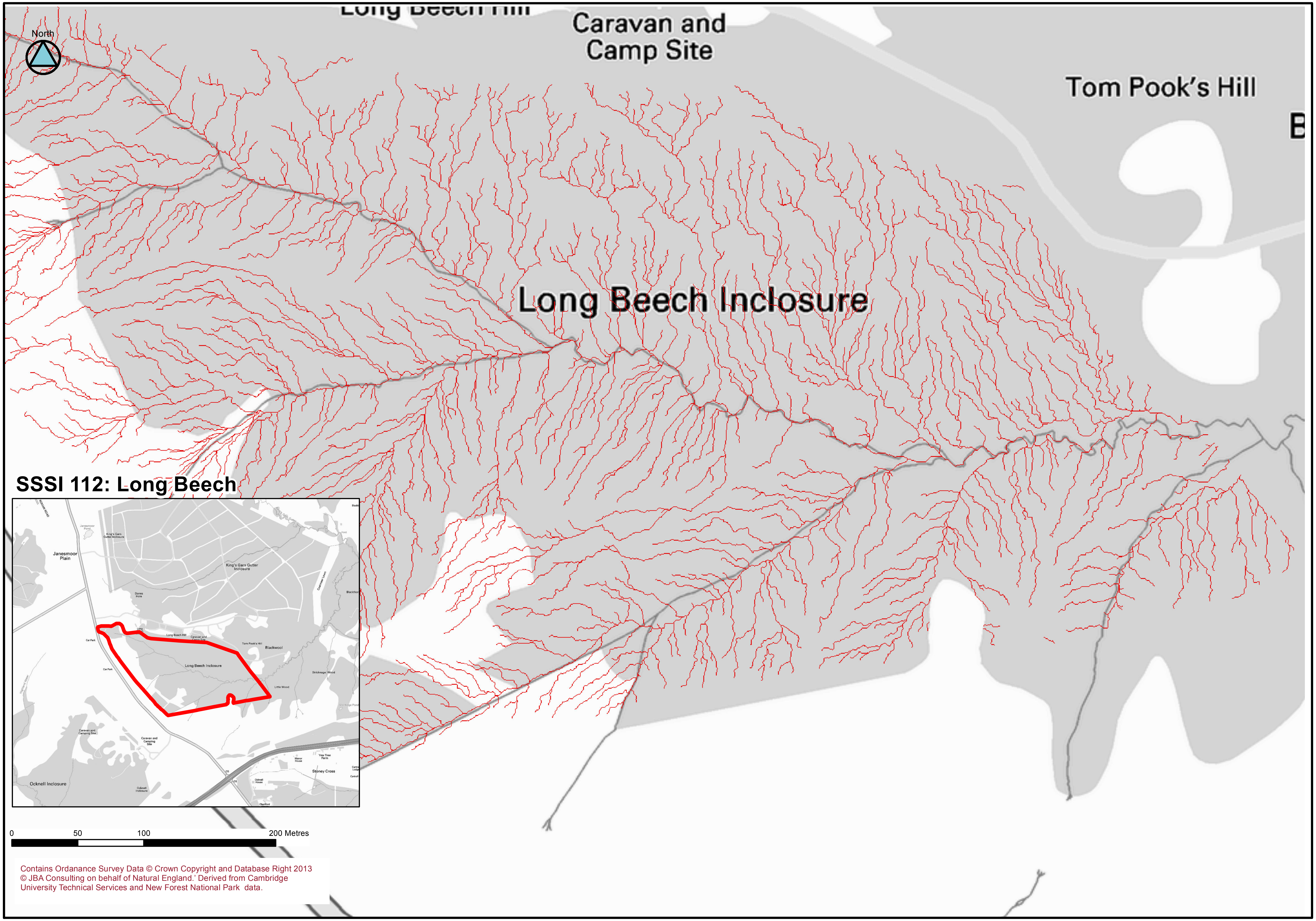
1.7 Restored channel and monitoring requirements

It is anticipated that the proposed restoration works will create a dynamic channel system with improved bed and groundwater conditions that could give rise to low level gravel feature development, whilst maintaining significant sediment transfer characteristics. This pattern of development is difficult to document accurately due to the complex nature of the river network and the difficult surveying conditions. As such a qualitative monitoring approach is recommended with automated time lapse photography employed at key restoration points 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 112.

<table>
<tr><th>Parameter</th><th>Approach</th><th>Frequency</th><th>Approximate cost</th></tr>
<tr><td>Morphologic unit change</td><td>Time lapse camera / audit</td><td>Daily (Annual statistical summary)</td><td rowspan="4">Capital 3 x £200
Half yearly downloading £200
Annual summary £300
Two - yearly reconnaissance audit £500</td></tr>
<tr><td>Flow change</td><td>Time lapse camera / audit</td><td>Daily (Annual statistical summary)</td></tr>
<tr><td>Sedimentology</td><td>Time lapse camera / audit</td><td>Daily (Annual statistical summary)</td></tr>
<tr><td rowspan="3">Vegetation change</td><td>Fixed point camera survey</td><td>Biennially</td></tr>
<tr><td>Fixed point quadrat survey</td><td rowspan="2">Biennially</td><td rowspan="2">Survey £350
Analysis £500</td></tr>
<tr><td>Fixed point aquatic macrophyte survey</td></tr>
<tr><td colspan="4">NB. Costs assume downloading and site visits as part of wider field campaign.</td></tr>
</table>

Appendix A - Artificial drains and flow lines - SSSI Unit 112


North
Caravan and Camp Site
Tom Pook's Hill
Long Beech Inclosure
SSSI 112: Long Beech
0 50 100 200 Metres
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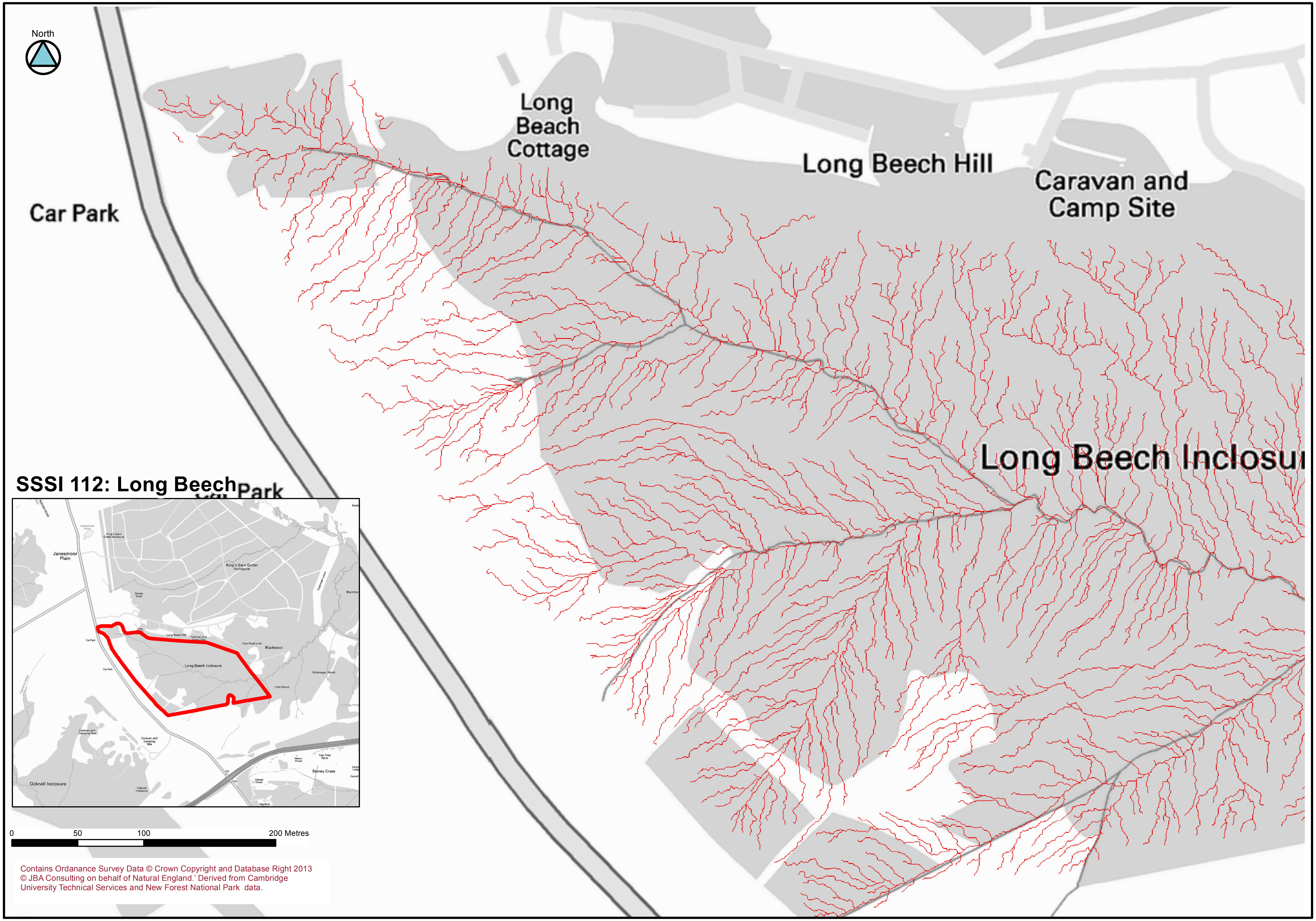
North
Long
Beach
Cottage
Long Beech Hill
Caravan and
Camp Site
Car Park
Long Beech Inclosu
Park
SSSI 112: Long Beech
Janesmoor
Plain
Ocknell Inclosure
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