Natural England Commissioned Report NECR141

New Forest SSSI Ecohydrological Survey Overview

Annex K: Ma 5 Wet 5 Part 2

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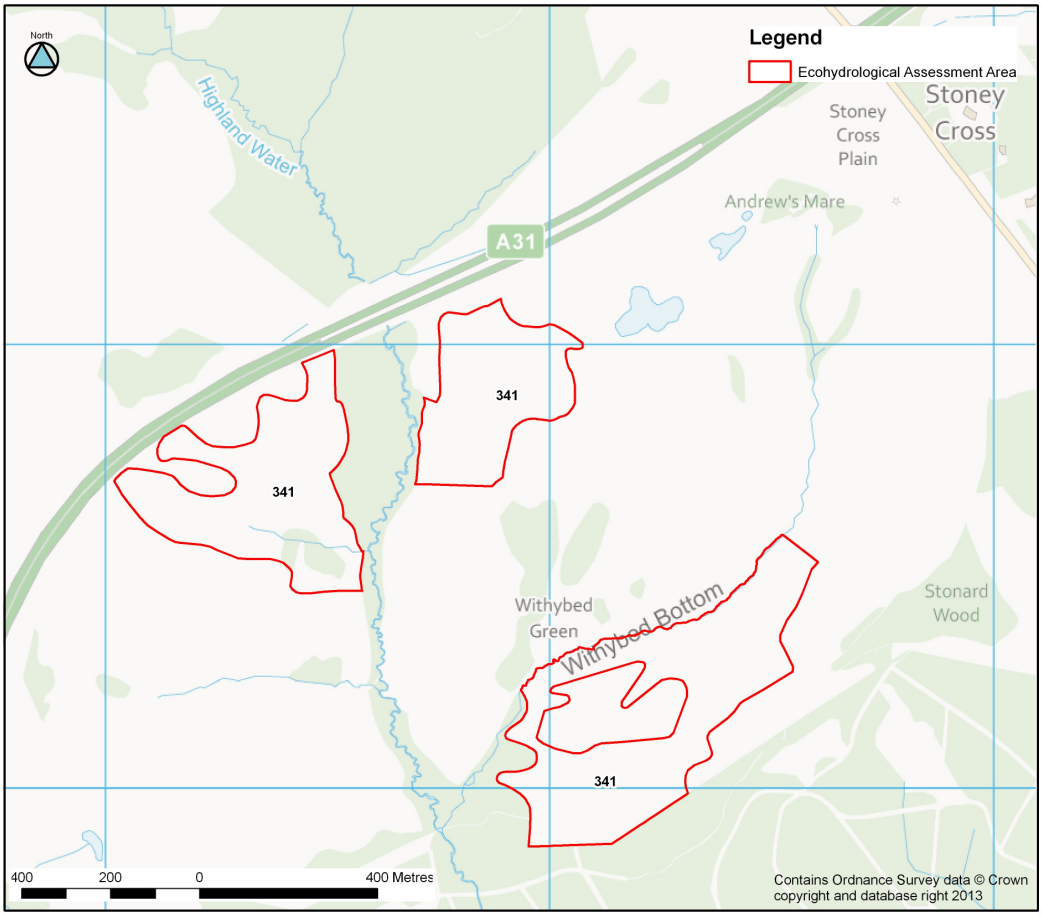
1 Ma 5 Wet 5 Part 2

1.1 Introduction

This Ecohydrological Assessment Area (EcoHAA) covers 42.9 ha and is contained within SSSI Unit 341 with its centre at National Grid Reference (NGR) 424849, 110496 (see Figure 1-1).

Figure 1-1: Location Map



The site consists of three distinct areas located within the catchment of Highland Water. Each contains flush-dominated valley mires fed by groundwater seepages at the base of Quaternary river terrace sand/gravel deposits, or at the base of head deposits formed by mass movement of the terrace material down-slope. The emerging water feeds mires on the valley sides and also in valley bottoms. Groundwater-flushed flow tracks are well-developed locally. There has been very little artificial drainage, and no obvious hydrological damage to the mires in this area. However, encroachment by Bracken *Pteridium aquilinum* and Scot's Pine *Pinus sylvestris* is an issue in places, as is poaching of the soil by animals (especially at water crossings).

Table 1-1: Ecohydrological Assessment Area Summary Table

Eco-hydrological Assessment Area		L
Name		Ma 5 Wet 5 part 2
Relative Geomorphology Assessment		
Size (ha)		42.9
SSSI Units		341
Valley Side Wetland	Present	Y
	Wetland Type	Seepage Dominated / Flush Dominated
	Main Source of water	Seepage from base of river terrace sand/gravel deposits and base of (down-slope) head deposits derived from these. Some water lost to ground over more permeable parts of the Chama Sand Formation.
	Indicative NVC communities	M16a, M24, M21a, M29, M25a, W4b, W23, W25
	Wetland Types	Wet Heath, Mire, Wet Woodland, Wet Grassland
	Drainage Damage	Y - some small-scale drainage associated with a footpath crossing Withybed Bottom (Minor)
	Scrub/Tree Encroachment Damage	Y - Scots Pine (Moderate)
	Poaching and Grazing Pressures Damage	Y (Minor)
Valley Basin Wetland	Present	Y
	Wetland Type	Flush Dominated Wetland
	Main Source of water	Fed by (i) groundwater seepage from upslope (see description of water source under "valley side") and (ii) surface water runoff.
	Indicative NVC communities	M16a, M24, M21a, M29, M25a, W4b, W23, W25
	Wetland Types	Wet Heath, Mire, Wet Woodland, Wet Grassland
	Drainage	Y - some small-scale drainage associated with a footpath crossing Withybed Bottom (Minor). However, most watercourses appear natural, with meandering planforms.
	Scrub/Tree Encroachment Damage	Y - Scots Pine and Bracken (Minor)
	Poaching and Grazing Pressures	Y - clay prone to poaching, especially at water crossings (Minor).
Additional Comments		Three hydrologically-distinct mire systems classed as a single unit. In places the quality of the wet heath appeared to be suffering from Bracken invasion.

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, ecology, 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

The site consists of three distinct areas located within the catchment of Highland Water. Each of these areas includes both valley side and valley bottom mires. The south-eastern area drains into Long Brook, a tributary of Highland Water. The remaining areas are also drained by tributaries of Highland Water, one shown on Ordnance Survey 1:10,000 mapping and one not (this latter may well not be a permanent watercourse).

Figure 1-2: General view of one of the valley side mires showing the break in slope associated with the edge of the river terrace deposits, which are marked by brown heather (NGR 425236 109941)

Figure 1-3: Poached ground; footpath crossing Withybed Bottom at the eastern edge of the site (thin mantle of stony head overlying Barton Clay) (NGR 425524 110566)

Figure 1-4: View of footpath crossing Withybed Bottom showing small track-side drainage ditches (NGR 425601 110510, looking northwest)

At the north-eastern edge of Withybed Bottom, a footpath forms the unit boundary. There are small open drainage ditches here on each side of the track (Figure 1-4).

1.3 Ecology

As this Eco-hydrological Assessment area consists of three discrete sites, each are discussed separately below.

The southernmost part of this Eco-hydrological Assessment area is Withybed Bottom, with Long Brook forming the northern boundary. This area contains a complex mix of habitats, with valley mire, wet heath, wet grassland and dry heath present, often with indistinct boundaries and mosaic areas. The wet heath areas contain a mix of Bog Myrtle *Myrica gale*, Purple Moor-grass *Molinia caerulea*, Cross-leaved Heath *Erica tetralix* and relatively frequent Heather *Calluna vulgaris* and some Bracken *Pteridium aquilinum* (M16a). Scot's Pine *Pinus sylvestris* is also beginning to encroach into some areas. The valley mire areas are relatively boggy with Deergrass *Trichosporum germanicum*, White Beak-sedge *Rhynchospora alba*, *Sphagnum* tussocks, Purple Moor-grass, Sharp-flowered Rush *Juncus acutiflorus* and some Heather and Cross-leaved Heath (M21a). Some wetter soakway (M29) channels are also present within this valley mire area, draining towards Long Brook. At the north-eastern corner of Withybed Bottom a path forms the area boundary, alongside which drains run parallel, one of which had been recently cleared at the time of the site visit (Figure 1-4). Where the path crosses Long Brook, poaching is extensive and new boardwalk crossing points across the stream appear to have recently been installed. The footpath may impede water movement to some extent, exacerbating the poaching issue. Around the higher margins of the area Heather and Bracken dominated dry heath is present.

The area to the east of Highland Water has a central valley mire, flowing east to west, which connects to Highland Water. This valley mire channels water through a boggy, Deergrass, White Beak-sedge and Purple Moor-grass dominated valley bottom. Surrounding this area is a wet heath, dominated by Purple Moor-grass, Heather and Cross-leaved Heath (M16a).

Around the eastern margins of the site, dense Bracken is present, along with areas of Heather-dominated dry heath, with patchy Gorse *Ulex europaeus* scrub. Also in the north-east of the site is a raised area with Bracken and Heather cover. Between this and the boundary of the unit is an area of valley mire dominated by Purple Moor-grass and Bog Myrtle (M24c).

To the west of Highland Water, the area has a central valley stream, formed from the connection of two tributaries, which then flows eastwards before discharging into Highland Water. The southern tributary originates in a valley mire habitat, which is relatively tussocky with Purple Moor-grass, and also quite species-rich, with Cross-leaved Heath, Common Yellow-sedge *Carex viridula ssp. oedocarpa*, Bog Myrtle, Carnation Sedge *Carex panicea*, White Beak-sedge (although not in significant quantities), and some Scot's Pine seedlings. This approximates to a community someway between M23a and M16a in the NVC. In the slightly wetter, soakway areas Bog Pondweed and Sharp-flowered Rush is also present (M29). The northern tributary is much more of a seepage line, without an associated wide valley mire habitat. Surrounding these areas are areas of wet heath, with Cross-leaved Heath, Heather, Purple Moor-grass and some patchy Bracken (M16a). Some of the wet heath areas appear to be suffering from Bracken encroachment along with quite heavy grazing pressure and this is probably indicative of this habitat drying-out as Bracken is intolerant of waterlogging. Just downstream of the confluence of the two tributaries, a small woodland area is present, with Alder *Alnus glutinosa*, Grey Willow *Salix cinerea*, Bramble *Rubus fruticosus agg.*, Ivy *Hedera helix*, Oak *Quercus robur.*, Holly *Ilex aquifolium* and birch *Betula spp.* (W6 W10). Where the stream discharges from the site, water flows in a clearly defined channel with poached and heavily grazed margins.

Overall the unit is in good condition but there are problems with erosion caused by humans and animals crossing the streams as well as, in an attempt to ameliorate this, the construction of footpaths and bridges. There is also some tantalising evidence of drying-out of the wet heathland but this may just be the result of the series of dry summers that ended in 2012.

1.4 Geology and Hydrogeology

Table 1-2 shows the geology beneath the site.

Table 1-2: Geology and Hydrogeology

Age	Group	Formation - member	Description	Thickness	Hydro-geological Role	Water Resources
Quaternary		Head	GRAVEL, SAND, SILT and CLAY		Aquifer / Aquitard - (aquifer where derived from river terrace sand/gravel)	
		River terrace deposits	CLAY,SILT, SAND and GRAVEL.		Aquifer / Aquitard - Spring lines may be present at the base of high level river terraces.	

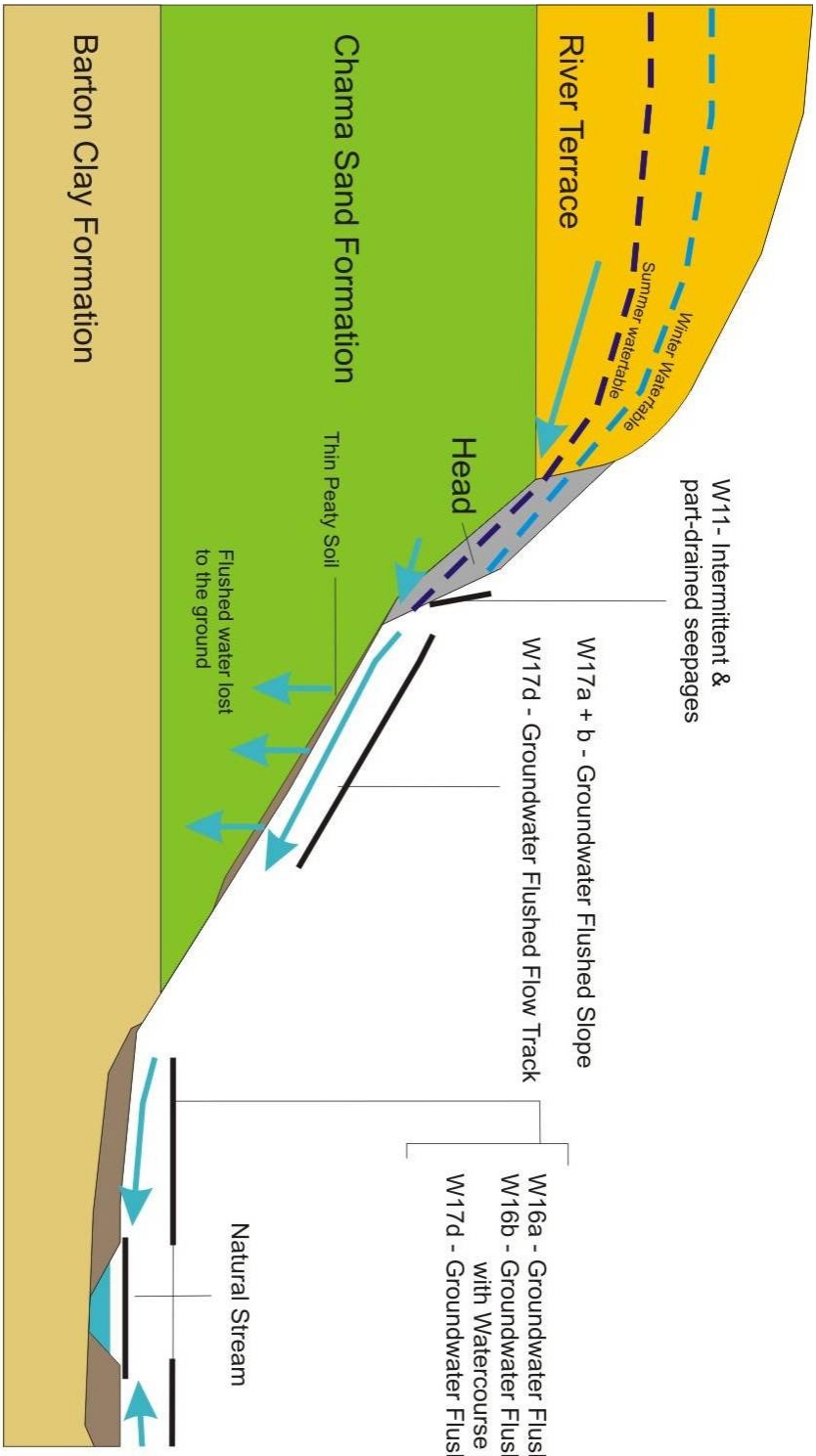
Tertiary (Eocene)	Barton Group	Becton Sand Formation	Yellow/buff fine- to very fine-grained well sorted SAND.	6 – 70 m	Aquifer - The most permeable and reliable aquifer within the Barton Group.	Yields up to 600 m^3/d in the south; in the north they rarely exceed 200 m^3/d.
		Chama Sand Formation	Greenish grey fine- to very fine-grained and rather clayey/silty SAND; slightly glauconitic. Also sandy CLAY.	6 – 15	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 Formation as mottled orange/grey silty, slightly clayey, fine sand with some fine and medium gravel, and the Barton Clay as brown/orange/grey silty or sandy clay with some gravel.

1.5 Water Supply Mechanisms

The wetlands on site are flush-dominated (see Figure 1-5). They receive water from a groundwater seepage face at the base of Quaternary river terrace sand/gravel deposits, or at the base of lobes of head derived from these deposits (the head occurs down-slope of the terrace deposits and represents terrace material re-mobilised by solifluction and other slope processes). The emerging water flows over the less permeable Chama Sand Formation, but some (locally all) is lost to ground over more permeable parts of the Chama Sand. The down-slope extent of the wetland is greatest where the topography focuses runoff, making the flow rate greater than the rate of infiltration. Where runoff rates are relatively high, the flushed slopes extend onto the low permeability Barton Clay, locally forming well-defined groundwater flushed flow tracks.

Figure 1-5: Conceptual Model Diagram



1.5.1 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 - W17a+b and W17d with small areas of W11 above.

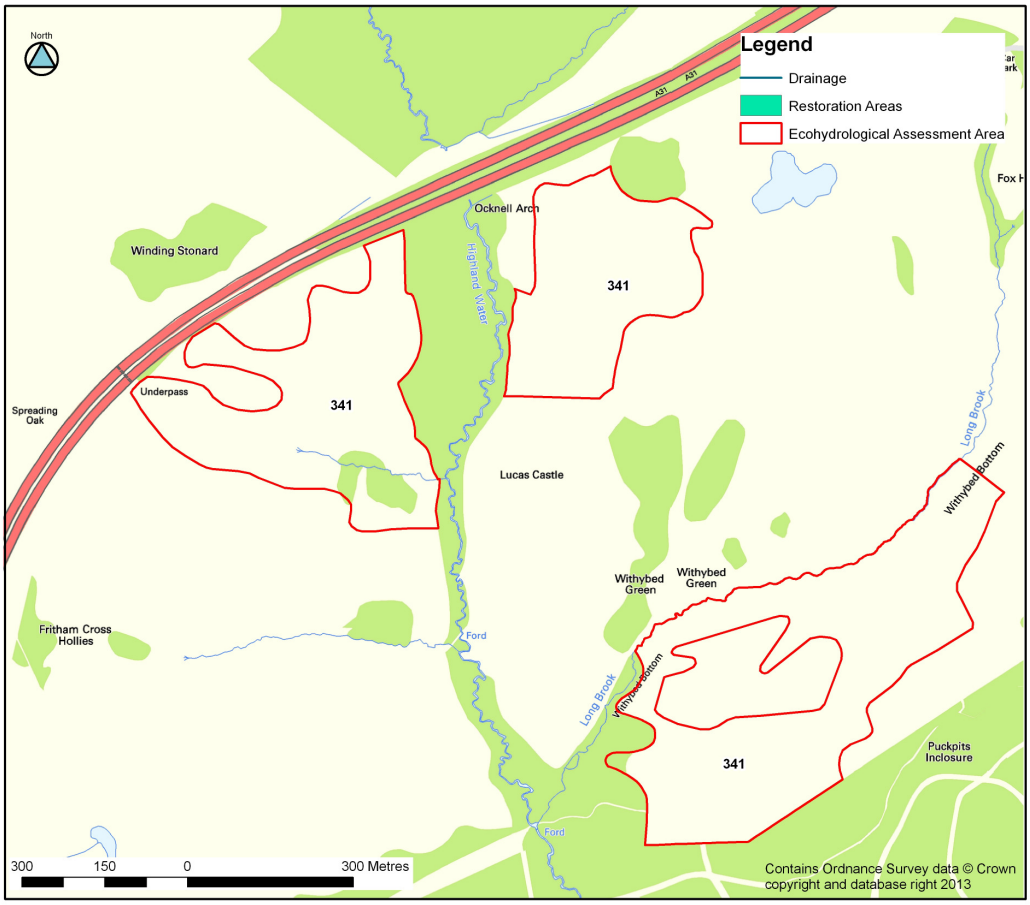
Valley bottom wetlands - W16a, W16b and W17d.

1.6 Damage and Restoration

1.6.1 Damage

There are no areas of significant hydrological damage (see Figure 1-6):

Figure 1-6: Restoration Areas Map (minor track drainage not shown in Withybed Bottom)



Within Withybed Bottom, particularly in the south-western portion, Scot's Pine seedlings are beginning to encroach into wet heath areas; control of this should be undertaken to prevent further encroachment and degradation of habitats.

1.6.2 Restoration

Table 1-3: Restoration Area Summary Table

Restoration Area	Damage Type	Restoration Proposals	Improvement	Constraints and Issues
Withybed Bottom	Scot's Pine encroachment	Scrub clearance	Removal of Scot's Pine which could result in localised drying of wet heath and mire habitats impact on communities present	None identified

1.7 Monitoring requirements

1.7.1 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, which limits the need for monitoring.

1.7.2 Vegetation

Scrub encroachment was identified as an issue in some areas, particularly Withybed Bottom, and monitoring of scrub encroachment (in this area and also the other two areas) should be monitored with further restoration actions taken if necessary. Bracken encroachment in the three areas should also be monitored as coverage was relatively extensive in some wet heath areas.

Monitoring of the poached areas, particularly the east of Withybed Bottom and around the stream in the area west of Highland Water, should also be undertaken to ensure the areas of localised damage do not increase.

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)
L	341	Ma 5 Wet (Fritham - Withybed)	Fixed point camera and transect surveys (specifically focussing on extent of pine scrub encroachment). Fixed point quadrat survey (areas of footpath erosion/poaching at crossing points).	Mostly flush dominated – no monitoring recommended

2 Maps

North

A31

Winding Stonard

Ocknell Arch

Highland Water

Fox Hill

Underpass

Lucas Castle

Long Brook

Withybed Bottom

Withybed Green

Withybed Green

Ford

Long Brook

Withybed Bottom

Puckpits Inclosure

Ford

290 145 0 290 Metres

Scale 1:5,516

LEGEND

Ecohydrological Assessment Area

JBA consulting

MAP 1

Site Location

North

275 137.5 0 275 Metres

Scale 1:5,516

LEGEND

Ecohydrological Assessment Area

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MAP 2

Aerial Photography

North

LEGEND

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

LIDAR

mAOD

High : 100

Low : 60

300 150 0 300 Metres

Scale 1:5,516

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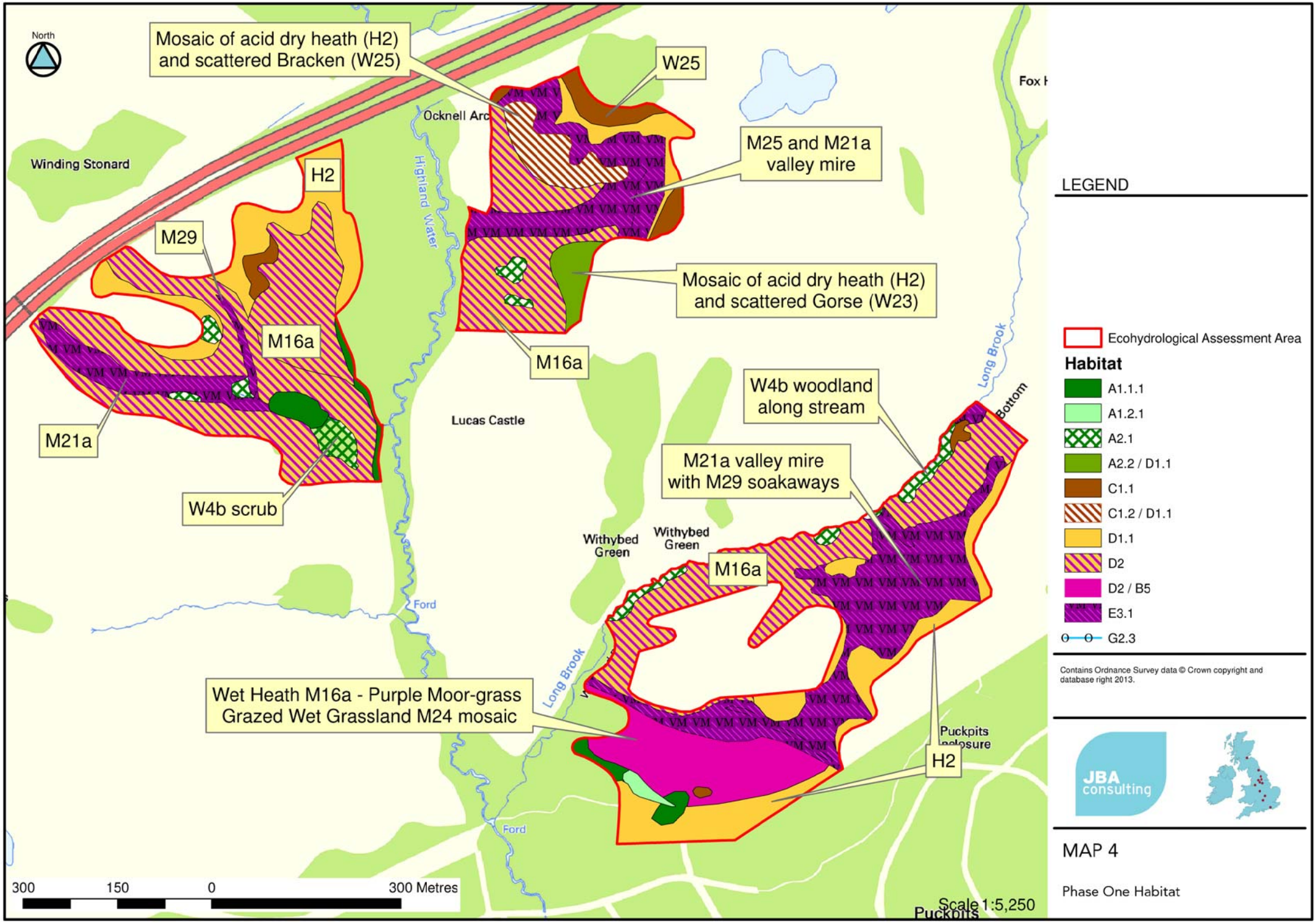
MAP 3

Topography, Hydrology and Wetland Distribution



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MAP 4

Phase One Habitat

North

Winding Stonard

Underpass

Ocknell Arch

Highland Water

A31

Lucas Castle

Fox Hill

Long Brook

Withybed Bottom

Withybed Green

Withybed Green

Ford

Long Brook

Withybed Bottom

Ford

Puckpits Inclosure

240 120 0 240 Metres

Scale 1:5,516

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

North

A31

Winding Stonard

Ocknell Arch

Fox Hill

BARTON CLAY FORMATION - CLAY

CHAMA SAND FORMATION - SAND, SILT AND CLAY

Highland Water

Underpass

Long Brook

Withybed Bottom

Lucas Castle

CHAMA SAND FORMATION - SAND, SILT AND CLAY

Withybed Green

Withybed Green

Ford

Long Brook

Withybed Bottom

BECTON SAND FORMATION - SAND

Puckpits Inclosure

CHAMA SAND FORMATION - SAND, SILT AND CLAY

CHAMA SAND FORMATION - SAND, SILT AND CLAY

CHAMA SAND FORMATION - SAND, SILT AND CLAY

Ford

240 120 0 240 Metres

Scale 1:5,516

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

Ocknell Arch

Fox Hill

Long Brook

Withybed Bottom

Lucas Castle

Withybed Green

Withybed Green

Puckpits Inclosure

240 120 0 240 Metres

Scale 1:5,516

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

JBA consulting

MAP 7

Eco-hydrology

North

A31

Winding Stonard

Ocknell Arch

Highland Water

Fox Hill

Underpass

Lucas Castle

Long Brook

Withybed Bottom

Withybed Green

Withybed Green

Ford

Long Brook

Withybed Bottom

Puckpits Inclosure

Ford

300 150 0 300 Metres

Scale 1:5,516

LEGEND

- Ecohydrological Assessment Area
- Drainage
- Restoration Areas

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MAP 8

Restoration Plan