Natural England Commissioned Report NECR141

New Forest SSSI Ecohydrological Survey Overview

Annex O: Norley Mire

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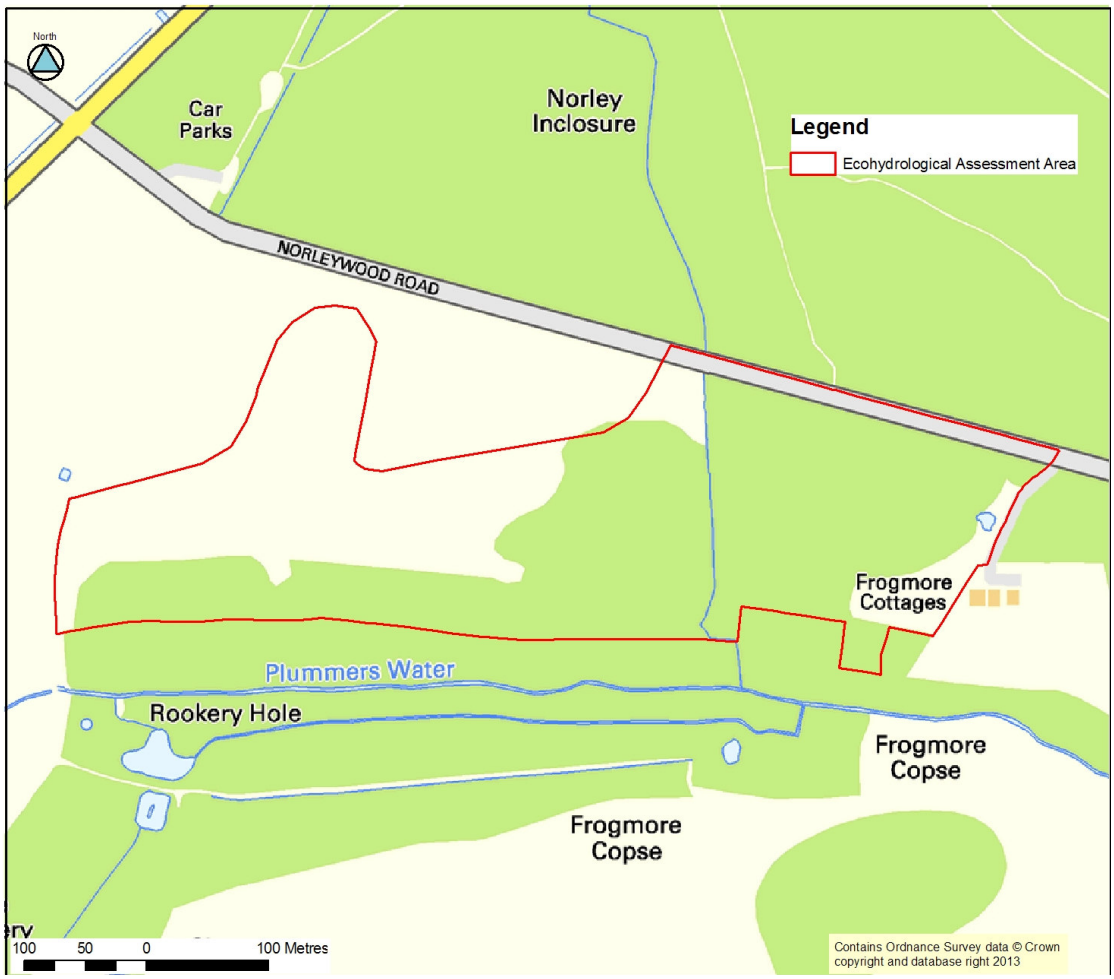
1 Norley Mire

1.1 Introduction

This Ecohydrological Assessment Area (EcoHAA) covers 13.5ha and is contained within SSSI Unit 444 with its centre at National Grid Reference (NGR) 434852, 097798 (see Figure 1-1).

Figure 1-1: Location Map



The site consists of two small valleys incised into a plateau edge containing wetlands supplied by seepage from the river terrace-underlying bedrock junction. The eastern valley has been subject to drainage and is in need of restoration.

Table 1-1: Norley Mire Ecohydrological Assessment Area Summary Table

Eco-hydrological Assessment Area		**P**
Name		Norley Mire
Relative Geomorphology Assessment		
Size (ha)		13.5
SSSI Units		444
Valley Side Wetland	Present	Y
	Wetland Type	Flush Dominated Wetland
	Main Source of water	Seepage from River terrace Gravels at join with Headon Formation (aquitard)
	Indicative NVC communities	M16, M21a, M29
	Wetland Types	Mire/ wet heath
	Drainage Damage	Y (Minor)

	Scrub/Tree Encroachment Damage	Y (Forestry)
	Poaching and Grazing Pressures Damage	N
Valley Basin Wetland	Present	Y
	Wetland Type	Flush Dominated Wetland
	Main Source of water	Seepage from River terrace Gravels at join with Headon Formation (aquitard)
	Indicative NVC communities	M16, M21a, M29
	Wetland Types	Mire
	Drainage	Y (Moderate/Major)
	Scrub/Tree Encroachment Damage	Y - Forestry
	Poaching and Grazing Pressures	N
Additional Comments		Two separate valley side and valley bottom mires. Western mire drier. Eastern mire -large central drainage and damaged by forestry.

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, 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

This site lies on the edge of a plateau. Two small valleys are incised into the plateaux edge. The relative position of the seepage face that supports the wetland in the two valleys affects the distribution of the wetlands. In the eastern valley, the seepage face is high up the valley side and so there is a steep valley side wetland. In the bottom of the valley is a valley bottom wetland with significant peat deposits forming a peat dome. A small drain has been cut through the centre of the peat mass. As the valley enters a plantation the drainage is more effective and the peat body has been completely destroyed.

Figure 1-2: Eastern Valley (NGR 434950, 097890)

Figure 1-3: The bottom of the Eastern valley as it enters the forestry and the peat mass peters out due to drainage (NGR 434999, 097859)

In the western valley, the seepage is weaker and occurs near the base of the valley bottom. Therefore there is only a valley bottom wetland in this area.

1.3 Ecology

There are two areas of valley mire within the unit contained within two small valleys.

There is a small area of valley mire present in the west which is surrounded by Birch *Betula spp.* and Gorse *Ulex europaeus* scrub on the higher slopes, interspersed with Bracken *Pteridium aquilinum*. This merges into a Gorse-dry Heath mosaic toward the middle of the site (on the higher ground). Further down this slope in the middle of the site lies valley mire habitat, which is Deergrass *Trichophorum germanicum* dominated. This small area at the bottom of the valley mire is cut off by drains. Within this area is a small pasture woodland which is dominated by Birch and Oak *Quercus spp.*, with Holly *Ilex aquifolium* being the most prevalent species in the sub-canopy.

At the top of the eastern mire, there is a large area of pooling right beside Norleywood Road, which was in good condition. The valley mire habitat continues south towards a large area of mixed woodland (See Figure 1-4 below), with a small drain cuttings through it. Where it enters the woodland, the drain becomes larger and the peat has been eroded away. The current status of this area is degrading due to the level of drainage present. This area in particular has been subject to cattle poaching which has further damaged the mire habitat (see Figure 1-3).

The lower part of the eastern valley wetland is surrounded by mixed woodland. There is a drain cut along the bottom of the valley. Both sides of the drain are bordered by valley mire which is dominated by *Sphagnum* sp, Deergrass and Bog Myrtle *Myrica gale.*

The far east of the site contains a large area of mixed woodland which is the most dominant habitat across the east of the site. A small area of wet grassland with 'tussocks' is also present suggesting that the area was once wetter and with more characteristic wet heath species dominating such as Purple-moor Grass *Molina caerulea*. A pond is present in the very east of

the site, near Frogmore Cottages; however there was no aquatic vegetation present, only leaf litter.

Figure 1-4: View from Norley Wood Road down eastern valley mire (with cut drain) towards woodland (NGR 434990, 097926)

1.4 Geology and Hydrogeology

Table 1-2 shows the geology at Norley Mire. The plateau along the northern edge of the site is covered by river terrace deposits. The valley sides are formed by the Headon Formation.

Table 1-2: Geology and Hydrogeology

Age	Group	Formation - member	Description	Thickness	Hydrogeological Role	Water Resources
Quaternary		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)	Solent Group	Headon Formation and Headon Hill Formation	Greenish grey shelly CLAY with laminated SAND, SILT and CLAY.	Up to 49 m	Aquifer / Aquitard	Sandy strata may provide yields sufficient for domestic or small agricultural use.

Local BGS borehole logs (available at http://www.bgs.ac.uk/GeoIndex/) describe the river terrace deposits as sandy gravel (likely to be relatively permeable and to act as an aquifer) and the Headon Formation as a greyish yellow green clay (likely to act as an aquitard).

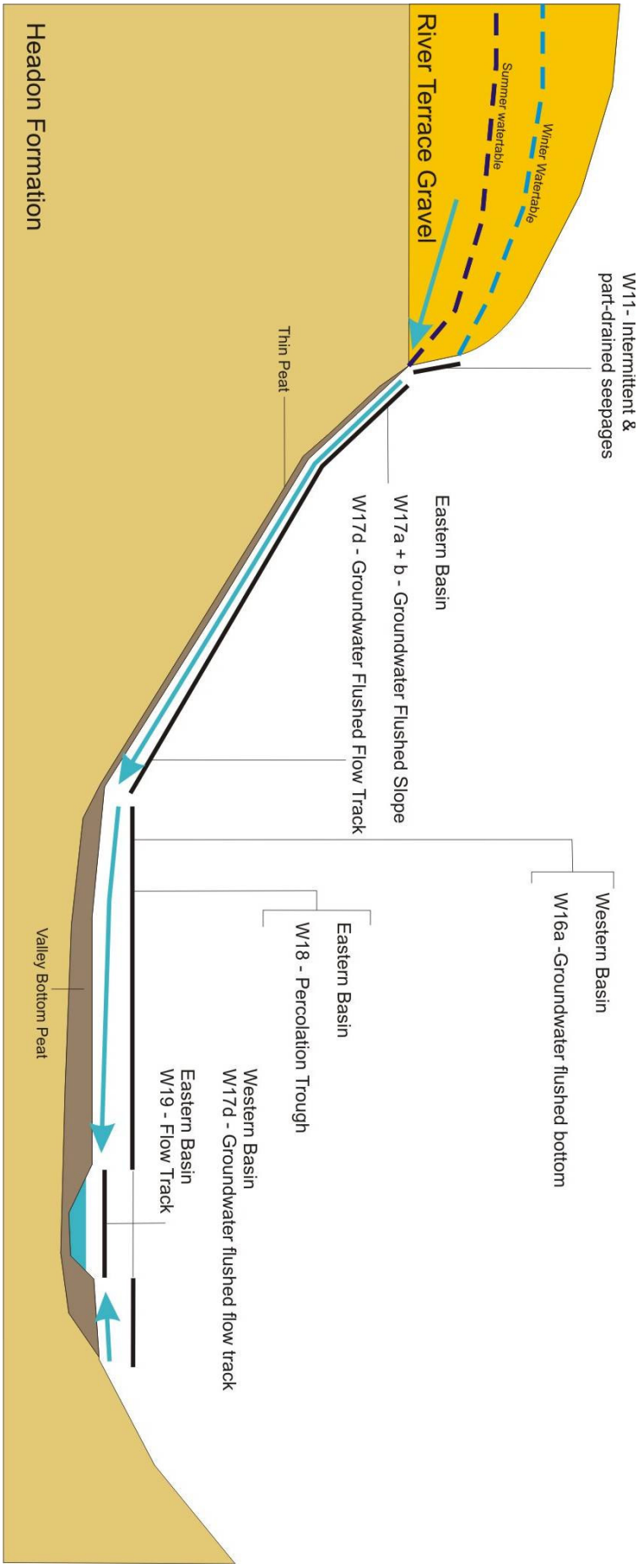
Within the valley basin wetland in the east, the centre is raised, suggesting a significant depth of peat.

1.5 Water Supply Mechanisms

The wetlands in the unit are flush dominated (see Figure 1-5). They receive water from a seepage face at the junction between river terrace deposits (aquifer) and the underlying

Headon Formation (aquitard). The major seepage faces at this junction have been mapped by the survey. The seepage supporting the eastern wetland appears stronger than that supporting the western wetland, this might be due to variations in the River Terrace Gravels and how the valleys intersect them.

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:

Eastern valley side wetlands - W17a and W17b.

Eastern valley peat area- valley bottom basin - W18.

Western valley bottom - W16a, and W17b.

1.6 Damage and Restoration

There is one area of significant damage (see Figure 1-6). The valley bottom wetland in the eastern valley has a small drain cut through the middle. This drain should be infilled, possibly with heather bales, with wooden dam supports built into the infilling and the water diverted across the mire surface to restore the quality and extent of the mire habitats. As the valley enters the area of forestry, the drainage has been more effective and the mire completely removed. There are possibilities for wetland creation in this area too (through removal of forestry, earth bunds and infilling the drains).

Figure 1-6: Restoration Areas Map

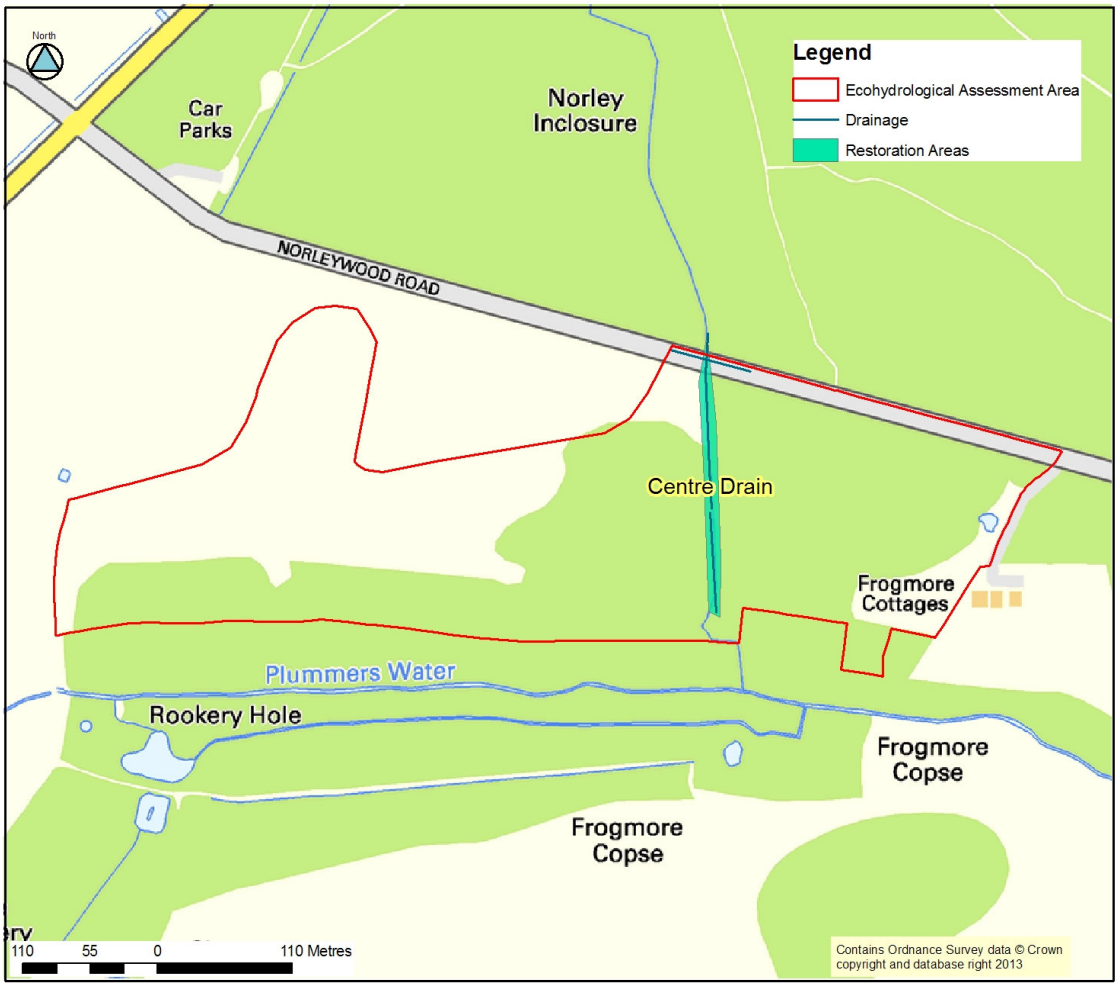


Figure 1-7: Drain cutting through the peat deposits in the eastern valley bottom wetland

The cut drain through the east of the site is compromising the mire and small raised bog habitat (which surrounds it) and, as a result, the immediate area is becoming drier, resulting in wet heath habitats forming instead. These are likely to become increasingly drier and scrubbed over without active intervention. This is already apparent in the form of minor scrub encroachment presently invading the west of the site. Poaching is also an issue on this site and some areas have been heavily grazed by both cattle and ponies.

The extent of scrub encroachment within the unit itself was relatively minor, however, there are extensive stands located on the north-western boundary of the unit. These stands have the potential to invade the unit in the future, especially if it becomes drier.

Table 1-3: Restoration Area Summary Table

Restoration	Damage Type	Restoration	Improvement	Constraints and Issues

Area		Proposals		
Centre Drain	Small centre drain through mire	Infilling drain with heather bales	Stop drainage and degradation of mire habitat. Increase in quality and extent of adjacent mire and wet heath habitats	Drain is an outfall of the road drainage system
Centre Drain in East of Unit	Poached Ground	Grazing management	Prevents sensitive mire habitat becoming trampled and damaged continuously	May be constrained by current grazing rights

1.7 Monitoring requirements

1.7.1 Water Monitoring

A limited number of monitoring boreholes within the peat mass of the eastern mire would help to quantify the damage cause by the centre drain and the improvement seen after restoration.

1.7.2 Vegetation

Scrub encroachment (in the form of Bracken and Gorse) has been identified as a minor issue at this site, especially in the western areas. However, this is not currently an extensive problem and is not a significant issue. As a result, it may be necessary to monitor the extent of colonisation by these species in the future to see if it increases across the site. Monitoring for scrub encroachment would consist of fixed point camera surveys and transect surveys to assess the population of the invasive species across the unit; this could be used to monitor continued encroachment without restoration.

Poaching from cattle and ponies, in combination with extensive drainage in the eastern areas of the unit, has also damaged the mire habitat here. Poaching across the unit can also be monitored by taking fixed point camera surveys of specific areas within the unit on a bi-annual basis. Quadrat surveys may also be used to monitor vegetation recovery within the managed grazing areas.

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)
P	444	Norley Mire	Fixed point camera survey (specifically focussing extent of scrub encroachment in the western areas) Fixed point quadrat surveys (focussing on the recovery of poached areas)	3 boreholes in the valley mire Plus associated monitoring and data processing

2 Maps

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Map 2: Aerial Photography
Map 3: Topography, Hydrology and Wetland Distribution
Map 4: Phase One Habitat
Map 5: Drift Geology
Map 6: Bedrock Geology
Map 7: Eco-Hydrology Map
Map 8: Restoration Plan

North

Car Parks

Norley Inclosure

NORLEYWOOD ROAD

Frogmore Cottages

Plummers Water

Rookery Hole

Frogmore Copse

Frogmore Copse

150 75 0 150 Metres

Scale 1:2,866

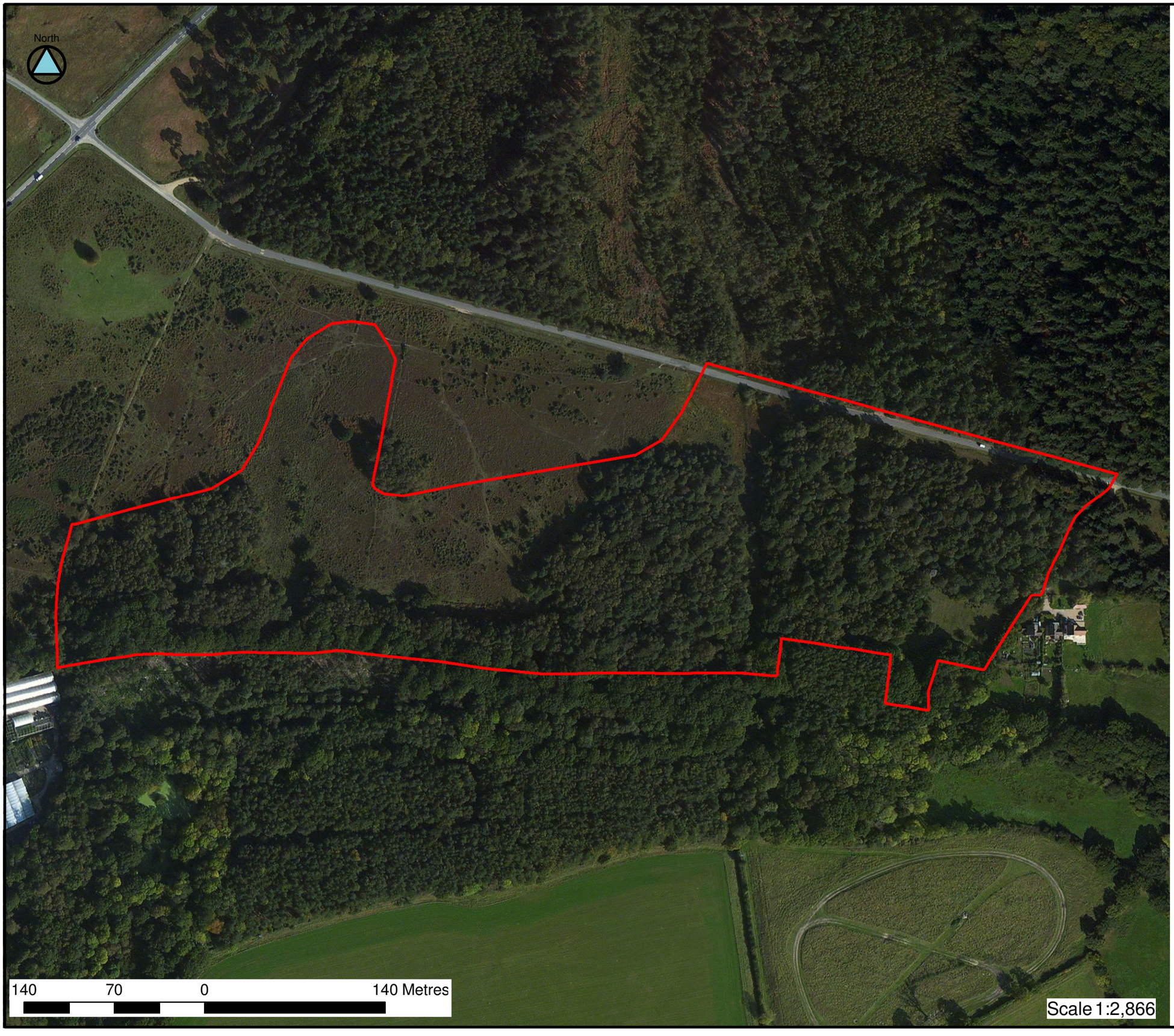
LEGEND

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 : 13

Low : 25

160 80 0 160 Metres

Scale 1:2,866

JBA consulting

MAP 3

Topography, Hydrology and Wetland Distribution

North

Car Parks

Norley Inclosure

NORLEYWOOD ROAD

M16a

M21a

M29 Soakaway

M21a

Small area of raised bog

M23a

Plummers Water

Rookery Hole

Frogmore Copse

Frogmore Copse

150 75 0 150 Metres

Scale 1:2,700

LEGEND

- Ecohydrological Assessment Area
- G2.3
- A1.1.2
- A1.3.1
- A2.1
- B5
- C1.1
- D1.1
- D2
- E3.1
- E3.2
- G1.3
- J4

JBA consulting

MAP 4

Phase One Habitat

North

Car Parks

Norley Inclosure

NORLEYWOOD ROAD

Frogmore Cottages

Plummers Water

Rookery Hole

Frogmore Copse

Frogmore Copse

125 62.5 0 125 Metres

Scale 1:2,866

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

JBA consulting

MAP 5

Drift Geology

North

Car Parks

Norley Inclosure

NORLEYWOOD ROAD

HEADON BEDS AND OSBORNE BEDS (UNDIFFERENTIATED) - CLAY, SILT AND SAND

Frogmore Cottages

Plummers Water

Rookery Hole

Frogmore Copse

Frogmore Copse

125 62.5 0 125 Metres

Scale 1:2,866

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

JBA consulting

MAP 6

Bedrock Geology

North

Car Parks

Norley Inclosure

Norley Wood Road

Frogmore Cottages

Plummers Water

Rookery Hole

Frogmore Copse

Frogmore Copse

125 62.5 0 125 Metres

Scale 1:2,866

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

Car Parks

Norley Inclosure

NORLEYWOOD ROAD

Centre Drain

Frogmore Cottages

Plummers Water

Rookery Hole

Frogmore Copse

Frogmore Copse

160 80 0 160 Metres

Scale 1:2,866

LEGEND

- Ecohydrological Assessment Area
- Drainage
- Restoration Areas

JBA consulting

MAP 8

Restoration Plan