Natural England Commissioned Report NECR021

Radio Tracking Study of Greater Horseshoe Bats at Dean Hall, Littledean, Cinderford

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Foreword

Natural England commission a range of reports from external contractors to provide evidence and advice to assist us in delivering our duties. The views in this report are those of the authors and do not necessarily represent those of Natural England.

Background

Dean Hall, Littledean, Cinderford is a Greater Horseshoe maternity colony and small hibernation roost, situated close to the Forest of Dean, Gloucestershire. The site is designated a Site of Special Scientific Interest because of the bats.

This report is the second phase of the project. This first phase is written up in Natural England Research Report NERR012.

Natural England commissioned this work to identify the flight paths used by female Greater horseshoe bats while roosting at Dean Hall including the principal foraging areas and linear features of the landscape.

A secondary objective was to identify any night roosts used by the bats.

The study has identified the principal foraging areas and commuting routes used by Greater horseshoe bats roosting at Dean Hall in Gloucestershire.

The findings will be used by the local Natural England team, planning officers, partners and others and have been published, to help:

- Protect the larger roosts of horseshoe bats within the Wye Valley and Forest of Dean Bat SAC.
- Assess the impact of local planning applications.

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Contractor - Geoff Billington, Greena Ecological Consultancy

Keywords - Horseshoe Bats, Great Horseshoe Bats, Radio Tracking, Dean Hall, Gloucestershire

Further information
This report can be downloaded from the Natural England website: **www.naturalengland.org.uk**. For information on Natural England publications contact the Natural England Enquiry Service on 0845 600 3078 or e-mail **enquiries@naturalengland.org.uk**.

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Natural England for funding and licensing the activities carried out under this study and for providing digital data.

The field surveyors: Geoff Billington and Jacqueline Warren.

David Priddis, who has been recording this colony since 1986, for providing assistance with the hand netting and handling at the roost, providing information on ringed bats and for assisting with one night's radio tracking.

The owners of Dean Hall for permitting access to their barn.

Summary

The study was requested by Natural England in order to discover further information on the activity patterns of Greater Horseshoe bat, *Rhinolophus ferrumequinum* whilst at their summer breeding roost at Dean Hall. The roost is. situated to the SE of Littledean in the Forest of Dean, Gloucestershire. A total of 10 bats were radio tagged and they were then tracked for a period of five days in June 2008 A similar study was carried out during August 2007 (Billington 2007).

Bats regularly commuted at least 10 kilometres to foraging areas. The total area bats were recorded foraging in covered at least 34 1km squares. This compares with using a traditional radio tracking analysis evaluation by convex polygon (linking together outer most location fixes) that would give an exaggerated area of at least 103 km^2 being used.

Bats were recorded foraging primarily around field systems with high hedges or along woodland edge/clearings in the forest. Seven out of the 10 bats were recorded heading into the Forest of Dean though most roamed from site to site rarely spending more than a few minutes in each location. This was conjectured to be the result of lack of insects to eat on account of the poor weather in spring/ early summer.

A total of 11 foraging areas were identified. The three most important areas found during this study period were at Soudley - mainly in clearings/ woodland edge in Smeyd, Foundry, Wallsprings and Dry Woods north of Soudley; along hedgerows at Denny Hill, and Farleys End (hedgerows).

Three night roosts were identified during the study, two at Denny Hill and another at Blakeney. The Blakeney roost was also found to be a day roost for both Greater horseshoe, *Rhinolophus ferrumequinum* and Lesser horseshoe bats, *Rhinolophus hipposideros*;, it had not previously been recorded.

No other day roosts were recorded being used by tagged bats but up to 5 bats (10-50%) were absent each day from Dean Hall. Radio tracked bats were recorded near at least two known underground hibernation sites it is likely some bats day roosted in them. This year the bats came back to Dean Hall several weeks later than in other years, and

gave birth about two weeks later than in 2007 (David Priddis pers. com.) This is believed to be a result mainly of poor weather and lack of insects in early 2008.

The main commuting routes used by the bats leaving the roost during this study from Dean Hall were identified as a track to the east of the Hall and south from the roost.

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1. Introduction

1.1 Objectives

To identify the principal foraging areas and linear features of the landscape used by female Greater horseshoe bats as flight routes while roosting at Dean Hall. Secondary objectives were to identify any night roosts used by the bats.

1.2 Background

This study was commissioned by Natural England and was carried out by Greena Ecological Consultancy from a temporary holiday cottage base at Coleford. In this study the movements of 10 Greater Horseshoe bats, 8 pregnant females and 2 females (not obviously pregnant) were studied. None of the tagged bats were in late stages of pregnancy.

1.3 Study area

Dean Hall, (sometimes also referred to as “Littledean Hall”), Littledean, Cinderford (GR SO 672130) is a Greater Horseshoe maternity colony and small hibernation roost, situated close to the Forest of Dean, Gloucestershire. The roost supports at least 200 individuals during summer. The study area encompasses an area dictated by the extent of the foraging range of the bats at Dean Hall during June. Areas found in the August 2007 study were also regularly searched in case bats were re-using these late summer foraging grounds. The Forest of Dean is in close proximity to the roost to the west side and the river Severn is to the south and east. There are also various scattered woodlands and copses, interlinked by mature high hedgerow complexes.

2. Methods

2.1 A total of 10 Greater Horseshoe bats were caught and radio tagged at Dean Hall on 1st June they were tracked over 5 nights from 3rd – 7th June 2008.

2.2 All bats were caught in hand nets from within the roost by two surveyors one a local volunteer David Priddis. Two separate locations within the roost were selected to catch from to avoid the risk that a group of bats roosting together used the same foraging area. The bats were fur-clipped and the transmitters glued between the shoulder blades, using SkinBond adhesive. Bats were fitted with 0.7g & 0.47g 173 MHz radio transmitters, manufactured by Biotrack, with a battery life set for at least seven days. 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 and ring damage. The roost was not re-entered during the study.

2.3 Two fieldworkers used *Australis* 26K and *Sika* receivers with *Yaggi* rigid aerials to track bats, assisted by a volunteer on one night. Whip omni directional antennas were used to search for bats by vehicle. Tailor-made recording sheets were used to record data. Radio sets and mobile phones were used for two-way communication. Accurate bearings of bat locations were taken from hand held sighting compasses. Global Positioning Systems were used to increase the speed and accuracy of the surveyors. *Duet* bat detectors were used to confirm the presence of horseshoe bats by listening for their characteristic echolocation calls. The Gloucestershire police were notified of the study.

2.4 For all detectable bats the following data was recorded: observer location, bat ID number, triangulation bearings were taken when possible, 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 with each surveyor based at separate locations, in contact by radio set or mobile phone. Both receivers were able to automatically scan through different frequencies which made it possible to search for a number of tagged bats. On occasion, surveyors were able to make close approaches to bats, to ascertain the exact foraging area and behaviour.

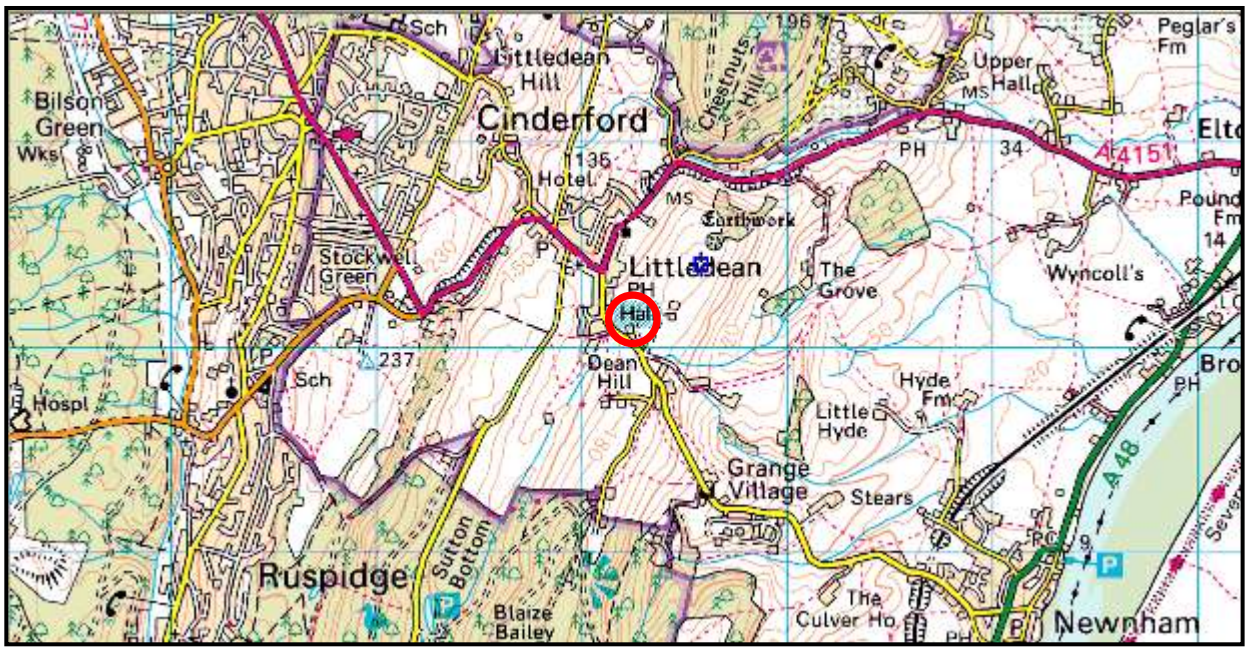
Tracking ended when the bats moved away or the fieldwork period ended. No tags fell off or malfunctioned during the study period.

2.5 At the start and end 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. Starting/ observation points used during June 2008 radio tracking

Grid Reference	Description
1. SO 6650 1341	A 4151 above Littledean
2. SO 6607 0995	Bradley Hill 1
3. SO 6610 0990	Bradley Hill 2
4. SO 6855 1442	Popes Hill
5. SO 6891 1224	Newnham near railway
6. SO 6739 1294	Littledean1
7. SO 6646 1332	Littledean2

Figure 1. Location of Dean Hall, Littledean, Cinderford (SO 672 130)



3. Results

3.1 Tracking and bat data

A total of 29 Greater Horseshoe bats were caught during the study. Of these, 10 were fitted with radio transmitters (Table 2).

Table 2. Greater Horseshoe bat captures at Dean Hall

Date	Total caught	No. of females	No. of males	No. radio tagged
1st June 08	29	18	11	10 females (8 obviously pregnant)

In total, 5 nights of radio tracking data was collected by two surveyors.
Welfare considerations for the bats took precedence over all other issues during capture and tagging. No abnormal behaviour of the bats was detected from radio tagging or during tracking of the bats.

Table 3. All catching data

Dean Hall Greater Horseshoe Catching Data Catch Date 1st June 2008 Ft x1.5 ≥ 5 yr							DH = Dean Hall BM = Buckshaft Mine BHRT = Bradley Hill Railway Tunnel Bullo = Bullo Railway Tunnel BrS = Bream Scowles OB = Old Bow, Coleford
Sex	**Age**	**Breeding status**	**Forearm (mm)**	**Weight (g)**	**Ring Number**	**Track number**	**Comments & Historical Data**
F	Mature adult	Ftx1 NOF	56.1	21.1	X1043 RF	1	1st Ringed DH 01.08.04
M	Sub-adult 1-3 yrs	NoT	55.6	17.1	X2445 RF		1st Ringed DH 22.07.07
F	Mature adult *	*Ftx1.5	56.4	25.1	X1032 RF		1st Ringed DH 08.08.04
F	Sub-adult 1-3 yrs	No ft	56.8	17.5	X2028 RF	2	1st Ringed DH 30.07.06. RF 06.08.06 DH
M	Sub-adult 1-3 yrs	RR			X2266 RF		1st Ringed DH 15.07.07 RF 22.07.07 DH
M	Sub-adult 1-3 yrs	RR			X2276 RF		1st Ringed DH 15.07.07
F	Mature adult	FP No ft	55.9	19.1	X1278 RF	3	1st Ringed DH 10.07.05 RF 23.02.08 BrS
F	Mature adult	FP Ftx1	56.0	22.1	X1347 RF	5	1st Ringed DH 17.07.05 RF 23.07.05 DH
F	Mature adult	FP Ftx 2	54.1	21.9	M5425 RF	4	1st Ringed DH 26.07.98 RF 02.08.98 DH RF 06.12.98 BM RF 28.05.00 DH
F	Sub-adult 1-3 yrs	No ft	55.9	17.1	X2278 RF		1st Ringed DH 15.07.07
F	Sub-adult 1-3 yrs	FP No ft	56.2	21.1	X2050 RF		1st Ringed DH 23.07.06 RF 30.07.06 DH
M	Mature adult		55.1	17.9	X1334 RF		1st Ringed DH 17.07.05 RF 23.07.05 DH
F	Sub-adult 1-3 yrs	#RCO No ft	56.1	18.1	X2434 RF		1st Ringed DH 22.07.07
M	Sub-adult 1-3 yrs	NoT	54.6	16.5	X2293 RF		1st Ringed DH 08.07.07
F	Mature adult	FP N ft	56.0	23.8	X1282 RF		1st Ringed DH 10.07.05 RF 17.07.05 DH
F	Sub-adult 1-3 yrs	No ft	54.6	16.1	X2443 RF		1st Ringed DH 22.07.07
F	Mature adult	FP Ftx2	57.0	21.8	M9405 RF	6	1st Ringed DH 28.07.01 RF 05.08.01 DH RF 03.03.02 OB RF 27.03.04 OB
F	Mature adult 21 yr	Old breeding female FP TW x 2 Ftx2.5	56.7	21.1	E6450 RF	7	1st ringed 17.02.88 BM born 1987 RF 29.08.89 DH KB No ft RF 12.04.97 Bullo KB ftx2 RF 24.08.07 DH
F	Mature adult	FP Ftx2	56.8	21.1	M9514 RF	8	1st Ringed DH 14.07.02 RF 21.07.02 DH
F	Mature adult	FP Ftx2	54.7	21.1	M9539 RF	9	1st Ringed DH 28.07.02 RF 05.02.03 PM
F	Sub-adult 1-3 yrs	No ft	53.2	16.0	X2438 RF		1st Ringed DH 22.07.07
F	Mature adult	FP Ftx2	57.0	23.0	M9087RF	10	1st Ringed DH 13.07.03
F	Sub-adult 1-3 yrs	FP No ft	55.6	19.0	X1485 RF		Born & 1st Ringed Woodchester 2006 RF 29.03.08 OB No FT, no Plug
M	Sub-adult 1-3 yrs	RR			X2287 RF		1st Ringed DH 15.07.07
M	Sub-adult 1-3 yrs	NoT	56.6	18.4	X2180 RF		1st Ringed DH 08.07.07
M	Sub-adult 1-3 yrs	NoT	55.1	17.9	X1952 RF		1st Ringed DH 23.07.06
M	Sub-adult 1-3 yrs	NoT	54.7	16.0	X2179 RF		1st Ringed DH 08.07.07
M	Sub-adult 1-3 yrs	NoT	54.6	16.4	X2274 RF		1st Ringed DH 15.07.07
M	Sub-adult 1-3 yrs	NoT	55.0	17.1	X2295 RF		1st Ringed DH 08.07.07 RF 22.07.07 DH

* Large foetus present # Ring through wing membrane

- No bats were found to have any ring damage on wings or forearms apart from X2434
- RF = Re-find
- TG = Tapered finger joints, grey fur (i.e. a juvenile)
- KB = Knobbly finger joints, brown fur (i.e. > 1 year)
- NoT = No testes
- Ft = False teats
- No ft = No false teats
- Ftx1-2.5 = False teats number of times as long as they are wide (i.e. breeding female)
- RCO = Ring changed over (to other arm due to ring damage)
- TW = Tooth Wear
- NOF = No obvious foetus
- MA = Mature adult
- FP = Foetus present
- RR = Released in roost

3.2 Foraging

3.2.1 Foraging areas

The location and descriptions of the foraging areas used by the Greater Horseshoe bats from Dean Hall are given below and detailed on Maps 1-11 in Appendix. The numbering system used does not denote any particular significance in terms of the importance of an individual foraging area.

3.2.1.1 Map 1 – Littledean

Grid squares: 6714, 6413, 6613, 6612 & 6712

This area encompasses the area near to Dean Hall that is situated on the outskirts of Littledean, close to Cinderford. Orchards and gardens in Littledean village are situated close to the west of Dean Hall whilst cattle and horse grazed fields are immediately to the south and northeast. These fields, orchards and gardens all serve to provide a good network of high hedgerows and mature trees, which are interspersed with hedged tracks, bridleways and paths. A stonewalled lane (public highway) is also used as a flyway, leading away from Dean Hall.

3.2.1.2. Map 2 – Soudley

Grid squares: 6509, 6511, 6610, 6611, 6612 & 6712

Within clearings, along woodland edge and along watercourses within the Forest north and south of Soudley bats roamed widely not feeding on one location for more than a few minutes.

3.2.1.3. Map 3 - Bullocks Breach and Blakeney Hill Wood

Grid squares: 6409 & 6410

In the depth of the Forest either along streams or in the woodland. Again sites only used for short durations with bats roaming widely.

3.2.1.4. Map 4 – Blakeney

Grid square: 6607

A single foraging site along a hedge close to Ovillo roost (2) was found in a grazed field system with some large hedges close to the Forest, just used by bat 3.

3.2.1.5. Map 5 – Newnham

Grid squares: 6811, 6812, 6911 & 6912

Foraging areas along high hedges bordering mainly grazed pasture (and also minor road), along the railway and along tree lined watercourses.

3.2.1.6. Map 6 – Elton and Broadoak

Grid squares: 6813, 6913, 6914 & 7013

Foraging areas along a tree lined watercourse west of Broadoak and small field systems with high hedges at Elton.

3.2.1.7. Map 7 – Westbury on Severn

Grid square: 7113

A hedgerow on the bank of the River Severn south of Westbury on Severn.

3.2.1.8. Map 8 – Edge Hill
Grid squares: 6614, 6615, 6616 & 6715

Clearings in the forest at Edge Hill including close to a hibernation site used by part of the colony in winter.

3.2.1.9. Map 9 – Bullo
Grid squares: 6709, 6710 & 6809

Woodland edge and hedgerows including a bat recorded at eastern portal to Soudley disused railway tunnel, used by part of the colony as a hibernation site in winter.

3.2.1.10. Map10 – Denny Hill
Grid squares: 7416, 7516 & 7616

Hedgerow systems mainly bordering grazed pasture either side of the River Severn, including low lying ground with high water table on east side of the river.

3.2.1.11. Map 11 – Farleys End
Grid squares: 7515, 7615, 7616, 7714 & 7715

Hedgerow systems mainly bordering grazed pasture on east side of the River Severn, including low lying ground with high water table.

3.2.2. Foraging area usage
Bat 3 used the night roost at Blakeney, roaming widely in the forest and at Blakeney and Bullo.

Bats 9 and 10 visited the Denny Hill and Farleys End areas and the two night roosts there, passing via Newnham and Westbury on Severn.

Seven bats were recorded heading to the south roaming widely and rarely spending more than a few minutes in each place.

3.3 Flight corridors

Key flight corridors linking Dean Hall with foraging areas: south down past Soudley Ponds and into the forest south of Soudley; along the route of the minor road southeast from the roost to Newnham and along a bridleway east of the roost. The commuting routes away from Dean Hall confirm those identified by David Priddis and the Gloucestershire Bat Group in 1996.

Two crossing points over the River Severn were located at 755153 & 760164 (Maps 10 & 11) and two over the A48(T) road at 700132 & 759167 (Maps 6 & 10).

3.4 Daytime roost sites

Only day roost records of tagged bats were made at Dean Hall, though a day roost of a small number of Greater horseshoe bats was found at Ovillo by David Priddis (local batworker) when he carried out a follow up visit to a night roost site on 3rd August. 24 Lesser horseshoe and 2 Greater horseshoe (untagged) bats were found there, the owner reported up to 45 bats using building including a number of “large bats” (probably Greater horseshoe). Further details in 5.5 Night roost sites, below.

Table 4. Daytime roost records

Date	Bat numbers	Roost
1 June	1-10	Dean Hall
4 June	1-3, 5-10	Dean Hall
5 June	1, 4, 5, 7-9	Dean Hall
6 June	1-9	Dean Hall
7 June	1, 3-8	Dean Hall
8 June	1, 3, 6-8	Dean Hall

3.5 Night roost sites

Night roosts are temporary roosts, used between and during bouts of foraging for resting, feeding and socialising. They may be used as stopping off points to rest before the bats to continue to forage further from the day roost, or possibly interact with individuals from their own or from another day roost.

Three night roosts were identified during the study, two at Denny Hill and another at Blakeney this was found to be a day roost for both Greater horseshoe and Lesser horseshoe bats that had not been previously recorded.

Table 5. Night roosts

Site name	Date	Tagged bats recorded	Other bats	Min duration night roost used
Hooks Farm	7/6/08	9 & 10	Not inspected	34min
Ovillo*	3/6/08	No. 3	Not inspected	29min
	5/6/08	No. 3	Not inspected	7min
	#3/8/08	N/A	24 Lesser horseshoe & 2 Greater horseshoe	N/A
Nr Denny Hill	8/6/08	9 & 10	Not inspected	161min

* Day roost as well # Evening visit by David Priddis after tracking study completed

1. Hooks Farm, Lower Ley (see map 10)
NGR SO 749167
Collection of farm buildings, not entered so exact roosting site is unknown.

2. Ovillo cottage, Blakeney (see photo on next page and map 4)
NGR SO 6684 0721
Twin storey redundant cottage used as a workshop and for storage, slate roof probably has stonewalls.
Failed to make contact with owner during fieldwork despite several visits.
A day roost housing a colony of Lesser horseshoe bats and of small numbers of Greater horseshoe bats.
David Priddis subsequently made contact, the owner being very co-operative.

3. Modern farm building, near Denny Hill (see photo on next page and map 10)
NGR SO 7599 1665
Steel framed metal clad building not entered so exact roosting site is unknown.

Figure 2. Ovillo bat roost

Figure 3. Denny Hill night roost

3.6 Weather

Weather conditions at dusk, no pronounced changes occurred in the weather during any of the nights of study except for some low areas dropping to 5C on 6 June morning.

Table 6. Weather

Date		**Temperature (C)**	**Wind (Beaufort)**	**Rain (0-5)**	**Cloud (%)**
3 June	Dusk	13.9	2-3	0	70
	Dawn	8.3	0-1	0	20
4 June	Dusk	12.0	0	0	0
	Dawn	7.6	1	0	50
5 June	Dusk	10.8	0	0	5
	Dawn	*9.0	3-4	0	0
6 June	Dusk	9.5	0-1	0	10
	Dawn	11.4	3-4	0	0
7 June	Dusk	17	3-4	0	90
	Dawn	12.5	0	0	0

*5C temperature in some lowland areas

4. Discussion

4.1 Study aims and objectives

The study was successful in achieving and identifying the principal foraging areas and commuting routes used by Greater horseshoe bats roosting at Dean Hall during a 5 day period in June 2007. A total of 3 night roosts were identified, one is a previously unrecorded day roost.

4.2 Foraging distances

The foraging areas identified during this August study lay around the site: 3 km north, 5km south, 3km west and 10 km to the east (see maps 1-11).

Table 7. Foraging distances and foraging records

Maximum foraging radius from roost (km)		**Number of 1km squares with bat fixes**	
2007	2008	2007	2008
9	10	18	34

4.3 Primary foraging habitat

A total of 11 foraging areas were identified the three most important areas found during this study period were at Soudley - mainly in clearings/ woodland edge in Smeyd, Foundry, Wallsprings and Dry Woods north of Soudley; at Denny Hill; and Farleys End (hedgerows).

No other day roosts were recorded but up to 5 of the tagged bats (10-50%) were absent each day from Dean Hall. Radio tracked bats were recorded near at least two known underground hibernation sites and it is likely some bats day roosted in them. This year the bats came back to Dean Hall several weeks later than in other years, and gave birth about two weeks later than in 2007 (David Priddis pers. com.). This is believed to be a result mainly of poor weather/ lack of insects in early 2008.

The foraging habitat was found to be mainly of two types: along hedgerows next to grassland with mature trees, and copses, and in woodland (mainly in clearings and along woodland edges).

In August 2007 two bats were found to be foraging in larger areas of woodland, but all the rest were foraging mainly in fields, tracks, gardens, orchards, and along hedgerows and woodland edges.

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.

4.4 Flight corridors

Key flight corridors linking Dean Hall with foraging areas: south down past Soudley Ponds and into the forest south of Soudley; along the route of the minor road southeast from the roost to Newnham and along a bridleway east of the roost.

4.5 Roosts

Three night roosts were found by tracking, all of which were new records, one of these was found to be a Greater Horseshoe day roost by follow up examination (see map 4). Some bats did not leave the roost at all on some nights and others spent only a very short time away from the roost after dusk prior to returning, almost certainly as a result of the poor weather. The Bullo tunnel is known to be used as a hibernaculam at times by Greater horseshoe bats (David Priddis pers.com.).

5. Recommendations

5.1 Foraging areas and flight routes

The bats roamed widely during study rarely settling in any location for more than a few minutes, the only exception were the areas around Denny Hill and Farleys End. These areas are important during June, particularly with the likely lack of insects being widely available this year. Action should be taken to instigate Stewardship Management for bats in Denny Hill and Farleys End where it is not already in place. This should also be applied to other important areas found in the August 2007 study (Billington 2007) i.e. particularly Hinders Farm.

Bats accessed some of the foraging areas by crossing the A48 (T) road in two places, where it is a single carriageway, these places are unlit (or dimly lit).
If road improvement schemes were required on this road, in the section between Blakeney and Ministerworth, careful assessment would have to be made to avoid any impacts to this colony of bats. This would be particularly important if it was involving extra or different lighting, re-alignment, tree felling or similar improvement-schemes. The same recommendation would apply for the road crossing areas found in August 2007 on the A 4151, A4163 and the A 40, although these were less clearly identified.

It must be born in mind that it is very likely that the bats will be using different areas at other times of the year and in years with different weather patterns.
It is likely that the bats spread further north, west, east, and south than were recorded during the brief study, which was undertaken. This study can only be regarded as a snapshot of bat activity during the month of June when it was conducted.

5.2 Roosts

Hooks Farm should be visited and if access is given an attempt to locate the night roost should be made. There could be a day roost here as there as at Ovillo.

David Priddis local batworker has already secured long-term access to monitor Ovillo.

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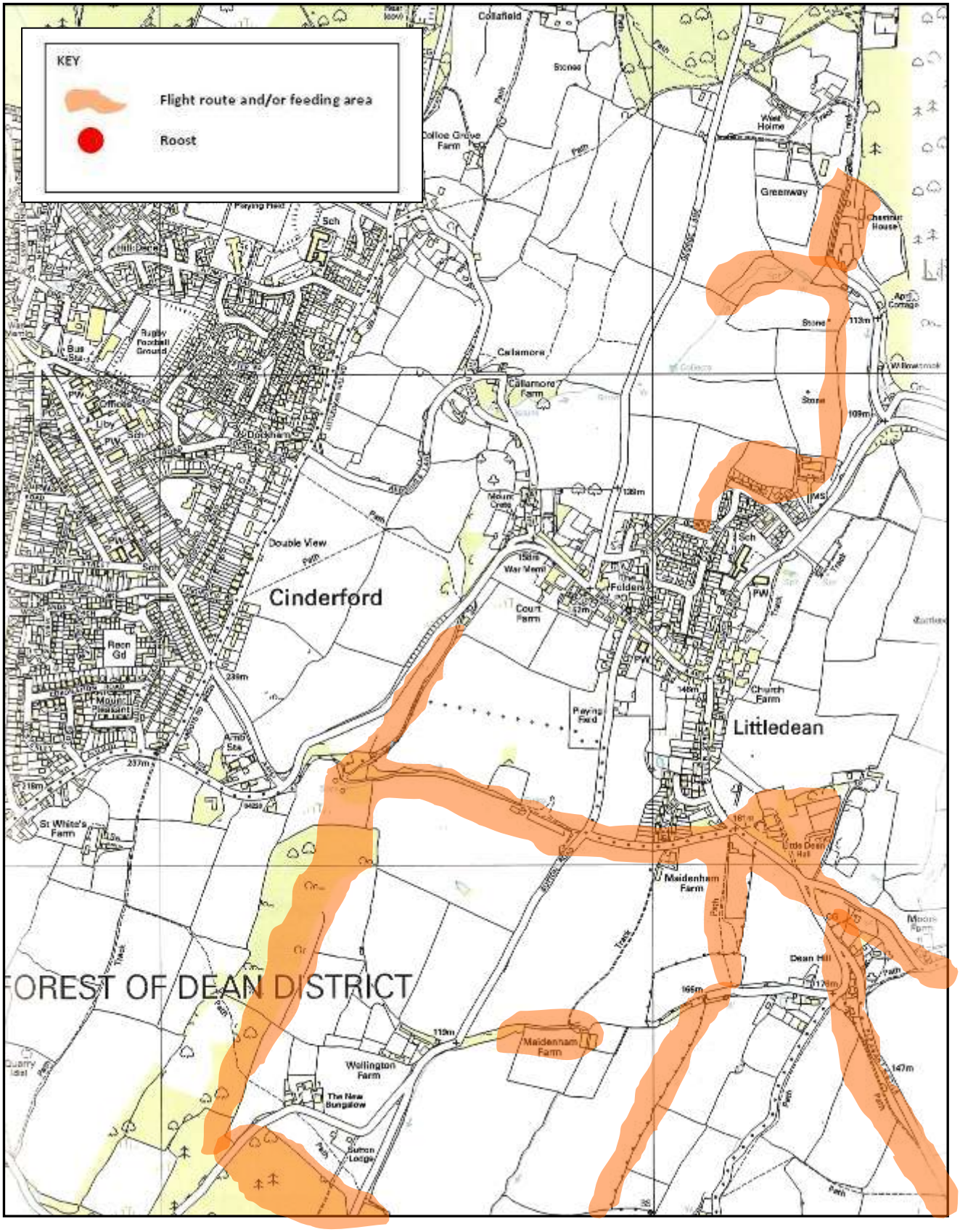
Appendix

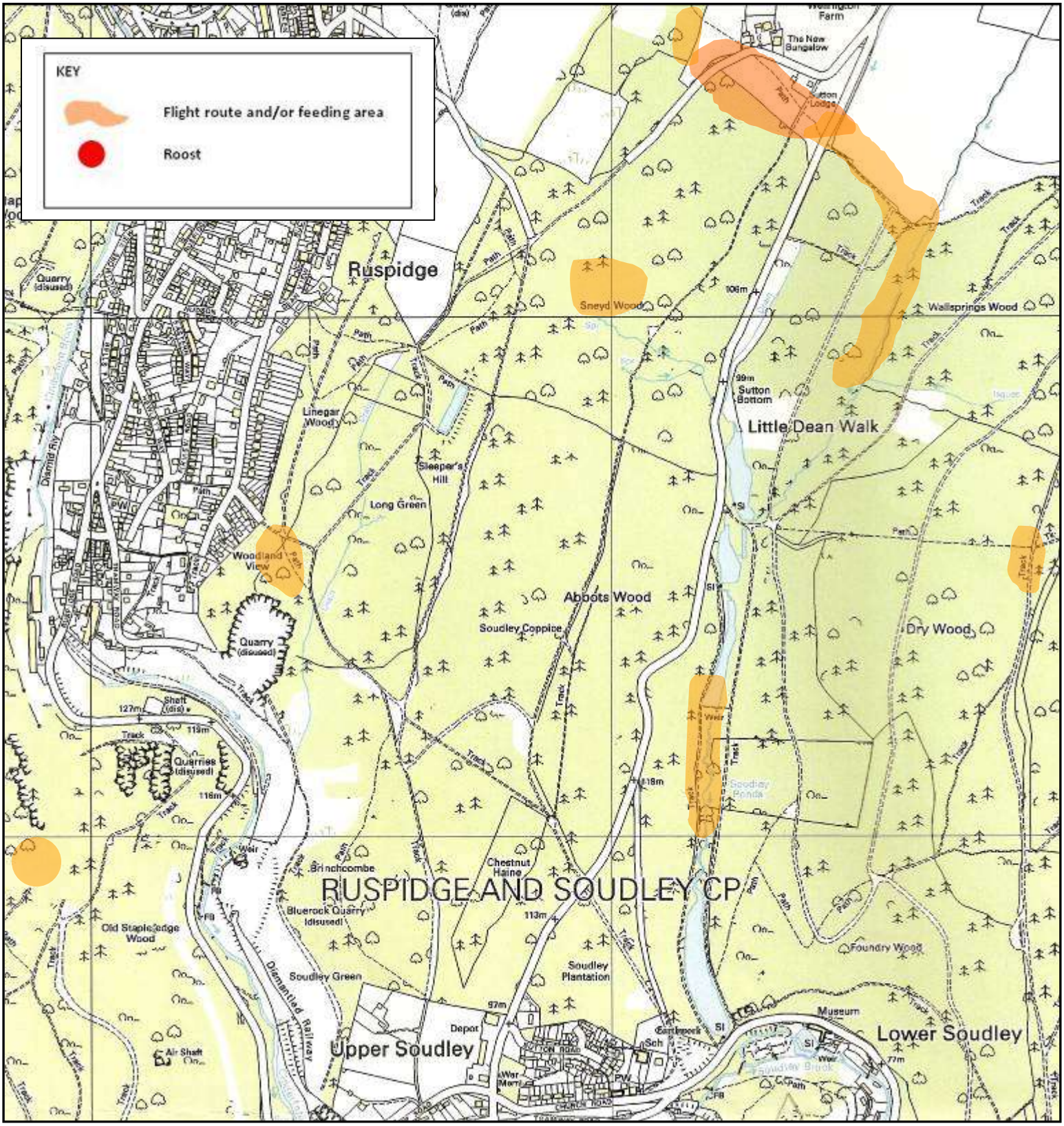
Maps 1-11 Foraging areas

Map 1	Littledean
Map 2	Soudley
Map 3	Bullocks Breach and Blakeney Hill
Map 4	Blakeney
Map 5	Newnham
Map 6	Elton and Broadoak
Map 7	Westbury on Severn
Map 8	Edge Hill
Map 9	Bullo
Map 10	Denny Hill
Map 11	Farleys End

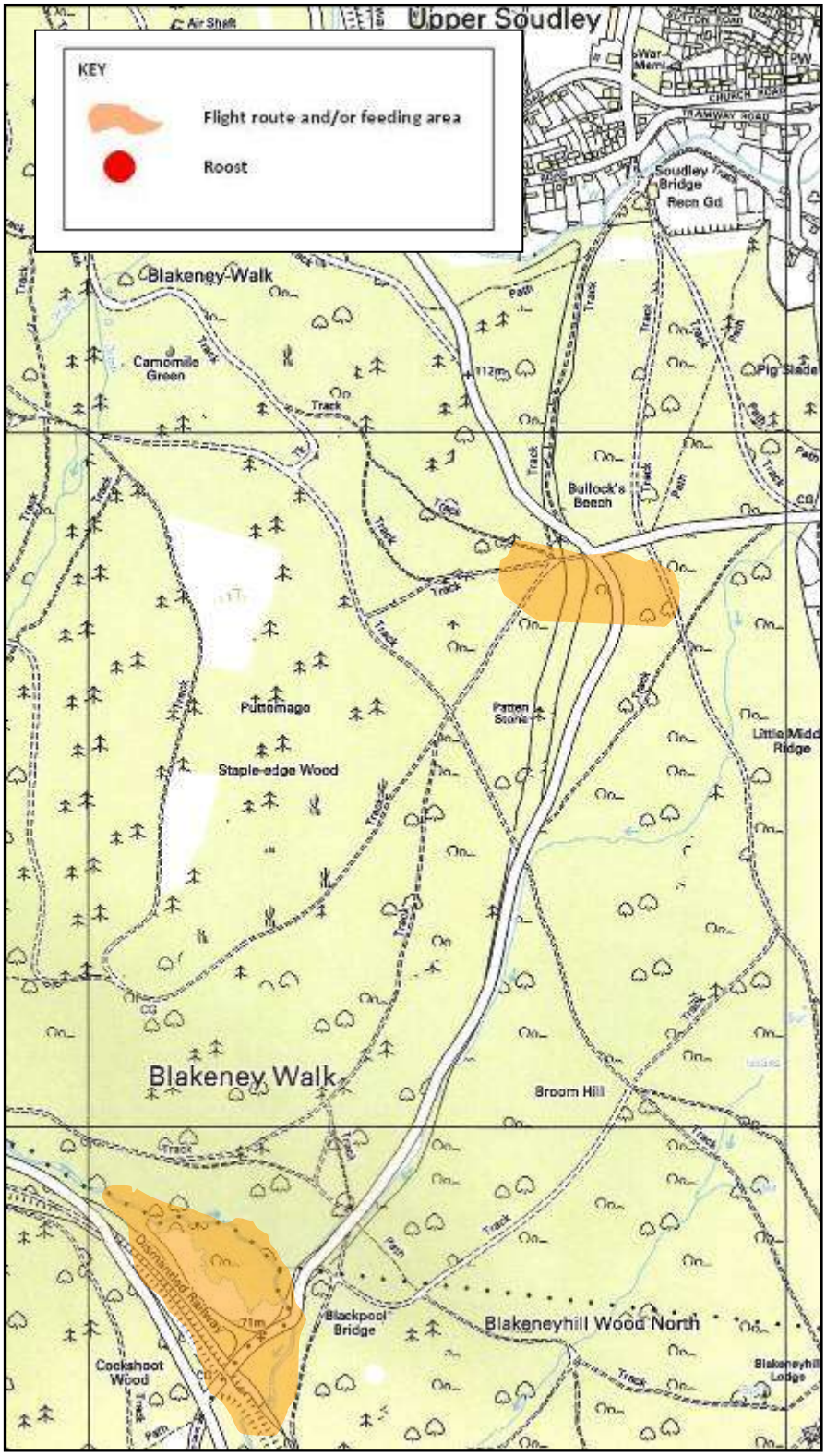
Map 1. Littledean



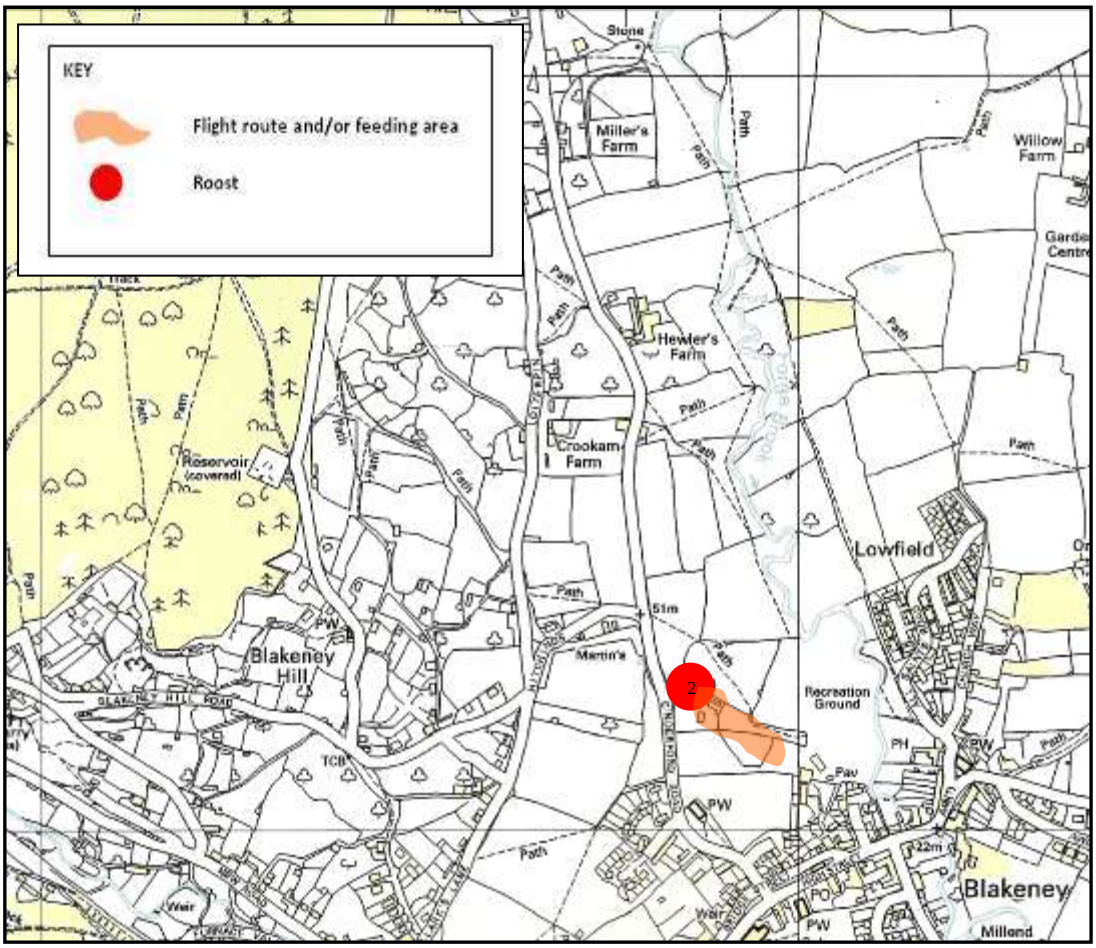
Map 2. Soudley



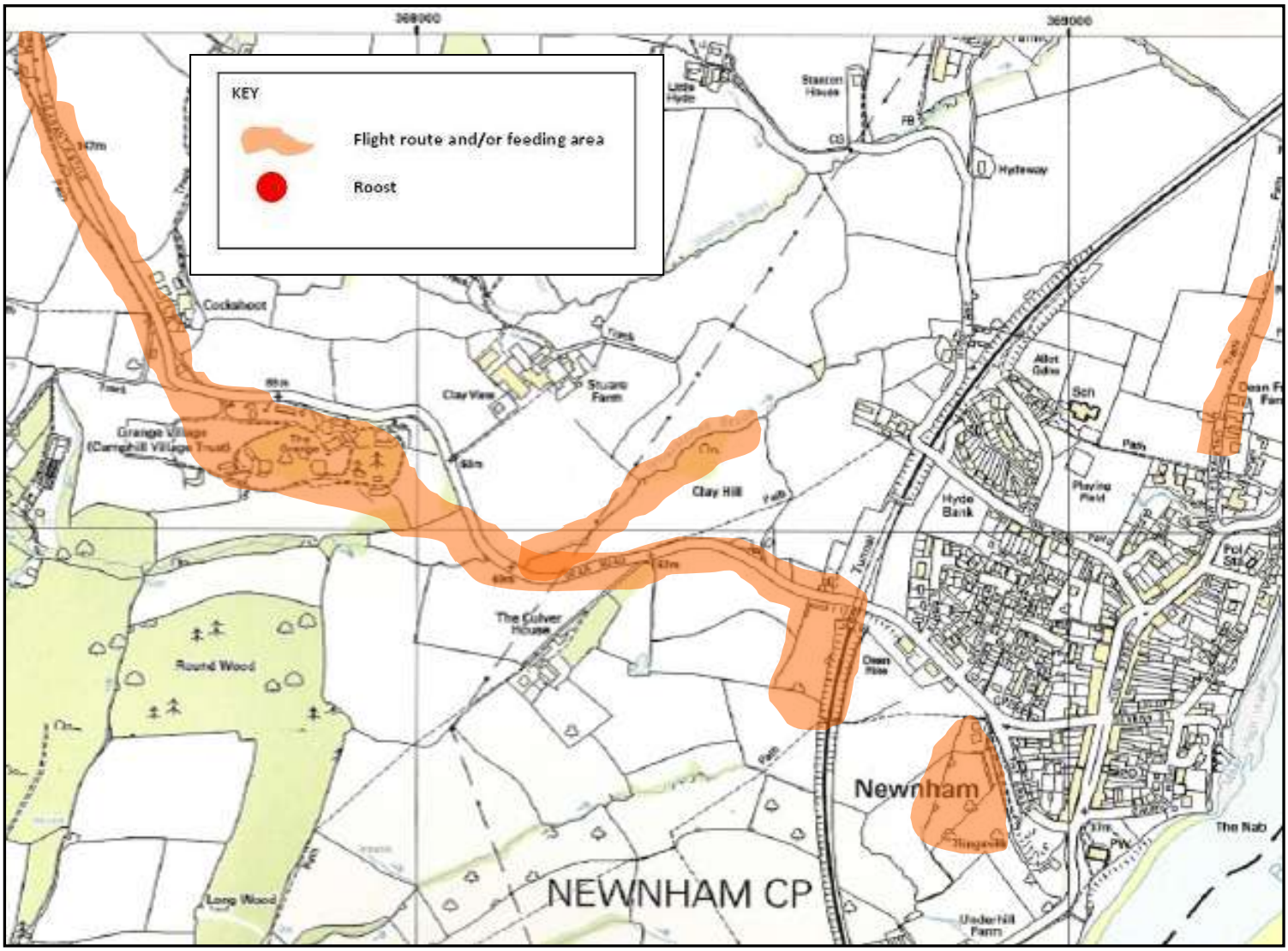
Map 3. Bullocks Breach and Blakeney Hill



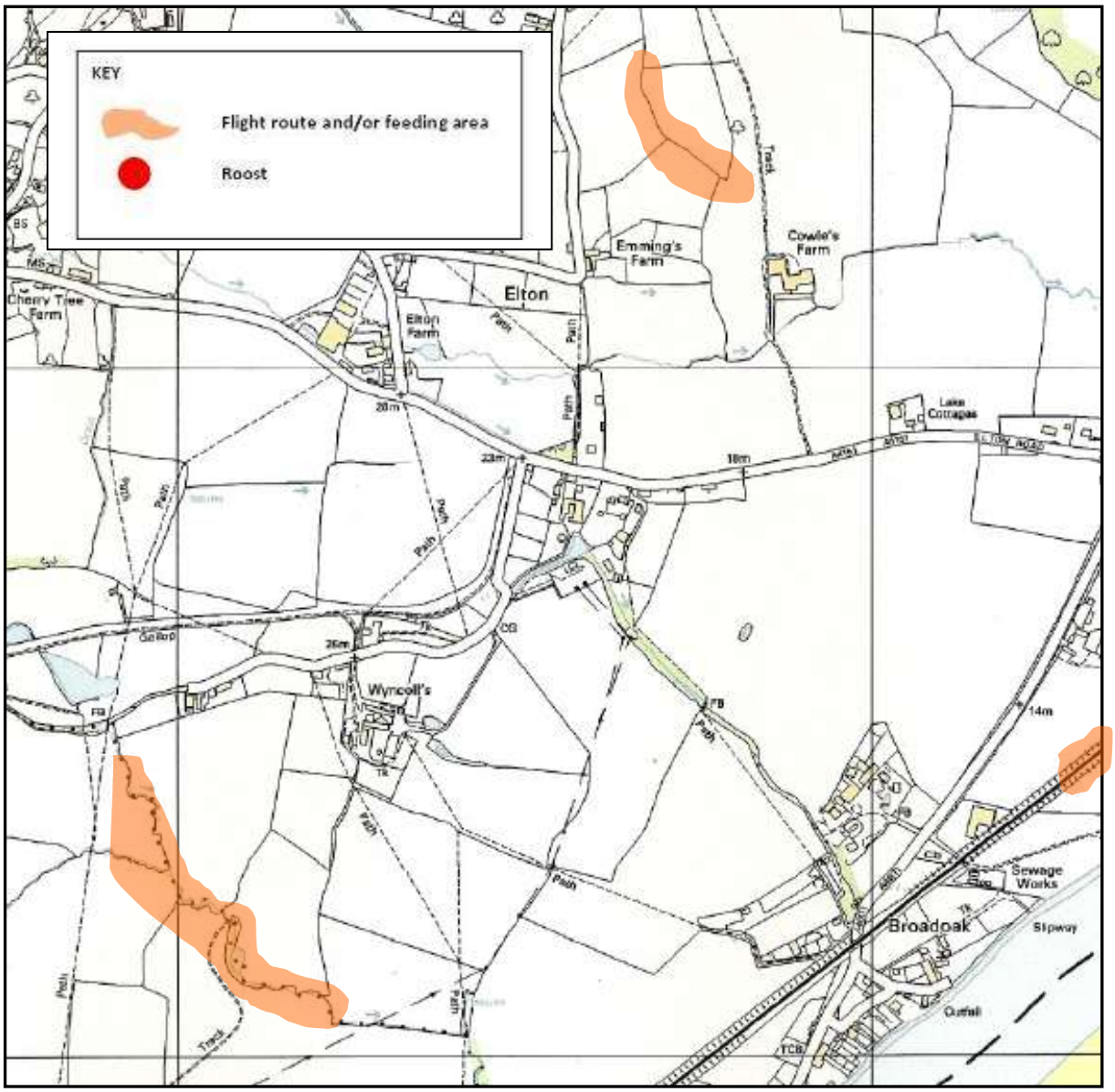
Map 4. Blakeney



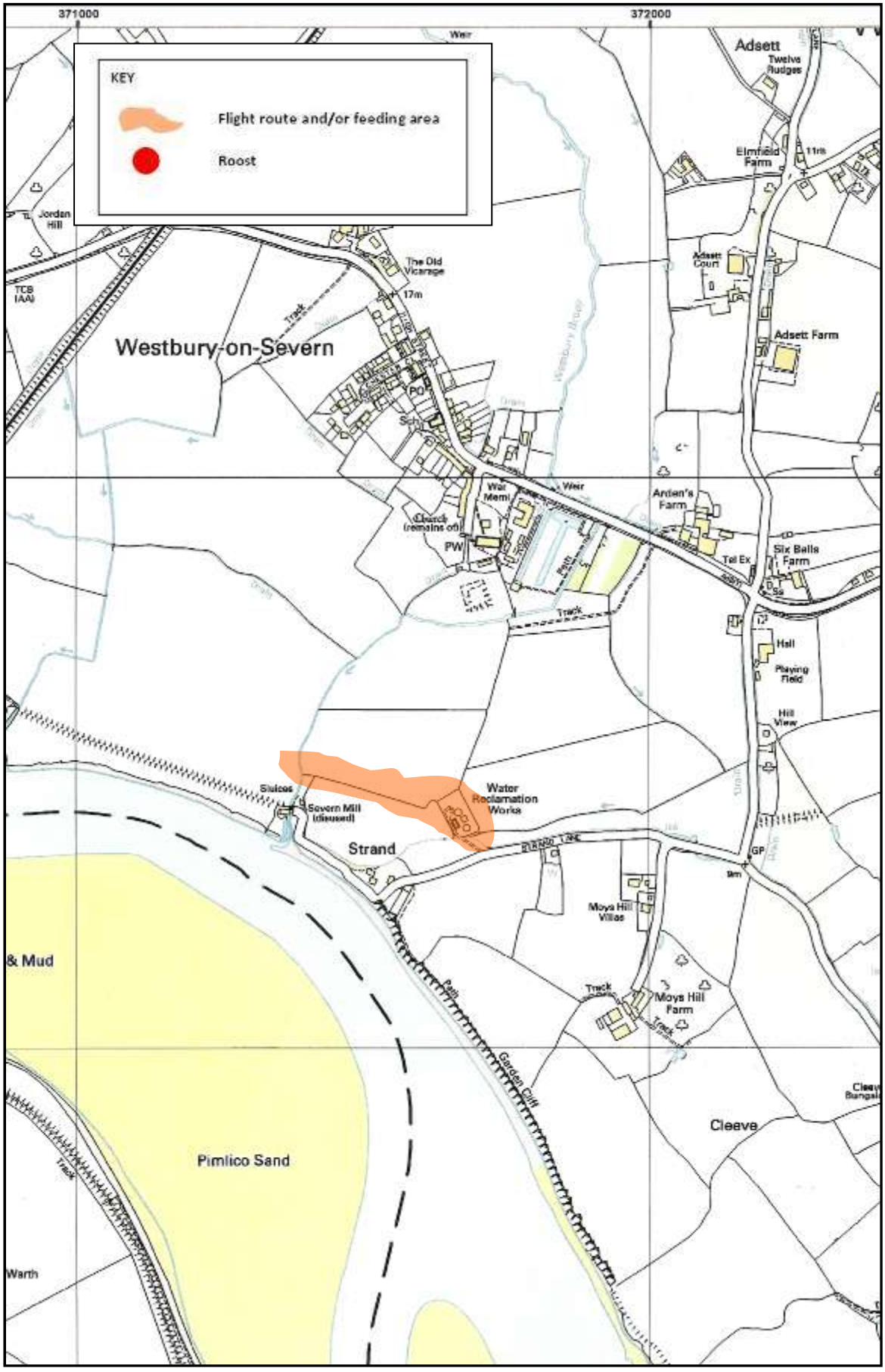
Map 5. Newnham



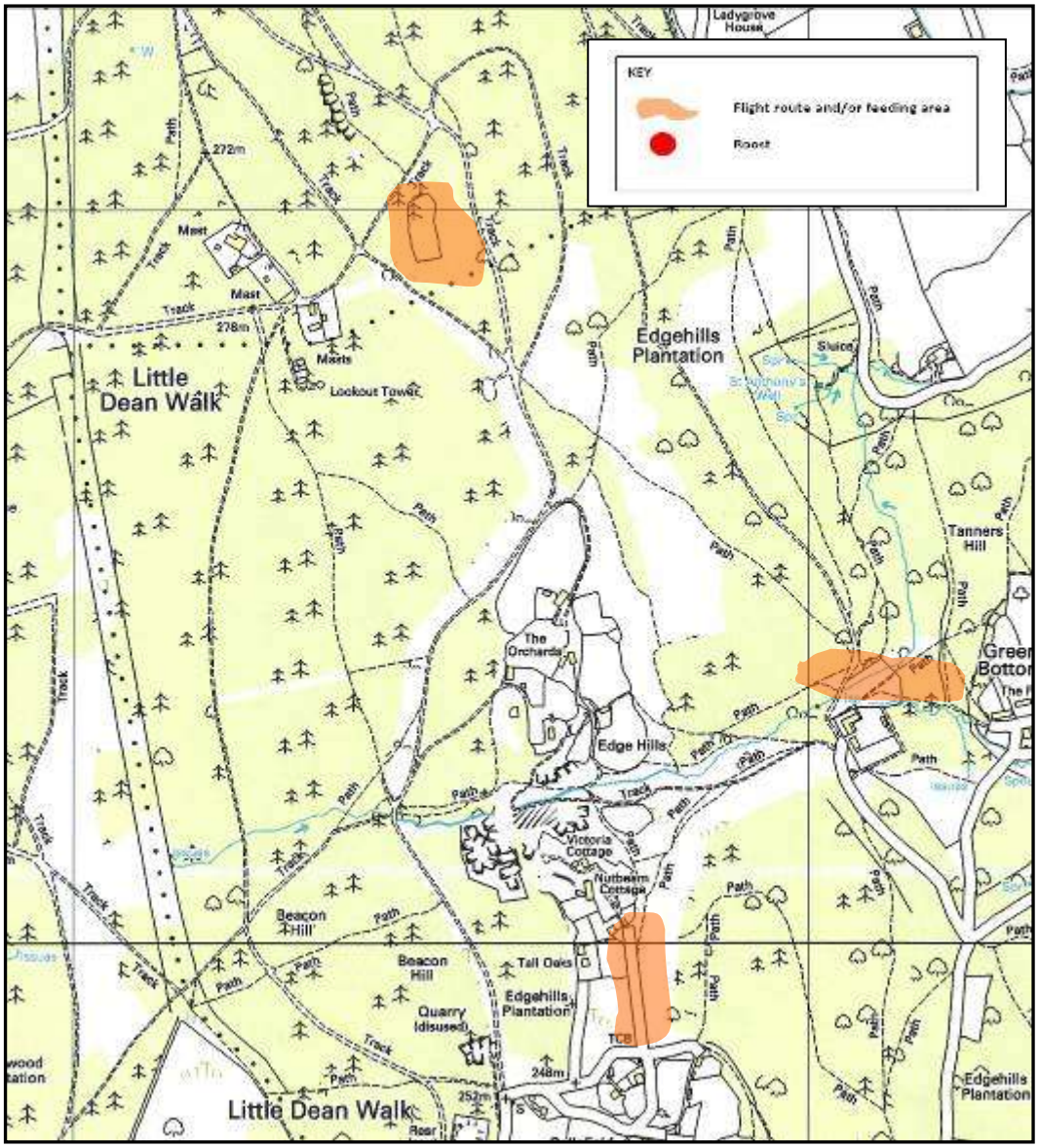
Map 6. Elton and Broadoak



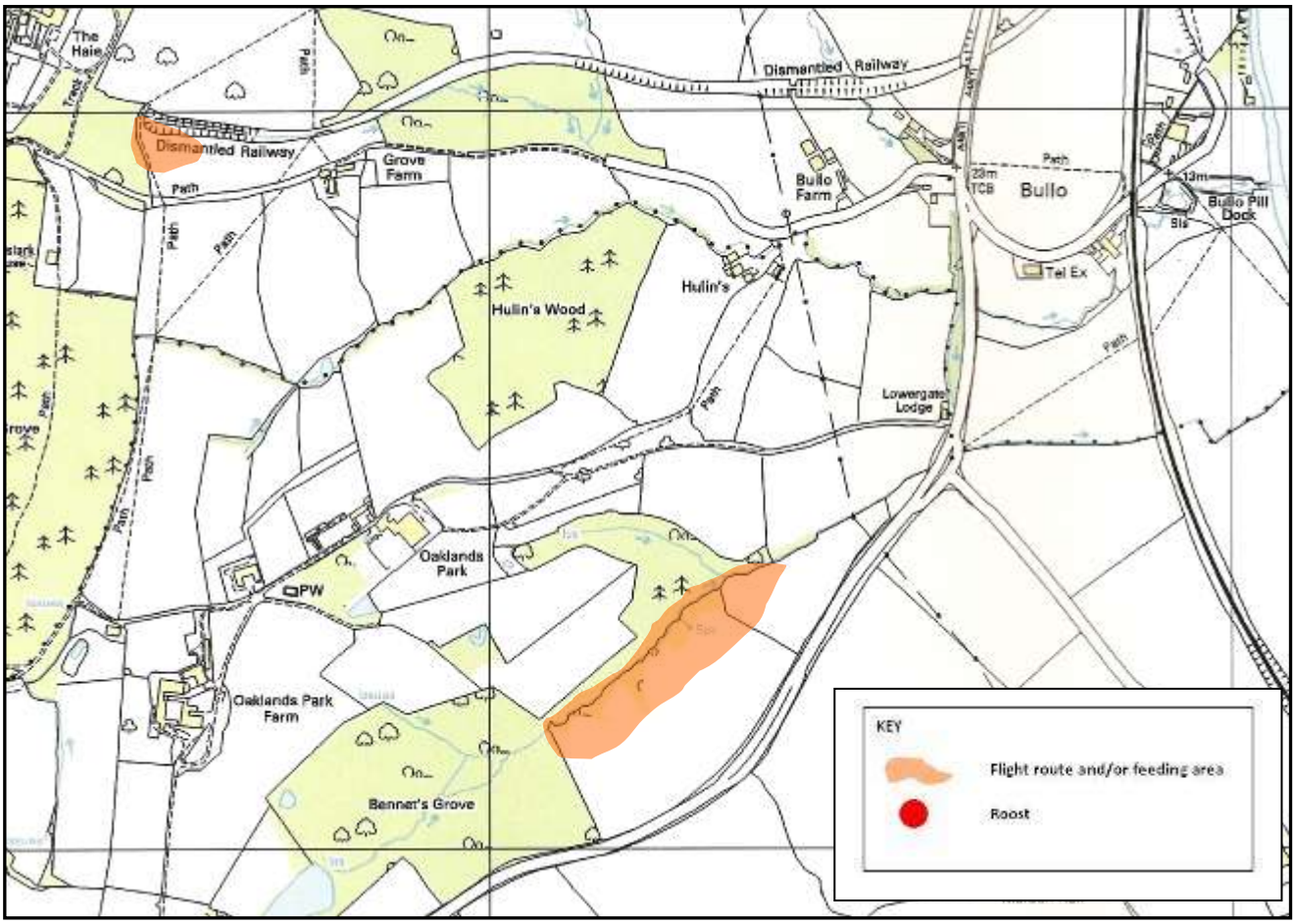
Map 7. Westbury on Severn



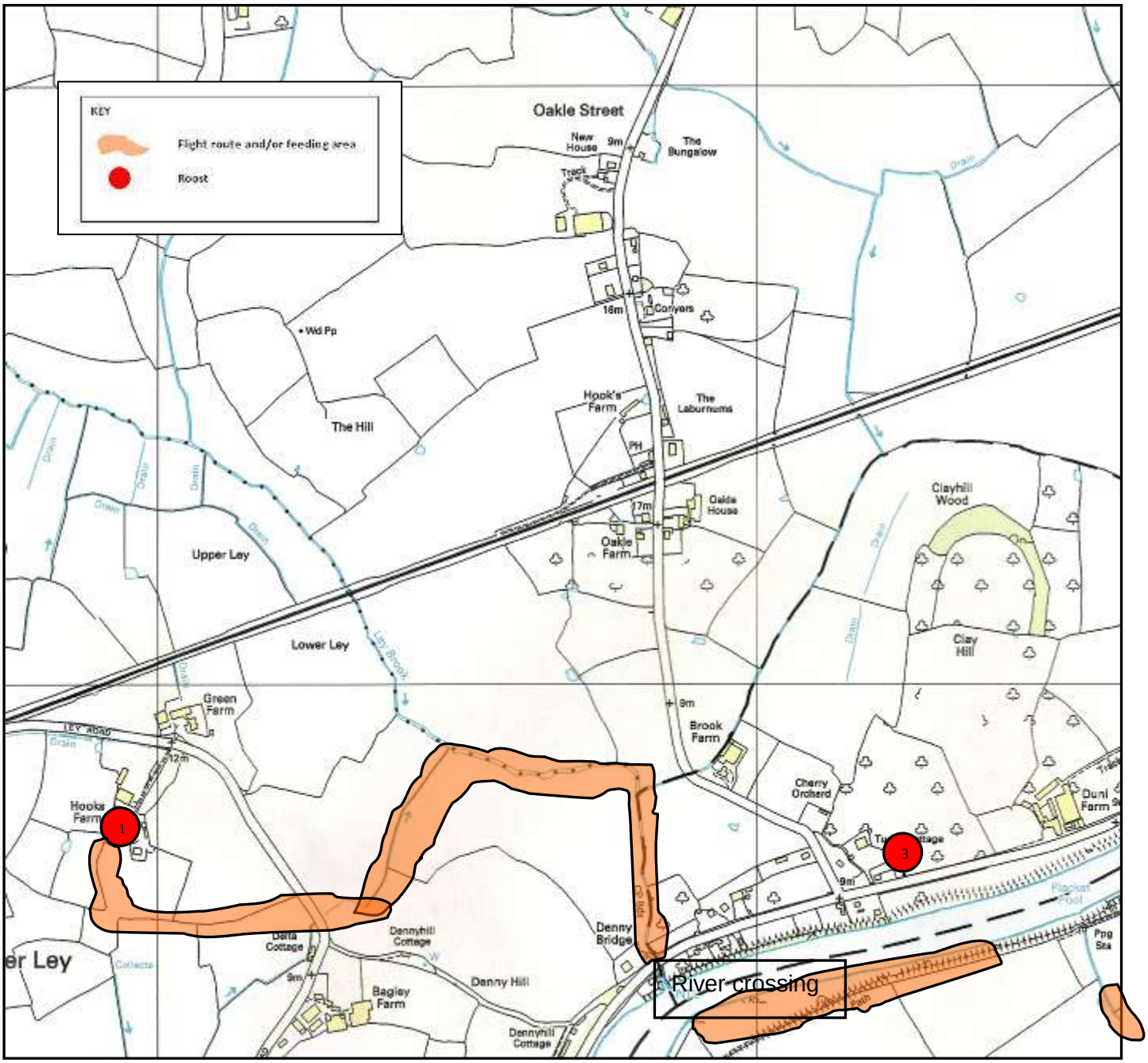
Map 8. Edge Hill



Map 9. Bullo


The Hale
Dismantled Railway
Grove Farm
Path
Bullo Farm
Bullo
Bullo Pill Dock
Tel Ex
Hulin's Wood
Hulin's
Lowergate Lodge
Oaklands Park
PW
Oaklands Park Farm
Bennet's Grove
KEY
Flight route and/or feeding area
Roost

Map 10. Denny Hill and Lower Ley



Map 11. Farleys End