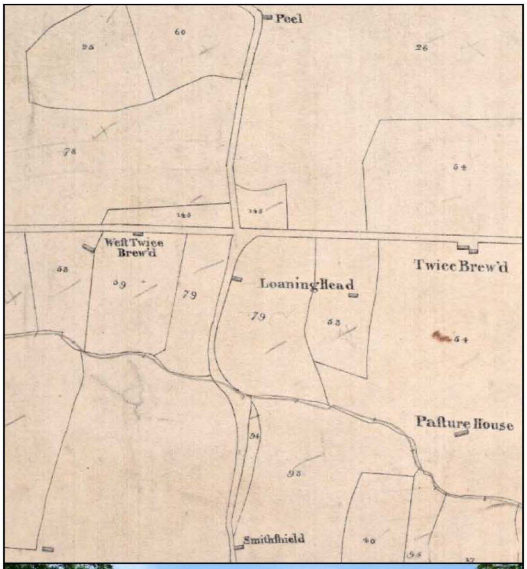


THE SILL PROJECT, ONCE BREWED, NORTHUMBERLAND

Conservation Management Plan: Appendices 1 and 3-7

oxfordarchaeology
northnorthnorth
Oxford Archaeology North

May 2014

NORTHUMBERLAND NATIONAL PARK AUTHORITY

Issue No: 2013–14/1449
OA North Job No: L10627
NGR: NY 75248 66892

APPENDIX 1: GAZETTEER OF SITES

Site Number **1**
Site Name Gate Stoup
NGR NY 75312 66915
Period Post-medieval
Photograph(s) 6873.jpg and 6959.jpg
Description A single stone gate stoup located on the south side of the farm gate into the eastern field.

Site Number **2**
Site Name Quarry
HER No. 1408114
NGR NY 75333 66939
Period Post-medieval
Photograph(s) 6875.jpg , 6878.jpg and 6885.jpg
Source Walkover survey; Armstrong's map of 1769
Description A sub-rectangular area of shallow quarrying located adjacent to the crossroads that has disturbed the western end of the Vallum mound (***3***). The east side of the quarry scoop is defined by a small stub of earthen bank that was identified by the NMP aerial photographic interpretation. Overall the site measures approximately 35m by 18m. This area may also have been disturbed as a result of the construction and subsequent removal of two buildings (Sites **56** and **57**), which were depicted on Armstrong's map of 1769.

Site Number **3**
Site Name Vallum Earthworks, East of Crossroads
SM No. 26061
HER No. 1408072
HER No. 6545
NGR NY 75398 66963
Period Roman
Photograph(s) 6886.jpg – 6893.jpg and 6904.jpg – 6906.jpg
Description The Vallum between the road to Steel Rigg car park and the road in Caw Gap in wall miles 39, 40 and 41. The earthwork was defined by the NMP aerial photographic interpretation. The earthwork survives within the development area up to 6m wide by over 1.5m in height. The western end is disturbed at the crossroads by a quarry (***2***), the eastern end has been cut through by the route of a post-medieval trackway (***35***), adjacent to a field boundary bank (***5***).

Site Number **4**
Site Name Broad Ridge and Furrow Cultivation
NGR NY 75,92 66952
Period Medieval to Post-medieval
Photograph(s) 6893.jpg and 6899.jpg-6902.jpg
Description A small sub-rectangular area of broad ridge and furrow cultivation in the northern end of the eastern development field. It measures approximately 0.08 hectares, is located abutting the south side of the Vallum mound (***3***), is of a north/south orientation and survives as shallow 7m wide ridges. The edge of the cultivation was picked out as a wavy line on the edge of the Vallum earthwork by the NMP aerial photographic interpretation.

Site Number **5**
Site Name Boundary Bank
HER No. 1408114
NGR NY 75469 66,930
Period Post-medieval
Photograph(s) 6914.jpg, 6919.jpg , 6924.jpg and 6932.jpg
Source Walkover survey; geophysical survey
Description A linear section of field boundary bank orientated roughly NNW/SSE on the eastern edge of the eastern development field. It was identified by the NMP aerial photographic interpretation. The boundary is separated from the boundary surrounding the field to the east (***6***) by a deep ditch. A linear positive magnetic response identified by the geophysical survey in this area is likely to represent this boundary (see Site **64**).

Site Number **6**
Site Name Boundary Bank
HER No. 1408114
NGR NY 75488 66754
Period Post-medieval
Photograph(s) 6940.jpg – 6941.jpg
Description A linear section of field boundary bank orientated roughly N/S on the south-eastern corner of the eastern development field. It was identified by the NMP aerial photographic interpretation. The boundary is separated (outside of the development area) from the boundary surrounding the field to the west (***5***) by a deep ditch.

Site Number **7**
Site Name Hollow Way/ Trackway
NGR NY 75347 66719
Period ?Post-medieval
Photograph(s) 6950.jpg – 6952.jpg
Description A short section of NNE/SSW orientated hollow way located on the south-west corner of the eastern development field. It survives in the development area as a very shallow ploughed-out linear feature. In the field to the south it is a well-defined feature that can be observed on aerial

photographs (but was not recorded in the NMP aerial photographic interpretation).

Site Number **8**
Site Name Clearance Cairn
NGR NY 75305 66802
Period Modern
Photograph(s) 6955.jpg – 6956.jpg
Description A machine-dumped clearance cairn piled against the boundary wall on the western edge of the eastern development field.

Site Number **9**
Site Name Boundary Bank
NGR NY 75301 66841
Period Post-medieval
Photograph(s) 6957.jpg – 6958.jpg
Description A linear section of field boundary bank orientated roughly N/S on the west side of the eastern development field. The boundary consists of a 0.5m-0.75m deep lynchet falling away to the modern field wall on the west side. There are several mature trees on top of this boundary. The feature may be a continuation to the sunken lane (***31***) located further to the south.

Site Number **10**
Site Name Narrow Ridge and Furrow Cultivation
HER No. 1402652
NGR NY 75246 66811
Period Post-medieval
Photograph(s) 6971.jpg , 6985.jpg, and 6987.jpg
Source Walkover survey; geophysical survey
Description An 0.16 hectare area of N/S orientated narrow ridge and furrow cultivation identified by the NMP aerial photographic interpretation in the western development field. The subtle cultivation features could not be observed on the ground during the present walkover survey. Positive magnetic linear responses identified from the geophysical survey appear to correspond with the ridge and furrow and the relatively weak responses suggest that the earthworks have been subsequently ploughed over.

Site Number **11**
Site Name Boundary Bank
HER No. 1408114
NGR NY 75220 66808
Period Post-medieval
Photograph(s) 7046.jpg – 7047.jpg
Source Walkover survey; geophysical survey
Description A linear section of field boundary bank orientated roughly NW/SE on the west side of the western development field. It was identified by the NMP aerial photographic interpretation. The boundary defines the west edge of an area of narrow ridge and furrow cultivation (***10***). A linear positive magnetic response identified by the geophysical survey in this area is likely to represent this boundary (see Site **59**).

Site Number **12**
Site Name Boundary Bank
HER No. 1408114
NGR NY 75240 66787
Period Post-Medieval
Photograph(s) 6986.jpg
Source Walkover survey; geophysical survey
Description A slightly curvilinear section of field boundary bank orientated roughly W/E in the north end of the western development field. It was identified by the NMP aerial photographic interpretation. The boundary defines a boundary between two areas of narrow ridge and furrow cultivation (***10*** and ***13***). A curving band of magnetic enhancement identified by the geophysical survey probably represents the remains of the bank.

Site Number **13**
Site Name Narrow Ridge and Furrow Cultivation
HER No. 1402652
NGR NY 75258 66749
Period Post-medieval
Photograph(s) 6989.jpg
Source Walkover survey; geophysical survey
Description An 0.30 hectare area of N/S orientated narrow ridge and furrow cultivation identified by the NMP aerial photographic interpretation in the western development field. The subtle cultivation features could not be observed on the ground during the present walkover survey. Positive magnetic linear responses identified from the geophysical survey appear to correspond with the ridge and furrow and the relatively weak responses suggest that the earthworks have been subsequently ploughed over.

Site Number **14**
Site Name Quarry
NGR NY 75294 66734
Period Post-medieval
Photograph(s) 7001.jpg – 7002.jpg
Description A shallow D-shaped quarry scoop or relict field entrance located on the eastern field boundary of the western development field. It measures approximately 5m by 4m and up to 0.5m deep.

Site Number **15**
Site Name Boundary Bank
NGR NY 75257 66715
Period Post-medieval
Photograph(s) 6995.jpg – 6996.jpg and 7000.jpg
Description A linear section of field boundary bank orientated roughly W/E in the centre of the western development field. It was not identified by the NMP aerial photographic interpretation. The boundary defines a boundary between two areas of narrow ridge and furrow cultivation (***13*** and ***16***).

Site Number **16**
Site Name Narrow Ridge and Furrow Cultivation
HER No. 1402652
NGR NY 75257 66686
Period Post-medieval
Photograph(s) N/A
Description An 0.38 hectare area of N/S orientated narrow ridge and furrow cultivation identified by the NMP aerial photographic interpretation in the western development field. The subtle cultivation features could not be observed on the ground during the present walkover survey.

Site Number **17**
Site Name Boundary Bank
HER No. 1408114
NGR NY 75259 66654
Period Post-medieval
Photograph(s) 7004.jpg – 7009.jpg
Description A linear section of field boundary bank orientated roughly W/E on the south end of the western development field. It was identified by the NMP aerial photographic interpretation. The boundary defines the southern edge of an area of narrow ridge and furrow cultivation (***16***).

Site Number **18**
Site Name Water Smoot
NGR NY 75209 66713
Period Post-medieval
Photograph(s) 7039.jpg – 7041.jpg
Description An arched stone water smoot set into the N/S orientated walled field boundary crossing the beck on the western edge of the western development field.

Site Number **19**
Site Name Boundary Bank
HER No. 1408114
NGR NY 7,215 66677
Period Post-medieval
Photograph(s) N/A
Description A slightly curvilinear section of field boundary bank orientated roughly N/S on the west end of the western development field. It was identified by the NMP aerial photographic interpretation. The boundary defines the western edge of an area of narrow ridge and furrow cultivation (***16***).

Site Number **20**
Site Name Boundary Bank
HER No. 1408114
NGR NY 75269 66631
Period Post-medieval
Photograph(s) 7024.jpg-7026.jpg
Description A linear section of field boundary bank orientated roughly NNW/SSE on the south end of the western development field. It was identified by the NMP aerial photographic interpretation.

Site Number **21**
Site Name Disturbed Ground
NGR NY 75315 66624
Period Modern
Photograph(s) 7015.jpg – 7016.jpg
Description A sub-rectangular slightly sunken area of disturbed ground located in the south-east corner of the western development field. It measures approximately 20m by 9m. The site was not depicted on the NMP aerial photographic interpretation but a modern rectangular structure is possibly depicted on the aerial photography.

Site Number **22**
Site Name Mound
NGR NY 75282 66618
Period Unknown
Photograph(s) 7017.jpg-7020.jpg
Description A small oval turf-covered mound located in the south end of the western development field. It measures approximately 5.5m by 3.5m. There is no obvious stone within the construction of the earthwork.

Site Number **23**
Site Name Clearance Cairn
NGR NY 75268 66608
Period Modern?
Photograph(s) 7022.jpg
Description A machine-dumped clearance cairn located on the edge of slope down into the stream on the south side of the western development field.

Site Number **24**
Site Name Boundary Stone
NGR NY 75214 66775
Period Post-Medieval
Photograph(s) 7044.jpg – 7045.jpg
Description A small uninscribed rectangular boundary stone located near the east bank of the stream in the western development field.

Site Number **25**
Site Name Spoil Mound
NGR NY 75,234 66865
Period Modern?
Photograph(s) 7048.jpg – 7049.jpg
Description A large sub-oval spoil mound located in a small wooded area immediately to the south of the Youth Hostel and adjacent to the Visitor Centre car park. The site is probably spoil cleared in construction of the buildings or car park but the present vegetation cover precluded more detailed investigation. A nearby sign indicated

that the woodland was planted in 1992.

Site Number **26**
Site Name Vallum Earthworks, West of Crossroads
SM No. 26063
HER No. 6677
NGR NY 75398 66963
Period Roman
Photograph(s) 7051.jpg – 7078.jpg

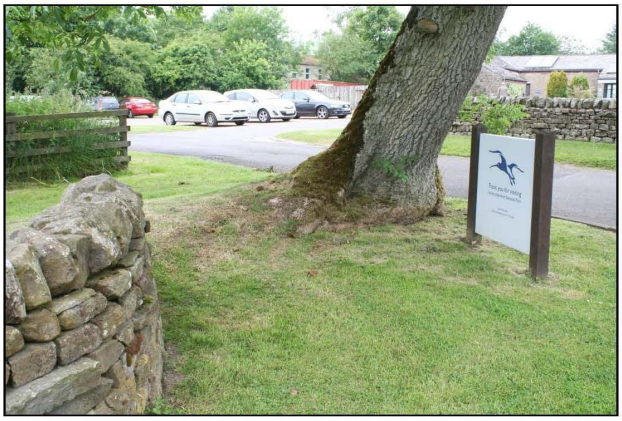
Description The Vallum between the road to Steel Rigg car park and the road in Caw Gap in wall miles 39, 40 and 41. The earthwork was not defined by the NMP aerial photographic interpretation as it lay within woodland in the Scheduled Monument area on the north side of the Youth Hostel. The earthwork survives within the development area up to 6m wide by over 1.5m in height. The western end of the Vallum mound is truncated near to the car park of the Twice Brewed Inn (cleared away by the farmer in the 1950s – Twice Brewed owner, *pers comm*) but continues to the east into the curtilage of the Youth Hostel. The earthwork on the north side of the Youth Hostel tapers slightly and becomes narrower as it runs further to the east and peters out as a visible earthwork feature next to the Youth Hostel car park. This end will have been cleared during the construction of the original 1934-dated Youth Hostel (***41***).

Site Number **27**
Site Name Garden/Pinfold
NGR NY 75322 66967
Period Post-medieval
Photograph(s) 7086.jpg – 7087.jpg, 7092.jpg, 7099.jpg – 7101.jpg, 7104.jpg and 7109.jpg-7110.jpg

Description An extant rectangular garden or pinfold enclosure located on the north-west corner of the crossroads to the north of the development. The drystone walled structure was shown on the OS 1859-62 mapping and was probably associated with the demolished Lane End house (***43***) on the opposite side of the road. It has a narrow gateway on the south side (***28***) and contains extant Vallum earthworks beneath scrubby woodland (***29***).

Site Number **28**
Site Name Gate stoup
NGR NY 75300 66952
Period Post-medieval
Photograph(s) 7105.jpg-7107.jpg
Description A narrow gateway giving access to the south side of a garden/pinfold enclosure (27). It consists of a pair of small quarried stone stoups.

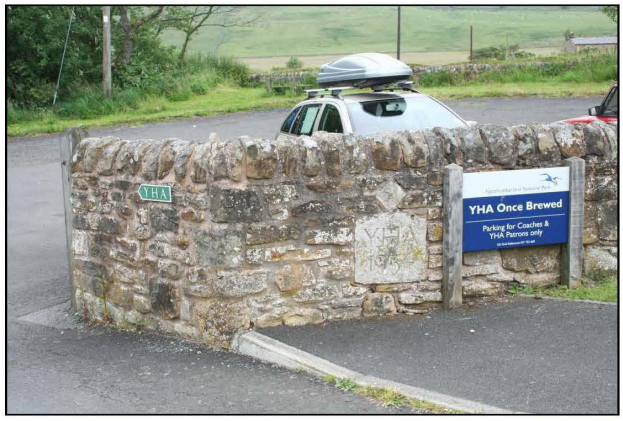
Site Number **29**
Site Name Vallum Earthworks, West of Crossroads
SM No. 26063
HER No. 6677
NGR NY 75309 66965
Period Roman
Photograph(s) 7104.jpg and 7109.jpg
Description The Vallum between the road to Steel Rigg car park and the road in Caw Gap in wall miles 39, 40 and 41. The extant earthworks of the Vallum ditch and northern mound found within the pinfold enclosure (***27***) on the north side of the crossroads on the Military Road. The mound survives up to 6m wide by 1.5m high with a slight flat berm separating it with the boggy ditched area that abuts and follows the southern wall of the enclosure.



Site Number **30**
Site Name Boundary Bank
NGR NY 75289 66832
Period Post-medieval
Photograph(s) 7134.jpg – 7135.jpg, 7137.jpg and 7139.jpg – 7140.jpg
Description A linear section of field boundary bank orientated roughly N/S on the east side of the western development field. It was not identified by the NMP aerial photographic interpretation. The boundary defines the east edge of an area of narrow ridge and furrow cultivation (***10***), and the western edge of a hollow way (***31***). The boundary disappears into a wooded area on the south end, has been landscaped adjacent to the Visitor Centre but still retains a veteran tree along its length adjacent to the car park entrance.

Site Number **31**
Site Name Lane / Hollow Way
NGR NY 75304 66728
Period Medieval to Post-medieval
Photograph(s) 7141.jpg – 7148.jpg , 7150.jpg and 7155.jpg
Description A curvilinear lane orientated roughly N/S and bisecting the two development area fields. The southern end of the feature is cut into the ground as a large and wide sunken hollow way over 2m deep as it descends the hillside towards a bridged crossing point of Brackies Burn.

Site Number **32**
Site Name Inscribed Stone
NGR NY 75296 66,911
Period Modern
Photograph(s) 7161.jpg - 7163.jpg
Description An inscribed stone slab set into the wall at the entrance to the Youth Hostel. Inscribed 'YHA 1934'. A remnant of the first Youth Hostel built on the site which opened in that year (***41***).



Site Number **33**
Site Name Commemorative Stone
NGR NY 75288 66885
Period Modern
Photograph(s) 7085.jpg
Description An inscribed stone slab commemorating the 50 year anniversary of Northumberland National Park in 2006.

Site Number **34**
Site Name Milestone
NGR NY 75355 66954
Period Post-medieval
Photograph(s) N/A
Description The site of a removed milestone originally located on the south side of the Military Road. It is depicted on all epochs of historic OS mapping 'Carlisle 24 miles, Newcastle 32 miles' up until at least the 1980s OS mapping.

Site Number **35**
Site Name Trackway
NGR NY 75460 66969
Period Post-medieval
Photograph(s) N/A
Description The site of a short NW/SE-orientated section of trackway that would have originally run upslope from the Military Road to the building named as 'Crows Nest' on the historic OS mapping. There is an eroded area of the Vallum mound (***3***) where the trackway would have cut through to the Military Road.

Site Number **36**
Site Name Field Boundary
NGR NY 75245 66883
Period Post-medieval
Photograph(s) N/A
Description Partially removed E/W field boundary defining a plot to the west of the demolished Lane End house (***40***) that predated the 1960s Youth Hostel. It is depicted from the OS 1946 mapping and defined the east edge of an orchard where the Youth Hostel it located.

Site Number **37**
Site Name Field Boundary
NGR NY 75257 66907
Period Post-medieval
Photograph(s) N/A
Description Removed N/S field boundary defining a plot to the west of the demolished Lane End house (***40***) that predated the 1960s Youth Hostel. It is depicted on the OS 1946 and 1952 mapping.

Site Number **38**
Site Name Building
NGR NY 75272 66894
Period Modern
Photograph(s) See Building Assessment
Description The Northumberland National Park Visitor Centre. A rectangular single storey sandstone structure with wooden clad garage on the western end and two small southern wings facing onto a modern car park. The original rectangular section of the building was depicted on the 1976 OS mapping with the wing extensions built at a later date. There is a commemorative stone located to the east of the entrance (***33***).

Site Number **39**
Site Name Building
NGR NY 75240 66907
Period Modern
Photograph(s) See Building Assessment
Description Once Brewed Youth Hostel, built in the 1960s to replace an earlier structure (***41***). The core of the building consists of a N/S-orientated two-storey concrete slab-constructed dormitory building with a flat-roofed single-storey eastern wing (including school rooms). A probable later single-storey glass-fronted entranceway/corridor on the eastern wing and a much later two-storey western dormitory wing with a probable manager's residence on the western end.

Site Number **40**
Site Name Site of Building
NGR NY 75297 66937
Period Post-medieval
Photograph(s) 7080.jpg – 7082.jpg
Description The site of a demolished cottage/farmhouse located on the south-west side of the crossroads and in the north-east corner of the western development field. The site was originally depicted as a rectangular building called 'Pasture House' on the 1859-62 OS mapping with a small attached smithy on the western end. In later editions of the historic mapping the building is called 'Lane End'. The site was demolished by the 1976 OS mapping and is now part of the Youth Hostel Car Park.

Site Number **41**
Site Name Site of Building
NGR NY 75283 66932.
Period Post-medieval to modern
Photograph(s) 7080.jpg – 7082.jpg
Description The site of the original demolished Youth Hostel located on the south-west side of the crossroads and in the north-east corner of the western development field. The site was originally depicted as a T-shaped building built on the western end of the cottage/farmhouse of 'Lane End' in 1934. There is a surviving commemorative date stone located at the entrance to the modern Youth Hostel Car Park (***32***). The site was demolished by the 1976 OS mapping and is now part of the Youth Hostel Car Park.

Site Number **42**
Site Name Loaning Head
NGR NY 75,315 66862
Period Post-medieval
Photograph(s) N/A
Source Fryer 1820; Greenwood 1828; Sopwith 1837 (ZBL 291/06); Henshaw tithe map 1842; OS 1858
Description The site of demolished farm buildings located on the west side of the eastern field. The farm was named Loaning Head and buildings were shown in this location on numerous historic maps from 1820, 1828, 1837, and 1842. The site was depicted as an un-named rectangular roofed building on the 1858 OS mapping. This structure was demolished before later editions of the historic mapping.

Site Number	**43**
Site Name	The Vallum between the road to Steel Rigg car park and the road in Caw Gap. Wall miles 39, 40, and 41
HER No.	6545
NGR	NY 7532 6694 to NY 7267 6669
Period	Roman
Stat. Designation	Scheduled Monument 26063
Photograph(s)	N/A
Sources	HER
Description	This portion of the monument lies between the western side of the road to Steel Rigg car park, at the east, and the western side of the road to Caw Gap, at the west. The Vallum follows an almost level course throughout this section in the low ground to the south of Winshields Crags and north of the ridge that carries the Stanegate Roman road. The Vallum survives well and is visible as an upstanding earthwork. The ditch averages 1m in depth, while the northern and southern mounds, which have been substantially reduced, average 0.3m in height. Near Shield on the Wall, the ditch has a maximum depth of 2m and the north and south mounds are 1m high. At Twice Brewed, the B6318 overlies the Vallum, running between the ditch and the southern mound. Parts of the northern mound and ditch here have been destroyed by quarrying. About 1km west of Whinshields farm a building platform is recessed into the Vallum. At Whinshields farm the southern mound and ditch have been destroyed by the farm buildings that overlie them. A watching brief at Once Brewed in 2008 encountered a well-constructed metalled surface overlying a substantial sandstone foundation. The surface was aligned NNW-SSE, parallel to the Vallum ditch, and ran along the northern berm. It was thought likely to be of Roman origin. Significant information relating to the development of the frontier system will be preserved within the fabric of the monument.

Site Number	**44**
Site Name	The Vallum between the field boundary west of turret 37a and the road to Steel Rigg car park. Wall miles 37, 38, and 39
HER No.	6677
NGR	NY 7807 6812 to NY 7531 6690
Period	Roman
Stat. Designation	Scheduled Monument 26061
Photograph(s)	N/A
Source	HER
Description	The Vallum survives well as an upstanding earthwork throughout most of this section. Where extant, the north mound averages 1.7m high, the south mound 1m high, and the ditch 1.2m deep. Between High Shield and Twice Brewed, the B6318 road overlies parts of the Vallum. Where the road runs along the line of the Vallum it occupies the southern berm, which has resulted in some disturbance to the monument. To the south of Hotbank Crags, the remains of the Vallum have been reduced and the ditch has silted up, although its course can still be traced. The line of the Vallum can be traced in the line of some later terraces. South of Bradley Farm, ploughing has largely removed the Vallum, but south of Milking Gap it survives as well-defined banks and ditches. The Vallum turns away from the crags and forms a straight section 1.8km long. Significant information relating to the development of the frontier system will be preserved within the fabric of the monument.

Site Number	**45**
Site Name	Twice Brewed Roman temporary camp
HER No.	6571
NGR	NY 7509 6675
Period	Roman
Stat. Designation	Scheduled Monument 26017
Photograph(s)	N/A
Source	HER
Description	This Roman temporary camp has three gates, all of which have with traverses. Little of the northern side and north-eastern angle are visible, for traces of the ditch approaching the north-west angle. The sides are not quite at right angles and its condition is rather poor. The remains are so reduced as to make the camp not easily distinguishable under pasture. The camp is located at the eastern end of a spur. Good natural protection is provided on the northern and eastern sides where steep slopes drop

away to a deep gully. To the south there is a gentle slope down to the Brackies Burn. For most of its circuit the rampart survives as an outer scarp. As the defences are so eroded on the north side and at the north east corner it is difficult to ascertain the exact size of the camp or whether there was a gateway on this side. The camp must have measured approximately 145m internally from east to west by approximately 100m north to south, enclosing an area of approximately 1.4ha. The defences are best preserved at the south east corner where the external face of the rampart reaches a height of 0.6m. At the southern end of the east side a ditch measures 0.2m in depth. Gateways were situated in the eastern, western and southern sides, though the one on the west side is no longer visible due to ploughing. The gateway on the southern side exists as a slight break, 5m wide, about 60m from the south east angle. An external defensive bank lies 12m outside it. The eastern gateway is centrally placed and is visible as a break 6m wide. Remains of an external defensive bank are located 6m outside the eastern gateway. Faint traces of ridge and furrow, aligned north to south, are visible running across the monument. The camp, which is now in improved pasture, has been extensively ploughed in modern times. The rarity of temporary camps, and in particular examples with upstanding remains, means that they are nationally important.

Site Number **46**
Site Name Seatsides 2 Roman Temporary Camp
HER No. 6572
NGR NY 7525 6647
Period Roman
Stat. Designation Scheduled Monument 26008
Photograph(s) N/A
Source HER
Description This Roman temporary camp has four gates, with good traverses on the east, south, and west, but the presence of a traverse is very doubtful to the north. The camp is situated on a shelf on a hillside on the southern side of the Brackies Burn and encloses an area of 3.4ha. The remains are greatly reduced and the camp is not easily distinguishable under pasture. Although somewhat eroded throughout its length, the rampart is generally well preserved, except along the western side where it only stands to about 0.2m high. Elsewhere, the rampart averages 0.5m in height above the bottom of its external ditch. Later drainage, both natural and artificial, has utilised the ditch of the camp, broadening it to a width of about 7m on the western side and cutting across the causeways of the gateways on the eastern, western and southern sides. The north gateway is marked only by a gap in the ramparts, but an external defence survives at each of the other three gateways. Within the interior, towards the south-eastern corner, there is a small flat-topped mound, 6m in diameter and 0.3m in height. Although cut by a modern drain it is unlikely to be earlier than the narrow ridge and furrow that overlays this half of the camp. The rarity of temporary camps, and in particular examples with upstanding remains, means that they are nationally important.

Site Number **47**
Site Name Quarry on line of the Vallum
HER No. 12316
NGR NY 7515 6695
Period Post-medieval
Photograph(s) N/A
Source HER
Description A post-medieval quarry, which is visible on aerial photographs, has removed a section of the Vallum.

Site Number **48**
Site Name West Twice Brewed
HER No. 13712
NGR NY 75025 66837
Period Post-medieval
Photograph(s) N/A
Source HER; Armstrong 1769; Greenwood 1828; Henshaw tithe map of 1842 (DT 233L); OS 1858; OS 1859-62; OS 1895a; OS 1895b; OS 1921-2
Description This is a late-eighteenth to early-nineteenth century farmhouse and barn. It is built of stone with a stone-flagged roof on the house and a Welsh slate roof on the barn. It is small and has been relatively unaltered. There are two stories and two bays with a central doorway. The door and windows are of

twentieth-century date but set within earlier openings. The house has a fine, steeply-pitched stone roof. The history of variants of the name 'Twice Brewed' as applied to local buildings is complex and the current West Twice Brewed has been renamed in the past. Armstrong's map of 1769 showed two buildings labelled as 'Twice Brew'd Ale (sic)'. One of these may have been Site **48** and the other may have been the current Twice Brewed public house (Site **55**). Greenwood's map of 1828 labelled the area of these buildings 'Old Twice Brewed' and the name 'Twice Brewed' had been applied to a cluster of buildings lying beyond the eastern boundary of the study area. A building in the location of the current Twice Brewed public house (Site **55**) appeared to be named 'West Twice Brewed' on the tithe map of 1842. Site **48** was known as Low Winshield on the OS maps of 1858, 1859-62, and the OS 6" to 1 mile map of 1895. Site **48** was shown as West Twice Brewed from the production of the 25" to 1 mile OS map of 1895 onwards. The maps of 1858 and 1895 (OS 1858; OS 1895) showed the current Twice Brewed building (Site **55**) as a public house but, by 1896 (OS 1896), West Twice Brewed (Site **48**) was shown as the public house. However, by 1921-2 (OS 1921-2), the current Twice Brewed (Site **55**) was named and shown as the public house.

Site Number **49**
Site Name Bank Head Shields/Crow's Nest
HER No. 24651
NGR NY 75580 66882
Period Post-medieval
Photograph(s) N/A
Source HER; Henshaw tithe map of 1842 (DT 233L); OS 1859-62
Description The foundations of a sub-rectangular building are defined by low turf-covered banks. It measures about 15m by 9m and is aligned on a bank boundary to the north which forms part of an extensive field system. Photographs dating to 1930 show a roofed building, probably a barn, in this spot. A building was depicted on the tithe map of 1842 and this plot was named as Bank Head Shields in the accompanying schedule. The OS maps (OS 1859-62) named the building, which was accessed by a trackway from the military road (Site **52**).

Site Number **50**
Site Name Sow Kiln at Once Brewed
HER No. 24652
NGR NY 75068 66909
Period Post-medieval
Photograph(s) N/A
Source HER
Description A circular earthwork is marked by a shallow ditch measuring less than 10m in diameter. It probably represents the site of a 'sow' or lime kiln and is visible on air photographs. It is located just to the west of a further group of sow kilns and associated limestone quarries and is cut into the northern mound of the Vallum.

Site Number **51**
Site Name Sow Kilns and limestone quarries at Once Brewed
HER No. 24653
NGR NY 75408 67038
Period Post-medieval
Photograph(s) N/A
Source HER
Description This site is a circular earthwork in the form of a shallow ditch less than 10m in diameter. It probably represents the site of a sow kiln. A series of quarries with a number of closely located embanked, circular 'sow' or lime kilns of post-medieval date, are visible as earthworks on aerial photographs. The quarries extend for a distance of about 475 metres. Some six 'sow' or lime kilns are visible and are defined by slight circular banks and range in diameter from 6m to 9m.

Site Number	**52**
Site Name	General Wade's military road
HER No.	-
NGR	NY
Period	Post-medieval
Photograph(s)	N/A
Source	Young *et al* 2003; Armstrong 1769
Description	The Newcastle to Carlisle Military Road was constructed between 1751 and 1759 by General Wade following the Jacobite rebellion of 1745, during which the movement of troops across the country had proved difficult (Young *et al* 2003, 316). In the central section of the Wall, the Military Road follows the lower-lying land to the south of the Wall, close to the Vallum, and at Once Brewed the road runs along the ditch of the Vallum. Armstrong's map of 1769 showed the military road as 'New Military Road'.

Site Number	**53**
Site Name	Medieval Ridge and Furrow
HER No.	-
NGR	NY
Period	Medieval
Photograph(s)	N/A
Source	NMP
Description	The National Mapping Programme (NMP) identified evidence of broad ridge and furrow, which may date to the medieval period, from aerial photographs.

Site Number	**54**
Site Name	Hadrian's Wall World Heritage Site (UNESCO)
HER No.	-
NGR	NY
Period	Roman
Photograph(s)	N/A
Source	Hadrian's Wall Trust 2008
Description	Hadrian's Wall was inscribed as a World Heritage Site (WHS) by the United Nations Educational, Scientific and Cultural Organisation (UNESCO) in 1987 as the most complex and best preserved of the frontiers of the Roman Empire. Since 2005, Hadrian's Wall has formed a part of the wider Frontiers of the Roman Empire World Heritage Site, which includes the German Limes and, since 2008, the Antonine Wall. The complex of archaeological remains comprising Hadrian's Wall is among the best known and best surviving examples of a Roman frontier in design, concept and execution. Largely built in the decade AD 120-130, it served as the Empire's north-west frontier for nearly 300 years except for a period of approximately 20 years, when the frontier reached to the Forth- Clyde isthmus with the construction of the Antonine Wall. It is of significant value in its scale and identity, the technical expertise of its builders and planners, its documentation, survival and rarity, and in its cultural, educational and economic contribution to today's world. It is also the most extensively researched Roman frontier. Work on the Wall, particularly in the nineteenth and early twentieth centuries, provided the motivation and techniques for the development of frontier studies in many other countries. World Heritage Sites are places judged to be of universal importance to humanity, and are recognised by their listing under the terms of the UNESCO 1972 World Heritage Convention3. This encourages the identification, protection and preservation of cultural and natural heritage around the world that has been identified as meeting one or more of UNESCO's criteria for Outstanding Universal Value (OUV). The OUV must inform the discussion, formulation, review and implementation of the management of the site.

Site Number	**55**
Site Name	Twice Brewed Public House
HER No.	-
NGR	NY 75094 66886
Period	Post-medieval
Photograph(s)	N/A
Source	Armstrong 1769; Greenwood 1828; Henshaw tithe map of 1842 (DT 233L); OS 1858; OS 1859-62; OS 1895a; OS 1895b; OS 1921-2
Description	The first map to have shown a building on the site occupied by the Twice Brewed was Armstrong's map of 1769. The history of variants of the name 'Twice Brewed' as applied to local buildings is complex and the current Twice Brewed has been renamed in the past. Armstrong's map of 1769 showed two buildings labelled as 'Twice Brew'd Ale (sic)'. One of these may have been Site **48** and the other may have been the current Twice Brewed public house (Site **55**). Greenwood's map of 1828 labelled the area of these buildings 'Old Twice Brewed' and the name 'Twice Brewed' had been applied to a cluster of buildings lying beyond the eastern boundary of the study area. A building in the location of Site **55** appeared to be named 'West Twice Brewed' on the tithe map of 1842 and the current West Twice Brewed (Site **48**) was known as Low Winshield on the OS maps of 1858, 1859-62, and the OS 6" to 1 mile map of 1895, but was shown as West Twice Brewed from the production of the 25" to 1 mile OS map of 1895 onwards. The maps of 1858 and 1895 (OS 1858; OS 1895) showed the current Twice Brewed building (Site **55**) as a public house but, by 1896 (OS 1896), West Twice Brewed (Site **48**) was shown as the public house. However, by 1921-2 (OS 1921-2), the current Twice Brewed (Site **55**) was named and shown as the public house.

Site Number	**56**
Site Name	Building
HER No.	-
NGR	NY 75321 66941
Period	?Post-medieval
Photograph(s)	N/A
Source	Armstrong 1769
Description	Armstrong's map of 1769 showed two buildings (Sites **56** and **57**) to the southern side of the military way, to the east of the crossroads within the CMP area. These buildings do not appear to correspond with any buildings shown on later mapping.

Site Number	**57**
Site Name	Building
HER No.	-
NGR	NY 75331 66944
Period	?Post-medieval
Photograph(s)	N/A
Source	Armstrong 1769
Description	Armstrong's map of 1769 showed two buildings (Sites **56** and **57**) to the southern side of the military way, to the east of the crossroads within the CMP area. These buildings do not appear to correspond with any buildings shown on later mapping.

Site Number	**58**
Site Name	Areas of magnetic debris
HER No.	-
NGR	NY
Period	Unknown
Photograph(s)	N/A
Source	Geophysical survey
Description	Three areas of magnetic 'noise' were detected within the field to the west of the road to Henshaw by geophysical survey. These deposits may have a pedological origin, such as deposits within palaeochannels, or may be man-made.

Site Number	**59**
Site Name	Linear and curvilinear features
HER No.	-
NGR	NY
Period	Unknown
Photograph(s)	N/A
Source	Geophysical survey
Description	Several linear and curvilinear responses within the field to the west of the road to Henshaw are distinguishable from adjacent occurrences of ridge and furrow as they are of higher amplitude. There is no discernible pattern to the distribution of these responses but several of them are distinctively sub-circular or L-shaped. These may be of archaeological interest, given the proximity to prehistoric and Roman heritage assets.

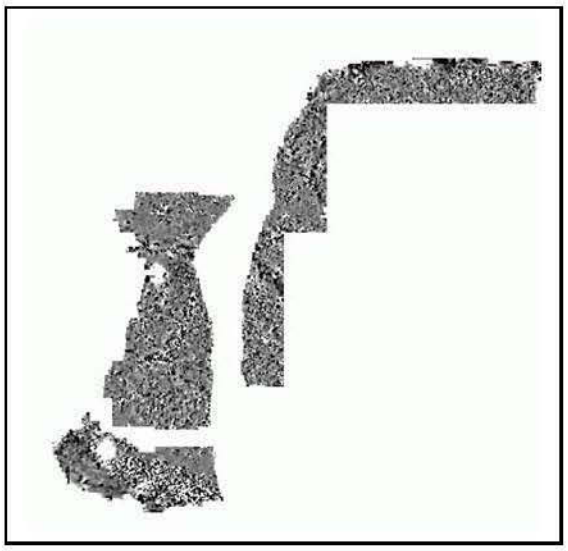
Site Number	**60**
Site Name	Linear pit or post alignment
HER No.	-
NGR	NY
Period	Unknown
Photograph(s)	N/A
Source	Geophysical survey
Description	The geophysical survey identified a line of three discrete positive magnetic responses that might be indicative of features such as pits.

Site Number	**61**
Site Name	Rectilinear pit or post grouping
HER No.	-
NGR	NY
Period	Unknown
Photograph(s)	N/A
Source	Geophysical survey
Description	The geophysical survey identified a group of six discrete positive magnetic responses that might be indicative of features such as pits. The rectilinear shape formed by the features might suggest a planned layout, although the area defined appears to be too large to represent a building.

Site Number	**62**
Site Name	Curvilinear pit or post grouping
HER No.	-
NGR	NY
Period	Unknown
Photograph(s)	N/A
Source	Geophysical survey
Description	The geophysical survey identified a group of seven discrete positive magnetic responses that might be indicative of features such as pits. The features were closely spaced and formed a curving linear shape.

Site Number	**63**
Site Name	Pit or post grouping
HER No.	-
NGR	NY
Period	Unknown
Photograph(s)	N/A
Source	Geophysical survey
Description	The geophysical survey identified a group of three discrete positive magnetic responses that might be indicative of features such as pits.

Site Number	**64**
Site Name	Linear and curvilinear features
HER No.	-
NGR	NY
Period	Unknown
Photograph(s)	N/A
Source	Geophysical survey
Description	Several linear and curvilinear responses within the field to the east of the road to Henshaw are distinguishable from adjacent occurrences of ridge and furrow as they are of higher amplitude. There is no discernible pattern to the distribution of these responses but several of them are distinctively sub-circular or L-shaped. These may be of archaeological interest, given the proximity to prehistoric and Roman heritage assets.
Site Number	**65**
Site Name	Pit or post grouping
HER No.	-
NGR	NY
Period	Unknown
Photograph(s)	N/A
Source	Geophysical survey
Description	The geophysical survey identified a group of three discrete positive magnetic responses that might be indicative of features such as pits.



The Sill Project, Once Brewed, Northumberland

Geophysical Survey

Oxford Archaeology North

August 2013

Northumberland National Park Authority

Issue No: 2013-14/1428
OA North Job No: L10627
NGR: NY 75248 66892

Document Title: THE SILL PROJECT, ONCE BREWED, NORTHUMBERLAND

Document Type: Geophysical Survey

Client Name: NORTHUMBERLAND NATIONAL PARK AUTHORITY

Issue Number: 2013-14/1428
OA North Job Number: L10627
National Grid Reference: NY 75248 66892

Prepared by: Karl Taylor
Position: Project Supervisor
Date: August 2013

Checked by: Emily Mercer
Position: Project Manager
Date: August 2013
Signed....

Approved by: Alan Lupton
Position: Operations Manager
Date: August 2013
Signed....

Oxford Archaeology North
Mill 3
Moor Lane Mills
Lancaster
LA1 1QD
t: (0044) 01524 541000
f: (0044) 01524 848606
w: www.oxfordarch.co.uk
e: info@oxfordarch.co.uk

Janus House
Osney Mead
Oxford
OX2 0EA
t: (0044) 01865 263800
f: (0044) 01865 793496

Oxford Archaeology Limited is a Registered Charity No: 285627

CONTENTS

CONTENTS **1**
SUMMARY **2**
ACKNOWLEDGEMENTS **3**
1. INTRODUCTION **4**
1.1 Circumstances of the Project 4
1.2 Location, Geology and Topography 4
1.3 Background 5
2. METHODOLOGY **9**
2.1 Project Design 9
2.2 Geophysical Survey 9
2.3 Archive 10
3. SURVEY RESULTS **11**
3.1 General Observations 11
3.2 Results 11
4. CONCLUSIONS **14**
4.1 Discussion 14
4.2 Recommendations 14
5. BIBLIOGRAPHY **15**
5.1 Secondary Sources 15
5.2 Online Sources 16
6. ILLUSTRATIONS **17**
6.1 List of Figures 17
6.2 List of Plates 17
APPENDIX 1: PROJECT DESIGN **18**

SUMMARY

The Sill Project relates to land at Once Brewed, Henshaw, Northumberland (NY 75248 66892), and is part of the partnership *The Sill: Unspoilt Landscapes, Inspiring People*, between the Northumberland National Park Authority (NNPA) and the Youth Hostel Association (YHA) (England and Wales). It was proposed that the YHA hostel and visitor centre at Once Brewed be redeveloped. The site, at the northern end, includes part of the Vallum, which is a scheduled monument (SM nos 26061 and 26063), and part of the Hadrian's Wall World Heritage Site (WHS). Therefore, being sited within an extremely rich historic landscape, a Conservation Management Plan (CMP) was required in order to inform the project proposals and to ensure the long-term conservation management of the site, as well as to provide learning and engagement opportunities.

An interim assessment report briefly setting out a summary of the current understanding of the historic environment of the CMP area and provisional recommendations for further archaeological work and mitigation, was produced by OA North in July 2013. In order to understand the archaeological sensitivities and how these may affect the designs, or how these may be mitigated, a programme of iterative archaeological works was proposed. The first stage of which was a magnetic gradiometer survey. The survey was carried out over two fields to the south of the Military Way (B6318) and either side of the north/south road to Henshaw, and identified a number of responses of both potential archaeological or pedological origin. Some of the most obvious being several responses corresponding to palaeochannels identified during the desk-based assessment and walkover survey. Spreads of magnetic debris also identified may be natural in origin, but the nature of the responses suggests that an artificial origin cannot be ruled out.

Ridge and furrow is known to have existed on the west field as evidenced by aerial photographic survey information. This was corroborated by the presence of weak linear responses on a similar alignment. Furthermore, evidence of previous field systems was found in the form of responses that correspond to former boundary banks identified during the desk-based assessment (Sites **5** and **12**).

The most enigmatic responses present were several positively magnetic linear and curvilinear responses potentially of archaeological origin. Given the rich archaeological resource in the immediate area, this is perhaps unsurprising. Numerous responses suggestive of pits were of interest, particularly as some seem to conform to specific patterns, such as a rectangular arrangement in the west field, and may be archaeological in origin.

Two buildings identified during the desk-based assessment (Sites **21** and **42**), were not detected in their presumed locations. Similarly, neither the Vallum nor any of the other features close by, such as the quarry (Site **02**), or broad ridge and furrow (Site **04**), were identified.

Recommendations for further work included those features of potential archaeological origin, such as the linear and curvilinear positively magnetic responses; responses indicative of pits; and spreads of magnetic debris be investigated further by archaeological trenching in order to determine their true nature.

ACKNOWLEDGEMENTS

Oxford Archaeology North (OA North) would like to thank Laura Sole, of the Northumberland National Park Authority for commissioning the project. Thanks are also due to Head Ranger, Paget Lazzari, and his colleagues for their kind assistance on site, together with the staff of the National Park Visitors Centre for kindly allowing OA Staff the use of their storeroom.

Karl Taylor undertook the geophysical survey and wrote the report. Karl Taylor and Mark Tidmarsh produced the drawings. Emily Mercer, who also edited the report, managed the project.

1. INTRODUCTION

1.1 CIRCUMSTANCES OF THE PROJECT

1.1.1 The Sill Project relates to land at Once Brewed, Henshaw, Northumberland (NY 75248 66892), and is part of the partnership *The Sill: Unspoilt Landscapes, Inspiring People*, between the Northumberland National Park Authority (NNPA) and the Youth Hostel Association (YHA) (England and Wales). It was proposed that the YHA hostel and visitor centre at Once Brewed be redeveloped. The site, at the northern end, includes part of the Vallum, which is a scheduled monument (SM nos 26061 and 26063), and part of the Hadrian's Wall World Heritage Site (WHS). Therefore, being sited within an extremely rich historic landscape, a Conservation Management Plan (CMP) was required in order to inform the project proposals and to ensure the long-term conservation management of the site, as well as to provide learning and engagement opportunities.

1.1.2 An interim assessment report briefly setting out a summary of the current understanding of the historic environment of the area and provisional recommendations for further archaeological work and mitigation, was produced by OA North in July 2013 (OA North 2013). In order to inform how the archaeological sensitivities may affect the designs, or how these may be mitigated, a programme of iterative archaeological works was proposed. The first stage of which was a magnetic gradiometer survey. The survey area was to include part of the Vallum in the eastern field (SM No 26061) and, therefore, scheduled monument consent was required; this was obtained by the client on behalf of OA North.

1.1.3 Following acceptance of a project design (*Appendix 1*), OA North were commissioned to carry out the survey, which was undertaken in July 2013. This report sets out the results of the geophysical survey and provides an interpretation of the results, along with recommendations for further work.

1.2 LOCATION, GEOLOGY AND TOPOGRAPHY

1.2.1 The proposed development area occupies the site of the current YHA Hostel and visitor centre at Once Brewed and car park, in addition to the field immediately to the south, and a second field to the east of the north/south road to Henshaw. The whole of the development area lies to the south of the B6318, which runs approximately west-south-west/east-north-east, with the exception of a small rectangular area defined by a possible pinfold at the north-western corner of the crossroads (Fig 1).

1.2.2 Both fields were grassed at the time of survey, and the topography sloped from north to south, whilst being highly undulated and crossed by steep stream gullies, including Brackies Burn, which defines the southern boundary of the CMP area. The survey area was bounded by post and wire fences, together with dry-stone walling, as well as post and rail fencing. The east field had been subject to mole drainage, the vertical slits being visible. The land varies across the site between approximately 200m and 226m (aOD).

1.2.3 The geophysical survey did not include the whole of the defined CMP area. It was, instead, restricted to the field to the south of the current Visitor Centre and YHA hostel, as well as a strip approximately 30m wide along the western and northern edges of the field immediately to the east of this (Fig 2). The survey technique is inhibited by magnetic street furniture, cars, live services and general magnetic 'clutter' associated with buildings, and so the area around the YHA hostel and Visitor Centre was omitted. The survey in the eastern field was restricted to areas of proposed potential impact resulting from the development. The area was reduced slightly due to the presence of overgrown areas and trees along the western boundary of the east field, as well as steep slopes in the southern and western part of the west field.

1.2.4 The local bedrock is part of the Yoredale group and comprises limestone with subordinate sandstone and argillaceous rocks (www.bgs.ac.uk). No drift geological deposits have been recorded in the CMP area, although the surrounding areas include glacial till, and peat deposits have accumulated in stream gullies (*ibid*). The underlying soils are classified as slowly permeable seasonally wet acid loamy and clayey soils (landis.org.uk).

1.3 BACKGROUND

1.3.1 The following background is a précis of the background provided by the interim desk-based assessment produced by OA North (OA North 2013), which should be read in conjunction with this report. The most prominent sites of archaeological interest in the area relate to Roman military activity, with Hadrian's Wall, the Vallum, the Stanegate, and Roman forts lying in the environs of the development area. However, this landscape was also the focus of activity both before and after the Roman occupation, with evidence from the wider area for human activity during the prehistoric period, including both Bronze-Age and Iron-Age remains, although there is no known evidence for activity within the immediate vicinity of the development area, but the potential exists for the remains of sites of varying date within the area.

1.3.2 The environs of the development area were subject to dramatic modifications and reorganisation by the Roman military. The conspicuous traces of this activity comprise forts, temporary camps, roads, and the complex of structures associated with Hadrian's Wall: the Vallum; associated ditches; turrets; milecastles; forts; and quarries. The earliest potential system of movement control along the frontier landscape consisted of the Stanegate, which was built as a strategic route rather than as a frontier (Breeze and Dobson 2000, 17), and established along the line of a road that had been built under Agricola (AD 77-84), or his successors, and ran from east to west from Carlisle to Corbridge (*op cit*, 16). Forts were established along the line of this road as early as the Flavian (AD 69-96) period. However, the Tyne-Solway isthmus did not begin to represent a Roman frontier until the later AD 90s (*op cit*, 10-14).

1.3.3 In around AD 105, a period of unrest culminated in the destruction of many of the forts to the north of the Tyne-Solway line (Daniels 1978, 5). During a visit to Britain by the Emperor Hadrian in AD 122, the decision was made to create a continuous and permanent frontier barrier from the Tyne to the Solway (*op*

cit, 26). Aulus Platorius Nepos, governor of Britain from AD 122, began construction of the Wall, which was largely completed in its initial format during the AD 120s. The wall was originally to be 10 Roman feet wide, based on a foundation of stone and puddled clay, or large flagstones. Between the North Tyne and Willowford, the Wall is largely a narrower gauge but in places it stands on foundations prepared for a broad gauge. Variations also occur in the construction of the Wall's lowest courses. West of the River Irthing the Wall was originally constructed of turf.

1.3.4 The Vallum, part of which runs through the northern portion of the CMP area, lies to the south of Hadrian's Wall. The relationship between the Wall and Vallum in certain places suggests that they were almost contemporary (Breeze and Dobson 2000, 56-7). The Vallum comprises a ditch measuring up to 6m wide and up to 3m deep, with a flat bottom some 2.5m wide. It is flanked on either side by mounds that measure 6m wide at the base, which are set back from the ditch by 'berms' that are up to 9m wide. In several places, a marginal mound has been found on the southern berm. This has been thought to be a result of the cleaning of the Vallum ditch, but recently such a mound has been proved to have been part of primary activity in the area (Wilmott and Bennett 2009). Together, the elements of the Vallum form a structure measuring up to 38.5m wide (Salway 1981, 180).

1.3.5 In AD 139 the Roman Army made a new advance into Scotland, which seemingly resulted in the virtual abandonment of Hadrian's Wall only to be re-occupied during the later AD 150s. The late second and early third centuries saw a period of continued rebuilding and modification along the Wall and, nearly a century later, a further programme of Wall restoration and modification occurred under Constantius, although nothing is known of the condition of the Vallum throughout this long period (Daniels 1978).

1.3.6 The abandonment of the Vallum in the third century allowed civilians to build up to the walls of the forts on the Wall (Breeze and Dobson 2000, 203). A native rural settlement (HER 6587), lying 1.5km to the north-east of the development area, was established between the Vallum and the Wall and comprised a rectangular stone-walled enclosure with internal stone-walled hut circles and a possible external field system. This does not appear to have been a planned settlement.

1.3.7 Leading up to the withdrawal of Roman rule from Britain in *c* AD 409, the population of the area in the vicinity of the Wall is likely to have diminished as a result of decreasing numbers of soldiers (*op cit*, 244). However, activity did continue in this area and there is evidence that elements of the Wall system, particularly some forts and even milecastles, remained in occupation beyond the formal end of Roman administration (Wilmott 1997). Activity within forts during the fifth century is attested by, several examples along the length of the wall.

1.3.8 Henshaw was a medieval manor that developed into the township of Henshaw, within which the study area lies. The current name of Henshaw is a corruption of earlier forms such as *Hethingeshalt* and *Hedeneshalgh*, and was first

recorded in the twelfth century when it was awarded by David I of Scotland to Richard Cumin and Hextilda, countess of Ethehetala (Hodgson 1840, 325).

1.3.9 Historic Ordnance Survey (OS) mapping demonstrates the presence of numerous place-names in the local area that incorporate elements similar to 'shield', such as Winshields and High Shield. This appears to attest to a predominance of shielings in the locale. A medieval shieling has been recorded 0.5km to the north of the development area, and a small building, known as Crows Nest on the historic OS mapping, was named as Bank Head Shields on the Henshaw tithe map of 1842 (DT 233L). A probable medieval farmhouse was excavated close to Hadrian's Wall, approximately 0.5km to the north of the development area. A medieval settlement and associated field systems have also been identified 1km to the north-east of the development area, and this lies close to a group of medieval shielings.

1.3.10 Evidence of cultivation during the medieval period, in the form of faint traces of associated ridge and furrow, are recorded in and around the proposed development site, particularly through the inspection of aerial photographs by the National Mapping Programme. Much of the study area, and surrounding locale, therefore, appears to have comprised open pasture during the medieval period, interspersed with farmsteads associated with land that was delineated for arable agriculture.

1.3.11 The historic township of Henshaw appears to have followed a general pattern of land use that is typical of the wider area. Settlements in this area have tended to accumulate in the portions of the township adjacent to the South Tyne and it is in this area that the nucleated villages, such as Henshaw, Melkridge, and Bardon Mill developed. The land upslope of the river appears from historic mapping to have remained as an agricultural landscape of dispersed farmsteads and open grazing lands during the post-medieval period.

1.3.12 One of the most conspicuous modifications to the immediate environs of the development area was the construction of the Newcastle to Carlisle Military Road, between 1751 and 1759. This was constructed by General Wade following the Jacobite rebellion of 1745, (Young *et al* 2005, 316). Hadrian's Wall was severely affected by the construction of the road and for some of its course the Military Road was built directly on top of it. In the central section of the Wall, the Military Road follows the lower-lying land to the south of the Wall, close to the Vallum, and at Once Brewed the road runs along the ditch of the Vallum.

1.3.13 The general character of the study area appears to have been established by the nineteenth century and the Northumberland Historic Landscape Characterisation programme describes all of the associated land to the east of the road to Henshaw, as well as the land to the south of Brackies Burn, on the western side of the road, as fieldscapes that developed as a result of piecemeal enclosure between the seventeenth and mid-eighteenth centuries. Evidence of the intensified use of the landscape for agriculture during these periods is provided by aerial photographs, the interpretation of which by the National Mapping Programme has revealed the presence of numerous field boundaries and examples of narrow ridge and furrow. This includes several examples that

lie within the development area. Many of the sites identified within the development area are of agricultural origin and date to this period.

1.3.14 Comparisons of the field boundaries recognisable from aerial photographs and the earliest detailed map of the study area, which is the Henshaw tithe map of 1842, show that by the mid nineteenth century much of the earlier network of small fields had been consolidated within larger enclosed fields. By 1842, a property called Loaning Head lay to the east of the road to Henshaw, and a property called Bank Head Shields, which would later become Crow's Nest, was shown to the east of this. A building in the location of the current Twice Brewed public house appeared to be named 'West Twice Brewed' on the tithe map, although this name was applied to the currently listed building lying to the west of this by the time of the OS mapping of 1895. By 1895 (OS 1895) West Twice Brewed was shown as a public house but by 1925 (OS 1925) the Twice Brewed was named and shown as the public house. Although the quarrying of the Vallum to the north of the military road was not depicted on the tithe mapping, this plot was described in the accompanying schedule as 'Awarded Quarries' and appears to have been owned by the Newcastle Upon Tyne and Carlisle Railway Company. Other post-medieval industrial sites are represented within the study area, with sow kilns and limestone quarries having been identified at Once Brewed. The small enclosure to the north of the Military Road was not depicted on the tithe map of 1842, but was shown on the OS mapping of 1859-62. A small house named as 'Pasture House' (Site **40**, OA North 2013) was present to the east of the current youth hostel by 1859-62 (OS 1859-62), and a small roofed building was shown close to the former location of Loaning Head, which was no longer depicted.

1.3.15 The most obvious change to the development area during the twentieth century was the addition of the original youth hostel building to the western side of Pasture House/Lane End in 1934. This had been demolished by the time of the production of the OS mapping of 1976, and had been replaced with a complex of buildings that was modified and incorporated into the current buildings on the site in the later twentieth, or early twenty-first centuries. The expansion of the youth hostel and visitor centre in the later twentieth century included the provision of additional car parks to the south of the buildings.

2. METHODOLOGY

2.1 PROJECT DESIGN

2.1.1 A project design was prepared by OA North (*Appendix 1*) and submitted to NNPA for approval. The project design was adhered to in full, and the work was consistent with the relevant standards and procedures of English Heritage (English Heritage 2008) and the Institute for Archaeologists (IfA 2011), and generally accepted best practice.

2.2 GEOPHYSICAL SURVEY

2.2.1 ***Magnetometer Survey:*** the preferred geophysical technique in the detection of many archaeological remains is a magnetometer area survey, which is effective in locating 'positively magnetic' material, such as iron-based (or 'ferrous') features and objects, or those subjected to firing, such as kilns, hearths, and even the buried remains of brick walls. This technique is also widely used to locate more subtle magnetic features associated with settlement and funerary remains, such as boundary or enclosure ditches and pits or post-holes, which have been gradually infilled with more humic material. The breakdown of organic matter through micro-biotic activity leads to the humic material becoming rich in magnetic iron oxides when compared with the subsoil, allowing the features to be identified by the technique. In addition, variations in magnetic susceptibility between the topsoil, subsoil and bedrock have a localised effect on the Earth's magnetic field. This enables the detection of features, such as silted-up or backfilled pits, due to the fact that the topsoil has more magnetic properties than the subsoil or bedrock, resulting in a positive magnetic anomaly. Conversely, earthwork or embankment remains can also be identified with magnetometry as a 'negative' feature due to the action in creating the earthwork of depositing the relatively low magnetic subsoil on top of the more magnetic topsoil. In this way, magnetometry is a very efficient technique and is recommended in the first instance by English Heritage (2008) for such investigations.

2.2.2 ***Magnetometry Equipment:*** the strength of the present geomagnetic field in Great Britain is approximately 50,000nT (nanoTeslas). Most buried archaeological features usually result in very weak changes of less than 1nT to the magnetic field (Clark 1990, 65). The instrument used for this survey was a *Bartington Grad 601-2* dual sensor fluxgate gradiometer, which has a sensitivity of 0.1nT when used in the 100nT range setting.

2.2.3 ***Sampling Interval:*** the survey area was divided into 30m x 30m grids. Magnetometry sampling was at 0.25m intervals, with inter-transect distances of 1m, equating to 3600 sample readings per grid. The survey was carried out in 'zigzag' mode, with precautions to minimise any heading error during the magnetometry survey. In total, an area of 2.511ha was surveyed (Fig 2). All survey grid nodes were staked out with canes using a Leica 1200 series RTK GPS system. Survey guidelines and traverse canes were then staked out.

2.2.4 ***Data Capture and Processing:*** data were captured in the internal memory of the instrument and downloaded to a portable computer on-site and backed-up on to a USB drive. The individual grids were combined to produce an overall

plan of the surveyed area, or 'composite'. The results were analysed and basic initial processing was carried out on-site using the software programme 'Terrasurveyor' by *DW Consulting*.

2.2.5 Final minimal processing of magnetometry raw data was undertaken off site, in accordance with English Heritage guidelines (English Heritage 2008), to remove any instrument error or survey effects in order to enhance more subtle anomalies normally associated with archaeological features:

- zero median traverse (ZMT) was applied to correct slight baseline shifts between adjacent survey lines;
- the data were de-spiked in order to remove random spikes. Random spikes are usually caused by erroneous small ferrous objects.

2.2.6 ***Presentation of the results and interpretation:*** the presentation of the data for the site involves a print-out of the minimally processed data as grey-scale plots (Fig 3). Anomalies have been identified, abstracted, interpreted and plotted onto Figure 4.

2.3 ARCHIVE

2.3.1 A full professional archive has been compiled in accordance with current IfA and English Heritage guidelines (English Heritage 1991). The paper and digital archive will be deposited with the NNPA on completion of the project. The project archive represents the collation and indexing of all the data and material gathered during the course of the project.

2.3.2 The deposition of a properly ordered and indexed project archive in an appropriate repository is considered an essential and integral element of all archaeological projects by the IfA in their *Code of Conduct* (2012). OA North conforms to best practice in the preparation of project archives for long-term storage.

2.3.3 A hard copy of the report will also be sent to the North East office of English Heritage together with an electronic copy to both the Inspector of Ancient Monuments for Hadrian's Wall and the Senior Geophysicist at English Heritage.

2.3.4 The Arts and Humanities Data Service (AHDS) online database project *Online Access to index of Archaeological Investigations* (OASIS) will be completed as part of the archiving phase of the project.

2.3.5 The geophysical survey data will be archived with the Archaeology Data Service (ADS) in accordance with the guidelines published by the ADS (Schmidt 2002)

3. SURVEY RESULTS

3.1 GENERAL OBSERVATIONS

3.1.1 The results of the gradiometer survey over both the west field, and the north and west strips surveyed in the eastern field show broad areas of magnetic debris or noise with quieter background areas in between (Fig 3). The areas of debris/noise are difficult to discern in their origin, but are unlikely to be geological given the low magnetic properties of the underlying geology, and so are probably due to imported material of unknown origin. Across the site are several clearly visible positively magnetic curvilinear responses that correspond with a number of palaeochannels identified during the walkover survey carried out by OA North (OA North 2013, and Plate 1). A number of strong magnetic responses characteristic of ferrous material, located along the northern boundary of the east field, as well as two discrete circular areas in the western field, are due to modern post and wire fences, and telegraph poles.

Plate 1: Aerial photograph illustrating the paleochannels and ridge and furrow

3.2 RESULTS

3.2.1 ***West field:*** this field contains three areas of general magnetic noise, one of which (situated in the southern part of the field), contains responses of relatively high magnitude when compared to the background data (Fig 3). The nature of this spread of responses suggests that material with enhanced magnetic properties is present. This material may have a pedological origin

such as a palaeochannel, or an anthropomorphic origin. Two site identified during the desk-based research and walkover survey (Site **22**, a modern clearance cairn, and Site **21**, the site of Loaning Head building) as being present within this field were not detected in their presumed locations. The other areas of magnetic disturbance are situated within the northern part of the field and may have similar origins.

3.2.2 There are numerous, quite faint, north/south-aligned, relatively short, positively magnetic linear responses, that appear to correspond with the narrow ridge and furrow cultivation identified from aerial photographs (Plate 1) and which is believed to be post-medieval in origin (OA North 2013). However, this was not visible on the ground (Sites **10**, **13** and **16**, *ibid*) and, combined with the weak linear responses, suggests that the ridge and furrow has been extensively ploughed over subsequently.

3.2.3 There are several other linear and curvilinear responses within this field that are of higher amplitude than the ridge and furrow (Fig 3). There is no pattern to the distribution of these responses but a number of them are quite distinctively circular or are L-shaped. These may be of archaeological origin given the site's proximity to a number of prehistoric and Roman heritage assets in the area.

3.2.4 A number of former boundary banks have been identified during the desk-based assessment and walkover survey (*ibid*) as being present within this field (Sites **11**, **12**, **15**, **17** and **19**). A curving band of magnetic enhancement crosses close to the northern end of the field that correlates with one of these (Site **12**). This probably represents the remains of the bank.

3.2.5 Finally, there are several discrete positively magnetic responses that are reminiscent of features such as pits. There are two groupings of these at the north end of the field and just to the south of the middle of the field. The southern grouping of these responses is the most obvious and is arranged in an almost rectangular pattern (Fig 3). The northern grouping consists of a line of three responses.

3.2.6 ***East field:*** the most obvious responses within this field are several fairly wide curvilinear responses that correlate almost exactly with palaeochannels clearly visible on the aerial photography (Plate 1). The responses are characteristic of this type of feature.

3.2.7 Other responses clearly visible in the field include several linear and curvilinear responses similar in appearance and magnitude to those described within the east field. Most of these are situated within the northern part of the survey area close to the Vallum. A linear response on a north/south axis, close to the eastern side of the field, seems to correspond with a former boundary bank (Site **5**).

3.2.8 There are several discrete responses of similar size and appearance to those seen in the west field and probably also due to features such as pits. A curving alignment of several of these is situated close to the western edge of the field, just to the north of two palaeochannels (Fig 3). Further responses are situated at the eastern side of the survey area. The site of a former field barn (Site **42**) recorded during the map regression for the desk-based research, yielded no responses indicative of a former structure. It is possible that this was either

timber and all traces have been removed, or it was stone-built with no magnetic response to be detected during the survey.

3.2.9 The survey included the line of the Vallum at the north side of the field but, due to strongly magnetic responses from the adjacent post and wire fence and road signs, much of its length was obscured.

4. CONCLUSIONS

4.1 DISCUSSION

4.1.1 The geophysical survey has highlighted several responses, potentially of either archaeological or pedological origin, some of the most obvious being the several responses corresponding to several palaeochannels identified during the desk-based assessment and walkover survey. The obvious spreads of magnetic debris may also be natural in origin but the nature of the responses suggests that an artificial origin cannot be excluded.

4.1.2 Ridge and furrow is known to have existed on the west field, as evidenced by aerial photographic survey information. This is corroborated by the presence of linear responses on a similar alignment, albeit fairly weak in nature. The reasons for this may be numerous, but the most likely explanation is these features have been reduced over time due to agricultural processes, such as ploughing. Evidence of previous field systems is present in the form of responses that correspond to former boundary banks (Sites **5** and **12**) identified during the desk-based assessment.

4.1.3 The most enigmatic responses present within the survey data are several linear and curvilinear positively magnetic responses, which from their general nature and appearance are potentially of archaeological origin. Given the rich archaeological resource known in the immediate area, this is perhaps unsurprising. The responses suggestive of pits are of interest, particularly as some seem to conform to specific patterns, such as the rectangular arrangement in the west field. These may be archaeological in origin.

4.1.4 Two buildings were identified during the desk-based assessment (Sites **42** and **21**), neither of which have been identified by the survey in their presumed locations (for reasons outlined in *Section 3.2.8*). Similarly, neither the Vallum nor any of the other features close by, such as the quarry (Site **02**) or broad ridge and furrow (Site **04**), were identified due to the strong magnetic responses from the adjacent boundary masking any weaker responses of archaeological origin. The low magnetic properties of the background geology also probably inhibited the detection of more subtle features. The limited size of the survey area restricts the ability to understand and appreciate subtle changes or the nature of any patterns of responses.

4.2 RECOMMENDATIONS

4.2.1 Those features of potential archaeological origin, such as the linear and curvilinear positively magnetic responses, should be investigated further by archaeological trenching in order to determine their true nature. The discrete responses possibly pertaining to pits would also benefit from further investigation, together with the spreads of magnetic debris in the western field in order to determine the nature of the buried features.

5. BIBLIOGRAPHY

5.1 PUBLISHED SOURCES

Breeze, DJ, and Dobson, B, 2000 *Hadrian's Wall*, 4th edn, London

Clark, A, 1990 *Seeing Beneath the Soil*, London

Daniels, C (ed), 1978 *The Roman Wall,* 13th edn, Newcastle upon Tyne

DT 233L *Plan of Henshaw Township in the Parish of Haltwhistle in the County of Northumberland 1842* (tithe map and schedule)

English Heritage, 1991 *Management of Archaeological Projects*, 2nd edn, London

English Heritage, 2008 *Geophysical Survey in Archaeological Field Evaluation* (2nd edition, Swindon

Hodgson, Rev J, 1840 *History of Northumberland, part II, volume III*, Newcastle

Institute for Archaeologists (IfA), 2011 *Standard and Guidance for Archaeological Geophysical Survey*, Reading

Institute for Archaeologists (IfA), 2012 *Code of Conduct* (revised edition), unpubl

OA North, 2013 *The Sill Project, Once Brewed, Northumberland: Interim Desk-based Assessment, and Field Survey*, unpubl

Ordnance Survey 1859-62, 6":1 mile, first edition

Ordnance Survey 1895, 6":1 mile, second edition

Ordnance Survey 1925, 6":1 mile

Ordnance Survey 1952, 6":1 mile

Ordnance Survey 1976, 1: 10000

Salway, P, 1981 *Roman Britain*, Oxford

Schmidt, A, 2002 *Geophysical Data in Archaeology: A Guide to Good Practice,* Oxford

UKIC, 1990 *Guidelines for the Preparation of Archives for Long-Term Storage*, London

Wilmott, T, 1997 Birdoswald, *Engl Herit Archaeol Rep*, **14**, London

Wilmott, T, and Bennett, J, 2009 The linear elements of the Hadrian's Wall complex: four investigations 1983-2000, in T Wilmott (ed), *Hadrian's Wall: Archaeological Research by English Heritage 1976-2000*, Swindon, 72-128

Young, R, Frodsham, P, Hedley, I, Speak, S, 2005 *An Archaeological Research Framework for Northumberland National Park, Resources Assessment, Research Agenda, and Research Strategy*

5.2 ONLINE SOURCES

British Geological Survey, www.bgs.ac.uk

Land Information System, www.landis.org.uk

6. ILLUSTRATIONS

6.1 LIST OF FIGURES

Figure 1: Site Location

Figure 3: Extent of gradiometer survey area

Figure 3: Plot of processed gradiometer data

Figure 4: Interpretation plot of gradiometer data

6.2 LIST OF PLATES

Plate 1: Aerial photograph illustrating the paleochannels and ridge and furrow

EM*L10627*MAT*Aug 2013

Figure 1: Site location

Figure 2: Extent of gradiometer survey area

Figure 3: Plot of processed gradiometer data

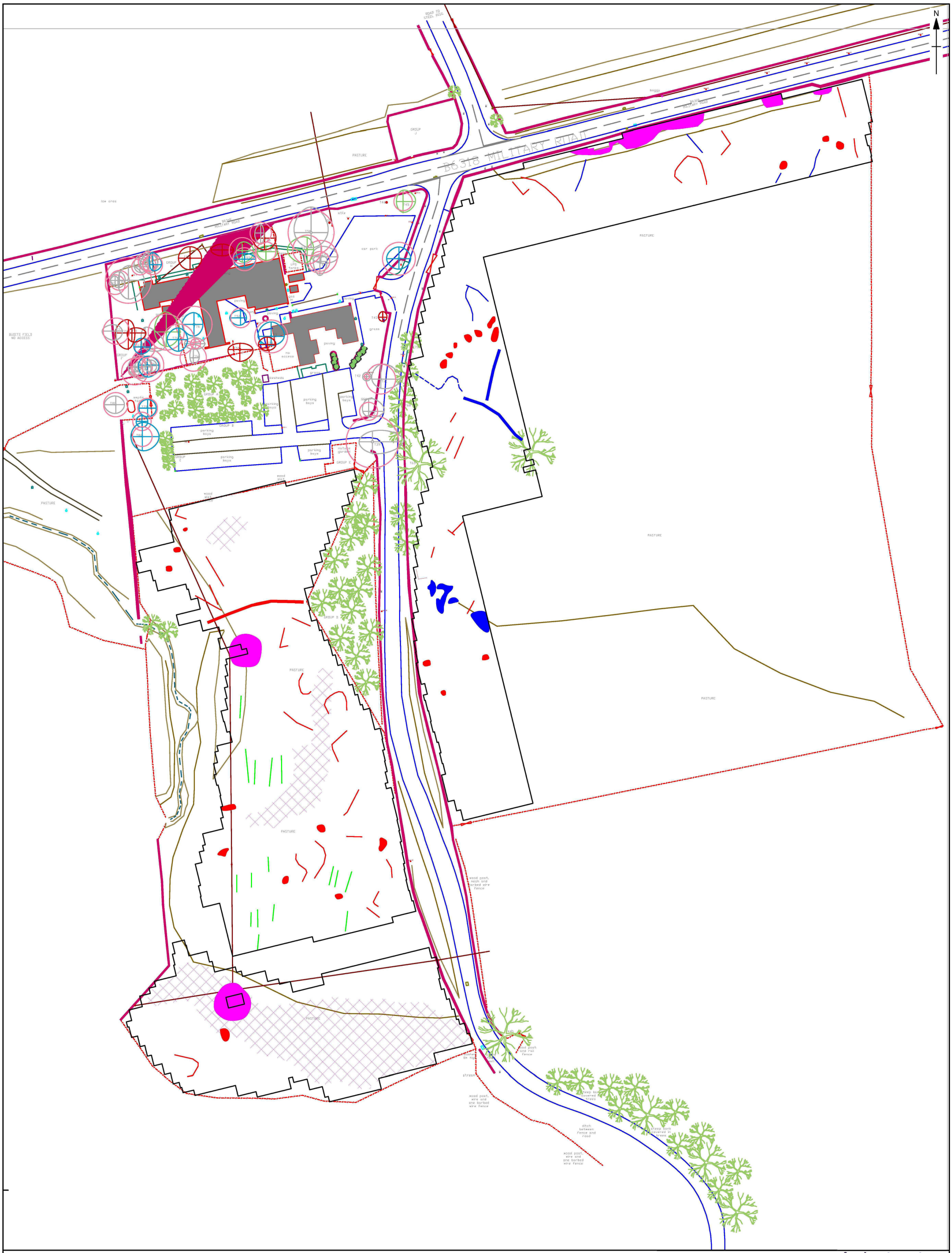


Figure 4: Interpretation plot of gradiometer data

APPENDIX 1: PROJECT DESIGN

1. INTRODUCTION

1.1 PROJECT BACKGROUND

1.1.1 The Sill Project is centred upon Once Brewed, Northumberland, which is sited in the Northumberland National Park. It has been ultimately established to see the redevelopment of the YHA hostel and visitor centre at Once Brewed, on Hadrian's Wall, for a new high quality facility combining the YHA accommodation and a Landscape Discovery Centre. The project is part of the partnership, *The Sill: Unspoilt Landscapes, Inspiring People*, between the Northumberland National Park Authority (NNPA) and the Youth Hostel Association (YHA) (England and Wales), although NNPA is the client, in this instance, on behalf of the partnership.

1.1.2 To inform the project proposals, and ensure its long-term maintenance by managing conservation issues and providing learning and engagement opportunities, a Conservation Management Plan (CMP) is currently being prepared in accordance with the Heritage Lottery Fund (HLF) guidance, *Conservation Management Planning*. The site is situated within an area of very high archaeological sensitivity, within the Hadrian's Wall World Heritage Site (WHS), whilst within the north end of the site is the Vallum, which is a Scheduled Monument (no 26063). Therefore, the impact upon this, in terms of the landscape character and the WHS' setting, any below ground archaeological remains, and the ecology of the site is being assessed.

1.1.3 However, the CMP is in its early stages, and the designs for the proposals are being prepared for RIBA Stage C. Therefore, in order to understand the archaeological sensitivities and how these may affect the designs, or how these may be mitigated, a programme of iterative archaeological works is proposed. The first stage of which is a geophysical survey, specifically magnetometry, to appreciate what remains may exist below ground. This will be informed by a desk-based research and field survey that have both been very recently completed by OA North (forthcoming).

1.1.4 The survey area includes the field to the south of the current Visitor Centre and YHA hostel, as well as a strip approximately 30m wide (depending on the configuration of the survey grid, see *Fig A*) along the western and northern edges of the field immediately to the east of this. The survey in this eastern field takes in part of the Vallum. Consequently, due to it being scheduled, Scheduled Monument Consent (SMC) is required. The following method statement has been prepared to inform the application for the SMC.

1.2 OXFORD ARCHAEOLOGY NORTH

1.2.1 Oxford Archaeology North has carried out geophysical surveys on all manner of sites, having the advantage of having an in-house capability, combining specialist surveys with archaeological knowledge. OA North has the professional expertise and resources to undertake the project detailed below to a high level of quality and efficiency. OA North is an Institute for Archaeologists (IfA) registered organisation, registration number 17, and all its members of staff operate subject to the IfA Code of Conduct (2012). OA North are licensed by Ofcom (Licence No. 0930879/1) to carry out GPR surveys.

1.3 STAFFING PROPOSALS

1.3.1 The project will be undertaken by two OA North geophysicists, Emily Mercer and Karl Taylor, who have, between them, 32 years experience of not only undertaking all manner of geophysical surveys (including magnetometry, resistivity, GPR, electro-magnetic surveys, metal detecting, magnetic susceptibility, geochemical analysis), but who also have the academic qualifications on the theory and practice of the applications.

1.3.2 The project will be under the direct management of **Emily Mercer BA MSc MIfA** (OA North Senior Project Manager) to whom all correspondence should be addressed. Emily is an

experienced archaeological geophysicist, having worked in the commercial and research sector across the UK, Sweden and Turkey.

1.3.3 The geophysical survey would be undertaken by **Karl Taylor BSc AIfA** (OA North Project Officer). Karl is a very experienced geophysicist, and has worked as a project manager for Stratascan and Phase Site Investigations, and also has directed and led numerous geophysical surveys for Archaeological Research Services and Oxford Archaeology North.

1.4 HEALTH AND SAFETY

1.4.1 OA North provides a Health and Safety Statement for all projects and maintains a company safety policy. All site procedures are in accordance with the guidance set out in the Health and Safety Manual compiled by the Standing Conference of Archaeological Unit Managers (1997). A written risk assessment will be undertaken in advance of project commencement and copies will be made available on request to all interested parties.

2 OBJECTIVES

2.1 The following programme has been designed to evaluate the archaeological potential of the outlined survey area (Fig A) using the non-intrusive investigative technique of magnetometry to English Heritage guidelines (2008). This information will be used to determine the presence or absence of below ground remains and aid their understanding in terms of their nature. The necessary stages to achieve these ends are as follows:

2.2 GEOPHYSICAL SURVEY

2.2.1 It is proposed that magnetometry will be used over the outlined area, which equates to approximately 2.6ha.

2.3 REPORT PRODUCTION

2.3.1 Preliminary results will be made available within one to two days of completion of the fieldwork, and the final report will be produced for the client within four weeks. A site archive will be produced to English Heritage guidelines (1991 and 2008) and in accordance with the *Guidelines for the Preparation of Excavation Archives for Long Term Storage* (UKIC 1990).

3. METHOD STATEMENT

3.1 INTRODUCTION

3.1.1 The two most commonly used techniques to undertake an effective geophysical survey in the location of archaeological remains are magnetometry and electrical resistance (resistivity) surveys. These allow below-ground remains to be located in a non-intrusive manner, and are often applied to the same site as they produce complementary results. However, these are not always suitable in their application for logistical purposes due to topographic features, such as very steep slopes, and current and past land use, such a areas with mature crops or wooded areas. Furthermore, in urban areas the presence of street furniture and the large number of below ground services, for example, would affect the magnetometer data so adversely as to render the results ineffective. Similarly, hard ground surfaces, such as tarmac, concrete etc, prevents the insertion of electrical resistance probes. In addition, there are, on occasions, cases where the objectives of the survey, requiring detailed three-dimension data are the major influencing factor. In each of these examples, the preferred technique would therefore be ground probing (or penetrating) radar (GPR).

3.1.2 Nevertheless, the results are also very much dependent on the type of instrument that is used for each technique, and the method of data collection using the chosen instrument. These choices can be influenced by external factors, including the local geographical positioning of the site, the solid and drift geology, and available resources such as time and budget.

3.1.3 Within the study area, the northern part of the western side is unavailable for survey due to the presence of buildings, services, the carpark etc. much in the same way urban areas are limiting for magnetometry and resistivity. Similarly, the small copse area to the north of the Military Way is restricted due to the presence of trees and shrubbery/undergrowth. For the remainder of the area, the single survey technique of magnetometry has been chosen , influenced by limitations in the schedule for the archaeological programme, and by budget. However, the results will be sufficient to provide an understanding of whether remains exist and provide targets for subsequent trial trenching.

3.1.4 The survey grid nodes will be staked out and surveyed using either the survey grade GPS system or total station to Ordnance Survey co-ordinates to at least 0.05m accuracy. Bamboo canes will be placed at grid node points and survey ropes and canes will be used to mark out the survey traverses.

3.1.5 The technique is defined below and will be carried out according to English Heritage Guidelines (2008).

3.2 MAGNETOMETER SURVEY

3.2.1 A magnetic, or magnetometer, survey is usually the first choice for a geophysical survey owing to its ability to be carried out relatively quickly (due to recent improvements in commercially available instruments), and is therefore the most cost effective of the commercially available techniques. Consequently, magnetometry is a very efficient technique and is recommended in the first instance by the English Heritage Guidelines (2008) for such investigations.

3.2.2 Magnetometry will easily locate 'positively magnetic' material such as iron-based features and objects, or those subjected to firing such as kilns, hearths, and even the buried remains of brick walls. Therefore, this technique is suitable in the detection of features associated with industrial activity. This technique can also be widely used to locate the more subtle magnetic features associated with settlement and funerary remains, such as boundary or enclosure ditches and pits or postholes, which have been gradually infilled with more humic material. The breakdown of organic matter through microbiotic activity leads to the humic material becoming rich in magnetic iron oxides when compared with the subsoil, allowing the features to be identified. Conversely, earthwork or embankment remains can also be identified with magnetometry as a 'negative' feature due to the action in creating the earthwork of upturning the relatively low magnetic subsoil on to the more magnetic topsoil. This technique is classed as a *passive* technique as it relies on measuring the physical attributes, or the magnetic field, of features that exist in the absence of a measuring device, such as a kiln or ferrous object (Schmidt 2001, 6).

3.2.3 However, the main drawback to magnetic surveys is that non-thermoremnant features, such as stone building remains, or those features with magnetic susceptibility levels similar to those of the background (particularly in areas where the parent material of the topsoil has very low magnetic susceptibility levels) will fail to be seen in the magnetic survey results. Therefore, a complementary or more suitable technique, such as an earth resistance survey, is often used in these instances.

3.2.4 ***Fieldwork methodology:*** a vertical gradiometer will be employed, the Bartington Grad601-2, with a sensor separation of 1.0m. The instrument is held above ground from which data are captured in the internal memory, and then downloaded to a portable computer for processing. The survey area will be divided into a 30m grid system, within which sampling will be at a minimum of 0.25m intervals on a 1m traverse separation.

3.1.6 ***Data:*** all data will be downloaded immediately following collection using specialist survey software (*Archaeosurveyor*) and will be minimally processed on site where applicable. Raster images will be exported, usually in png or jpg format for presentation and dissemination. These images will be imported into CAD software and overlain on a geo-referenced base plan. An interpretation of the anomalies will be presented in CAD and a non-technical summary and discussion of the results will be included in a report which will accompany the interpretation.

3.4 REPORT AND ARCHIVE

3.4.1 ***Preliminary results:*** following completion of the survey, plots will be issued for circulation around the interested parties showing the survey data and a preliminary interpretation within one to two days

3.4.2 ***Editing and submission:*** the report will be subject to the OA North's stringent editing procedure, after which a draft will issued to the client and interested parties for consultation prior to finalisation.

3.4.3 ***Report:*** a digital copy of the report will be submitted to the client within four weeks of completion of the fieldwork, unless hard copies are also required. Copies will also be forwarded to English Heritage, the County HER, as well as the National Trust Archives, and the NNPA HER for references purposes within six months of completion. The report will include;

- a site location plan related to the national grid
- a front cover to include the planning application number and the NGR
- the dates on which all elements of the fieldwork was undertaken
- a concise, non-technical summary of the results
- an explanation to any agreed variations to the brief, including any justification for any elements not undertaken
- brief précis of the historical background
- a description of the methodology employed, work undertaken and results obtained (both objectively abstracted and interpreted)
- illustrations will be presented at an appropriate scale (1:1000). The site mapping is based upon the CAD base. The report will be accompanied by photographs and historic illustrations. The report illustrations will include the following: location plan, outline and extent of survey areas; plot of minimally processed magnetic and/or resistance survey results; trace plots, interpretation plot of survey results, and combined plot of survey results where appropriate. Examples of GPR profiles will also be included
- a copy of this project design, and indications of any agreed departure from that design
- the report will also include a complete bibliography of sources from which data has been derived.

3.4.4 This report will be in the same basic format as this project design; two copies of the report will be provided on CD as a pdf, with copies of the plots also provided in CAD format.

3.4.5 ***Confidentiality:*** the final report is designed as a document for the specific use of the client, and should be treated as such; it is not suitable for publication as an academic report, or otherwise, without amendment or revision. Any requirement to revise or reorder the material for submission or presentation to third parties beyond the project brief and project design, or for any other explicit purpose, can be fulfilled, but will require separate discussion and funding.

3.4.6 ***Publication:*** information from the project will be fed into the OASIS project (On-line Access to Index of Archaeological Investigation).

3.4.7 ***Archive:*** the results will form the basis of a full archive to professional standards (Schmidt 2001), and in accordance with current English Heritage (1991) and UKIC (1990) guidelines.

The deposition of a properly ordered and indexed project archive in an appropriate repository is considered an essential and integral element of all archaeological projects by the IfA in that organisation's Code of Conduct (2012). The archive will be mainly digital and will be deposited within six months of the completion of the fieldwork with the appropriate HERs and the National Monuments Record in Swindon.

4. OTHER MATTERS

4.1 ACCESS

4.1.1 Formal Scheduled Monument Consent is required to survey the area of the Vallum and it is hoped that this will be made available either before site work commences or during the fieldwork. Should this have not been received during the two days set aside for the fieldwork, OA North may need to return to site in order to complete the survey. This will need to be charged as a variation to the cost, and will be agreed with the client beforehand. It is understood that general access to the two fields concerned is being arranged by the NNPA head ranger.

4.2 WORK TIMETABLE

4.2.1 ***Geophysical Survey:*** this element is anticipated to take between two days to complete providing that SMC is received before or on the first day of survey, which is scheduled to be 23rd July 2013.

4.2.2 ***Preliminary results:*** these will be issued within two days of the completion of the fieldwork, i.e. by 26th July 2013.

4.2.2 ***Report:*** a report will be submitted within four weeks of the completion of the fieldwork.

BIBLIOGRAPHY

English Heritage, 1991 *The Management of Archaeological Projects*, 2nd edn, London

English Heritage, 2008 *Geophysical Survey in Archaeological Field Evaluation*, Swindon

Gaffney, C, Gater, JA, and Ovenden, SM, 2002 *The Use of Geophysical Techniques in Archaeological Evaluations*, IFA Technical Pap 6, Reading

Institute for Archaeologists (IfA), 2012 *Code of Conduct*, Reading

Institute for Archaeologists (IfA), 2011 *Standards and Guidance for an Archaeological Geophysical Survey*, Reading

OA North, forthcoming *The Sill Project, Once Brewed, Northumberland: Interim Desk-based Assessment and Field Survey*

Schmidt, A, 2001 *Geophysical Data in Archaeology: A Guide to Good Practice*, Oxford

SCAUM (Standing Conference of Archaeological Unit Managers), 1997 *Health and Safety Manual*, Poole

United Kingdom Institute for Conservation (UKIC), 1990 *Guidelines for the preparation of archives for long-term storage*

wardell-armstrong.com

ENERGY AND CLIMATE CHANGE
ENVIRONMENT AND SUSTAINABILITY
INFRASTRUCTURE AND UTILITIES
LAND AND PROPERTY
MINING, QUARRYING AND MINERAL ESTATES
WASTE RESOURCE MANAGEMENT

LAND ADJACENT TO THE ONCE BREWED YOUTH HOSTEL & NATIONAL PARK CENTRE NORTHUMBERLAND

INTERIM ARCHAEOLOGICAL EVALUATION REPORT

NOVEMBER 2013

your earth our world

wardell armstrong

LAND ADJACENT TO THE ONCE BREWED YOUTH HOSTEL AND NATIONAL PARK CENTRE, NORTHUMBERLAND

INTERIM ARCHAEOLOGICAL EVALUATION REPORT

CP. NO: CP10696

22/11/2013

WARDELL ARMSTRONG ARCHAEOLOGY
COCKLAKES YARD,
CUMWHINTON,
CARLISLE,
CUMBRIA,
CA4 0BQ
TEL: 01228 564820
FAX: 01228 560025
WWW.WA-ARCHAEOLOGY.COM

WARDELL ARMSTRONG ARCHAEOLOGY

DOCUMENT TITLE:	Land Adjacent to The Once brewed Youth Hostel and National Park centre, Northumberland
DOCUMENT TYPE:	Archaeological Evaluation Report
CLIENT:	Northumberland National Park Authority
CP NUMBER:	CP10696
SITE CODE:	OBV-A
OASIS REFERENCE:	Wardella2-164826
PRINT DATE:	22/11/2013
GRID REFERENCE:	NY 75242 66904

Quality Assurance

This report covers works as outlined in the brief for the above-named project as issued by the relevant authority, and as outlined in the agreed programme of works. Any deviation to the programme of works has been agreed by all parties. The works have been carried out according to the guidelines set out in the Institute for Archaeologists (IfA) Standards, Policy Statements and Codes of Conduct. The report has been prepared in keeping with the guidance set out by Wardell Armstrong Archaeology on the preparation of reports.

REVISION SCHEDULE			
	01	**02**	**03**
PREPARED BY: **POSITION:** **DATE:**	Adam Slater Project Officer 20/11/2013		
EDITED BY: **POSITION:** **DATE:**	Frank Giecco Project Manager 20/11/2013		

CONTENTS

SUMMARY **5**
ACKNOWLEDGEMENTS **6**
1 INTRODUCTION **7**
1.1 Circumstances of the Project 7
2 METHODOLOGY **8**
2.1 Project Design 8
2.2 The Field Evaluation 8
2.3 The Archive 9
3 BACKGROUND **10**
3.1 Location and Geological Context 10
3.2 Historical Context 10
3.3 Previous Work 12
4 ARCHAEOLOGICAL EVALUATION RESULTS **13**
4.1 Introduction 13
4.2 Results 13
4.3 Archaeological Finds and Environmental Sampling 18
5 CONCLUSIONS **19**
5.1 Conclusions 19
6 BIBLIOGRAPHY **21**
APPENDIX 1: CONTEXT TABLE **22**
APPENDIX 2: FIGURES **24**

ILLUSTRATIONS

FIGURES (APPENDIX 2)

FIGURE 1: SITE LOCATION

FIGURE 2: LOCATION OF TRENCHES 1-5

FIGURE 3: TRENCH 1; PLAN AND SECTION

FIGURE 4: TRENCH 2; PLAN AND SECTION

FIGURE 5: TRENCH 3; PLAN AND SECTION

FIGURE 6: TRENCH 4; PLAN AND SECTION

FIGURE 7: TRENCH 5; PLAN AND SECTION

PLATES

PLATE 1: TRENCH 1, BANK AND TURF DEPOSIT (MID EX) – FACING EAST, 2X2M SCALE.....14

PLATE 2: TRENCH 2 WITH BANK, TURF AND PALAEOSOIL – FACING EAST, 2X2M SCALE 15

PLATE 3: TRENCH 3 WITH SURVIVING BANK DEPOSITS – FACING WEST, 2X2M SCALES 16

PLATE 4: TRENCH 4 – FACING SOUTH-EAST, 2X1M SCALES.....17

PLATE 5: TRENCH 5 – FACING WEST, 2X1M SCALES 18

SUMMARY

Wardell Armstrong Archaeology were commissioned by Laura Sole, Sill Project Co-ordinator for the provision of archaeological services for Northumberland National Park Authority (NNPA) and the Youth Hostel Association (YHA), to undertake a desk-based assessment and archaeological evaluation at Land adjacent to the Once Brewed Youth Hostel and National Park Centre, Northumberland (NGR NY 75242 66904). This work will support a planning application for the construction of a Landscape Discovery Centre. Northumberland county council and Northumberland National Parks Authority granted planning consent for the development, on the condition an archaeological evaluation be undertaken. The work is required as the site lies within an area of high archaeological significance; within the Frontiers of the Roman Empire World Heritage Site (Hadrians Wall) and adjacent to a number of listed buildings and Scheduled Ancient Monuments. At the north of the site boundary are the remains of the vallum (SAM 26063) associated with the composite defences of Hadrians Wall. Two Roman marching/ temporary camps (SAM 26017 & 26008) are located to the south and south-west.

The first of two phases of archaeological evaluation (Phase 1) was undertaken over three days between the 5th and 7th November 2013 The evaluation involved the excavation of five trenches, totalling 46m in length, 69m^2 in total area. Trenches 1-3 confirmed the southern limit of the southern bank of the Vallum associated with the defensive line Hadrian's Wall. A probable early 2nd century palaeosoil horizon was sealed by the construction of an early bank of stacked turf which seemed to form the earliest phase of the construction of the Vallum bank.

Trenches 4 & 5 confirmed that the area of the car park to the south of the visitors centre had been heavily terraced and disturbed when the car parks were constructed and has very low archaeological potential.

The second Phase of Evaluation, located to the south of the current trenches will be undertaken in 2014.

ACKNOWLEDGEMENTS

Wardell Armstrong Archaeology would like to thank Laura Sole, Sill Project Co-ordinator for the provision of archaeological services for Northumberland National Park Authority (NNPA) and the Youth Hostel Association (YHA), for commissioning the project, and for all assistance throughout the work. Wardell Armstrong Archaeology would also like to thank, Chris Jones, Historic Environment Officer (NNPA), and Mike Collins, Inspector of Ancient Monuments (Hadrian's Wall) at English Heritage for their assistance and advice throughout the project. Wardell Armstrong Archaeology would also like to extend their thanks to the Northumberland National Park Authority Rangers, for their help and access to facilities offered during this project.

Wardell Armstrong Archaeology would also like to extend their thanks to Potts Plant Hire, for their help during this project.

The Project Proposal was written by Frank Giecco. The archaeological evaluation was undertaken by Adam Slater and Cat Peters. The report was written by Adam Slater and the drawings were produced by Adrian Bailey. The project was managed by Frank Giecco, Project Manager for WAA. The report was edited by Frank Giecco, Project Manager for WAA.

1 INTRODUCTION

1.1 CIRCUMSTANCES OF THE PROJECT

1.1.1 In November 2013 Wardell Armstrong Archaeology were invited by Laura Sole, Sill Project coordinator for the provision of archaeological services for Northumberland National Park Authority (NNPA) and the Youth Hostel Association (YHA), to undertake a archaeological evaluation at land adjacent to the Youth Hostel and Northumberland National Parks Authority visitors centre, Once Brewed, Northumberland (NGR; NY 75242 66904, Figure 1). The proposed works lie within the immediate vicinity of the Roman Frontiers World Heritage Site (Hadrian's wall) with the southern Vallum of the frontier defences running through the north of the site (SAM 26063). As a result, Chris Jones, archaeologist for Northumberland National Park Authority requested a programme of archaeological investigation, prior to the development taking place. This is in line with government advice as set out in Section 12 of the National Planning Policy Framework (NPPF 2012).

1.1.2 This archaeological evaluation forms Phase 1 of archaeological work in the proposed development area; Phase 2 involves the excavation of further trenching to the south of the current buildings and will be undertaken in 2014.

1.1.3 The archaeological evaluation was undertaken following approved standards and guidance (IfA 2008), and was consistent with the specification provided by Giecco (2013) and generally accepted best practice.

1.1.4 This report outlines the evaluation works undertaken on-site, the subsequent programme of post-fieldwork analysis, and the results of this scheme of archaeological works.

2 METHODOLOGY

2.1 PROJECT DESIGN

2.1.1 A Project Proposal/ Project Design was submitted by Wardell Armstrong Archaeology in response to a request by Laura Sole, Sill Project Co-ordinator for the provision of archaeological services for Northumberland National Park Authority (NNPA) for an archaeological evaluation of the study area. Following acceptance of the project design by Chris Jones Historic Environment Officer, Northumberland National Parks Authority, Mike Collins, Inspector of Ancient Monuments (Hadrians Wall) at English Heritage and Mark Newman at The National Trust; Wardell Armstrong Archaeology Ltd was commissioned by the client to undertake the work. The project design was adhered to in full, and the work was consistent with the relevant standards and procedures of the Institute for Archaeologists (IfA), and generally accepted best practice.

2.2 THE FIELD EVALUATION

2.2.1 The Phase 1 evaluation consisted of the excavation of 5 trenches covering 69m^2 of the proposed development area. The purpose of this phase of evaluation was to establish the nature and extent of below ground archaeological remains within the vicinity. Three of the evaluation trenches were located to define the southern extent of and state of survival of the Roman Vallum bank crossing the northern boundary of the site. Two trenches were excavated within the car park to the rear of the current Northumberland National Park Authority visitors centre. All work was conducted according to the recommendations of the Institute for Archaeologists (2008).

2.2.2 In summary, the main objectives of the field evaluation were:

- to establish the presence/absence, nature, extent and state of preservation of archaeological remains and to record these where they were observed;
- to establish the character of those features in terms of cuts, soil matrices and interfaces;
- to record the nature, date and extent of any features associated with the Frontier zone of Hadrian's Wall;
- to recover artefactual material, especially that useful for dating purposes;

- to recover palaeoenvironmental material where it survives in order to understand site and landscape formation processes.

2.2.3 Turf and topsoil was removed by mechanical excavator under close archaeological supervision. The trial trenches were subsequently cleaned by hand and all features were investigated and recording according to the Wardell Armstrong Archaeology standard procedure as set out in the Excavation Manual (Giecco 2013).

2.2.4 The 5 evaluation trenches were backfilled following inspection by Mike Collins, Inspector of Ancient Monuments (Hadrian's Wall) at English Heritage and Chris Jones, Historic Environment Officer Northumbria National Park Authority (NNPA), following excavation and recording.

2.2.5 The fieldwork programme was followed by an assessment of the data as set out in the Management of Archaeological Projects (2nd Edition, 1991).

2.3 THE ARCHIVE

2.3.1 A full professional archive has been compiled in accordance with the specification, and according to the Archaeological Archives Forum recommendations (Brown 2011). The archive will be deposited within Northumberland Archives, with copies of the report sent to the Northumberland Historic Environment Record at Morpeth, available upon request. The archive can be accessed under the unique project identifier WAA13-OBV-A, CP 10696.

2.3.2 Wardell Armstrong Archaeology, Northumberland National Park Authority and English Heritage, support the **O**nline **A**cces**S** to the **I**ndex of Archaeological Investigation**S** (**OASIS**) project. This project aims to provide an on-line index and access to the extensive and expanding body of grey literature, created as a result of developer-funded archaeological work. As a result, details of the results of this project will be made available by Wardell Armstrong Archaeology, as a part of this national project.

3 BACKGROUND

3.1 LOCATION AND GEOLOGICAL CONTEXT

3.1.1 The Once Brewed Youth Hostel and visitors lies to the immediate south of the B6318 The land slopes from north to south and is highly undulating and crossed by stream gullies to the south of the development area. The site lies at between a height of approximately 200m and 226m AOD.

3.1.2 The underlying geology is is part of the Yoredale group, comprising limestone with subordinate sandstones and argillaceous rocks (British Geological Survey 2013). No drift geology is recorded in the evaluation area, but surrounding areas include glacial till and peat deposits accumulated in stream gullies.

3.2 HISTORICAL CONTEXT

3.2.1 *Prehistoric:* the earliest evidence of activity comprise of possible Bronze Age field boundaries located 1km north-east of the evaluation area at Sycamore Gap (HER 6676); Bronze Age funerary monuments in the form of a round cairn (HER 6586, located 1.5km east of the evaluation area) and a ring cairn with evidence for funerary use (HER 6955, located 3.5km north of the evaluation).

3.2.2 Iron Age activity in the wider environs of the current evaluation include two sub-rectangular enclosures 2km south at Shawhead Hill (HER 15329), and 3km south at Henshaw (HER 15336). Suggestions of Iron Age cultivation in the form of spade dug corded rig have been identified at Greenlee Lough, 3km north of the evaluation (HER 12318, 12319, 12320, 12322, 12346, 12371, 12396, 12397 & 12398).

3.2.3 *Roman:* The environs of the area of evaluation were very heavily affected by Roman occupation, the most prominent being that of the complex of boundaries associated with Hadrian's Wall. However, the earliest system of Roman military control was the *Stanegate*, a series of forts and fortlets built along the Roman road between Carlisle and Corbridge during the Flavian period (AD 69-96) to consolidate the rapid military occupation of Britain since initial invasion in AD 43. It is probable that the two large temporary camps (SAM 26017 & 26008) located immediately to the south-west and south of the current evaluation were associated with increase in military activity building up to this period of consolidation.

3.2.4 The early second century saw unrest in the region, with many forts and fortlets north of the Tyne-Solway line being destroyed by a hostile

population (Daniels 1978). This led to the decision by Imperial authorities to build a definite, continuous and permanent frontier from the Tyne to the Solway, known as Hadrians's Wall; the primary phase of which was constructed in the AD 120s and was in the course of its use, frequently re-modeled and expanded.

3.2.5 The wall itself is located approximately 500m to the north of the current evaluation area following the geological ridge; but the stone barrier formed only part of the final frontier boundary. To the south of the wall there was a military road and to the south of this was a deep, wide, flat bottomed ditch bounded on each side by an upcast bank (Vallum), creating a wide gap bounding the south of the militarised zone of the wall, only being crossed at the wall forts.

3.2.6 *Medieval:* The current area of evaluation lies within the Medieval manorial lands of Henshaw, first recorded in the twelfth century (Hodgeson 1840). It is likely from the presence of several *sheilings* in the wider landscape that sheep formed a strong element of the Medieval economy. Ridge and furrow is identified to the immediate west and south of the evaluation area, possibly utilising the flat land of earlier Roman forts and a probable Medieval Farmhouse was excavated 500m to the north (OAN 2013).

3.2.7 *Post-medieval:* The most dramatic post-Medieval feature of the immediate landscape is the Newcastle to Carlisle Military Road, constructed between 1751 and 1759 following the suppression of the Jacobite uprising of 1746/6. Much of the masonry of Hadrian's wall was used in the construction of the road and occasionally runs along the line of the wall itself. In the central section, the road follows the line of the Vallum, and at Once Brewed, the Millitary Road was built directly on top of the Vallum ditch. The 18th century road is still in use as the current B6318. A heavy degree of quarrying, exploiting the stone within the boulder clay adjacent to the road was carried out during the 19th century, with large quarries still visible directly opposite the current evaluation area.

3.2.8 *Modern*; The current buildings of the Youth Hostel, Northumbrian National Park Authority visitors centre and carp parking areas were constructed in the mid to late 20th century, following the demolition of the first hostel building, a farmhouse first recorded in 1859-62 located to the immediate east of the modern buildings, fronting directly onto the road and likely truncating the Vallum bank. The southern Vallum bank within the evaluation area is heavily planted with trees and it is known that at least one modern infrastructural service was located along the crown of the bank.

3.3 PREVIOUS WORK

3.3.1 An Archaeological Desk Based Assessment identified the high archaeological potential within and around the proposed development area (OAN 2013). A geophysical survey was undertaken by Oxford Archaeology North in early 2013 to the immediate south and east of the current (Phase 1) evaluation area. This identified several curvilinear features and possible post lines potentially associated with or respecting the alignment of the the vallum, as well as several probable palaeochannels (Taylor 2013).

4 ARCHAEOLOGICAL EVALUATION RESULTS

4.1 INTRODUCTION

4.1.1 The Phase 1 evaluation was undertaken between the 5th November and 7th November 2013 (Figure 2). Trenches 1-3 were excavated on the Scheduled Ancient Monument of the Southern bank of the Vallum (SAM 26063) under Scheduled Monument Consent (SMC). Trenches 4 & 5 were positioned to the rear of the visitors centre, within flat tarmac and gravel car parking. A second phase of evaluation trenches is expected to be undertaken in 2014.

4.2 RESULTS

4.2.1 ***Trench 1:*** Trench 1 was located toward the north-western corner of the evaluation area, was 5m in length and was aligned roughly north to south, located to investigate the preservation and extent of the southern side of the Vallum bank (Figure 2). The topsoil was stripped by a mini-digger with a back-hoe and 1.2m wide toothless ditching bucket.

4.2.2 The trench was excavated to a maximum depth of 1.5m revealing boulder-clay with large rounded stone inclusions (**101**). Immediately overlying the geological natural was a thin horizon of probable pre-Hadrianic buried soil (**106**), a maximum of 0.07m in thickness, demonstrating the gentle southward slope of the ground prior to the vallum construction. Overlying the buried soil was a primary bank deposit (**105**) comprising light grey silty sand with numerous dark lenses likely representing stacked turfs a maximum of 0.36m in height and 1.9m in excavated width. Two deposits of firmly compacted redeposited natural (**104**) & (**103**) upcast from the vallum ditch overlie the turf bank and form the main body of the bank, to a maximum height of 0.85m and excavated width of 2.2m. A deposit of sandy clay subsoil (102) overlay the bank, 0.04m in thickness at the crown of the vallum and 0.46m at the base. Likely being in part formed from slumping of the bank, homogenized by heavy rooting. A thick, densely rooted dark grey-brown silty topsoil (**100**) overlay the subsoil and it is likely that the planting of the trees present along the vallum bank is demonstrated by cut [107]. (Plate 1, Figure 3).

Plate 1: Trench 1 bank and turf deposit (mid ex) – Facing East, 2x2m scale.

4.2.3 ***Trench 2:*** Trench 2 was located at the northern boundary of the evaluation area, was 4.9m in length and was aligned roughly north to south, located to investigate the preservation and extent of the southern side of the Vallum bank (Figure 2). The topsoil was stripped by a mini-digger with a back-hoe and 1.2m wide toothless ditching bucket.

4.2.4 The trench was excavated to a maximum depth of 1.2m revealing boulder-clay with large rounded stone inclusions (**201**). Immediately overlying the geological natural was a thin horizon of probable 2nd century palaeosoil (**208**), a maximum of 0.1m in thickness, demonstrating the gentle southward slope of the ground prior to the vallum construction. Overlying the buried soil was a primary bank deposit (**207**) comprising light grey silty sand with numerous dark lenses likely representing stacked turfs a maximum of 0.46m in height and 2.15m in excavated width. A thick deposit of firmly compacted redeposited natural (**206**) upcast from the vallum ditch and forming the main body of the bank overlay the northern side of the turf bank to a maximum height of 0.9m and a slumping deposit (**205**) was present overlying turf bank (**207**). A deposit of sandy clay subsoil (**202**) overlay the bank, and slump deposit, 0.07m in thickness at the crown of the vallum and 0.16m at the base, likely being in part formed from slumping of the bank, homogenized by heavy rooting. Thick, densely rooted dark grey-brown silty topsoil (**200**) overlay the subsoil and it is likely that the planting of the trees present along the vallum bank was again demonstrated by cut [**203**]. (Plate 2, Figure 4).

Plate 2: Trench 2 with bank, turf and palaeosoil – Facing east, 2x2m scale

4.2.5 ***Trench 3;*** Trench 3 was located toward the north-eastern corner of the evaluation area, was 13.5m in length and was aligned roughly north to south, located to investigate the preservation and extent of the southern side of the Vallum bank as well as to determine the form and preservation of any structural elements associated with the farmhouse/ original hostel located in the north-east of the evaluation area within a late 20th century car park. (Figure 2). The topsoil and car park deposits were stripped by a mini-digger with a back-hoe and 1.2m wide toothless ditching bucket.

4.2.6 The trench was excavated to a maximum depth of 0.9m revealing boulder-clay with large rounded stone inclusions (**301**). The majority of the trench showed a very high degree of truncation, associated with either the construction or demolition of the previous farm and hostel buildings in the area; A thick deposit of angular stone rubble and occasional brick within a dark grey silty clay matrix (**308**) a maximum of 0.5m in thickness immediately overlay the geological natural, and was sealed by a compacted layer of sand and thin layer of tarmac forming the current car park surface. The only surviving Vallum bank was located in the northern end of the trench, truncated both in its upper deposits, not visible as an upstanding earthwork and to the south by the insertion of a concrete foundation for the present car-park kerb. A thin deposit of compacted, grey palaeosoil (**303**) overlay the geological natural, 0.16m in thickness and 1.2m in excavated width. This was overlain by a deposit of compacted sandy clay bank material or slumping (**302**) a maximum of 0.47m in thickness. No remnants

of a turf mound was present. Truncated bank material was overlain by a dark grey, silty topsoil (**300**). (Plate 3). (Figure 5).

Plate 3: Trench 3 with Surviving bank deposits – Facing west, 2x2m scales

4.2.7 ***Trench 4;*** Trench 4 was located in the car park immediately to the south of the current Northumberland National Parks Authority visitors centre. Aligned roughly north-south, the trench was 9m in length and a maximum of 0.6m in depth. The current car park deposits were stripped by a mini-digger with a back-hoe and 1.2m wide toothless ditching bucket.

4.2.8 A geological natural of boulder-clay with large rounded stone inclusions (**401**) was present throughout the trench; a complete lack of sub or top-soils demonstrated a high degree of truncation associated with the present car parks. A single straight sided, east-west aligned field drain [**402**] was present centrally within the trench. Immediately overlying natural were four compacted deposits of sandy gravels forming accumulative layers of late 20th century car park surface (**404**), (**405**), (**406**), (**407**).

Plate 4: Trench 4 – Facing south-east, 2x1m scales

4.2.9 ***Trench 5***; Trench 5 was located in the car park immediately to the south west of the current Northumberland National Parks Authority visitors centre. Aligned roughly east west, the trench was 18m in length and a maximum of 0.72m in depth. The current car park deposits were stripped by a mini-digger with a back-hoe and 1.2m wide toothless ditching bucket.

4.2.10 A geological natural of boulder-clay with large rounded stone inclusions (**501**) was present throughout the trench; again a complete lack of sub or top-soils demonstrated a high degree of truncation associated with the present car parks. Immediately overlying natural were five compacted deposits of sandy gravels forming accumulative layers of late 20th century car park surface (**502**), (**503**), (**504**), (**505**), (**506**).

Plate 5: Trench 5 – Facing west, 2x1m scales

4.3 ARCHAEOLOGICAL FINDS AND ENVIRONMENTAL SAMPLING

4.3.1 No archaeological finds were recovered during the Phase 1 evaluation. Bulk environmental samples were taken from the palaeosoil (106) and turf bank (105). These shall be retained and processed following the completion of the Phase 2 evaluation trenches.

5 CONCLUSIONS

5.1 CONCLUSIONS

5.1.1 During Phase 1 of the archaeological field evaluation on land adjacent to Once Brewed Youth Hostel trenches were excavated in two separate areas. The purpose of the evaluation was to establish the nature and extent of below ground archaeological remains within the vicinity; three of the evaluation trenches being located to assess the preservation, form and extent of the southern Vallum bank whilst two trenches were excavated to examine the possibility of archaeological preservation under the car parks to the south of the present buildings which were not included in the previous geophysical survey. All trenches were excavated down to the top of the natural substrate.

5.1.2 Trenches 4 and 5 were devoid of any features or deposits of archaeological significance and demonstrated a high degree of truncation associated with the construction of the car parks to the rear of the visitors centre in the late 20th century. The depth of the field drain present within trench 4 [402] and the presence of gravel similar to that of the car park deposits within its fill (403) suggest it to be contemporary with terracing of the land for the car park construction.

5.1.3 Trenches 1-2 identified the preservation, formation and extent of the southern Vallum bank; surviving to a maximum height of 0.9m above a pre-Hadrianic buried soil horizon. A primary low mound of stacked turf a maximum of 0.46m in height was present and 2.25m in width. It is unlikely that this represents a turf 'core' of the larger bank; the original base of the bank being 20 Roman feet (approx 6.6m) in width (Divine 1969 p149) and it is more likely to be a deliberately placed turf 'kerb' delineating the southern side of the bank and minimising downhill slumping of the more substantial boulder clay upcast from the Vallum ditch. Estimates of an original height of the bank suggest it was approximately five Roman feet (1.7m) and it is probable that the excavated deposits overlying the turf in trenches 1 and 2 represent the inevitable collapse of the mound.

5.1.4 Trench 3 showed a high degree of truncation of the bank associated with the road frontage and later demolition of the 19th century farmhouse and early hostel buildings. The probable pre-Hadrianic buried soil survives to a maximum thickness of 0.1m and was sealed by a 0.47m thick deposit of probable bank slump, although no bank survives above the current ground level, and is completely truncated to the south of the kerb of the modern car park.

6 BIBLIOGRAPHY

Breeze, D & Dobson, B. 2000. *Hadrians Wall (Fourth Edition)*. Penguin.

Brown, D.H. (2011) *Archaeological Archives: A Guide to Best Practice in Creation, Compilation, Transfer and Curation.* Archaeological Archives Forum

Countryside Commission (1998) *Countryside Character Volume 2: North-west - The character of England's natural and man-made landscape*. Cheltenham.

Divine, D. 1969. *The north-west Frontier of Rome; A Military History of Hadrian's Wall*. Mcdonald Publishing.

English Heritage (1991) *Management of Archaeological Projects (MAP2).* London: English Heritage.

English Heritage (2002) *Environmental Archaeology: A Guide to the Theory and Practice of Methods from Sampling and Recording to Post-Excavation).* London: English Heritage.

English Heritage (2006) *Management of Research Projects in the Historic Environment.* London: English Heritage.

IfA (2008) *Standards and Guidance for Archaeological Watching Briefs*. Reading: Institute for Archaeologists.

NPPF (2012) *National Planning Policy Framework: Archaeology and Planning*. Department for Communities and Local Government

Oxford Archaeology North (2013) *The Sill Project, Once Brewed, Northumberland: Interim Desk Based assessment and Field Survey*. Oxford Archaeology North, Unpublished Report.

SSEW (1984) *Soils and their use in Northern England*. Soil Survey of England and Wales.

Taylor, K (2013) *The sill Project, Once Brewed, Northumberland: Geophysical Survey.* Oxford Archaeology north, Unpublished Report.

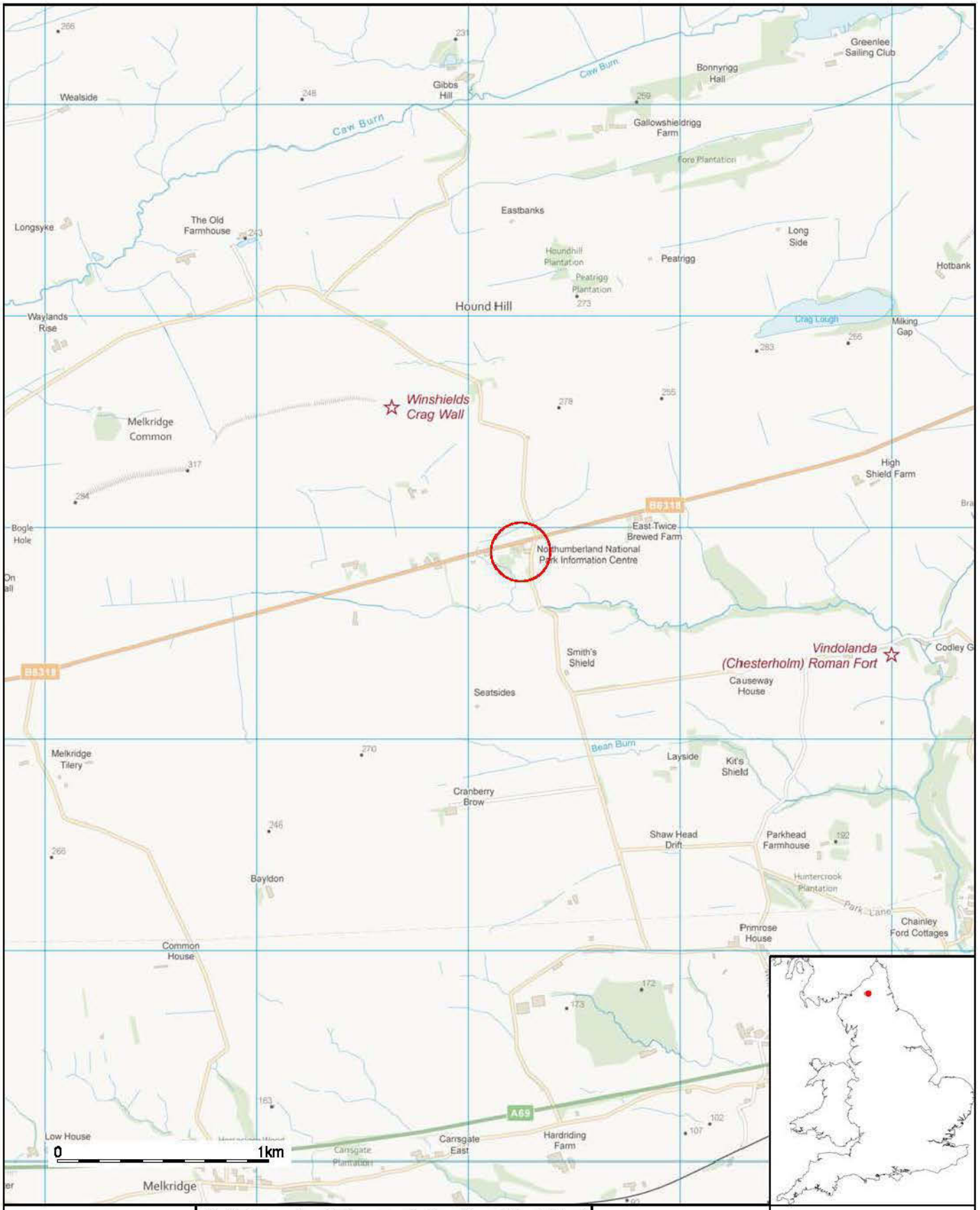
APPENDIX 1: CONTEXT TABLE

Context Number	Context Type	Description
100	Deposit	Topsoil. Very dark grey, loosely compacted silty clay. High degree of rooting.
101	Deposit	Natural; Light yellowy brown sandy clay with occasional rounded boulders.
102	Deposit	Subsoil; Mid yellowy brown, moderate to firmly compacted sandy clay with occasional angular and sub-angular stones.
103	Deposit	Bank/ slumping deposit; Mid yellowy-brown, firmly compacted sandy clay with frequent angular and sub-angular stones.
104	Deposit	Bank deposit; Light to mid yellowy-brown, very firmly compacted sandy clay with frequent angular and sub-angular stones.
105	Deposit	Turf Bank; Mid to light grey-brown, moderately compacted silty sand with frequent thin, dark grey to black silty sandy silt lenses representing preserved turves.
106	Deposit	Palaeosoil; mid to light grey, moderately compacted silty sand.
107	Cut	Concave in section, rounded base. Modern root bowl?
108	Deposit	Dark grey, loosely compacted silty clay with very high degree of rooting.
109	Deposit	Modern concrete path.
110	Deposit	Gravel bedding for (109).
111	Deposit	Foundation cut for (109) and (110).
200	Deposit	Topsoil. Very dark grey loosely compacted silty clay. High degree of rooting.
201	Deposit	Natural; Light yellowy brown sandy clay with occasional rounded boulders.
202	Deposit	Subsoil; Mid yellowy brown, moderate to firmly compacted sandy clay with occasional angular and sub-angular stones.
203	Deposit	Concave in section, rounded base. Modern root bowl?
204	Deposit	Dark grey, loosely compacted silty clay with very high degree of rooting.
205	Deposit	Bank deposit; Light to mid yellowy-brown, very firmly compacted sandy clay with frequent angular and sub-angular stones.
206	Deposit	Bank deposit; mid brown, firmly compacted sandy clay with frequent rounded and sub-rounded stones.
207	Deposit	Turf Bank; Mid to light grey-brown, moderately compacted silty sand with frequent thin, dark grey to black silty sandy silt lenses representing preserved turves.
208	Deposit	Palaeosoil; mid to light grey, moderately compacted silty sand..
300	Deposit	Topsoil. Very dark grey loosely compact silty clay. High degree of rooting.
301		Natural; Light yellowy brown sandy clay with occasional rounded boulders.
302	Deposit	Bank/ slumping deposit; Mid yellowy-brown, firmly compacted sandy clay with frequent angular and sub-angular stones.
303	Deposit	Palaeosoil; mid to light grey, moderately compacted silty sand.
304	Cut	Foundation cut for modern concrete and rubble kerb (305)
305	Deposit	Concrete and rubble foundation for modern kerb.
306	Deposit	Modern carpark deposit- tarmac
307	Deposit	Modern carpark deposit- compacted sandy gravel
308	Deposit	Consolidation/ demolition deposit; Angular and sub-angular

		rubble and brick within a matrix of dark grey-brown silty clay.
401	Deposit	Natural; Light yellowy brown sandy clay with occasional rounded boulders.
402	Cut	East-west aligned straight linear in plan with straight, near vertical sides to irregular, flat base.
403	Deposit	Fill of [402]; mid to dark grey-brown, firmly compacted silty clay
404	Deposit	Modern Carpark deposit; firmly compacted angular sandy gravel.
405	Deposit	Modern Carpark deposit; firmly compacted angular sandy gravel.
406	Deposit	Modern Carpark deposit; firmly compacted angular sandy gravel.
407	Deposit	Modern Carpark deposit; firmly compacted angular sandy gravel.
501	Deposit	Natural; Light yellowy brown sandy clay with occasional rounded boulders.
502	Deposit	Modern Carpark deposit; firmly compacted angular sandy gravel.
503	Deposit	Modern Carpark deposit; firmly compacted angular sandy gravel.
504	Deposit	Modern Carpark deposit; firmly compacted angular sandy gravel.
505	Deposit	Modern Carpark deposit; firmly compacted angular sandy gravel.
506	Deposit	Modern Carpark deposit; firmly compacted angular sandy gravel.

Table 4: List of Contexts issued during Phase 1 evaluation.

APPENDIX 2: FIGURES



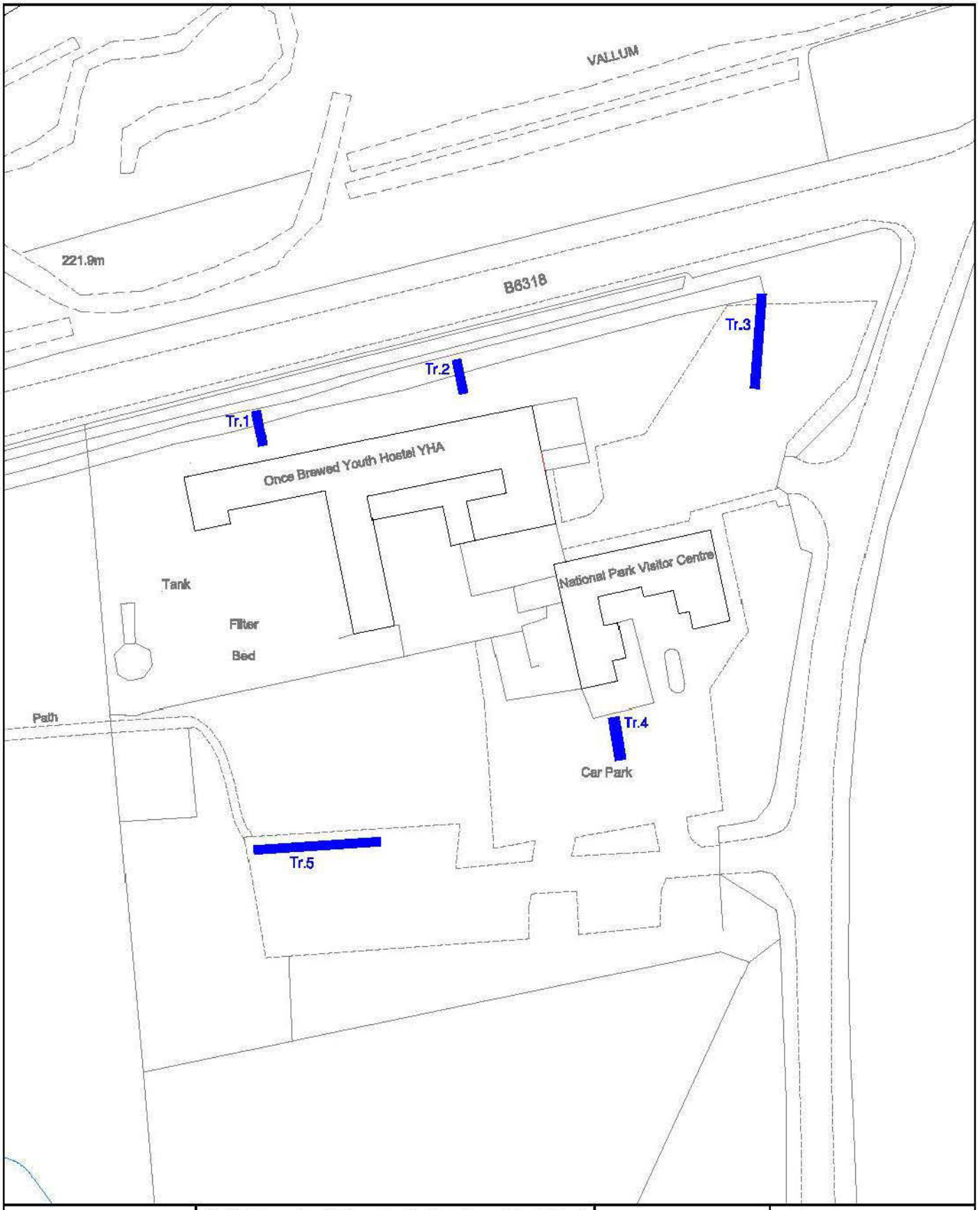
PROJECT:	Land Adjacent to The Once Brewed Youth Hostel and National Park Centre, Northumberland
SCALE:	1:25,000 at A4
REPORT No:	CP10696
CLIENT:	Northumberland National Park Authority
DRAWN BY:	AB
DATE:	November 2013
FIGURE:	1

KEY:

Site location

Wardell Armstrong Archaeology 2013

Figure 1: Site location.



wardell armstrong archaeology

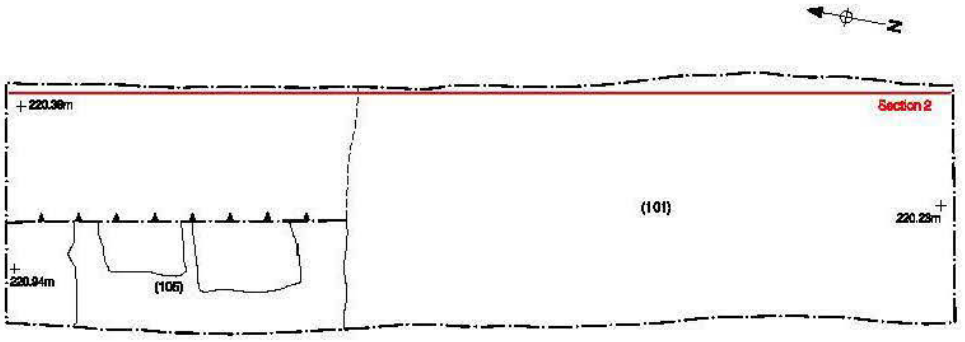
Wardell Armstrong Archaeology 2013

PROJECT:	Land Adjacent to The Once Brewed Youth Hostel and National Park Centre, Northumberland
SCALE:	1:750 at A4
REPORT No:	CP10696
CLIENT:	Northumberland National Park Authority
DRAWN BY:	AB
DATE:	November 2013
FIGURE:	2

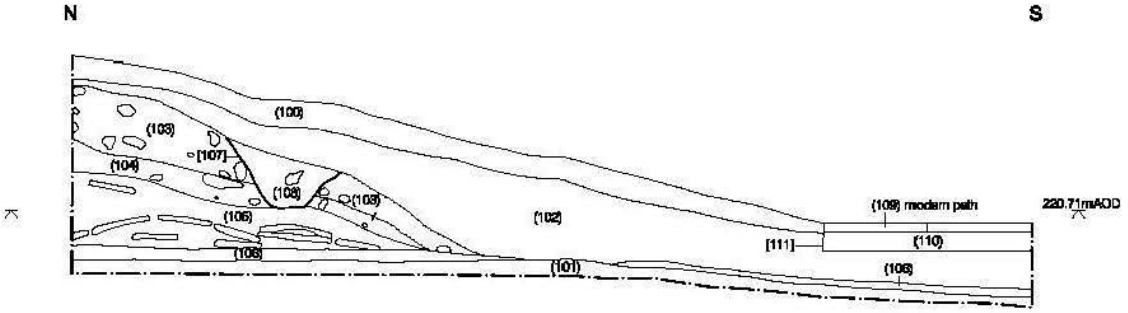
KEY:

Evaluation trenches

Figure 2: Location of Trenches 1-5.



Trench 1. Plan.



Section 2. West facing section, Trench 1.

PROJECT:	Land Adjacent to The Once Brewed Youth Hostel and National Park Centre, Northumberland
SCALE:	1:40 at A4
REPORT No:	CP10696
CLIENT:	Northumberland National Park Authority
DRAWN BY:	AB/CP
DATE:	November 2013
FIGURE:	3

KEY:

[101] Context numbers

Height mAOD

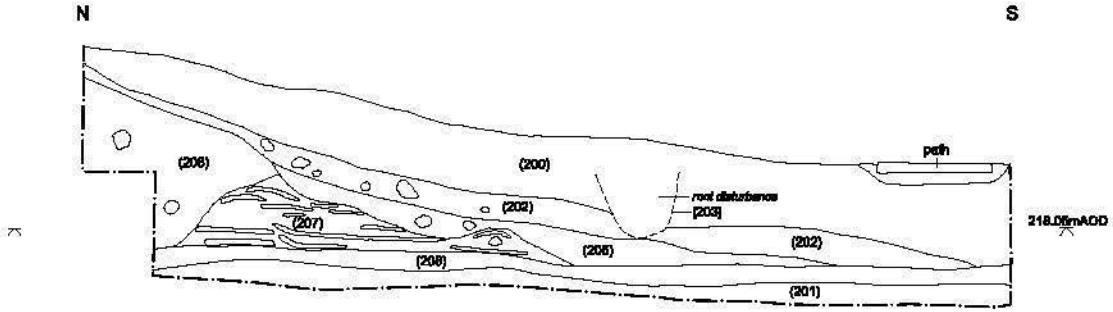
Section location

Limit of excavation

Wardell Armstrong Archaeology 2013

Figure 3: Trench 1; plan and section.

Trench 2, plan.



Section 3. West facing section, Trench 2.

0 2m

Wardell Armstrong Archaeology 2013

PROJECT:
Land Adjacent to The Once Brewed Youth Hostel and National Park Centre, Northumberland

CLIENT:
Northumberland National Park Authority

SCALE: 1:40 at A4

DRAWN BY: AB

DATE: November 2013

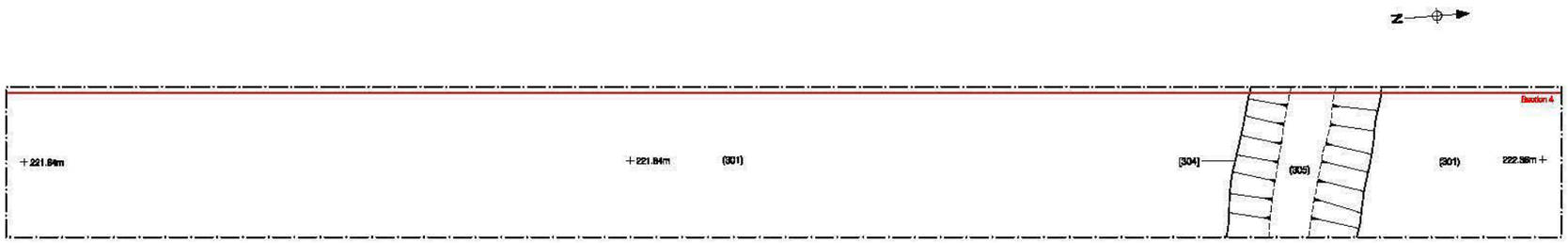
KEY:

[101] Context numbers
Height mAOD
Section location
Limit of excavation

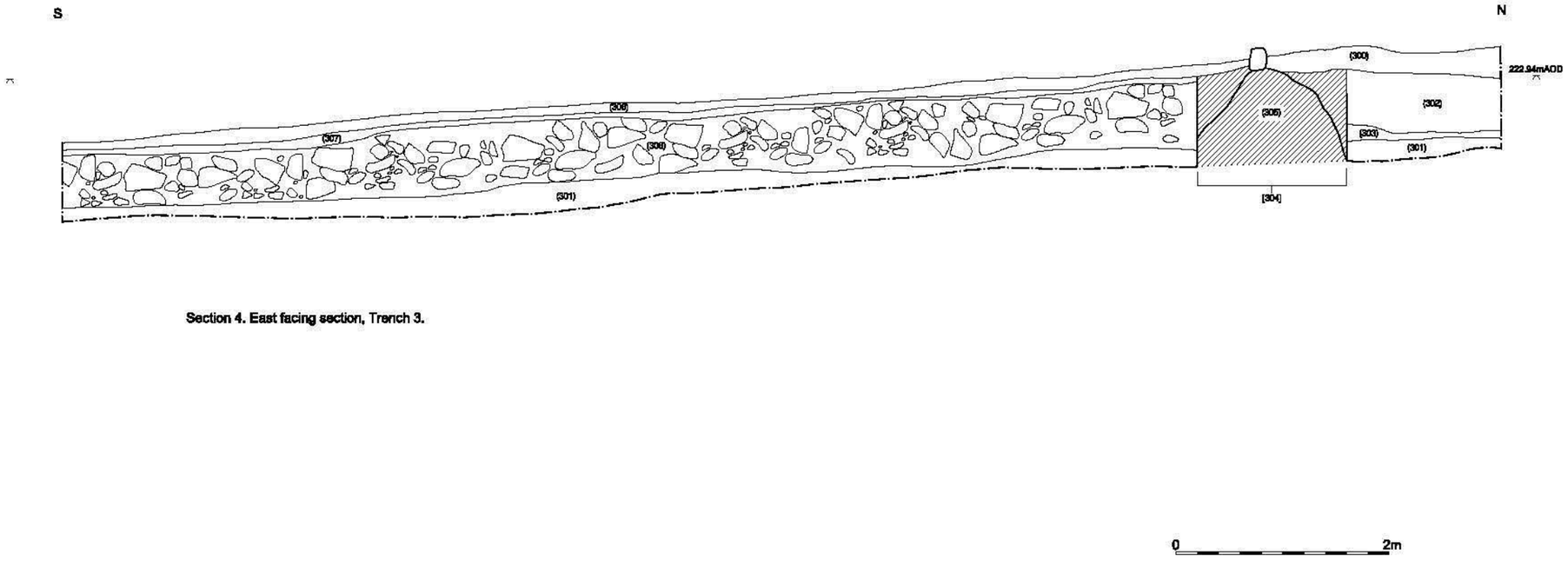
REPORT No:
CP10696

FIGURE:
4

Figure 4: Trench 2; plan and section.



Trench 3, plan.



Section 4. East facing section, Trench 3.

wardell armstrong archaeology

Wardell Armstrong
Archaeology
2013

PROJECT:

Land Adjacent to
The Once Brewed Youth Hostel
and National Park Centre,
Northumberland

CLIENT:

Northumberland National
Park Authority

SCALE: 1:50 at A3

DRAWN BY: AB/CP

DATE: November 2013

KEY:

[101] Context numbers
Height mAOD
Section location
Limit of excavation

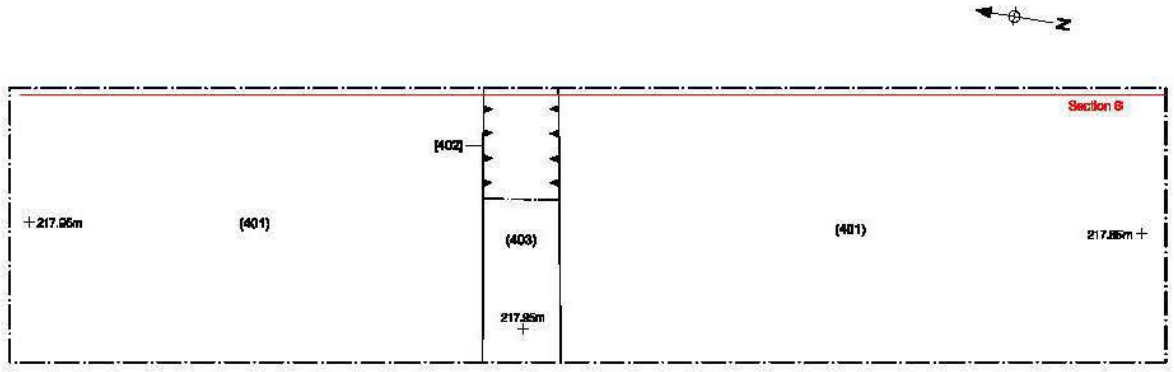
REPORT No:

CP10696

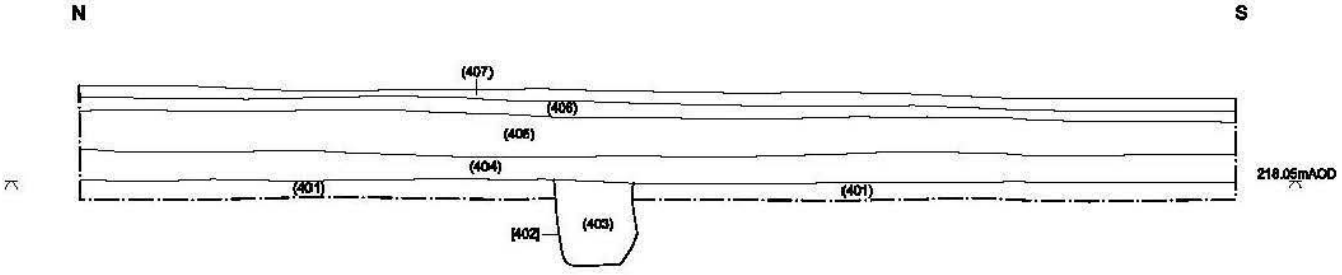
FIGURE:

5

Figure 5: Trench 3; plan and section.



Trench 4. Plan.



Section 6. West facing section, Trench 4.

0 2m

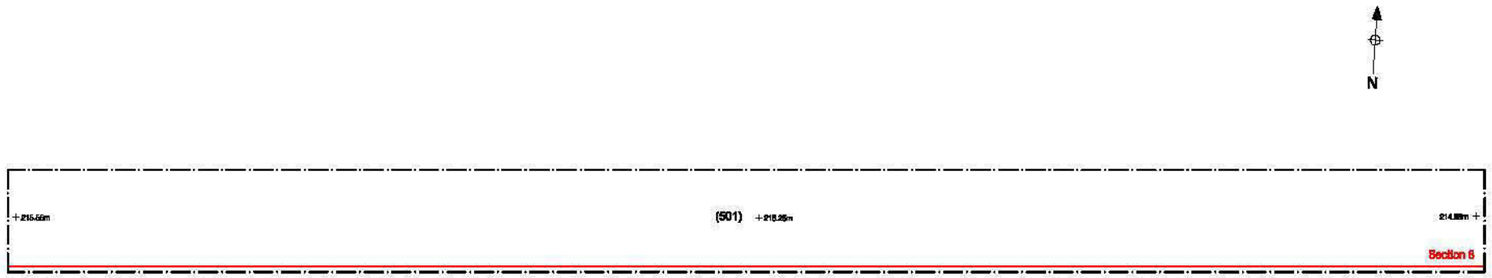
PROJECT:	Land Adjacent to The Once Brewed Youth Hostel and National Park Centre, Northumberland
SCALE:	1:40 at A4
REPORT No:	CP10696
CLIENT:	Northumberland National Park Authority
DRAWN BY:	AB/CP
DATE:	November 2013
FIGURE:	6

Wardell Armstrong Archaeology 2013

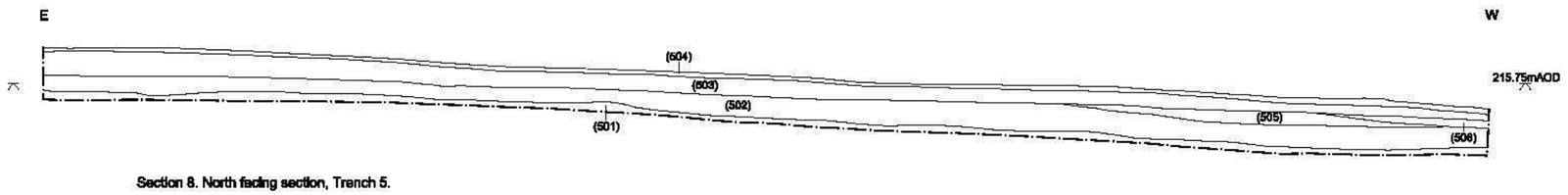
KEY:

[101] Context numbers
Height mAOD
Section location
Limit of excavation

Figure 6: Trench 4; plan and section.



Trench 5, plan.



Section 8. North facing section, Trench 5.

0 5m

wardell armstrong archaeology

Wardell Armstrong
Archaeology
2013

PROJECT:
Land Adjacent to
The Once Brewed Youth Hostel
and National Park Centre,
Northumberland

CLIENT:
Northumberland National
Park Authority

SCALE: 1:75 at A3

DRAWN BY: AB/CP

DATE: November 2013

KEY:

[101] Context numbers
Height mAOD
Section location
Limit of excavation

REPORT No:
CP10696

FIGURE:
7

Figure 7: Trench 5; plan and section.

wardell-armstrong.com

STOKE-ON-TRENT
Sir Henry Doulton House
Forge Lane
Etruria
Stoke-on-Trent
ST1 5BD
Tel: +44 (0)845 111 7777

CARDIFF
22 Windsor Place
Cardiff
CF10 3BY
Tel: +44 (0)29 2072 9191

EDINBURGH
Suite 2/3, Great Michael House
14 Links Place
Edinburgh
EH6 7EZ
Tel: +44 (0)131 555 3311

GREATER MANCHESTER
2 The Avenue
Leigh
Greater Manchester
WN7 1ES
Tel: +44 (0)1942 260101

LONDON
Sutherland House
5-6 Argyll Street
London
W1F 7TE
Tel: +44 (0)20 7287 2872

NEWCASTLE UPON TYNE
City Quadrant
11 Waterloo Square
Newcastle upon Tyne
NE1 4DP
Tel: +44 (0)191 232 0943

PENRYN
Tremough Innovation Centre
Tremough Campus
Penryn
Cornwall
TR10 9TA
Tel: +44 (0)1872 560738

SHEFFIELD
Unit 5
Newton Business Centre
Newton Chambers Road
Thorncliffe Park
Chapeltown
Sheffield
S35 2PH
Tel: +44 (0)114 245 6244

TRURO
Wheal Jane
Baldhu
Truro
Cornwall
TR3 6EH
Tel: +44 (0)1872 560738

WEST BROMWICH
Thynne Court
Thynne Street
West Bromwich
West Midlands
B70 6PH
Tel: +44 (0)121 580 0909

International offices:

ALMATY
29/6 Satpaev Avenue
Rahat Palace Hotel
Office Tower
9th floor
Almaty
Kazakhstan
050040
Tel : +7-727-3341310

MOSCOW
Suite 2, Block 10,
Letnikovskaya St.
Moscow, Russia
115114
Tel: +7(495) 980 07 67

Wardell Armstrong Archaeology:

CUMBRIA
Cocklakes Yard
Carlisle
Cumbria
CA4 0BQ
Tel: +44 (0)1228 564820

EXTENDED PHASE 1 HABITAT SURVEY

ONCE BREWED VISITOR CENTRE & YOUTH HOSTEL

Report No 2
Final
October 2013

Principal Contact:

Dr Antony Martin BSc PhD MLI MCIEEM
Director
Tony.martin@e3ecology.co.uk

Client	Revision	Status	Date	Author	Proof Read	Checked
Northumberland National Park Authority	R01	Draft	25.06.13	JA/ADM		ADM
	R02	Draft	02.08.13	JA	RA	JS
	R03	Final	14.10.13	ADM		
Job No. 649						

CONTENTS

SUMMARY 4

A INTRODUCTION 7

A.1 Background to Development 7
A.2 Personnel 9
A.3 Objectives of Study 9

B RELEVANT LEGISLATION AND PLANNING CONTEXT 10

B.1 National Planning Policy Framework 10
B.2 Protected Species Legislation 10

C SURVEY AREA AND METHODOLOGY 12

C.1 Survey Area 12
C.2 Methodology 13
C.2.1 Desktop Study 13
C.2.2 Field Survey 13
C.2.2.1 Survey Equipment 13
C.2.2.2 Phase 1 Habitats 13
C.2.2.3 Protected Species 13
C.2.2.4 White Clawed Crayfish 13
C.2.2.5 Bats 14
C.2.2.6 Biodiversity Action Plan Species 14

D RESULTS 15

D.1 Desktop Study 15
D.1.1 Pre-existing Information 15
D.1.2 Consultation 15
D.2 Field Survey 16
D.2.1 Habitats 16
D.2.2 Target Notes 18
D.2.3 Species 21

E ASSESSMENT 24

E.1 Habitat Conservation Value 25
E.2 Protected and Biodiversity Action Plan Species 25
E.3 Limitations 26
E.4 Impact Assessment 26

F MITIGATION AND RECOMMENDATIONS 26

F.1 Further Survey 26
F.2 Mitigation Requirements 26

SUMMARY

E3 Ecology Ltd was commissioned by Northumberland National Park Authority to undertake an extended phase 1 survey of Once Brewed visitor centre and youth hostel in June 2013 and a white-clawed crayfish survey in September 2013.

The site is located in an upland location in Northumberland National Park, 500m south of Hadrian's Wall. The proposed development consists of the demolition of the existing youth hostel and visitor centre buildings and the construction of a new multipurpose building. The remainder of the site will be landscaped to include creation of additional car parking and an outdoor classroom and play area.

Consultation with ERIC NE and the MAGIC website indicated that the site is immediately adjacent to the Roman Wall Escarpments SSSI, which is designated for its geological importance. The Roman Wall Loughs Special Area of Conservation lies within 600m of the site. The SAC is deignated due to the presence of three natural eutrophic lakes. Records of otter, red squirrel and badger were identified within a 2km radius of the site.

Consultation with the ecologist at the Northumberland National Park Authority indicated use of the open fields in the surrounding area by waders, such as curlew. The potential use of the burn to the south of the site by white-clawed crayfish and otter was also highlighted, but it was confirmed that there are no existing water vole records in the local area. White-clawed crayfish are known to use burns and loughs to the north of the site, with otter known to use watercourses throughout the National Park. The National Park Authority ecologist also highlighted that grassland fungi, including waxcaps and related species have recently been recorded along Hadrian's Wall, although there are no records for this specific site.

The site is in an area dominated by upland pasture and meadow, often unimproved and species-rich. Brackies Burn runs adjacent to the southern site boundary and encloses the pasture that forms part of the site to the southern and western boundaries. There is mature plantation mixed woodland around the youth hostel, and a further triangle of mixed plantation to the east of the main field. An area of wet flush, interspersed with smaller areas of semi-improved grassland, lies to the west of the site. Rhododendron sp, a Schedule 9 listed invasive species, was identified within the plantation woodland surrounding the youth hostel.

The grassland around the visitor centre is regularly cut amenity grassland, but areas associated with the youth hostel have been allowed to grow long, forming coarse mesotrophic grassland and, in the plantations to the south, tall ruderal communities.

The field to the south is dominated by improved and poor semi-improved pasture, used for sheep grazing at the time of survey. The character of the grassland varies distinctly with slope, with the steeper banks having escaped any agricultural improvement, other than intensive grazing, and supporting semi-improved neutral and acidic grassland communities, grading into marshy grassland communities along the meandering stream, where the introduced monkey flower was recorded. To the south, along the verges of the lane, are areas of good quality unimproved grassland. These more diverse grasslands, though common in the local area, are threatened nationally and areas should be conserved within the designed landscape. Survey in early October of the less improved areas of grassland did not record any waxcap fungi.

Buildings onsite consit of the single storey, u-shaped visitor centre and two-storey, L-shaped youth hostel accommodation block. Full details of bat survey work of these buildings and the site are provided in a separate bat report.

Breeding bird communities are likely to be of no more than local ecological value, with the potential for birds of open farmland such as skylark to nest within the grassland when the farmland management is appropriate. Breeding waders were not recorded within the site boundary.

Field signs of badger were recorded at the southern end of the site but no setts were recorded, and suitable foraging for the species is abundant in the local area, hence the site is likely to be of no more than local value for badger.

There is a risk that reptile species such as adder, common lizard and perhaps slow worm will use areas of the site, which provide an appropriate mosaic of habitats, but the main field will provide poor conditions for them. The site is likely to be of local value to reptiles.

Survey for white clawed crayfish was carried out in September 2013 and recorded no signs of the species, with the shallow burn considered to be of generally poor suitability for the species. It is therefore considered that white-clawed crayfish are absent from the site.

There is a possibility that otter may use the burn as a commuting and foraging route, although no field signs were recorded and it is likely to be of no more than local value to the species.

No signs of water vole were recorded during this survey, and it is considered that the species is absent from the site.

Red squirrel have been recorded in the immediate local area within the last year, and the plantation woodland may provide habitat of local value to the species for foraging and drey creation.

No ponds are evident within 500m of the site, hence great crested newt are considered likely to be absent from the site.

Overall, the main potential ecological constraints in approximate order of priority are:

1. The bat roosts within the buildings which will result in timing constraints, a requirement for licensing, and a need for detailed ecological input into design of new structures where it is intended to support bat roosts;
2. The stream corridors and the requirement to retain very high water quality during both construction and operation;
3. The resource of maturing trees;
4. The areas of more species-rich unimproved grassland;
5. If the footprint of the new buildings and car parking is greater than the existing footprints, then BREEAM ecology points are likely to be limited unless green roofs can be incorporated into the design.

The likely effects of the proposed development, without appropriate targeted mitigation, are:

- Loss of roosts supporting a range of bat species and harm/disturbance to bats (full details given in separate bat report).
- Loss of foraging and nesting areas for bats, birds and red squirrel through loss of trees and scrub.
- Loss of foraging areas for species such as badger through redevelopment of the site.
- Loss of areas of species-rich unimproved grassland of parish value.
- Loss of/damage to stream corridors, including pollution during construction and operation, which potentially support otter.

- Spread of Rhododendron, a Schedule 9 listed invasive species.

Key mitigation requirements include:

Timing of Works

- Removal of vegetation should be carried out outside of the bird-nesting season, unless a suitably qualified ecologist confirms that nests are absent.

Habitat Creation and Enhancement

- Landscape design should incorporate a mosaic of habitats including the retained unimproved neutral grassland, plantation woodland, scattered trees and shrubs, new ponds and mires as a resource for bats, birds, reptiles and amphibians.

Good Working Practices

- Trees around the youth hostel will be retained wherever possible, with a root protection zone in place. Lighting around the trees will be avoided if at all possible, or kept low level and low lux.
- Removal of Rhododendron, a Schedule 9 species, must be completed to a method statement (Appendix 1).
- Care must be taken to protect the quality of the watercourse adjacent to the site.
- Long-term management should enhance the biodiversity of the local habitats.

Mitigation requirements with relation to bats are detailed in the separate bat report.

The local planning authority and Natural England are likely to require the means of delivery of the mitigation to be identified. It is recommended that mitigation and enhancement proposals are incorporated into the master-planning documents.

Before this report can be used to support a planning application it is recommended that:

- The project ecologist provides input into the site drainage plan, with respect to retention of water quality of Brackies Burn.

If you are assessing this report for a local planning authority and have any difficulties interpreting plans and figures from a scanned version of the report, E3 Ecology Ltd would be happy to email a PDF copy to you. Please contact us on 01434 230982.

A INTRODUCTION

E3 Ecology Ltd was commissioned by Northumberland National Park to undertake an extended phase 1 survey of Once Brewed Visitor Centre and Youth Hostel in June 2013 and white-clawed crayfish survey of the site in September 2013 to meet the requirements of the local planning authority.

A.1 Background to Development

The National Park visitor centre and youth hostel are situated in Northumberland National Park at Once Brewed at grid reference NY 753 667. Site location is illustrated in figure 1 below:

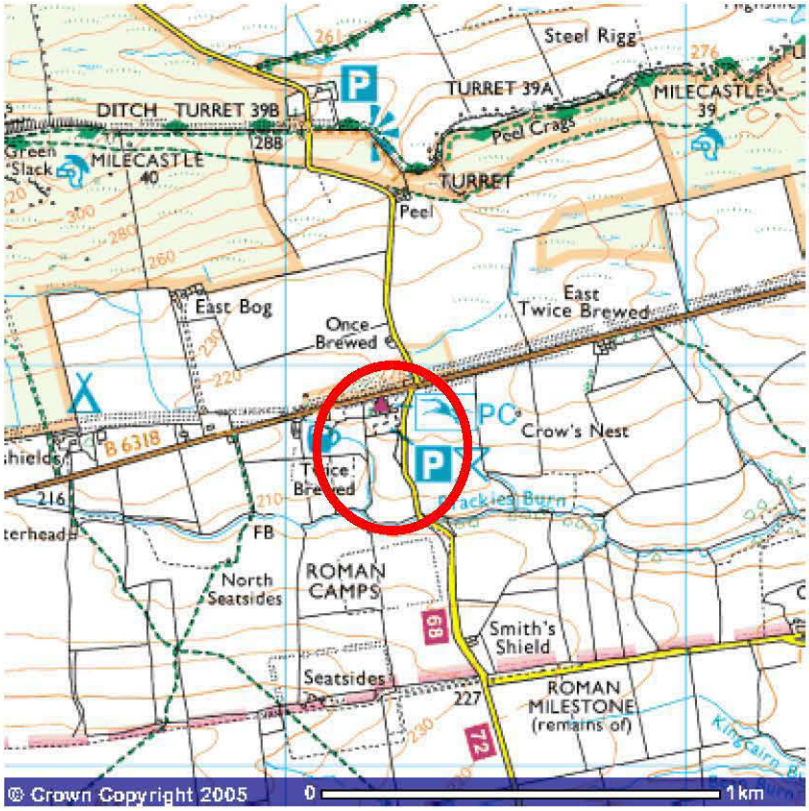


Figure 1 – Site Location
(Reproduced from the ordnance survey map with the permission of the controller of Her Majesty's stationery office. CJ Crown Copyright reserved. Licence number 100039392.)

It is proposed to demolish the existing buildings on site, to redevelop the site with a single multipurpose building, outdoor classroom, car parking, landscaping and a play area.

Figure 2, below, illustrates the currently available plans for the proposed development.

Figure 2 – Development Proposals

A.2 Personnel

Survey work and reporting was undertaken by:

- Tony Martin BSc PhD MLI MCIEEM
- Neil Beamsley BSc MCIEEM
- Jessica Andrews BSc MSc GradCIEEM
- Emma Barnes BSc MSc
- James Streets BSc MSc MCIEEM

The project was supervised by:

- Tony Martin BSc PhD MLI MCIEEM

Details of experience and qualifications are available at www.e3ecology.co.uk.

A.3 Objectives of Study

To determine the presence or otherwise of habitats of conservation value or protected species, the extent that they may be affected by the proposed development and, where necessary, to develop mitigation proposals that will allow development to proceed without significant adverse ecological effect.

B RELEVANT LEGISLATION AND PLANNING CONTEXT

B.1 National Planning Policy Framework

The Government's National Planning Policy Framework (NPPF) states the following:

- Plan policies and planning decisions should be based upon up-to-date information about the natural environment (Paragraph 158 and 165).
- Plan policies should promote the preservation, restoration and recreation of priority habitats, ecological networks and the recovery of priority species (Paragraph 117).
- Local planning authorities should set out a strategic approach in their Plans, planning positively for the creation, protection, enhancement and management of networks of biodiversity and green infrastructure. (Paragraph 114).
- When determining planning applications in accordance with the Local Plan and the presumption in favour of sustainable development local planning authorities should aim to conserve and enhance biodiversity by applying a number of principles, including if significant harm resulting from a development cannot be avoided, adequately mitigated, or, as a last resort, compensated for, then planning permission should be refused. (Paragraph 118).

B.2 Protected Species Legislation

The following protected species may be present on a site such as this:

Species	Relevant Legislation	Level of Protection
Bats (All species)	• Protection under the Wildlife and Countryside Act (WCA) (1981) (Listed on Schedule 5) - as amended • Classified as European protected species under Conservation of Habitats and Species Regulations 2010 • Bats are also protected by the Wild Mammals (Protection) Act 1996	The WCA (1981) and Habitat Regulations (2010) make it an offence to: • Intentionally kill, injure, or take any species of bat • Intentionally or recklessly disturb bats • Intentionally or recklessly damage destroy or obstruct access to bat roosts
Otter	• Protection under the Wildlife and Countryside Act (WCA) (1981) (Listed on Schedule 5) - as amended • Classified as European protected species under Conservation of Habitats and Species Regulations 2010 • Otters are also protected by the Wild Mammals (Protection) Act 1996	The WCA (1981) and Habitat Regulations (2010) make it an offence to: • intentionally kill, injure, or take otters • intentionally or recklessly disturb otters • intentionally or damage destroy or obstruct access to otter holts or any place used by the animal for shelter or protection
Great Crested Newt	• Protection under the Wildlife and Countryside Act (WCA) (1981) (Listed on Schedule 5) - as amended • Classified as European protected species under Conservation of Habitats and Species Regulations 2010	The WCA (1981) and Habitat Regulations (2010) make it an offence to: • intentionally kill, injure, or take great crested newts • intentionally or recklessly disturb great crested newts • intentionally or recklessly damage destroy or obstruct access to any place used by the animal for shelter or protection
Red Squirrel	• Full protection under the Wildlife and Countryside Act (WCA) (1981) (Listed on Schedule 5) - as amended • Red squirrels are also protected by the Wild Mammals (Protection) Act 1996	The WCA (1981) makes it an offence to: • intentionally kill, injure, or take red squirrels • intentionally or recklessly damage destroy or obstruct access to any place used by the animal for shelter or protection or disturb red squirrels whilst they are using such a place

Species	Relevant Legislation	Level of Protection
Birds	• Protection under the Wildlife and Countryside Act (1981) as amended with the exception of some species listed in Schedule 2 of the Act	The WCA (1981) makes it an offence to (with exceptions for certain species): • Intentionally kill, injure or take any wild bird • Intentionally take, damage or destroy nests in use or being built (including ground nesting birds) • Intentionally take, damage or destroy eggs • Species listed on Schedule 1 of the WCA or their dependant young are afforded additional protection from disturbance whilst they are at their nests
White-clawed Crayfish	• Partially protected by the Wildlife and Countryside Act (1981)	The WCA (1981) makes it an offence to: • Take a white-clawed crayfish from its habitat • Sell, offer for sale, advertise for sale, possess or transport for the purposes of selling any live or dead white clawed crayfish
Badger	• Protection of Badgers Act 1992 • Badgers are also protected by the Wild Mammals (Protection) Act 1996	The Protection of Badgers Act (1992) makes it an offence to intentionally or recklessly: • Damage a badger sett or any part of it • Destroy a badger sett • Obstruct access to, or any entrance of a badger sett • Disturb a badger whilst it is occupying a badger sett
Water Vole	• Full protection under the Wildlife and Countryside Act (WCA) (1981) (Listed on Schedule 5) - as amended • Water voles are also protected by the Wild Mammals (Protection) Act 1996	The WCA (1981) makes it an offence to: • intentionally kill, injure, or take water voles • intentionally or recklessly damage destroy or obstruct access to any place used by the animal for shelter or protection or disturb water voles whilst they are using such a place
Common reptiles (Slow-worm, Adder, Grass Snake, Common Lizard)	• Partially protected by the Wildlife and Countryside Act	The WCA (1981) makes it an offence to: • intentionally kill or injure these animals • Sell, offer for sale, advertise for sale, possess or transport for the purposes of selling any live or dead animals or part of these animals
Under the Countryside and Rights of Way Act 2000 (CROW Act) the offence in section 9(4) of the Wildlife and Countryside Act 1981 of damaging a place of shelter or disturbing those species given full protection under the act is extended to cover reckless damage or disturbance.		

Although not afforded any legal protection, species listed as Biodiversity Action Plan (UK or Local) priority species are a material consideration in the planning process and as such have been assessed accordingly within this report.

C SURVEY AREA AND METHODOLOGY

C.1 Survey Area

Figure 3 illustrates the site boundary whilst Figure 4 illustrates the broad habitats present on site and within an approximate 500m buffer zone.

Figure 3 – Aerial photograph illustrating the extent of the site with a redline boundary
(Reproduced under licence from Google Earth Pro.)

Figure 4 – Aerial photograph centred on the site with a 500m radius illustrating the setting and the habitats it supports
(Reproduced under licence from Google Earth Pro.)

The study area includes the site and adjacent land to allow for possible secondary impacts in line with Natural England recommendations.

C.2 Methodology

C.2.1 Desktop Study

Initially, the site was assessed from aerial photographs and 1:25000 OS plans. Following this, consultation was undertaken with the Local Records Centre and the National Park Authority ecologist. The MAGIC website was checked for any notable sites or habitat or species records.

C.2.2 Field Survey

C.2.2.1 Survey Equipment

The following items of equipment were utilised during survey work and analysis:

- Leica Ultravid 8 x 32 binoculars
- Pond net
- Hand lens

C.2.2.2 Phase 1 Habitat Survey

The field survey of the proposed site was conducted using the methodology of the Joint Nature Conservation Committee's Phase 1 Habitat Survey, as outlined in their manual[1]. Each parcel of land was assessed by a trained surveyor and classified as one of approximately ninety habitat types. These were then mapped and the habitat information supplemented by dominant and indicator species codes and target notes where appropriate.

Survey was undertaken on 24.06.13 and 30.07.13. There were no constraints to the survey work. Survey for wax cap fungi was undertaken on 8.10.13.

C.2.2.3 Protected Species

As part of the extended Phase 1 survey, the risk of protected species being present was assessed from the consultation responses, field signs and local knowledge. If present, any trackways regularly used by badger and deer were mapped, and any badger sett usage assessed by the presence of freshly dug earth and/or bedding at the entrance. Wetlands were reviewed for their potential use by great crested newt, otter and water voles, with particular attention paid to possible otter sprainting sites and resting areas. The risk of reptiles using the site was assessed based on the habitats present. Structures and trees were assessed for the risk of supporting roosting bats. Likely use of the site by birds was assessed from the species seen during the survey, and the habitats present.

C.2.2.4 White Clawed Crayfish

Survey of white-clawed crayfish was carried out at Brackies Burn on the 25.09.13.

A survey area of 250m upstream and downstream of the site was undertaken, where water depths allowed, in order to determine the presence/absence of the species. Within this area, sections of good quality habitat were identified (if present), and refuge searching was undertaken with all refuges searched where possible. Refuge searching involves the turning over of rocks or other debris which crayfish may be able to hide under during the day (as they are nocturnal). A net is held downstream in order to capture any crayfish that may be disturbed by the movement of the rock, and then checked. This is especially useful if the

[1] JNCC (1993) Handbook for Phase 1 Habitat Survey – A technique for environmental audit.

waterbody is turbid and visibility is poor. When found, the approximate age and length of the crayfish is noted in order to determine the likely population size. An idea of the population size can also be determined from the density of crayfish caught.

C.2.2.5 Bats

E3 Ecology has undertaken bat survey work at Once Brewed since 2005, details of this are available in a separate bat report.

C.2.2.6 Biodiversity Action Plan Species

The likelihood of certain Biodiversity Action Plan (BAP) species (both UK and local designations) being present on site and affected by the development has also been assessed. The UK BAP species groups assessed are limited to birds, freshwater fish, herptiles, terrestrial mammals, butterflies and dragonflies. Where it is considered likely that there is a significant risk of UKBAP species being affected or where habitats are of particularly high value and/or where statutory sites are present in the vicinity which may be affected by development proposals, additional specialist survey work has been recommended. The presence of relevant species, based on habitats present and consultation data, listed on LBAP lists have been assessed.

D RESULTS

D.1 Desktop Study

D.1.1 Pre-existing Information

Figures 1 (A1) and 3 (C1) show that the general land use in the surrounding area is upland pasture with small stands of plantation woodland and a burn approximately 400m to the south. The most recent aerial photograph of the site (Figure 2, C1) indicates that habitats on site are dominated by buildings and car parking, with mature trees around the youth hostel, and a pasture field to the south. Historical imagery indicates that land use has remained the same since at least 2002.

Consultation with the government's Multi Agency Geographic Information for the Countryside website indicated that in addition to the site being within the Northumberland National Park, the Roman Wall Escarpments SSSI lies immediately to the north of the site. The SSSI is designated for geological importance of exposures of the Whin Sill in a landscape influenced by the action of ice during the last glaciation.

D.1.2 Consultation

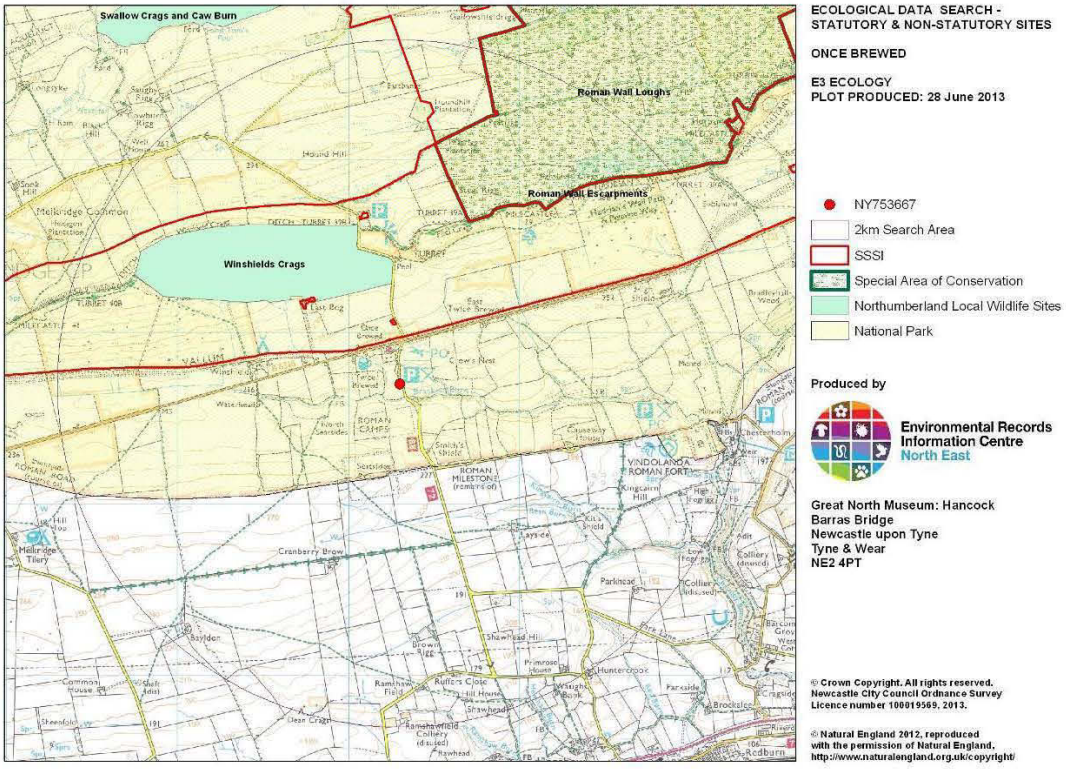
Consultation with the Environmental Records Information Centre for the North East (ERIC NE) provided records of the following protected and notable species within a 2km radius of the site from within the last 20 years:

Taxon	Species	Taxon	Species
Bird	Common buzzard	**Butterfly**	Green hairstreak
Flowering plant	Chives		Small heath
	Lesser tussock sedge		Large heath
	Few flowered sedge		Wall
	Dune helleborine	**Liverwort**	Bog Pawwort
	Snowdrop	**Mosses**	Large white moss
	Bogbean		Marsh thyme moss
	Long-stalked pondweed		Long fringe moss
	Annual knawel		Bog moss
	Betony		Lesser cow-horn bog-moss
Reptile	Slow worm		Red bog-moss
Terrestrial mammal	Roe deer		Feathery bog-moss
	West European hedgehog		Cow horn bog-moss
	European otter		Lesser cow horn bog-moss
	Eurasian badger		Melleganic bog-moss
	Stoat		Blunt leaved bog-moss
	Weasel		Papillose bog-moss
	Eurasian water shrew		Flat topped bog-moss
	Grey squirrel		Spiky bog-moss
	Red squirrel		Lustrous bog-moss
			Soft bog-moss

Records from ERIC NE also indicated that the Roman Wall Loughs Special Area of Conservation (SAC) lies approximately 600m to the north east of the site. The SAC covers

684 Ha and is designated due to the presence of three natural eutrophic lakes – Crag, Broomlee and Greenlees loughs. The loughs contain 11 species of pondweed between them, and the nationally rare autumnal water-starwort occurs in Crag Lough – the closest lake to the development site.

The Winshields Crags and Swallow Crags and Cow Burn Local Wildlife Sites (LWS) also lie within a 2km radius of the site. The locations of these sites are shown on the figure below:

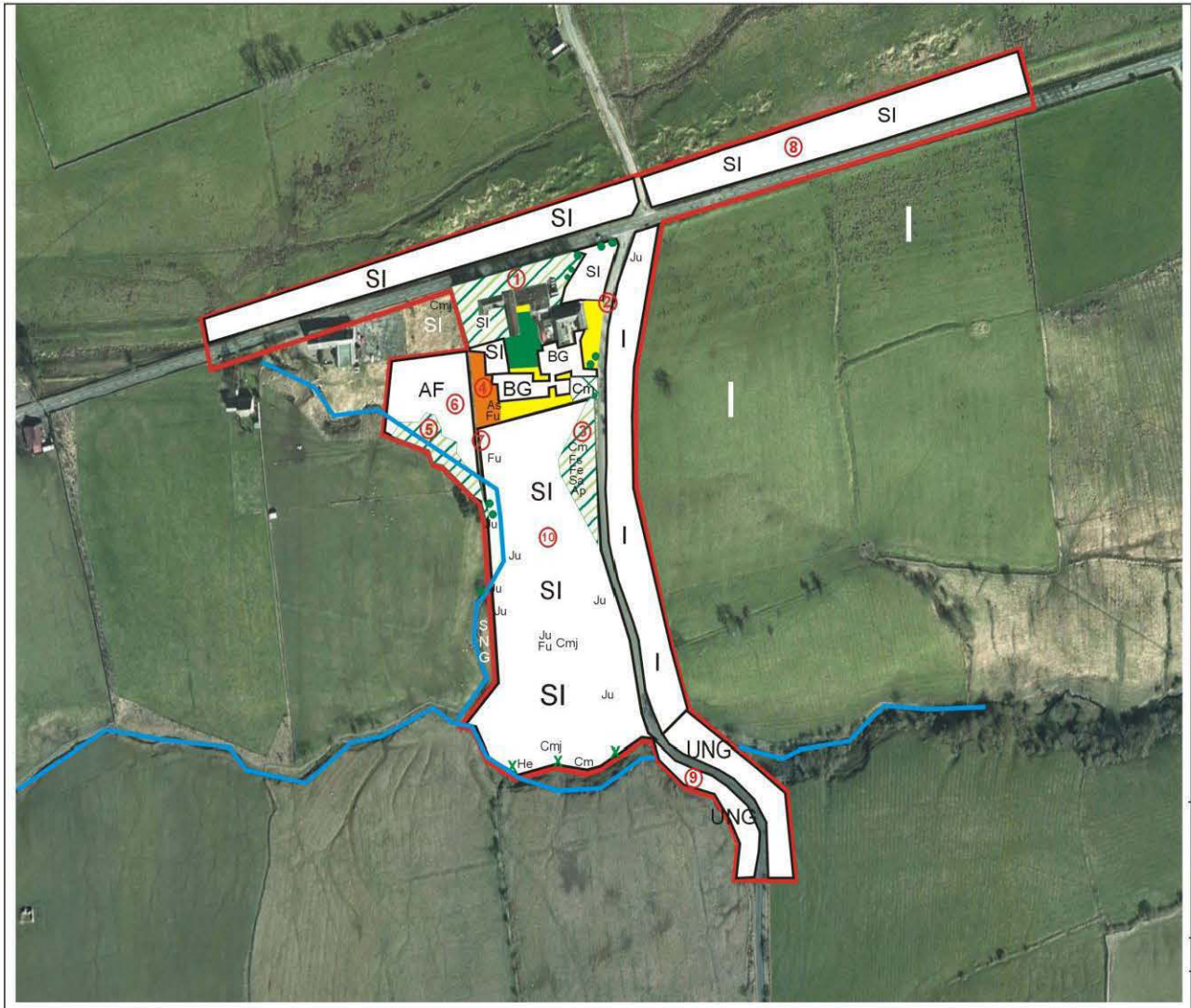


Consultation with the Northumberland National Park Authority indicated use of the open fields in the surrounding area by waders, including curlew. The potential use of the burn to the south of the site by white-clawed crayfish and otter was also highlighted, but it was confirmed that there are no existing water vole records in the local area. White-clawed crayfish are known to use burns and loughs to the north of the site, with otter known to use water courses throughout the National Park. The Hadrian's Wall area has recently been flagged with respect to grassland fungi, including waxcaps and related species, although there are no records for this specific site.

D.2 Field Survey

D.2.1 Habitats

The phase 1 map, Figure 6 below, illustrates the habitats present on site:



Key

- Semi-natural broadleaved woodland
- *Mixed plantation woodland -* Broadleaved dominant
- Dense scrub
- X Scattered scrub
- Running water
- Amenity grassland
- I Improved grassland
- SI Semi-improved grassland
- SNG Semi-improved neutral grassland
- SAG Semi-improved acid grassland
- UNG Un-improved neutral grassland
- Coarse, mesotrophic grassland
- BG Bare ground
- AF Flush

Ju Juncus spp.
Fu Meadow sweet
Cmj Pignut
He Wild angelica
As Hawthorn
Cm Beech
Fs Ash
Fe Sorbus sp.
Sa Sycamore

① Target note

Drawn By: JA
Date: 09.08.13
Revision: 01
Scale: NTS

E3 Ecology Ltd
Tel: 01434 230982

Job No:- 649

Title:- Once Brewed
Extended Phase 1 Habitat Map

The youth hostel is bordered by mature plantation mixed woodland, with a further small triangle of mixed plantation to the east of the main field. Both areas are unusual in the local area, which is characterised by open upland habitats and larger blocks of plantation woodland and provide important shelter for a range of species, including foraging bats. They are considered to be of parish conservation value. *Rhododendron ponticum* was recorded in the plantation woodland around the youth hostel. This is a Schedule 9 invasive species, and hence its removal must be undertaken to a method statement.

An area of flush, interspersed with smaller areas of semi-improved grassland lies to the west of the site. The grassland around the visitor centre is regularly cut amenity grassland, but areas associated with the youth hostel have been allowed to grow long, forming coarse mesotrophic grassland and, in the plantations to the south, tall ruderal communities. It is considered to be of low conservation value.

The field to the south (target note 10) is dominated by improved and poor semi-improved pasture, used for sheep grazing at the time of survey. The character of the grassland varies distinctly with slope, with the steeper banks having escaped any agricultural improvement, other than intensive grazing, and supporting semi-improved neutral grassland communities including species like pignut and bird's-foot trefoil and semi-improved acidic grassland communties, grading into marshy grassland communities along the meandering stream, where the introduced monkey flower was recorded. Further south, on the verges of the lane, are areas of good quality unimproved grassland (target note 9). These more diverse grasslands, though common in the local area, are threatened nationally and areas should be conserved within the designed landscape.

The burn is shallow and meandering in character with a gravel/pebble and cobble substrate and no higher aquatic plants in the adjacent section. Fish are likely to be absent, but deeper pools down stream could be suitable for white-clawed crayfish, and it has the potential to be used by otter moving through the landscape.

D.2.2 Target Notes

1. Mixed plantation woodland to north and west (Photo 1)

The youth hostel area is surrounded on the northern and western side by mixed plantation woodland, probably approximately 50 years old, with a mixture of wild cherry, (*Prunus avium*), rowan (*Sorbus aucuparia*), ash (*Fraxinus excelsior*), sycamore (*Acer pseudoplatanus*), silver birch (*Betula pendula*), beech (*Fagus sylvatica*) and sessile oak (*Quercus petraea*). The trees are tagged. The cherry trees are mainly in poor condition and appear to be dying. They lie over largely unmanaged poor semi-improved grassland with some pignut (*Conopodium majus*) and occasional rhododendron (*Rhododendron ponticum*). Generally the trees do not appear to have a significant bat roost risk, although some of the *Prunus* and *Sorbus* have areas of peeling and occluded bark, which could support individual roosting bats. Rhododendron is a schedule 9 invasive species and will be removed to a method statement.

2. Lane (Photo 2)

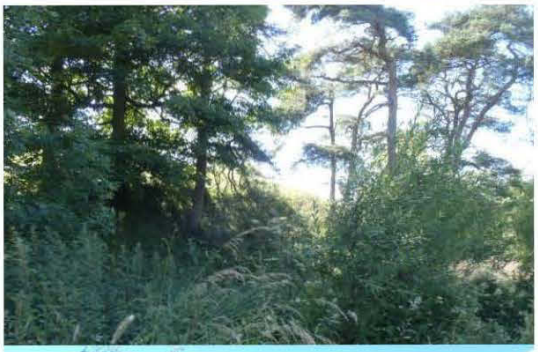
The lane along the eastern boundary of the visitor centre includes a number of maturing ash including several with bat boxes present.

3. Mixed plantation woodland to south (Photo 3)

with hawthorn (*Crataegus monogyna*) around the edges, this woodland is approximately 20 years old and has generally established a dense canopy / scrub layer with predominantly common nettle (*Urtica dioica*) beneath. This is likely to provide good cover for nesting and foraging birds and there is a developing canopy of ash and Scot's pine.

4. Area to west of car park (Photo 4)

To the west of the car park is an area of scattered tree planting, scrub and tall ruderal / coarse mesotrophic grassland communities. Tree species include sycamore (*Acer pseudoplatanus*), alder (*Alnus glutinosa*), and rowan (*Sorbus aucuparia*) with the herb layer dominated by common nettle (*Urtica dioica*), cow parsley (*Anthriscus sylvestris*), broad-leaved dock (*Rumex obtusifolius*), hogweed (*Heracleum sphondylium*) and creeping thistle (*Cirsium arvense*). Along the southern boundary this grades into unmanaged grassland communities including lady's mantle spp. (*Alchemilla spp.*), pignut (*Conopodium majus*), and meadow vetchling (*Lathyrus pratensis*).



5.Belt of semi-mature to mature plantation woodland (Photo 5).

To the west of the site is a belt of semi-mature to mature mixed plantation woodland with species including Scot's pine (*Pinus sylvestris*), sycamore (*Acer pseudoplatanus*), ash (*Fraxinus excelsior*) and alder (*Alnus glutinosa*).

6. Area of wet flush vegetation (Photo 6).

To the north of the woodland belt lies an area of wet flush vegetation. This may result from the outfall of a natural sewage filtration system and is interspersed with smaller areas of average acid grassland. Wetter areas are dominated by Phragmites, with some meadow sweet (*Fillipendula ulmaria*), black knapweed (*Centaurea nigra*), creeping thistle (*Cirsium arvense*), cow parsley (*Anthriscus sylvestris*), young alder (*Alnus glutinosa*), willow (*Salix spp.*), common nettle (*Urtica dioica*) and small patches of bramble (*Rubus fruticosus*).

7 - Stone wall, over-run with vegetation (Photo 7).
To the west of the youth hostel is a stone wall, currently over-run with vegetation. This is likely to provide a good location for common lizard and potentially slow worm and adder, and may also be used by small to medium sized mammals such as bank vole and stoat.

8 - Improved grassland (Photo 8).
The verge to the south side of the main road is generally species poor, improved grassland. The north side of the road is again species poor, but more semi-improved in character. Margins of the improved/semi-improved fields are significantly more botanically interesting, but are still quite species poor. Species present include false oat-grass (*Arrhenatherum elatius*), *Juncus spp.*, annual meadow grass (*Poa annua*), Yorkshire fog (*Holcus lanatus*), occasional black knapweed (*Centaurea nigra*), common nettle (*Urtica dioica*), rosebay willow-herb (*Chamerion angustifolium*), dandelion (Taraxacum officinale agg.), red dead-nettle (*Lamium purpureum*), greater plantain (*Plantago major*), red clover (*Trifolium pratense*), creeping buttercup (*Ranunculus repens*), wood avens (*Geum urbanum*) and small patches of wild thyme (*Thymus serpyllum*).

9 - Area of high quality neutral/acid grassland (Photos 9 and 10).

The verges to either side of the lane, further south adjacent to the main field surveyed comprises unimproved and species rich grassland. Species recorded include (not exhaustive): hogweed (*Heracleum sphondylium*), false oat-grass (*Arrhenatherum elatius*), common bent (*Agrostis capillaris*), yarrow (*Achillea millefolium*), bush vetch (*Vicia sepium*), black knapweed (*Centaurea nigra*), lady's bedstraw (*Galium verum*), heath bedstraw (*Galium saxatile*), compact rush (*Juncus conglomeratus*), carnation sedge (*Carex flacca*), ribwort plantain (*Plantago lanceolata*), lady's mantle spp. (*Alchemilla spp.*), bird's-foot trefoil (*Lotus corniculatus*), tormentil (*Potentilla erecta*), greater burnet (*Acaena magellanica)*, meadow vetchling (*Lathyrus pratensis*), pignut (*Conopodium majus*), goat willow (*Salix caprea*), common sorrel (*Rumex acetosa*), bilberry (*Vaccinium myrtillus*), common heather (*Calluna vulgaris*), bramble (*Rumex fruticosus*), wood avens (*Geum urbanum*), common twayblade (*Neottia ovata)*, pyramidal

orchid *(Anacamptis pyramidalis)*, possible heath-marsh orchid hybrid, betony (*Stachys officianalis*), Yorkshire fog (Holcus lanatus) and sneeze wort (*Achillea ptarmica*).

10 – Semi improved grassland (Photo 11)

The main field on site, is dominated by poor semi-improved grassland, that was sheep grazed at the time of survey. The character of the site varies distinctly with slope, with improved grassland in less steep areas, and semi-improved neutral and acidic grassland communities present on steeper slopes. Marshy grassland communities feature along the burn.

D.2.3 Species

Bats

Full details of bat surveys are provided in the separate bat report.

White Clawed Crayfish

The watercourse to the south of the site is a typical upland burn varying between 1m and 0.3m in width and less than 0.1m and 0.5m in depth along the survey reach. Water speed is variable with areas of slower flowing water with a smooth flow and shallow sections with a broken standing wave flow type. The substrate along the watercourse is dominated by cobbles, pebbles and gravel. The banks are earthen and well vegetated with sections of the watercourse downstream of the site being over-shaded by trees and scrub. Upstream and adjacent to the site the watercourse flows through semi-improved grassland and marshy grassland and is open and small in size. Throughout the reach, the watercourse suffers from various levels of siltation.

No evidence of white clawed crayfish was recorded during survey work. The macro-invertebrate assemblage within the watercourse is limited to small numbers of cased caddis fly, *gammarus, baetidae*, and *asellus* indicative of moderate water quality. Macrophytes present within the watercourse are limited to water mint (*Mentha aquatica*), and water forget me not (*Myosotis scorpiodes*).

Otter

No evidence of otter was recorded during the survey work, however small numbers of fish, a potential food source, were recorded including small numbers of brown trout, stone loache and minnow.

Water Vole

No evidence of water vole was recorded during the survey.

Great Crested Newt

No water bodies were recorded on site and aerial imagery and OS maps confirm that there are no ponds evident within a 500m radius, therefore great crested newts are considered to be absent from the site.

Birds

There is potential for birds of open farmland, such as skylark, to nest within the grassland when the farmland management is appropriate. The main pasture within the site was regularly grazed by sheep during the survey period, and is small in extent, reducing the likelihood of waders such as curlew nesting. They are present in larger fields nearby that were being managed for hay/haylage.

Badger

Field signs of badger were recorded at the southern end of the site but no setts were recorded, and suitable foraging for the species is abundant in the local area. Consultation provided numerous records of badger using the local area, with the closest record being from Twice Brewed Inn, approximately 140m to the east of the site.

Reptiles

The over grown wall on site is likely to provide suitable habitat for reptiles, including common lizard, slow worm and adder. There is a risk that these species will also use other areas of site, which provide an appropriate mosaic of habitats, although the main field will provide poor conditions for them.

Red Squirrel

Consultation with ERIC NE indicated that red squirrel have been recorded at Twice Brewed and Crag Lough within the last year, both of which are within 500m of the site. It is possible that this species may use the woodland areas on site although no evidence of the species was recorded on site.

Invertebrates

Small skipper, small tortoiseshell, peacock and meadow brown butterflies were recorded on site during the July survey work. Bird's-foot trefoil, the food plant of dingy skipper (a UK BAP species) was recorded within the unimproved grassland areas; hence this species may be present.

Based on the habitats present and consultation information, the following UK and Local BAP species may also be present on site at times:

Species	Designation	Relevant habitat
Barn Owl	Northumberland BAP	Farmland, open fields
Bullfinch	UK BAP	Scrub, deciduous woodland
Common Linnet	UK BAP	Scrub, open farmland
Common Starling	UK BAP	Generalist
Dunnock	UK BAP	Scrub/hedge
Eurasian Tree Sparrow	UK BAP	Agricultural land, hedgerow, open farmland

Goldfinch	Northumberland BAP	Generalist
Greenfinch	Northumberland BAP	Scattered trees
House sparrow	UK BAP	Buildings
Kestrel	Northumberland BAP	Open farmland
Northern Lapwing	UK BAP	Agricultural land
Skylark	UK BAP	Open farmland
Song Thrush	UK BAP	Woodland
Yellowhammer	UK BAP	Agricultural land, open farmland
Curlew	UK BAP	Uplands

E ASSESSMENT

The value and significance of the habitats and species found was assessed against the following criteria developed from the Guidelines for Ecological Impact Assessment produced by the Institute of Ecology and Environmental Management[1].

Level of Value	Examples
International	• An internationally designated site or candidate site. • A viable area of a habitat type listed in Annex I of the Habitats Directive, or smaller areas of such habitat, which are essential to maintain the viability of a larger whole. • Any regularly occurring population of an internationally important species, which is threatened or rare in the UK. • Any regularly occurring, nationally significant population/number of any internationally important species.
National	• A nationally designated site. • A viable area of a priority habitat identified in the UK BAP, or smaller areas of such habitat, which are essential to maintain the viability of a larger whole. • Any regularly occurring population of a nationally important species, which is threatened or rare in the region or county. • A regularly occurring regionally or county significant population/number of any nationally important species. • A feature identified as of critical importance in the UK BAP.
Regional	• Viable areas of key habitat identified in the Regional BAP or smaller areas of such habitat, which are essential to maintain the viability of a larger whole. • A regularly occurring, locally significant number of a regionally important species.
County	• County designated sites. • A viable area of a habitat type identified in the County BAP. • Any regularly occurring, locally significant population of a species which is listed in a County "red data book" or BAP on account of its regional rarity or localisation. • A regularly occurring, locally significant number of a species important in a County context.
District	• Areas of habitat identified in a District level BAP. • Sites designated at a District level. • Sites/features that are scarce within the District or which appreciably enrich the District habitat resource. • A population of a species that is listed in a District BAP because of its rarity in the locality.
Parish	• Area of habitat considered to appreciably enrich the habitat resource within the context of the Parish. • Local Nature Reserves.
Local	• Habitats and species that contribute to local biodiversity, could only be replicated in the medium term, but are common in the local area. • Loss of such habitats would ideally be mitigated if local biodiversity is to be conserved and enhanced.
Low	• Habitats of poor to moderate diversity such as established conifer plantations, species poor hedgerows and unintensively managed grassland that may support a range of Local BAP species but which are unexceptional, common to the local area and whose loss can generally be readily mitigated.

1 Institute for Ecology and Environmental Management (2006) Guidelines for Ecological Impact Assessment in the United Kingdom (Version 7 July 2006). http:/www.ieem.org.uk/ecia/index.html.

E.1 Habitat Conservation Value

Overall, the site is considered to be of local conservation value with a mosaic of plantation woodland and grasslands present that are not uncommon in the wider area, and with better examples of their type within the parish. The more diverse semi-improved grassland communities within the main field, the unimproved grasslands on the lane verges to the south and mature plantation mixed woodland are considered to be features of higher ecological significance and these should be conserved within the designed landscape.

E.2 Protected and Biodiversity Action Plan Species

Bats
A separate bat survey report is available, providing details of potential impacts and mitigation with relation to bats.

White-Clawed Crayfish
No evidence of this species was recorded during survey work and the risk of the species being present is considered to be low as a result. Overall the site is of only low value to this species.

Birds
The site provides good habitat for nesting farmland and woodland edge birds, but due to the small area and presence of similar habitats in the surrounding area, is likely to only be of local value.

Badger
Although badger are likely to be using the site to forage, no setts were recorded and as suitable habitat is abundant in the local area, the site is considered to be of low value for badger.

Reptiles
The over grown wall to the south west of the buildings is considered to have potential to support reptiles. There is a risk that reptile species such as adder, common lizard and slow worm will use other areas of the site, which provide an appropriate mosaic of habitats, but the main field will provide poor conditions for them. The site is considered to be of local value to reptiles.

Great Crested Newt
No water bodies are evident within 500m of the site; therefore great crested newts are considered likely to be absent. The site is considered to be of negligible value to great crested newts.

Otter
No field signs of the species were recorded during the species, but as they are known to be present in the local area, there is a residual risk that otter use the burn as a commuting and foraging route. The site is likely to be of no more than local value to the species.

Red Squirrel
Red squirrel have been recorded in the local area, and may use the mature plantation woodland on site for foraging and drey creation. The site is considered to be of no more than local value to red squirrel.

Water Vole
No signs of water vole were recorded during the survey work, and the species is considered likely to be absent. The site is of negligible value to the species.

E.3 Limitations
There were no significant constraints to the survey work.

E.4 Impact Assessment
The likely effects of the proposed development, without appropriate targeted mitigation, are:

- Loss of roosts supporting a range of bat species and harm/disturbance to bats (full details given in separate bat report).
- Loss of foraging and nesting areas for bats, birds and red squirrel through loss of trees and scrub.
- Loss of foraging areas for species such as badger through redevelopment of the site.
- Loss of small areas of species-rich unimproved grassland.
- Loss of/damage to stream corridors, including pollution during construction and operation, which potentially support otter.
- Spread of Rhododendron, a Schedule 9 listed invasive species.

F MITIGATION AND RECOMMENDATIONS

F.1 Further Survey

No further survey work is recommended.

F.2 Mitigation Requirements

Timing of Works

- Removal of vegetation will be carried out outside of the bird-nesting season, unless a suitably qualified ecologist confirms that nests are absent.
- Demolition should not occur during the bat maternity or hibernation seasons.

Habitat Creation and Enhancement

- Landscape design will incorporate a mosaic of habitats including the retained unimproved neutral grassland, plantation woodland, scattered trees and shrubs, new ponds and mires as a resource for bats, birds, reptiles and amphibians.

Good Working Practices

- If areas that may support reptiles are to be lost they should be trapped out first.
- Trees around the youth hostel will be retained wherever possible, with a root protection zone in place. Lighting around the trees will be avoided if at all possible, or kept low level and low lux.
- Removal of Rhododendron, a Schedule 9 species, must be completed to a method statement (Appendix 1).
- Care must be taken to protect the quality of the watercourse adjacent to the site from pollution during both construction and operation of the site.

Mitigation requirements in relation to bats are provided in the separate bat report.

G APPENDIX 1

Method Statement for *Rhododendron* sp.

What are the environmental issues associated with *Rhododendron* sp.?

Under the Wildlife and Countryside Act 1981 / Wildlife (Northern Ireland) Order 1985, which was updated in 2010, under section 14(2) it is an offence "to plant or otherwise encourage" the growth of *Rhododendron* sp. This could include cutting the plant or roots and disturbing surrounding soil if not correctly managed.

Any polluted soil or plant material that you discard, intend to discard should be appropriately disposed of at a licensed landfill. *Rhododendron* sp seeds in contaminated soils can remain dormant for several years before regrowth. If contaminated soils are to remain on site it should be treated and controlled, and monitored for any regrowth.

Control of *Rhododendron* sp.

Although there are a number of options available for the treatment of these species, the majority of these require a number of years in order to be effective. The two methods outlined below are the most effective in the time scales generally required by the construction industry.

1. **Spraying with herbicide**

Spraying the plant with an appropriate herbicide is the most effective option available, however it can take several years and rarely achieves eradication without mechanical disturbance. Herbicide treatment can give the appearance of control but the rhizome network (roots below ground) may still be viable and disturbing the ground will cause the plant to regrow. Soil movement should not be attempted until no rhizome remains in a viable condition.

Spraying can only be carried out during the growing season when there is green, leafy material present, unless the majority of the plant has been mechanically removed and herbicides are directly applied to the stump. Herbicide treatments take effect within a few weeks but eradication can take a minimum of two sprays in one growing season to achieve. Often, when a contractor takes control of a site, the working programme is tight and does not allow sufficient time for this method of eradication to be used. Even so, a spraying programme may be an option for weakening the plant before removal or treating regrowth and remaining plants in the spring.

Anyone planning to spray a herbicide must be "competent in their duties and have received adequate instruction and guidance in the safe and efficient use of pesticides." This means that the person who will be undertaking the spraying must hold a Certificate of Competence for herbicide use or should work under the direct supervision of a certificate holder. A Certificate of Technical Competence can be obtained by attending a short course at an agricultural college or similar institution.

The most effective active ingredient for use is called glyphosate. This is the active ingredient found in 'Round Up' and other similar herbicides. It is because it does not kill the plant immediately. Instead, the herbicide soaks through the leaves and is taken into the plant root system. The greater the number of green leaves present, the larger the quantity of herbicide that can be absorbed into the plant. It can take up to ten days for the plant to begin to die off after

treatment and you should always watch for regrowth.

2. **Digging and Spraying**

A quicker method of removing *Rhododendron* sp involves the clearing of above ground leaf/stem material and the removal of ground material polluted with roots. Care should be taken to ensure that all roots are removed - this is one situation where it pays to remove too much material – which can involve clearing the area 3m around the plant to a depth of 3m, in order to ensure that the entire root system has been removed.

Even with great care, a certain amount of regrowth in the spring would be expected and any should be treated with an appropriate herbicide as discussed above. Make sure you read on for tips on how to prevent spreading plant fragments around the site during the works.

Disposal of *Rhododendron* sp – Removal from Site

- Polluted material should be removed from the site for disposal, unless otherwise agreed with the Environmental Regulator and Client.
- As both species are considered to be a pollutant, you can apply to Customs and Excise for a 'Landfill Tax Exemption' for polluted soil.
- Any bags/skips containing these species should be covered to avoid spread of seeds along public highways.
- If contaminated soil is not treated on site or retained on site, Waste Transfer documentation will be required for any polluted material leaving the site.
- Check with the disposal site in advance that they can receive material containing these species. Be aware, the disposal site may require notice to allow an area to be prepared for this material away from the landfill liner.
- Chipped waste that is removed from the site should not be disposed of in adjacent waterbodies or left on adjacent land.

Working Methods in Areas Where *Rhododendron* sp is Present

- Polluted areas should be clearly marked out on site. Areas that do not need to be disturbed during the works should be fenced off, allowing a buffer of at least four metres to allow for the likely extent of the roots.
- Use of tracked machinery should be limited until areas polluted with these species have been cleared and/or identified and cordoned off.
- If tracked machinery must be used in areas where these species are known to be present, then consider using a strong geotextile overlain with hardcore as a base for vehicles to travel on.
- Areas where these species have been identified should be cleared slowly, one at a time with ongoing assessment of the extent of polluted ground. Only essential vehicles should be present in polluted areas.
- Never stockpile potentially polluted material within 10 metres of a watercourse.
- Care should be taken to ensure that polluted material is not dropped or transferred to other areas of the site.
- Remaining contaminated soil should be monitored for regrowth, particularly during the growing season and, if necessary, treated with an appropriate herbicide as discussed above.
- All site operatives should be made aware of the requirements associated with the removal/disposal of this species in order to help limit accidental spread.
- All haulage lorries or dumpers carrying these species should be covered.
- Never use a strimmer, mower (without collection bucket) or chipper on these species material.

- If you are working between November and March in an area where these species are known to be present, then dead shoots from the previous year can be a good indication of its location. Even if there is no growth evident above ground, the below-ground parts of the plant will still be alive. Breaking up this root network and transporting either off site or around your site on vehicle tracks will spread the plant. Use the precautions outlined above to reduce the risk of spreading the plant.

Planning Application for the demolition of existing National Park Visitor Centre (D1), Offices (B1), Retail (A1) and Café (A3) and 79 bed Youth Hostel (Sui Generis) and associated car parking, and redevelopment of site as new Landscape Discovery Centre incorporating Exhibition Space (D1), Retail (A1), Café (A3), Offices (B1) and 86 bed Youth Hostel (Sui Generis) together with 87 Permanent Car Parking Spaces, 93 Overflow car parking spaces, associated landscaping, substation and crossing point across the B6318 Military Road, pedestrian ramp within the roadside ditch and formation of pedestrian refuges and route within wooded copse.
Application situated at land South and North of the B6318 at Once Brewed, Haydon Bridge, Northumberland, NE47 7AN

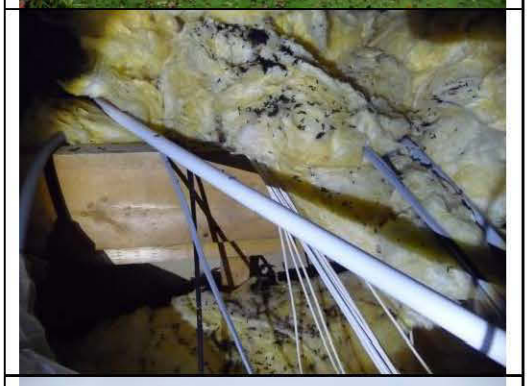
Bat Survey

Northumberland National Park

yha
be inspired

heritage lottery fund
LOTTERY FUNDED

BAT SURVEY



ONCE BREWED VISITORS' CENTRE & YOUTH HOSTEL

Report No 6
Draft
January 2014

Produced by:

E3 Ecology Ltd
Pasture House, Wark, Hexham, Northumberland, NE48 3DG

T: 01434 230982 E: mail@e3ecology.co.uk W: www.e3ecology.co.uk

Principal Contact:

Dr Tony Martin BSc PhD MLI MCIEEM
Director
Tony.martin@e3ecology.co.uk

Client	Revision	Status	Date	Author	Proof Read	Checked
Northumberland National Park Authority	R01	Draft	3.10.12	MEM	EB	ADM
	R05	Draft	12.08.13	JA	NB	ADM
	R06	Draft	06.01.14	JA		ADM
Job No. 649						

Unless requested otherwise, the information below, relating to the local area, will be provided to the Environmental Records Centre for the North East (ERIC)					
Species	**Recorder**	**Date**	**Location (4 Fig. NGR)**	**Abundance**	**Comment**
Common pipistrelle	E3	Aug/Sept 2012	NY753 669	5-20	Maternity roost? Mating roost
Soprano pipistrelle	E3	Aug/Sept 2012	NY753 669	2-6	Various small roosts
Brown long eared bat	E3	July 2013	NY 753 669	1-4	Roost – DNA analysis
Whiskered/Brandt's bat	E3	Aug 2012	NY753 669	2-3	Anabat analysis ID

CONTENTS

SUMMARY 4

A INTRODUCTION 8

A.1 Background to development 8
A.2 Personnel 10
A.3 Objectives of study 10

B RELEVANT LEGISLATION AND PLANNING CONTEXT 11

B.1 National Planning Policy Framework 11
B.2 Protected species legislation 11

C SURVEY AREA AND METHODOLOGY 13

C.1 Survey area 13
C.2 Methodology 14
C.2.1 Desktop study 14
C.2.2 Survey equipment 14
C.2.3 Daytime Assessment 14
C.2.5 Timing 16
C.2.6 Weather conditions 16

D RESULTS 17

D.1 Desktop study 17
D.1.1 Pre-existing information 17
D.1.2 Bat risk assessment 17
D.2 Field survey 18
D.2.1 Habitats 18
D.2.2 Built structures 19
Visitor Centre 19
D.2.3 Activity surveys 23
September 2012 23
D.2.4 Microclimate Monitoring 30
D.2.5 DNA Analysis 31

E ASSESSMENT 32

E.1 Assessment of survey findings 33
E.2 Population size class assessment 33
E.3 Impacts 33
E.4 Constraints 34

F MITIGATION AND RECOMMENDATIONS 35

F.1 Further survey 35
F.2 Mitigation requirements 35

G APPENDICES 39

G.1 Appendix 1: BAT ECOLOGY 39
G.2 Appendix 2: RESULTS OF DUSK/DAWN ACTIVITY SURVEYS 41
G.3 Appendix 3: DNA Analysis 57
G.4 Appendix 4: Mitigation Figures 58

SUMMARY

E3 Ecology Ltd was commissioned by Northumberland National Park Authority to undertake bat survey work at Once Brewed visitor centre and youth hostel in July 2013. This comprised a daytime risk assessment, two dusk activity surveys, though the night anabat monitoring and microclimate monitoring of lofts.

Development proposals include the demolition of both the visitor centre and youth hostel buildings and the creation of a single building comprising a youth hostel and landscape discovery centre, outdoor classrooms, event spaces and play areas as well as car parking and associated landscaping.

Survey work was undertaken in July and August 2013. E3 had previously carried out bat survey work of the visitors' centre only in September 2005 and of both buildings in July 2007 and August 2012.

The National Park visitor centre & youth hostel are situated in an upland location in Northumberland National Park at Once Brewed, half a kilometre south of Hadrian's Wall. The buildings are in an area dominated by unimproved upland pasture; Brackies Burn runs approximately 400m to the south, with some tree cover. There are mature trees around the youth hostel, and a small plantation woodland lies approximately 500m to the east, but good foraging and commuting routes for bats are sparse. Overall, the habitats present within the local area would suggest that the risk of small number of bats of roosting, foraging and commuting in the local area is moderate to high.

The visitor centre is single storey, u-shaped and of stone construction with a tile roof. The building is of modern construction but has been built in a traditional style to blend in with the area. The roof is supported on exposed beams. Pointing is in relatively good condition both internally and externally, however there are numerous access routes into the fabric of the walls under the wooden bargeboards and under the eaves. Thorough external inspection of the building recorded several access routes, particularly associated with bargeboards, but some also around the roof area. The loft is lined with plywood.

In previous years, internal inspection of the lofts found both pipistrelle and large myotis/brown long-eared type droppings in several locations. In 2013, bat droppings were clearly evident throughout the loft space, with obvious accumulations present in the corners of the hipped sections of the roof, both trapped in cobwebs and laying on the insulation. Droppings were consistent with Natterer's/brown long-eared bats, but also some smaller pipistrelle/whiskered/Brandt's type droppings. All droppings appeared to be fresh. Access within the loft space was limited by the height of the roof and a dense layer of insulation, making it difficult to locate ceiling joists. The loft space had a strong smell of bat urine that is often associated with large bat roosts. Externally, droppings were present all around the building, generally associated with the fascia boards between the wall top and eaves but, in July, not in the numbers that are generally associated with maternity roosts. House sparrow were also present in these areas in a number of locations.

The youth hostel is an L-shaped, two-storey accommodation block with a single storey, flat roofed dining/reception area. The two-storey element is of modern stone on the ground floor and pebble dashed on the upper floor, all of which are well sealed. The extension is modern stone block and timber cladding, again generally well sealed. Internally there are 5 loft spaces. The roof is of modern truss construction, lined with traditional bitumastic sarking. Potential roosting opportunities are restricted to gaps under bargeboards, at gable ends where

mortaring has come away under roof tiles and occasional gaps at the ridge tiles. In 2012, a low number of scattered pipistrelle type droppings were recorded in one loft, of varying age, indicative of use by one or two pipistrelle bats. Access to the youth hostel loft was not possible during 2013 survey.

A summary of activity surveys undertaken by E3 Ecology in previous years is provided in the table below. Full details are included within the body of the report:

Date	*Start Time*	*End Time*	*No. of Surveyors*	*Key Findings*
12.9.05	19.25	20.55	2	Emergence of 15 common pip and 4 possible BLE from various points around visitor centre.
30.7.07	21.05	22.15	6	Emergence of 18 common and 3 soprano pip from visitor centre. Possible emergence of common pip from hostel.
16.8.12	20.25	21.50	7	2 possible whiskered/Brandt's and 11 common pip emerged from visitor centre.
4.9.12	19:39	21:08	8	9 common pip and 4 soprano pip emerged from visitor centre. 5 pips from youth hostel.

Anabat analysis of 2013 data indicated that many of the pipistrelle bats were echolocating at close to 50kHz, with only a small number of passes clearly being soprano pipistrelle. Given the cluttered location it is assumed that bats are mainly common pipistrelles.

In July 2013, emergence of up to 8 common pipistrelles as well as several silent bats, thought likely to be brown long eared bats, was recorded from the south of the visitor centre and up to 4 common pipistrelle were recorded emerging from the east side of the visitor centre, from various points under the fascia boards. 4 pipistrelles were also recorded emerging from the south side of the youth hostel, with a further pipistrelle bat emergence from the northern end. First emergences were recorded at 21:30 the youth hostel and 21:44 from the visitor centre. High levels of common pipistrelle were recorded foraging and commuting in the local area after this time, with smaller numbers of soprano pipistrelle present later on in the survey, but no other species were recorded on site.

Survey in August 2013 recorded emergence of 14 common pipistrelles from the south face of the visitor centre and 1 common pipistrelle from the east side of the visitor centre, again from 4-5 locations under the fascia boards, with pipistrelles also emerging from loose ridge tiles. First emergences were recorded at 21:03 from the south face and 21:22 from the east face of the building, which is consistent with expected emergence times for pipistrelle bats. No emergences were confirmed from the youth hostel. High levels of common pipistrelle activity were again recorded across the site. Anabat monitoring in three locations during this survey also recorded common and soprano pipistrelle and a single possible whiskered/Brandt's bat pass adjacent to the visitor centre at 21:23.

Three samples of bat droppings from the visitor centre loft were identified as brown long-eared droppings through DNA analysis. Due to the quantity and freshness of these droppings, this may suggest that the silent bats seen emerging from the south face of the visitor centre were brown long-eared bats.

October anabat survey confirmed the likely presence of common and soprano pipistrelle roosts, with common pipistrelle activity very close to both dusk and dawn, but only a small proportion of soprano pipistrelle passes. There was abundant social calling of common pipistrelle in the vicinity of the visitor centre suggesting that a mating roost may be present.

The site is concluded to support the following roosts:

- Small soprano pipistrelle roost (2-6) in the visitor centre, and using various access points around the YHA building.
- Small brown long-eared roost in the visitor centre.
- Small common pipistrelle roost (5-20) in the visitor centre which may well include both maternity and mating use.
- Occasional use of visitor centre by non-breeding, roosting Whiskered/Brandt's bats.
- Non-breeding common and soprano pipistrelle roost in the youth hostel (1-5 of each species).

Potential impacts of the development could include:

1. Loss of a common pipistrelle roost that is likely to include maternity and mating use, occasional soprano pipistrelle roosts and roosts used by small numbers of brown long-eared and whiskered/Brandt's bats through demolition of the visitor centre.
2. Loss of roosts used by non-breeding common and soprano pipistrelle, occasional whiskered/Brandt's bats through demolition of the youth hostel.
3. Disturbance or harm to a range of species of bats that may be using the buildings at the time, including possible hibernating bats if works are undertaken during the winter (mid Nov-mid March) and breeding bats if works are undertaken to the visitor centre in the breeding period (June-August).
4. Loss of loft spaces/voids used as day roosts.
5. Impacts on foraging areas through any tree loss as part of the redevelopment of the site, and changes to lighting around the site.

Key mitigation measures are likely to include:

- **A Natural England licence will be required prior to the start of works.**
- **All structural works to both buildings will be undertaken as detailed within a Natural England development licence method statement.**
- Demolition works to both buildings will not be carried out during the hibernation period (November to March).
- Demolition works to the visitor centre will not be carried out during the summer maternity period (June to August).
- Fascia boards, ridge tiles and roof slates will be removed by hand.
- A bat loft will be constructed on site in the new youth hostel gardens, prior to demolition of the existing buildings.
- The bat loft building will incorporate a traditional slate roof with ridge tiles, with access provided at the eaves, through inclusion of 3 bat slates and via access gaps under and between the ridge tiles.
- South facing cavities, suitable for pipistrelle maternity roosts will also be provided.
- To avoid harm to bats due to entanglement with breathable roofing membranes, 1m^2 sections of traditional roofing felt will be installed behind bat access points within the roof and in all locations where bats may roost.
- 20 bat boxes will be erected in nearby trees prior to works commencing. **Three boxes suitable for maternity use will be erected as soon as possible**.
- 31 crevice roost sites will be recreated within the new build plus 5 on the north side suitable for hibernation use.
- Timber treatments that are toxic to mammals will be avoided.
- If bats are found the project ecologist will be contacted immediately.
- External lighting that may reduce bat use of the buildings will be avoided. High intensity security lights will be avoided, and any lighting along access routes will be low

level, directional and low wattage. Light spillage to areas used by bats should be less than 1 lux.

- Trees around the youth hostel will be retained wherever possible, with a root protection zone in place. Lighting around the trees will be avoided if at all possible, or kept low level and low lux.

The local planning authority and Natural England are likely to require the means of delivery of the mitigation to be identified. It is recommended that mitigation and enhancement proposals are incorporated into the master-planning documents.

If you are assessing this report for a local planning authority and have any difficulties interpreting plans and figures from a scanned version of the report, E3 Ecology Ltd would be happy to email a PDF copy to you. Please contact us on 01434 230982.

A INTRODUCTION

E3 Ecology Ltd was commissioned by Northumberland National Park Authority to undertake a daytime bat risk assessment, two dusk bat surveys, internal microclimate monitoring and DNA sampling of bat droppings at Once Brewed visitor centre and youth hostel in July and August 2013. Surveys had previously also been undertaken in 2005 (visitor centre only), 2007 (both buildings) and 2012 (both buildings).

As bats are small nocturnal species that can roost in inaccessible crevices only 16mm wide, it can be very hard to demonstrate that they are absent from a site, particularly given a limited number of visits during part of the year. As a result, assessment and development approaches are based on an informed risk assessment, and where appropriate a reasonable worst-case scenario, in order to ensure that bats are not recklessly harmed by the proposals.

A.1 Background to development

The National Park visitor centre and youth hostel is situated in Northumberland National Park at Once Brewed at grid reference NY753 669. Its location is illustrated in figure 1.

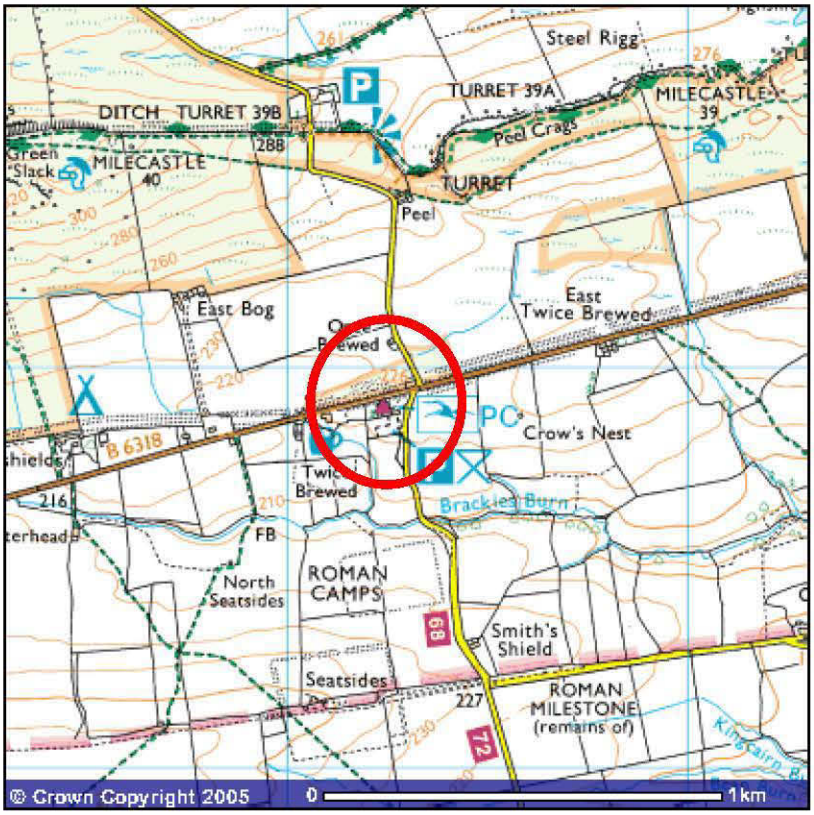


Figure 1 – Site Location
(Reproduced from the ordnance survey map with the permission of the controller of Her Majesty's stationery office. CJ Crown Copyright reserved. Licence number 100039392.)

The site is owned by Northumberland National Park Authority. Development proposals include the demolition of both the visitor centre and youth hostel buildings and the creation of a single building comprising a youth hostel and landscape discovery centre, outdoor classrooms, event spaces and play areas as well as car parking and associated landscaping. Figure 2 below illustrates the proposed master plan:

Figure 2: Development proposals.

A.2 Personnel

Survey work and reporting was undertaken by:

- Mary Martin BSc (Natural England licence No. 20122223)
- Tony Martin BSc PhD MLI MCIEEM (Natural England License No.20120420)
- Neil Beamsley BSc MCIEEM (Natural England License No. CLS00815)
- Jessica Andrews BSc MSc GradCIEEM

The project was supervised by:

- Tony Martin BSc (Natural England licence No. 20122223)

Details of experience and qualifications are available at www.e3ecology.co.uk.

A.3 Objectives of study

The objective of the study was to gain a sufficiently detailed picture of bat populations to allow an assessment of the likely impacts of the proposed development on these species, and where necessary to allow mitigation to be designed which minimises the risk of harm and maintains their conservation status in the local area (for example by ensuring that there is no net reduction in the number of available roost sites).

Comments on the state of the structures within the site relate solely to their potential use by bats and must not be taken as a professional assessment of the structural integrity or safety of the structures. For example, descriptions of walls and roofs being in 'good' or 'poor condition' relate to likely provision of roost sites for bats, potential access routes to roost sites, and likely persistence of field signs such as droppings and feeding remains, which will not persist in exposed conditions. Maternity roosts are less likely to be present in cool, exposed, damp and draughty locations.

B RELEVANT LEGISLATION AND PLANNING CONTEXT

B.1 National Planning Policy Framework

The government National Planning Policy Framework (NPPF) states the following:

- Plan policies and planning decisions should be based upon up-to-date information about the natural environment (Paragraph 158 and 165).
- Plan policies should promote the preservation, restoration and recreation of priority habitats, ecological networks and the recovery of priority species (Paragraph 117).
- Local planning authorities should set out a strategic approach in their Plans, planning positively for the creation, protection, enhancement and management of networks of biodiversity and green infrastructure. (Paragraph 114).
- When determining planning applications in accordance with the Local Plan and the presumption in favour of sustainable development local planning authorities should aim to conserve and enhance biodiversity by applying a number of principles, including if significant harm resulting from a development cannot be avoided, adequately mitigated, or, as a last resort, compensated for, then planning permission should be refused. (Paragraph 118).

As of October 1 2006, public authorities have a duty to conserve biodiversity under the Natural Environment and Rural Communities (NERC) Act 2006.

B.2 Protected species legislation

Bats

Within England all bat species are specially protected under the Conservation of Habitats and Species Regulations (2010).

As a result there is a requirement to consult with Natural England before undertaking any works that may disturb bats or their roost, and under the Conservation of Habitats and Species Regulations it is illegal to.

- Deliberately kill, injure or capture bats.
- Deliberately disturb bats; in particular any disturbance which is likely to impair their ability:

  (i) to survive, to breed or reproduce, or to rear or nurture their young; or

  (ii) in the case of animals of a hibernating or migratory species, to hibernate or migrate; or

  (iii) to affect significantly the local distribution or abundance of the species to which they belong.
- Deliberately obstruct access to a bat roost.
- Damage or destroy a bat roost.

Under the Wildlife and Countryside Act (1981) the above offence of disturbing bats includes low level disturbance and as such under this act it is also an offence to:

- Intentionally or recklessly disturb at bat while it is occupying a roost.

- Intentionally or recklessly obstruct access to a roost.

Under the above legal protection, only the offences under the Conservation of Habitats and Species Regulations (2010) are strict liability offences; the remaining offences, under the Wildlife and Countryside Act (1981), are offences only where they are carried out "intentionally or recklessly".

Defences that were previously available under the Conservation (Natural Habitats, &c.) Regulations 1994, legislation which is superseded by the Conservation of Habitats and Species Regulations (2010), have now been removed. Specifically the 'dwelling-house' defence and the 'incidental result of a lawful operation' defence no longer apply. However the 'incidental result' defence persists within the Wildlife and Countryside Act disturbing bats or obstructing access to a roost and activities that cause low level disturbance may be able to rely on this defence.

Under the Countryside and Rights of Way Act 2000 (CROW Act) the offence in section 9(4) of the 1981 Act of disturbing bats is extended to cover reckless damage or disturbance.

The Hedgerow Regulations 1997 provide for the conservation of important hedgerows and their constituent trees. The presence of a protected species such as bats is a relevant consideration when assessing whether a hedgerow is important and may influence a local planning authority's decision on whether to approve removal of such hedges.

As of October 1 2006, public authorities have a duty to conserve biodiversity under the Natural Environment and Rural Communities (NERC) Act 2006.

C SURVEY AREA AND METHODOLOGY

C.1 Survey area

Figure 3 shows the buildings present on site and Figure 4 illustrates the broad habitats present on site and within an approximate 500m buffer zone.

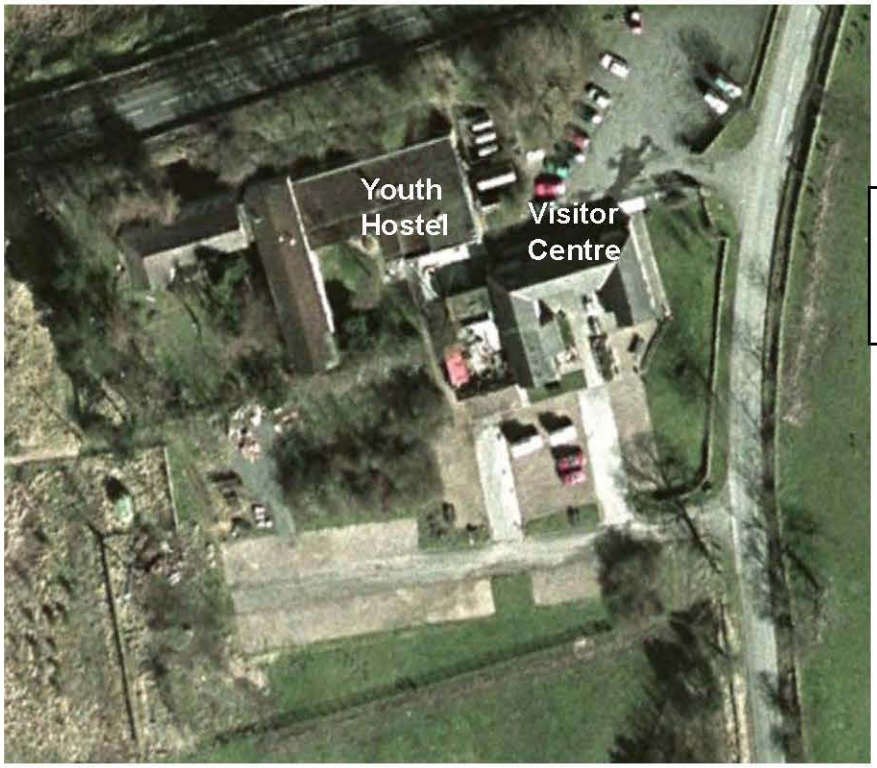


Figure 3– Aerial photograph indicating the buildings on site.
(Reproduced under licence from Google Earth Pro.)

Figure 4 – Aerial photograph centred on the site with a 500m radius illustrating the setting and the habitats it supports (Reproduced under licence from Google Earth Pro.)

The study area includes the site and adjacent land to allow for possible secondary impacts in line with Natural England recommendations.

C.2 Methodology

C.2.1 Desktop study

Initially, the site was assessed from aerial photographs and 1:25000 OS plans. Following this, the National Bat Atlas was checked for any notable sites or habitat or species records.

C.2.2 Survey equipment

The following items of equipment were utilised during survey work and analysis:

- Refrakta 210 lumen inspection lamp
- LED Lenser P7
- 8 x 32 binoculars
- Extendable ladders
- Duet bat detectors
- MP3/WAV digital recorders
- Batsounds software
- Anabat recorder
- Analook software
- RH/Temperature USB Data Loggers

C.2.3 Daytime Assessment

In 2013, an internal and external daytime assessment was made of the visitor centre in order to evaluate its potential for supporting roosting bats, and where present, to record signs of use by bats. An external inspection of all buildings had also been made in 2007, and internal and external inspections of the visitor centre in 2005 and of all buildings in 2012.

Where present, soffits, purlins and ridge boards were searched thoroughly, together with the floor under potential roost sites and any mortise joints, particularly in the gable walls. Wherever practicable, roof spaces and attic areas were surveyed for signs of droppings, which persist all year in dry conditions, food debris, entry points and bats themselves. Where bats were present the survey was adapted to avoid disturbance, with identification being confirmed by recording bats at emergence and analysing the calls.

Externally, the buildings were examined for potential roost access points indicated by clean crevices, urine marks, polished wood or stonework and droppings. Particular attention was given to sheltered areas under the eaves of buildings, window ledges and towards the tops of windows where droppings are less likely to have been washed off.

C.2.4 Microclimate Monitoring

In 2013, internal microclimate monitoring of the lofts of the visitor centre and adjacent ranger's office was carried out. Data loggers were left in the lofts from 30th July 2013 to 13th August 2013 inclusive and recorded temperature, relative humidity and dew point every five minutes over the course of the survey period.

C.2.5 Activity Survey

Activity surveys were undertaken in suitably mild conditions when bats are active. Surveyor locations sought to box-in the site and give a good degree of confidence of whether bats were flying into or out of the survey area.

Surveyors were positioned to ensure coverage of all high-risk areas of the site, including any potential flightlines from structures within the site to adjacent cover such as woodland blocks, and where any bats entering or emerging from the site as a whole could be detected. If bats were recorded within the site before bats were seen in the wider area, or flying into the site, it is assumed that roosts are present within the site.

All surveyors used Batbox Duet bat detectors linked to MP3 recorders, listening through earphones to both heterodyne and frequency division signals to help ensure that all bats were detected. Data were recorded to allow confirmation of species identification through sonogram analysis (using Batsounds software), and to capture brief echolocation calls that could not be reliably identified in the field. Field survey recorded numbers of bats detected, feeding activity, flight paths, species (as far as is practicable), and social calls.

In 2013, a total of 18 person-nights work was undertaken, with direct observation being reinforced by remote recording of bat activity within high risk areas of the site, giving a total of 10 recording points on the 30th July and 12 recording points on the 13th August.

In addition, internal Anabat monitoring of loft spaces was carried out in September 2013 and through the night external Anabat monitoring was undertaken in four locations on 8th October 2013.

The figures under C7 illustrate the approximate location of each surveyor and monitoring point on each survey.

Given good calls many species, including common and soprano pipistrelles, and noctule can be identified with a good degree of confidence. A this site a large number of calls were close to 50kHz, but were considered to be common pipistrelle given the cluttered conditions. The *Myotis* genus of bats are much harder to separate reliably as their frequency modulated calls are very similar. For these species a combination of call loudness, frequency range, habitat and flight characteristics can be used to provide a best estimate. Where recorded by Anabat identification was based on slope analysis, which is not totally reliable but gives a strong indication of likely species.

In the text bats are identified as accurately as possible, within the constraints identified above. If the species name is given without qualification, the record was of good quality. If there is a degree of uncertainty this is indicated by a question mark, e.g.?brown long-eared. If identification to species is not practicable then just the Genus or 'bats' is used.

C.2.5 Timing

Daytime inspections were undertaken on 12 September 2005, 30 July 2007, 16 August, 4 September and 3 October 2012 and 30 July 2013.

Activity surveys were undertaken on the following dates:

Activity Surveys					
Date	*Start Time*	*End Time*	*Time of Sunset/rise*	*No. of Surveyors*	*No. of Remote Monitoring Points*
12.9.05	19.25	20.55	19.32	2	0
30.7.07	21.05	22.15	21.15	6	0
16.8.12	20.25	21.50	21.35	7	3
4.9.12	19:39	21:08	19.52	8	1
30.7.13	21:08	22:30	21:13	9	1
13.8.13	20:33	22:00	20:44	9	3
8.10.13	18.30	08.00	18.40	0	4

C.2.6 Weather conditions

Date	*Start Temp.*	*End Temp.*	*Cloud Cover*	*Wind Conditions*	*Rain*	*Time of Sunset*
12.9.05	12.4°C	9.4°C	25%	NE1	Dry	19:31
30.7.07	14.4°C	13°C	80%	Still	Dry	21.15
16.8.12	21.0°C	16.4°C	60%	Still	Dry	21.35
4.9.12	14.8°C	12°C	70%	F1-3	Dry	19.52
30.7.13	21.4°C	11.3°C	10%	2	Dry	21:13
13.8.13	18.1°C	9.6°C	40 – 80 %	2 – 3	Dry	20:44

C.2.7 DNA Analysis

In August 2013, three samples of bat droppings taken from the visitor centre loft were sent to the Ecological Forensics lab at The University of Warwick for DNA analysis to species level. A detailed breakdown of the DNA sequencing is provided in Appendix 3.

D RESULTS

D.1 Desktop study

D.1.1 Pre-existing information

OS map & aerial photographs

Figures 1 (A1) and 3 (C1) show that the general land use in the surrounding area is upland pasture with small pockets of plantation woodland and a burn approximately 400m to the south. The most recent aerial photograph of the site (Figure 3, C1) indicates that habitats on site are dominated by buildings and car parking, with mature trees around the youth hostel, with improved and semi-improved grassland to the south of the buildings.

The National Atlas of bat distribution indicates that pipistrelle; brown long-eared bats and noctule have been recorded within this 10k square.[1]

Survey by E3 Ecology has recorded common and soprano pipistrelle, Natterer's and brown long-eared bats in this area.

D.1.2 Bat risk assessment

	Risk of supporting roosting bats[2]							
	Minimal		***Low***		***Medium***		***High***	
Habitats and Setting								
Habitats and cover within 200m	City Centre		Open, exposed arable, amenity grass or pasture		Hedges and trees linking site to wider countryside		Excellent cover with mature trees and/or good hedges	
Habitats within 1km	City Centre		Little tree cover, few hedges, arable dominated		Some semi-natural habitats, trees hedges etc		Good network of woods, wetland and hedges	
Alternative roosts within 1km	City centre		Numerous alternative roost sites of a similar nature		A number of similar buildings in the local area		Few alternative buildings and site of good quality for roosts	
Setting	Inner city		Urban with little green space		Upland with some trees		Rural Lowland with woodland and trees.	
Distance to water/marsh	>1km		500m-1000m		200m-500m		<200m	
Distance to woodland/scrub	>1km		500m-1000m		200m-500m		<200m	

[1] Distribution Atlas of Bats in Britain and Ireland, Phil Richardson 2000, Bat Conservation Trust.

[2] This risk assessment technique has been audited through a research project with York University which compared the risk assessment scoring with the results of detailed field assessment for over 100 sites. Statistically significant associations were found between habitat setting and building features and the presence of absence of different bat species. For example habitat connections and nearby woodland were significant for brown long-eared bats and the presence of species-rich grassland is important for many species.

	Risk of supporting roosting bats[2]							
	Minimal		*Low*		*Medium*		*High*	
Distance to species-rich grassland	>1km		500m-1000m		200m-500m		<200m	
Commuting routes	Isolated by development, major roads, large scale agriculture		No potential flyways linking site to wider countryside		Some potential commuting routes to and from site		Site is well connected to surrounding area with multiple flyways	
Buildings								
Approximate age	Modern well sealed		Post 1940's		1900-1940		Pre 20th C	
Building/complex type	Industrial complex of modern design		Single, small building		Several buildings, large old single structure		Set of traditional farm buildings, country house, castle, hospital	
Building - storeys			Single storey		Multiple storeys		Multiple storeys, large roof voids	
Stone/brick work	No detectable crevices		Well pointed		Some cracks and crevices		Poor condition, many crevices,	
Framework – timbers/steel	Modern sheet materials, steel frame steel sheet cladding		timber purlins, sheet asbestos		Timbers kingpost or similar		Large timbers traditional joints	
Roof void	Fully sealed or flat roof		Small, cluttered void		Medium, relatively open		Large, open, interconnected	
Roof covering	Modern sheet materials and Tightly fitting		Good condition, no gaps or very open not weatherproof modern sheet materials		Some potential access routes, slates, tiles		Uneven with gaps, not too open, stone slates	
Additional features	Very well maintained and tightly sealed		No features with potential access		Some features with potential access		Hanging tiles, cladding, barge boards, soffits with access gaps	
External lighting	Extensive security lights covering much of the site		Widespread areas above 2 lux at night		Intermittent lights of low intensity		Minimal	
Building use	Very noisy, dusty		Regular use		Intermittent use		Disused	

Both buildings and setting are overall of moderate risk of supporting bats, though the upland exposed surroundings are likely to limit the number of bats the site could support. The lack of alternative roost sites in the local area, and the unintensive management of the surrounding habitats increase the risk of roosts being present.

D.2 Field survey

D.2.1 Habitats

Foraging habitats

The trees around the youth hostel provide a good, though small, foraging area for bats, with some small plantation woodland and wooded corridors in the wider area providing some further foraging habitat. The un-intensive management of surrounding habitats will result in good invertebrate populations, but both shelter and roost sites are lacking in the wider countryside.

Commuting routes

Commuting links are relatively poor, with some tree corridors to the south linking in to the burn, but the majority of the area has stone walled field boundaries.

Exposed/sheltered

The courtyard of the visitor's centre and the trees around the youth hostel provide some sheltered foraging but overall the setting is relatively exposed.

Potential alternative roost locations

Alternative roosting locations are limited to scattered houses and farm dwellings in the area.

D.2.2 Built structures

Visitor Centre

- Single storey of modern stone construction with a tile roof
- Building runs east-west with two wings leading south, one on the east end and a larger one at the west end, forming three sides of a courtyard
- Stone built except for the majority of the north face which has large windows above wooden slats and two sections of the west wing, where the wall is rendered on each side towards the north end.
- The roof extends lower over the two stores, one to the east of the courtyard and the other to the west and over the porch on the south wall.
- Roof in good condition with few gaps
- Ridge tiles are secure although there are a few areas where the mortar is missing.
- The lower edges of roof overhang the walls in several areas and there are gaps leading up into the roof space.
- The lead flashing is in good repair and is tight to the roof.
- There are three roof lights facing east on the west wing and two facing north on the east west section.
- The whole building has guttering supported on wooden bargeboards.

- Externally there are access routes into the fabric of the walls, particularly behind bargeboards and under the roof overhangs.
- There are several access routes on the south face and the west face of the east wing.
- There are a smaller number on the east face of the east wing, and the west face of the west wing.
- Since the 2005 survey, solar panels have been added to part of the southern roof.
- In 2005, bat droppings were recorded on the floor and caught on the leaves of a hosta, of brown long eared/Natterer's type, in the angle between the east wing and the store, under a clean access hole.
- Pipistrelle type droppings found externally in the courtyard during 2005, 2007 and 2012 surveys, on the ground and wall in various points under gaps in barge boarding, particularly within the courtyard.
- In 2013, bat droppings were present all around the building, generally associated with the fascia board located between the wall top and the eaves but in July numbers were low for an active maternity roost.

Internal

- Vertical ridge beam with exposed timbers and wooden boarding
- Lofts are divided by a breezeblock partition.
- They are clean and in good repair and hold water tanks and pipes.
- The roof lights are boxed and so do not provide any light into the loft space, although where the roof overhangs the walls some light comes in.
- Traditional sarking.
- Height c1.25m.
- The loft runs east above the display area but due to high ceilings is only around 50-70cm high, access was possible but this space was not entered due to height restrictions.
- The timbers in both sections of the loft are of rough wood with large gaps between the joints.
- By 2012, the majority of the loft had been filled with large amounts of insulation (>0.5m deep) making inspection of the majority of the loft impossible.
- In 2005, above the toilet block there were fresh bat droppings of brown long eared/Natterer's type caught on a plastic bag directly below the angle joint of the roof. The droppings were scattered below the joists and ranged from fresh to old and crumbly. Above the display area, where the roof becomes too shallow to allow easy access, there was a concentration of pipistrelle type droppings to the south of

the ridge, under a wooden joist. This corresponds to the area above the south wall of the courtyard.

- To the south of the loft hatch there is a partial breezeblock partition. To the south of this partition there was a large scatter of brown long eared/Natterer's type droppings under the wooden joists. Some droppings were stuck to the joists above. There was some pipistrelle type droppings stuck to the south side of the breezeblock partition just to the south of the access hatch.

In 2012 access was restricted to much of the loft due to high levels of insulation. A small number of *Myotis* type droppings were found towards the western end of the main east-west range.

A large number of pipistrelle type droppings, including fresh dropping recorded under a section of roof in the main east-west range where three timber roof supports were installed close together, providing some good potential crevice roosting opportunities. Levels indicative of a maternity roost in the 2012 season.

In 2013, access was again limited within the loft space due to the dense layer of insulation. Droppings were recorded throughout the loft space, with obvious accumulations in the corners of the hipped sections of the roof, both trapped in cobwebs and laying on the insulation. Droppings were consistent with Natterer's/brown long-eared bats, but some smaller pipistrelle/whiskered-Brandt's type droppings were also recorded. Where accumulations are present, droppings number up to around 50-75 and all seemed to be fresh. The loft space had a strong smell of bats (not dissimilar to the smell of a large soprano roost).

Youth Hostel

External description

Kitchen, dining and reception area

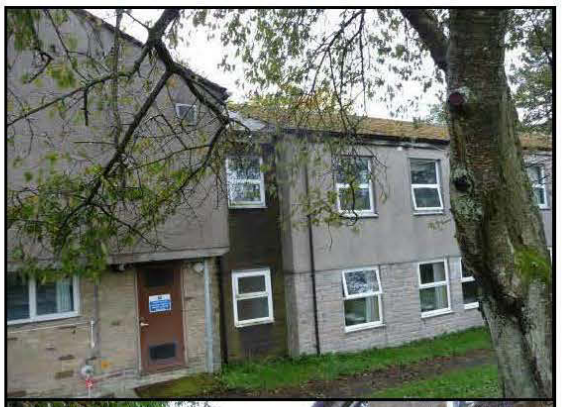
- Single storey, flat roof
- Part modern stone and part timber construction with large glazed windows
- Joins the main youth hostel accommodation at right angles
- Timber work is generally in good condition

with any gaps noted appearing too narrow for bat use.

- There are some narrow cracks in the stone work, which again appear too narrow for bat use.
- Window lintels are concrete beam
- Majority uPVC double glazed windows, well sealed.
- Northern windows are aluminium but again well sealed into the surrounding stonework.

Main Accommodation Block

- Two storey L-shaped with the north to south section having overhanging first floor.
- The upper floor of all but the interconnecting corridor is pebble dashed;
- The lower section is modern stonework
- Slate roof
- uPVC windows
- Timber clad small connecting corridor.
- The overhang is concrete filled with no roosting opportunities but there is evidence of nesting birds, probably swallow.
- Both rendering and stonework generally appear very well sealed.
- There is a timber barge board on the timber connecting corridor which is set away from the roof providing too wide a gap for bats.
- There are also timber bargeboards behind the guttering on the main buildings. These have gaps that could potentially be used by bats.
- There is a single storey timber porch at the northern side of the staff accommodation at the western end. This is well sealed.
- The main gaps are associated with the gaps at the ends of the roof where mortaring is missing and under barge boards.
- The walls are well sealed with no potential gaps noted suitable for roosting bats.



The roof appears generally in good condition but there are some gaps associated with ridge tiles.

Internal

- There are 5 loft spaces; one small section (northern end of the N-S section) could not be accessed due to the location of fixed drying shelves immediately below the loft, and one (western end of the E-W section) could only be surveyed from the loft hatch, due to the number of boxes stored within in but all those inspected were of a similar construction:

- Modern fink truss construction, c1-1.5m high
- Traditional sarking, majority in good condition, but occasional torn areas
- Low levels/no insulation
- Majority of ridge beams and loft spaces heavily cobwebbed, no clean areas indicating bat use; some had no ridge beam visible.
- Some limited light at eaves height, indicating potential access
- Breezeblock gable walls, majority well sealed, with only occasional gaps within and at wall tops suitable for bat use
- Occasional scattered pipistrelle type droppings found, but no accumulations indicating regular or high level use by bats recorded where access was possible.

D.2.3 Activity surveys

September 2005 (Visitor Centre only)
Fifteen common pipistrelles emerged from the south wall of the visitor centre, using a variety of exit holes along the length of the wall. Four brown long eared bats also emerged, two from under bargeboards at the southwest end of the internal east wall and two from the southwest corner of the west wing.

Bats were detected flying and foraging in the area.

July 2007 (Visitor Centre & Youth Hostel)
No species other than pipistrelle bats were recorded during the survey. 18 common pipistrelle and 3 soprano pipistrelle were recorded emerging from various points of the visitor centre, including paired bats from one roost location and about 10 from locations in close proximity to each other, around the south west corner of the visitors centre. 3 soprano bats were recorded emerging from the western elevation of the visitors centre. Given the time of the first recorded bats at the youth hostel, before bats were recorded emerging from the centre, at least 5 common pipistrelle were thought to have emerged from the roof area, however, given the proximity of the tree cover a good visual coverage of the roof was not possible.

August 2012 (Visitor Centre & Youth Hostel)

Bat emergence was late, but common pipistrelle roosts were present at the eaves of the visitor centre, and most probably within the youth hostel from timings of the first activity, although no definite emergence was recorded due to the poor visibility. In addition, 2 ?whiskered bats were recorded emerging from the south side of the visitor centre, identified through slope analysis of Anabat records. Eleven common pipistrelle bats also emerged from the south side of visitor centre. There was evidence of young bats being present with adults from flight patterns and echolocation call frequencies.

September 2012
Up to 9 common and 4 soprano pipistrelle (plus one unidentified pipistrelle bat) recorded emerging from various points around bargeboards in the courtyard of the visitor centre, plus one silent bat; a further pipistrelle, was recorded emerging from the west side of the building. Up to 5 pipistrelle bats in total (common and soprano) may have emerged from the youth hostel, though visibility of the building was poor, therefore it is possible not all of these bats emerged from the building.

July 2013 (Visitor Centre and Youth Hostel)

In July 2013, up to 4 pipistrelles and a number of silent bats (considered likely to be brown long-eared bats) were recorded emerging from the south of the visitor centre and 4 common

pipistrelle from the east side of the visitor centre, from various points under the fascia boards. 4 pipistrelles were also recorded emerging from the south side of the youth hostel, with a further pipistrelle bat emergence from the northern end. First emergences were recorded at 21:30 the youth hostel and 21:44 from the visitor centre. High levels of both common and soprano pipistrelle were recorded foraging and commuting in the local area after this time, but no other species were recorded on site.

August 2013

Survey in August 2013 recorded emergence of 14 common pipistrelles from the south face of the visitor centre and 1 common pipistrelle from the east side of the visitor centre, again from 4-5 locations under the fascia boards, with soprano pipistrelles also emerging from loose ridge tiles. First emergences were recorded at 21:03 from the south face and 21:22 from the east face of the building, which is consistent with expected emergence times for pipistrelle bats. No emergences were confirmed from the youth hostel. High levels of common and soprano pipistrelle activity were again recorded across the site. Anabat monitoring in three locations during this survey also recorded common and soprano pipistrelle and a single possible whiskered/Brandt's bat pass also recorded adjacent to the visitor centre at 21:23.

October 2013

Anabat monitoring through the night on 8th October 2013, when weather was mild (dusk temperature 14ºC, 100% cloud, wind 1-3 decreasing to 0) in four locations (south east corner, north east corner, visitor centre southern elevation and YHA courtyard) recorded activity from just after dusk to dawn, indicating the presence of roosting bats, mainly common pipistrelle, but with below 10% soprano pipistrelle passes. No soprano bats were recorded close to dawn, suggesting that their roost may be further away. There was a high level of social calling in the vicinity of the visitor centre, indicating the likely presence of a mating roost.

The figures below indicate surveyor locations and bat activity from all surveys undertaken from 2007 onwards:

Figure 5: Bat Activity, Once Brewed 30.07.07

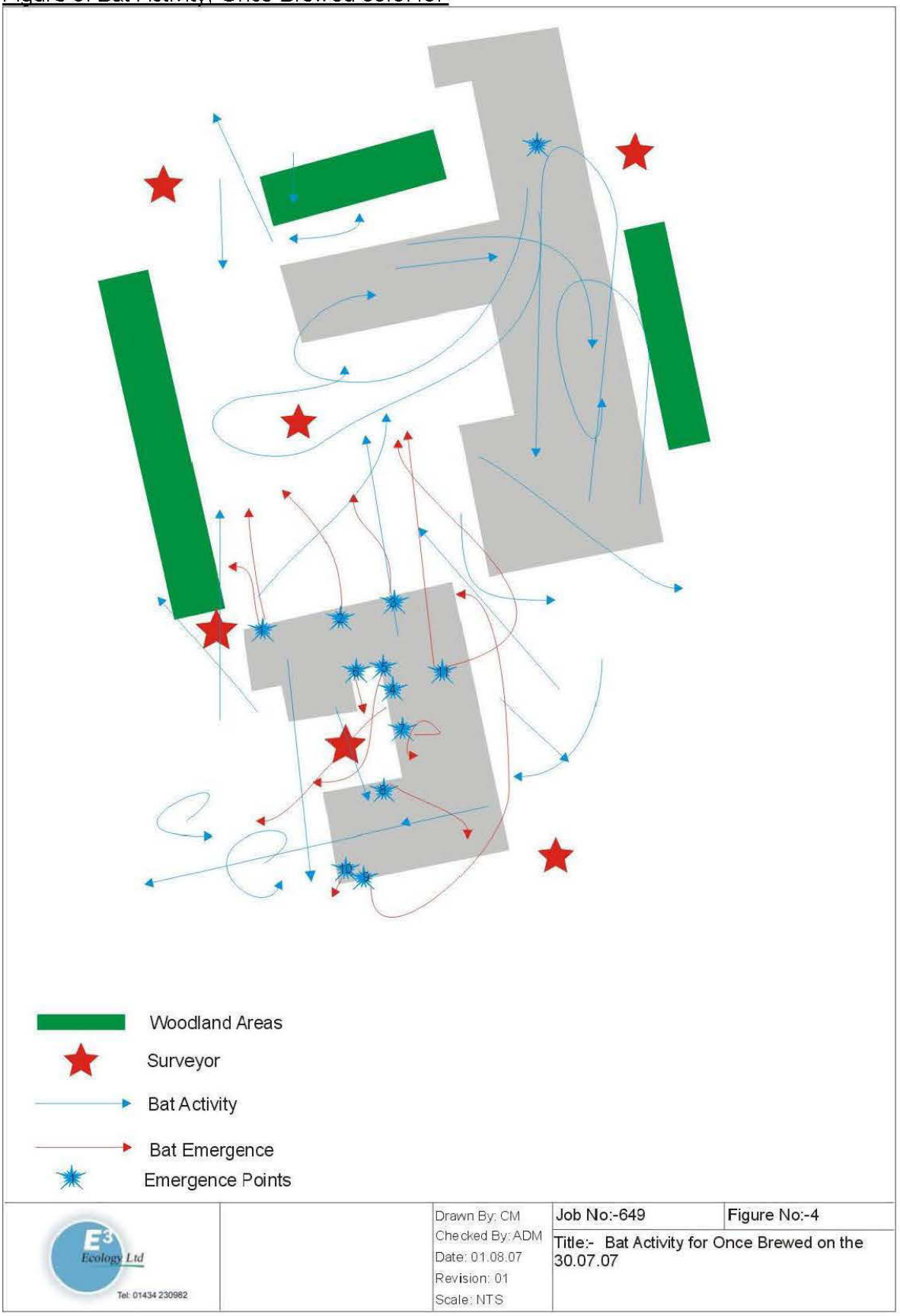


Figure 6: Bat Activity, Once Brewed
16.08.12

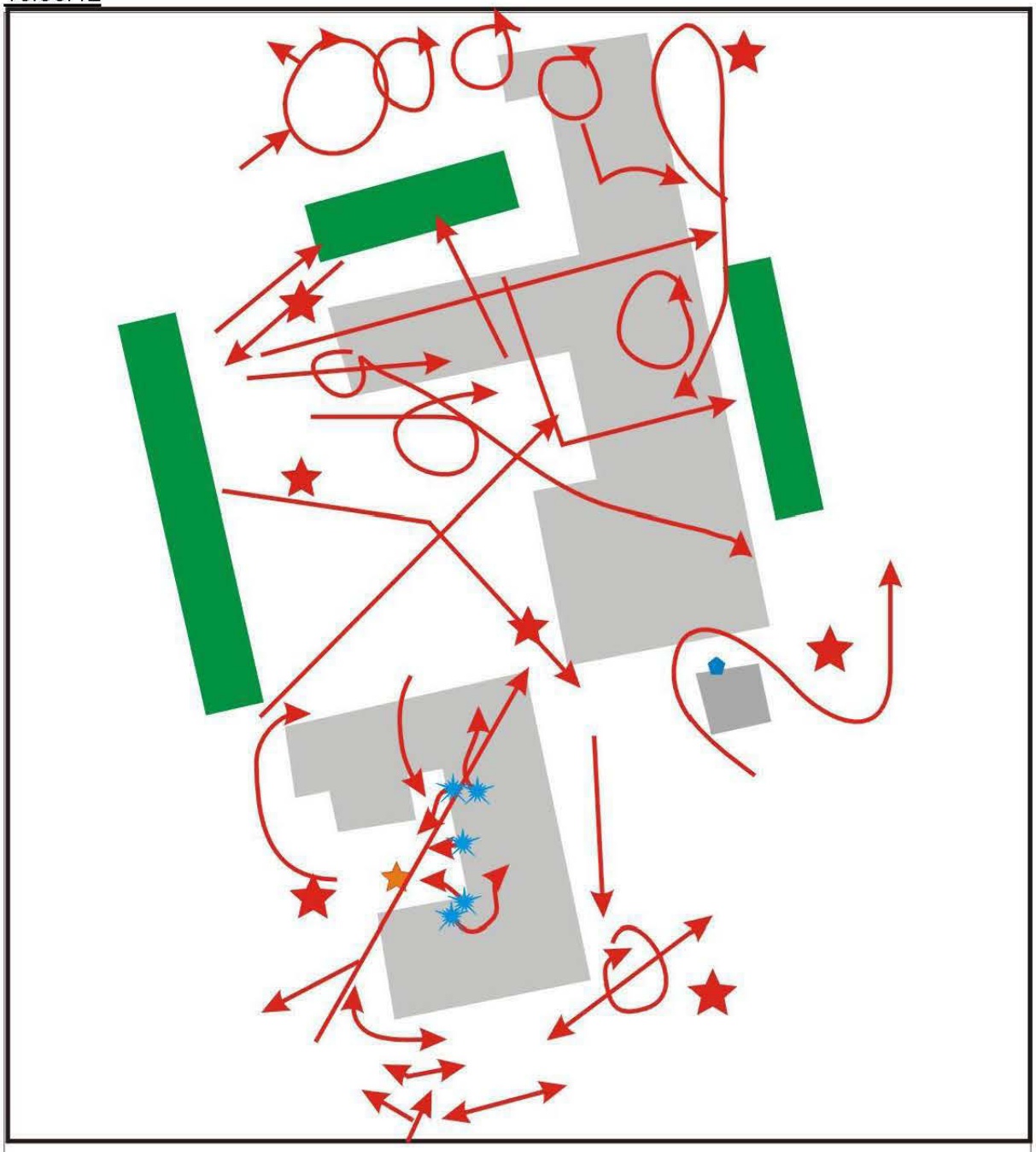


Figure 7: Bat Activity, Once Brewed 04.09.12

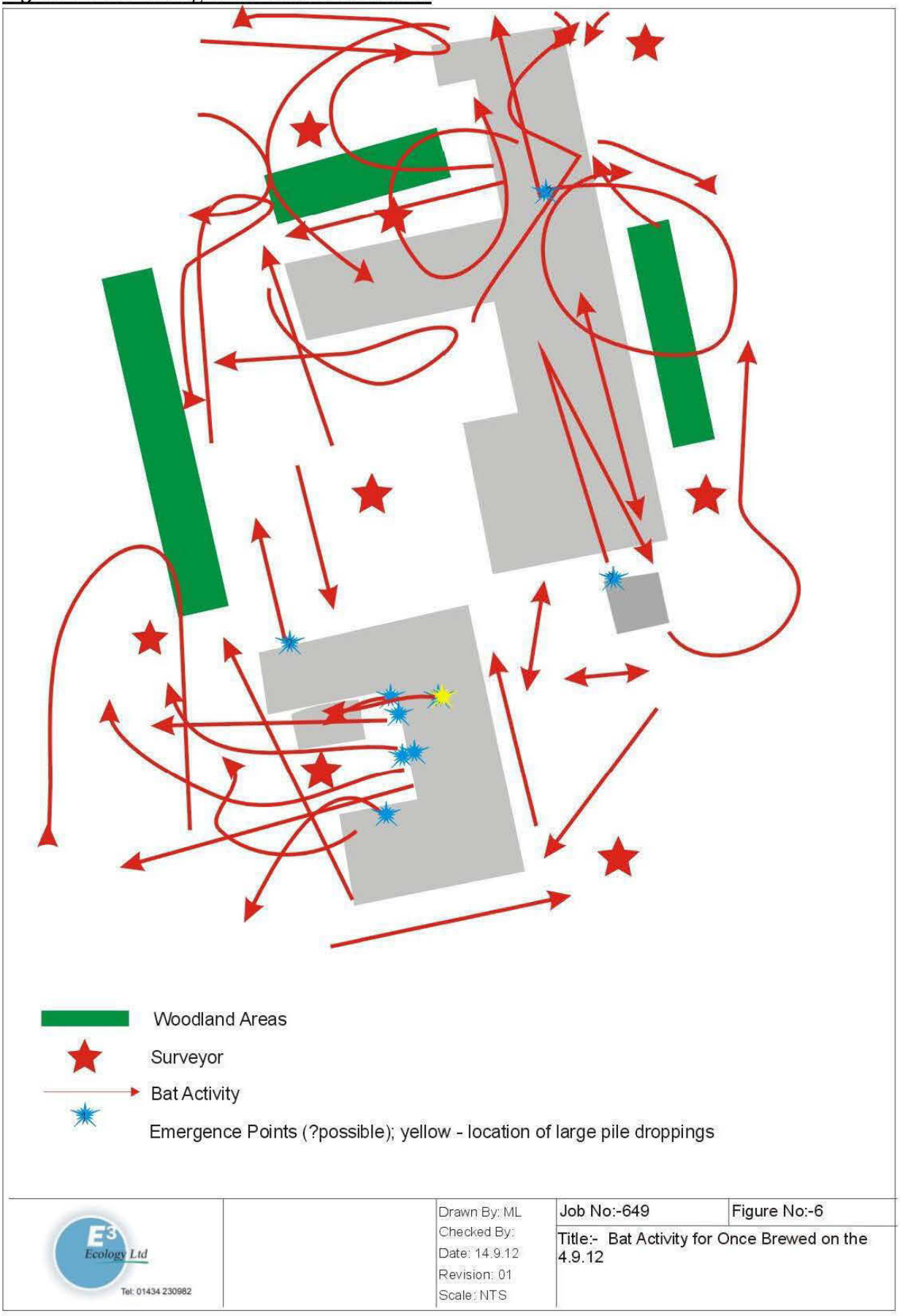
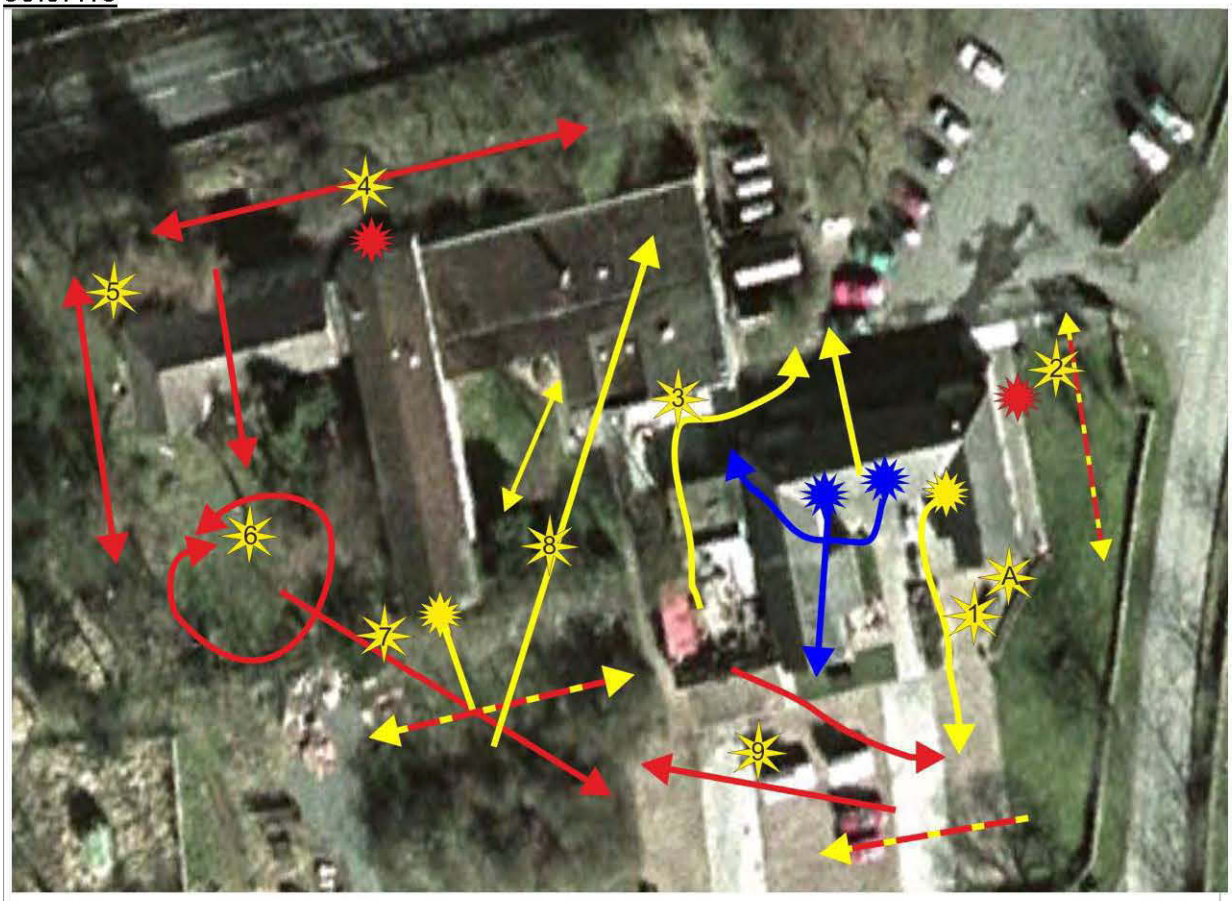


Figure 8: Bat Activity, Once Brewed
30.07.13



Location of surveyors

Emergence (red common pipistrelle, yellow soprano pipistrelle, blue silent bat)

Bat activity (red common pipistrelle, yellow soprano pipistrelle, blue silent bat)

Bat activity (red and yellow both common and soprano pipistrelle)

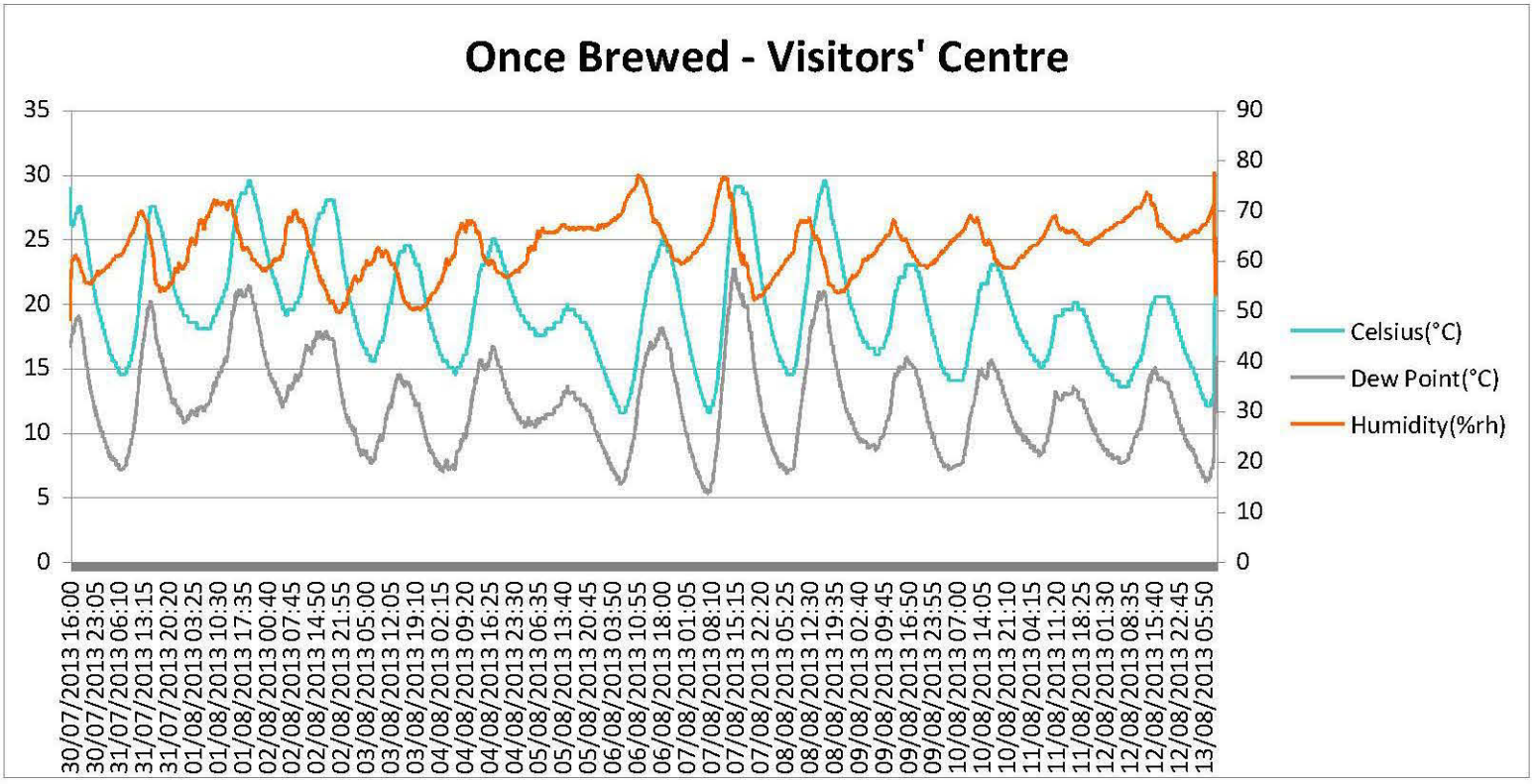
E3 Ecology Ltd
Tel: 01434 230982

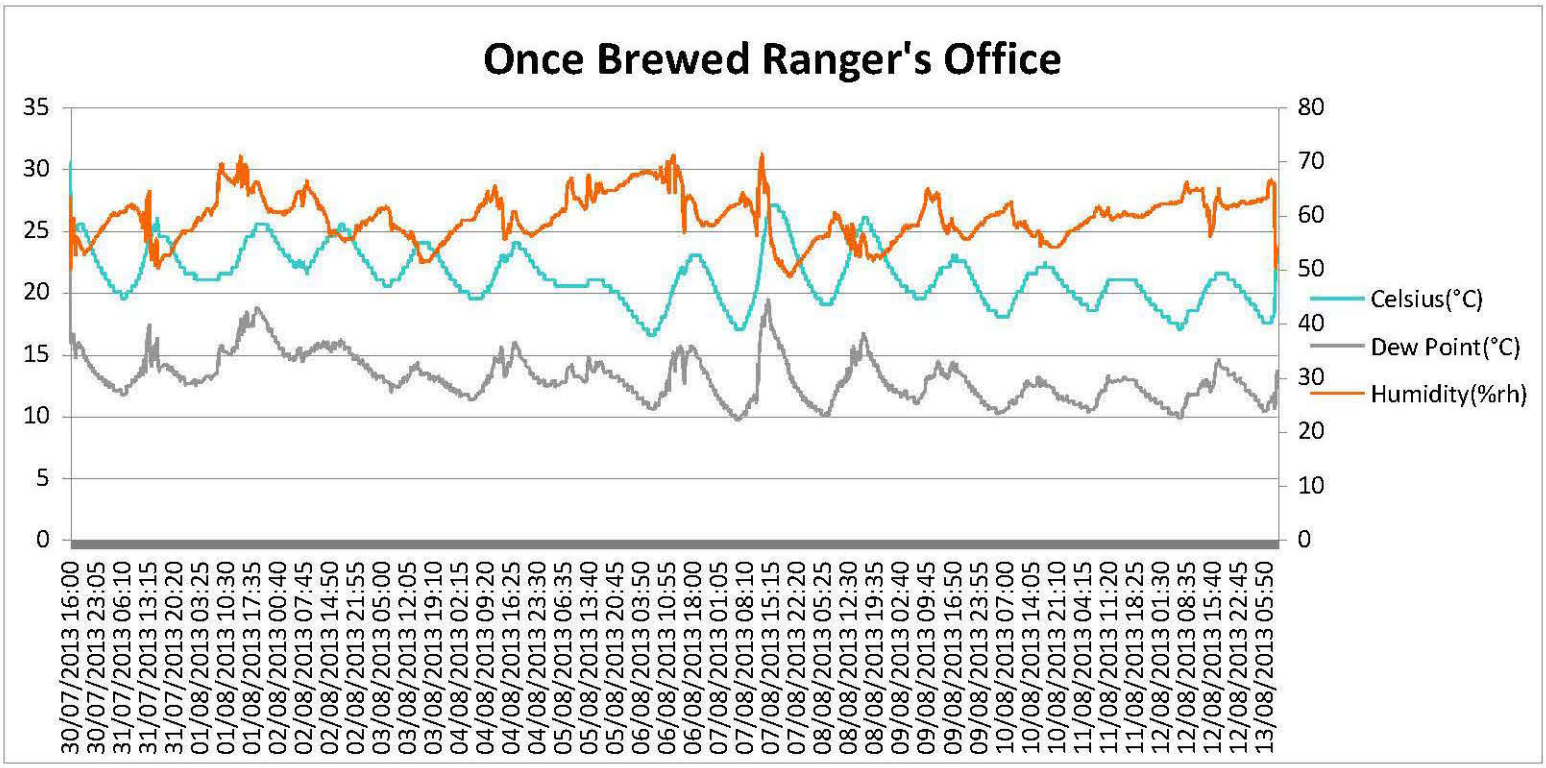
Drawn By: AJ	Job No:- 649	Figure No:- 7
Date: 09.08.13	Title:- Once Brewed Activity Survey 30.07.13	
Revision: 01		
Scale: NTS		

Figure 9: Once Brewed, Bat Activity 13.08.13

D.2.4 Microclimate Monitoring

USB Data Loggers were placed in lofts of the visitor centre and adjacent rangers' office for a two-week period, and recorded temperature, dew point and relative humidity every five minutes. Overall, both lofts showed similar levels of variability in temperature, although the rangers' office was in general slightly warmer. In the visitor centre, maximum daytime temperature ranged between 19.5 and 29.5 (range = 10), and minimum nighttime temperature ranged between 11.5 and 19 (range = 7.5). In the Rangers' Office loft, maximum daytime temperature ranged between 21 and 30.5 (range = 9.5) and minimum nighttime temperature ranged between 16.5 and 21.5 (range = 5).





D.2.5 DNA Analysis

3 samples of bat droppings taken from the loft of the visitor centre were sent for phylogenetic analysis in order to identify bat species to gather further information on bat use in the loft. The results returned indicated that all three samples were brown long-eared bat droppings. Given the quantity and fresh nature of these droppings, it is expected that the species uses the loft as a small roost site, and that silent bats emerging from the south face of the visitor centre in 2013, may have been brown long-eared bats. Detailed results are shown in Appendix 3.

Anabat monitoring within the loft area over a 5 day period in September recorded no bat activity, suggesting most roosts are crevice roosts.

E ASSESSMENT

The value and significance of the habitats and species found was assessed against the following criteria developed from the Guidelines for Ecological Impact Assessment produced by the Institute of Ecology and Environmental Management[3].

Level of Value	Examples
International	• An internationally designated site or candidate site. • A viable area of a habitat type listed in Annex I of the Habitats Directive, or smaller areas of such habitat, which are essential to maintain the viability of a larger whole. • Any regularly occurring population of an internationally important species, which is threatened or rare in the UK. • Any regularly occurring, nationally significant population/number of any internationally important species.
National	• A nationally designated site. • A viable area of a priority habitat identified in the UK BAP, or smaller areas of such habitat, which are essential to maintain the viability of a larger whole. • Any regularly occurring population of a nationally important species, which is threatened or rare in the region or county. • A regularly occurring regionally or county significant population/number of any nationally important species. • A feature identified as of critical importance in the UK BAP.
Regional	• Viable areas of key habitat identified in the Regional BAP or smaller areas of such habitat, which are essential to maintain the viability of a larger whole. • A regularly occurring, locally significant number of a regionally important species. • Bats: large maternity sites used by rare species in the region, including Nathusius pipistrelle, Leisler's and Brandt's bats.
County	• County designated sites. • A viable area of a habitat type identified in the County BAP. • Any regularly occurring, locally significant population of a species which is listed in a County "red data book" or BAP on account of its regional rarity or localisation. • A regularly occurring, locally significant number of a species important in a County context. • Bats: large maternity sites used by uncommon species in the region, including Daubenton, Natterers, soprano pipistrelle, noctule, brown long eared and whiskered bats; or small to moderate maternity roosts, hibernation and autumn swarming roosts used by rare species
District	• Areas of habitat identified in a District level BAP. • Sites designated at a District level. • Sites/features that are scarce within the District or which appreciably enrich the District habitat resource. • A population of a species that is listed in a District BAP because of its rarity in the locality. • Bats: small numbers of non-breeding rare species (5+); small-moderate maternity or hibernation roosts used by uncommon species, large maternity roost of common species to the region (common pipistrelle)
Parish	• Area of habitat considered to appreciably enrich the habitat resource within the context of the Parish. • Local Nature Reserves. • Bats: large hibernation, small-moderate maternity and autumn swarming roosts of species common; small numbers of uncommon species or occasional (1-4) roost of rare species

3 Institute for Ecology and Environmental Management (2006) Guidelines for Ecological Impact Assessment in the United Kingdom (Version 7 July 2006). http:/www.ieem.org.uk/ecia/index.html.

Level of Value	Examples
Local	• Habitats and species that contribute to local biodiversity, could only be replicated in the medium term, but are common in the local area. • Loss of such habitats would ideally be mitigated if local biodiversity is to be conserved and enhanced. • Bats: small numbers of common species, feeding/individual roosts of uncommon species or feeding roosts of rare species.
Low	• Habitats of poor to moderate diversity such as established conifer plantations, species poor hedgerows and unintensively managed grassland that may support a range of Local BAP species but which are unexceptional, common to the local area and whose loss can generally be readily mitigated.

E.1 Assessment of survey findings

The visitor centre is considered to be of Parish value, supporting a small maternity and mating roost of common pipistrelle and non-breeding roosts of small numbers of common pipistrelle, soprano pipistrelle, brown-long-eared and Whiskered/Brandt's bats. The use of fairly isolated buildings in this area by small numbers of woodland bat species has been recorded by E3 nearby in a similar setting, and it is most likely that whiskered/Brandt's bats and brown long-eared bats are breeding nearby in more lowland, and densely wooded, habitats.

Hibernating bats are likely to be present in low numbers.

The youth hostel is considered to be of local value, supporting small numbers of non-breeding common and soprano pipistrelle bats.

E.2 Population size class assessment

The site is concluded to support the following roosts:

- Small common pipistrelle maternity and mating roosts (5-20) in the visitor centre, using various access points around the building.
- Small brown long-eared roost in the visitor centre.
- Small non-breeding common pipistrelle roost (4-8) in the visitor centre.
- Occasional use of visitor centre by non-breeding, roosting Whiskered/Brandt's bats.
- Non-breeding common and soprano pipistrelle roosts in the youth hostel (1-5 of each species).

The building is likely to be used as a hibernation site by crevice roosting species, particularly pipistrelle.

E.3 Impacts

Bats are most vulnerable to disturbance during June, July and August, when they are breeding, and between November and March when they are hibernating.

Without targeted mitigation, impacts are likely to include:

1. Loss of a common pipistrelle maternity roost and brown long-eared, whiskered/Brandt's and soprano pipistrelle roosts through demolition of the visitor centre.

2. Loss of roosts used by non-breeding common and soprano pipistrelle, occasional whiskered/Brandt's bats through demolition of the youth hostel.
3. Disturbance or harm to a range of species of bats that may be using the buildings at the time, including possible hibernating bats if works are undertaken during the winter (mid Nov-mid March) and breeding bats if works are undertaken to the visitor centre in the breeding period (June-August).
4. Loss of loft spaces/voids used as day roosts.
5. Impacts on foraging areas through any tree loss as part of the redevelopment of the site, and changes to lighting around the site.

E.4 Constraints

Access to the lofts within the youth hostel could not be gained in 2013. Access to the visitor centre was restricted due to roof height and depth of insulation making it impossible to see joists. In 2012, two lofts within the youth hostel could not be accessed, one due to the level of stored material and one due the positioning of drying shelves preventing access to the hatch. The loft of the youth hostel was fully inspected in 2005, but by 2012 the level of insulation restricted safe access to much of the loft. Survey work in 2013 was commissioned later than ideal for maternity season assessment, but the spring of 2013 was about 1 month late, so significant maternity roosts would be expected to still be very evident in late July.

F MITIGATION AND RECOMMENDATIONS

F.1 Further survey

As bat roosts are present within the site and will be affected by the proposed works, a Natural England licence will be obtained prior to works commencing on site. Natural England will require updating checks in the year of the licence application to ensure that the situation has not changed.

If development does not happen within 12 months of this report, an updating survey will be required, ideally between May and August.

F.2 Mitigation requirements

Key mitigation requirements include:

Timing of Works

- **A Natural England licence will be required prior to the start of works.**
- **All demolition works to both buildings will be undertaken as detailed within a Natural England development licence method statement.**
- Demolition works to both buildings will not be carried out during the hibernation period (November to March).
- Demolition works to the visitor centre will not be carried out during the summer maternity period (June to August).
- A bat loft (detailed below) and 20 bat boxes will be provided on site in nearby trees, prior to work commencing. Three boxes suitable for maternity use will be erected as soon as possible.
- Prior to demolition works commencing a site induction meeting will be held, attended by the project ecologist and lead contractors and demolition contractor.
- Once scaffolding is in place the project ecologist will carry out a detailed inspection of the structures and mark up crevice roost sites and access points.
- Where evidence of current use is recorded, the project ecologist will install standard one-way exclusion valves. If one-way valves are used these will be left in place for a minimum of 4 nights when temperatures remain higher than 10°C for at least one hour after dusk. No exclusion will be undertaken of the visitor centre during the maternity period (June to August inclusive) unless the site inspection completed by the project ecologist has confirmed that maternity roosts are absent. No exclusion will be undertaken of either building during the hibernation period (mid November to mid March inclusive).
- The following key elements of work will not be completed on either building during the hibernation period unless bats have been excluded and proven to be absent:
    - Demolition of stonework
    - Demolition of brickwork
    - Removal of ridge tiles
    - Removal of roof timbers
    - Exposing of the wall tops via roof stripping works
    - Removal of bargeboards
    - Demolition works to the visitor centre, as detailed above will not commence during the maternity period (June to August inclusive). If substantial disturbance has

occurred before the maternity season, such as removal of roofs, then maternity roosts are very unlikely to become established and spring work may continue into the summer.

Working Methods

- A copy of the relevant Natural England licence method statement will be provided to contractors as part of the induction process at the start of works. The project ecologist will review all key points with contractors during the induction and provide all necessary training.
- Fascia boards, ridge tiles and roof tiles will be removed carefully by hand, being aware that bats may be present beneath tiles or ridge tiles, within cavity walls, between lintels and in gaps around window frames.
- Removal of fascia and the southern and eastern elevations of roof of the visitors centre will be supervised by the project ecologist.
- If bats are found during works, works will stop in that area and the ecological consultant will be contacted immediately. If it is necessary to move the bats for their safety, this will be undertaken by a licensed bat handler.

Habitat Creation and Enhancement

Bat Loft

E3 have constructed two bat buildings designed to provide bat lofts, one in Northumberland and one in Scotland. Both were occupied by roosting pipistrelle and Natterer's bats in the first year, and the Northumberland loft was used by hibernating bats in the second winter, so the technique is known to be successful.

Full details of the bat mitigation are included in the architect's plans.

- A bat loft will be constructed on site within the new youth hostel gardens, prior to demolition of the existing buildings (mitigation figures provided in Appendix 4). This will mitigate for loss of existing internal roost sites and will be suitable for crevice and void roosting species.
- The proposed bat loft has a footprint of 4m x 4m, and a height of 2m, with a lower level being proposed for cycle storage. Internally, bat boxes will provide a variety of roosting opportunities and microclimates.
- The bat loft building will incorporate south facing cavities, suitable for pipistrelle maternity roosts within the roof structure.
- As the new build has a flat "green" roof, the bat loft will incorporate a traditional slate roof with ridge tiles. Access to the loft will be provided at the eaves, and through the provision of 3 bat slates, two on either pitch of the roof close to the ridge.
- In addition, access to the loft will be provided from the cavity under the ridge tiles at least 400mm distant from the access gaps in the pointing to prevent water ingress. Access between ridge tiles will be provided through gaps in the mortar joints. Access to the loft will also be provided by a hay loft type door that will be kept open for the first summer, allowing bats to explore the structure, and then progressively closed, leaving long term bat access via a 30mm gap at the top of the door.
- Trussed rafter construction will not be used, as large open voids are required.
- Rough sawn timbers 150mm wide will be incorporated as noggings to either side of the ridge beam, creating long narrow crevices approximately 15mm in diameter at the ridge and widening to 25mm at the bottom.
- Only traditional bitumastic sarking will be used in areas that may be used by bats.

Bat Boxes

- 20 bat boxes will be erected in nearby trees to be retained on site prior to works commencing to provide alternative roost sites[4]. Three boxes suitable for maternity roost will be erected as soon as possible. Boxes will be erected as high as possible, ideally at a minimum height of 4m.

Crevice Roost Sites

- 31 crevice roost sites will be recreated within the new build, in sections that face south-east or south-west. 16 will be in the 'dry stone' buttresses, and 15 behind the larch cladding.
- Roosts will include crevice roost sites suitable for pipistrelle bats, and larger voids of the type used by Natterer's bats.
- It is likely that a number of the roosting locations will be created by using commercial bat boxes built into the structure.
- 5 roost sites in stonework will be created on the northern elevation suitable for hibernating bats.

Good Working Practices

The following measures should be included as general good working practice:

- Sound and heat insulation will be incorporated between roost sites and working or sleeping areas.
- Roost access points will not be over windows.
- Timber treatments that are toxic to mammals will be avoided in locations to be used by bats. If required, timber treatment will be carried out in the spring or autumn. Both pre-treated timbers and timber treatments will use chemicals classed as safe for use where bats may be present (see http://www.jncc.gov.uk/pdf/batwork_manualpt4.pdf).
- External lighting that may reduce bat use of the buildings will be avoided. High intensity security lights will be avoided as far as practical, and any lighting in areas identified as being important for bats will be low level (2m) and low wattage (50w). Modern LED lighting is very effective at putting light where it is required and minimising spillage. No lighting will be installed along the flyways between the roosts and adjacent trees. Where security lights are required, these will be set on a short timer and will be motion sensitive only to larger objects. Light spillage to areas of importance to bats should be less than 1 lux.
- The landscape planting will be designed to enhance structural diversity, and will include plants bearing flowers, nectar and fruits which are attractive to invertebrates, thereby helping to maintain the food resource for bats and wildlife generally.
- Trees around the youth hostel will be retained wherever possible, with a root protection zone in place. Lighting around the trees will be avoided if at all possible, or kept low level and low lux.

[4] The number of bat boxes proposed is based on research that has indicated that typically 10% of boxes will be used by bats, so if 5 roosts are to be created one needs to provide 50 boxes.

- Tree management will be carried out to promote deadwood habitats, retain standing over-mature trees, and promote biodiversity.

Monitoring

- As a condition of the Natural England licence the site will be monitored in years two, four and six, following completion of the development works.

G APPENDICES

G.1 Appendix 1: BAT ECOLOGY

Habitat and roost preferences

In their guidelines for bat surveys in the Northumbria Region, Natural England indicates the types of building and trees that are more or less likely to support bat roosts:

*Presence of **built structures** which appear to have a high probability of use by bats:-*

- *Properties older than 1939, with multiple roofs within 200m of woodland or water.*
- *Properties older than 1914 within 200m of woodland or water.*
- *Listed buildings or monuments.*
- *Traditional ranges of farm buildings.*

The risk of bat roosts being present will be higher where structures have:

- *Pre-20th Century construction.*
- *A lowland rural setting.*
- *Woodland, mature trees, species-rich grassland and/or water nearby.*
- *Large dimension roof timbers with cracks, joints and holes.*
- *Numerous crevices in stonework and structures.*
- *Uneven roof covering with gaps, though not too draughty.*
- *Hanging tiles or roof cladding, especially on south-facing walls.*
- *Roof warmed by the sun.*
- *Disused or little used; largely undisturbed.*

The risk of bat roosts being present will be lower where structures have:

- *Urban setting with little greenspace.*
- *Heavy disturbance.*
- *Small, cluttered roof void (particularly for brown long-eared).*
- *Modern construction with few gaps or crevices that bats can fly or crawl through (though pipistrelles may still be present).*
- *Prefabricated of steel or sheet materials*
- *Active industrial premises*

Habitats that increase the risk of bats being present include:

- *Presence of trees with a high probability of bat use, including ancient woodland or parkland, large trees with complex growth form, and trees with cavities, visible damage and loose bark (Coniferous plantation and young trees are less likely to support roosts). It can be extremely difficult to be certain of the presence or absence of bat roosts in trees meeting the above criteria.*
- *Recent or historical records of bats on the site, or bat roosts in the general area.*
- *Presence of underground structures such as abandoned mines, tunnels, kilns, cellars or fortifications which provide appropriate hibernation conditions.*
- *Where a development has a significant habitat impact on woods, hedgerows with field trees, parkland, diverse grassland and wetland habitats potential impacts on tree roosts, foraging habitats and flight-lines should be considered.*

Species information and population estimates

Pipistrelle maternity colonies generally consist of 25 to 100 individuals, but colonies numbering up to 1000 are not uncommon[5]. Adult females often form large maternity roosts, occupied between May and August, and frequently number around 300 individuals. Males are often solitary or in small groups during the summer, later congregating with the females at winter hibernation roosts[6].

[5] Roberts, G.M. & Hutson, A.M. 2000. *Pipistrelle*. British Bats No. 6. The Bat Conservation Trust, London

[6] Corbet, G.B & Southern, H.N., 1964. The handbook of British Mammals).

Maternity colonies of brown long-eared bats are generally small, consisting of 10 to 20 adults[7,8] (although numbers are likely to be underestimated, due to present in inaccessible areas of the roost). The largest colony recorded was located in northwest England and contained 150 individuals[9].

Natterer's bats roost within crevices and cavities, typically within hollow trees, old buildings, caves and tunnels[10]. Maternity colonies comprising up to 200 adult females can be found in buildings during the summer months while bachelor roosts comprising up to 28 males have been recorded during the summer months in Scotland[11]. Maternity roosts are not exclusively female, with both adult and immature males comprising up to 25% of the colony. Male only colonies have been found with up to 30 bats[12]. Foraging individuals will perch during the night at roosts near to foraging areas, not used as day roosts. Mostly these roosts are trees or shrubs but barns will also be used[13].

Whiskered bats, the smallest of the *Myotis* species, roost in trees and buildings. Nursery roosts can number over 100 bats, and are almost exclusively female bats. This species hibernates singly in caves, hanging on the open wall or in crevices[12].

Brandt's bat is thought to have similar roosting behaviour and foraging ecology to the whiskered bat, however, further research is needed to clarify this[12].

Maternity roosts are critical to the long-term survival of a colony, and disturbance can lead to the young being abandoned to die. Bats that are disturbed and escape in the winter use up a lot of energy, which they cannot replace, as there are few insects about as food.

---

[7] Speakman, J. R. *et al.*, 1991. Minimum summer populations and densities of bats in NE Scotland, near the northern borders of their distributions. *J. Appl. Ecol.*,225: 327-345

[8] Entwistle, A.C., 1994. Roost ecology of the brown long-eared bat *Plecotus auritus* in north-east Scotland. Unpublished PhD thesis, University of Aberdeen, UK

[9] Billington, G., 1993. *Bat Groups*. No. 7. Bat Conservation Trust, London).

[10] Stebbings, R.E. 1991. Natterer's bat *Myotis nattereri*. In The handbook of British Mammals. 3rd Edition Corbet, G.B. & Harris, S. (Eds) Oxford: Blackwell Scientific.

[11] Swift, S. M. 1997 Roosting and foraging behaviour of Natterer's bats (*Myotis Nattereri*) close to the northern border of their distribution. J. Zool. (Lond) **242:** 375-384.

[12] Altringham, J.D. 2003. British Bats. The New Naturalist. Pub. Harper Collins.

[13] Smith, P.G. & Racey, P.A. 2005. The itinerant Natterer: physical and thermal characteristics of summer roosts of *Myotis nattereri* (Mammalia: Chiroptera) J. Zool. Lond. 266: 171-180.

G.2 Appendix 2: RESULTS OF DUSK/DAWN ACTIVITY SURVEYS

Key findings - 12th September 2005

(Observations of southern surveyor in black, northern surveyor in blue)

19.25Start of survey

20:00 Common pipistrelle emerged from under bargeboard on south side, east of toilet doorway, left to S

20:02Common pipistrelle emerged from under bargeboard on south side just to right (east) of previous bat, left to S

20:033 Common pipistrelle emerged from under bargeboard on south side, one in corner above toilet door, 2 further along in area where previous bats out, went S

20:04Common pipistrelle emerged from SE corner of south wall, from under bargeboard, went SW

20:054 Common pipistrelle emerged from under bargeboard on south wall to east of toilet door, went S

20:08Common pipistrelle emerged from under bargeboard on south wall to east of toilet door, went S

20:092 Common pipistrelle emerged from under bargeboard on south wall to east of toilet door, 1 went S,

20:25Bat emerged from under bargeboards west end of internal east wall, above hosta, very faint, droppings on ground suggest BLE/Natterer's

20:27 Bat emerged from under bargeboards west end of internal east wall, possible brown long eared/Natterer's left round E of building

20:342 Common pipistrelle emerged from under bargeboard on south wall, east of toilet doorway

20:34Bat, ?BLE emerged from south west corner

20:35Bat, ?BLE? emerged from south west corner

20:55 End of survey

Dusk Survey 31.7.07 Summary

Surveyor Time/ Location	Surveyor 1 (between visitors centre & trees)	Surveyor 2 (between visitor centre & youth hostel, YH courtyard)	Surveyor 3 (in courtyard of visitors centre)	Surveyor 4 (W of the site between trees)	Surveyor 5 (far N of youth hostel)	Surveyor 6 (NE of visitors centre)
21.15						
21.20	**21.23 CP heading west from under bargeboard Pt 1**			**21.24 x2CP feeding in the tree tops. Poss emergence from roof?**	**21.22 CP foraging above youth hostel. Poss emergence from roof?**	
21.25			21.29 CP heard, very faint		21.25 **x5CP foraging above youth hostel. ?emergence?**	
21.30	21.30 CP prob from under fascia, not seen 21.32 SP from under bargeboard, Pt 2 21.34 CP heading west, from courtyard 21.34 CP as above		**21.32 CP exiting building, just right of door from roof (pt 4)**			**21.31 CP emerged from SE of N building, pt 9**
21.35	21.38 SP heading west, from under bargeboard Pt 3 21.38 CP heading west from trees to the south	21.37 CP feeding, less than 10m high	**21.38 CP exiting building, just right of door from roof (Pt 4)**	21.38 CP flew into the site from W	21.36 x3CP foraging above building	
21.40	21.40 CP heading west from trees to the south **21.40 silent bat from under bargeboard Pt 1, ?CP just not echo locating**	21.40 CP commuting/feedingo ver the roof top, from N	**21.40 x2CP exiting building above toilets, at pt 5** 21.42 CP commuting over the building from NW	21.41 x2CP flew into the site from W 21.43 x3 CP flew out of site from youth hostel area		21.41 CP briefly heard 21.42 CP commuting into site from S

Surveyor Time/ Location	Surveyor 1 (between visitors centre & trees)	Surveyor 2 (between visitor centre & youth hostel, YH courtyard)	Surveyor 3 (in courtyard of visitors centre)	Surveyor 4 (W of the site between trees)	Surveyor 5 (far N of youth hostel)	Surveyor 6 (NE of visitors centre)
21.45	**21.47 2xCP disappeared under roof cover, 2nd stone from the edge (Pt 1)** 21.48 CP commuting/feeding from E direction		21.47 CP exiting building at toilets, pt 5 **21.47 CP exiting building near rangers office, pt 6**	21.47 cp heard, not seen. Foraging through the evening above the garden/trees of youth hostel around 12 bats.	21.46 SP & CP over buildings	21.47 CP commuting from S 21.48 Bat not heard, emerged from roof area? Pt 11 21.48 x2CP commuting N to S **21.49 CP emerged by middle of drain pipe under fascia board, pt 9**
21.50	**21.51 SP from under bargeboard Pt 2**		**21.50 silent bat, exiting building near rangers office, pt 6** 21.51 CP commuting over building S to NE 21.53 CP commuting over building from W			21.50 CP emerged at peak of roof pt 11 21.52 Cp commuting N-S **21.53 Bat not heard, emerged from SE corner of building**
21.55	21.55 x3Bats, SP & CP over roof, 2 chasing heading west 21.59 CP from wood, over carpark	21.56 CP commuting/feedingi n from E 21.59 CP as above 21.59 CP commuting/feeding	21.55 x2CP exiting building at toilets, pt 5 **21.56 CP exiting building to left of entrance, pt 7.** 21.57 CP feeding to SE; 21.59 CP commuting from N over building			21.56 x2?SP into & back out of site from SE 21.58 CP commuting in from SE
22.00	22.04 CP heard, not seen	22.02 CP commuting/feeding over the roof tops from N 22.04 CP commuting/feeding from E	22.02 CP feeding to SW of courtyard **22.04 CP exiting building on W elevation of inner courtyard, pt 8**		21.56 x2/3 ?CP still foraging above the East building. Foraging continues through evening.	22.02 x4CP emerged from SE of N building, feeding
22.05	22.05 CP heading west to east from wood over car park 22.06 x2CP west to east from off site 22.07 & 22.08 as above.	22.06 CP feeding/commuting over roof tops, heading N 22.08 x2CP commuting/feeding heading 22.09 CP commuting/feeding from N	22.06 Bat exiting building at right side of building 22.08 Bat heard very faint			

Surveyor Time/ Location	Surveyor 1 (between visitors centre & trees)	Surveyor 2 (between visitor centre & youth hostel, YH courtyard)	Surveyor 3 (in courtyard of visitors centre)	Surveyor 4 (W of the site between trees)	Surveyor 5 (far N of youth hostel)	Surveyor 6 (NE of visitors centre)
22.10	22,12 CP heard, not seen. 2nd CP in from headed west	22.11 CP commuting/feedingc ircling the courtyard towards S	22.14 CP feeding over building			
22.15		22.16 CP feeding less than 10m high 22.19 CP heard not seen				
22.20						22.23 ?bat heard ?Natterer around carpark
	Sunset					
	Light levels low enough for Pipistrelle emergence/open flight					
	Light levels low enough for Myotis emergence/open flight					

Date:	Start Time:	End Time:	Number of Surveyors:	Number of Remote Recording Points:
16th Aug 2012	**20.25**	**21.50**	**7**	**3**

Start Temp:	End Temp:	Cloud cover:	Precipitation	Wind:	Sunset/Sunrise:
21.0	**16.4**	**60%**	**0**	**0**	**21.35**

Summary of Survey

Rather late bat emergence but common pipistrelle roosts present at eaves of visitor center, and most probably with the youth hostel from timings of first activity. ? Whiskered bat 2No roosting at south side of visitor center, identified through slope analysis of Anabat records. 11 Common pipistrelle and 2 ? Whiskered bats emerged from the south side of visitor center. Evidence of young bats being present with adults from flight patterns and echolocation call frequencies.

Activity Table

Time	Light level (Lux)	South of visitor centre	South of visitor anabat	North west of visitor	North east of visitor	South of YHA	South west of YHA	West of YHA anabat	North west of YHA	North of YHA Anabat	North east of YHA
20.25	320										
20.30	246		No Activity	No Activity	No Activity	No Activity					No Activity
20.35	183										

20.40	105										
20.45	51										
20.50	27	20.54 45 HNS					20.54.45 45 F in trees heading NW	45 x 3	20.54.20 4-6 bats F in trees at 15m and above until 21.02.15		
20.55	9	**20.55 poss 45 emerged; 20.57 45 emerged**				20.59.25 ? HNS	20.55.30 45 x2 F in trees heading NW 20.57.30 45 45 F in trees at 9m heading SE 20.58.40 45 x2 F in trees at 8m for 5 mins heading NW	45 x 10 Pip x 4		45 x 3 ?Wh x 1	
21.00	4.5	21.00 45 heard; **21.02 3 x 45 emerged; 21.03 1 x 45 emerged**	**21.04 ?Wh**	21.01.25 45 HNS 21.02.20 45 F above tree	21.02.40 45 C over building	21.00.10 ? HNS 21.01.08 45 21.02.09 45 F at 4-5m 21.03.30 45 21.04.53 45 x2 C	21.02.10 45 F in trees at 8m heading SE 21.04.50 45 F in open at 7m heading NE	45 x 17 Pip x 1	21.00.00 45 x2 F from E to W along northern side of building until 21.04.15 21.03.04 Activity reduced to one bat F	45 x 7	21.00.06 45 Poss. Emergence 21.03.12 45/Myotis x2
21.05	2.4	**21.06 45 emerged; 21.07 ?45 emerged; 21.07 45 x 2 emerged; 21.09 x 2 45 emer**	45 x 4		21.05.15 45 C to fields 21.07.22 45 x2 C around building	21.05.26 55 C and F at 3m 21.06.09 55 F at 3m 21.07.04 55 F at 3m 21.08.29 55	21.05.55 ?Nat F and heading NE 21.09.05 45 x2 F in trees for 4 mins at 7m heading NW	45 x 18	21.07.00 4 bats F 21.09.28 ?Myotis/ 45 x3-5 From N F in trees	45 x 16	21.05.16 45 + Myotis x4

		ged									
21.10	1.7	2 x 45 **+ Quiet emer ge - Wh**	**21.14 ?Wh** 45 x 13 Pip x 2	21.11.10 ?55 x2 F 21.13.35 45 C	21.10.13 45 x2 21.13.09 45 C 21.14.56 45 F	21.10.0 0 45 C 21.11.2 3 45 HNS 21.11.5 6 45 C 21.13.0 5 45 F and C	21.12.30 45 F in trees heading SE	45 x 17 Pip x 2	21.12.0 0 3 bats exit S	45 x 12	
21.15	1.2	45 flew S-N	45 x 11 55 x 2 ?Wh x 2	21.18.18 45 C 21.19.20 45	21.17.32 45 21.18.22 45 x2 HNS		21.15.15 45 x2 F in trees heading SE 21.17.05 45 C around building at 6m heading NW	45 x 23	21.16.1 7 45 F in trees heading S 21.18.0 0 45 C W to E at 5-8m	45 x 5	21.19.42 45 x2 Circling building
21.20	0.6	Activit y falls away	45 x 5 Pip x 3 ?Wh x 2	21.24.29 ?Myotis HNS	21.20.34 ?Noc/45 HNS 21.24.22 45 HNS		21.24.40 55 C SW at 8m	45 x 1 55 x 1	21.20.1 9 Myotis F in trees 21.24.3 7 Noc faint call HNS	45 x 4	21.21.12 Noc + 45 21.24.02 45 Circling roof and F in trees
21.25	0.3		45 x 1					45 x 1		45 x 3	21.26.12 ?Noc HNS 21.27.06 45 F and circling above shed
21.30	0.2		45 x 2								
21.35	0.2			21.37.20 45 HNS	21.39.14 Noc + 45 HNS			45 x 3	21.37.3 8 Bat HNS		21.37.02 ?Noc + 45 HNSS
21.40	0.1		45 x 2 Noc x 1		21.40.30 45 HNS F						
21.45	0.1		45 x 1								
21.50	0.1										
		Sunset									
		Light levels low enough for Pipistrelle emergence/open flight									
		Light levels low enough for Myotis emergence/open flight									

45 – common pipistrelle 55- soprano pipistrelle Noc – Noctule BLE - brown long-eared bat Nat – Natterer's WB – Whiskered/Brandt's. ? before a name indicates uncertain identification due to poor sonogram or closely related species. BP – bat passes. Records in bold indicate roost present. HNS – heard not seen, generally bat is behind the surveyor or hidden by trees/building. F – foraging C- commuting SC – social call

Date:	Start Time:	End Time:	Number of Surveyors:	Number of Remote Recording Points:
04.09.12	**19:39**	**21:08**	**8**	**0**

Start Temp:	End Temp:	Cloud cover:	Precipitation	Wind:	Sunset/Sunrise
14.8C	**12C**	**70%**	**Dry**	**F1-3**	

Summary of Survey
Pipistrelles emerging from various points along the southern courtyard of the visitors centre, both under bargeboards and from around solar panels. A possible emergence from the west side of the building, the eastern section of the youth hostel and, although not confirmed, potentially from the roof of the hostel.

Activity Table									
Time	Light level (Lux)	Surveyor 1 to the S of visitors centre	Surveyor 2 to the SW of visitors centre	Surveyor 3 to NE of visitors centre	Surveyor 4 to W of YH	Surveyor 5 to the NW of YH	Surveyor 6 S (centre) of YH	Surveyor 7 to SE of YH	Surveyor 8 to the NE of YH
19.35									
19.40									
19.45									
19.50	**290**								
19.55	**150**								
20.00	**121.7**								
20.05	**64**								
20.10	**24.4**								
20.15	**10.8**	**20.16.07 45 Emergence from bargeboard 20.17.41 45 Emergence from left of reception**	20.16.12 Pip Commuting at approx. 10ft 20.17.40 Pip Commuting at approx. 10ft **20.18.55 Pip Emergence and** Commuting	20.19.36on e 45 pip HNS	20.19.30 45 + 55 x2 bats Foraging for 4-5 mins	20.19.20 45 Foraging at 6-8m From E until 20.24.19	20.19.14 45 Foraging for several mins		
20.20	**6.5**	**20.22.39 Pip Emergence from under solar panels 20.22.57 45 x2 Emergence as above 20.23.23 55**	20.22.10 Pip Commuting at approx. 10ft 20.22.40 45 Commuting at approx. 10ft 20.23.05 45 Foraging for approx. one minute 20.24.58 Bat	20.21.16 one 45 pip HNS foraging	20.21.20 45 Joins previous bats Foraging 20.24.30 45 Foraging	20.21.20 45 Second bat joins Foraging until 20.24.19 20.23.15 45 From N Joined bats Foraging until 20.23.25 20.24 – 20.25 45 x2 Commuting	20.21 – 20.29 55 Foraging	20.20.40 45 Commuting 20.23.45 45 Foraging, 4 passes	20.20.31 one 45 pip foraging in W-E-W dirn **20.22.07 one 45 and one 55 pip - potential emergence from E face of W**

			Commuting			N to E at 4-6m			building
20.25	**2.2**	**20.25.07 45 Emergence from under bargeboard 20.25.23 45 Emergence as above 20.27.49 55 Emergence from roof** 20.28.05 45 Commuting 20.28.40 55 x2 One Emergence from bargeboard. **Second bat Foraging**	20.26.00 – 20.32.40 45 + 55 Foraging	20.25.32 one 45 pip HNS 20.27.40 one 45 pip foraging at 5m N-S dirn 20.29.32 one 45 pip foraging at 5m	**20.25.00** ?55 Foraging and Commuting 20.27.10 45 x2 **20.28.00 45 x2 + 55 Foraging and one Possible Emergence 20.29 – 20.32 45 + 55 x3-4 bats Foraging and one Possible Emergence**	20.25.30 45 x2 From N Foraging at 6-8m 5 passes 20.27.36 45 x2 Foraging to N of building, 8 passes	20.27.49 45 x2 Foraging	20.26.12 Pip Constant Foraging in trees bordering site 20.28.15 Pip x2 Joined Foraging	20.28.39 three 4 5 pips constant foraging over building with a possible 55 pip joining for all survey
20.30		**20.30.17 55 Emergence** 20.30.56 55 + 45 Foraging 20.33.10 55 + 45 up to 3 bats Foraging **20.34.36 45 Possible Emergence 20.34.58 45 Emergence from bargeboard**		20.31.21 one 45 and one 55 pip foraging at 5m NW to SE dirn	20.33 45 x2-3 20.34.20 45 x2 Foraging	20.30.00 45 Joins previous bats Foraging until 20.32.15 20.32.30 ?Pip x1-2 Foraging to N side of building, multiple passes until 20.36.40	20.30.06 45 x2 Foraging for approx 6 mins		
20.35		**20.35.15 55 Emergence from bargeboard 20.36.43 Silent bat Emergence** 20.37.05 45 + 55 Foraging 20.38.44 45 HNS 20.39.49 45 Commuting across site	20.35.55 – 20.44.35 45 + 55 x3 bats Foraging	20.36.18 one 45 pip HNS 20.39.30 one 45 pip foraging at 5m E-W-E dirn	20.35.10 45 + 55 Foraging and Commuting 20.37 – 21.00 55 + 45 16 passes 20.39.05 55 Foraging and Commuting	20.37.00 – 20.41.05 45 + 55 Foraging over building	20.38.17 45 x4 Foraging, 9 passes		
20.40		20.41.18 45 Foraging 20.42.49 45 Foraging in yard 20.43.36 45 x2		20.40.18 one 45 pip foraging at 3m S-N	20.42.00 45 Foraging	20.41.48 45 x2-3 Foraging over building to N for several minutes	20.40.16 45 x3-4 Foraging for 2 mins 20.44.35 45 x2 Foraging for several		

							minutes, 8 passes		
20.45		**20.45.34 45 Possible Emergence from roof**	20.45.20 – 20.46.40 45 Foraging	20.45.22 one 45 pip HNS 20.46.54 one 45 pip HNS 20.47.18 one 45 pip foraging at 4m S-N dirn	**20.45.15 45 Possible Emergence** 20.47.20 45		20.47.59 45 Foraging for several minutes, 8 passes		20.45.28 2 45 pips foraging over building
20.50		20.51.36 45 + 55 x2-3 Chasing + Noc HNS		20.54.32 one 45 pip HNS	20.54 – 21.00 Bat Foraging	20.50.21 – 20.53.35 45 x2-3 HNS + ?Noc 20.54.00 45 x3-4 HNS Foraging	20.50.15 45 Foraging for approx. 6 mins		
20.55				20.55.52 one 55 pip and one noc HNS 20.57.16 one 45 pip foraging at 4m S-N dirn				20.55.52 Pip HNS 20.58.17 ?Noc HNS	20.58.57 two 45 pips continual foraging over building 20.59.57 one Pip poss.45 foraging W-E-W
21.00				21.02.32 one 45 pip and one noc HNS			21.00.04 45 x2 HNS Foraging		
21.05									
		Sunset							
		Light levels low enough for Pipistrelle emergence/open flight							
		Light levels low enough for Myotis emergence/open flight							

45 – common pipistrelle 55- soprano pipistrelle Noc – Noctule BLE - brown long-eared bat Nat – Natterer's WB – Whiskered/Brandt's. ? before a name indicates uncertain identification due to poor sonogram or closely related species. BP – bat passes. Records in bold indicate roost present. HNS – heard not seen, generally bat is behind the surveyor or hidden by trees/building. F – foraging C- commuting SC – social call

Site:	Date:	Start Time:	End Time:	Number of Surveyors:	No. of Remote Recording Points:
Once Brewed	30/07/2013	21:08	22:30	9	1

Start Temp:	End Temp:	Cloud Cover:	Precipitation:	Wind:	Sunset/Sunrise:
21.4ºC	11.3ºC	10%	0	2	21:13

Summary of Survey:

Activity Table:						
Time	Light Level (Lux)	Surveyor 1 (SE of site)	Surveyor 2 (E of site)	Surveyor 3 (Centre of site)	Surveyor 4 (N of site)	Surveyor 5 (NW of site)
21:05						
21:10						
21:15						
21:20						
21:25						
21:30						
21:35					**21:35 1x Pip emergence from N side of Youth Hostel, C headed W**	
21:40		**21:44 1x pip emergence from S side of Visitor Centre, C headed S**			21:42 1x Pip HNS	21:41-21:47 1x 45 F W of site 21:48 1x 45 F W of site
21:45	19.5	**21:48 1x Pip emergence from S side of Visitor Centre, C headed NW**		21:48 1x 55 C headed S		
21:50	9.41	21:50 1x 45 F headed SE 21:51 1x 55 HNS **21:53 1x pip emergence from S side of Visitor Centre, C headed S** & 1x 45 HNS	21:50-22:20 frequent C&F of 45's & 55's & a Pip calling at 50 KHz, headed N-S **21:51 3x Pip (both 45 and a pip calling at 50 KHz) emergences from under**	21:51 1x 55 HNS 21:54 1x 55 C&F headed N	21:51 1x 45 HNS 21:54 1x 45 HNS	

21:55	6.13	21:57-22:'02 2x pip F S side of Visitor Centre **21:59 1x pip emergence from S side of Visitor Centre headed S**	**fascia E side of Visitor Centre 22:00 1x Pip calling at 50 KHz emergence from under fascia E side of Visitor Centre**	21:58 1x 55 C&F HNS 21:59 1x 55 F centre of site	21:57 1x 45 HNS 21:59 1x 45 F headed SE	21:59 1x 45 C headed S
22:00	3.11			22:03 1x 55 C&F headed NE	22:01 2x 55 F SW of site 22:03 1x 45 HNS	22:01 1x 45 F N of site 22:02 1x 45 C headed S
22:05	1.74				22:05 1x 45 HNS 22:06 1x 45 F N of site 22:07 1x 45 HNS 22:09 1x 45 F headed SW	22:05 2x 45 F HNS 22:06 1x 45 C&F headed S 22:07 1x 45 C headed W
22:10						22:10 1x 45 C headed W
22:15						22:15 1x 45 HNS 22:18 1x 45 F N of site
22:20						
22:25					22:25 1x 45 HNS	
22:30						
Surveyor		Neil Beamsley	Jessica Andrews	Darryl Birch	Russell Speight	Jessica Wilson

	Sunset
	Light levels low enough for Pipistrelle emergence/open flight
	Light levels low enough for Myotis emergence/open flight

45 – common pipistrelle 55- soprano pipistrelle Noc – Noctule BLE - brown long-eared bat Nat – Natterer's WB – Whiskered/Brandt's. ? before a name indicates uncertain identification due to poor sonogram or closely related species. BP – bat passes. Records in bold indicate roost present. HNS – heard not seen, generally bat is behind the surveyor or hidden by trees/building. F – foraging C- commuting SC – social call

Activity Table:						
Time	**Light Level (Lux)**	**Surveyor 6 (W of site)**	**Surveyor 7 (S of site)**	**Surveyor 8 (Centre of site)**	**Surveyor 9 (Carpark S of site)**	**Anabat (SE of site)**
21:05						
21:10						
21:15						

21:20						
21:25						
21:30						
21:35						
21:40		21:41 1x 45 F W of site				21:44 1x 55
21:45	19.5	21:48 1x 45 F W of site	21:45 1x 55 C&F headed E 21:48 1x 45 C&F headed E	21:45 1x 55 HNS 21:48 1x 55 C headed W	21:45 1x 45 F headed W 21:46 1x 45 C headed SE	
21:50	9.41	21:50 1x 45 F W of site	**21:50 3x pip emergences from apex S side of Youth Hostel**, F in nearby trees until 21:55	21:50-21:57 3x 55 F headed E-W	21:50 2x 45 C headed SE 21:51 1x 45 HNS	21:50-22:20 Frequent F of 45 & 55 & pip calling at 50 KHz
21:55	6.13	21:56 2x 45 F headed N 21:59 1x 45 F W of site	**21:56 1x 55 emergence from apex S side of Youth Hostel**, F in nearby trees 21:57 3x 55 F headed E 21:59 2x 55 F headed E-W		21:55 1x 45 F HNS 3x BP 21:56 1x 45 F HNS 21:57 2x 45 F S of site 3x BP 21:58 1x 45 HNS 21:59 1x 45 C&F S of site	
22:00	3.11	22:04 2x 45 F headed N	22:02-22:06 2x 55 F headed E-W 22:06 1x 45 C&F headed W 22:07 1x 55 C&F headed SE	22:00-22:12 1x Pip (50KHz) F centre of site	22:00 1x 45 C headed NW 3x BP 22:01 2x 45 C&F S of site 22:02 1x 45 F headed SE 22:03 1x 45 HNS	
22:05	1.74	22:07 1x 45 F W site 22:09 2x 45 F headed N			22:06 1x 45 & 1x 55 C headed W 22:07 1x 45 HNS	
22:10			22:10-22:12 1x 55 F headed E-W			
22:15		22:15 1x 45 C headed N 22:19 1x 45 C headed N	22:16 1x Pip (50 KHz) F headed E-W		22:16 1x 45 F headed SE 22:18 1x 45 F S of site	

22:20			22:21 1x Pip (50 KHz F headed E-W 22:22 1x 45 F HNS		22:21 1x 55 F S of site 22:22 1x 45 C headed W	
22:25						
22:30						
Surveyor		Corey Higham	Adam Jones	James Streets	Becca Melville	Anabat L

	Sunset
	Light levels low enough for Pipistrelle emergence/open flight
	Light levels low enough for Myotis emergence/open flight

45 – common pipistrelle 55- soprano pipistrelle Noc – Noctule BLE - brown long-eared bat Nat – Natterer's WB – Whiskered/Brandt's. ? before a name indicates uncertain identification due to poor sonogram or closely related species. BP – bat passes. Records in bold indicate roost present. HNS – heard not seen, generally bat is behind the surveyor or hidden by trees/building. F – foraging C- commuting SC – social call

Date:	Start Time:	End Time:	Number of Surveyors:	Number of Remote Recording Points:
13/08/13	**20.33**	**22.00**	**9**	**3**

Start Temp:	End Temp:	Cloud cover:	Precipitation	Wind:	Sunset/Sunrise:
18.1	**9.6**	**40-80%**	**0**	**2-3**	**20.44**

Summary of Survey

Anabat analysis indicated that the majority of bats were common pipistrelle, but that in the field a number are likely to have been identified as soprano and much of the echolocation calling was around 50kHz.

Lux meter malfunction (dead battery) at 21:10
Anabats on at 20:30 and off at 22:00

Activity Table

Time	Light level (Lux)	Surveyor 1 SE Bldg 1	Surveyor 2 SW Bldg 1	Surveyor 3 S Bldg 2	Surveyor 4 SW Bldg 2	Surveyor 5 W Bldg 2	Surveyor 6 NW Bldg 2	Surveyor 7 NE Bldg 2	Surveyor 8 SE Bldg 2	Surveyor 9 E Bldg 2
20.30										
20.35										
20.40										
20.45										
20.50										
20.55										
21.00		**21:03 pip x2 emerged from bldg 1**	21:03 55 C in front of bldg 1 at raft height		21:04 45 C & F looping around tops trees feeding for 2mins	21:00 45 x3 F, finishing at 21:04; the 3rd finishing at 21:05	21:01 45 F at 6/7m in open area between bldg. 2 and trees.			
21.05	**146**			21:08 45 C at 7m	21:06 55 C & F came from centre	21:06 55 F 21:08	21:07 45 x4 F at 6/7m, coming	21:07 45 F at 5m		

					roof, down and over to trees 21:07 55 C & F around side of bldg 2 21:08 45 x3 C & F up and down side of bldg, v low	45 F	into site via S, constant circling.			
21.10			21:13 55 x2 F in front of bldg 1 to trees 21:14 55 F from car park to N	21:11 45 C at 7m 21:12 45 C at 5m, landing under guttering above 3rd window	21:10 Pip x3 C & F straight across top opening 21:14 45 C & F at tree tops	21:10 45 Possible emergence from bldg, but flew over, F 21:12 45 F	No activity	21:10 45 F at 5m 21:12 45 F at 5m following same path as 45 above until 21:21	21:10 45 C at 5m 21:13 45 C at 5m	
21.15		**21:12 pip emerged from bldg 1** **21:13 55 emerged from bldg 1**	21:15 45 F along trees to W 21:19 55 F flying S over yard	21:17 45 HNS	21:17 45 C & F at tree tops for 12+ mins 21:19:12 45 C & F at tree tops for 16+ mins	21:16 45 F			21:18 55 C at 4m	21:17 45 C along N of bldg. 1 towards E
21.20		**21:15 ? emerged from bldg 1** **21:15 pip emerged from bldg 1** **21:17 pip emerged from bldg 1** **21:18 pip x3 emerged from bldg 1** **21:19 55 emerged**	21:21 silent bat SNH, C flying E 21:22 55 F in front of bldg 2 21:24:09 45 C flying E	21:20 45 F at 4m 21:24:31 45 F at 4m	21:20 45 C & F at tree tops for 16+ mins	No activity		21:24 45 F at 5m, following path as above	21:21 45 x2 C at 2.5m 21:24:15 45 C at 6m	21:21 45 F in car park/along N & E of bldg. 1 **21:22 45 emerged from E side of bldg. 1.** Then F along E side until 21:24

		from bldg 1								
21.25		**21:20 pip emerged from bldg 1 21:21 pip x2 emerged from bldg 1** 21:24 55 x2/3 continuous foraging until 21:33, and then 21:34 until 21:41	21:25 55 F around car park/yard/trees to W 21:26 55 F as above 21:27 55 F as above	21:26 45 F at 4m 21:29:13 45 x2 F at 4m	21:27 45 C & F	21:28 45 C	21:27 45 F then flew E	21:27 45 x3 F at 5m, following same path as above	21:26 45 x2 F at 2.5m 21:27:50 45 F at 2.5m	21:25 45 F E side of bldg. 1 until 21:27 21:29 45 F E side of bldg. 1 for 1 min
21.30		No activity	21:31 45 F as above 21:32 55 C flying NW over car park	21:31 45 F at 5m 21:33 45 F at 5m 21:34 45 F at 6m	21:32 45 x2 C & F at tree tops 21:34 45 x2 C & F at tree tops, social calling	No activity	21:31 45 C, flew over roof of bldg. 2 21:34 45 x2 C & F flying from the E	21:33 45 HNS	21:30 45 C at 2.5m 21:3145 C at 3m 21:32 55 C at 4m 21:34 55 x2 C at 4m	21:31 45 C & F in car park area 21:33 45 F E side of bldg. 1 until 21:36
21.35		No activity	21:36 45 x2 C & F flying N over car park	21:37 55 C at 7m 21:38 45 x2 F	No activity		21:38 45 x2 C & F, circled briefly then flew E	21:38 45 HNS	21:36 55 C at 4m 21:38 55 C at 4m	21:36 55 C 21:38 45 & 55 C & F along E side of bldg. 1 and over grass until 21:41
21.40		No activity	21:44 55 HNS	21:40 45 F at 5m 21:43 45 F at 5m	21:40 45 C & F at tree tops	21:40 45 C	No activity	21:42 45	21:40 55 HNS 21:42 45 & 55 C at 3m 21:43 55 C at 6m	21:41 45 F as above, until 21:43 21:44 55 HNS (very brief)
21.45		No activity	No activity	21:47 55 HNS 21:48 55 HNS	No activity	No activity		21:45 55 HNS 21:48 55 HNS	21:45 55 F at 4m 21:48 55 C HNS	21:45 45 F E side of bldg. 1 21:47 55 C HNS 21:49

											45 F along E side of bldg. 1
21.50		No activity	21:52 55 HNS	21:50 55 HNS 21:54 55 HNS		21:54 45 & 55 C & F		No activity	21:51 55 C HNS	21:51 55 HNS
21.55			No activity	21:56 45 HNS 21:58 45 HNS	21:55 HNS, F in trees from 21:54, all HNS	No activity			21:55 55 C HNS	
22.00		**End of Survey**								
		Sunset								
		Light levels low enough for Pipistrelle emergence/open flight								
		Light levels low enough for Myotis emergence/open flight								

45 – common pipistrelle 55- soprano pipistrelle Noc – Noctule BLE - brown long-eared bat Nat – Natterer's WB – Whiskered/Brandt's. ? before a name indicates uncertain identification due to poor sonogram or closely related species. BP – bat passes. Records in bold indicate roost present. HNS – heard not seen, generally bat is behind the surveyor or hidden by trees/building. F – foraging C- commuting SC – social call

G.3 Appendix 3: DNA Analysis

27th August 2013

Re: Bat Identification Results for Jessica Andrews, E3 Ecology

Bat job number 02500 received 16th August 2013

Sample labelled: sample 1
PCR amplification successful. DNA sequence:
ATGACCAACATTCGAAAGTCCCACCCTCTCATAAAAATTATCAATGACTCATTCAT
TGACTTACCTGCTCCCTCAAATATTTCATCATGATGAAACTT
Phylogenetic analysis identification: *Plecotus auritus*

Confirmed by maximum likelihood, maximum parsimony, bootstrap 100%.

Bat job number 02501 received 16th August 2013

Sample labelled: sample 2
PCR amplification successful. DNA sequence:
ATGACCAACATTCGAAAGTCCCACCCTCTCATAAAAATTATCAATGACTCATTCAT
TGACTTACCTGCTCCCTCAAATATTTCATCATGATGAAACTT
Phylogenetic analysis identification: *Plecotus auritus*

Confirmed by maximum likelihood, maximum parsimony, bootstrap 100%.

Bat job number 02502 received 16th August 2013

Sample labelled: sample 3
PCR amplification successful. DNA sequence:
ATGACCAACATTCGAAAGTCCCACCCTCTCATAAAAATTATCAATGACTCATTCAT
TGACTTACCTGCTCCCTCAAATATTTCATCATGATGAAACTT
Phylogenetic analysis identification: *Plecotus auritus*

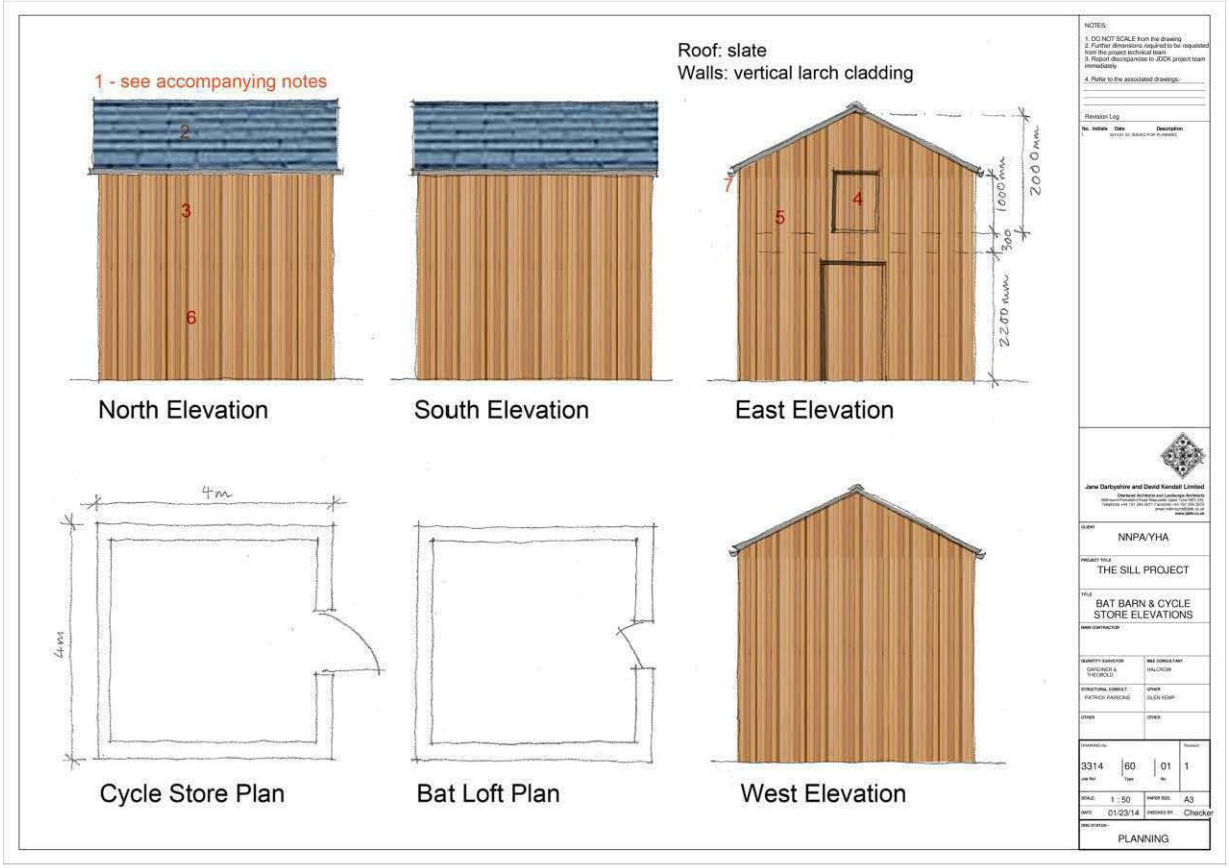
Confirmed by maximum likelihood, maximum parsimony, bootstrap 100%.

Best regards,
Robin Allaby
Associate Professor.

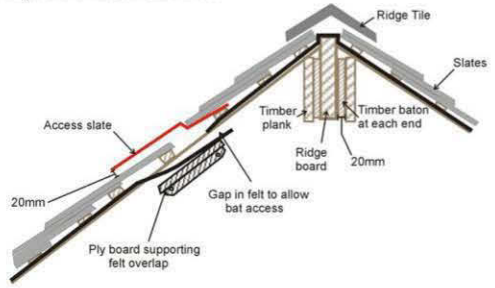
The results and conclusions in this report are based on an investigation of mtDNA sequence analysis. The results obtained have beenreported with accuracy. The interpretation represents the most probable conclusion for the DNA sequence obtained rather than the sample provided given current levels of species data. It should be borne in mind that different circumstances might produce different results. Therefore, care must be taken with interpretation of the results especially if they are used as the basis for commercial recommendations.

Dr Robin Allaby
School of Life Sciences,
Gibbet Hill Campus,
University of Warwick,
Coventry CV4 7AL
Tel: 02476575059
Fax: 02476574500

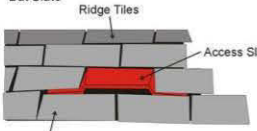
G.4 Appendix 4: Mitigation Figures



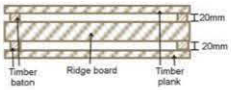
Ridge Boards with Bat Slate Access

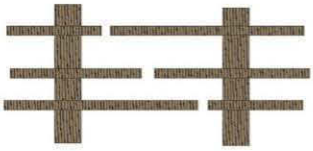


'Bat Slate'



View of Underside of Ridge Boards



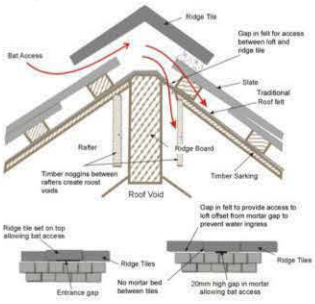


Timber Rafters

Gap to allow access between each baton Within roof structure

Roof Structure

Ridge Tile Access



1 Stone or ceramic ridge tiles with pointing that allows bat access from the eaves to the cavity between the ridge tiles and the slates. Four gaps at the ridge allow access from the bat loft into the void beneath the ridge tiles, a feature that is often used by Natterer's bats.

2 Slates lain on lats to create a 20mm void between the slates and traditional bitumastic sarking beneath.

2 Three bat slates to provide access to loft void.

3 Timber cladding on 20mm lats with bitumastic sarking beneath. Routed out grooves in the cladding create bat access behind the cladding whilst keeping water tight.

4 Hay loft type door on eastern elevation is left open over the first summer to allow bats to easily find access into the loft area. Then progressively closed, leaving a 30mm gap at the door top for bat access.

5 Rockwool insulation on loft floor.

6 Walls of the storage area are not lined out, creating a cooler environment. Access route provided for nesting swallows to use interior space.

7 Overhanging eaves create suitable locations for nesting house martin. Gaps at eaves provide bat access routes.

General features:
The loft is constructed to be draft-proof, so higher temperatures can be achieved during the summer, encouraging maternity use. It is lined out with OSB board, which provides a good surface for bats to hold onto. The roof structure includes a ridge board with adjacent noggins creating gaps 150mm deep and narrowing from 30mm at the bottom to 15mm at the top. All roof timbers and noggins to be rough sawn and any timber treatment to be suitable for areas used by bats. Interior bat boxes within the loft provide voids suitable for whiskered and Natterer's bats.

NOTES:
1. DO NOT SCALE from the drawing
2. Further dimensions required to be requested from the project technical team
3. Report discrepancies to JDEK project team immediately.
4. Refer to the associated drawings:

Revision Log

No.	Initials	Date	Description

Jane Derbyshire and David Kendall Limited

CLIENT: NNPA/YHA

PROJECT TITLE: THE SILL PROJECT

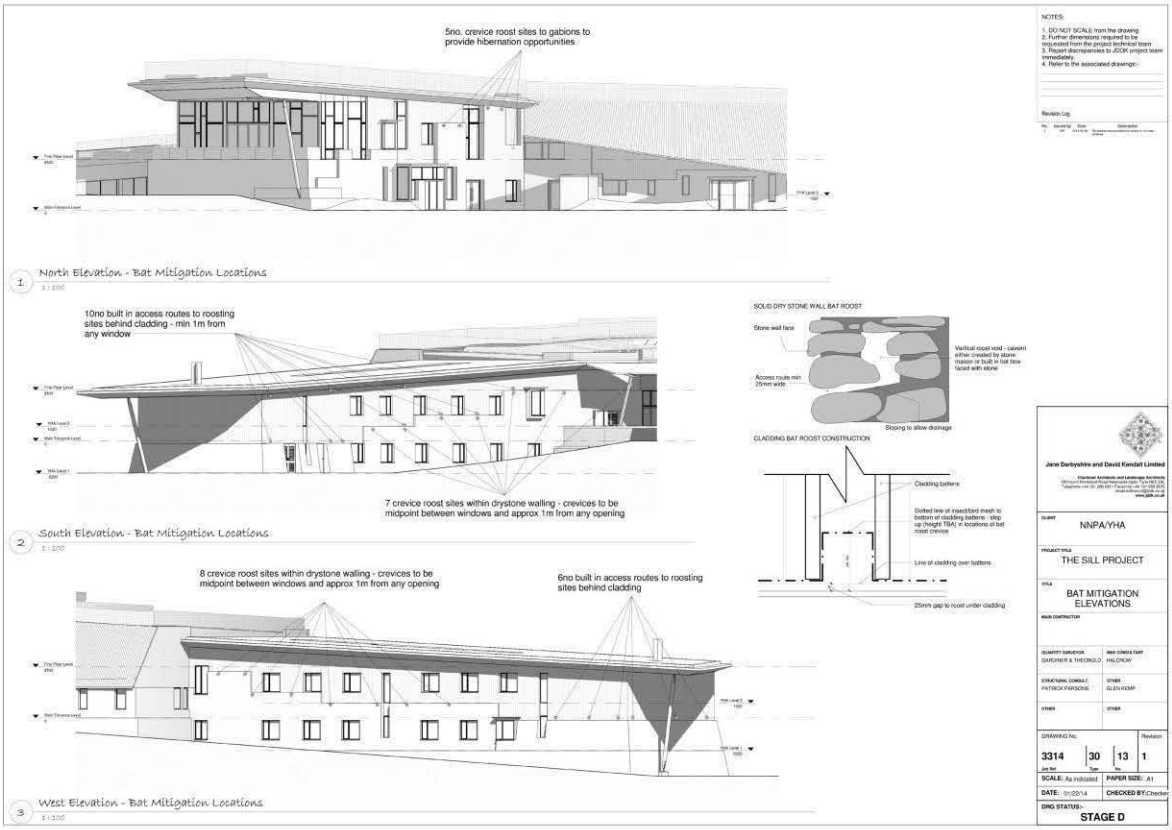
TITLE: BAT BARN ROOST DETAILS

MAIN CONTRACTOR:

QUANTITY SURVEYOR	BAT CONSULTANT
GARDINER & THEOBOLD	HALLORAN
STRUCTURAL CONSULT.	OTHER
PATRICK PARSONS	GLEN KEMP
OTHER	OTHER

DRAWING No.			Revision
3314	60	03	1
Job No.	Type	No.	

SCALE: 1 : 1 PAPER SIZE: A3
DATE: 01/29/14 CHECKED BY: Checker
ISSUE STATUS: PLANNING



649 Once Brewed Bat R06

TREE REPORT IN RELATION TO PROPOSED DEVELOPMENT

OF "THE SILL" AT ONCE BREWED,

BARDON MILL

NORTHUMBERLAND

1. BACKGROUND

1.1 Introduction

The site at Once Brewed currently occupied by the National Park Visitor Centre and the Youth Hostel is to be re-developed to create a Landscape Discovery Centre to be named "The Sill" after the Whin Sill which runs through the landscape to the north and on which the most iconic sections of Hadrian's Wall were built. Planning permission is to be sought for the project. It is generally advised that such an application involving a site with trees present will require an arboricultural survey and report and that such a report should conform to the requirements of *British Standard* 5837:2005 - *Trees In Relation to Construction - Recommendations*. In this case, where the site is situated in a National Park and a World Heritage Site, protection of the Natural Beauty and as part of that the landscape will be particularly critical.

1.2 The Site

The proposed development site is located immediately to the south of the Military Road (B6318) approximately 1km south of Hadrian's wall. The site is currently occupied by an unattractive building built in the 1960's which houses the Youth Hostel and a small stone built National Park Visitor centre. Neither building is fit for purpose in the 21st century. The buildings are surrounded by a large number of trees of varying age and species, There are 51 individual trees with diameter at breast height larger than 75mm and also a number of groups of trees and small woodlands. The individual trees were all recorded separately and their details recorded

Company Registration No. 6678658 Chartered Land Surveyors

amrGeomatics Limited, Idylwild, St.George's Road, Hexham, Northumberland, NE46 2HG
Tel/Fax 01434 600320 Mobile 07971 672071 email a.rigg@amrgeomatics.co.uk
www.amrGeomatics.co.uk

as required by the British Standard BS 5837: Trees in Relation to Construction.

1.3 Landscape

The development site is located within the Northumberland National Park and within the setting of the Hadrian's Wall World Heritage Site. It therefore has the highest designation in terms of Landscape, National Park purposes: To conserve and enhance the natural beauty, wildlife and cultural heritage; and to promote opportunities for the understanding and enjoyment of the special qualities by the public need to be taken into account in planning for the development of the site. The landscape of the Hadrian's Wall corridor is characterised by its geology and is an open landscape with few trees and woodlands (in contrast to Wark Forest which lies to the north).Those trees and woodlands which are present are an important addition to the landscape.

2. ARBORICULTURAL CONSTRAINTS

2.1 Rationale

The arboricultural constraints have been assessed and will be used to inform the site layout. However, as stated in Section 6.1 of BS 5837

"*it is recognised that the competing needs of development mean that trees are only one factor requiring consideration. Certain trees are of such importance and sensitivity as to prevent development occurring or to substantially modify its design or layout. However, care should be taken to avoid misplaced tree retention; attempts to retain too many unsuitable trees on a site may result in excessive pressure on the trees during development work and subsequent demands for their removal.*"

The aim of arboricultural input at the design stage will therefore be to ensure that sustainable tree retention is implemented and where the retention of existing trees is not practical, to implement new planting which will ensure that trees remain on the site long into the future. Given the proposed use of the site as a Youth Hostel and Visitor Centre, safety in relation to the trees is a vital consideration.

Company Registration No. 6678658 Chartered Land Surveyors

amrGeomatics Limited, Idylwild, St.George's Road, Hexham, Northumberland, NE46 2HG
Tel/Fax 01434 600320 Mobile 07971 672071 email a.rigg@amrgeomatics.co.uk
www.amrGeomatics.co.uk

2.2 Elements of Constraint

Trees have two major features which place constraints on the development of a site and therefore influence design and layout. Below ground, due to the presence of their roots and above ground due to the trunk and canopy.

2.3 Tree Constraints Plan

To evaluate, inform and illustrate the constraints placed by trees a Tree Constraints Plan (TCP) Drawing No P2151/amr/3 has been prepared. The TCP shows the locations of all of the trees and the areas affected, above ground by the canopy spread and the below ground by the Root Protection Area (RPA) which will influence the site layout.

2.4 Root Protection Areas

The root protection area (RPA) of each tree has been calculated in accordance with Table 2 of BS 5837 and plotted on the plan. The RPA is the minimum area which should be left undisturbed.

3. TREE SURVEY

3.1 Summary of trees present

The Arboricultural Survey of the site was carried out on 24 June 2013. The survey recorded 51 individual trees within the site with a DBH of >75mm, a number of groups of trees and small woodlands were also recorded.

3.2Survey drawing

The trees present on and immediately adjacent to the site have been allocated numbers on the survey drawing ref P2151/amr/1Rev1. These correspond to the numbers on the tree schedule and in the notes below.

amrGeomatics Limited, Idylwild, St.George's Road, Hexham, Northumberland, NE46 2HG
Tel/Fax 01434 600320 Mobile 07971 672071 email a.rigg@amrgeomatics.co.uk
www.amrGeomatics.co.uk

THE SILL P 2151, TREE REPORT, (continued)

3.3 Notes to accompany the Tree Schedule

A full categorisation of the trees in accordance with BS5837 was carried out and recommendations made regarding the condition of the trees and their suitability for retention. These are included in the Tree Schedule .

The tree schedule follows the guidance contained in BS5837:2005 'Trees in Relation to Construction'.

Age class Y= young, MA = middle aged, M = mature, OM = over mature, V = veteran,

Category grading (for details see BS5837:2005)

R - trees in such a condition that any existing value would be lost within 10 years and should be removed for reasons of sound arboricultural management.

A - trees of high quality and value: in such a condition as to be able to make a substantial contribution (a minimum of 40 years is suggested).

B- trees of moderate quality and value: those in such a condition as to make a significant contribution (a minimum of 20 years is suggested).

C - trees of low quality and value: currently in adequate condition to remain until new planting could be established (a minimum of 10 years) or young trees with a stem diameter of less than 150mm should be considered for relocation.

Subcategories

1 Mainly arboricultural value- trees which are particularly good examples of the species, or are of rare or unusual species.
2 Mainly landscape value- trees which provide a screening or softening effect to a locality or are of visual importance.
3 Trees of significant conservation, historical, commemorative or other value eg veteran trees.

RICS
Company Registration No. 6678658 Chartered Land Surveyors

amrGeomatics Limited, Idylwild, St.George's Road, Hexham, Northumberland, NE46 2HG
Tel/Fax 01434 600320 Mobile 07971 672071 email a.rigg@amrgeomatics.co.uk
www.amrGeomatics.co.uk

THE SILL P 2151, TREE REPORT, (continued)

3.4 Tree Species, condition and recommendations.

Alder *Alnus glutinosa.* **T79, 80 and 81** These are all middle aged trees located towards the west of the site close to the septic tank **T79** and **81** are in fair condition. The foliage on **T80** is a little sparse perhaps because of its location close to the tank.

Ash, *Fraxinus excelsior.* **T39, 40, 41**, these trees are all located on the east side of the site close to the road. Ash trees in England are currently at risk from Ash Chalara, a disease which has spread to England from Europe in the last two years. The disease has been detected in mature Ash trees in Northumberland. The disease causes the gradual death of trees often over several years and death in mature trees is often associated with other diseases or weaknesses. Clearly the Ash trees present on the site are at risk from this disease and their life span if they became infected is likely to be less than 10 years. It is impossible at this stage to predict whether the trees will succumb to the disease or show resistance and at what stage this might happen.
T39 is a mature Ash tree located close to the current site entrance. The tree is growing at a considerable angle leaning towards the road. The tree has a hollow at the base of the trunk on the side nearest to the entrance road and which shows signs of rot. This combined with the lean of the tree towards the road raises significant concerns regarding its future stability. If considering for retention then further investigation of the hollow at the base is advised. The tree has bat boxes attached to it. The National Park Ecologist would need to be involved if the tree is to be felled to ensure that the regulations relating to Protected Species are fully complied with.
T41 is located on the roadside. It currently has two stems, a third has been removed and the scar is not healing. Rot may therefore be present.

Beech *Fagus sylvatica.* **T 47, 48, 50, 76, 78, 84, 85, 92, 93** are all located within the youth hostel grounds
T47,48 and 50 located to the north east of the building are all affected to varying degrees by a canker type disease of the bark. The most seriously affected tree is **T50** the other trees are less seriously affected. The disease causes lesions to the bark. In all cases the trees are combating the disease by rapid new bark growth under the lesion and there is no evidence of rot entering the heart wood. There appears to be

RICS
Company Registration No. 6678658 Chartered Land Surveyors

amrGeomatics Limited, Idylwild, St.George's Road, Hexham, Northumberland, NE46 2HG
Tel/Fax 01434 600320 Mobile 07971 672071 email a.rigg@amrgeomatics.co.uk
www.amrGeomatics.co.uk

THE SILL P 2151, TREE REPORT, (continued

evidence on the bark of old lesions which have now completely healed. Apart from the lesions the trees appear to be healthy; there is no thinning or discolouring of the foliage, however because of the disease it is possible that they will be less able to cope with the stress of development within close proximity. If to be kept then their health should be regularly monitored.
T76, T78 located to the west and with **T76** quite close to the youth hostel building are both in fair condition.
T84 located in the north-west corner of the site has poor form, being suppressed by the surrounding trees, and also has the canker type condition.
T85 is in poor condition and has rot present.
T88 is a young tree in fair condition, beech scale insect is present but there is no indication at this stage of this developing into beech bark disease.
T92 and 93 are both middle aged healthy trees with **T93** located close to the northern wall of the existing Youth Hostel building.

Cherry *Prunus sp* T46, 51, 55, 75, 86, 89, 90, 91, 94, 96.
T46, 51 and 94 are all dead and should be felled.
T55, 90, 91 and 96 are all in poor condition and should also be felled
T 90 has rot at the base at the south side which makes it potentially unstable and therefore it should be felled..
T75 and **86** are in fair condition and **T89** is good.

Larch *Larix decidua* T61 This tree is in fair condition but is of poor form with all of its canopy on the north and east sides.

Norway Maple *Acer platanoides* T44, 62, 77 and 82 These trees are all in fair or good condition.

Norway spruce *Picea abies* T87 and 97 both trees are located to the north of the Youth Hostel between the building and the road side wall. They are both in a fair condition.

Oak *Quercus petraea* T42, 49, 71 and 95. T42 is a young Oak tree which is in poor condition, with very sparse foliage probably due to insect attack in the previous growing season. No insects are currently present. **T49** has a poor shape and would probably benefit from some crown reduction. There was some limited browning of the new foliage, which should be monitored, otherwise this tree is healthy.

RICS
Company Registration No. 6678658 Chartered Land Surveyors

amrGeomatics Limited, Idylwild, St.George's Road, Hexham, Northumberland, NE46 2HG
Tel/Fax 01434 600320 Mobile 07971 672071 email a.rigg@amrgeomatics.co.uk
www.amrGeomatics.co.uk

THE SILL P 2151, TREE REPORT, (continued).

T71 This tree has been damaged by fire which has resulted in debarking on one side, it seems unlikely that it will recover and it should be felled. **T95** which is situated to the north of the Youth Hostel building is in good condition and should be retained if possible.

Rowan *Sorbus aucuparia* T43 and 54 both are in poor condition, are suffering dieback , have lots of deadwood and should be felled.

Scots Pine *Pinus sylvestris* T 56, 57, 73, 74 and 83 and the Scots pines included in Group F are situated in the grounds of the Youth Hostel adjacent to the western and southern boundaries and are all mature and in decline. They all have poor canopy development and sparse foliage with some browning of needles. This is likely to be either desiccation damage from the last winter or may be due to infection with Red Needle Blight. If retained they are likely to have a limited life span.

Silver Birch *Betula pendula* T45 and 52. T45 is located in the north eastern corner of the site and is a middle aged tree in good condition. **T52** which is a mature tree is located in the central courtyard of the Youth Hostel. It has a small number of scars which are healing.

Sycamore *Acer pseudoplatanus* T53, 58, 59, 60 and 72,
T53 which is located in the courtyard area between the two buildings is in fair condition, it has a small scar which should be monitored if this tree is to be retained to ensure that there is no entry of disease.
T58 and 60 are located to the west of the youth hostel and are both of poor form being suppressed by the larger surrounding trees.
T59 is in good condition and would be suitable tree for retention.
T72 is also located to the west of the Youth Hostel, it has suffered severe fire damage to the bark and should be felled.

GROUPS OF TREES

Most of the groups of trees (with the exception of Group F,G and H) consist of trees and shrubs planted by the National Park over the last 20-30 years. They are therefore fairly young, but they are well established and add significantly to the landscape and habitats of the site. Newly planted trees and shrubs do not grow well in the harsh climate of the Hadrian's Wall corridor and therefore although these trees would not

RICS
Company Registration No. 6678658 Chartered Land Surveyors

amrGeomatics Limited, Idylwild, St.George's Road, Hexham, Northumberland, NE46 2HG
Tel/Fax 01434 600320 Mobile 07971 672071 email a.rigg@amrgeomatics.co.uk
www.amrGeomatics.co.uk

THE SILL P 2151, TREE REPORT, (continued).

typically be rated highly under BS 5837 retention where possible should be considered.

Group A Consists of 10 Alder, 4 Ash, 1 Beech, and 25 Hawthorn. Although fairly young this group of trees is well established and healthy. There would be merit in selecting some of these trees for retention.

Group B and C are young Rowan (10) and Cherry (1) planted along the edges of an existing parking area.

Group D is the woodland located to the east of the bottom field consisting of Rowan, Ash, Scots pine, Sycamore and Hawthorn.

Group E is the small wildlife garden located to the south of the current site entrance and consisting of Hawthorn and Beech.

Groups F and G are located on the Youth Hostel grounds and consist of two overgrown Leylandii hedges and a number of mature and overmature Scots pines.

Group H is located on the bank to the north of the Youth Hostel and consists of a number of multi stemmed Rowan and Cherries which are in very poor condition, most should be felled.

Group J is located to the north of the Military road and consists of a mixture of Alder and Rowan planted about 25 years ago. The trees are planted in straight lines of alternate species. The trees on the edges which are able to get plenty of light are growing well but those in the centre are much smaller, poorer specimens. It is suggested that the plantation should be thinned and about 15 of the best trees retained. These should also have the lower branches removed to improve visibility.

3.5 Landscape value

The mature trees on the site make a significant contribution to the landscape of this part of the Hadrian's Wall corridor and help to blend the existing buildings into the landscape.

RICS

Company Registration No. 6678658 Chartered Land Surveyors

amrGeomatics Limited, Idylwild, St.George's Road, Hexham, Northumberland, NE46 2HG
Tel/Fax 01434 600320 Mobile 07971 672071 email a.rigg@amrgeomatics.co.uk
www.amrGeomatics.co.uk

THE SILL P 2151, TREE REPORT, (continued).

Note

The Tree Schedule was prepared following an inspection of the trees on the site made on 24 June 2013. Trees are living organisms whose health and condition can change rapidly and all observations are based on the status of the trees at the time of inspection. All observations were made from ground level without detailed investigation. Recommendations for further inspection and monitoring of trees are included with the comments.

Recommendations are also made regarding tree surgery and the felling of trees which are considered to be potentially unsafe. Trees are protected by law. They may be protected by Tree Preservation Orders, information on which can be obtained from the Local Planning Authority. Felling of trees is also regulated by the Forestry Commission through the issuing of Felling Licences. See Forestry Commisssion leaflet -Felling Trees: Getting Permission, available on the Forestry Commission website. It is also essential to take into account Protected Species (bats) and nesting birds when planning tree felling.

Elaine Rigg

BSc. MSc. CMLI. 28 June 2013

Company Registration No. 6678658 Chartered Land Surveyors

amrGeomatics Limited, Idylwild, St.George's Road, Hexham, Northumberland, NE46 2HG
Tel/Fax 01434 600320 Mobile 07971 672071 email a.rigg@amrgeomatics.co.uk
www.amrGeomatics.co.uk

amrGeomatics Limited
Chartered Land Surveyors
Idylwild, St George's Road,
Hexham. NE46 2HG
01434 600320

TREE SCHEDULE,THE SILL BS 5837

No.	SPECIES	HEIGHT	STEM DIAMETER	BRANCH	SPREAD	(m)		HEIGHT OF CROWN CLEARANCE (m)	AGE CLASS	PHYSIOLOGICAL CONDITION	STRUCTURAL CONDITION	PRELIMINARY MANAGEMENT RECOMMENDATIONS	ESTIMATED REMAINING CONTRIBUTION years	CATEGORY GRADING	ROOT PROTECTION AREA circle radius(m)
		(m)	(mm)	N	E	S	W								
39	Ash	13	800	3.5	10	4	4.5	2	M	Fair	Small hollow with rot at base of trunk	Investigate extent of rot of intention is to retain	<10	C2/R	9.60
40	Ash	9	275	4.5	5	2	2	2	Y	Good	Good	Monitor for Ash Chalara	Depends on AC <10	C2	3.30
41	Ash	10	2x270	5	7	3	3	3	Ma	Fair	Orig 3 stems one removed	Monitor for Ash Chalara	Depends on AC <10	C2	5.40
42	Oak	6	80	1.5	1.5	1.5	1.5	1	Y	Poor	very sparce foliage	Monitor	If condition does not improve <10	C2	0.96
43	Rowan	6	95	2	1.5	1.5	1.5	1.5	Y	Poor	Dying back at top	Fell	<10	R	
44	Maple	10	3x200	4	4	3.5	4.2	1	Ma	Good	Some dead wood	Remove dead wood	20-40	B2	6.00
45	Silver Birch	10	280	4	4	4	2.3	1.5	Ma	Good	Good	None	>40	A2	3.36
46	Cherry	8	280	0	0	0	0	0	Ma	Dead	Dead	Fell	0	R	
47	Beech	13	500	3.5	6	2	3.2	3	Ma	Poor/fair	Disease of bark	Monitor	20-40	C2	6.00
48	Beech	13	300	2	2.5	5	2.3	1.5	Ma	Poor/ Fair	Early stages of bark disease	Monitor	20-40	C2	3.60
49	Oak	12	440	4.2	2	4.8	7	2	Ma	Fair	Poor shape,small amount of dieback of young shoots	Reduce crown to improve shape	>40	A2	5.28
50	Beech	13	700	9	5.8	5.2	5.8	0	M	Poor/fair	Severe scaring from bark disease	Monitor	20-40	C2	8.40
51	Cherry	9	500	0	0	0		0	OM	Dead	Dead	Fell	<10	R	
52	Silver Birch	16	300	2.5	2	2.5	3.8	1.5	M	Fair	Scars at 0.75m and base, healing	Monitor scars	20 - 40	B2	3.60
53	Sycamore	11	2x300	5	4.5	3	4.5	3	Ma	Fair/ good	Forked at 0.7m scar @2m	Monitor scar	>40	B2	6.00
54	Rowan	9	2x200	2.5	3	2	3	3	M	Poor	Lots of dead wood	Fell	<10	R	
55	Cherry	15	3x200	2	4.5	4	4	2	M	Poor	Multi stemmed rot in centre	Fell	<10	R	

TREE SCHEDULE, THE SILL BS5837 CONTINUED.

No.	SPECIES	HEIGHT	STEM DIAMETER	BRANCH	SPREAD	(m)		HEIGHT OF CROWN CLEARANCE	AGE CLASS	PHYSIOLOGICAL CONDITION	STRUCTURAL CONDITION	PRELIMINARY MANAGEMENT RECOMMENDATIONS	ESTIMATED REMAINING CONTRIBUTION	CATEGORY GRADING	ROOT PROTECTION AREA
		(m)	(mm)	N	E	S	W	(m)					years		circle radius (m)
56	Scots Pine	13	400	1.5	1.5	1.5	2	4	M	Poor	Poor crown dev. Foliage sparce		<10	C2/R	4.8
57	Scots Pine	13	300	2	1	1	1	10	M	Poor	Poor crown dev. Foliage sparce		<10	C2/R	3.6
58	Sycamore	10	300 multi	4	3	4	5	0	Ma	Poor	Multi stemmed, suppressed.	Fell	20 - 40	C2/R	3.6
59	Sycamore	12	500	3	4	4	3	2	Ma	Good	Forked at 2m		>40	B2	6
60	Sycamore	13	275	2	2	2	2	2	Y	Fair	Suppressed		>40	C2	3.3
61	Larch	12	300	7.5	6	0	0	8	M	Fair	Poor form		10 to 20	C2/R	3.6
62	Maple	13	325	3	3	2.5	2.5	4	Ma	Fair	Poor pruning in past, not healed	Monitor	>40	B2	3.9
71	Oak	14	300	1.5	5	3	1.5	10	Ma	Poor	Fire damaged	Fell	<10	R	
72	Sycamore	14	600	4.5	2	5.8	4.5	1.5	M	Poor	Fire damaged	Fell	<10	R	
73	Scots Pine	15	400	2	2	3	5	1	M	Poor/ fair	Some thinning and browning of foliage		10 to 20	C2	4.8
74	Scots Pine	12	400	3.5	2	2	1	9	M	Fair	Limited crown, slight lean		10 to 20	C2	4.8
75	Cherry	8	150	2	3.5	2	4	4	Y	Fair			20 to 40	C2	1.8
76	Beech	18	550	4	3	4	4	0	M	Fair	Ivy covered	Remove ivy	20 to 40	B2	6.6
77	Maple	18	550	6.5	5	5	4	2	M	Good	Forked at 3m some dead wood	Remove dead wood	>40	A2	6.6
78	Beech	14	475	4	3	4	4	0	Ma	Fair/good	Good		>40	B2	5.70
79	Alder	5	300	3	3	3	3	1	Ma	Fair	Multi stemmed		20 to 40	B2	3.60
80	Alder	9	370	3	3	3	4	1	Ma	Poor	Sparce foliage		10 to 20	C2	4.44
81	Alder	6	280	2	2	2	2	0	Ma	Fair			20 to 40	B2	3.36
82	Maple	8	300	5	6	5	4	1	Ma	Good	Multi stemmed		>40	B2	3.60
83	Scots pine	18	300	3	1	0	2	13	M	Poor	Poor form some dead wood	Consider felling	<10	C2	3.60
84	Beech	12	300	3	2	2.5	3	0.5	Ma	Poor	Poor form, suppressed	Same bark problem as other beech	10 to 20	C2/R	3.60
85	Beech	17	700	5	5.5	6.5	3.5	3	M	Poor	Multi stemmed from 1m rot	Consider felling	20 to 40	C2/R	8.40
86	Cherry	8	250	4	3	2	2	1	Ma	Fair	Some dead wood	Remove dead wood	10 to 20	C2	3.00
87	Spruce	8	300	4	1	1	1.5	1	Ma	Fair	Forked at 2.5m		10 to 20	C2	3.60
88	Beech	10	200	4	3	3	3	0.5	Y	Fair	Beech scale insect, scars and dead wood	Remove dead wood	20 to 40	C2	2.40

TREE SCHEDULE, THE SILL BS5837 CONTINUED

No.	SPECIES	HEIGHT	STEM DIAMETER	BRANCH	SPREAD	(m)		HEIGHT OF CROWN CLEARANCE	AGE CLASS	PHYSIOLOGICAL CONDITION	STRUCTURAL CONDITION	PRELIMINARY MANAGEMENT RECOMMENDATIONS	ESTIMATED REMAINING CONTRIBUTION	CATEGORY GRADING	ROOT PROTECTION AREA
		(m)	(mm)	N	E	S	W	(m)					years		Circle radius (m)
89	Cherry	9	300	4	3.2	2	1	2	Ma	Good	2 scars following pruning	Monitor scars	20 to 40	B2	3.60
90	Cherry	11	450	4	4	4	4	3	M	Poor	Rot at base on S side	Fell	<10	R	
91	Cherry	9	300	2	4	2	4	3	M	Poor	Scars and rot on main trunk and side branch	Fell	<10	R	
92	Beech	13	400	3	4	4	2	1	Ma	Good	Good form		>40	A2	4.80
93	Beech	11	350	2	4	3	4	3	Ma	Fair	Forked at 1.8m		20 to 40	B2	4.20
94	Cherry	7	290	0	0	0	0	0	OM	Dead	Dead	Fell	0	R	
95	Oak	11	300	2	4	3	3	2	Ma	Good	Good		>40	A2	3.60
96	Cherry	9	450	4	4	4	4	7	M	Poor	Sparce foliage and dead wood	Fell	<10	R	
97	Spruce	10	325	3	1	4	2	0	M	Fair	Good		20 to 40	C2	3.90