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Report Number
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Radio tracking study of greater horseshoe bats at Caen Valley Bats Site of Special Scientific Interest 2002

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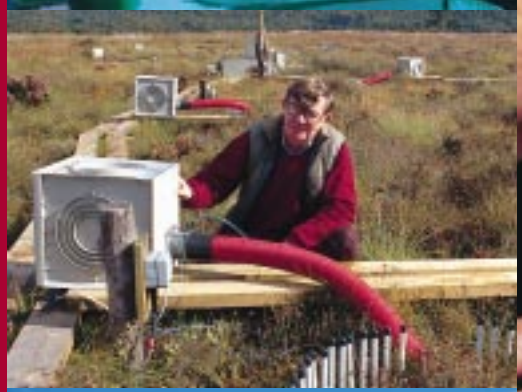

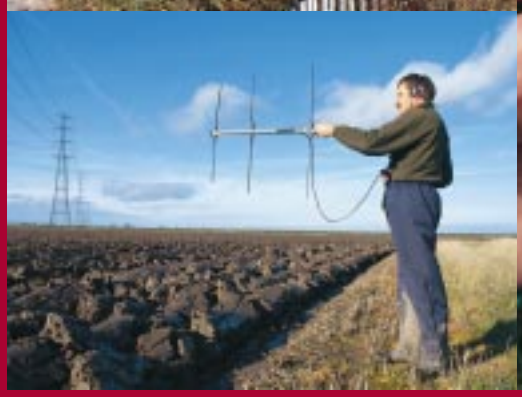

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Radio tracking study of greater horseshoe bats

at Caen Valley Bats Site of Special Scientific Interest 2002

Mr Geoff Billington
Greena Ecological Consultancy

Project Manager: James Diamond, English Nature Devon Area Team

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Summary

The activity patterns of greater horseshoe bats *Rhinolophus ferrumequinum* roosting at Caen Valley Bats Site of Special Scientific Interest (SSSI) were investigated over two 7 night periods in May and August 2002. A total of 20 bats of both sexes were radio-tracked over the two sessions.

The bats regularly commuted five kilometres to foraging areas and were recorded travelling over seven kilometres away from the roost. The total area used by the population covered at least 100 square kilometres.

Foraging occurred primarily in and around wet woodland, scrub, grassland adjacent to tall, bushy hedgerows and tree lines, and along tree-lined watercourses.

A total of 14 foraging areas were identified during the study. The most significant foraging areas were: Saunton, Braunton, Braunton Great Field, Braunton Marsh and Braunton Burrows in May and Georgeham in August.

The main commuting routes used by the bats leaving the SSSI were identified as north and south along the Caen valley, west to Georgeham and east along Knowle Water towards Barnstaple.

Two significant night roosts were identified.

Recommendations are made for further survey and conservation work on foraging areas, commuting routes and roosts.

1.0 Objectives

To identify the principal foraging areas and flight routes used by greater horseshoe bats roosting at Caen Valley Bats SSSI. Secondary objectives were to identify any night and day roosts used by the bats.

2.0 Background

This study was commissioned and funded by English Nature and carried out by Greena Ecological Consultancy. In this study the movements of relatively large groups of bats (up to ten) were examined to record the distribution and behaviour of greater horseshoe bats during May and August 2002.

3.0 Study area

Caen Valley Bats SSSI (NGR SS484377) is a greater horseshoe bat maternity and hibernation roost, situated on the valley slopes of the River Caen, to the north of the town of Braunton in Devon (Figure 1). The roost supports the second largest known population of greater horseshoe bats in the United Kingdom (James Diamond, English Nature, personal communication).

The study area lies near the north Devon coast between Barnstaple and Croyde. The local landscape is characterised by low hills, with a number of small valley systems flowing south to the Taw/ Torridge Estuary. On the northern side of the estuary is Braunton Burrows, one of the most extensive sand dune systems in the UK. Scattered over the area are small disused mine workings and within ten kilometres of the roost are a number of sea caves.

Livestock rearing and dairy production dominate the local agricultural landscape. There are numerous small to medium-sized fields enclosed by hedgerows, with frequent copses and tree lines. Larger arable fields occur on the higher, more exposed plateaus.

4.0 Methods

Greater horseshoe bats were radio-tracked over a total of 14 nights from 17-23 May and 24–30 August 2002.

All bats were caught in static butterfly nets in the maternity roost. The bats were fur-clipped and the transmitters glued between the shoulder blades, using *SkinBond* adhesive. Bats were fitted with 0.57g 173 MHz radio transmitters, manufactured by *Biotrack*, with a specified minimum nine-day battery life. The bats were given time to settle down before release. Captured bats were also weighed, sexed, measured and examined to ascertain breeding condition. The bats were also checked for the presence of rings.

Professor Gareth Jones collected tail membrane biopsy samples (3mm diameter punched holes) on the first of the two study periods (17 May), for use in ongoing genetic research.

Up to three fieldworkers used *Australis* 26K and *Biotrack* receivers with *Yaggi* rigid aerials to track bats. Whip omni directional antennas were used to search for bats by vehicle. Dictaphone, mini-cassette recorders and notebooks were used to record data. CB radio sets were used for two-way communication. Accurate bearings of bat locations were taken from hand held compasses. Global Positioning Systems were used to increase the speed and accuracy of the

surveyors. *Tranquillity* and *Duet* bat detectors were used to confirm the presence of horseshoe bats by listening for their characteristic echolocation calls.

For all detectable bats the following data was recorded: observer location, bat ID number, triangulation bearings, signal strength, apparent location or route and behaviour. When bats were commuting or at their first foraging sites, they were usually observed from elevated points (see Table 1) with each surveyor based at separate locations, in contact by radio set. Both receivers were able to automatically scan through different frequencies; this made it possible to search for a number of tagged bats. On several occasions surveyors were able to make close approaches to bats, to ascertain the exact foraging area and behaviour or commence pursuit if the bat was moving away.

Tracking ended either when the tags fell off the bats, the transmitters failed, the bats moved out of range or the fieldwork period ended.

At the start of each survey night, estimations of environmental conditions were noted: wind (Beaufort scale) and direction, rain (0-5), cloud cover (0-100%) and air temperature (Celsius). Any marked changes in weather throughout the survey period were also noted.

Table 1. Elevated observation points used during radio tracking

Observation point	Grid reference	No. times used
Challowell	SS488381	1
Velator Bridge	SS486357	2
Challowell Hill	SS487386	2
Boode	SS497375	4
Buttercombe	SS523397	3
Braunton Marsh	SS480344	7
Braunton Burrows	SS468372	8
Braunton Burrows	SS462345	1
Eastacombe	SS506363	1
Velator Quay	SS484353	9
Fairlinch	SS476377	1
Ashford	SS522349	6
Chapel Hill	SS492375	1
Halsinger	SS523393	2
Buckland	SS482375	26
Spreacombe	SS497402	2

Tracking was carried out for a total of 14 nights throughout the night or during the main foraging periods. Daytime work included verifying roost occupation, recording and plotting out results. Several investigations of confirmed and likely roosting sites were made.

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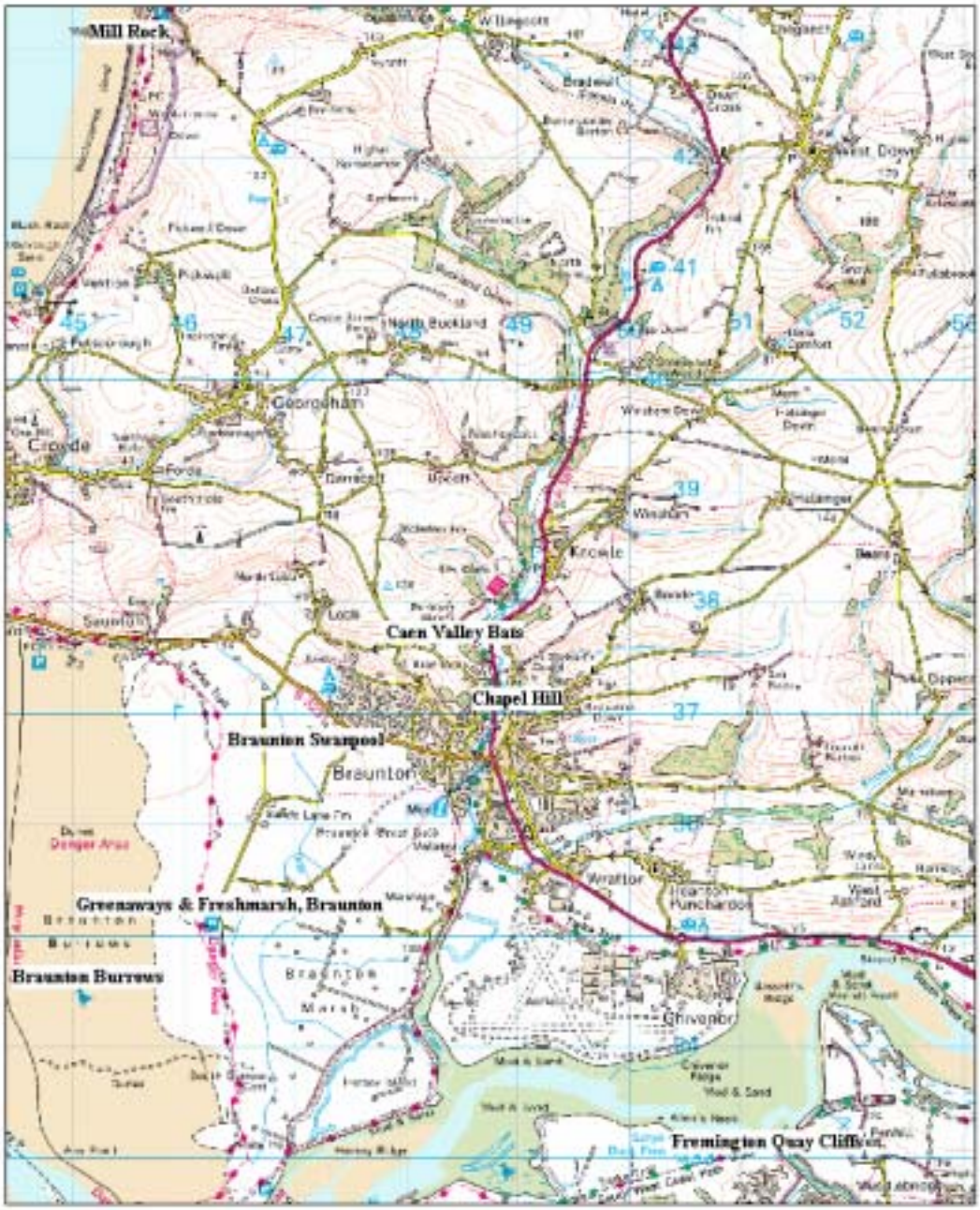
Figure 1. Location of Caen Valley Bats SSSI

Showing other SSSIs in vicinity



Scale 1:50000 Map

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5.0 Results

5.1 Tracking and bat data

A total of 48 separate greater horseshoe bats were caught during the study, eight were recaptured on the second session. Of these, 20 were fitted with radio transmitters (Table 2). No other bat species were captured.

Table 2. Greater horseshoe bat captures at Caen Valley Bats SSSI

Date	Total caught	Number radio tagged
17 May	30	10
24 August	26	10

In total, 74 bat/days data was collected; 47 in the first period and 27 in the second period. An average of 3.7 days of data per bat (a range of 0-6 days) was collected, based on data from 20 bats. No data was collected from two of the bats, due either to defective tags or bats moving beyond reception range (Chart 1 and Table 3).

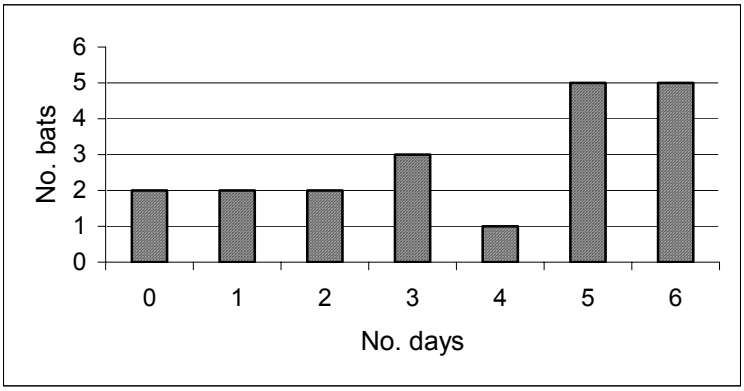


Chart 1. Radio-tracking periods at Caen Valley Bats SSSI

Welfare considerations took precedence over all other issues. One bat suffered a minor bite injury whilst in a net. The animal was released immediately to minimise any possible stress. No other injuries or abnormal behaviour were detected from catching or radio tagging the bats, although on the first night of tracking the bats did tend to spend more time in the day roost than on subsequent nights.

Table 3. Greater horseshoe bat captures, measurements and tracking periods

F-female, M-male, Θ-Juvenile, pl-post lactating, b-bred before, nb-not bred before, y-1yr old

Capture date	Gender	Forearm (mm)	Weight (grams)	Tracking period (nights)	Bat No.	Evidence of biopsy sample taken (i.e. caught in previous session)
17 May	F b	54.5	22.5			No
	F b	58.0	23.0			No
	M	56.0	18.6			No
	F b	54.8	21.4	5	9	No
	F nb	55.7	21.5	5	8	No
	M	55.2	17.0			No
	F nb	55.5	21.3	6	1	No
	F nb	55.2	21.0	5	3	No
	F b	54.9	20.0			No
	F nb	56.8	20.8	6	7	No
	F b	56.0	20.5			No
	F b	55.1	21.0	0	4	No
	F b	56.7	20.6	4	5	No
	F nb	54.2	17.8			No
	F nb	54.2	17.5			No
	M y	54.9	16.5			No
	F b	56.3	20.2	6	10	No
	F nb	54.7	17.5			No
	F nb	54.9	18.0			No
	F nb	55.6	17.0			No
	F nb	52.7	17.5			No
	M	53.4	19.8			No
	M y	54.9	17.5			No
	F nb	56.5	17.2			No
	F nb	55.0	19.0			No
	F b	56.5	22.4	5	2	No
	F b	54.5	20.1			No
	F b	56.0	20.5	5	6	No
	F nb	56.3	19.0			No
	M	55.2	19.8			No
24 Aug	F pl	55.1	19.6	6	11	No
	F pl	57.3	21.0	3	12	No
	F pl	54.5	20.8	6	13	No
	M Θ	56.5	18.1	3	14	No
	M Θ	55.2	17.6			No
	F Θ	54.3	17.5			No
	F Θ	55.8	18.8			No
	F Θ	54.6	18.7	2	15	No
	F Θ	55.2	18.3	1	16	No
	M Θ	54.8	18.6	3	17	No
	F pl	55.4	20.5	1	18	No
	M Θ	54.0	16.4			No
	F nb	54.3	20.3	2	19	Yes
	F pl	53.8	20.2	0	20	Yes
	F nb	55.0	19.2			Yes
	F nb	56.2	20.3			Yes
	M	53.8	18.6			Yes
	F Θ	55.2	19.6			No
	F Θ	57.5	19.1			No
	M Θ	54.5	17.6			No
	F pl	56.9	24.5			Yes
	F Θ	55.1	17.6			No
	F pl	55.5	21.2			Yes
	F pl	56.6	22.3			Yes
	F Θ	53.7	17.7			No
	F Θ	56.1	18.2			No

5.2 Foraging

5.2.1 Foraging areas

The location and descriptions of the 14 foraging areas identified during this study are given below and on Maps 1-14 in Appendix I. The numbering system used does not denote any particular significance in terms of the importance of an individual foraging area.

5.2.1.1 Knowle (foraging area 1)

SS4938 (see map 7)
The Caen Valley a kilometre north of Braunton. An area of broadleaved and coniferous woodland encompassing the river and a disused railway. Four bats were recorded foraging here.

5.2.1.2. Saunton (foraging area 2)

SS4537 and SS4538 (see maps 2 & 3)
A south-facing combe of no more than a few hundred metres in length, containing broadleaved woodland and extensive gorse scrub. This was an important foraging area in May. Ten bats were recorded foraging here.

5.2.1.3. Braunton Marsh (foraging area 3)

SS4634, SS4734, SS4834, SS4635, SS4735, SS4835, SS4636, SS4736 & SS4737
(see maps 3, 4 & 9)
An extensive area of grazed unimproved, semi-improved and improved pasture bounded by small to medium sized hedgerows and ditches. Includes the Braunton Swanpool and Greenaways and Freshmarsh SSSIs. This was an important foraging area in May. Six bats were recorded foraging here.

5.2.1.4. Braunton (foraging area 4)

SS4836, SS4837, SS4936 and SS4937 (see maps 2, 3, 4, 7, 8 & 9)
The nursery roost is situated here in the Caen Valley on the north side of Braunton. The area comprises the town, improved grassland bounded by hedgerows and blocks of woodland. The tree-lined River Caen passes through the middle of the town to join the Taw Estuary. The river through Braunton was an important flight corridor for the bats to reach foraging areas at Braunton Great Field and Braunton Marsh, particularly in May. Bats usually foraged in the area around the roost only for a few minutes, before they moved off to more distant foraging areas. Longer spells of foraging occurred in the early hours of the morning. Twelve bats were recorded foraging here.

5.2.1.5. Lobb (foraging area 5)

SS4637 and SS4638 (see maps 2 & 3)
A small area of high hedgerows surrounding grazed pasture on south facing slopes. Five bats were recorded foraging here.

5.2.1.6. Braunton Burrows (foraging area 6)

SS4433, SS4434, SS4435, SS4436, SS4437, SS4532, SS4533, SS4534, SS4535, SS4536, SS4537, SS4632, SS4633, SS4634, SS4635, SS4636 & SS4637
(see maps 3, 4, & 5)
Braunton Burrows is one of the largest dune systems in the UK and is protected as a SSSI and candidate Special Area of Conservation. Areas of scrub and damp woodland along the eastern edge of the dune system were used by the bats, particularly in May. Eight bats were recorded foraging here.

5.2.1.7. Knowle Water (foraging area 7)

SS5035, SS5036, SS5135 & SS5136 (see map 9)
A valley system running east from Braunton, containing coniferous and broadleaved woodland along the watercourse, bordering semi-improved and improved grassland. Eight bats were recorded foraging here.

5.2.1.8. Braunton Great Field (foraging area 8)

SS4835 & SS4836 (see maps 3, 4 & 9)
A small area on the eastern edge of the Great Field system comprising pasture (mainly horse grazed), a former industrial site and the tree lined River Caen. Two bats were recorded foraging here.

5.2.1.9. Fremington (foraging area 9)

SS4832, SS5133, SS5233 & SS5333 (see maps 5, 12 & 13)
An area of on the south side of the Taw Estuary; foraging area consists of improved pasture, salt marsh, hedgerows and a disused railway. Two bats were recorded foraging here.

5.2.1.10. Ashford (foraging area 10)

SS5134, SS5135, SS5234, SS5235 & SS5335 (see maps 9 & 12)
Field and hedgerow system on a south-facing hillside above the Taw Estuary. Five bats were recorded foraging here.

5.2.1.11. Fullabrook (foraging area 11)

SS4940, SS5039, SS5040, SS5139, SS5140 & SS5240 (see maps 6, 7 & 11)
The Caen valley and tributary, with extensive wet woodland, tree lined watercourses, scrub, small field systems and a number of mine levels. Four bats were recorded foraging here.

5.2.1.12. Buttercombe (foraging area 12)

SS4937 & SS5037 (see map 8)
Small tributary valleys leading east from the Caen valley at Braunton, containing mainly improved pasture, hedgerows and tree lined watercourses. Two bats were recorded foraging here.

5.2.1.13. Georgeham (foraging area 13)

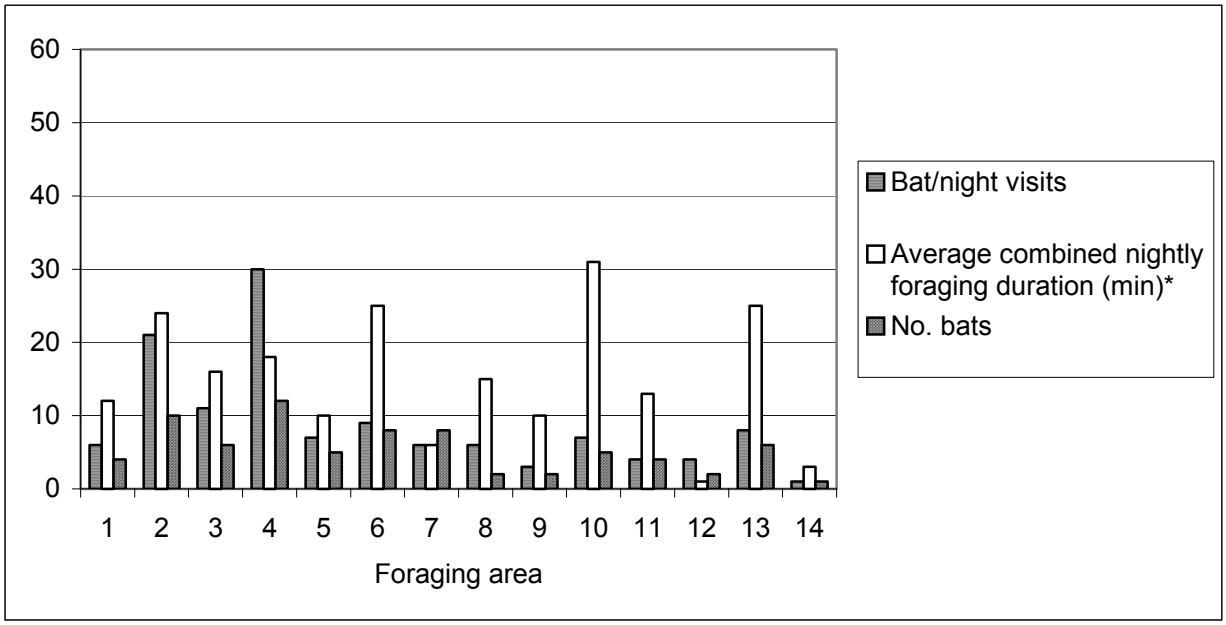
SS3944, SS4044, SS4144, SS4244 & SS4344 (see map 1)
An area with extensive small field systems with high hedgerows and tree lined watercourses. Six bats were recorded foraging here in August.

5.2.1.14. Barnstaple (foraging area 14)

SS5434, SS5435, SS5534 & SS5535 (see map 12)
An area of improved pasture bounded by hedgerows and a small area of woodland bordering the NW of Barnstaple. One bat was recorded foraging here.

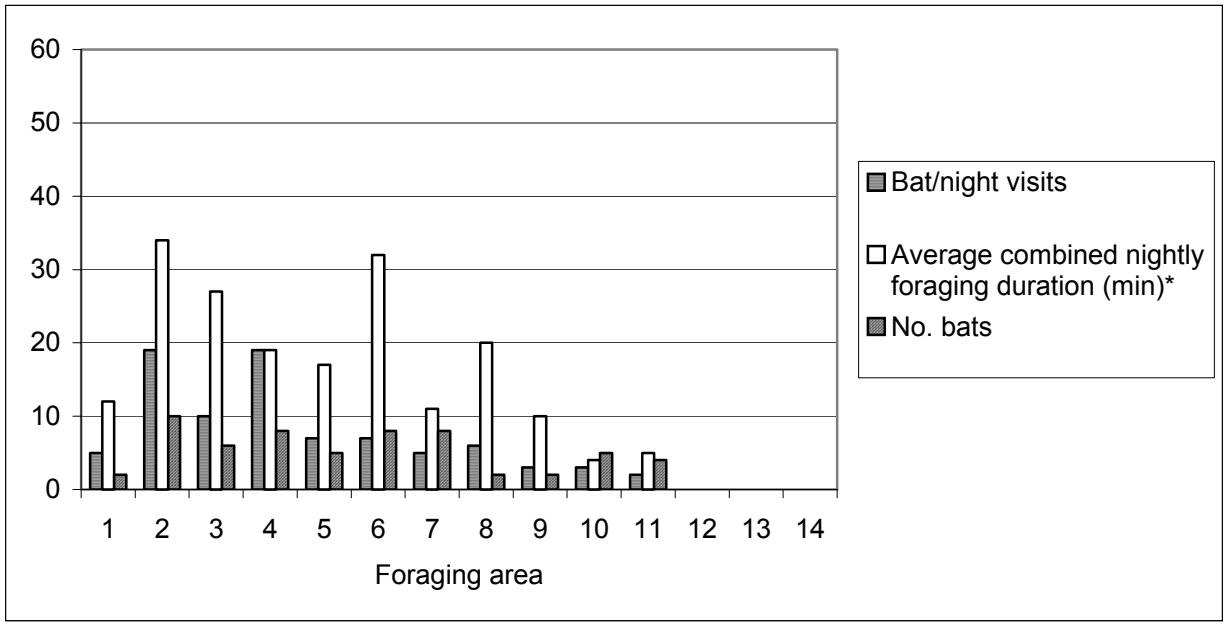
5.2.2. Foraging area usage

The six most significant foraging areas are Saunton (2), Braunton Marsh (3), Braunton (4), Braunton Burrows (6), Braunton Great Field (8) and Georgeham (13) (Chart 2). The former five areas were used primarily during the May tracking session, whilst the latter was used only during the August session (Charts 3 and 4).



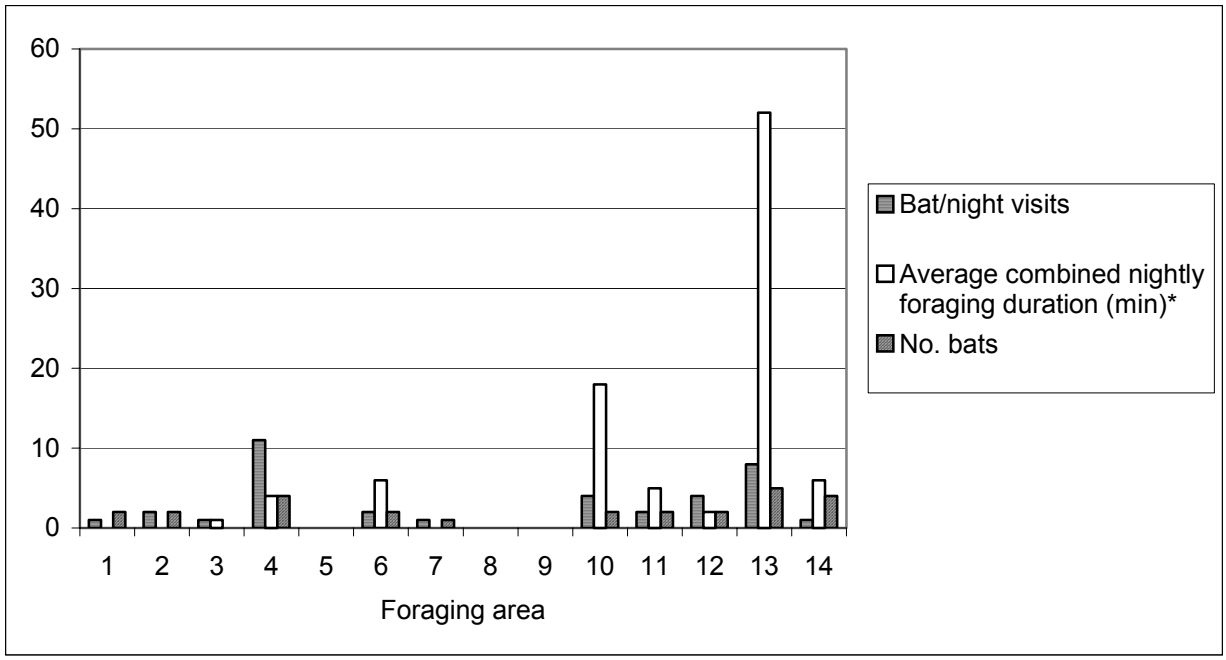
* total number of minutes foraging during study period divided by total number of nights tracking

Chart 2. Combined foraging area usage by tagged bats over the two survey periods



* total number of minutes foraging during study period divided by total number of nights tracking

Chart 3. Foraging area usage 17 – 23 May 2002



* total number of minutes foraging during study period divided by total number of nights tracking

Chart 4. Foraging area usage 24 – 30 August 2002

5.3 Flight corridors

Flight routes used by the bats are shown in the series of maps in Appendix I.

The main commuting routes identified were;

- south along the River Caen, through the middle of Braunton to the southern edge of the town at Velator Bridge. This route was particularly well used during the May session, to reach favoured foraging areas at Braunton Great Field, Braunton Marsh and Braunton Burrows
- north along the Caen valley, following the river or disused railway
- west from the roost to Georgeham, particularly during the August session
- east along Buttercombe then either further east into Knowle Water and onto Ashford, or northwest over the hill to Fullabrook

On several occasions in May, bats were recorded crossing the Taw Estuary (see maps 5, 9, 12 & 13), sometimes to forage close to the estuary shore near Fremington, and also to head further south.

5.4 Daytime roost sites

5.4.1 Number of roosts and roost types

Day roosting was recorded at Caen Valley Bats SSSI (as expected) and in a limekiln on the southern estuary shore at Fremington (one bat for one day) (Chart 5). Bats unaccounted for on a particular day may have been in undetectable positions; either in known roosts or in other undiscovered locations.

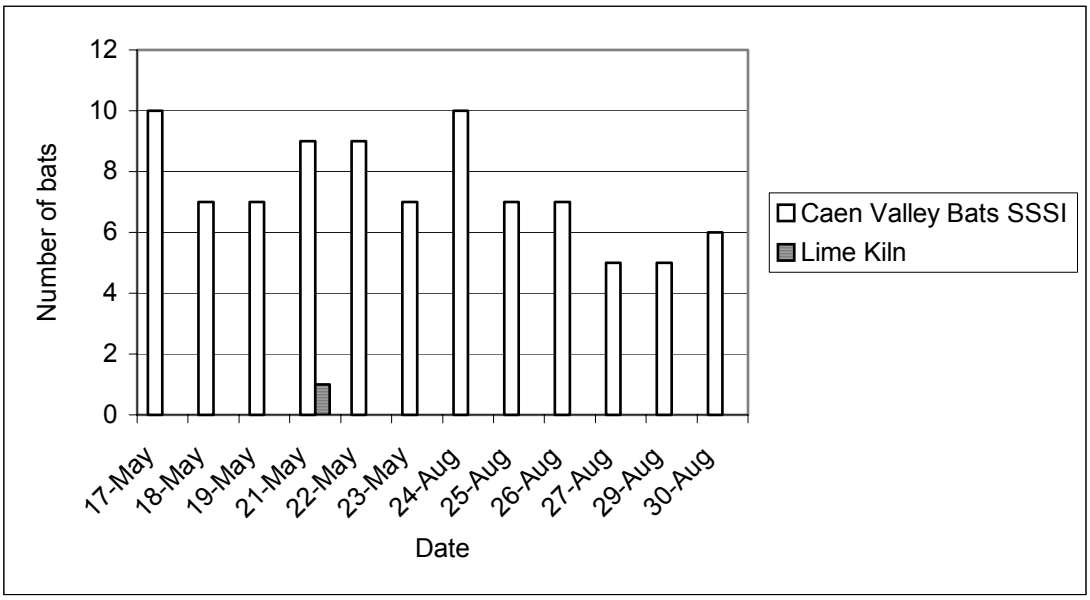


Chart 5. Daily usage of day roosts by tagged bats throughout study

5.4.2. Roost descriptions

5.4.2.1. Caen Valley Bats SSSI (map 3 - roost 6 SS483377)

The roost has been known as a nursery site since at least 1979. It is believed that a population totalling approximately 700 greater horseshoe bats use the roost (James Diamond, personal communication).

5.4.2.2. Lime Kiln (map 13 – roost 7 SS51343319)

An old lime kiln constructed of stone with three archways connecting to a central void. The site is grilled and was not entered. It is only a few metres from the high water mark of the Taw Estuary at Fremington Quay.

Several lesser horseshoe bat *Rhinolophus hipposideros* droppings were observed through the grill on the floor of the kiln.

5.5 Night roost sites

Night roosts are temporary roosts, used between and during bouts of foraging for resting, feeding and socialising.

5.5.1 Number of roosts and roost types

Bats were recorded night roosting at eleven sites. Table 4 shows the night roost types identified or confirmed in this study. Appendix III gives tagged bat occupation records.

Table 4. Night roost types

Type	Number
Building	7
Factory	2
Lime Kiln	1
Unknown	1

5.5.2. Roost descriptions

5.5.2.1 Pine's Dean Copse (map 6 – roost 1 SS51406)

Small field building not shown on Ordnance Survey map, not visited.

5.5.2.2 Saunton Court (map 3 – roost 11 SS45633785)

Single storey porch (8 x 2 metre) with an approximately 200 centimetre diameter pile of greater horseshoe bat droppings on the floor, also bat staining on roof timbers, feeding remains of several cockchafer *Melolontha melolontha* wings. This was a very heavily used night roost in May but was used less during the August session. Owner reports sweeping away large accumulations of droppings every day during the summer (visited by James Diamond 18 June 2002).

5.5.2.3. North Hele (map 2 – roost 3 SS457394)

Barn in complex of buildings, not visited.

5.5.2.4. Braunton Marsh (map 4 – roost 4 SS48043503)

A small single storey linhay barn, built with stonewalls and a slate roof 6 x 3 x 3 metre, with open doorways on west side. 200+ fresh greater horseshoe droppings; seven greater horseshoe bats (one tagged); remains of 15+ cockchafer beetles (visited by G. Billington & J. Kaczanow 20 May 2002).

5.5.2.5. Ashford House (map 12 – roost 5 SS526350)

Complex of buildings, not visited.

5.5.2.6. Caen Valley Bats SSSI (map 3 – roost 6 SS483377)

See 5.4.2.1 for site description

5.5.2.7. Fremington (map 13 – roost 7 SS51343319)

See 5.4.2.2 for site description

5.5.2.8. Knowle (map 7 – roost 8 SS49133859)

Factory building, not visited.

5.5.2.9. Braunton (map 3 – roost 9 SS485361)

Disused factory building, not visited.

5.5.2.10. Bradiford House (map 12 – roost 10 SS549347)

Complex of buildings, not visited.

5.5.2.11. Saunton (map 3 – roost 2 SS397377)

Garden shed, not visited.

6.0 Discussion

Study aims and objectives

The study was successful in achieving the primary objective of identifying the principal foraging areas and commuting routes used by greater horseshoe bats roosting at Caen Valley Bats SSSI during May and August 2002.

One additional day roost and eleven night roosts were identified. Two of these night roosts, Saunton Court and Braunton Marsh linhay, appear to be of significance to this population.

Foraging distances

The majority of foraging areas identified lay within six kilometres of the roost. The results obtained are similar to findings of a comparative study at Brockley Hall Stables SSSI (Somerset) in 2001 (Billington 2002) (Table 5)

Table 5. Maximum foraging distances and area of foraging from radio-tracking studies of greater horseshoe bats at Caen Valley Bats SSSI and Brockley Hall Stables SSSI (Billington 2002)

Age class	Maximum foraging radius from roost (km)		Number of 1 km squares with bat fixes	
	Brockley Hall Stables	Caen Valley Bats	Brockley Hall Stables	Caen Valley Bats
Juvenile	4.5	4.5	75	62
Adult	6.8	7.25		

Primary foraging habitat

The longest foraging periods and most favoured foraging areas were associated with mosaics of scrub and wet woodland, high overgrown hedges, and woodland edge adjacent to meadows and grazed pastures. Limited foraging was recorded within woodland.

Jones *et al.* (1995) have previously reported the importance of grassland, hedgerow and woodland mosaics as foraging areas for greater horseshoe bats. Ransome (1996) has linked these landscape features to the availability and abundance of key prey species.

Flight corridors

Key flight corridors linking Caen Valley Bats SSSI with foraging areas were identified and were found to be associated with watercourses, tall, bushy hedgerows, sheltered woodland edge and tree lines.

Roosts

Virtually all of the bats remained faithful to Caen Valley Bats SSSI, with individuals spending only single days away from the roost. There is no indication that this population uses another maternity site.

7.0 Recommendations

Foraging areas

Hedgerows on south facing slopes were found to be important foraging routes for this colony of greater horseshoe bats. Where appropriate, attention should be given to restoring and maintaining the hedgerow network in and around the foraging areas identified by this study.

The foraging areas and flight routes identified during this study should be given priority in the targeting of advice and management agreements to maintain and enhance the landscape for the bats using Caen Valley Bats SSSI.

Potential developments that may affect the foraging areas and flight routes identified during this study should be fully assessed to ensure that there are no negative impacts on the bats or the landscape that supports them.

Roosts

The main winter hibernation roost of this population remains unknown and may be vulnerable to disturbance or destruction. Further studies should be considered to attempt to identify these hibernation roost(s).

The limekiln at Fremington is inappropriately grilled for horseshoe bats. When the opportunity arises, the grilles should be altered to create several horizontal slits instead of the vertical gaps at present.

8.0 Acknowledgements

English Nature (in particular James Diamond) for planning, funding and licensing the activities carried out under this study, for the loan of aerial photographs and for providing copies of 1:10000 and Phase I habitat maps under their Ordnance Survey licence.

The owner and manager of Caen Valley Bats SSSI for allowing extensive access to buildings and land.

John Breeds for sharing his extensive local knowledge with us, and assisting the project by taking us to the locations of other known roosting sites, and for helping arrange access permissions.

The contract field surveyors John Kaczanow and Anita Glover.

Jan Collins and Siobhan Murphy for voluntary assistance.

The owners of Saunton Court for allowing access to inspect their outbuildings.

Major Bentham-Green for the tour around potential bat sites on Chivenor Airfield.

9.0 References

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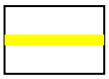
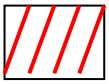
Appendix I - Maps

Key to maps

Foraging areas/flight routes 

Flight connections (route unknown***)*** 

Approximate foraging area
(foraging site(s) within shaded area) 

Roosting sites are denoted by red circles

Map scale 1 : 10000

1/. 43NW & 43NE Georgeham

2/. 43NE Braunton, Georgeham, Lobb and Saunton

3/. 43NW & 43NE Braunton, Braunton Burrows & Marsh, Braunton Great Field and Saunton

4/. 43SE & 43NE Braunton Burrows, Braunton Marsh and Braunton Great Field

5/. 43SE Braunton Burrows and Fremington

6/. 44SE & 44SW Fullabrook

7/. 43NE Braunton, Fullabrook and Knowle

8/. 43NE Braunton, Buttercombe and Knowle Water

9/. 43SE Braunton, Braunton Marsh, Braunton Great Field and Knowle Water

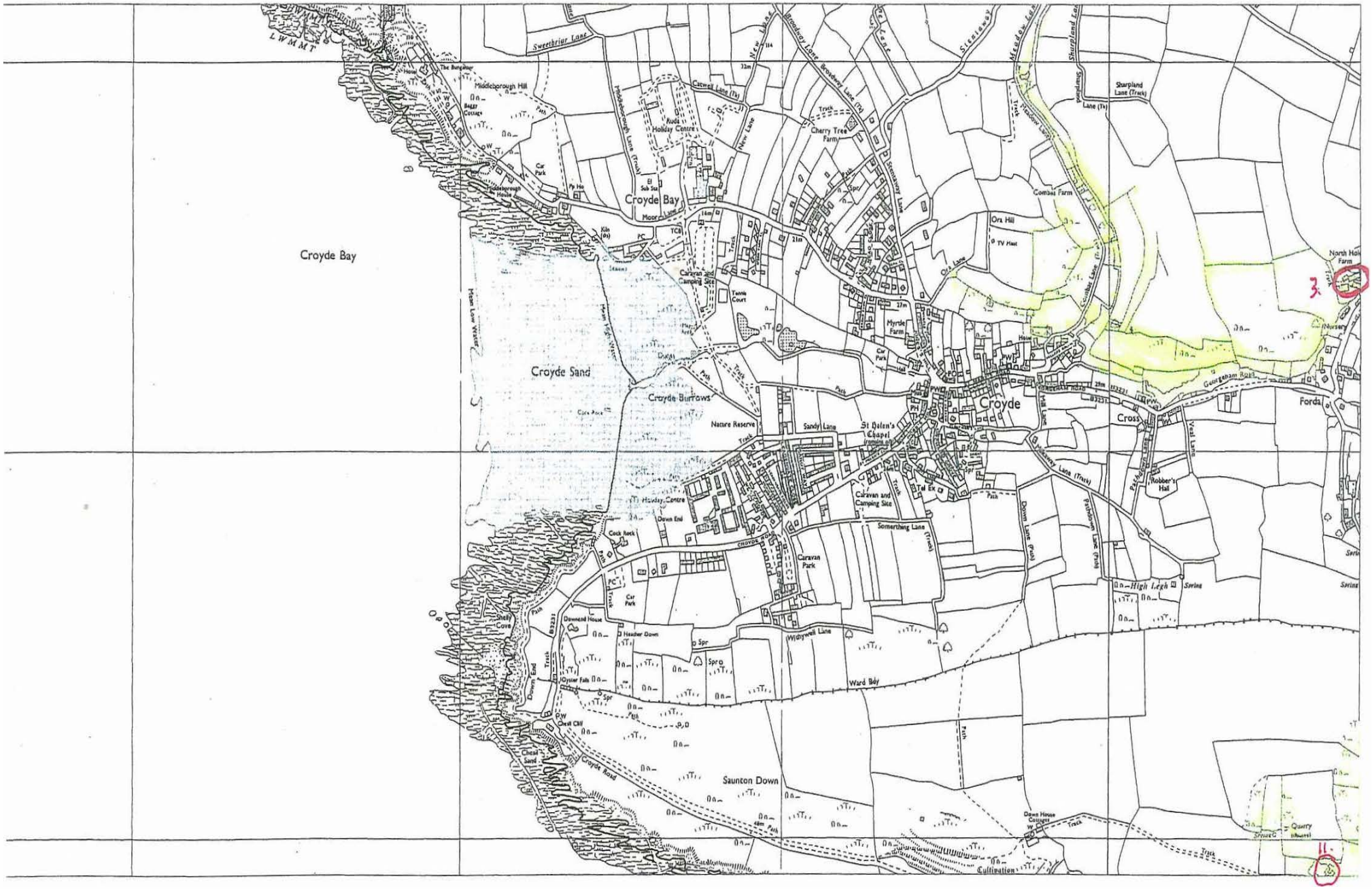
10/. 43SE & 53SW Fremington

11/. 53NW Fullabrook

12/. 53SW & 53NW Ashford, Barnstaple and Fremington

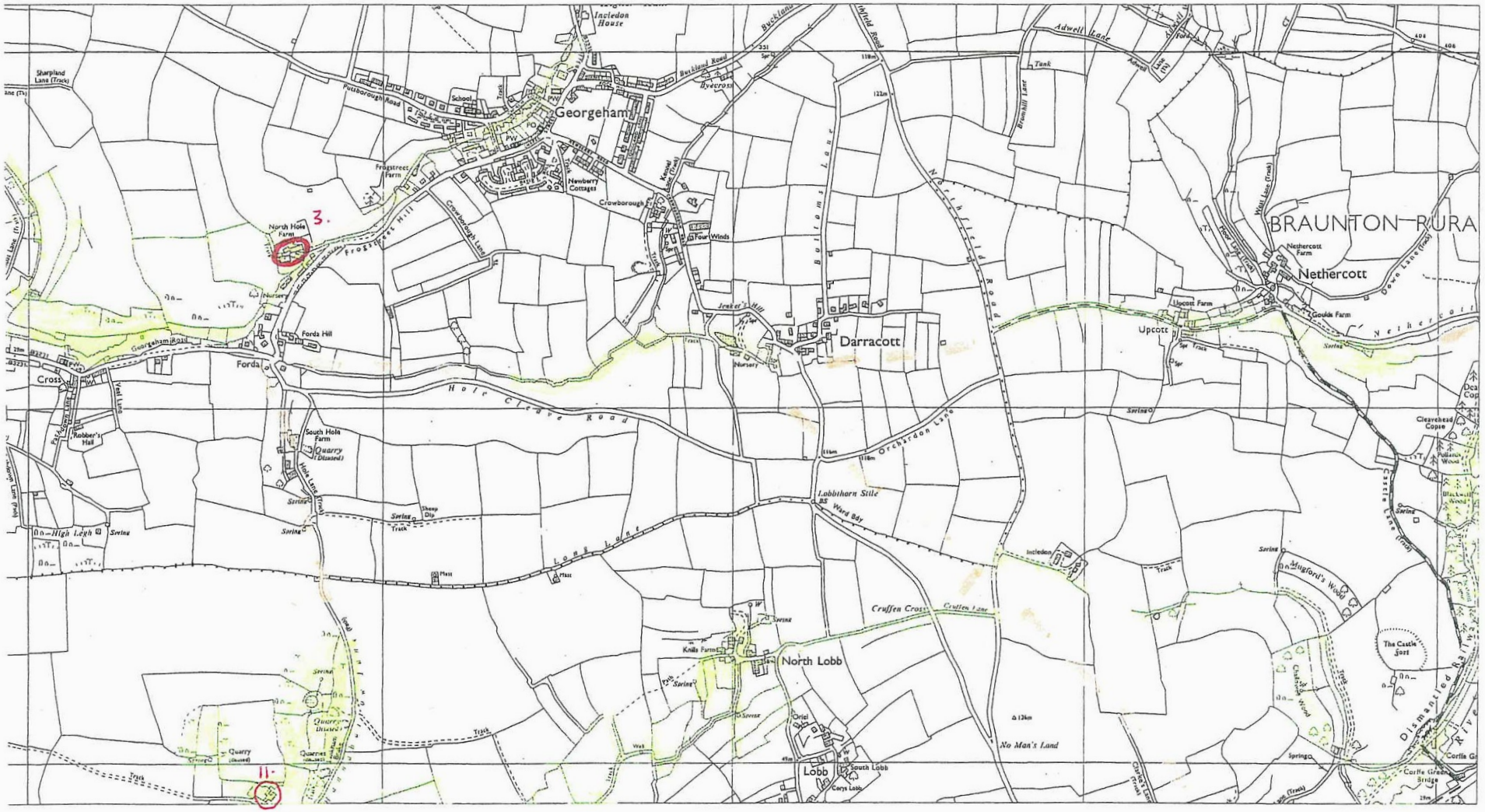
13/. 53SW & 53NW Fremington

Map 1. 43NW & 43NE
Georgeham

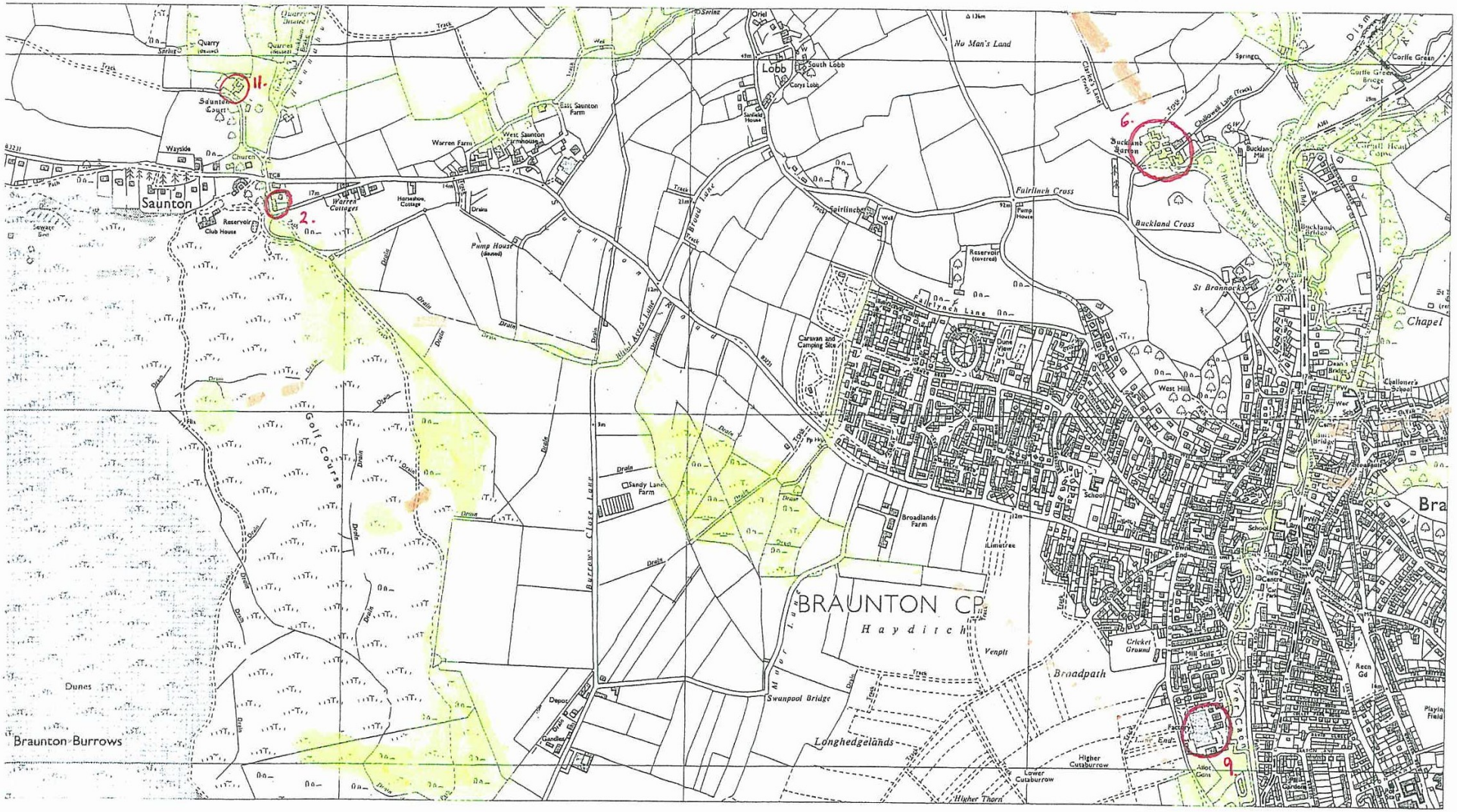


Map 2: 45NE

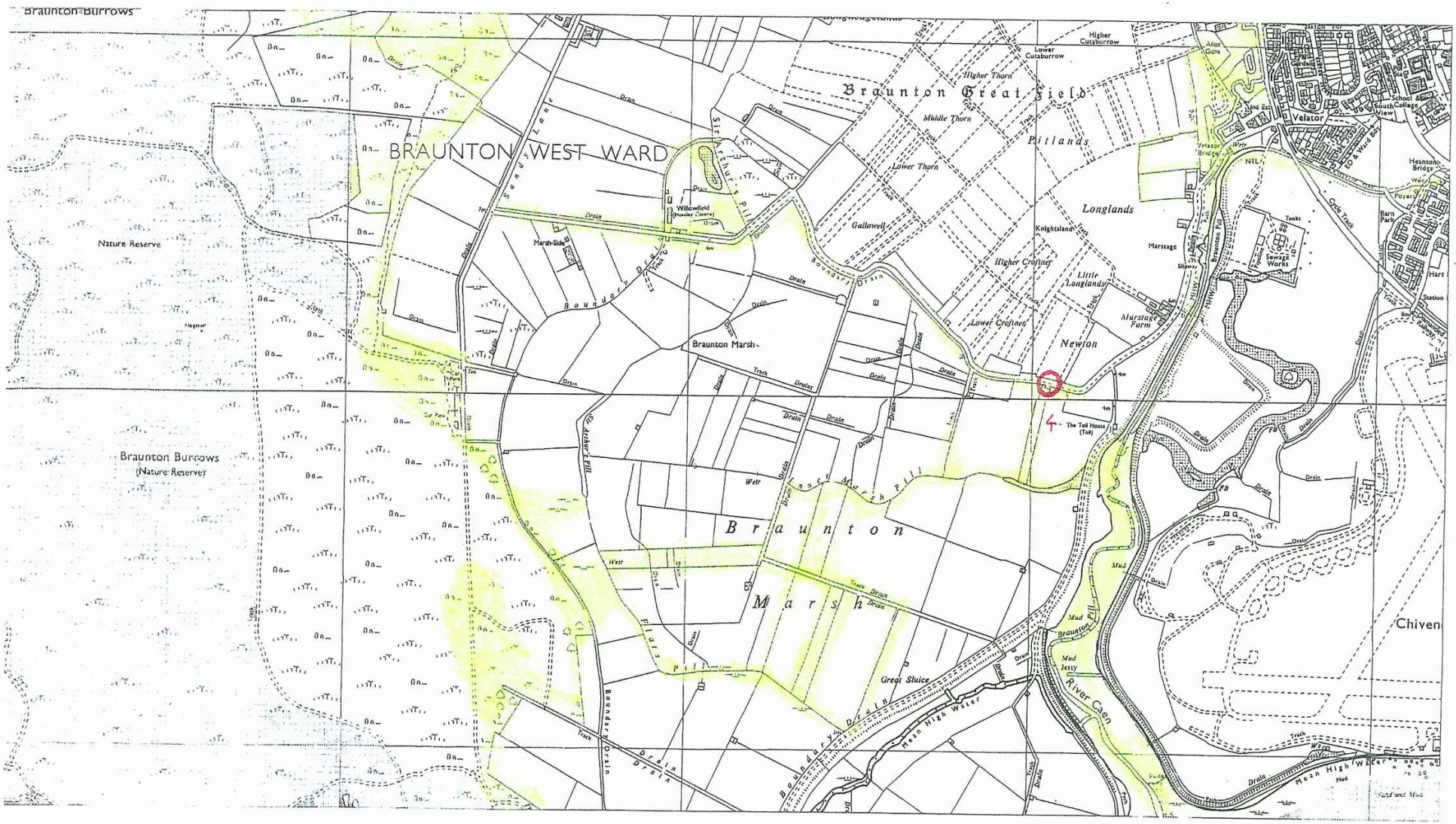
Braunton, Georgeham, Lobb & Saunt



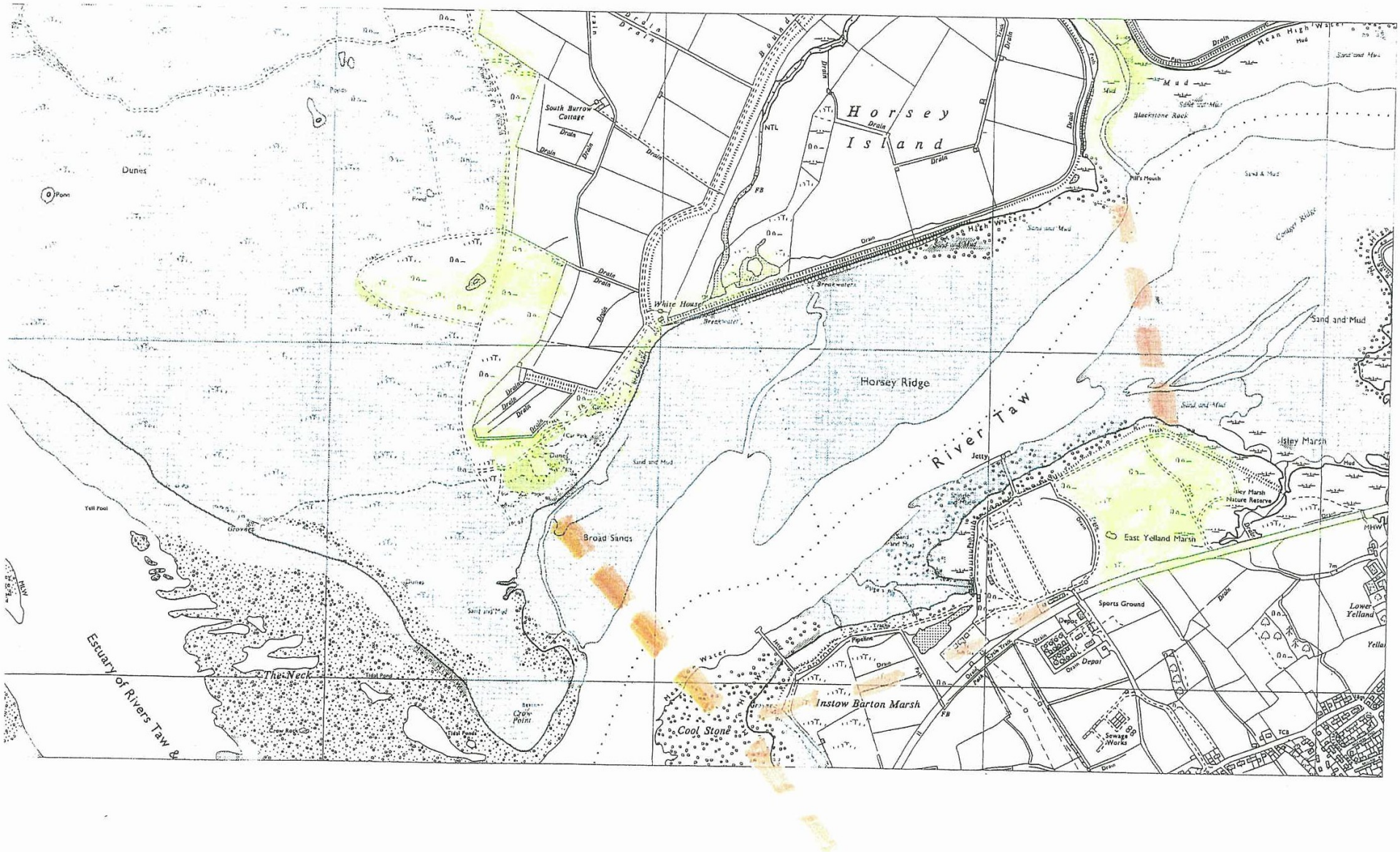
Map 3. 43NW & 43NE
Braunton, Braunton Burrows, Braun
Marsh, Braunton Great Field & Saun



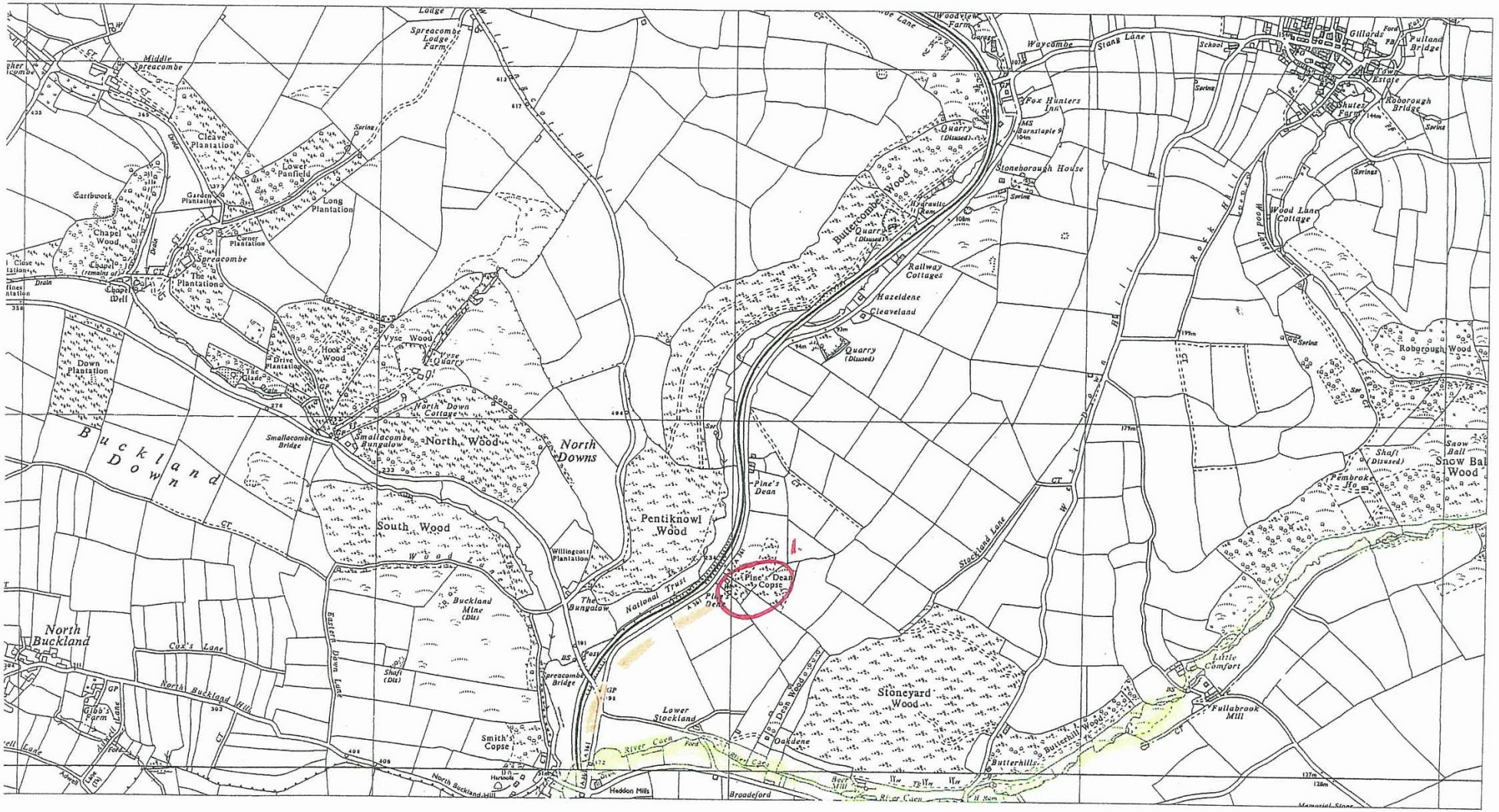
Map 4. 43SE & 43NE
Braunton Burrows, Braunton Marsh
Braunton Great Field



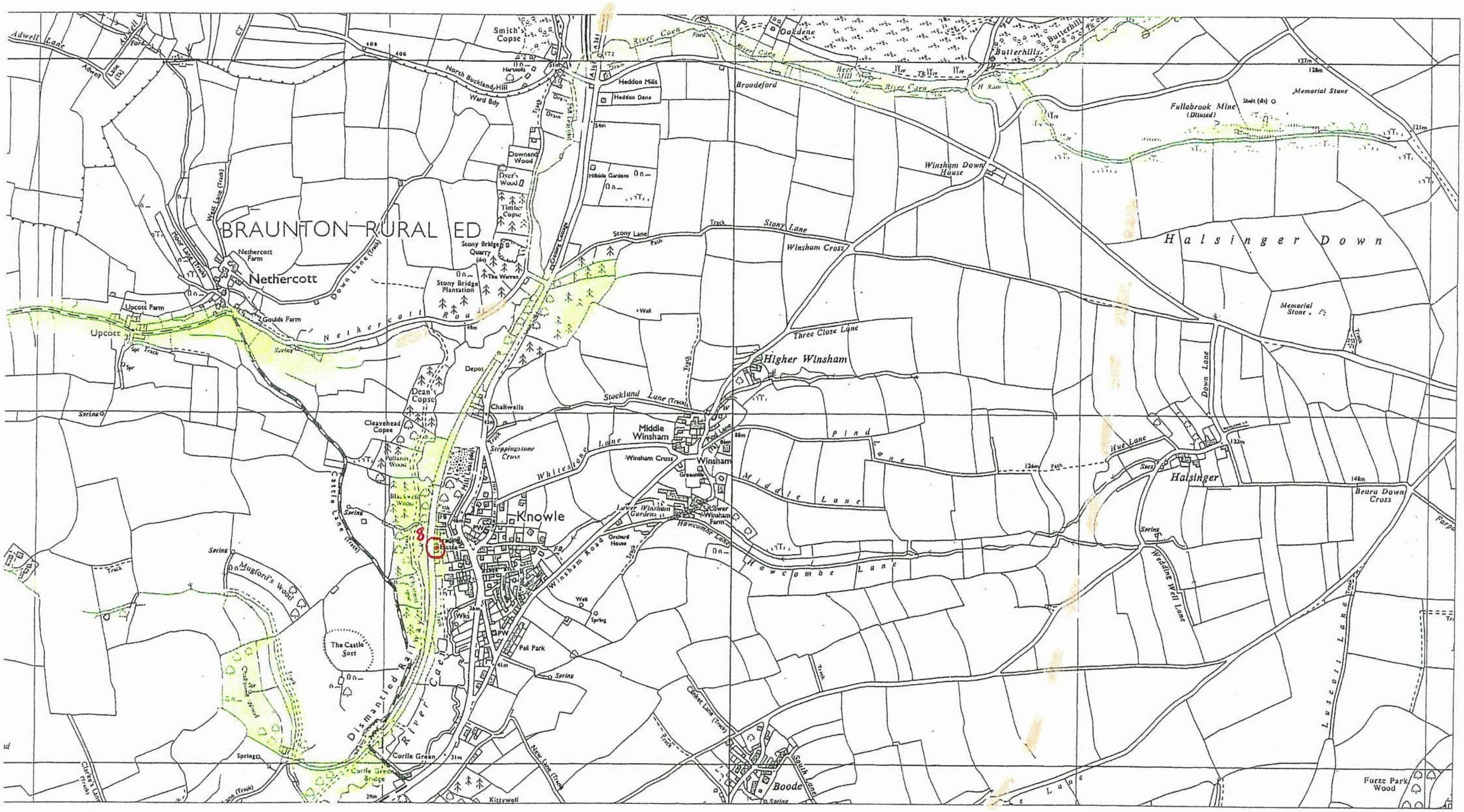
Map 5. 43SE
Braunton Burrows & Fremington



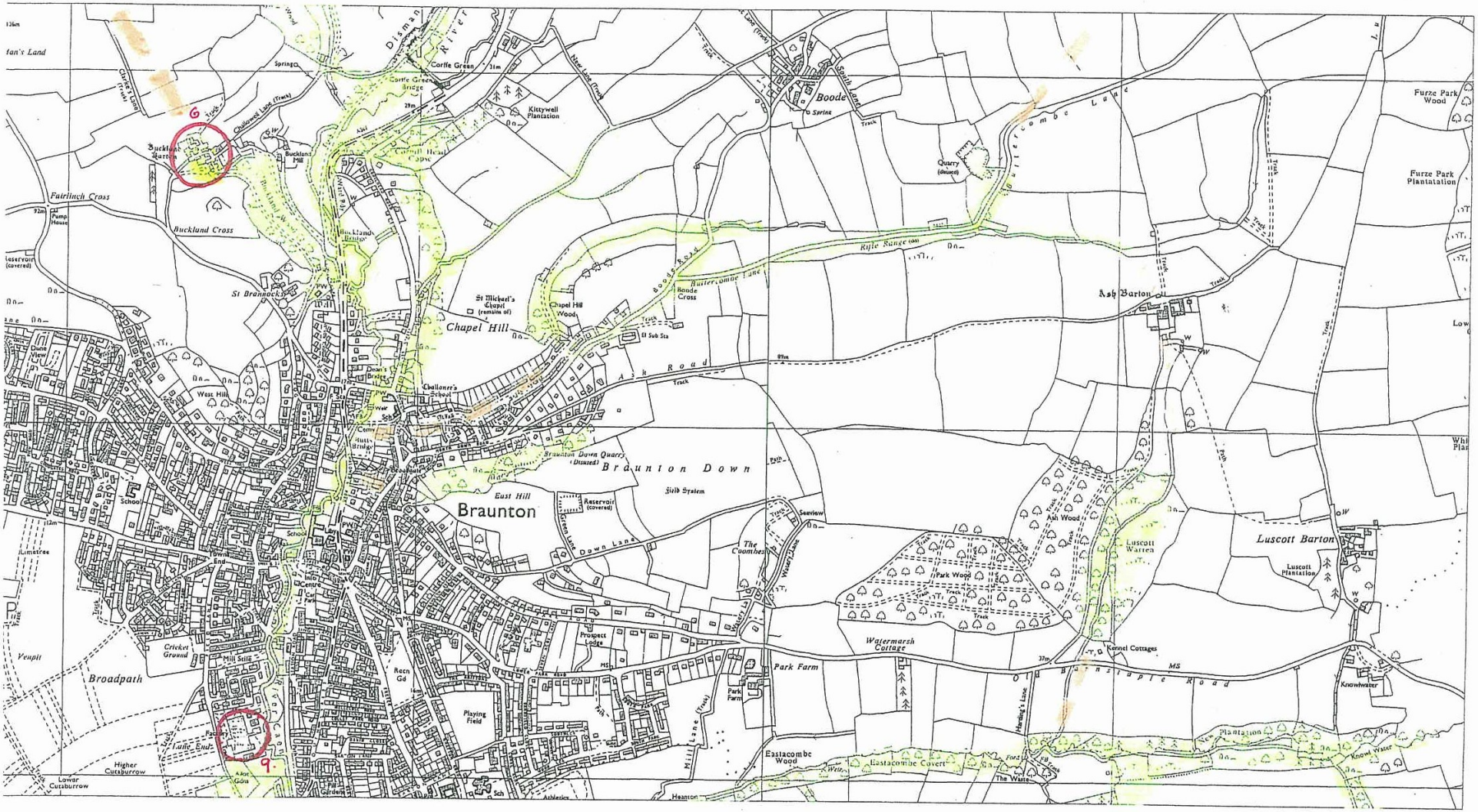
Map 6. 44SE & 44SW
Fullabrook



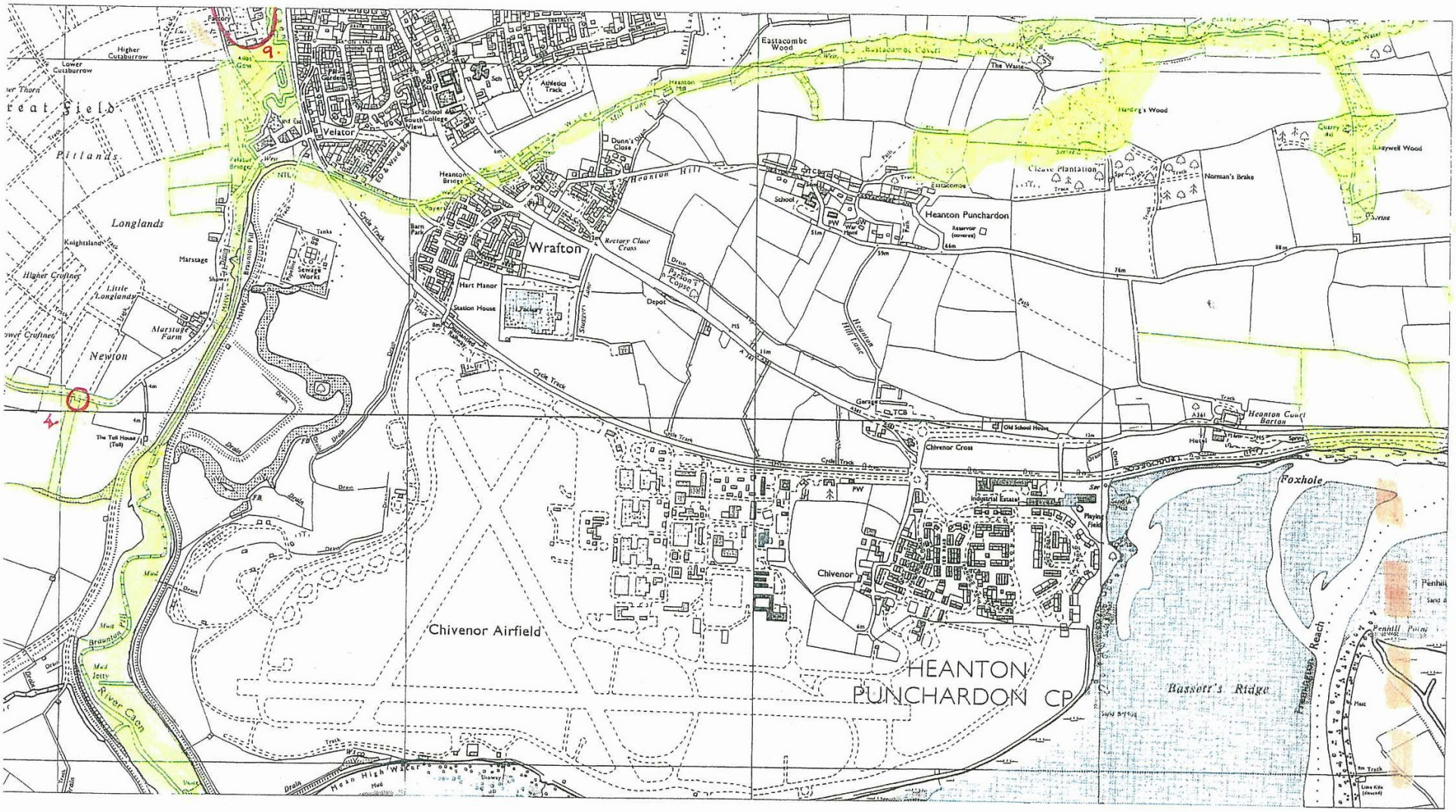
Map 7: 43NE
Braunton, Fullabrook & Knowle



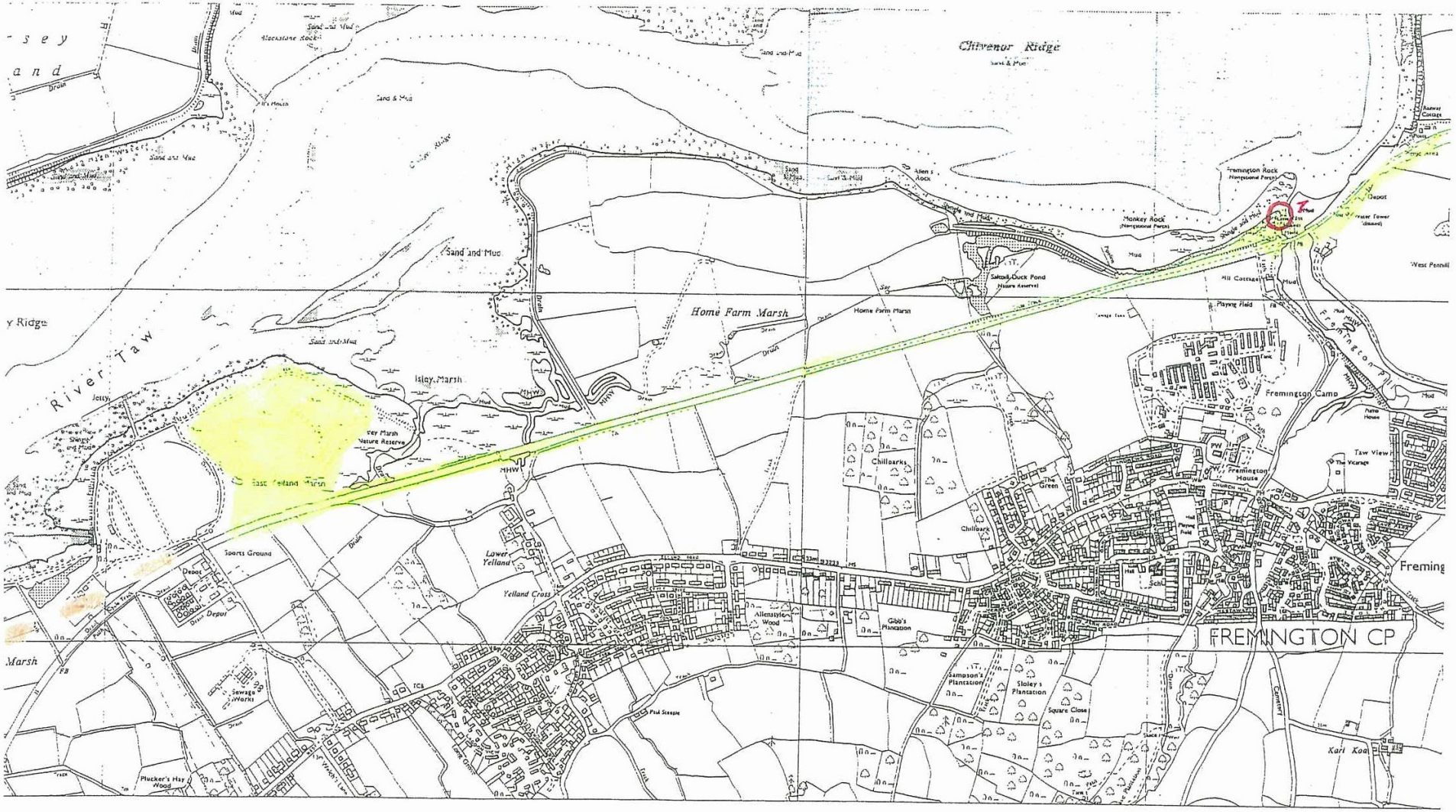
Map 8. 43NE
Braunton, Buttercombe & Knowle Water



Map 9. 43SE
Braunton, Braunton Marsh, Braunton Great Field and Knowle Water

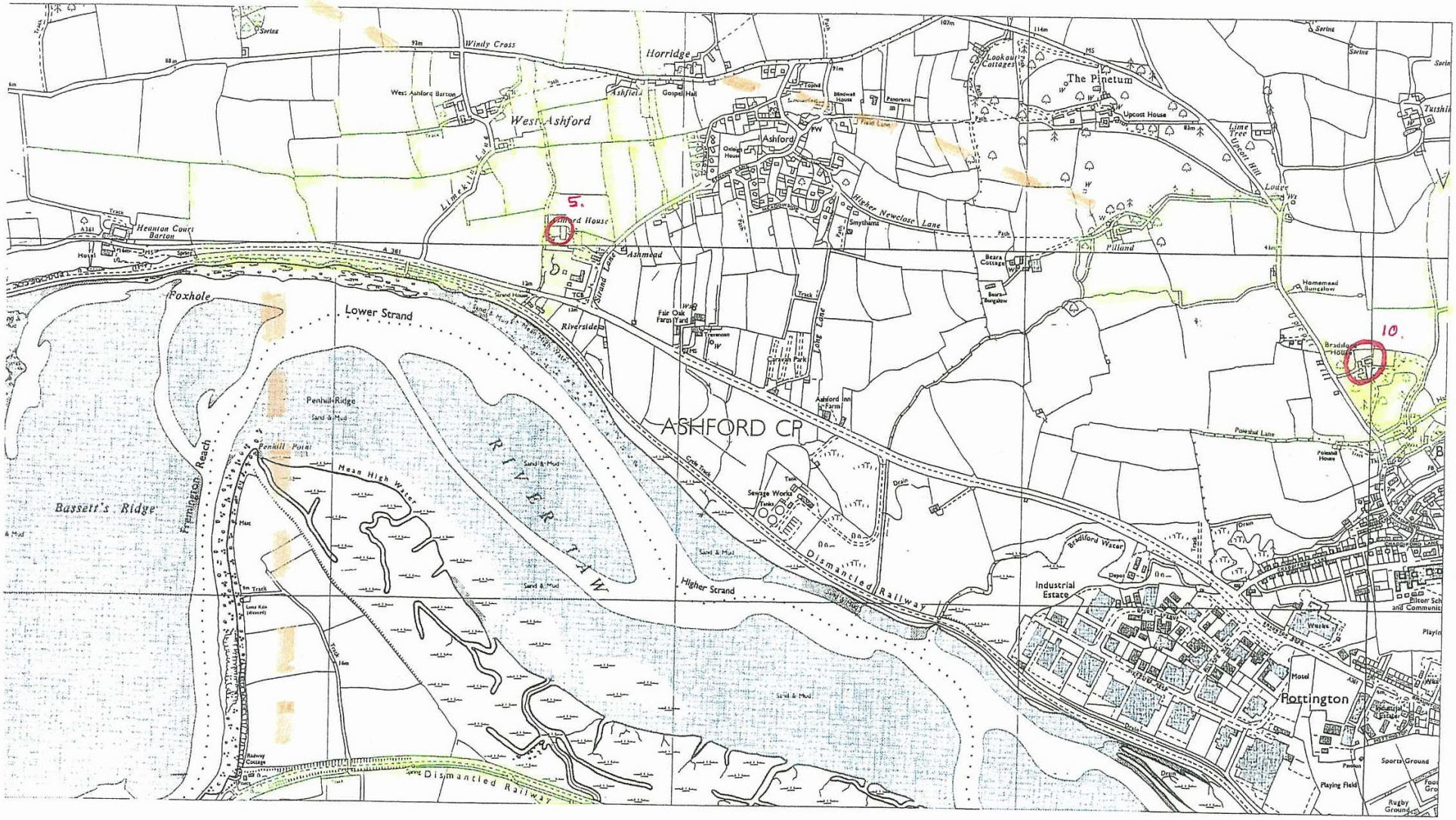


Map 10. 43SE & 53SW
Fremington

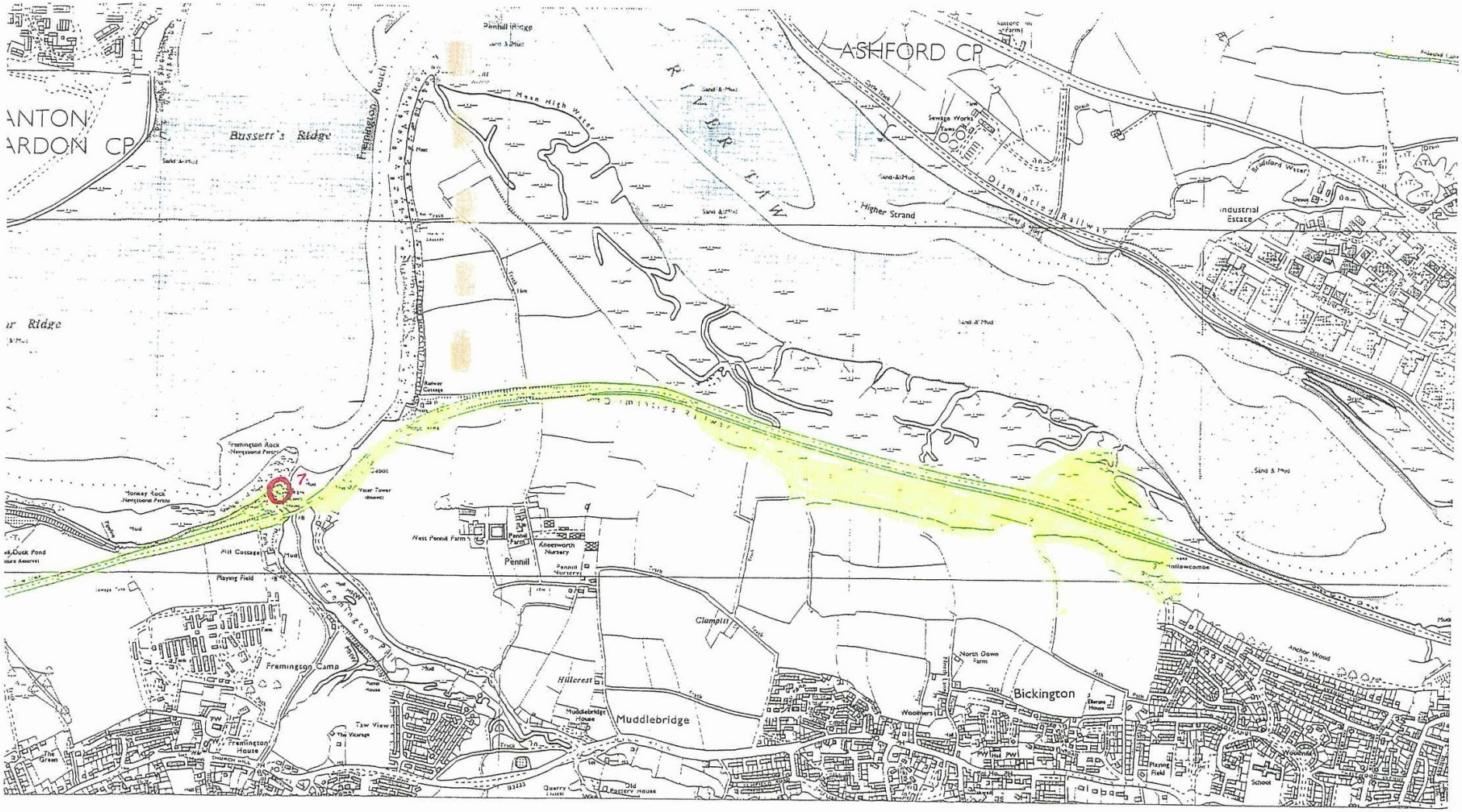


Map 11. 53NW
Fullabrook

Map 12. 53SW & 53NW
Ashford, Barnstaple & Fremington



Map 13. 53SW & 53NW
Fremington



Appendix II - Day roost usage data

Caen Valley Bats SSSI

Date (2002)	Bat no.
17 May	1-10
18 May	2, 3, 5-8 & 10
19 May	2, 3, 5-8 & 10
21 May	1-3 & 5-10
22 May	1-3 & 5-10
23 May	1, 2, 5-8 & 10
24 August	1-10
25 August	1, 3, 4, 6, 7, 9 & 10
26 August	1-5, 7 & 8
27 August	1, 3, 5 & 8
29 August	1, 2, 6, 7 & 9
30 August	1-3, 6, 7 & 9

Lime Kiln

Date (2002)	Bat no.
21 May	4

Appendix III - Night roost usage data

Site	Date (2002)	Bat number	Times
1	17 May	5	0155
2	17 May	5	0155
	18 May	7	2223-2347
		6	2259
		8	2259
	19 May	2	2236-42 0353-0403
		8	2240-42 2300
		6	2240-2300 0153
		7	2240-2300 0353-0404
	20 May	2	2200-30
		6	2200-38
		7	2200-39 0310
	21 May	6	2244-2343
		7	2244-2343 0258
		2	2253-55 2310-28
		9	0258
	22 May	9	2324- 0021
3	18 May	7	0021
	25 August	15	2216
		9	0152
	19 May	3	0027-0116 (with 5 greater horseshoe bats)
			0130-0140 (with 5 greater horseshoe bats)
	20 May	10	2146-2210 (with 7 greater horseshoe bats)
4	21 May	3	2355-0000 (with 5 greater horseshoe bats)
	24 August	13	2140 (with one greater horseshoe bat)
	20 May	1	0148-0239
		8	0124-0215 0229-39
	21 May	8	0001-0016 0243
5	27 August	11	2201-37 2306-24
		3	2324-39
	29 August	11	0150
	30 August	11	2355-0007
		3	2355-0007
6	17 May	5	0155
7	20 May	9	2145-55 0243
8	21 May	8	0023-43 0202-04 0210-12
9	23 May	10	2305-10
10	30 August	20	2310 2326-38
11	18 May	6	0323-29
11	20 May	6	0010-20

Appendix IV - Weather conditions during survey periods

Temperature (degrees centigrade), rainfall (0-5), cloud levels (%) and wind strength (Beaufort scale), were recorded at dusk. During the surveys changes in temperature, increased wind strength and percentage rainfall were noted.

Date	Dusk weather				Minimum Temp (C)	Maximum wind strength	% time rain fell
	Temp (C)	Rainfall	Cloud (% cover)	Wind strength and direction			
17 May	14.0	0	70	1SW	13.0	1	0
18 May	13.5	0	100	0	13.0	1	15
19 May	13.5	1	95	1SW	13.0	2	10
20 May	13.0	2	100	2SW	7.5	2	80
21 May	12.5	2	100	2SW	12.5	3	10
22 May	12.0	2	90	3SW	12.0	4	70
23 May	13.0	1	95	1SW	12.0	1	50
24 August	18.0	0	20	0	15.0	0	0
25 August	17.0	0	40	0	14.0	0	0
26 August	17.5	0	10	0	16.0	0	0
27 August	15.5	0	15	0	13.0	0	0
28 August	16.5	0	70	1N	15.0	1	20
29 August	17.5	1	100	3N	16.0	3	70
30 August	15.0	3	100	2NE	14.0	2	60

Appendix V – Photographs

All photographs by Geoff Billington

1/. Saunton

2/. Braunton Marsh

3/. Lobb

4/. Braunton Burrows

5/. Braunton Burrows wet woodland

6/. Braunton Burrows wetland scrub

7/. Braunton Burrows dune scrub

8/. Braunton Great Field

9/. River Caen beside Braunton Great Field

10/. Fremington

11/. North Hele Georgeham

12/. Georgeham

13/. Lime kiln

14/. Estuary crossing place near Ashford

15/. Braunton Marsh night roost

1/. Saunton - SS467369 NNW

2/. Braunton Marsh - SS480350 S

3/. Lobb - SS467369 NNE

4/. Braunton Burrows – SS440380 SSE

5/. Braunton Burrows wet woodland – SS463367 N

6/. Braunton Burrows wetland scrub - SS463366 E

7/. Braunton Burrows dune scrub – SS463346 SE

8/. Braunton Great Field – SS475360 S

9/. River Caen beside Braunton Great Field – SS470368 E

10/. Fremington – SS517333 E

11/. North Hele Georgeham – ST459395 SW

12/. Georgeham – SS463391 E

13/. Lime kiln - SS51343319

14/. Estuary crossing place near Ashford – SS512332 NE

15/. Braunton Marsh night roost - SS48043503

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Front cover photographs:
Top left: Using a home-made moth trap.
Peter Wakely/English Nature 17,396
Middle left: Co_2 experiment at Roudsea Wood and Mosses NNR, Lancashire.
Peter Wakely/English Nature 21,792
Bottom left: Radio tracking a hare on Pawlett Hams, Somerset.
Paul Glendell/English Nature 23,020
Main: Identifying moths caught in a moth trap at Ham Wall NNR, Somerset.
Paul Glendell/English Nature 24,888