Natural England Commissioned Report NECR141

New Forest SSSI Ecohydrological Survey Overview

Annex H: Picket and Buckherd Bottom

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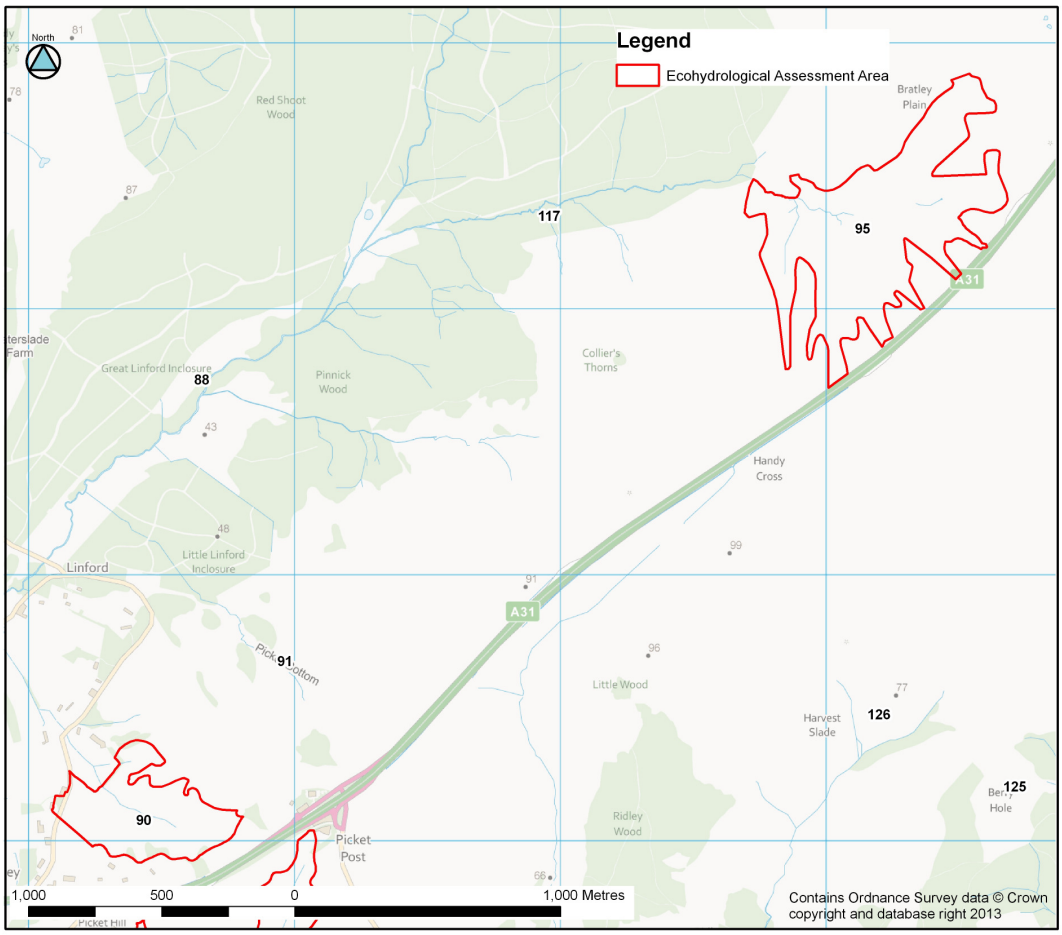
Contents

1 Picket and Buckherd Bottom

1.1 Introduction

This Ecohydrological Assessment Area (EcoHAA) covers 62.8 ha and is contained within SSSI Units 90 and 95 with its centre at National Grid Reference (NGR) 420005 107176 (see Figure 1-1). Unit 95 is classified as a mire to stream transition unit. Note that a separate geomorphology survey report has been prepared for the nearby Unit 91, which is hydrogeologically similar to the units described here.

Figure 1-1: Location Map



The site has two discrete parts: Shobley Bottom (Unit 90) in the southwest and Buckherd Bottom (Unit 95) in the northeast. It includes a series of flush-dominated valley mires supplied with water by seepage from the base of Quaternary river terrace sand/gravel deposits. The edge of the river terraces forms a prominent break in slope, and it is here that seepage occurs.

There has been little artificial drainage within these SSSI units. However, the outflow channel from Buckherd Bottom has undergone significant headward erosion. Remediation measures (logs and heather bales) have been put in place in the past to address this problem, but do not appear to be functioning effectively. Buckherd Bottom has seen extensive burning of wet heath. Both sites show minor encroachment by Rhododendron *Rhododendron ponticum*, and Buckherd Bottom also shows minor encroachment by Scot's Pine *Pinus sylvestris.*

Table 1-1: Ecohydrological Assessment Area Summary Table

Eco-hydrological Assessment Area		**H**	
Name		Picket and Buckherd Bottom	
Relative Geomorphology Assessment		Unit 91 (Picket Bottom)	
Size (ha)		62.8	
SSSI Units		90 (Shobley Bottom)	95 (Buckherd Bottom)
Valley Side Wetland	Present	Y	
	Wetland Type	Flush Dominated Wetland	
	Main Source of water	Seepage from base of river terrace sand/gravel deposits. There may also be diffuse seepage from bedrock aquifers (Becton Sand Formation and Chama Sand Formation) via overlying permeable head deposits.	
	Indicative NVC communities	M16a, M21a, M25a, M29, H2, W4b, W25	M16b, M16a, M21a, M29, W4b, H2, M24
	Wetland Types	Wet Heath, Valley Mire, Wet Woodland	Wet Heath, Valley Mire, Wet Grassland
	Drainage Damage	N	N
	Scrub/Tree Encroachment Damage	Y - one small patch of Rhododendron recorded (Minor)	Y - one small patch of Rhododendron recorded along with some Scot's Pine encroachment at the head of one valley side mire (Minor)
	Poaching and Grazing Pressures Damage	N	Y - small localised impact at the heads of the valley side mires (Negligible)
Valley Basin Wetland	Present	Y	
	Wetland Type	Flush Dominated Wetland	
	Main Source of water	Seepage from base of river terrace sand/gravel deposits. There may also be diffuse seepage from bedrock aquifers (Becton Sand Formation and Chama Sand Formation) via overlying permeable head deposits.	
	Indicative NVC communities	M16a, M21a, M25a, M29, H2, W4b, W11, W25	M16a, M16b M29, S4, W4b, M21a
	Wetland Types	Wet Heath, Valley Mire	Wet Heath, Valley Mire
	Drainage	Y - artificial drainage an influence at the north-western (downstream) edge of the site (Minor)	Y - headward erosion at the western (downstream) edge of the site (Moderate)
	Scrub/Tree Encroachment Damage	Y - one small patch of Rhododendron recorded (Minor)	N
	Poaching and Grazing Pressures	Y	Y - some small localised areas of grazing pressure (Minor)
Additional Comments		A lot of poaching at the downstream end of the site, which in places has led to the creation of bog pools along the line of drainage from the mire. Occasional patches of Rhododendron.	OS 1:10,000 mapping shows two separate stream segments flowing from east to west across the site. On the day of the site visit these were connected to form a single stream. At the north-western (downstream) edge of the site there has been significant headward erosion, and remediation measures have previously been put in place (logs, heather bales and a small weir). However, the remediation measures - especially the heather bales - do not appear to be functioning effectively. Burning of wet heath was extensive in this unit and relatively recently undertaken.

It should be noted that although this is a standalone report, it is strongly reliant upon the background information provided in section 3 of the JBA (2013) Ecohydrology Survey Overview report, which provides general geology, ecology, hydrogeology, wetland mechanisms and restoration information for the New Forest wetlands surveyed. At the end of the report is a series of maps which support the assessment and indicate the spatial distribution of the features described.

1.2 Topography and Wetland Distribution

Both parts of the site consist of valley systems draining broadly north-westwards towards Linford Brook. The wetlands take the form of valley mires and are sourced mainly by groundwater seepages that occur at a prominent break of slope marking the edge of river terrace sand/gravel deposits. Streams occur in the valley bottoms.

Figure 1-2: General view looking northwards over Buckherd Bottom from near the A31 (NGR 421211 107859) - the orange/brown bracken-covered areas correspond closely to the river terraces

Figure 1-3: Existing restoration measures to combat erosion: log, posts and heather bales on the outflow channel from Buckherd Bottom (NGR 420763 108453)

Figure 1-4: Existing restoration measures to combat erosion: low weir, posts and heather bales on the outflow channel from Buckherd Bottom (NGR 420717 108488)

1.3 Ecology

Both component sites of this Ecohydrological Assessment Area contain valley mire habitats, broadly similar in character. In Shobley Bottom the mire habitats consist of *Sphagnum* tussocks, Deer-grass *Trichophorum germanicum*, White Beak-sedge *Rhynchospora alba*, Bog Myrtle *Myrica gale*, Marsh St. John's-wort *Hypericum elodes* and Sharp-flowered Rush *Juncus acutiflorus* (M21a). The valley side mires of Buckherd Bottom, of which there were several draining into the valley bottom mire, have a similar species composition, with Bog Asphodel *Narthecium ossifragum* also recorded, along with occasional Cross-leaved Heath *Erica tetralix* and Purple Moor-grass *Molinia caerulea*. Bog Pondweed *Potamogeton polygonifolius* and New Zealand Willowherb *Epilobium brunnescens* were also recorded in soakway areas (M29) showing preferential flow paths.

Wet heath is present on both component sites and is very extensive on Buckherd Bottom, although it is variable in character. In the east of Buckherd Bottom the wet heath is Purple Moor-grass and Bog Myrtle dominated, with very large Purple Moor-grass tussocks (M24c). Moving westwards across the unit the wet heath has been burned in many places, with a less tussocky sward present and increased Heather *Calluna vulgaris* and Cross-leaved Heath (M16a). Upslope of the wet heath, Heather, Bracken *Pteridium aquilinum* and Gorse *Ulex europaeus* are more abundant.

Woodland is present in both component sites. In Shobley Bottom Oak *Quercus robur*.dominated woodland is present along the western boundaries of the unit, with some Downy Birch *Betula pubescens* (W10a). Holly *Ilex aquifolium* dominates the understorey and around the wetter mire margins. Along the valley bottom, Grey Willow *Salix cinerea* is more abundant. Grey Willlow dominated bog woodland is the main woodland type in Buckherd Bottom (W4b).

In the western portion of Shobley Bottom the waters draining into the valley mires were channelled into a narrow watercourse, which then flowed westwards and out of the unit towards the village of Shobley. Part way along this channel, where poaching was heavy, a small pool had developed, with Sharp-flowered Rush, Bog Pondweed, Floating Sweet-grass *Glyceria fluitans* and Water Mint *Mentha aquatica* abundant. In Buckherd Bottom a clear channel was evident through the majority of the valley bottom mire (although not the valley side mires where soakway habitats are present). Part way along the valley bottom watercourse a small stand of Common Reed *Phragmites australis* (S4), surrounding a small dystrophic bog pool, has developed.

As previously discussed, patches of Rhododendron were recorded within both Shobley Bottom and Buckherd Bottom, although only a small patch in Buckherd Bottom.

1.4 Geomorphology

Unit 95 (Buckherd Bottom) is classified as a mire to stream transition unit and is drained by tributaries of Linford Brook. Ordnance Survey 1:10,000 mapping shows two separate stream segments flowing from east to west across the site, separated by "collects" and "spreads". On the day of the site visit these were connected to form a single stream. A second stream, flowing from south to north, joins the first just inside the downstream boundary of the site.

At the outflow from the site the (combined) stream is about 2 m wide and has undergone significant headward erosion. Remediation measures have been put in place in an attempt to prevent the erosion. At one location, logs and heather bales (secured by wooden stakes) have been installed within the channel (Figure 1-3). At another location a short distance downstream, heather bales have been staked in place immediately downstream of a low weir structure (Figure 1-4). These measures have been only partially effective, with heather being washed out by high energy stream flows.

The headward erosion has taken place within the mineral substrate and has not directly affected the peaty soils of the valley mire. However, continued upstream propagation of the erosion would potentially pose a threat to the mire habitats in the future.

1.5 Geology and Hydrogeology

Table 1-2 shows the geology at Picket and Buckherd Bottom. The head deposits occur down-slope of the river terrace sands and gravels, and are likely to represent terrace sands and gravels that have moved down-slope.

Table 1-2: Geology and Hydrogeology

Age	Group	Formation - member	Description	Thickness	Hydro-geological Role	Water Resources
Quat-ernary		River terrace deposits	SAND and GRAVEL.		Aquifer - Spring lines may be present at the base of high level river terraces.	
		Head	GRAVELLY SAND		Aquifer	
Tertiary (Eocene)	Barton Group	Becton Sand Formation	Yellow/buff fine- to very fine-grained well sorted SAND.	6 – 70 m	Aquifer - The most permeable and reliable aquifer within the Barton Group.	Yields up to 600 m^3/d in the south; in the north they rarely exceed 200 m^3/d.
		Chama Sand Formation	Greenish grey fine- to very fine-grained and rather clayey/silty SAND; slightly glauconitic. Also sandy CLAY.	6 – 15 m	Aquifer	May yield small supplies
		Barton Clay Formation	Greenish grey to olive grey, glauconitic CLAY; may contain fine-grained sand and shells (mainly bivalves and gastropods).	26 – 80 m	Aquitard	Little useable groundwater

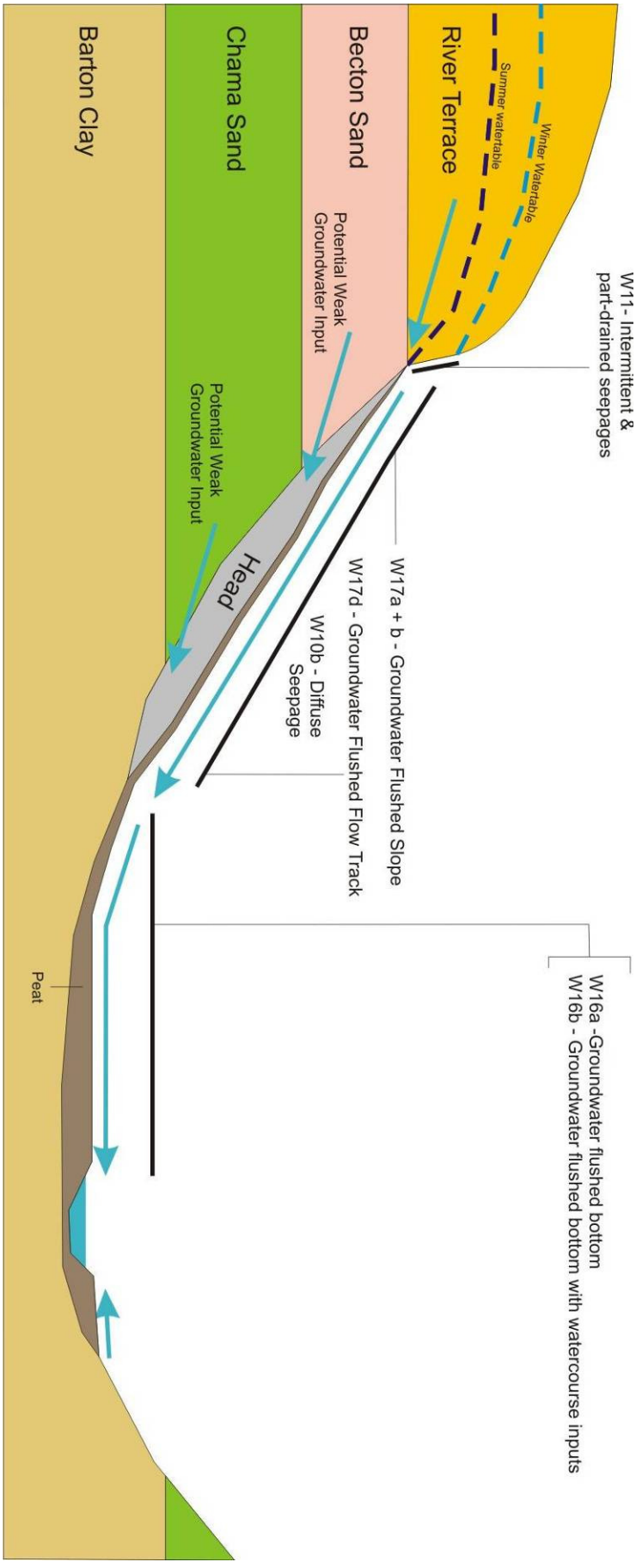
Local BGS borehole logs (available at http://www.bgs.ac.uk/GeoIndex/) describe the Chama Sand as orange/brown/grey clayey or silty fine sand, and the river terrace gravels as orange/brown/grey slightly silty, fine- to coarse-grained, sand with fine to coarse flint gravel.

1.6 Water Supply Mechanisms

The wetlands on site are flush dominated (see Figure 1-5). They mainly receive water from a seepage face at the junction between Quaternary river terrace deposits and the underlying Tertiary bedrock. This junction is obscured by gravelly head that has moved down-slope. Additional water may be supplied by bedrock aquifers (Becton Sand Formation and Chama Sand Formation) via overlying permeable head deposits.

Please note that the identified seepage lines do not line up exactly with the 1:50,000 digital geology mapping produced by the British Geological Survey (BGS). This reflects the relatively broad scale nature of the BGS mapping.

Figure 1-5: Conceptual Model Diagram



1.6.1 WETMECS identified

WETMECs are ecohydrological classifications of how water can be supplied to a wetland to create distinguishable habitats WETMECS were developed in partnership between the Wetland Research Group at the University of Sheffield, the Environment Agency, English Nature (now Natural England) and Countryside Council for Wales (now Natural Resources Wales). For each Ecohydrological Assessment Area WETMECS have been identified.

The WETMECS identified include:

Valley side wetlands - narrow areas of W17a+b and W17d with small areas of W11 above. Also potential diffuse seepage (W10b) from bedrock aquifers via permeable head deposits.

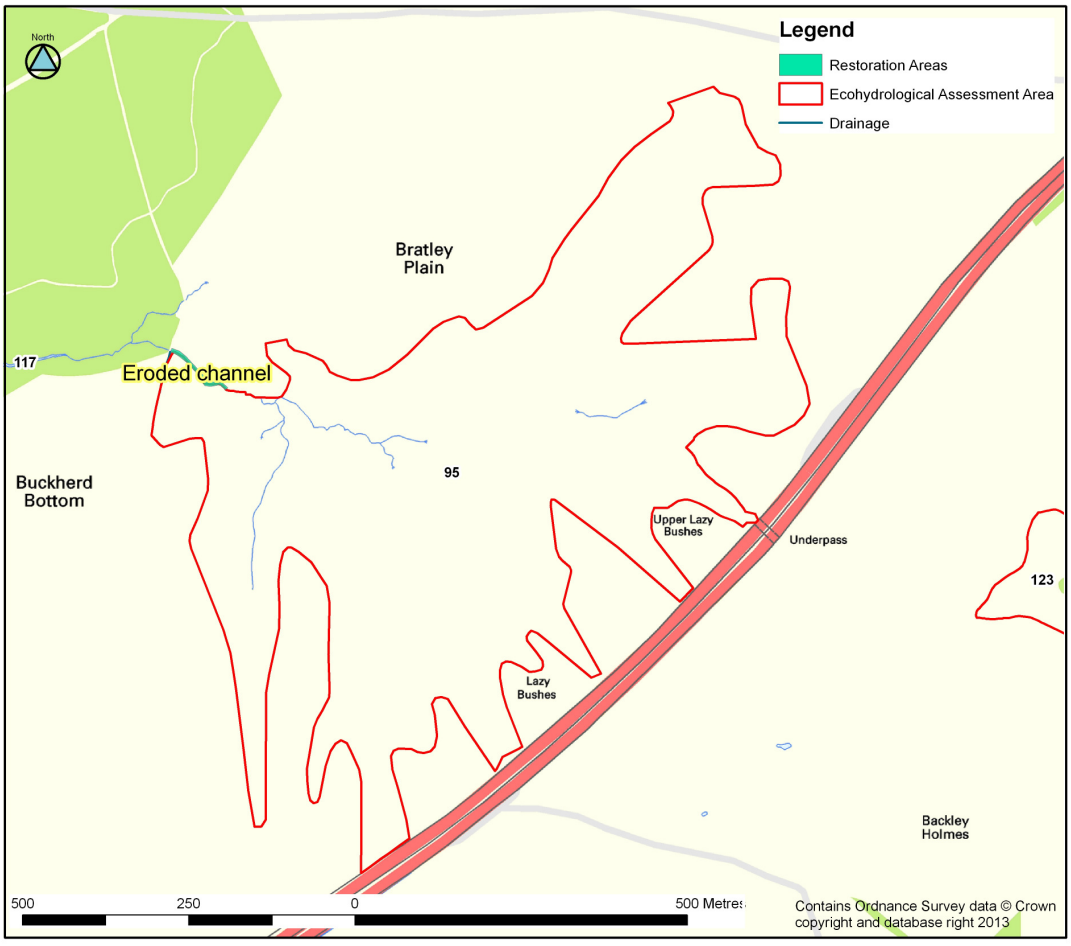
Valley bottom wetlands - W16a+b.

1.7 Damage and Restoration

1.7.1 Damage

There are no areas of significant damage within the mire areas themselves. However, headward erosion of the outflow channel of Buckherd Bottom could potentially pose a threat (see Figure 1-6).

Figure 1-6: Restoration Areas Map (Buckherd Bottom only)



Scrub encroachment of Rhododendron was noted at both Shobley Bottom and Buckherd Bottom. However, at both component sites, particularly Buckherd Bottom, the extent of Rhododendron encroachment was relatively small and should be reasonably simple to eradicate if tackled in the near future. Scot's Pine was also noted in some areas. Again, this was a relatively minor issue; however, it should be monitored.

1.7.2 Restoration

No ecohydrological restoration proposals are made for this site, but it is recommended that the outflow channel from Buckherd Bottom be monitored to detect any further significant headward erosion. If a problem is identified then it may be necessary to take further steps to prevent the erosion by modifying, adding to, or replacing, the existing structures. Further slope control measures could potentially include the installation of more weirs with infilling/re-profiling of the channel, forming a stepped morphology. The engineering design of suitable control measures would need to be based on a detailed study beyond the scope of this report.

Table 1-3: Restoration Area Summary Table

Restoration Area	Damage Type	Restoration Proposals	Improvement	Constraints and Issues
Eroded channel	Headward erosion	Monitor existing restoration measures		The design of suitable control measures (if needed) will require a more detailed study beyond the scope of this report. Weirs may be bypassed.
Shobley Bottom and Buckherd Bottom	Scrub and Rhododendron encroachment	Eradication of Rhododendron stands Monitor Scot's Pine encroachment	Removal of non-native invasive species	Possible requirement for ongoing management

1.8 Monitoring requirements

1.8.1 Water Monitoring

The site contains flush-dominated wetlands with thin peats or peaty soils. Groundwater monitoring is unlikely to be appropriate for such a site. The surface water features are small and appear stable, limiting the need for monitoring.

1.8.2 Vegetation

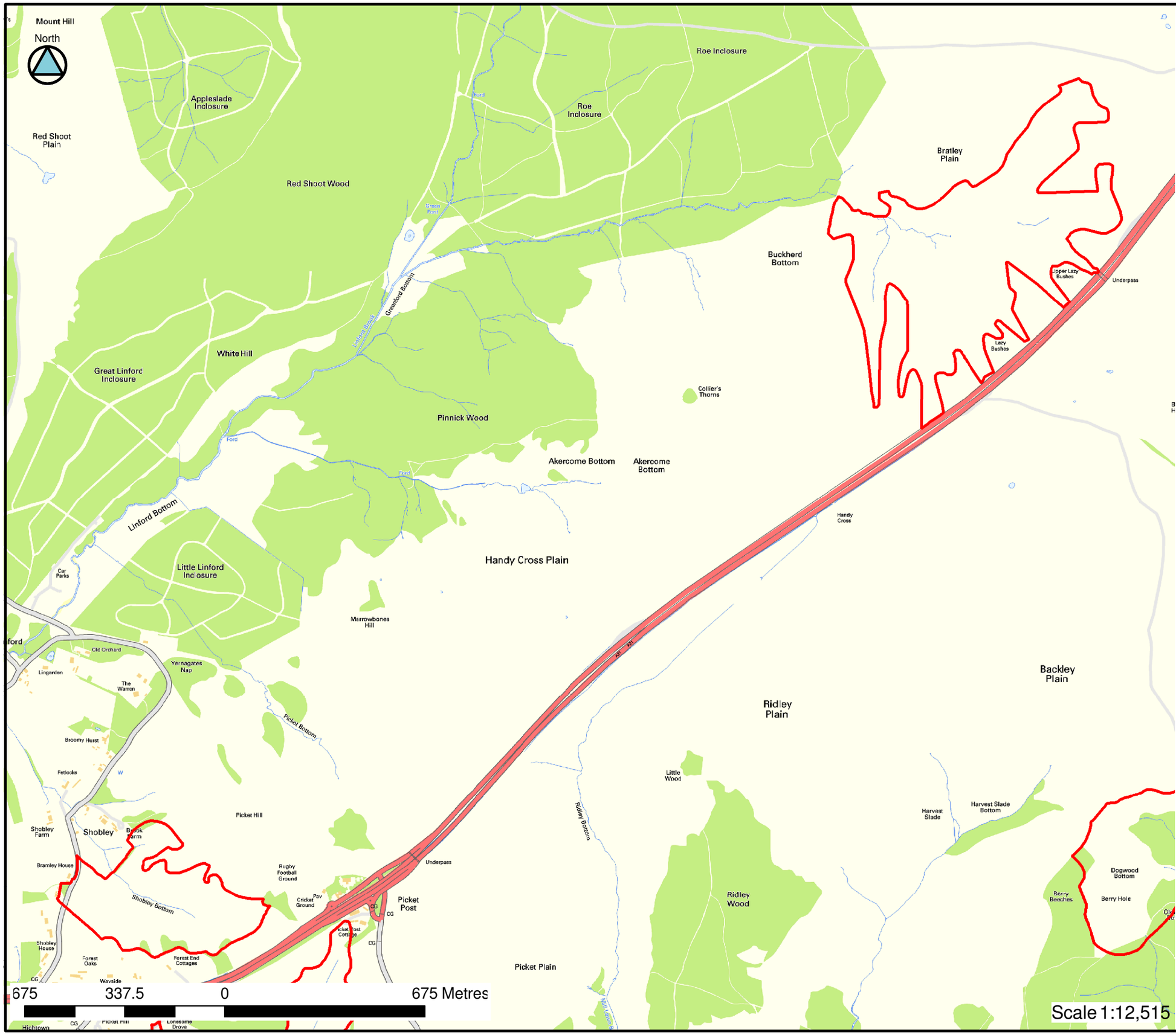
Encroachment by Rhododendron and Scot's Pine has been identified as an issue at this site. As a result, it may be necessary to monitor the extent of encroachment annually following the restoration works.

Table 1-4: Monitoring Requirements

Eco-hydrological Assessment Area	SSSI Units	Site Names	Requirements for monitoring: ecology	Requirements for monitoring: hydrology (number of installations estimated)
H	90 and 95	Shobley Bottom Mire and Buckherd Bottom	Fixed point camera survey and transect studies (specifically focussing on extent of pine and Rhododendron scrub encroachment) Fixed point quadrat survey	Flush dominated wetland – little peat – no monitoring recommended

2 Maps

Map 1: Location
Map 2: Aerial Photography
Map 3: Topography, Hydrology and Wetland Distribution
Map 4a: Phase One Habitat - Shobley Bottom
Map 4b: Phase One Habitat - Buckherd Bottom
Map 5: Drift Geology
Map 6: Bedrock Geology
Map 7: Eco-Hydrology Map
Map 8: Restoration Plan



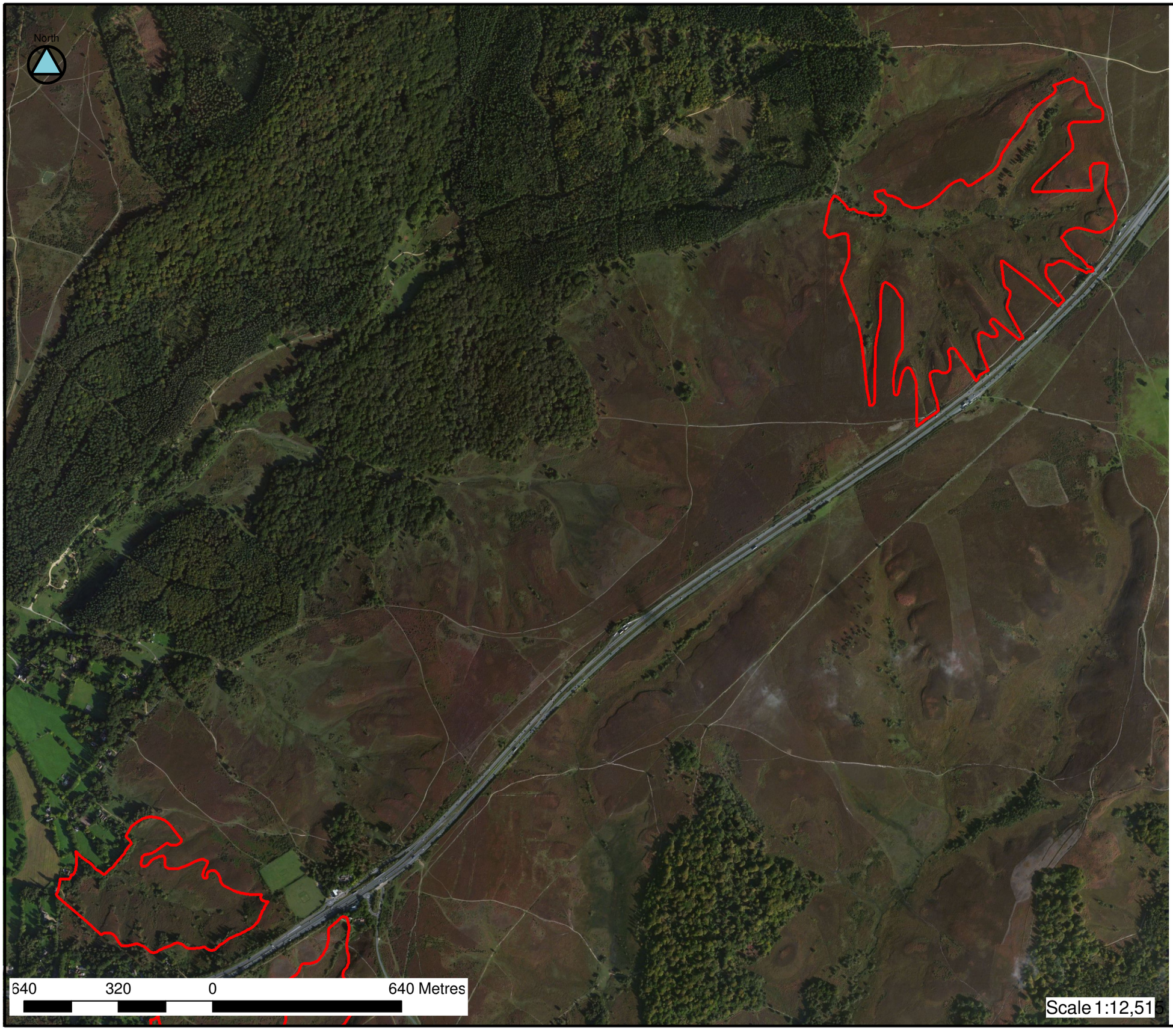
LEGEND

Ecohydrological Assessment Area

JBA consulting

MAP 1

Site Location



LEGEND

Ecohydrological Assessment Area

JBA consulting

MAP 2

Aerial Photography

North

LEGEND

- Ecohydrological Assessment Area
- Seepage face
- Drainage
- Valley Bottom Wetland
- Valley Side Wetland

LIDAR

mAOD

High : 80

Low : 50

140 70 0 140 Metres

Scale 1:2,552

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MAP 3

Topography, Hydrology and Wetland Distribution

North

LEGEND

Ecohydrological Assessment Area

Seepage face

Drainage

Valley Bottom Wetland

Valley Side Wetland

LIDAR

mAOD

High : 65

Low : 100

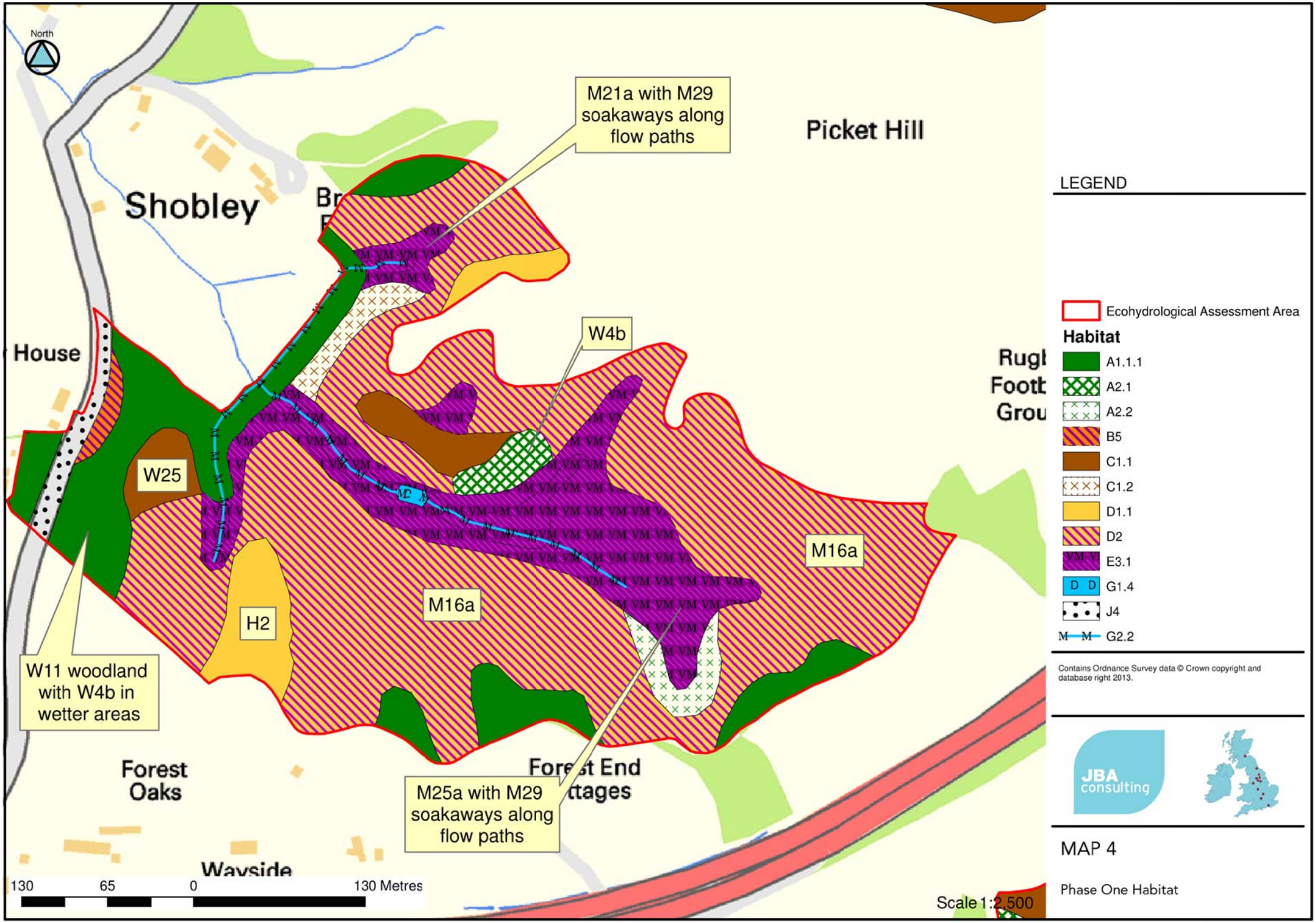
280 140 0 280 Metres

Scale 1:5,040

JBA consulting

MAP 3

Topography, Hydrology and Wetland Distribution


North
M21a with M29 soakaways along flow paths
Picket Hill
Shobley
W4b
W25
M16a
M16a
H2
W11 woodland with W4b in wetter areas
Forest Oaks
M25a with M29 soakaways along flow paths
Wayside
130 65 0 130 Metres
Scale 1:2,500
LEGEND
Ecohydrological Assessment Area
Habitat
A1.1.1
A2.1
A2.2
B5
C1.1
C1.2
D1.1
D2
E3.1
G1.4
J4
G2.2
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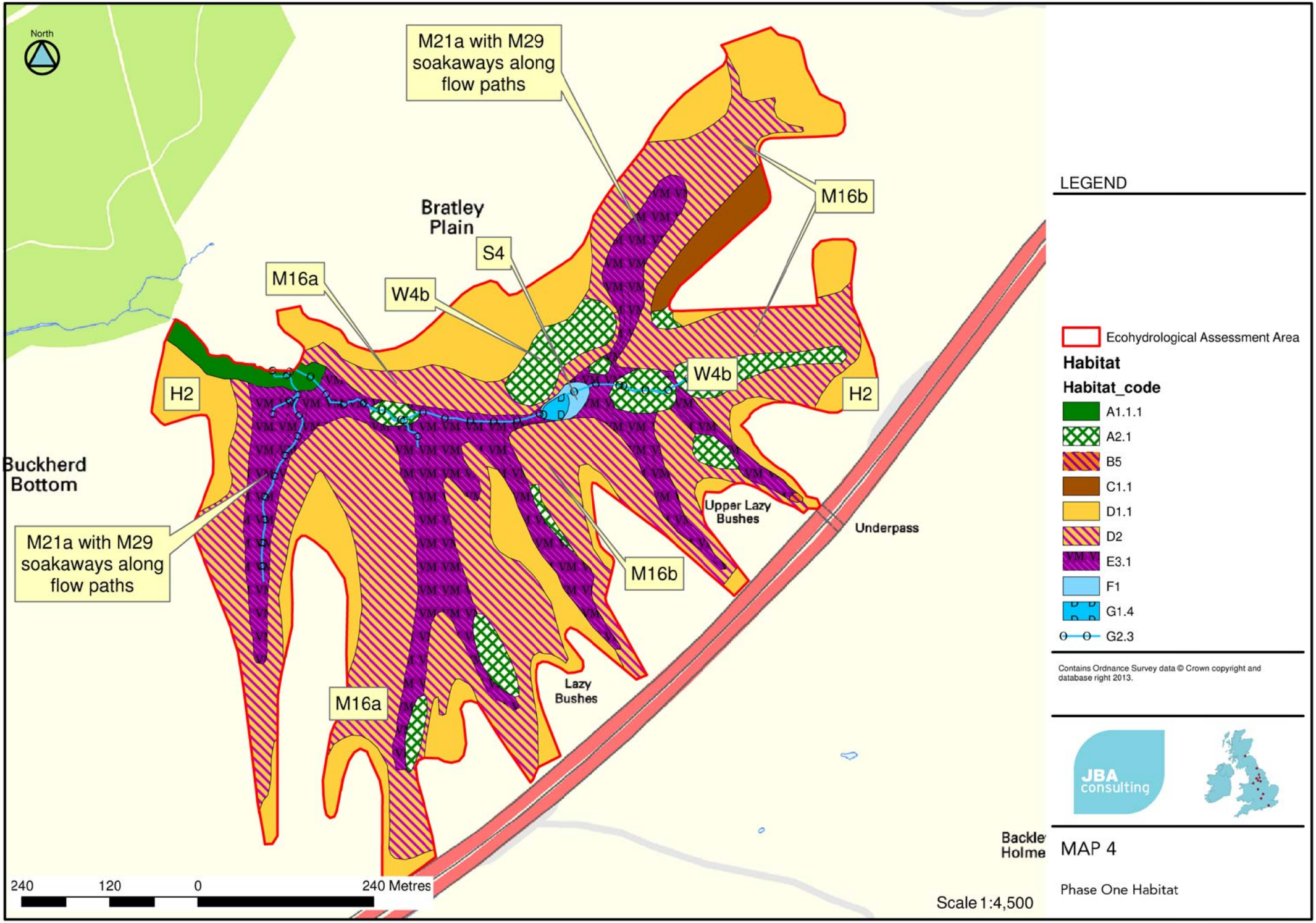
MAP 4
Phase One Habitat


North
M21a with M29 soakaways along flow paths
Bratley Plain
M16b
S4
M16a
W4b
W4b
H2
H2
Buckherd Bottom
M21a with M29 soakaways along flow paths
Upper Lazy Bushes
Underpass
M16b
Lazy Bushes
M16a
Backle
Holme
240 120 0 240 Metres
Scale 1:4,500
LEGEND
Ecohydrological Assessment Area
Habitat
Habitat_code
A1.1.1
A2.1
B5
C1.1
D1.1
D2
E3.1
F1
G1.4
G2.3
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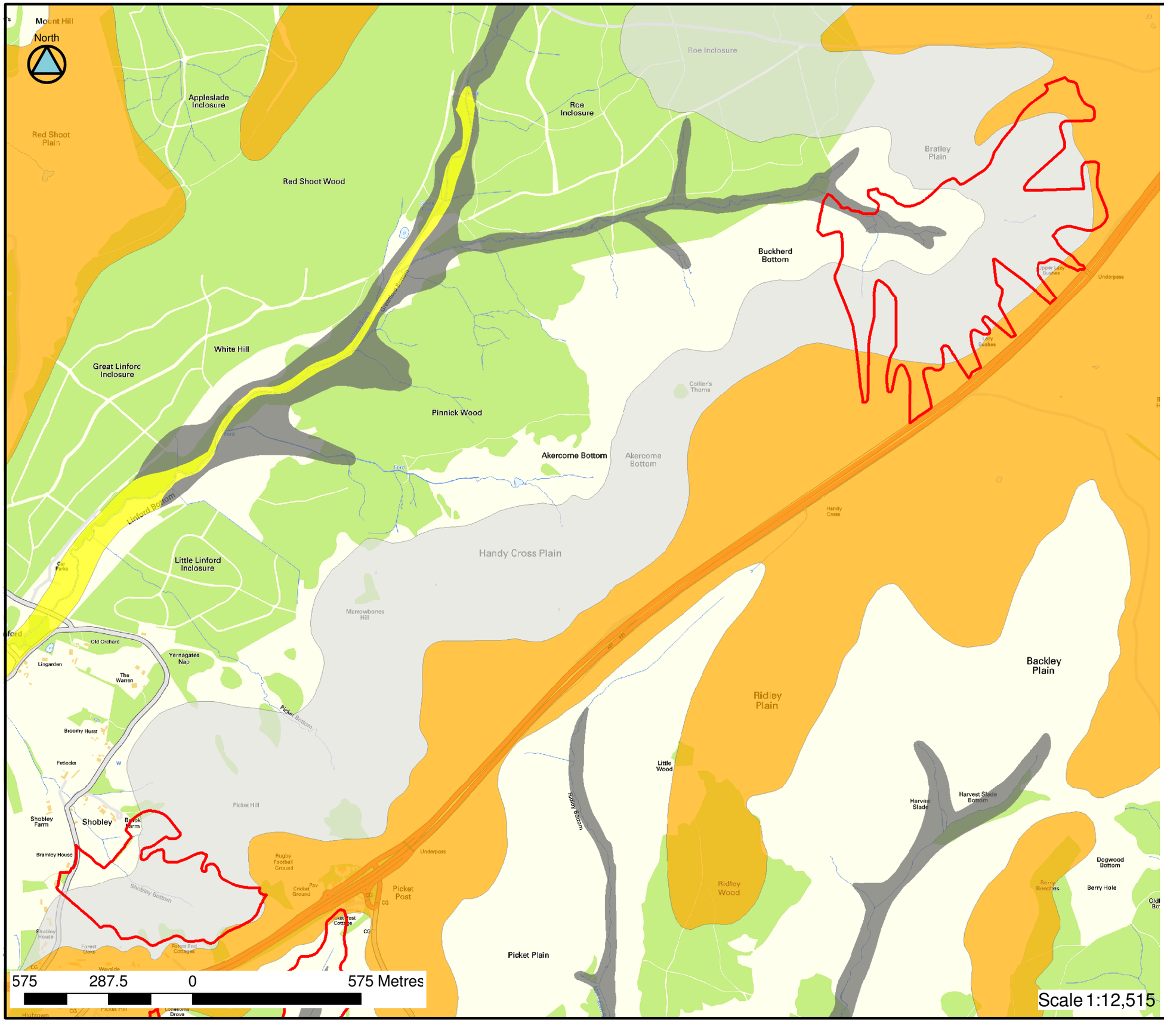
MAP 4
Phase One Habitat



LEGEND

- Ecohydrological Assessment Area
- No Drift
- Other Deposits
- Alluvium - Clay, Silt, Sand and Grave
- Head - Clay, Silt, Sand and Gravel
- Head - Gravel, Sand, Silt and Clay
- Head - Silty Clay
- Head - Gravelly Sand
- Peat
- River Terrace Deposits - Clay and Silt
- River Terrace Deposits - Sand and Gravel
- River Terrace Deposits - Sand, Silt and Clay

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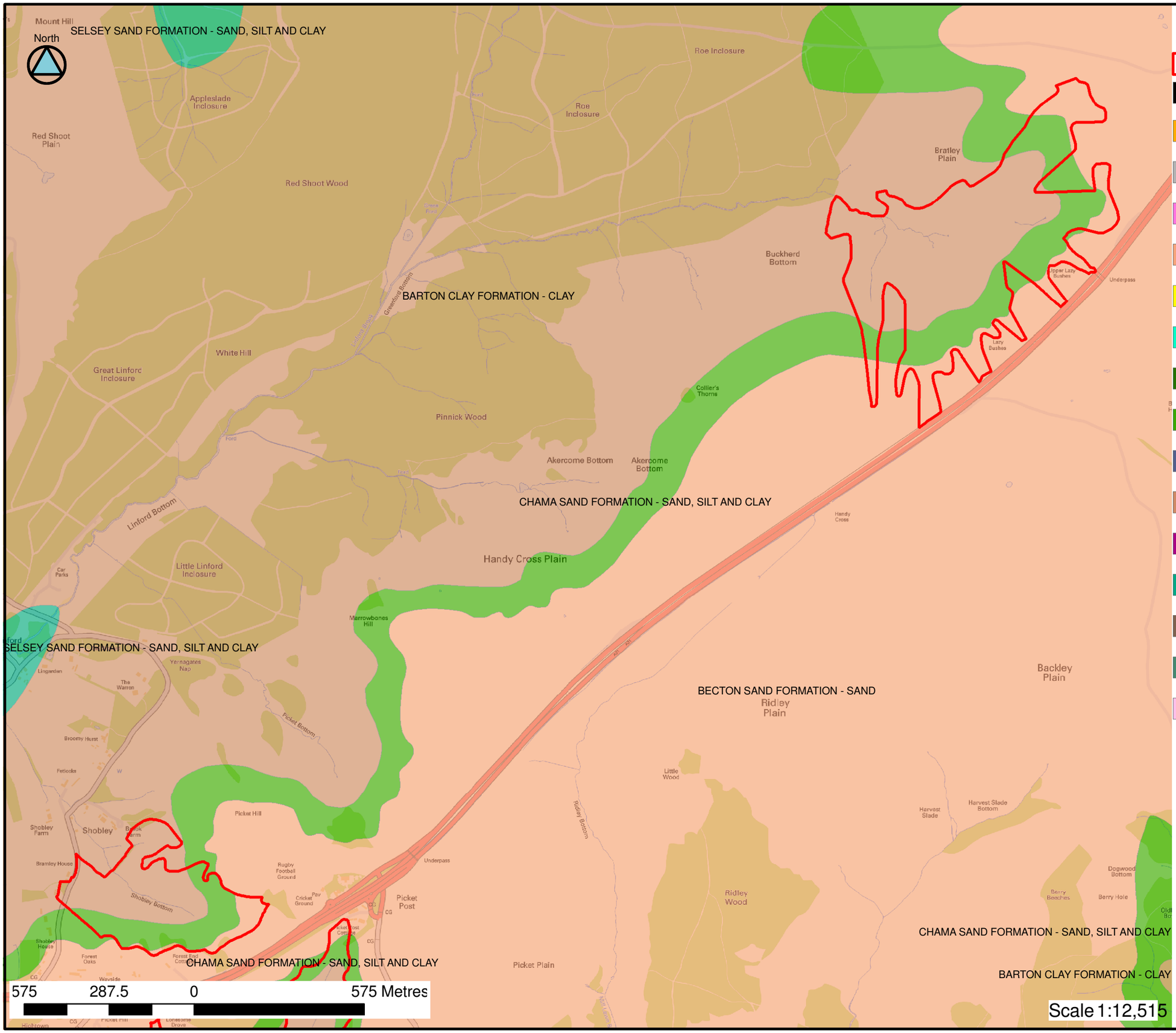
MAP 5

Drift Geology



LEGEND

- Ecohydrological Assessment Area
- Other Rock Types
- Headon and Osbourne Beds - Clay, Silt and Sand
- Headon Formation - Clay, Silt and Sand
- Lyndhurst Member - Sand, Silt and Clay
- Becton Sand Formation - Sand
- Becton and Chama Sand Formation - Sand, Silt and Clay
- Becton Bunny Member - Clay
- Chama Sand Formation - Sand
- Chama Sand Formation - Sand, Silt and Clay
- Chama Sand Formation - Silty Clay
- Barton Clay Formation - Clay
- Barton Clay Formation - Sand
- Selsey Sand Formation - Sand, Silt and Clay
- Marsh Farm Formation - Clay, Silt and Sand
- Poole Formation - Sand, Silt and Clay
- London Clay Formation - Clay, Silt and Sand

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MAP 6

Bedrock Geology

North

Appleslade Inclosure

Roe Inclosure

Red Shoot Wood

Buckherd Bottom

White Hill

Great Linford Inclosure

Pinnick Wood

Akercome Bottom

Little Linford Inclosure

Handy Cross Plain

Backley Plain

Ridley Plain

Picket Plain

575 287.5 0 575 Metres

Scale 1:12,515

LEGEND

- Ecohydrological Assessment Area
- Seepage face
- Drainage
- Valley Bottom Wetland
- Valley Side Wetland

Drift Hydrogeology

- Aquifer
- Aquifer/Aquitard
- Aquitard

Bedrock Hydrogeology

- Aquifer
- Aquifer/Aquitard
- Aquitard

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MAP 7

Eco-hydrology

Mount Hill

North

Red Shoot Plain

Appleslade Inclosure

Roe Inclosure

Roe Inclosure

Red Shoot Wood

Bratley Plain

Eroded channel

Buckherd Bottom

Upper Lazy Bushes

Underpass

Lazy Bushes

Greenford Bottom

Linford Brook

White Hill

Great Linford Inclosure

Collier's Thorns

Pinnick Wood

Ford

Akercome Bottom

Akercome Bottom

Ford

Handy Cross

Linford Bottom

Handy Cross Plain

Car Parks

Little Linford Inclosure

Merrowbones Hill

Old Orchard

Yernagates Nap

Lingardan

The Warren

Backley Plain

Picket Bottom

Ridley Plain

Broomy Hurst

Fetlocks

Little Wood

Picket Hill

Harvest Slade

Harvest Slade Bottom

Shobley Farm

Shobley

Brook Farm

Ridley Bottom

Bramley House

Rugby Football Ground

Underpass

Dogwood Bottom

Shobley Bottom

Cricket Ground

Pav

Picket Post

Ridley Wood

Berry Beeches

Berry Hole

Shobley House

Forest Oaks

Forest End Cottages

Wayside

Picket Plain

710 355 0 710 Metres

Scale 1:12,515

LEGEND

- Ecohydrological Assessment Area
- Drainage
- Restoration Areas

JBA consulting

MAP 8

Restoration Plan