Natural England Commissioned Report NECR141

New Forest SSSI Ecohydrological Survey Overview

Annex R: Lay Gutter Valley

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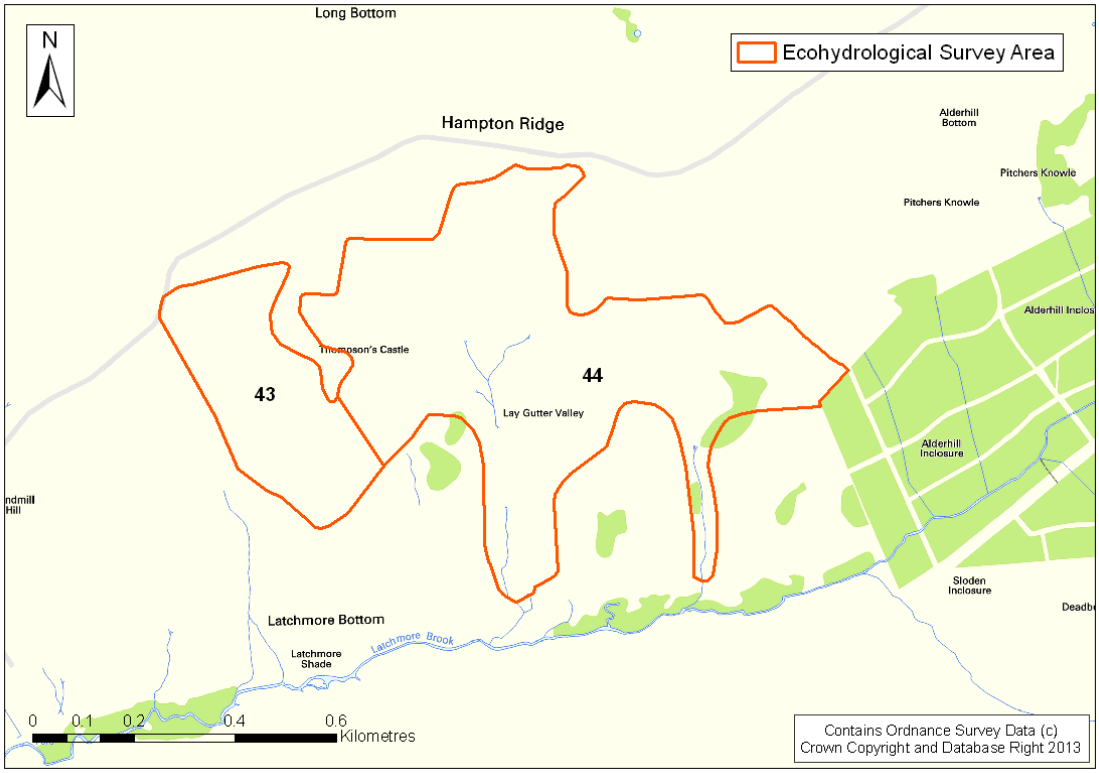
Contents

1 Lay Gutter Valley

1.1 Introduction

This Ecohydrological Assessment Area (EcoHAA) covers 49.1ha and is contained within SSSI Units 43 and 44 with its centre at National Grid Reference (NGR) 419050, 113243 (see Figure 1-1). Unit 43 is defined as a mire to stream transition unit.

Figure 1-1: Location Map



This site occupies three small valleys on the side of a plateau. The wetlands within them are supported by a seepage face high up the valley side at the junction of an area of head deposits and underlying bed rock. There are two areas of small scale gulleying which require restoration.

Table 1-1: Ecohydrological Assessment Area Summary Table

Eco-hydrological Assessment Area		**S**	
Name		Lay Gutter Valley	
Relative Geomorphology Assessment			
Size (ha)		49.1	
SSSI Units		43	44
Valley Side Wetland	Present	Y	
	Wetland Type	Flush Dominated Wetland	
	Main Source of water	Seepage from River Terrace gravels (and associated unmapped head deposits)	
	Indicative NVC communities	H2a, H3c, H2c, H3a, H3b, M16b, M25a, M21a, M29	H3b, M29, M21a, M16a, M16b, M16c, M23a, M30
	Wetland Types	Mire, Wet heath	Mire, Wet heath, Wet grassland
	Drainage Damage	N	N
	Scrub/Tree Encroachment Damage	N	Y - occasional Willow growth (Minor)

	Poaching and Grazing Pressures Damage	N	N
Valley Basin Wetland	Present	Y	Y
	Wetland Type	Flush Dominated Wetland	
	Main Source of water	Seepage from River Terrace gravels (and associated unmapped head deposits)	
	Indicative NVC communities	H3b, M29, M21a, M16a, M16b, M16c, M23a, M30, W4b	M21a, M23a, M25a, M30, M16abc, H3abc, U1
	Wetland Types	Mire, Wet heath	Mire, Wet heath, Wet grassland
	Drainage	Y- drainage at a narrow point in the valley will associated headwater erosion (Moderate)	
	Scrub/Tree Encroachment Damage	N	Y - Willow (Minor)
	Poaching and Grazing Pressures	Y - at a fording point (Minor)	Y - at a fording point (Minor)
Additional Comments		Seepage from river terraces collects into three valleys. The bottom of the western valley (outside the assessment area) has been subject to significant drainage destroying the wetland	

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

There are three small valleys within the site descending from the edge of a plateau. Within the valleys are three valley bottom wetlands supplied by water from seepage faces high up the valley sides. In the centre of the middle valley, at a narrow crossing point is an area of gulleying and erosion (see Figure 1-2). It appears that there has been some restoration attempted in this area. In the lower part of the middle valley the mire widens and forms a quag mire with a slight peat dome. The western valley bottom wetland stops halfway down the valley just upstream of the boundary of the SSSI (see Figure 1-3 and Figure 1-4). At this point the valley has been subjected to drainage and there is a degree of headwater erosion of the drainage path into the SSSI. There is some evidence of attempts to restore this area (e.g. staves in the channel), however, these measures have not been effective. Nevertheless, even though the stakes and bales have been lost, the bottom part of the valley mire has been stabilised and headward erosion has slowed. That said, the valley mire is now drained by soakways across its surface which now discharge over a small peat cliff as a waterfall into the incised channel downstream (Figure 1-3) where the damming took place and, as a result, the peat mass of the valley mire here is in danger of being damaged.

Figure 1-2: Crossing point and Erosion at in upper part of the middle valley bottom wetland (NGR 418990, 113165)

Figure 1-3: Headwater Erosion at the base of the western valley bottom wetland (note tops of staves in the channel in the foreground) (NGR 418476, 113053)

Figure 1-4: Effective draining of western valley bottom wetland downstream of the SSSI unit (NGR 418522, 112868)

1.3 Ecology

1.3.1 Eastern Valley (Unit 44)

These units are generally in good condition with some areas of pristine raised bog. The eastern valley has a large section of bog woodland sited on the break of slope below the seepage face. This retains water and has an interesting flora dominated by Grey Willow *Salix cinerea* with extensive stands of Bog Myrtle *Myrica gale*. There is also a small outlier of this habitat to the east at the top of an unnamed soakway outwith the SSSI unit adjacent to the Alderhill Inclosure. Here there are small number of Grey sallow trees of considerable antiquity. The ground flora is dominated by beds of *Sphagna*, including *Sphagnum fimbriatum, S. flexuosum, S. palustre* and *S. squarrosum* and tussocks of Purple Moor-grass *Molinia caerulea*. The wetter runnels surrounding the woodland and the flat ground above are typical of M29 soakway communities with extensive Marsh St. John's-wort *Hypericum elodes* and Bog Pondweed *Potamogeton polygonifolius,* also with extensive areas of *Sphagnum denticulatum* and *S. Fallax*. The lowest part of this valley narrows considerably and naturally forms a stream with adjacent wet lawns with heavily grazed rushes *Juncus sp.* and Purple Moor-grass. The upper and middle sections of this valley are an excellent example of the natural drainage and habitat transition of the valley side mires as there are no nick points in this system and the natural drainage has not been interfered with. Lower down the valley opens out and is crossed by a culvert. Here the ground is heavily poached on and around the structure and this has damaged the Molinia mire (M25a) vegetation here. Downstream of the culvert the mire changes character and resembles M21a although here it is associated with some W4b woodland and has suffered damage from grazing and poaching in places.

1.3.2 Central Valley (Unit 44)

The central valley contains large areas of pristine blanket and topogenous mire, occasionally separated by drains which show a tendency towards headward erosion. This is basically a large valley mire contained within a wide and shallow valley. The spurs to either side have large Bracken *Pteridium aquilinum* stands and drier, Heather *Calluna vulgaris* dominated dry heathland. The bog is perched enough to have formed lagg streams along the sides and these contain the typical M29 soakway flora. The central mire is generally all the M21a NVC community (*Narthecium ossifragum-Sphagnum papillosum* valley mire, *Rhynchospora alba-Sphagnum auriculatum* sub-community) with good populations of Purple Moor-grass and Cross-leaved Heath *Erica tetralix*. There are scattered patches of Sallow carr scrub and occasional isolated pioneer Pine *Pinus sp.* trees.

Downstream the mire continues and is confined within the terraces on the sides of the wide valley. However, towards the bottom, the valley narrows and here the nature of the vegetation changes where there are quad-bike and animal crossing points as well as past drainage works and banks of unknown origin but of some antiquity. It is here that this mire begins to break up into eroded patches of mire and New Forest lawn-like vegetation begins to intrude. At this point the stream leaves this unit and enters Unit 48, Latchmore Brook.

1.3.3 Western Valley (Unit 43)

The western valley has mire communities that appear restricted to the valley head seepages on the east side of the unit, which, due to the topography, collects into a single main stream and soakway complex at the western edge of the unit. The remainder of the valley to the west of the watercourse(s) is composed of dry heath communities whilst the east is dominated by wet heath. The wet heaths are all broadly similar in type, with fluctuations in the amount of Heather present, reflecting increases in water level. These increases reflect transitions from M16a to M16c, *Erica tetralix-Sphagnum compactum* wet heath, typical sub-community and *Rhynchospora alba-Drosera intermedia* sub-community.

The large areas of mire are in good condition and composed of the M21a valley mire community. Butterwort *Pinguicula vulgaris* can be found here along with Common Sundew *Drosera rotundifolia* and many species of *Sphagnum*, including *Sphagnum papillosum*. These mires are associated with soakways that flow over the top and around them. These streams do not cut into the peat and, where this is still the case, the mires are still in a pristine condition. There mires themselves are semi-continuous as you move downstream and presumably have formed behind small constrictions in the valley sides or raised areas within the stream platforms. Typically they are connected by the M29 soakway communities and, as a result, form a continuous mire complex at the base of the valley as you move downstream and this is the situation when the unit boundary is reached. Here, as is mentioned above, the stream has been incised and headward erosion is taking place exacerbated by poaching and erosion where animals and people cross the stream. The result of this is that the soakways have been transformed into a single-thread stream that is actively cutting into its bed and upstream. This has already led to the loss of some of the mire communities, leaving a rump of isolated patches of *Sphagnum auriculatum* at the base of and *Erica cinerea* on top of eroded Molinia tussocks. This headward erosion has now reached a large area of valley mire that extends into the SSSI and this is currently being drained by the soakways on its surface that discharge via a 1m waterfall over a peat cliff into the eroding single-thread stream.

Downstream of the above there are a number of further nick points in the stream that are the focus of additional headward erosion, and again outside of the unit, there is a large lawn area which has been subject to extensive drainage activity. It is at this point the stream enters Unit 48.

1.4 Geology and Hydrogeology

Table 1-2 shows the geology at Lay Gutter Valley. The plateau above the site is covered with river terrace deposits. Down the valley side is a large area of unmapped head deposits originating from the river terrace deposits. The bedrock of the site in the upper part is underlain by the Selsey Sand Formation and in the lower part by the Poole Formation.

At the lower end of the central valley, where it widens out, a peat dome with quaking surfaces has formed.

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.	
		Head	CLAY, SILT, SAND and		Aquifer / Aquitard	

			GRAVEL.			
Tertiary (Eocene)	Bracklesham Group	Selsey Sand Formation	Fine-grained SAND, sandy SILT and sandy CLAY; locally shelly and glauconitic.	0 –50 m	Aquifer / Aquitard - Spring line at base	Variable lithology makes borehole yield hard to predict. Boreholes up to 200 mm in diameter may yield up to 200 m^3/d; boreholes over 400 mm diameter have yielded more than 1800 m^3/d from sandier strata. However, boreholes with little or no yield have been recorded.
	Bracklesham Group	Poole Formation	Fine- to very coarse-grained (locally pebbly) cross-bedded, commonly lignitic, SAND. Interbedded with pale grey to dark brown, carbonaceous, lignitic and (commonly) laminated CLAY. Red-stained structureless clay and silty clay present locally.	25 – 110 m	Aquifer / Aquitard - Spring line at base	

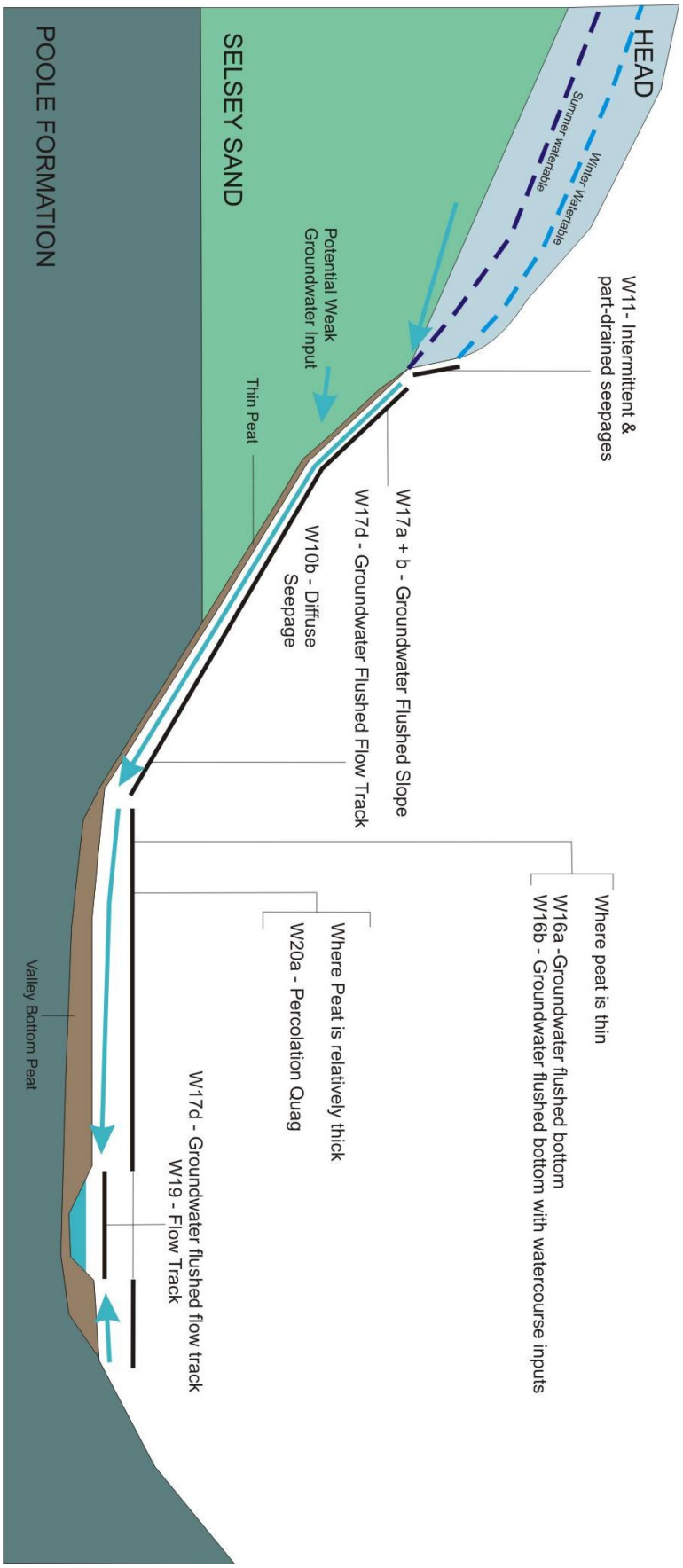
At the junction of the head deposits and the bedrock, a seepage face forms which supports a flush dominated slope over the bedrock (see Figure 1-5). The upper part of this slope is underlain by the Selsey Sand Formation which might act as a weak aquifer supplying water to this slope; however the seepage from the head deposits appears to be the main source of water. The lower part of the sites and the majority of the valley bottom wetlands are underlain by the Poole Formation which appear to act as an aquitard (no springs, or seepages were observed on the valley sides bordering the valley bottom wetlands).

Figure 1-5: Seepage face at junction of head and underlying bedrock (NGR 419480, 113165)

1.5 Water Supply Mechanisms

The wetlands on site are flush dominated (see Figure 1-6). They receive water from a seepage face at the junction between head (aquifer) and the underlying Selsey Sands Formation. The Selsey Sands Formation may also supply some water to the valley side wetlands. The water runs over the surface of the Selsey Sands forming wide flushed slopes before reaching valley bottoms which, in their lower reaches, are underlain by the Poole Formation.

Figure 1-6: 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. For each Ecohydrological Assessment Area WETMECS have been identified.

The WETMECS identified include:

Valley side wetlands - narrow areas of W17a+b and W17b with some area of W11 where the Selsey Formation supplies groundwater.

Western and Eastern valley bottom wetlands - W18 and W19.

Lower part of central valley bottom wetland- W20a and W20b and W19

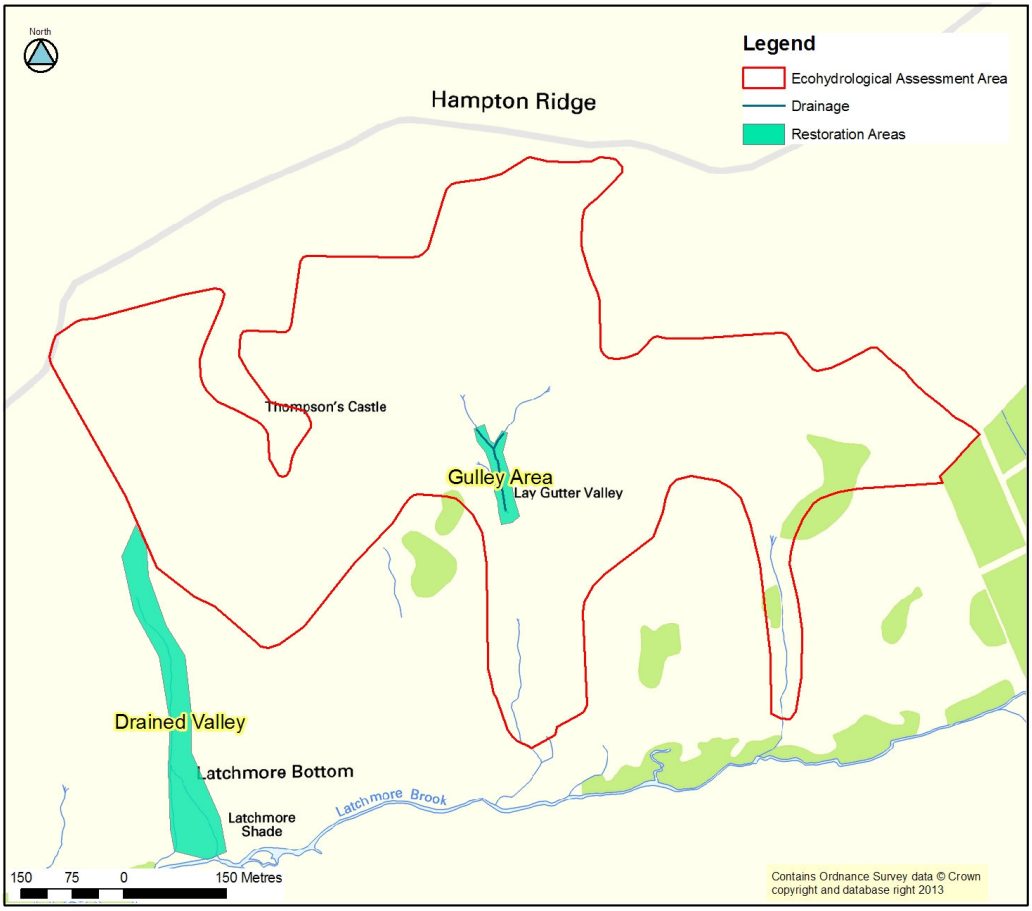
1.6 Damage and Restoration

1.6.1 Damage

There are two areas of significant damage (see Figure 1-7):

- Gully Area - poaching at a narrow crossing point in this valley bottom wetland has led to the development of a gulley;
- Drained Valley - downstream of the site artificial drainage has led to the removal of the valley bottom wetland. There is some headward erosion into the SSSI.

Figure 1-7: Restoration Areas Map



Ecologically, the site faces risks of a reduction in the size of pristine mire communities through headward erosion; this is not caused by artificial drainage activity at these points, but through poaching of watercourses and the headward erosion resulting from this and the incision of the

Latchford Brook, following engineering works. There is limited scrub incursion, this is unlikely to pose a long term threat to these wetland unless they suffer additional drainage from headward erosion.

The Geomorphological Assessment of Unit 48, Latchmore Brook identified two additional tributaries to Latchmore Brook from the Ecohydrological Assessment Area that appear to be incising. At the moment however, these do not appear to be damaging the areas of mire but the Geomorphological Assessment does proposes incision management for these streams.

1.6.2 Restoration

Restoration should focus on two areas:

- Gulley Area - restoration works have already been undertaken in this area in the past. From the site walk-over it was difficult to access whether the dams and plugs were deteriorating under the erosive power of the gulley or the gulley had improved since the installation of the restoration works. It is therefore recommended that the efficacy of these works be reviewed. Replacement of dams, with a series of well constructed tiered wooden planks or plastic sheet piling dams may be required.
- Drained valley - a large dam or bund structure will now be required to prevent further headward erosion into the valley mire upstream. This should consist of a concrete structure with a sloping downstream face to prevent erosion and undermining of the structure.
    - Below the above and at the various nick points in this stream, a series of plastic sheet pile dams should be installed with very low crest heights, only 15cm or so in each case. Ideally these should be positioned so that the water pouring over the crest falls into the next pool created by another plastic dam downstream, cascading downstream until the original bed of the stream is encountered;
    - The rest of the drained valley provides potential for the extension and restoration of the valley bottom wetland; however restoration objectives need to be created for this area. For example, in the lower part of the valley, mire has been replaced by lawn so management decisions are required to assess the value of restoration.

Table 1-3: Restoration Area Summary Table

Restoration Area	Damage Type	Restoration Proposals	Improvement	Constraints and Issues
Gulley Area	Gulleying and poaching	Review of the efficacy of existing restoration works	N/A	N/A
Drained Valley	Headward erosion	Large concrete dam Plastic sheet pile dams	Stop headward erosion. Restoration of mire extent	Access to site of large machinery Use of alkaline materials
All	Scrub encroachment	Scrub control	Removal of invading species and restoration of habitat	None

1.7 Monitoring requirements

1.7.1 Water Monitoring

The majority of the site contains flush dominated wetlands with thin peats or peaty soils - groundwater monitoring is unlikely to be appropriate for such areas. The surface water features are small and appear stable which limits the need for monitoring. Some monitoring of groundwater levels in the lower central valley quag area could give information about the site at the moment and changes in condition into the future.

1.7.2 Vegetation

The overall extent of the bog area should be monitored to quantify reductions in area. Fixed point photography and potentially the use of aerial photography should be used to undertake this. The Pine encroachment is currently minimal; however, this should be subject to some control as it is likely to increase if allowed.

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)
S	43 and 44	Lay Gutter Valley	Fixed point camera survey Fixed point quadrat survey	3 Boreholes (3 installations in total) Plus associated monitoring and processing

2 Maps

Map 1: Location

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

Hampton Ridge

Thompson's Castle

Lay Gutter Valley

Latchmore Bottom

Latchmore Brook

Latchmore Shade

240 120 0 240 Metres

Scale 1:4,737

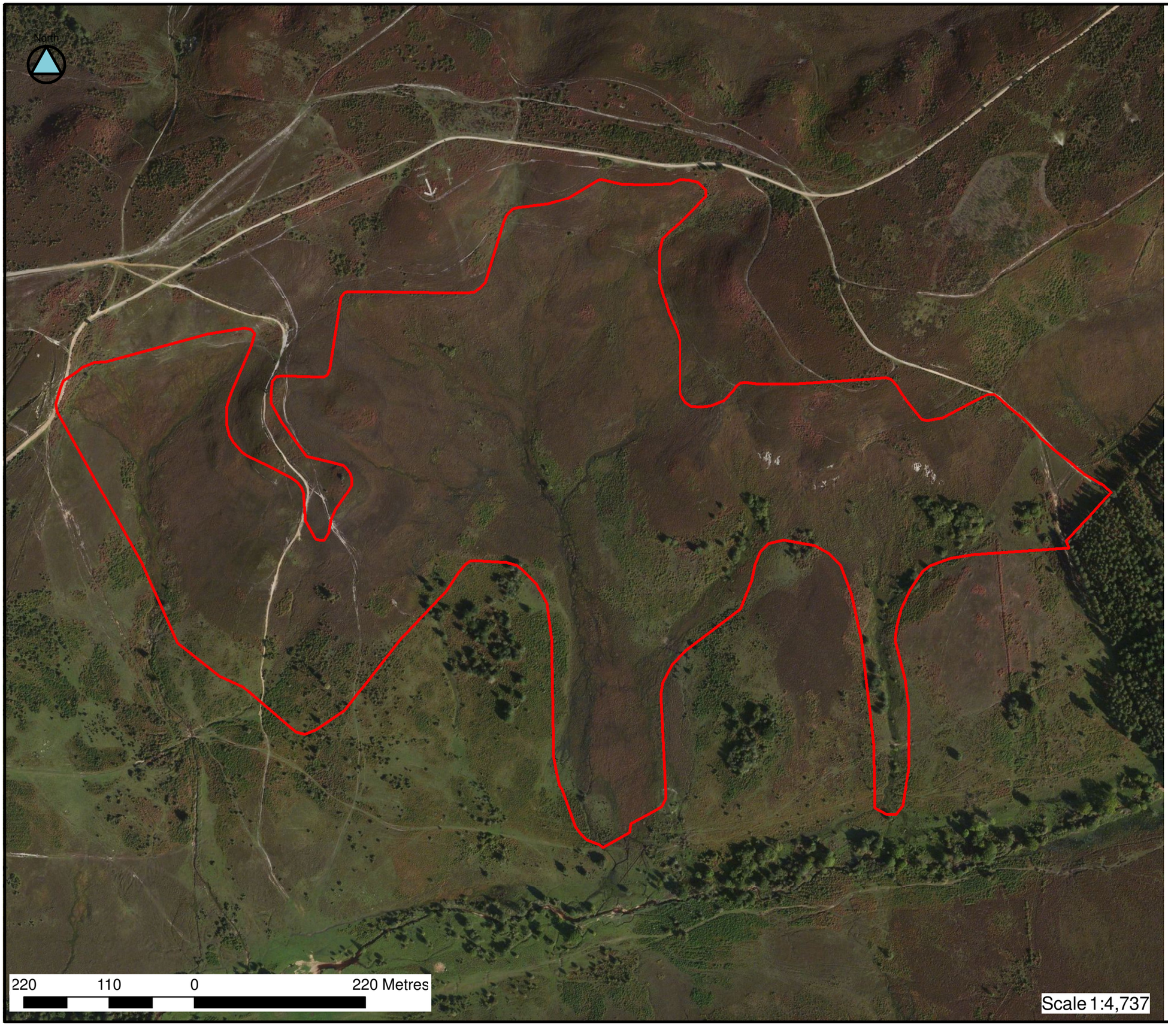
LEGEND

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 : 110

Low : 45

270 135 0 270 Metres

Scale 1:4,737

JBA consulting

MAP 3

Topography, Hydrology and Wetland Distribution

North

Hampton Ridge

H2

M16a

H2 & U5

M21a

M21a

M16a

M16a

H2

M24

M24

M24 & M16a

M24 & Lawn

M24

250 125 0 250 Metres

Scale 1:4,500

LEGEND

- Ecohydrological Assessment Area
- G2.3
- A1.1.1
- A1.2.2
- A1.3.2
- A2.1
- A2.2
- B1.1
- B5
- C1.1
- D1.1
- D2
- D5
- D6
- E3.1
- E3.2
- J4

JBA consulting

MAP 4

Phase One Habitat

North

Hampton Ridge

Thompson's Castle

Lay Gutter Valley

Latchmore Bottom

Latchmore Brook

Latchmore Shade

200 100 0 200 Metres

Scale 1:4,737

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

Hampton Ridge

SELSEY SAND FORMATION - SAND, SILT AND CLAY

Thompson's Castle

Lay Gutter Valley

POOLE FORMATION - SAND, SILT AND CLAY

Latchmore Bottom

Latchmore Brook

Latchmore Shade

200 100 0 200 Metres

Scale 1:4,737

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

Hampton Ridge

Thornbury Castle

Lay Gutter Valley

Lindmore Horcum

Lindmore Beck

200 100 0 200 Metres

Scale 1:4,737

LEGEND

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

Drift Hydrogeology

- Aquifer
- Aquifer/Aquitard
- Aquitard

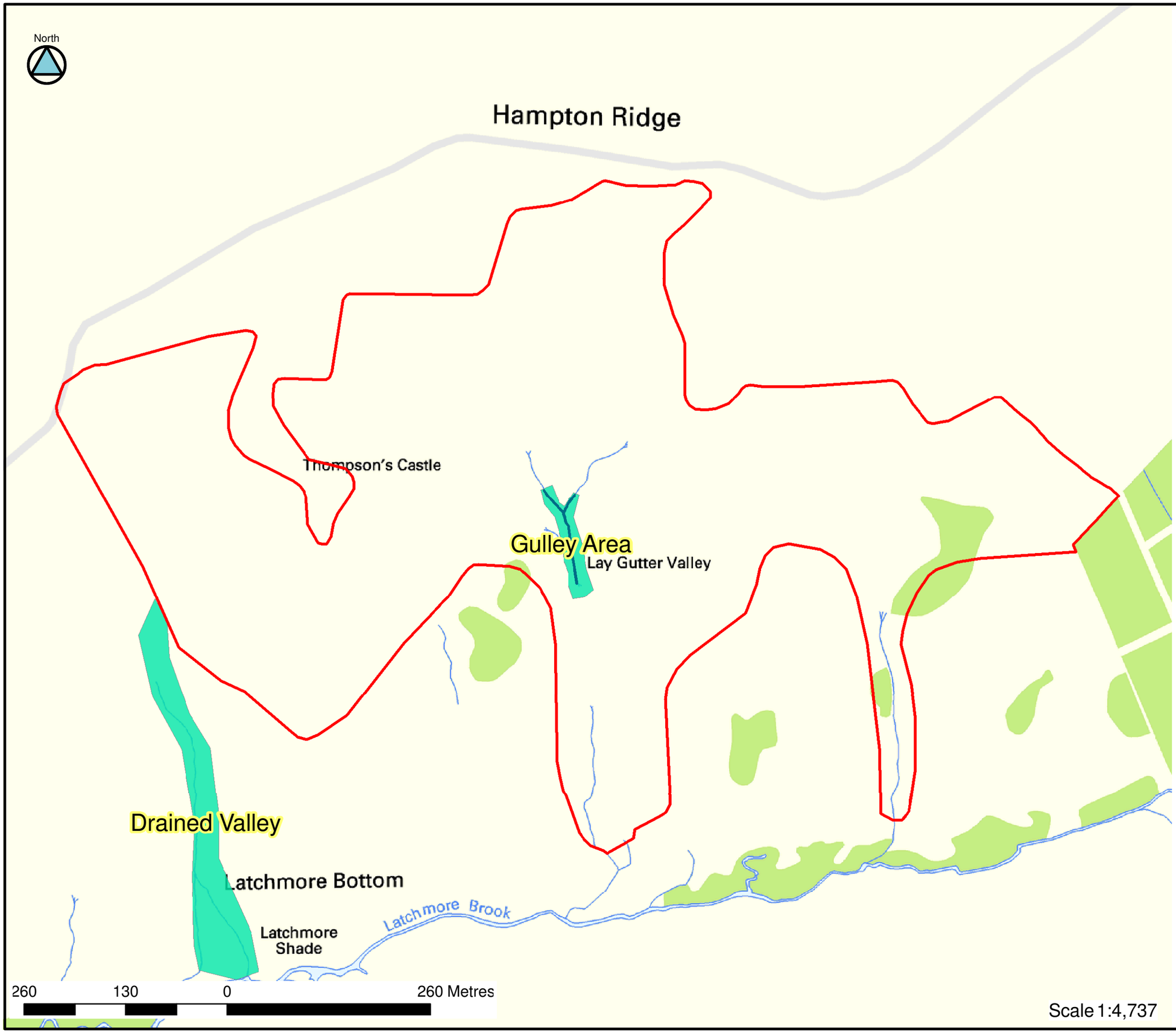
Bedrock Hydrogeology

- Aquifer
- Aquifer/Aquitard
- Aquitard

JBA consulting

MAP 7

Eco-hydrology



LEGEND

- Ecohydrological Assessment Area
- Drainage
- Restoration Areas

JBA consulting

MAP 8

Restoration Plan