
**HRA Screening Assessment
NA1 Houghton Barton
Development Framework Plan**

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Teignbridge District Council

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HRA Screening Assessment NA1 Houghton Barton, Newton Abbot Development Framework Plan

Prepared by Greenbridge Ltd and Teignbridge District Council

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Natural England has been consulted on the HRA Screening Report and their comments have been reflected in this final version.

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Summary

The following report provides a Habitat Regulations Screening Assessment for the NA1 Houghton Barton Development Framework Plan.

The Screening Assessment identifies the likely effects arising from the planning proposals for NA1 (e.g. their likely effect on the integrity of South Hams SAC in relation to greater horseshoe bats), and makes recommendations, where required, for appropriate mitigation measures (commensurate with levels of information and certainty available at the Plan Making stage of the planning process).

This Assessment has also considered possible 'in combination' effects with the development proposals for NA1 and proposals by Devon County Council to improve the A382, proposals to extend Stover Golf Course and with recent development of Hele Park.

On the basis that the proposed mitigation set out in Section 5 of this Assessment is adopted as part of the NA1 Development Framework Plan, and refined measures are subsequently secured through appropriate planning mechanisms at such time as individual planning applications are determined, then it is concluded that the development of NA1 (as proposed) will not have a 'likely significant effect' on the South Hams Special Area of Conservation.

This HRA Screening Report has been undertaken in the context of existing guidance published by Natural England (2010). Such guidance is updated periodically with a review of the existing Natural England guidance (currently being prepared by the SAC competent authorities) expected to be published for consultation in 2018. Further ecological surveys and HRA Screening which will be required as part of any relevant applications on the NA1 site will therefore need to have regard to the most up to date guidance available at the time an application is submitted. This will need to be accompanied by a Bespoke Mitigation Plan as required by Policy NA1 of the TDC Local Plan.

1. Introduction and Background

1.1 Introduction

- 1.1.1. The Draft NA1 Houghton Barton Development Framework Plan provides detailed and relevant planning guidance relating to the development of land that is allocated through Policy NA1 Houghton Barton of the Teignbridge Local Plan. It does not replace Policy NA1 Houghton Barton, which remains in force as part of the statutory adopted Teignbridge Local Plan 2013-2033.
- 1.1.2. This document has been commissioned by Teignbridge District Council (TDC). It provides a Habitat Regulations Assessment (HRA) Screening Assessment of the Draft NA1 Houghton Barton Development Framework Plan. As such, it has been carried out to meet the requirements of Regulation 102 of the Habitat and Species Regulations 2010. Local planning authorities may only adopt a plan after it has been ascertained through an HRA that the plan will not adversely affect the integrity of a European site (e.g. a Special Area of Conservation).
- 1.1.3. This screening assessment identifies the likely effects arising from those proposals (e.g. their likely effect on the integrity of South Hams SAC in relation to greater horseshoe bats), and makes recommendations, where required, for appropriate mitigation measures commensurate with levels of information and certainty available at this stage of the planning process.

1.2 Background

- 1.2.1. The NA1 Development Framework Plan, once approved, will set out how proposals for housing, employment land, green spaces and the required infrastructure at Houghton Barton should be planned, delivered and phased comprehensively and in a sustainable form across the allocation as required by Policy NA1. It will be a material consideration in determining planning applications, ensuring that the overall allocation requirements, particularly in relation to planning and delivery, can be met. However, it does not preclude alternative planning proposals being considered provided these are compliant with the policy requirements of the Local Plan and which help to deliver a comprehensive scheme for NA1 Houghton Barton.

1.3 Strategic Landscape Approach to Greater Horseshoe Bat Conservation

- 1.3.1. In undertaking a screening assessment of the NA1 Development Framework Plan, there has been a need to consider the conservation of a highly mobile species such as the greater horseshoe bat at the landscape scale. Consequently, screening of the area has considered how (i) the conservation status of the bats and (ii) the conservation objectives for the South Hams SAC can be applied practically at a strategic landscape level for NA1 and the surrounding area. To do this, in addition to the requirements for plan and project level Habitat Regulations Assessment (HRA), mitigation proposals have also been informed by other relevant statutory provisions.
- 1.3.2. For instance, Regulation 39 of *The Conservation of Habitats and Species Regulations (2010)* transposes the requirements of Article 10 of the EU Habitats Directive (1992) into English legislation. Regulation 39 requires development plan policies to include policies that encourage the management of features of the landscape which are of major importance for wild flora and fauna. Article 10 states:

“Member States shall endeavour, where they consider it necessary, in their land use planning and development policies and, in particular, with a view to improving the ecological coherence of The Natura 2000 network, to encourage the management of features of the landscape which are of major importance for wild fauna and flora. Such features are those which, by virtue of their linear and continuous structure (such as rivers with their banks or the traditional systems of marking field boundaries) or their

function as stepping stones (such as ponds or small woods), are essential for the migration, dispersal and genetic exchange of wild species”.

- 1.3.3. In response to the above, the broad principles set out in Box 1 should be applied to the formulation of all appropriate greater horseshoe bat mitigation proposals for NA1.

Box 1 Guiding Principles for Greater Horseshoe Mitigation Measures

- *Maintenance of dark and unlit habitat connectivity across the wider landscape;*
- *Provision of adequate foraging habitat;*
- *Provision, where appropriate, of adequate permeability through and between areas of built development following existing and new flight paths;*
- *Provision of new bespoke roosts where they will provide ‘stepping stones’ across the landscape as well as maintenance of existing roosts.*

- 1.3.4. The application of these principles are considered in more detail in Section 5 of this HRA Screening Assessment for NA1.

2. Methodology

2.1 Desk Study

- 2.1.1. A preliminary appraisal of habitat and landscape features in and around NA1 Houghton Barton was undertaken with reference to relevant Ordnance Survey maps and aerial photographs. These were used to identify key topographical features associated within the area as well as prominent habitat features capable of supporting greater horseshoe bats, such as hedgerows, woodlands, water courses and grazed pasture.
- 2.1.2. Where available, further information has been gathered from a selection of ecological surveys and reports that have been prepared over the last 1-3 years in support of various development proposals within the area to the north and east of Newton Abbot. Where available and in the public domain, other older records have also been referenced. Detailed reports that have included the results from bat surveys have been particularly useful and these have provided invaluable information on the occurrence and distribution of greater horseshoe bats in the landscape around NA1. Taken together, they present an overview of where and how greater horseshoe bats are using the wider landscape in the area.
- 2.1.3. A large part of the site was surveyed by Kestrel in 2016, the results and analysis of which are appended to this Screening Report in Appendix 1.
- 2.1.4. Phase 1 Habitat Surveys from October 2011 and November 2012 (carried out by EAD Ecological Consultants) have also been included in the desk top review.
- 2.1.5. Map 2 of this report presents a summary of the existing evidence and shows:
- the location of planning applications (shown by a red dot and application reference number) where greater horseshoe bats have been recorded;
 - flight lines recorded by various bat surveys (with the source coloured coded and identified in the map legend)..
 - greater horseshoe bat records provided by Devon Biodiversity Records Centre (DBRC) and linked to these records.

- 2.1.6. Aerial photo 1 shows aerial photography of the site, identifying key topographical and prominent habitat features likely to be used by GHBs. These are described in Section 5.
- 2.1.7. Aerial Photo 2 shows greater horseshoe bat activity recorded within NA1 by Kestrel Wildlife Ltd as part of work undertaken for Devon County Council during 2015 and 2016.

2.2 Site Visits

- 2.2.1. The following report was informed by walk over surveys undertaken in the NA1 area during January 2016 by M. Oxford (FCIEEM, CEcol) and Laurent Duverge (MIEEM) of Kestrel Wildlife Ltd. Access for these visits was obtained from public rights of way or from views obtained from adjacent roads. Also, where necessary, access was gained under Teignbridge District Council's powers under Section 324 of the Town and Country Planning Act 1990, whereby a local planning authority may authorise a person to enter any land for the purpose of surveying it in connection with the preparation, adoption or approval of a local development document.
- 2.2.2. The purpose of the walkover surveys was to ground-truth topographic and habitat features identified through the desk studies and, in particular, to identify GHB commuting habitat features within the landscape that are capable of supporting commuting greater horseshoe bats. Once identified, and in conjunction with the results from existing field surveys, these features were used to establish likely commuting routes within and around NA1.
- 2.2.3. Walkover surveys do not in themselves provide a fully robust evidence base for reaching conclusions as to the use, or suitability, of the site for GHBs. However, done in conjunction with the desk top review of topographical data, aerial photographs and existing ecological survey data, the walkover surveys can enable reasonable assumptions to be made as to the network of commuting habitat features in and around the site. This level of survey and analysis is considered commensurate with this stage of the plan making process and further HRA screening supported by full and up to date survey data will be required once full details and information are available at the planning application stage.

3.0 Structure of This Screening Assessment

- 3.1 A Screening Assessment is presented in Section 5 below for NA1. The assessment is based on the desk studies, bat surveys and walk over surveys described in Section 2 above. The assessment provides information on the following:
 - a. The South Hams Special Area of Conservation (SAC) and greater horseshoe bats;
 - b. Key physical characteristics of the NA1 area;
 - c. Whether future development of the site has the potential to impact the integrity of the South Hams SAC;
 - d. Whether it is likely that potential impacts will require Habitat Regulations Assessment (HRA);
 - e. Whether it is likely that likely impacts can be mitigated effectively.
- 3.2 In addition, this assessment also considers the potential for 'in combination' effects with other development proposals that may interact adversely with the proposals for NA1.

4. The South Hams SAC and Greater Horseshoe Bats

4.1 Composition and Importance of the South Hams SAC in a European Context

- 4.1.1 The South Hams SAC has been designated for its population of greater horseshoe bats. This species is identified as an Annex II species in the Habitats Directive (1992) because it is one of the rarest/most threatened animals in Europe.
- 4.1.2 The SAC holds the largest population of greater horseshoe bat in the UK, with over 1,000 adult bats (approximately 30% of the UK population). It includes both maternity and hibernation roosts, and contains the largest known maternity roost in the UK and possibly in Europe.
- 4.1.3 The SAC comprises five Sites of Special Scientific Interest (SSSIs) spread across South Devon (see Table 1). Map 1 shows the location of the five sites that make up the South Hams SAC as well as the SSSI at High Marks Barn.

Table 1 Component Parts of the South Hams SAC (see also Map 1)

Site Name and Relevant LPA	Description and Reasons for Notification as a SSSI	Maternity	Hibernation
Berry Head to Sharkham Point SSSI and NNR <i>Torbay Council</i>	Roost in caves on sea cliffs	✓	✓
Buckfastleigh Caves SSSI <i>Dartmoor National Park Authority</i> <i>Teignbridge District Council</i> <i>Devon County Council</i>	Roosts in inland cave complex	✓	✓
Bulkamore Iron Mine SSSI <i>South Hams District Council</i> <i>Devon County Council</i>	Roost in large disused mine		✓
Chudleigh Caves and Woods SSSI <i>Teignbridge District Council</i> <i>Devon County Council</i>	Roosts in inland cave complex.	✓	✓
Haytor and Smallacombe Iron Mines SSSI <i>Dartmoor National Park Authority</i> <i>Devon County Council</i>	Roosts in disused mines		✓

- 4.1.4 A sixth site has recently (2012) been designated as an SSSI as an important greater horseshoe maternity roost, although it is currently not a formal part of the designated SAC.

High Marks Barn SSSI <i>South Hams District Council</i> <i>Devon County Council</i>	Large agricultural barn	✓	
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- 4.1.5 Between them, these six sites support a large proportion of the total greater horseshoe bat population across South Devon; and while the High Marks Barn has not been designated as a SAC, the colony here is an integral part of the overall SAC population and must therefore be included as a consideration in any and all relevant Habitat Regulations Assessments.
- 4.1.6 The designated roost sites have been identified on the basis of their relative importance for hibernation during winter, and/or also summer roosts where whole colonies gather together and where females give birth and rear their young.

NOTE Buckfastleigh and High Marks Barn are secure sites, owned and managed for the benefit of greater horseshoe bats by The Vincent Wildlife Trust.

- 4.1.7 In addition to the importance of the SAC roosts, greater horseshoe bats are dependent upon the wider countryside of South Devon for the majority of their activities, including commuting, foraging, roosting, mating and seasonal migration (see Map 1).

4.2 Greater Horseshoe Bats: Ecology, Behaviour and Use of the South Devon Landscape

- 4.2.1 The greater horseshoe bat is one of Britain's largest and rarest bats, with a total UK population of about 5500 individuals. It should be noted that their population is not confined to the SAC sites and they are able to travel relatively large distances across the landscape and have large foraging territories.
- 4.2.2 Greater horseshoe bats are long-lived (in excess of 30 years) with the bats remaining faithful to these important roosting sites, returning year after year for generations (Natural England 2010). They feed primarily in and around woodlands, hedges and grazed pasture, especially cattle-grazed pasture. Any loss or degradation to such areas can have an impact, especially in areas close to the maternity roosts, where the juvenile bats feed. For instance conversion of pasture to amenity grassland would remove the key food source for GHBs of dung-feeding insects'. Also, the bats follow a network of 'traditional' flyways between roost sites and feeding areas and are susceptible to breaks in or removal of the features along which they commute.

4.3 Sustenance Zones

- 4.3.1 The *Sustenance Zones* (shown on Map 1) are considered to be of strategic importance for maintaining the population of greater horseshoe bats across the South Hams SAC. These zones are based on the original work undertaken to produce Natural England's Guidance (2010) and have been identified using the best available scientific knowledge¹.
- 4.3.2 For maternity roosts, the Sustenance Zones have generally been mapped using a 4km radius circle centred on each of the component SACs; as such they reflect the strategic importance of the feeding habitat around these roosts². However, the roost at Berry Head is situated on a peninsula surrounded on three sides by the sea, so the sustenance zone here has an area approximately equal to a 4km radius circle). In addition to the Sustenance Zones around the SAC roosts, because of the number of bats it supports, a 4km radius sustenance area has been identified around the non-SAC roost at High Marks Barn SSSI in the Avon valley (see Map 1).

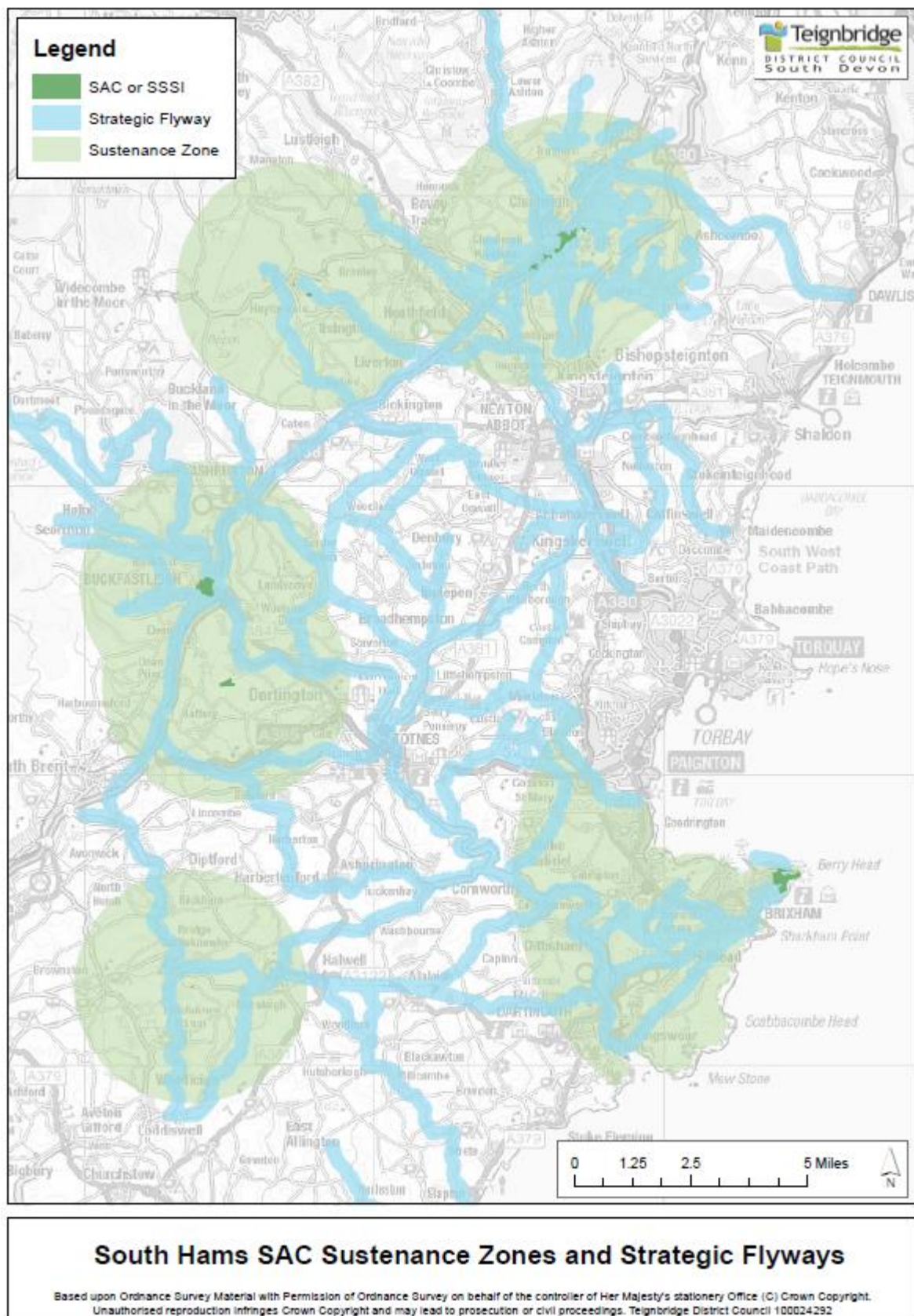
4.4 Strategic Flyways

- 4.4.1 Natural England (2010) have identified the *Strategic Flyways* (shown on Map 1) that are most likely to link the key (SAC) roosts and foraging habitats with the contiguous landscape features most likely to be used by greater horseshoe bats.
- 4.4.2 The *Flyways* identified are closely associated with the main rivers and sheltered valleys of South Devon. They have been identified as being 500 metres wide to offer several pathways

¹ Natural England based their 2010 guidance upon a consolidation of relevant greater horseshoe bat research and information drawn together over the previous year by Marquis & Lord Consultants. The knowledge gained through that project represents the best understanding, to date, of the dispersal patterns and key habitats of greater horseshoe bats across South Devon. In addition, based on the known distribution of greater horseshoe bats, Marquis & Lord collated spatial information to create a GIS layer that was used to inform the preparation of Map 1.

² Ransome RD and Hutson AM (2000) *Action plan for the conservation of the greater horseshoe in Europe (Rhinolophus ferrumequinum)*, Convention on the Conservation of European Wildlife and Natural Habitats, Nature and Environment No 109. <http://www.swild.ch/Rhinolophus/PlanII.pdf>
Also see EN research reports R174 R241 R341 & R532

Map 1 South Ham SAC, Sustenance Zones and Strategic Flyways



and provide alternative routes to accommodate variance in the weather; for example, greater horseshoe bats will prefer to travel on the leeward side of a hedgerow when conditions are adversely windy.

4.4.3 NA1 falls outside of the defined SZs and SFs. However, because of the scale of development proposed, it has the potential to affect commuting routes through the wider landscape. It is therefore necessary to screen the SPD in order to ensure that key connectivity can be maintained.

4.4.4 While the network of flyways shown on Map 1 is a current '*best estimate*' for likely routes through the landscape, other equally important routes may be identified in the course of further survey work in the future. The SAC Competent Authorities (Devon County Council, Dartmoor National Park, South Hams District Council, Teignbridge District Council and Torbay Council) and Natural England are currently in the process of updating the guidance relating to the management of the SAC and, in particular, the network of Strategic Flyways. This HRA screening has been based on the published 2010 Guidance³ but any relevant future planning applications submitted should ensure they have regard to the most up to date guidance available at the time.

4.5 Features Required to Maintain the Integrity of the SAC

4.5.1 Under Regulation 61 of the *Habitat and Species Regulations* (2010) planning authorities⁴ in South Devon cannot lawfully grant planning permission, nor under Regulation 102 can they allocate proposals in their Local Plans, unless they have established that such development proposals are not likely to have a significant adverse effect upon the integrity of the South Hams SAC. The integrity of a European site can be defined⁵ as:

“the coherence of its ecological structure and function, across its whole area, which enables it to sustain the habitat, complex of habitats and/or the levels of populations of the species for which it was classified”.

4.5.2 In practical terms, this means understanding the specific requirements necessary to maintain the SAC's integrity and with it the population of greater horseshoe bats at a '*favourable conservation status*' (see Section 4.3). To achieve this, Natural England (2010) state:

- i. The area has to be large enough to provide a range of food sources capable of supporting the whole bat population; the bats feed at a number of locations through the night and will select different feeding areas through the year linked to the seasonal availability of their insect prey.
- ii. The bats regularly travel through South Devon between their feeding sites and roosts via a network of established flyways. They also travel greater distances between the sites designated as the South Hams SAC at certain times of the year, for example: in the spring and autumn between hibernacula and maternity sites, and in the autumn to mating sites.
- iii. To move between their roosts and foraging areas, the bats require linear features in the landscape to provide landscape permeability. Compared to most other bat species, the echolocation call of the greater horseshoe bat diminishes (attenuates) rapidly in air due to its relatively high frequency. This means it cannot 'see' a great distance and is one reason why it tends to use landscape features to navigate, such as lines of vegetation (e.g.

³ <http://www.devon.gov.uk/core-doc-y1-greater-horseshoes-bat-consultation-zone-planning-guidance.pdf>

⁴ The competent authority is most likely to be the planning authority for planning applications, but for other types of consent may be another regulatory body (e.g. the Environment Agency) or infrastructure provider (such as the Highways Authority).

⁵ See Chartered Institute of Ecology and Environment <http://www.cieem.net/glossary>

hedgerows, woodland edge, vegetated watercourses etc). The greater horseshoe bat will tend to fly close to the ground (up to a height of 2m), and mostly beneath vegetation cover. Radio tracking studies⁶ and observations in the field confirm that greater horseshoe bats will regularly use the interconnected flyways associated with lines of vegetation. Further studies⁷ have shown that landscapes with broadleaved woodland and watercourses are important as they provide habitat continuity.

- iv. This species is sensitive to light and will avoid lit areas⁸. The interruption of a flyway by light disturbance, as with physical removal/ obstruction, would force greater horseshoes to find an alternative route which is likely to incur an additional energetic burden and will therefore be a threat to the viability of the bat colony. In some circumstances, alternatives will not be available, leading to isolation and fragmentation of the bat population from key foraging areas and/or roosts.
- v. There must be a sufficient number and range of different types of roosts throughout the landscape to support the population through all stages of the bats' daily and seasonal life cycle.
- vi. Roost exits must be shielded from any artificial lighting, and suitable cover should be present to provide darkened flyways to assist safe access to and from the wider habitat⁹.
- vii. The feeding and foraging requirements of this species have been well studied in Devon and in the UK¹⁰. Most feeding activity is concentrated in an area within 4km of the roost (juvenile bats will forage within 3km at a stage in their life when they are most susceptible to mortality). The most important types of habitat for feeding have been shown to be permanent pasture grazed by cattle, broad-leaved woodland, hay meadows and wetland features such as stream-lines and wet woodland. Pastures and meadows are particularly well used where they are surrounded by well-developed field boundaries.
- viii. Depending upon the availability of suitable flyways and feeding opportunities, most urban areas will provide limited greater horseshoe bat habitat. This is particularly true of dense urban areas with a high incidence of night lighting and lack of unlit green spaces.

4.6 Subsidiary Roosts

- 4.6.1 GHBs from the designated roosts will also use a complex range of subsidiary roosts throughout the year for feeding, mating, swarming, resting and, potentially, hibernating. Impacts on such roosts are principally dealt with by Natural England licensing procedures. However, there may be instances where a subsidiary roost, because of its size or location, is critical to the integrity of the SAC population. If such roosts are identified through further detailed survey work undertaken for the purposes of the planning application, appropriate mitigation will need to be secured to ensure that they, and their supporting habitats, are protected.

⁶ Radio tracking studies of greater horseshoe bats have been commissioned by Natural England as described in the following research reports R344, R496 & R573.

⁷ A L Walsh & S Harris, (1996), Foraging habitat preferences of vespertilionid bats in Britain. *Journal of Applied Ecology*, 33, 508–518.

⁸ <http://www.batsandlighting.co.uk>

⁹ See English Nature research report R174

¹⁰ R D Ransome and A M Hutson, (2000), Action plan for the conservation of the greater horseshoe in Europe (*Rhinolophus ferrumequinum*), Convention on the Conservation of European Wildlife and Natural Habitats, Nature and Environment No 109. <http://www.swild.ch/Rhinolophus/PlanII.pdf>
Also see EN research reports R174 R241 R341 & R532.

4.7 Changes in the Landscape and Potential Impacts on Site Integrity

4.7.1 Taking the above requirements into account, greater horseshoe bats are particularly susceptible to the following changes in their habitat that may arise as a result of development:

- Impact on roost sites (including damage, destruction, disturbance and prevention of access);
- Removal, severance, obstruction or disturbance of linear features used for navigation and commuting;
- Change in habitat structure and composition (e.g. loss or change in quality, quantity and distribution of foraging habitat);
- Disturbance from new illumination causing bats to change their use of an area;
- Physical injury by wind turbines and / or displacement from foraging or commuting habitat by wind turbines
- Barrier effects across the landscape caused by new roads and increased risk of collision between bats and vehicles.

4.7.2 These effects are likely to be most significant in the *Strategic Flyways* and *Sustenance Zones* (see Map 1)¹¹.

4.7.3 While there are odd exceptions, greater horseshoe bats are extremely sensitive to increased light levels and will typically avoid areas where the lighting is brighter than 'moonlight' (typically recorded as being between 0.27 and 1lux)¹². Thus house lights, road lights, vehicle lights, security lighting and floodlighting may all have an adverse effect. For instance, one poorly positioned light can stop bats using a crucial flyway or an area of feeding habitat. Unusual levels and pitches of noise can also cause disturbance.

¹¹ Based on original guidance from Natural England (2010).

¹² Schlyter, Paul (1997–2009). Radiometry and photometry in astronomy. Archived from the original on 2013-12-07 and

Bunning, Erwin; Moser, Ilse (April 1969). Interference of moonlight with the photoperiodic measurement of time by plants, and their adaptive reactive. *Proceedings of the National Academy of Sciences of the United States of America* **62** (4): 1018–1022.

5. HRA Screening Assessment

5.1 Key Characteristics of NA1 Houghton Barton and Use by Greater Horseshoe Bats

- 5.1.1. The Houghton Barton area is currently characterised by gently rolling open countryside to the north of Newton Abbot.
- 5.1.2. The highest point is around the former Seale-Hayne Agricultural College (now a centre for the Dame Hannah Rogers Charity) towards the north-western corner of NA1. From here the land drops generally in the direction of Newton Abbot to the south (see Aerial Photo 1).
- 5.1.3. NA1 lies between the A382 to the east and the A383 to the south-west. A large mineral working and associated settlement lagoons lie to the south-east of Houghton Barton and separate it from the Local Plan allocation NA2 at Whitehill.
- 5.1.4. NA1 and NA2 are, in the main, linked by open countryside containing pastures and mature hedgerows around the prominent hill known as Darracombe Beacon (see Maps 2 and 3). These latter features provide near-optimal foraging and commuting habitat for greater horseshoe bats and provide strong habitat connectivity across the landscape between the two allocations.
- 5.1.5. NA1 does not lie directly within a *Sustenance Zone* for any of the designated South Hams SAC roosts (the closest being centred on the Chudleigh caves *Site of Special Scientific Interest* approximately 6km to the north-east of NA1). Nor does NA1 lie directly within any of the SAC *Strategic Flyways* (see Map 1).
- 5.1.6. However, because of the scale of development proposed, it has potential to affect commuting routes through the wider landscape by creating a permanent and irreversible change at a landscape scale. Whilst the records are dispersed and the exact abundance and distribution of these local GHBs is unclear due to the limitations of the evidence gathered for the purposes of this screening (see Section 2), it is evident that there is GHB activity in NA1 and its immediate vicinity. As such, it is important to ensure that the GHBs can continue to use this landscape to travel between the SZs and between SZ roosts and other roosts. Although the main function of this area for GHBs will be commuting, there is likely to be some element of feeding as the bats travel around.
- 5.1.7. NA1 is a composite allocation made up of a number of land parcels; these are shown on Aerial Photo 1 of this report. Each are identified separately by a capital letter (e.g. 'A', 'B', 'C' etc) and their key characteristics and interest for GHBs are described in turn below.
- 5.1.8. **Area 'A'** forms the north-eastern corner of NA1 and is comprised of three large agriculturally improved grassland fields which lie to the north of and adjacent to Staplehill Road. These three fields slope down gently towards an un-named small stream along their northern boundary, with two narrow grassland fields on the other side of the stream. EAD Ecological Consultants (2012) have recorded that all of these fields were cattle grazed at the time that they undertook their Phase I Habitat Surveys in October 2011 and November 2012¹³(insert maps and table from EAD report).
- 5.1.9. The boundary hedges on the four eastern fields appear to be regularly managed with a flail mower to maintain a low box cross-section. In contrast, the northern boundary of the large western field is marked by a tree-line and mature hedgerow with a small copse at its eastern end.

¹³ EAD Ecological Consultants (December 2012) Ecological Deliverability Report. Houghton Barton, Newton Abbot. Proposed Local Plan Policy NA1 for Clarence Developments Ltd.

- 5.1.10. The hedgerows along Staplehill Road are also considered to be important features for commuting greater horseshoe bats because they are generally either tall and bushy and/or contain lines of mature trees; the only exception is along the northern side of the eastern end of Staplehill Road as it approaches Forches Cross and the junction with the A382. Here the hedge on the northern side of the road is flailed regularly and not allowed to become tall. However, the hedge along the southern side of the road at this point is also tall and bushy and would provide a strong feature for commuting bats to follow.
- 5.1.11. Kestrel Wildlife Consultants (2015) have recorded greater horseshoe bats commuting in an east-west direction along the stream and hedgerows towards the northern part of Area 'A' (see Map 2 and Aerial Photo 2). Kestrel have also recorded greater horseshoe bats commuting towards Staplehill Road along hedges coming from the south near the garden centre and nurseries.
- 5.1.12. The un-named stream, through Area 'A', flows eastward into a woodland plantation, passing first through a small culvert under the A382 (see Figure 1).
- 5.1.13. **Area 'B'** lies in a triangle between Perry Lane and Staplehill Road. Topography appears to influence land use and agricultural practice, where the two gently sloping fields in the north-eastern part of Area 'B' are suited for arable cultivation. Whereas, the rest of the area is more steeply sloping and irregular in character and is comprised of permanent semi-improved pasture, with tall mature boundary hedges (see EAD 2012 Phase I Maps)¹⁴.
- 5.1.14. A small steeply sloping valley, containing the upper stretches of the Blatchford Brook, sweeps round from a property known as Greenhill on the north-east edge of Area 'B' towards Perry Farm on Perry Lane. Kestrel Wildlife Consultants (2015) have recorded greater horseshoe bats commuting along several hedgerows within this area (see Map 2 and Aerial Photo 1) and have identified the small valley through Area 'B' as a particularly important local flyway.
- 5.1.15. **Area 'C'** lies between Perry Lane to the north and the extensive areas of mineral workings and settlement lagoons to the south. Much of the area is characterised by small unimproved and semi-improved permanent pasture fields and tall bushy hedgerows and trees along most boundaries (including around the fields and along Perry Lane). As such, these smaller fields provide near optimal commuting habitat for greater horseshoe bats.
- 5.1.16. The upper stretches of the Blatchford Brook valley (see Aerial Photo 1), that runs through Area 'B', continues through Area 'C' and forms the boundary between this area and the mineral workings to the south, where the stream turns and flows in a south-easterly direction before flowing through a culvert under the A382 at Grid Reference: SX850728.
- 5.1.17. The southern-most part of Area 'C' also includes another small valley (a tributary to the Blatchford Brook) that runs westwards down to the narrow hedge-lined Howton Road. Again, the fields in this part of Area 'C' appears to offer near optimal commuting habitat for greater horseshoe bats.
- 5.1.18. Area 'C' also contains a number of residential and agricultural properties - all with access off of Perry Lane. Due to the tall trees and hedgerows throughout Area 'C', light spill from these properties is unlikely to affect significantly any commuting bats because the tall boundary vegetation will provide ample screening and buffering.
- 5.1.19. Kestrel Wildlife Consultants (2015) have recorded greater horseshoe bats flying along the boundary between Area 'C' and the eastern edge of Area 'E' in an approximately east-west

¹⁴ EAD Ecological Consultants (December 2012) Ecological Deliverability Report. Houghton Barton, Newton Abbot. Proposed Local Plan Policy NA1 for Clarence Developments Ltd.

direction (see Aerial Photo 2). The direction of movement recorded here would be consistent with, and suggest linkage with recordings along the southern boundary of Area 'F' (see below).

- 5.1.20. **Area 'D'** is comprised of two small fields on the northern side of Howton Road. The eastern field is relatively flat and has been identified on the EAD Ecological Consultants (2012) Phase I Map as semi-improved pasture. The western field has been recorded by EAD as unimproved grassland and this dips down towards the small valley described in Area 'C' above. Boundary hedges along the road and around the fields appear tall and mature, with the exception of the northern boundary which is more open in character and adjacent to the mineral workings.
- 5.1.21. **Area 'E'** is comprised of three large fields; recorded by EAD Ecological Consultants (2012; see footnote 19) as one arable to the north of the area and the other two as agriculturally improved grassland. The hedges along Perry Lane, and along the northern and western boundaries of Area 'E' are tall and bushy. However, the boundary hedge along Howton Road and all internal hedges are regularly flailed leaving no tall bushy vegetation.
- 5.1.22. Kestrel Wildlife Consultants (2015) have recorded greater horseshoe bats flying along the eastern boundary of Area 'E' adjacent to Area 'C' in an approximately east-west direction (see Aerial Photo 2). Otherwise, very few if any substantial habitat features are present and the area is consequently less likely to be attractive to commuting bats.
- 5.1.23. **Area 'F'** is comprised of a dozen or so irregularly shaped fields that slope gently from high ground in the north-west towards the lower eastern boundary of NA1. Land use is a mixture of both arable within the larger eastern fields and pasture and grassland in the smaller northern and western fields. Hedges around the arable fields tend to be intensively managed into a box cross-section, whereas the hedges around the pasture fields tend to be taller and bushier. One field in the south-western corner of Area 'F', near the junction of Howton Lane and the A383, accommodate permanent sports pitches that are intensively managed for that purpose (e.g. no grazing cattle).
- 5.1.24. A tall hedge along the A383 forms the southern boundary for Area 'F'. Then, to the east, the south-western end of the boundary adjacent to the new Hele Park residential development, is comprised of a linear belt of trees and shrubs. The adjacent field, immediately to the north of this boundary, has been identified on the EAD Ecological Consultants Phase I Map (2012) as semi-improved pasture. Further east along this boundary the hedgerow is much narrower and is intensively managed with no tall or bushy vegetation. A small stream also flows eastward along this boundary between Hele Park and Area 'F'. It is a small tributary to the Blatchford Brook, which it joins in Area 'C'.
- 5.1.25. Greater horseshoe bats have been recorded by Kestrel Wildlife Consultants (2015) flying along the hedges that lie beside the track between Howton Road to Mead Farm; this activity has been observed in an approximately east-west direction through the middle of Area 'F'. The bats have also been recorded flying from the direction of Seale Hayne into the northern part of Area 'F', again towards Mead Farm (see Map 3). While no roosting bats have been recorded at the farm, the pasture to the north and south-west are likely to offer suitable foraging habitat and may explain the local movements recorded.
- 5.1.26. While the arable fields within Area 'F' offer little attractive habitat for greater horseshoe bats, Kestrel Wildlife Consultants (2015) have recorded these bats flying along the boundary features between Area 'F' and Hele Park, again in an approximately east-west direction (see Map 3) from the A383 to and from Areas 'E' and 'C'. These results are also consistent with results recorded along this boundary by the Baker Ecological Consultants (2011) as part of their work to inform the planning application at Hele Park.
- 5.1.27. **Area 'G'** is bounded on the southern, western and northern sides by Howton Road and relatively low intensively managed hedgerows. In contrast, a tall tree line and bushy hedgerow forms the boundary on the eastern side, adjacent to Area 'B'. Area 'G' is comprised of one large

and one small arable field, which together offer very limited suitable habitat for greater horseshoe bats.

- 5.1.28. **Area 'H'** covers the extended campus of existing buildings associated with the former Seale Hayne agricultural college. The college campus also contains extensive areas of landscaping with mature trees and shrubs. The buildings are of mixed age and character and, along with the mature trees, provide a variety of suitable roosting opportunities for a number of bat species. Kestrel Wildlife Consultants (2015) have undertaken internal inspections and/or emergence surveys for many of the buildings. One GHB bat night roost was confirmed in the old summerhouse on the south-eastern corner of the Seale Hayne campus. Kestrel also report that the 2010 survey by Andrews Ecology identified two GHB night roosts in a quadrangle of old farm buildings on the southern edge of the campus. Unfortunately, these buildings were not accessible during the Kestrel 2015 survey because they were fenced off for health and safety reasons. Figure 1 of this document shows Kestrel's conclusions in relation to actual or potential greater horseshoe roosts at Seale Hayne.
- 5.1.29. Kestrel (July 2015) also considered the likely use of houses, barns and other buildings around Seale Hayne and considered that 4 barns could potentially be suitable for GHBs. Three of the barns are within 2-300 metres of the Seale Hayne campus to the south and west. Unfortunately, none were visited during the survey as all are in private ownership. However, all of them appear to have large roof voids with clear access points that would allow GHBs to fly freely into the barns; as such Kestrel (July 2015) state that they should therefore be considered as having the potential to support a small maternity colony of greater horseshoe bats.
- 5.1.30. **Area 'I'** forms a parcel of land on the western side of NA1 and lies to the south-west of Seale Hayne. The southern part of Area 'I' is part of a large arable field, and the northern half of this area is formed from four rectangular fields orientated in an east-west direction, where land use appears to be predominantly agriculturally improved pasture (EAD Ecological Consultants 2012). A row of terraced and semi-detached residential properties also lie along the eastern edge of Area 'I' beside Howton Lane. Kestrel Wildlife (2015) have recorded no greater horseshoe bat activity within this area.

5.2 Use of NA1 by Greater Horseshoe Bats

- 5.2.1. Overall NA1 provides a very mixed landscape for greater horseshoe bats, with some areas providing near-optimal commuting habitat (e.g. tall bushy hedgerows), whereas other areas are relatively inhospitable (e.g. large arable fields with either boundary fences or intensively managed hedges).
- 5.2.2. However, based on bat survey results in and around NA1, it is evident that there is GHB activity in the area of NA1.
- 5.2.3. There are also records for at least a dozen known greater horseshoe roosts¹⁵ in the landscape within just a few kilometres of NA1, and therefore well within daily commuting distance. In addition, NA1 is within approximately 6km of the maternity roost at the *Chudleigh Caves Component of the South Hams SAC* and is about the same distance from the winter hibernation roosts at *Haytor and Smallacombe Mines Component of the SAC* on the edge of Dartmoor.
- 5.2.4. Greater horseshoe bats have also been recorded roosting in buildings at and around Seale-Hayne (see description for Area 'H' above) with further buildings identified as having good potential as roosts – some even as possible breeding sites.

¹⁵ The locations of the roosts have been identified through desk studies undertaken to inform this HRA Screening Assessment. Not all of the records are in the public domain but have none-the-less been made available to Teignbridge District Council e.g. from Devon Bat Group and Devon Biodiversity Records Centre. Other records have been obtained by the Council as part of submissions accompanying planning applications.

- 5.2.5. Aerial Photo 2 of this report shows both recorded and 'likely' flight routes for greater horseshoe bats through and near NA1. In some instances, the likely routes simply join gaps in existing survey results (see Map 1), whereas other routes are predicted based on the interpretation of existing data *and* examination of nearby suitable landscape features that are capable of supporting commuting horseshoe bats.
- 5.2.6. Given that the area of NA1 is neither within a defined SZ or SF, the potential impacts on the integrity of the SAC in this area relate to the potential of the proposed development to sever valuable landscape connectivity for GHBs in and around the site. As such, in order to maintain their current range and distribution in the landscape, and to maintain population levels at favourable conservation status (see Appendix B), it is important that existing habitat connectivity across the landscape is retained, and wherever possible enhanced (as is consistent with paragraph 118 of the National Planning Policy Framework).
- 5.2.7. While the numbers at any one survey location may be relatively low, compared to other common species (e.g. common pipistrelle), it must be born in mind that greater horseshoe bats are afforded special protection under Annex II of the EU Habitats Directive (1992) because of their rarity. They are also notoriously difficult to detect because of the rapid attenuation of their echolocation calls that effectively means that they need to pass close to any survey recorder in order to be identified. This should be taken into account when analysing survey data.

5.3 Does Future Development of NA1 Houghton Barton Have the Potential to Impact the Integrity of the South Hams SAC?

- 5.3.1. A number of landscape features, likely to be of importance to GHBs, offer suitable (or even optimal) commuting habitat for greater horseshoe bats (Aerial Photo 1). These include:
- The long thin fields along the northern edge of Area 'A';
 - The small valley and water course in the western half of Area 'B';
 - The water course mature trees and hedgerows through Area 'C';
 - The hedgerows along Perry Lane between Areas 'B' and 'C';
 - The hedgerow along the eastern boundary of Area 'C' adjacent to the garden centre;
 - The orchard in the north-west corner of Area 'B';
 - The western field in Area 'D';
 - The track to the east of Mead Farm in Area 'F';
 - Hedges to the north of Mead Farm in Area 'F';
 - The boundary hedgerow along the southern edge of Area 'F' adjacent to Hele Park;
 - The linear stretch following the route of the watercourse in the western half of Area 'F';
- 5.3.2. In addition, at least three buildings at Seale-Hayne have been identified as having roosting greater horseshoe bats, and a further 3-4 buildings (barns) within 300 metres of Seale-Hayne have been identified as having high potential to support roosting horseshoes. Also, while no greater horseshoe bats have been recorded at Mead Farm, the characteristics of the old farm buildings do offer potential for roosting bats, and commuting activity has been detected along the track to the east.
- 5.3.3. Based on the available evidence for this screening which identifies GHBs using the landscape, it will be important to ensure that the location and design of development does not have the potential to adversely affect the integrity of the South Hams SAC by negatively impacting on commuting habitat. Likely (i.e. potential) impacts that may arise from development proposals for NA1 are set out in Table 2.

5.4 Is it Likely That Potential Impacts Will Require Habitat Regulations Assessment (HRA)?

5.4.1. Consistent with the precautionary principle, and where proposed development is likely to lead to some or all of the impacts described in Table 2, an HRA Screening Assessment is required to determine whether there is a 'likely significant effect' on the SAC.

5.4.2. It will only be possible to avoid a full Appropriate Assessment if detailed mitigation measures are incorporated fully into the development proposals that clearly demonstrate that there will be no likely significant adverse effect on the integrity of the South Hams SAC. An effective means of demonstrating that detailed measures are an integral part of any planning application is through the use of *Bespoke GHB Mitigation Plans* (see Appendix C of this document).

5.4.3. In order to meet the requirements of the HRA process, decisions by Teignbridge District Council, over future planning applications for development within NA1 Houghton Barton, will need to be informed by:

- Adequate bat surveys (consistent with the Bat Conservation Trust guidance¹⁶ and the emerging South Hams SAC SPD and Technical Advice Notes) and in accordance with Clause 6.2 of BS42020:2013);

NOTE: Comprehensive surveys should cover all existing buildings and likely flight routes to such buildings and should provide sufficient seasonal coverage to detect/identify possible mating roosts and activity.

- Accompanying ecological impact assessments (EclAs), and;
- A Bespoke Greater Horseshoe Bat Mitigation Plan for NA1 (concentrating on measures required in sensitive locations e.g. at bat road crossing points, such as through culverts where the design and alignment of the culvert may be critical and supported by appropriate landform and habitat establishment on either side).
- The most up to date South Hams SAC guidance prepared by the SAC competent authorities and Natural England.

NOTE: The provision of a Bespoke Mitigation Plan to support planning applications is a requirement under a number of TDC Local Plan Policies¹⁷. Such detailed information will enable the planning authority to undertake final 'project level' HRA to ensure that all necessary mitigation is an integral part of the proposed development.

¹⁶ <http://www.bats.org.uk/pages/batsurveyguide.html>

¹⁷ Provision of Bespoke GHB Mitigation Plans in support of planning applications are an explicit requirement in Local Plan Policies NA1, NA2, NA3, KS1, KS3, KK1, BT1, BT2A, BT2C, BT3, BT4, CH1, CH2, CH3, CH4.

Table 2: Likely Impacts and their Implications for the SAC Conservation Objectives

Likely Impacts Arising from Development	Implications for SAC Conservation Objectives (see Appendix B)
<p>Loss of habitat connectivity through removal of or damage to linear habitat (e.g. trees and hedgerows resulting in the loss of key areas of commuting habitat used by greater horseshoe bats).</p>	<p>Reduction in the extent and distribution of the habitats used by relevant qualifying species.</p>
<p>Disturbance from human activities along commuting routes where development is located too close to commuting habitat causing an adverse effect (primarily) from new sources of artificial light – either from within the new houses or from external lighting e.g. vehicles and street lighting.</p> <p>Loss of existing subsidiary roosts in and around the site and supporting commuting habitat;</p> <p>Disturbance from construction activities along commuting routes where increased noise and light may have an adverse effect in adjacent habitats.</p>	<p>Change in habitats used by relevant qualifying species, such that the structure and/or function of those habitats is compromised (not maintained).</p>
<p>New, wider and busier roads in the landscape leading to increased risk of bat mortality through vehicle collisions.</p>	<p>Reduction in the population of the relevant qualifying species.</p>
<p>Increased length of commuting routes leading to the bats having to travel further to navigate through the landscape to the north of Newton Abbot and with consequent greater expenditure of energy to do so.</p> <p>Restriction on the bats' ability to disperse and move to and from roosts and foraging areas either side of the A382. Such movement may occur on a regular daily basis, or on a more infrequent seasonal basis; such as in the:</p> <ul style="list-style-type: none"> i. late summer and early autumn when males and females are seeking each other out to mate, and; ii. early spring and late autumn when the bats may be using routes through NA1 in order to migrate to and from their hibernation roosts used through the winter. 	<p>Change in the distribution of the relevant qualifying species across the South Hams SAC</p>

5.5 Is it Likely That Impacts Can Be Mitigated Effectively?

- 5.5.1. Mitigation measures for GHBs should support the *SAC Conservation Objectives* set by Natural England and also promote *Favourable Conservation Status* for this species (see Appendix B). As such, mitigation measures for NA1 should aim to:

Facilitate ease of movement and conserve energy expenditure by greater horseshoe bats by providing optimal daily and seasonal commuting routes through the existing and proposed new built up areas and by retaining and enhancing foraging and roosting opportunities.

- 5.5.2 In order to achieve the above aim, and to provide the certainty necessary to satisfy the requirements of the HRA process, the following mitigation principles must be incorporated into the development framework plan for NA1. These principles apply some site specific context to the mitigation requirements based on the evidence and information available for the purposes of this screening. Such measures are based on the principle of creating and maintaining habitat

known to be associated with GHBs. They will need to be refined, secured and implemented in full at such time as development applications are brought forward and relate principally to ensuring connectivity through the landscape through the protection and maintenance of GHB commuting habitat. Such mitigation should be a combination of identifying and recognising:

- key design constraints required to avoid or minimise¹⁸ adverse effects, and;
- habitat mitigation/enhancement opportunities to provide overall net gains¹⁹ for GHBs specifically and for wider biodiversity in general.

5.5.3 *Design Constraints should:*

- i. Maintain and optimise existing and also provide new bat commuting habitat through and around NA1 to achieve overall connectivity in accordance with the proposed flyways shown on Aerial Photo 2;
- ii. Have regard to areas of optimal foraging habitat and maintaining and optimising these as necessary to support commuting routes and habitat;
- iii. Achieve no overall net loss of existing hedgerows and trees within NA1 which are used to provide GHB commuting habitat;
- iv. Avoid light spill in bat flyways and foraging areas i.e. achieve light levels less than 0.5 lux and have regard to other ambient background lighting and overall light spill from the development as a whole;
- v. Ensure the new road network in NA1 does not sever key habitat connectivity. Effective mitigation must therefore be achieved through a combination of careful siting of underpasses²⁰, sensitive ground shaping (e.g. earth bunds, banks and cuttings), sensitive lighting design, sympathetic landscape design, vehicle speed restrictions and vehicle 'calming' measures - in order to avoid and reduce risk of vehicle collision with bats and to avoid disturbance caused from artificial light spill into flight routes²¹;
- vi. Ensure that any public footpath / cycleway through the bat corridors are either unlit or are lit through a very carefully designed scheme that minimises light spill in sensitive locations, while at the same time providing a safe and adequately lit route for pedestrians and cyclists.
- vii. Ensure that the provision of public realm open space in bat corridors – while being potentially multifunctional - is designed and maintained to provide adequate optimal habitat for commuting and foraging greater horseshoe bats.
- viii. Submit a *Bespoke Bat Mitigation Plan* (see Appendix C) with any applications for development, including for the new road passing through the development, in accordance with the guidelines set out in this HRA Screening report. The Plan(s) should be based on up to date bat surveys and take into consideration how to address any in combination effects

¹⁸ Adverse effects should be 'minimised' to the point where either alone or in combination with other effects they do not have an adverse effect on the integrity of the South Hams SAC.

¹⁹ The achievement of a net gain for biodiversity is consistent with the objectives set out in paragraph 118 of the National Planning Policy Framework.

²⁰ As appropriate and necessary to provide safe passage for bats where other mitigation measures are inadequate.

²¹ All mitigation aimed at providing safe road crossings for bats must follow the *precautionary principle* and be informed by latest research, such as Highways Agency (2011), Berthunissen and Altringham (2015) and Fensome and Mathews (2016).

identified during the course of detailed impact assessment.

Habitat Mitigation/Enhancement Opportunities should where appropriate:

- ix. Undertake tree planting to create new orchards and areas of woodland in order to provide more diverse commuting habitat for GHBs (see Map 1);
 - x. Mitigate (both on and offsite site where necessary) for the loss of hedgerow (flyways) if removal is unavoidable;
 - xi. Undertake habitat creation/enhancement (in partnership with landowners) to provide new tree lines and hedgerows in the surrounding landscape to strengthen bat commuting habitat in the wider landscape if required;
 - xii. Provide a “stand off zone” from development between bat flyways and supporting foraging habitat (as indicated on Aerial Photo 2) and the new built development. These are in addition to the actual habitat features;
 - xiii. Protect existing subsidiary roost(s) and create new bespoke bat roost(s) as necessary to support and improve the number and distribution of subsidiary roosts. These should be in appropriate locations either within the green infrastructure in NA1 or within the surrounding landscape;
 - xiv. Provide long-term habitat management for GHBs, for each development, through a Landscape and Ecological Management Plan (LEMP), secured through a planning condition and/or obligations;
 - xv. Implement development through the means of a prior-approved Construction Environmental Management Plan (CEMP), secured through a planning condition;
 - xvi. Undertake appropriate and proportionate ecological monitoring of the LEMP to establish the effectiveness of proposed mitigation measures and to provide early warning of any necessary contingency or remedial measures required to meet original objectives;
- 5.5.4. The provision of such measures would be consistent with the four principles set out in section 1.3.3 of this Screening Assessment.

6. Consideration of 'In combination' Effects

6.1. Statutory Requirements

- 6.1.1. When undertaking HRA, the underlying purpose of Article 6(3) of the Habitats Directive must be considered. This is to ensure that a plan or project is authorised only to the extent that it will not, either 'alone' or 'in combination' with other plans or projects, adversely affect the integrity of a European site. The following sections consider the likely significant effects of NA1 in relation to 'in combination' effects generated by other plans and projects that may affect the integrity of the South Hams SAC.

6.2 Potential 'in combination' effects

- 6.2.1 In order to inform the assessment of potential 'in combination' effects, TDC commissioned the preparation of the draft *South Hams SAC Mitigation Strategy For The Heart of Teignbridge And Bovey Tracy: Mitigating 'In Combination' Effects by Protecting Landscape Connectivity Through Development 'Pinch Points'* (Greenbridge Ltd; 2016). This was consulted on between February and April 2017 and responses to the consultation have been reviewed and considered. Due to the preparation of updated South Hams SAC Greater Horseshoe Bat guidance currently being undertaken by the SAC competent authorities (Devon County Council, Dartmoor National Park, South Hams District Council, Teignbridge District Council and Torbay Council) and Natural England, it has been agreed that this document will be replaced and updated by the SPD rather than issuing a final version. The in-combination effects that the draft Mitigation Strategy refers to will be taken into consideration in the preparation of the SPD.
- 6.2.2 There are a number of planned and consented development projects taking place within close proximity to NA1. In particular, these include (see Map 3):
- Houghton Barton, NA1 (A)
 - Whitehill, NA2 (B)
 - Wolborough, NA3 (C)
 - Hele Park, south of NA1 (D)
 - The line of the proposed A382 road improvement scheme north of Newton Abbot;
 - The line of the proposed A382/A383 link road through NA1 Houghton Barton;
 - The line of the proposed A381/A380 link road through NA3 Wolborough;
 - South Devon Link Road (SDLR)
- 6.2.3 There are also a number of major mineral working units in the surrounding Bovey Basin which have the potential to impact on the way in which GHBs are able to use the landscape.
- 6.2.4 Although survey data is limited at this stage relating to all these developments, an overview of all of these projects is required in order to ensure that robust strategic corridors are retained and/or planned for in order to secure connectivity between these development areas and the South Hams SAC designated roosts within the Sustenance Zones. Both individually and collectively these commitments and proposals represent a permanent and irreversible change at a landscape scale, with the potential to fragment commuting habitats used by GHBs. These potential landscape scale impacts and in-combination effects could affect the favourable conservation status of GHBs by restricting landscape scale connectivity and reducing population resilience to change.
- 6.2.5 It is expected that further guidance relating to identifying and managing potential in-combination effects will be consulted on in 2018 as part of the updated Natural England guidance currently being prepared by the South Hams SAC competent authorities. This should be referred to at the point of undertaking further ecological surveys and HRA screening at the planning application stage.

6.3. Potential 'In Combination' Effects from the A382 Road Improvements and NA1

Implication of the A382 Proposals for Greater Horseshoe Bats

- 6.3.1. Devon Highways Authority has recently approved a scheme to achieve significant improvements to the A382 from the Drumbridges junction on the A38 to Jetty Marshes on the northern edge of Newton Abbot (Planning Reference Number: DCC/3851/2016).
- 6.3.2. Of all the development proposals under consideration through this HRA, the A382 scheme has the greatest potential for 'in combination' effects with NA1 arising through residual impacts remaining after initial scheme mitigation has been implemented. This is because both are large scale projects with the potential to affect extensive areas of the greater horseshoe bat territory.
- 6.3.3. The findings of research published in 2016 by Exeter University are particularly relevant to an assessment of likely effects arising from the A382 proposals. The findings of the research are summarised in Appendix E of this HRA, with the two key points being that roads may:
- act as a barrier to bat movement, and;
 - cause bat mortality through collisions with road vehicles.
- 6.3.4. Devon County Council has undertaken an HRA Screening in respect of this application and has concluded that subject to the recommended mitigation, there will be no likely significant effect either alone or in combination with other plans or projects. This HRA screening considered projects taking place on surrounding land, including NA1, and the potential impacts in terms of overall landscape permeability. The key mitigation required through the HRA screening is identified as:
- Verges managed as low maintenance grassland
 - Advance hedge/woodland/scrub planting
 - Bat culvert near Forches Cross (this culvert will link to flight lines provided for TDC's NA1 development on the western side and link into Stover Park Wood mixed plantation, a stream corridor leading to the Teign and vegetation on the edge of Stover Clay Works on the eastern side)
 - Bat culvert on the Blatchford Brook
 - Construction and operational phase lighting restrictions

6.4. Potential In Combination Effects from Hele Park and NA1

- 6.4.1. The Hele Park development has been built on a former golf course. As such, the area provided very little opportunity for foraging greater horseshoe bats. However, ecological surveys²² conducted to inform the planning application did establish that the bats were commuting in an east-west direction along the hedgerow and small watercourse that marks the boundary with NA1.
- 6.4.2. As part of the planning consent for Hele Park, it was agreed that a buffer strip was to be left along the hedgerow to provide and maintain this flight route for bats.
- 6.4.3. There is a proposed road link (Buttercup Way) between Hele Park and NA1 and this has the potential to interrupt the flight corridor running along the boundary. A culvert is planned to carry the watercourse and this should be designed in accordance with the design constraints presented in paragraph 5.5.3 to enable bats to also pass safely under the road. There are therefore no likely 'in combination' effects between Hele Park and NA1.

²² Baker Ecological Consultants (2011)

6.5. Potential In Combination Effects from Stover Golf Course and NA1

- 6.5.1. Planning permission has been granted for Stover Golf Course to extend part of the course towards the south (see Planning Reference 16/00922/MAJ). The land involved currently consists of species poor semi-improved grassland crossed with ditches, arable land, woodland and hedges. The proposal is to remove some of the woodland, short stretches of hedge and ditches and to create 4½ holes, a lake, landscaping and areas of wildlife habitat.
- 6.5.2. The new holes are required to replace old holes that will be lost to proposed Devon Highway Authority's road widening scheme for the A382 (see section 6.6 below).
- 6.5.3. The HRA conducted by TDC (2016) for the golf course application states:

Part of the application site and existing golf course are within a South Hams SAC Strategic Flyway. Very close by are buildings containing known greater horseshoe bat roosts: Stover School (medium sized hibernation roost type, 400m) and its Ice House (small hibernation roost, 250m). Bat surveys for the A382 road widening found GHBs crossing the road in many locations. Two buildings have been retained at Ilford Park (400m) as a roost for bats including greater horseshoes.

It is therefore likely that the application site is used for commuting and foraging. The site boundary hedges provide likely flyways to the adjacent Ice House Copse and for bats moving between Stover and land to the west. Bats are likely to make some foraging use of the woodland that is to be felled. Even though the applicant says that the cattle which graze the pasture are likely to be wormed with avermectins, this field is still likely to provide other useful prey items, e.g. tipulids. The arable field is unlikely to offer many prey items. Trees may be used to 'hang up' whilst feeding.

Land in close proximity to hibernation roosts can be of particular importance when the bats make brief winter foraging expeditions”.

- 6.5.4. The HRA has assessed that in the absence of mitigation:

“The proposals will result in:

- Loss of woodland foraging habitat*
- Conversion of pasture foraging habitat to non-grazed grassland*
- Loss of short sections of hedges*
- Longer stretches of hedges to be cut low (to 0.75m)*

This might have an impact alone, or in combination with other plans or projects”.

- 6.5.5. A package of mitigation measures has been proposed by the golf course that includes providing new habitat features that should, once established, ensure an overall net gain in the length of hedgerows, water bodies, semi-improved pasture and woodland. TDC has secured:

- Appropriate phasing of works following a Construction Environmental Management Plan (CEMP);*
- Ongoing habitat management for the duration of the development;*
- No lighting on site*
- Installation of a greater horseshoe bat night roost facility to offset loss of tree perches and any other residual impacts.*

7. Conclusion

- 7.1. In undertaking any HRA Screening Assessment, the Council must ascertain that the plan and/or proposals would not adversely affect the integrity of a European site. This should only be concluded if the Council has made certain that this is the case. In order to be certain, the plan-making body should be convinced that no reasonable scientific doubt remains as to the absence of such effects²³
- 7.2. However, an absolute guarantee that there will be no adverse effect on site integrity is not possible. The best that can be achieved is for the competent authority to identify the potential risks, so far as they may be reasonably foreseeable, in light of such information as can reasonably be obtained, and then put in place a legally enforceable framework with the aim of preventing the risks from materialising²⁴.
 - 7.2.1. In undertaking this HRA Screening Assessment, the Council has referred to all of the data available to it on the occurrence and distribution of greater horseshoe bats both within NA1 and across the surrounding landscape.
 - 7.2.2. The Council has also identified in the NA1 Development Framework Plan the potential risks of development to greater horseshoe bats and has set out mitigation measures that accord with the recommendations set out in this HRA screening assessment which are necessary to avoid such risks from occurring.
 - 7.2.3. Consequently, since it is possible to identify appropriate and adequate mitigation that will avoid significant adverse effects (that are capable of being secured through the determination of specific planning applications), it is possible to conclude that there will be no Likely Significant Effect (LSE) on the South Hams SAC.
 - 7.2.4. However, it is essential that all necessary mitigation is secured and implemented. Consequently, the Council must – in order to discharge its statutory obligations – ensure that all future planning applications are subjected to adequate scrutiny through an HRA LSE Screening Assessment and, where necessary, an *Appropriate Assessment* wherever uncertainty remains over possible adverse effects on the integrity of the SAC.
 - 7.2.5. It is also strongly recommended that the Council continues to liaise with the SAC Competent Authorities to ensure that development proposals do not give rise to any in combination effects on the South Hams SAC.

²³ See paragraph 61 European Court of Justice case C-127/02 dated 7th September 2004, 'the Waddenzee ruling'

²⁴ WWF-UK Ltd and RSPB v Secretary of State for Scotland et al [1999] 1 C.M.L.R. 1021 [1999] Env LR 632, Court of Session, Edinburgh, 28th October 1998

Appendix A: Kestrel Wildlife Ltd Survey Report (2016)

Additional bat survey information and detailed results

The following pages present detailed information gathered during the bat surveys carried out across the NA1 A382-A382 Link Road Scheme in 2015 & 2016, other than that already presented in the main report body.

The following pages contains information as set out in the order below:-

- **Data from walked transects carried out:-**
 - **A4M1-** A map of the four transects showing their location across the site (pg. 3)
 - **A4T1-** A table of survey dates on which the transects were walked, and prevailing weather conditions during the surveys (pg. 4)
 - **Key to transect notes** (pg. 4)
 - **A4M2&T2-** A detailed map (pg. 7) of **Transect 1** showing where bats were encountered, followed by a table (pg. 8) detailing all the observations collected on the transect in 2015 & 2016, cross-referenced to the locations shown on the map
 - **A4M3&T3-** A detailed map (pg. 17) of **Transect 2** showing where bats were encountered, followed by a table (pg. 18) detailing all the observations collected on the transect in 2015 & 2016, cross-referenced to the locations shown on the map refer
 - **A4M4&T4-** A detailed map (pg. 25) of **Transect 3** showing where bats were encountered, followed by a table (pg. 26) detailing all the observations collected on the transect in 2015 & 2016, cross-referenced to the locations shown on the map refer
 - **A4M5&T5-** A detailed map (pg. 34) of **Transect 4** showing where bats were encountered, followed by a table (pg. 35) detailing all the observations collected on the transect in 2015 & 2016, cross-referenced to the locations shown on the map refer
 - **A4M6-** A map showing where horseshoe bat observations were recorded, identified by species (greater or lesser) and month of survey (pg. 43)

- **Data from the static logging sessions carried out:-**
 - **A4M7-** A map of the logger locations and identification (pg. 44)
 - **A4T6-** A table showing when surveys were carried out at each station (pg. 45)
 - **A4T7-** A table showing the bat activity recorded overall, for all species, at each station (pg. 46)

- **A4M8**- A map presenting the overall greater horseshoe bat activity recorded across the site in 2015/16 (pg. 47)
- **A4T8**- A table showing the monthly data gathered at each location for all species (pg. 48)
- **A4T9**- A table presenting the nightly greater horseshoe data recorded at each station, across all surveys in 2015/16, broken down into 1/2hr segments across the night, and their activity relative to sunset and sunrise (pg. 52)

- **Data from the dusk emergence/dawn re-entry surveys carried out:-**
 - **A4T10**- Observations pertaining to the building and tree roosts identified during the surveys carried out in 2015 & 2016

Map 1:- Location of the 4 transects surveyed across the preliminary scheme area, and static logger positions used during the survey

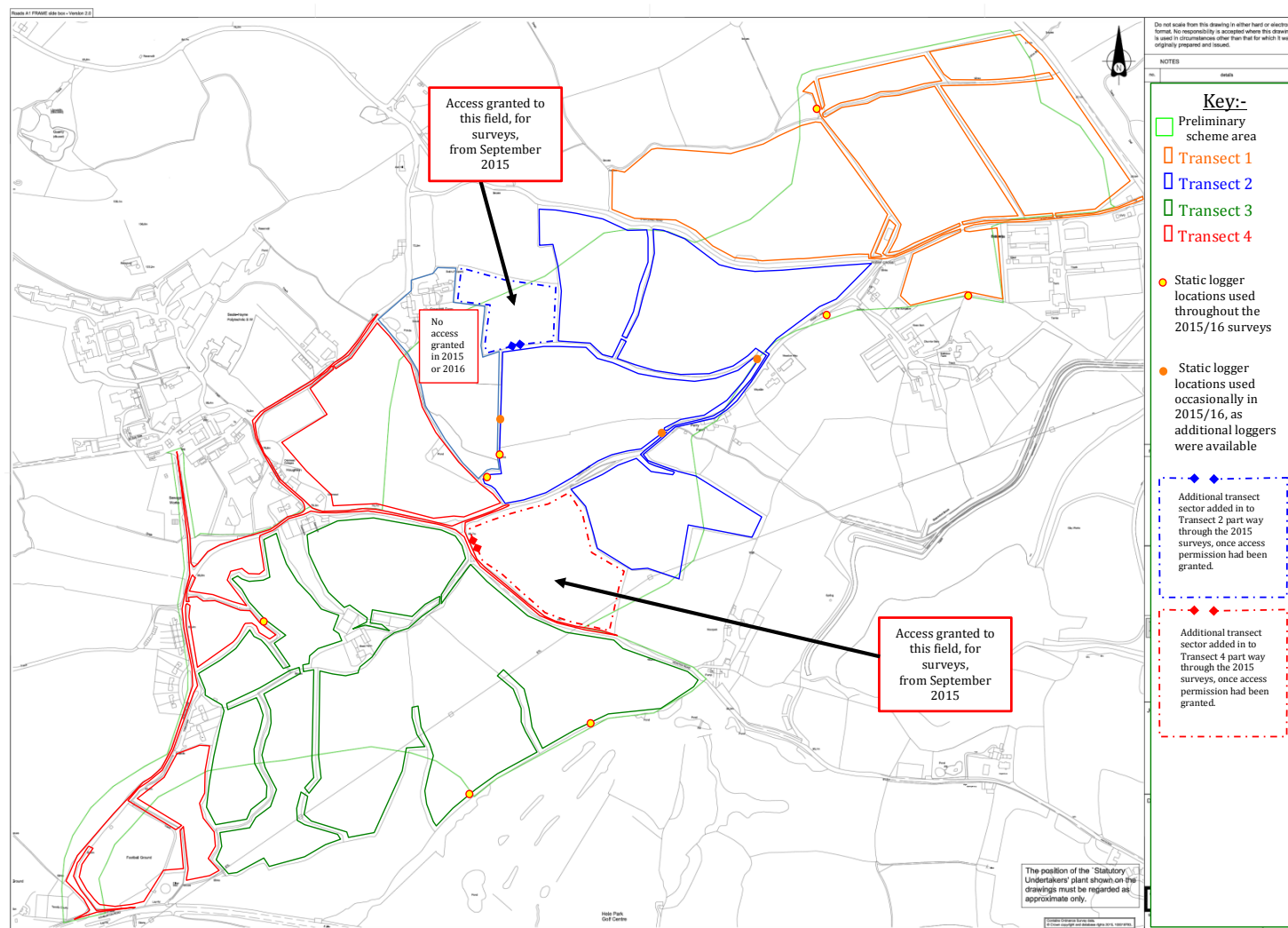


Table 1:- Walked transect survey dates and general information, and prevailing weather at the time of surveys.

Date		Transect								Sunset or sunrise	Start or end of survey?	Time of Start/end of survey	Temp	Humidity	Wind	Cloud Cover
		1		2		3		4					°C	%rh	Strength (Bft) & direction	%
		Whom	Notes	Whom	Notes	Whom	Notes	Whom	Notes							
26/05/15	Dusk	SR	Started at LP1 on the map, headed for LP2 onwards	JB	Started at Locn 11 on the map, heading towards LP1 onwards	LD	Started at Locn 1 on the map, and headed to LP10 onwards	KD	Started at Locn 16 on the map, headed for LP1 onwards	21.08	Start	21.00	13.2	72.4	0-1 W	0
										End	00.25	10.1	72.2	0	0	
10/06/15	Dusk	SR	Started at location 7 on the map, headed for LP6 onwards	JB	Started at Locn 2 on the map, headed for LP2 onwards	LD	Started at gate at LP3, headed for Mead Farm and onwards to LP5 etc...			21.23	Start	21.15	15.3	61.3	0-1/NE	50
										End	00.30	14.2	64.4	0-1/NE	50	
17/06/15	Dusk							JB	Started at Locn 16, then headed for LP7 onwards	21.27	Start	21.20	16.9	73.3	2 SW	10
										End	00.38	15.2	76.4	2 SW	10	
22/07/15	Dusk	SR	Start at location 10 on the map, headed to LP8 onwards	JB	Started at LP5, headed for LP6 onwards	LD	Started at Mead Fm, walked past LP5 & on to LP10 onwards	KD	Started at LP9, headed for LP10 onwards	21.12	Start	21.05	17.5	60	0	0
										End	00.15	11.4	69	0	0	

28/08/15	Dawn	LJ	Started at LP1 on the map, headed for LP2 onwards	SR	Started at Locn 10a, headed for LP9 onwards	LD	Started at Locn 38, went to LP8, then on to 9, then through yard due to flooded ditch at Locn 7	JB	Started at Locn 3 on the map, headed for Lp2 onwards	06.20	Start	03.15	9.7	74.7	0	0
											End	06.20	9.2	86.1	0-1 W	25
28/08/15	Dusk	LJ	Started at LP5 on the map, headed for LP6 onwards	SR	Started at Locn 10a, headed for LP9 onwards	LD	Started at LP8, then followed the same path as last night, as the ditch at Locn 7 is still impassable	JB	Started at Locn 3 on the map, headed for Lp2 onwards	20.07	Start	20.00	16.1	81.7	0-1 W	100
											End	23.10	15.1	91.2	0-1 W	100
24/09/15	Dusk					LD	Started at LP7, and headed for LP6 etc.	LJ	Started at Locn 16 on the map, then headed for Locn 25, then on to LP5, LP4 etc...	19.08	Start	18.50	14.5	73.2	0-1 W	10
											End	22.15	12.5	76.8	0-1 W	10
29/09/15	Dusk	LJ	Started at LP9 on the map, headed for LP10 onwards	LD	Started at Perry Lane Layby, opposite Locn 30, and headed for LP1 onwards					18.56	Start	18.45	16.5	63.3	0-1 E	10
											End	21.58	14.6	64.3	1-2 E	40
07/10/15	Dusk	SR	Started at LP9 on the map, headed for LP8 onwards	JB	Started at Locn 2 on the map, headed for LP2 onwards	LD	Started at LP5 gateway, then headed for Lp6 onwards	KD	Started at Locn 9, headed for LP8, then L7 onwards	18.39	Start	18.30	12.5	71.1	0-1 W	10
											End	21.40	9.8	78.4	0-1 W	10

23/04/16	Dusk	U	Started at Locn 8, headed for LP1, then to LP2 onwards	LBT	Started at LP1, going to LP2, 3 etc...	LD	Starting at LP3, and headed for LP2, 1 etc...	KD	Started at LP9, going to 8, 7 etc	20.21	Start	20.10	11.0	61.3	0-1 NW	30
											End	23.20	6.9	75.9	0-1 WNW	10

Key to shorthand annotation of transect survey notes:-

Species annotations:-

Bb/Barb/Barbastelle- barbastelle bat (*Barbastella barbastellus*), Es/Ser/Serotine- serotine bat (*Eptesicus serotinus*), GH/GHB- greater horseshoe bat (*Rhinolophus ferrumequinum*), LE- Long-eared bat (presumed brown- *Plecotus auritus*), LH/LHB- lesser horseshoe bat (*Rhinolophus hipposideros*), Myo sp.- *Myotis* sp. Bat, Nn-noctule- noctule bat (*Nyctalus noctula*), NSL- undifferentiated big bat (noctule/serotine/Leisler's) calls, P45- common pipistrelle (*Pipistrellus pipistrellus*), P55- soprano pipistrelle (*Pipistrellus pygmaeus*), Pnath- Nathusius's pipistrelle (*Pipistrellus nathusii*), Pip sp.- undifferentiated pipistrelle calls.

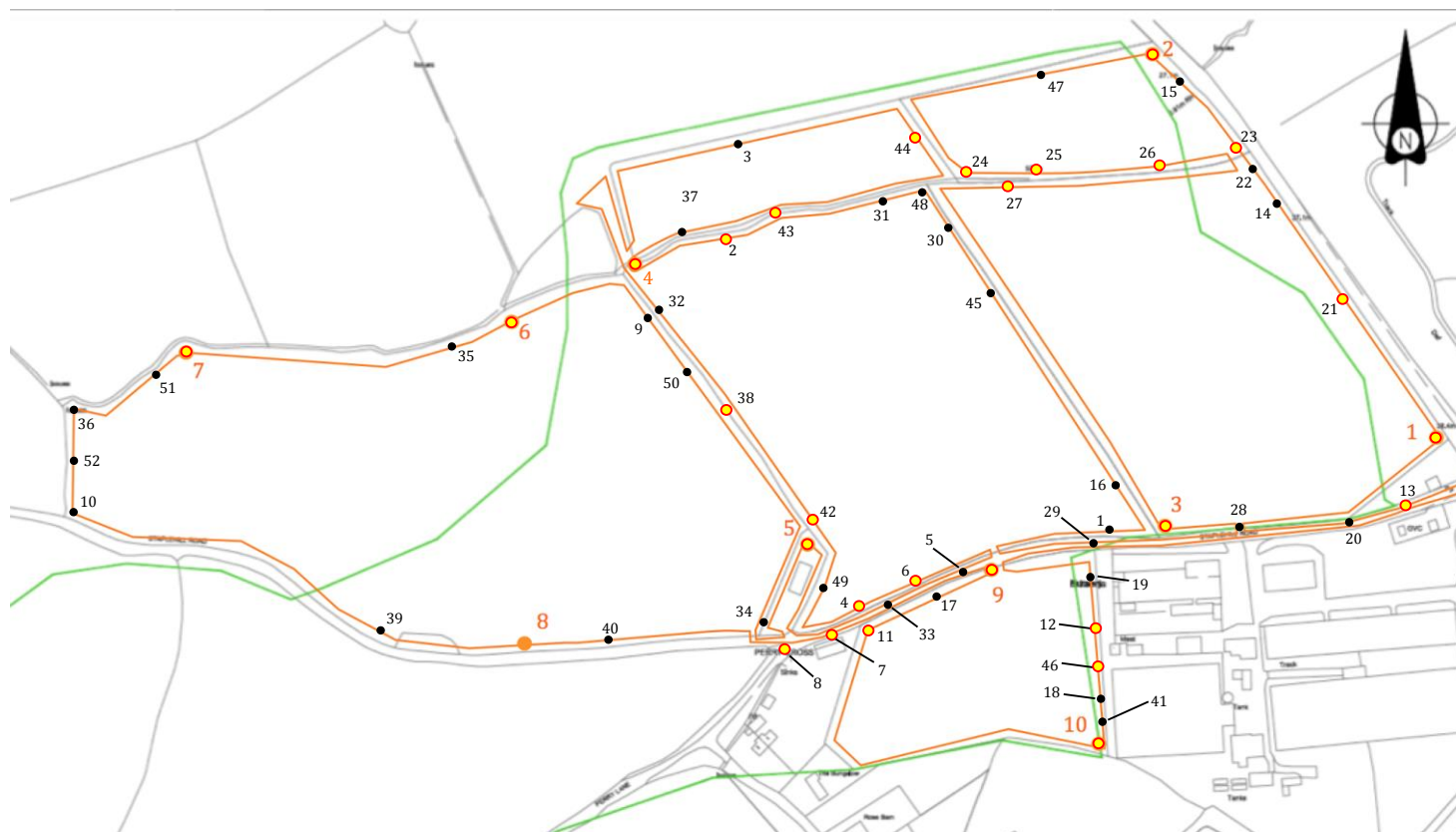
Other annotations:-

Transect Master Locations:- LP1-7- Listening points 1-7, other numbered points refer to the locations shown on each transect.

Directional notations- n/N- north, s/S- South, e/E- east, w/W- west, and combinations thereof, e.g.- sw- south-west, se- south-east etc., w-e/W-E- west to east

Descriptive general annotations:- u/s- unseen, b&f- back and forth, o/h- overhead, F- Foraging, f- flying, poss- possibly

Map 2 & Table 2:- A detailed map of **Transect 1** showing where bats were encountered, followed by a table of observations collected during the 2015 & 2016 surveys. Locations numbered in orange are listening points along the transect. Those marked by bright yellow/red spots refer to locations where bats OTHER THAN pipistrelles were recorded. All locations relate to those mentioned in the table that follows.



Note:- In the following table, cells highlighted in yellow document observations where lesser horseshoe bats were encountered during our surveys. Those highlighted in orange show where greater horseshoe bats were encountered, and those in light green where bats OTHER THAN pipistrelles were found. All data are for dusk surveys, unless stated otherwise.

Date & Time	Transect Master Location	Observations
26/05/15		
21:50	1	P45 unseen.
22:01	2	Myotis flying 2m high flying east along line of hedge
22:05	LP4	P45 activity around the trees, unseen.
22:13	3	P45 unseen.
22:17	LP4	P45 activity around the trees, unseen.
22:21	4	P45 unseen.
22:23	5	P45 foraging, 4m high on the road.
22:27	6	P45 unseen, on the road.
22:29	7	P45 foraging over the road at the junction, 4m high. Myotis unseen.
22:32-35	LP5	P45, P55 and Nn, unseen.
22:37	8	P45 unseen.
22:39	9	P45 activity, unseen,
22:45-48	LP6	P45 activity, unseen.
		P45,P55 and Nn unseen.
22:52	LP6-LP7	Continual P45 and P55 activity between LP6 and LP7. P55 seen flying east along hedge line.
22:55	LP7	P55 activity at corner of field, unseen.
23:01	LP7-10	Continual P45 and P55 activity between LP7 and 10.
23:12	7	P45 activity at the junction near the barn, unseen.
23:16	LP9	Myotis unseen 23:16.

23:22	11	P45 activity, unseen.
23:23-26	LP10	23:25 LE, unseen.
23:28	12	GH unseen along conifer trees.
23:29	LP9	P45 detected unseen.
23:35	13	P45 activity, unseen.
23:44	14	P45 activity, unseen.
23:46	14	P45 seen foraging back and forth along hedge at 14.
23:47	15	P45 and P55 activity unseen.
00:01	16	P45 activity, unseen.

10/6/15

22:01	7	P45 seen commuting down the road away from barn, 4m high, heading south.
22:02	7	P45 foraging around the junction, 4m high, heading south.
22:04-05	7-5	P45 activity along road.
22:06-09	LP9	P45 and P55 activity detected. P45 and P55 seen foraging inside field along roadside hedge.
22:10	17	P45 activity along hedge, unseen.
22:10	17	P55 activity 2m high along hedgerow heading east.
22:10-14	LP9-11	P45 and P55 foraging back and forth along hedgerow.
22:21	18	P45 unseen.
22:24	19	P45 and P55 activity, unseen.
22:24-26	LP9	Continuous P45 activity by gate, briefly seen foraging 5m high around tree canopies.
22:36	13	P45 detected, unseen.
22:40-41	20	P55 detected, unseen.
22:47-48	21	P45 and Bb detected, unseen.
22:50	22	P45 detected, unseen.
22:50	23	P45 detected, unseen.
22:50-52	23-LP2	Continuous P45 foraging activity.

22:52-56	LP2	P45 seen foraging 6m high up and down road. Myotis detected, unseen. Continuous P45 activity (two bats).
22:59	24	Myotis detected, unseen.
23:02	25	Myotis and P45 detected, unseen.
23:05	26	Myotis activity, unseen.
23:09	27	P45 activity, unseen.
23:21	28	P45 detected, unseen.
23:23	29	P45 activity, unseen.
23:25	29-gate	P45 activity along road, unseen.
23:27	1	P55 activity, unseen
23:30	30	P45 activity, unseen.
23:32	31	P45 activity, unseen.
23:35-38	LP4	Continuous P45 activity, unseen.
23:48	LP4	P45 activity as approaching gate, unseen.
23:50	32	P45 activity, unseen.
23:54	4	P45 detected, unseen.
23:56	33	P45 activity, unseen.
23:57	5	P45 activity on the road, unseen.
23:58	5-6	Continuous P45 foraging along road, unseen.
00:00	7	P45 activity, unseen.
00:00-04	Small barn field loop to 8	P45 continual activity, unseen.
00:07	34	P45 activity, unseen.
00:11-14	LP6	P45 and P55 activity, unseen. P55 activity all along tree-line.
00:14	35	P45 and P55 activity, unseen.
00:15	35-LP7	Intermittent P45 activity along hedgerow, unseen.
00:16	LP7	P55 activity, unseen.
00:19	36	P45, P55 and social calls detected, unseen.

00:20	36-10	P55 activity detected, unseen.
22/7/15		
21:27	11	Nn 30m high heading west from LP9.
21:38	19	P45 5m high heading east to corner of field.
21:48	LP1	Nn detected, unseen.
22:00	15	P45 detected, unseen. several passes.
22:01	15-LP2	P45 activity detected, unseen.
22:03-06	LP2	P45 activity detected, unseen.
22:26-29	LP3	Nn pass detected, unseen. P55 detected, P45 detected. All unseen.
22:31	28 roadside	2 P45 activity detected, unseen.
22:32	LP3 roadside	P45 seen commuting east at 3m high.
22:33	29	P45 detected, unseen.
22:34	Gate near 29	P45 detected, unseen.
22:35-36	1	P45 activity detected, unseen.
22:44-45	2	2 P45 detected, unseen.
22:46-49	LP4	P45 detected, intermittent, unseen.
22:49-53	LP4-37	P45 detected, continuous, unseen.
23:03-04	LP4	Continuous P45 activity detected on approach to LP4.
23:07	38	P45 activity detected, continuous, unseen.
23:10	38-4	P45 activity detected, continuous, unseen.
23:10-11	Approaching 4	Continuous P45 activity, unseen.
23:12	Approaching 6	P55 detected, LE detected, unseen.
23:15	gate-33	P45 continuous activity, unseen.
23:22	LP5	Myotis activity around barn fenced compound.

23:32-35	LP6	P45 and P55 continuous foraging activity, unseen. Poss. Nn.
23:36	LP6-35	2 P45 detected, unseen.
23:36-37	35	2 P45 detected, unseen.
23:38	35-LP7	2 P45 detected, unseen.
23:40-44	LP7	2 P45 passes detected, unseen.
23:46	36	P45 pass detected, unseen.
23:57-58	8	2 P45 detected, unseen, Myotis detected, unseen.
00:00	5	P45 heading east along road 2m high. P45 detected, unseen.
00:01	5-LP9	P45 detected, unseen.

28/8/15 Dawn

4.50	LP9	Barbastelle pass u/s next to gate by road.
5.03	LP5	Barbastelle pass, unseen.
5.24	LP7	Serotine flew past under tree canopy u/s
5.51	8	1xP55 crossed at junction from Perry lane to Dutch barn.

28/8/15 Dusk

20.34	LP7	2xP55 bats flew past under tree/ hedge line u/s
20.35	LP7	P55 foraging under tree canopy.
20.37	LP7	P45 & P55- several passes as two pips foraging under tree canopy – several circuits
20.38	LP7	1x LH pass along hedge line, followed by noctule o/h
20.48	10	Three pips 2xP45, 1xP55- foraging along hedge
20.56	39	1xP45 pass u/s along hedge.
21.02	LP8	2+P45 flying around trees continual activity until 21.06.
21.08	40	1xP45 Foraging along hedge.
21.11	8	Several passes P45 flying around trees around junction with Perry Lane
21.15	4	1xP55 pass along lane u/s

21.19	LP9	P45 sp. flying from e to w along lane
21.19	LP9	1xPip sp. pass u/s
21.20	LP9	P45 flying under trees several passes
21.22	LP9	P45 flying under trees several passes
21.33	LP10	1xP55 pass u/s
21.34	LP10	Myotid bat flying under trees to east.
21.36	LP10	1xP45 under tree canopies W of me
21.39	41	P 45 Foraging and heading for LP10
21.46	4	1xP45 Foraging along hedge, several passes.
21.51	42	P45 & P55 flying back and forth and foraging along the hedge. 1xLH unseen
22.02	38	Serotine flying along hedge, on both sides of hedgerow. Several passes in and out of the gateway.
22.05	LP4	Continual P45 activity around trees NW of me. Myotis detected, u/s.
22.13	43	1xP55 foraging along the hedge
22.16	43	1xP45 foraging along the hedge
22.25	44	Noctule detected overhead, u/s.
22.31	LP4	Continuous P45 activity E of copse
22.37	43 S side of hedge	Serotine flying back & forth along hedge, 3-5m high
22.44	45	1xP45 u/s
22.58	45 east side of hedge	1xP45 foraging along the hedge, head height up to 3-4m
23.01	27	1x serotine foraging along the hedge
23.06	23	1xP55 passes across gateway from bat foraging parallel to the road.
23.09	26	1xP45 & 1xLH pass along the hedge, unseen
23.14	25	1xLH bat (2 passes) moving in a W to E direction
23.16	24	1xP45 & 1xserotine passes recorded. Bats foraging at the junction of the two hedges
23.25-28	LP2	2xP45 and 2xP55 passes unseen
23.37	LP1	Noctule pass detected, feint, unseen

29/9/15

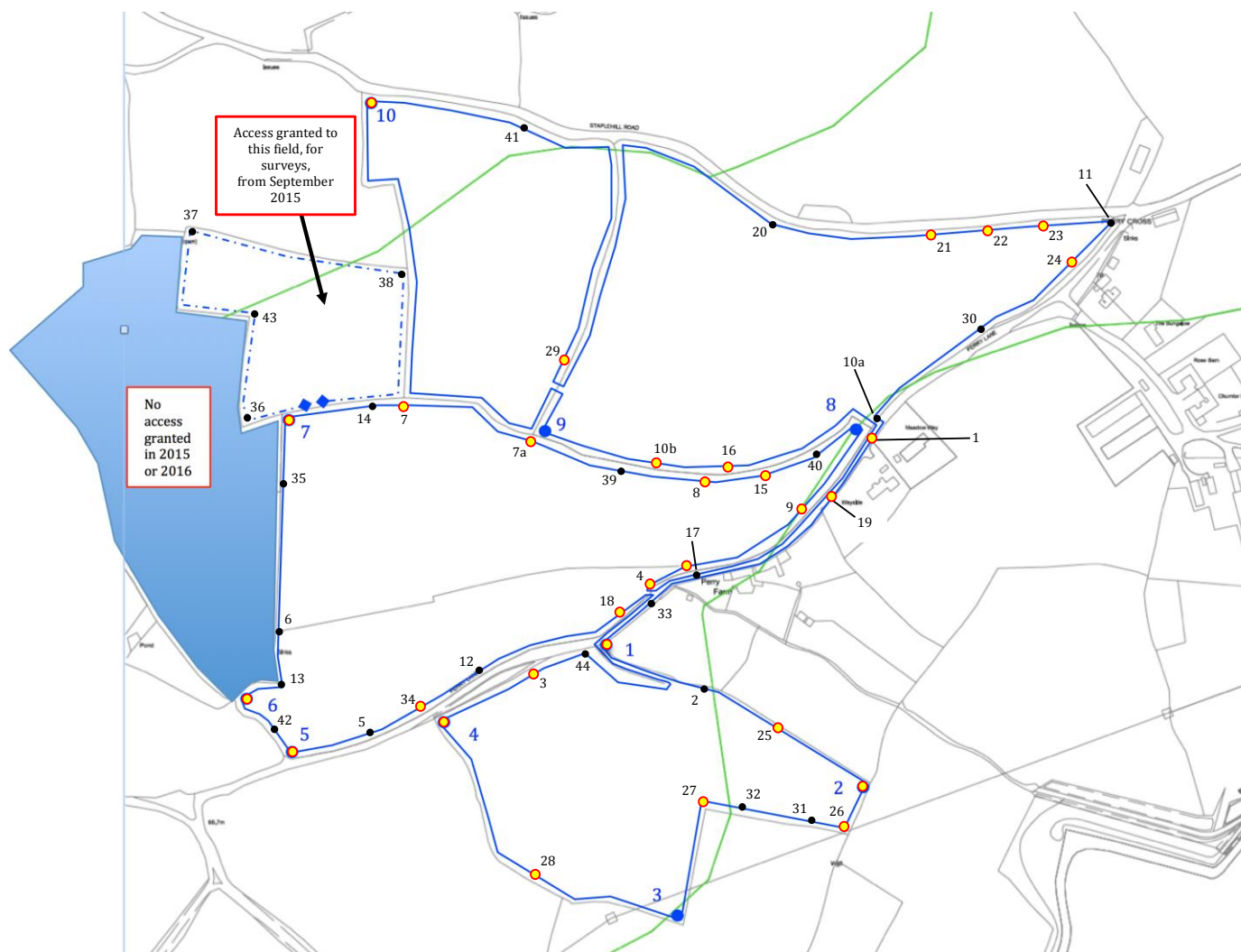
19.11	LP9	P45 flew o/h at tree canopy height along edge of field
19.15	46	Myotis bat flew o/h from W to E above conifers.
19.17	41	P45 flew o/h from W to E as previous
19.31 to 19.35	11	P45 flying under trees along the road, several passes. Continued foraging along the hedge/ trees for several minutes.
19.44	LP1	1xP55 picked up, u/s
19.50	21	1xP45 picked up, u/s
19.55	23	Serotine detected, unseen.
20.02	47	1xP45 & 1xP55 flying along hedge.
20.05	24	Continuous flying activity by P45 in corner of field and along hedgerows.
20.23	LP3	P45 , 1 pass u/s
20.27	28	P55 flying along lane, picked up at gateway.
20.37	48	P45 flying along hedge.
20.42	LP4	P45 and P55 flying continuously around the trees
20.59	LP4	2+ P45 flying W of the copse and around the trees. Myotis also detected, u/s
21.05	49	P45 flying close to and under trees, as there is a strong wind on east side of this hedge.
21.11	LP5	P45 flying continually in and around the barn to 21.14 hrs. Barn is fairly sheltered.
21.20	50	P55 flying around the tree in hedge.
21.23	LP6	Continual P45 flying activity under the trees
21.24-30	Hedge from LP6 to LP7	Continuous P45 activity along hedge.
21.31-34	LP7	Several P55 passes around trees, & 1 myotis bat detected, u/s
21.34 to 21.37	LP7-51	Occasional activity by P45
21.38	51-36	Occasional P45 passes along hedge, & 1xP55 pass
21.42-45	52	Continuous P45 f activity under and around large oak tree in corner of field. Getting very windy at the top end of the field.

7/10/15

19.07-10	Hedge from LP7 to LP6	Regular P45 (5 passes) and occasional P55 (2 passes) activity as approaching LP6. Bats flying just above and along hedge, back and forth.
19.11-13	LP6	Regular P55 activity around canopy of trees within and around copse. At least 2 bats. Logged 13 passes. Also recorded 1xP45 (4 passes) and 1xMyotis (2 passes)
19.17	38	1xP45 passing E of me, unseen
19.19	Passing LP5	P45 active towards the hedge. 3 passes.
19.20-22	LP5	Continuous P45 activity (20 passes). Myotis flew by and did a couple of back and forth flights in the gap between the Dutch barn and hedge (4 passes).
19.23	8	Myotis bat overhead, unseen.
19.23-24	Between 8 & 4	P45 active over the road, unseen. 1 bat, 5 passes.
19.31	49	1xP45 flying on the E side of the hedge
19.32-33	42	P45 from above also foraging here
19.36	32	P55 detected N of me. Unseen
19.37-39	LP4	Occasional P45 and P55 activity. 8 and 2 passes respectively.
19.40-42	LP4- locn 3	P45 activity continuous along this hedge. Only 1 bat seen at any time.
19.43	Bet locn 3 & 44	1xP45 and 1xP55 picked up flying back and forth along the hedge
19.45	44	P45 detected flying S of this location, unseen.
19.46-48	44-43	6xP45 passes from bat flying back and forth along the hedge.
19.49	Passing LP4	P45 active continuously in the enclave W of the copse
19.51	48	P45 detected N of this location
19.52	Bet locn 48 & 45	Picked up 3xP45 passes, unseen
19.53-54	45	As above. Bat(s?) seems to be E of me
20.16	27	1xP55 heard, unseen

20.24	24	P45 detected, unseen
20.40	23	P55 detected W of me, unseen.
21.07	18	P45 detected over greenhouses area, unseen.
21.19	LP9	2xP45 chasing each other along the S side of the roadside hedge, moving W to E.
23/4/16		
20.57	LP3	1xP45 flying along hedge from W to E
21.13	13	Noctule overhead, unseen.
21.41	4	1xMyotis bat flying along road hedge, u/s, followed by 1xP45, also u/s.
21.59	LP4	Continuous P45 f activity around trees for all 3mins, at least 2 bats.
22.18	LP4	Activity above still ongoing.
22.30	LP5	1xMyotis bat detected, u/s.
22.38	LP4	Passing corner on the way to LP6, P45 activity as before.
22.38- 22.42	LP4 corner- LP6	Continuous P45 flying/foraging activity along hedge between LP4 and LP6, same around trees at LP6.
22.43-47	LP6	Regular P45 activity during the listening period. Counted a total of 19 passes.
22.47-55	LP6-LP7	Occasional P45 pass along the hedge between the listening points
22.56-59	LP7	Continuous P45 activity under the trees.
23.01	52	1xP45 flying continuously under the large oak tree on the edge of the field

Map 3 & Table 3:- A detailed map of **Transect 2** showing where bats were encountered, followed by a table of observations collected during the 2015 & 2016 surveys. Locations numbered in blue are listening points along the transect. Those marked by bright yellow/red spots refer to locations where bats OTHER THAN pipistrelles were recorded. All locations relate to those mentioned in the table that follows.



Note:- In the following table, cells highlighted in yellow document observations where lesser horseshoe bats were encountered during our surveys. Those highlighted in orange show where greater horseshoe bats were encountered, and those in light green where bats OTHER THAN pipistrelles were found. All data are for dusk surveys, unless stated otherwise.

26/05/15

21:32	1	P45 unseen, possibly behind tree-line of gardens.
21:38-41	LP1	P45 detected unseen. P45 activity seen up and down road, 1-2m high.
21:42	2	P45 flying SE along track, 3m high.
21:43	2	P45 detected, unseen.
21:52	LP2	P45 unseen, followed by P45 flying SE over gate following hedge-line, turning N over gate, 3m high.
22:21	3	P45 flying 3m high heading W along hedge.
22:25	2	P45 activity detected along track, unseen.
22:27	LP1	P45 foraging over field to north of me and along hedge.
22:31	LP1	P45 foraging to the W up and down the road.
22:38	4	Faint P45, unseen.
22:40	Adjacent LP1	P45 foraging up and down over road, unseen.
22:44	5	P45 foraging up and down over road, unseen.
22:48-51	LP5	P45 foraging on other side of hedge/next field, unseen. 22:49 GHB detected close-by, unseen.
22:58	LP6	GHB detected, unseen.
23:00	6	Faint P45, unseen.
23:05	LP7	Faint P45, unseen.
23:11	7	Bb detected along hedge/tree-line, unseen.
23:12	7	P45 foraging detected, unseen.
23:16	7a	Myotis detected, unseen.
23:21	8	P45 detected, unseen.
23:23	LP8	P45 detected, unseen.
23:29	9	P45 detected over road adjacent, unseen.
23:32	4	P45 detected over road adjacent, unseen.
23:36	4-1	Intermittent foraging while walking up road. P45, P55.

23:39	10a	P45 briefly detected at gate to field from road.
23:41	10b	P45 detected, unseen.
22:56	LP10	P45 detected, unseen.
00:10	11	P45 detected, unseen.
10/06/15		
21:45	LP4	Unseen P45 pass, possibly on road.
21:52-55	LP1	P45 foraging along road and into adjacent field entrance. 21:54 Two P45 passes, unseen.
21:56	LP1-4	P45 pass unseen. P45 foraging near gate, unseen.
21:58	LP1	P45 foraging detected over road adjacent to LP1, not on field side.
	Adjacent	
22:00	12	P45 faint pass over adjacent road.
22:05-08	LP5	P45 and P55 foraging under tree canopy over road, down to the gate and back up the hill.
22:09-10	LP5-LP6	P45 foraging on the other side of tree-line
22:13	LP6	P45 flying NE over tree-line and along tree-line towards 13.
22:13	LP6	GHB pass, unseen, faint.
22:16	13	P45 pass, unseen.
22:22-25	LP7	P45 foraging around canopy of tree in adjacent West field, 4-5m high.
22:27	14	P45 pass along thin low hedge, possibly on other side, unseen.
22:32	7a	P45 faint foraging detected, unseen.
22:23	8	P45 foraging under tree canopy W-E, 2-3m high.
22:36-37	15	P45 and P55 foraging along tree-line and out over field, 2-3m high.
22:38	15-LP8	P45 and P55 foraging out over field from canopy.
22:4	LP8	P55 heading NE over narrow end-hedge followed by P45, 3m high.
22:42	LP8	P55 heading NE over hedge, P45 detected foraging, unseen.
22:46	4	Two P45 foraging over road, near gate to field, unseen.
22:50	9 Adjacent	P45 pass along road, unseen.
22:54	LP8	P45 and P55 activity detected on other side of hedge.
	Adjacent	
22:56	16	P45 detected on other side of tree-line.
23:13	LP10	LE detected, brief pass, unseen.
23:34	11	P45 activity nearby, unseen.
23:42	17	Pip. sp. detected along road, unseen.
23:44	17	P45 pass along road heading NE? Unseen.

00:03	LP1	Full lap of field, no activity.
00:05	4	P55 heading up road towards LP1, unseen.
00:07	18	On field side, detected P45 along road, unseen.
00:10	12	P45 detected foraging on road below this hedge, unseen.
00:17	LP5-LP6	P45 detected, unseen

22/07/15

21:32-37	10b-16	3 Nn foraging in large circular beats over the field, heading E-W and S as far as the lane and N as far as the field boundary. 20m - 2m high.
21:46	9	Nn heading E across field towards LP8.
21:49	17 adjacent (in field)	Nn seen at position 4 heading S over lane to adjacent field. P45 detected probably below hedge on the road.
21:52	4	P55 heading W down the lane towards LP1, 2m high. Nn detected, unseen.
21:56	19	Myotis heading W down the lane under the tree canopies to this position then headed back up the lane to the E.
21:58	19	P45 foraging detected, unseen, possibly in adjacent gardens.
22:01	10a	P45 faint pass, unseen.
22:06	16	Nn pass, unseen.
22:23-26	LP10	Myotis flying around my head on arrival at this position, unseen departure. P45 close pass, unseen. 22:25: LE foraging around me, unseen departure.
22:47	20	2 successive LE passes, unseen.
22:52	21	Serotine pass unseen. P45 foraging nearby, unseen, possibly on the road.
22:54	22	LE faint pass, unseen.
22:55	23	Nn pass unseen. P45 pass unseen.
22:57	11	P45 faint foraging activity, unseen.
23:00	24	GH pass, unseen, maybe on road side. Missed recording.
23:06	1	GH pass on the road, faint, unseen.
23:13	LP1	2 successive passes by GH, unseen. May have changed direction on the road.
23:17	25	LE pass, unseen.
23:18	25	LE pass, unseen.
23:23	LP2	P45 pass, unseen.
23:26	26	2 successive LE passes, unseen
23:31	27	3 successive LE passes, unseen.
23:42	28	LE pass, unseen.

23:55	3	LE pass, unseen. P45 pass, unseen.
23:57	LP1	P45 pass on the lane.
00:05	LP5	P45 crossing the corner of the field from the road hedge to the field boundary tree-line.
00:10	5	P45 pass back and forth detected, probably on the road.

28/08/15 Dawn

5.28	LP5	2 passes by Pip. sp. unseen.
05:31	LP5	2-3 Pips seen foraging above trees at LP5. Pip. sp. recorded.
05:46	7-7a	P55 commuting west along hedge, 2m high.
05:47	7a	P55 loop from east to west and back with foraging along hedge

28/08/15 Dusk

20:41	29	Noctule detected, unseen.
20:58-21:00	30	P45 foraging 8m high continuous around canopy.
21:04	19	Serotine detected, unseen.
21.11	LP1	2xP45 passes, detected together, unseen.
21:23	LP2-26	Myotis detected, unseen.
21:25	26	P45 foraging east along hedge. P45 detected, unseen.
21:26	26	3 P45 passes detected, unseen.
21:50	LP1	2 P45 detected, unseen.
21:53	4	P55 detected, unseen.
21:56	12	P45 detected, unseen.
21:58	12-5	Serotine detected, unseen.
22:02-06	LP5	Myotis detected, unseen. P45 detected, unseen. Noctule detected, unseen.
22:09	LP5-LP6	P45 detected, unseen.
22.12	LP6	2 P45 detected, unseen.
22:27	7a	P45 detected, unseen.
22:31-33	8	P45 3m high and 5m out from hedge, heading west. 2 P45 detected, unseen. P55 detected, unseen.
22:45	9	2 P55 with social calls detected, unseen.
22:48	4	LE detected, unseen. Pip seen foraging at canopy height above road, not detected.
22:51-52	1	2 P55 with social calls detected, unseen.
22:55	10a	P45 detected at gate, unseen.

23:01-02	10b	P55 detected x 2, unseen.
29/09/15		
19.18	LP1	P45 came in from Perry Farm direction above tree canopies, flying along valley. Note hedge leading s from Perry Lane to LP2 flailed
19.25	LP2	P45 flew past going w - e, to s of me at 6-7 m high
19.26	31	1x P45 and 1x P55 chasing each other around tree canopy, bats went off to s and e. P55 returned under canopy of tree on corner.
19.31	32	P55 following hedge from nw heading to se
19.34	LP3	no activity, windswept
19.43	LP4	sheltered, long eared came from w up to me along hedge then headed back westwards. Peak freq 31 - 38 kHz.
19.45	LP4	Can still occasionally see LE bat silhouetted flying continuously on other side of hedge. Moving on to LP5.
19.53	33	picking up P45 to e towards Perry Farm, unseen
19.55	18	Myotid along tree canopies /along road, came from west, unseen
19.56	12	P45 activity to the west of me , unseen
19.58	34	long eared low-frequency calls detected, seen bat in silhouette along lane flying e - w, followed by medium sized Myotid flying w - e.
20.01	LP5	P45 to west near blind corner under big trees unseen 11x passes in total. Just as I left gate picked up GHB foraging along edge of tree line that leads to the bottom of the steep field
20.13	6	P45 flew over following hedge n - s
20.14	6	P45 flew in opposite direction and then flew back n- s, 4 passes in total
20.23	35	P45 foraging e- w along tree line towards LP7 plus social calls
20.24-25	Approaching LP7	2x P45 flying back and forth along treeline to east of me, foraging continuously and social calling
20.26-29	LP7	P45s had an average of 15 passes/ minute, 40 - 50 recorded over listening period, mainly 1 bat sometimes 2, including flying/foraging into next field (new permission) to N.
20.31	36	Found P45s foraging in sw corner of field
20.35/36	37	Continuous P45 activity in orchard and in tree belt to the n east
20.38	38	P45 continuous activity foraging around canopy
20.45	LP7 again	P45s still continuous foraging. Moon out. Gets very windy as one leaves LP7 and heads E. No bat activity.
20.46	7	2x P45s foraging on e side of canopy

20.51	7a-39	P45 foraging continuously, at least 3 bats 1x p45, medium sized myotid peak freq 45khz all flying on w side of tree canopies.
20.55	39	2x P45 foraging down hill of me in lee of trees
20.57	8	Barbastelle unseen no direction
20.58	15	myotid flying ne-sw along hedge
20.59	40	P45 foraging in enclave, where cattle are bedded down.
21.01	40-LP8	P45 foraging activity along the road and opposite side of road to s.
21.06	LP8	P45 came from the NE along the road plus social calls
21.08	Opposite 19	P45 to s of me unseen
21.12	4	3x P55 passes unseen to s of me or along lane
21.15	10a	P55 and P45 foraging around tree canopies and in gardens, at least 1 of each
21.22-25	LP9	P45 activity downhill of me, S of trees and hedge. 17xP45 passes counted.
21.32-34	LP10	P45 activity under big ash tree to w. P45 and P55 several passes, P45 came from w and headed back in same direction
21.38	41	P45 coming from river bottom unseen
21.44-58	41-car	walked back in v windy conditions. Easternmost maze field windswept, no activity until end of transect.

07/10/15

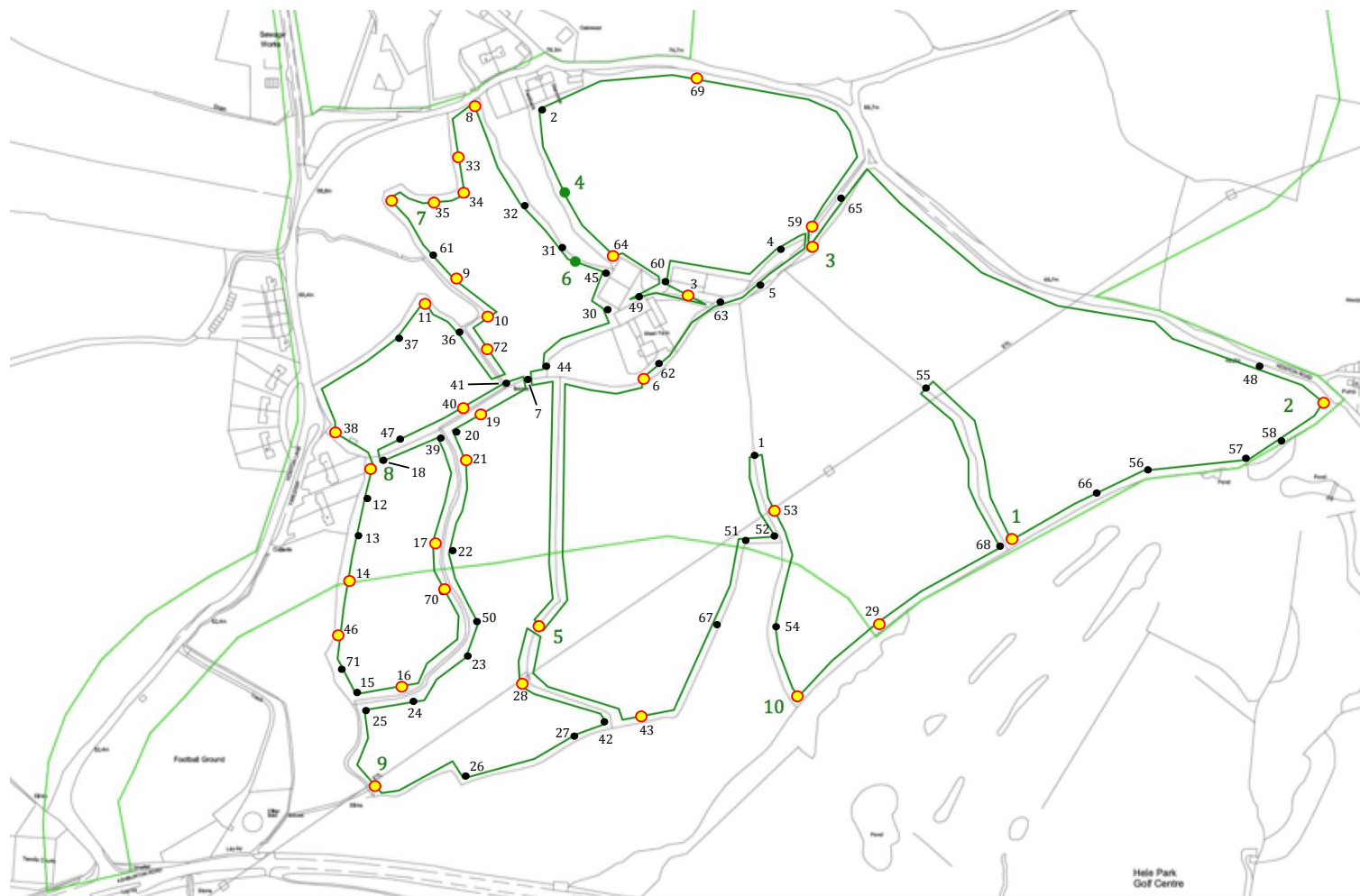
19:08	18	Nn flying E-W across centre of field towards and beyond large tree. Second Nn seen foraging above old field boundary at bottom of valley. Third Nn heading E-W across field.
19:15-18	LP5	19:18- GH seen foraging near fallen tree at edge of field (locn 42). No recording- too far for detector.
19:19	42	P55 foraging along top of tree line.
19:21-24	LP6	P45 travelling from 13 towards LP6 then returning. P45 foraging loop out over the field from 13. GH detected briefly, unseen.
19:27	6	P45 detected, unseen. Second pass, unseen.
19:37	LP7	GH detected while crossing gate/fence. No recording.
19:42	43	P45 pass, unseen.

23/04/16

20.51	LP4	1xP45 commuting along the hedge in a W direction
20.54	44	1xP45 detected, unseen

21.06	LP5	1xP45 detected, unseen. Foraging too- feeding buzzes heard
21.14	LP6	1xP45 detected, unseen. Foraging too- feeding buzzes heard
21.19	35	1xP45 detected, unseen
21.24	LP7	1xP45 detected, unseen
21.37	LP8	1xP45 & 1xP55 detected, unseen
21.52	24	1xP45 detected, unseen
22.38	1	1xP45 detected, unseen

Map 4 & Table 4:- A detailed map of **Transect 3** showing where bats were encountered, followed by a table of observations collected during the 2015 & 2016 surveys. Locations numbered in green are listening points along the transect. Those marked by bright yellow/red spots refer to locations where bats OTHER THAN pipistrelles were recorded. All locations relate to those mentioned in the table that follows.



Note:- In the following table, cells highlighted in yellow document observations where lesser horseshoe bats were encountered during our surveys. Those highlighted in orange show where greater horseshoe bats were encountered, and those in light green where bats OTHER THAN pipistrelles were found. All data are for dusk surveys, unless stated otherwise.

Date & Time	Transect Master Location (TML)	Observations
26/5/15		
21.39	LP3	P45 coming in from farm, pip flew off along track to east.
21.46	2	P 45 1 bat foraging
21.55	3	1 poss. 2 P45 foraging back and forth on open ground under the open barn roof
21.57	4	P45 activity foraging in lane just to the south, at least 2 bats
21.59	5	Both P45 and P55 foraging over the track, one P55 and at least 3 P45's
22.09	6	Myotid peak freq 38 bat flying westwards from house, very fast at 3m high
22.18	LP5	Pip sp. Unseen
22.23	7	P45 foraging around tree canopies to the west of me
22.33	8	P45 foraging to the north of me, unseen
22.35	LP7	P55 overhead unseen.
22.40	LP7	P45 foraging overhead
22.42	9	P45 and P55 chasing each other maybe. Myotid as well. Bats unseen
22.45	10	P45 foraging, several passes then took off heading north
22.50	11	P45 foraging to north of me with crazy cattle
22.58		
23.03	12	P45 foraging back and forth along tree canopies, 1 bat at 4-5 m
23.04	13	P45 foraging along tree canopies
23.06	14	Just caught a glimpse of a LE flying N-S at 4m high along edge of canopies, and P45 foraging overhead at same time
23.09	15	P45 and P55 foraging overhead unseen

23.11	16	2xP45 and 1xmyotid recorded, unseen, S of me
23.18	17	P45 flew past n-s following stream at shoulder height
23.21	18	P45 foraging continuously in this corner nw corner of field
23.26	19	P45 and p55 chasing each other overhead unseen plus P45 social calls.
23.30	20	Both P45 and P55 foraging along s side of hedge in field I have just crossed on n boundary
23.33	21	at least 2 poss 3 P45s foraging back and forth over area. 1x Barbastelle recorded, unseen.
23.36	22	P45 activity continuous, 1 bat flying s-n along hedge W of me, unseen
23.37	23	P45 flying in opposite direction
23.39	24	picking up P45s ahead of me, foraging lots of feeding buzzes
23.40-41	25	picked up P55 bats chasing each other overhead, poss myotid
23.43-46	LP9	continuous P55 foraging activity here. 28 passes from same P55, maybe 2 going back and forth across field recorded 2 poss 3 bats
23.48	26	P55 flying along s boundary of field, unseen
23.49	27	note another P55 flew w-e along s boundary half way along field, unseen
23.57	28	Weak long eared call. Bat flying very low along & over hedge just S of pylon Took off heading east along hedge.
00.11	29	P45 flying w-e overhead unseen
10/6/15		
21.51	30	P45 first bat arrived from w along bottom edge of field, foraged for 1min then left
21.56	31	P45 and P55, 1 pass of each along thin triangular scrubby area
21.57	32	P45 between me and top road, foraging back and forth along north eastern side of field (in lee of hedge)
22.00	33	P45 on other side of hedge to w of me, heard not seen
22.02	34	bat to w of me P45 recorded
22.04	35	P45 foraging on other side of hedge
22.05	LP7	P45 flying from foraging area southbound along hedge between stream and western edge of field heading towards houses.
22.07	LP7	Serotine came from n and flew over my head heading s, then left in westerly direction, 1 bat
22.09	9	feint P55 activity to s of me, unseen
22.13	36	feint P55 pass just to n of me, unseen

22.14	11	P45 foraging on other side of hedge, approx. 6 passes
22.15	37	P45 foraging along hedge on front of me, heading SW, single bat 5-8m from hedge under 5m high
22.18	38	P45 foraging over open lozenge area in front of the houses W of locn (on transect 4), also occasional P55 pass recorded.
22.21	LP8	feint P45 unseen
22.26	14	feint P45 unseen
22.27	15	both P45 and P55 foraging continuously in the field to w of me between me and the cricket pitch. On windward side at this location, therefore bats are leeward of the hedge.
22.29	16	3 recordings, at least 2x P45s and 1x P55 foraging to the w of me, unseen.
22.31	17	Slower Pip at 41 KHz. Recorded it. Nathusius's Pip. Unseen.
22.37	39	P45 flying in w direction unseen
22.39	LP8	v low frequency (40 KHz), slow beat pip, unseen. IDed as Nathusius's pip.
22.41	40	both P45 and P55 foraging around big trees
22.45	41	2 P45s bats on S side of river crossing foraging between me and w corner of field @ Locn 20
22.48	19	Barbastelle recorded, unseen.
22.52	23	P55 to sw
22.57	LP9	P55 flew over hedge from W now foraging between me and corner of fields to the N, 1 bat. Feint P45 to NW of me on other side the of hedge
22.58	LP9	Total of 5x P55 passes and 1 P45, moving on
23.01	26	P55 activity to S of me on other side of hedge, 1 bat unseen.
23.03	27	P45 detected to S of me, unseen.
23.04	42	P45 foraging under and around tree crown.
23.15	43	Long-eared bat detected, travelling E-W along S hedge, unseen
23.48	LP1	2x GHBs travelling E along hedge
00.14	LP3	P45 to w in shelter of tree belt

22/7/15

22.02	LP3	GHB came from the E and flew down lane, westwards, about 1m high
22.02	LP3	A GHB flew W-E along the lane, as it went past I swivelled around and bat flew about head height up lane, heading E and staying low within the lane

22.12	2	P55 came up hill from s, 7-8m high, turned and headed E across back of gardens. Field is cattle grazed 6-8 young bullocks
22.20	3	1xmyotid bat detected, joined by P45 in background, bats unseen.
22.22	3	1x P45 active S of me along lane , unseen
22.27	5	At least 1xP45 active on the farm yard N of me, unseen.
22.30	6	P45 overhead, unseen
22.50	44	P45 to w of me, unseen
22.53	45	P45 unseen. Note- pastures are all interconnected, 20 -30 cattle
22.55	45	1xP45 bat unseen came from n along w side of trees then headed across to corner of building to w of me
23.13	9	P45 active under big oaks just to s of LP7, continuous activity along the stream.
23.15	10	P45 foraging just round corner, heading towards drainpipe
23.23-26	LP8	Single P45 came from the S, foraging along e side of tree line, then headed off ne.
23.27	12	2xPip sp., foraging, unseen.
23.30	14	P45 overhead on E side of treeline. Bat unseen
23.32	46	P45 activity, continuous, unseen. Just seen a badger.
23.40	LP8	P45 foraging overhead, unseen
23.41	47	P45 activity overhead bat unseen
23.51	24	P55 running along the edge of field westwards, unseen

28/8/15 Dawn

04.59	LP2	Myotid unseen to the S of me
04.59	LP2	LH unseen, again to the S of me.
05.03	48	P45 coming down the road from the N, and heading to LP2

28/8/15 Dusk

20.28	30	P45 flying and foraging along edge of buildings
20.28	30	As I approached gate P45 emerged from big barn to nw of me, and second one emerged from holes with missing tins in side wall. Now foraging along back of barns

20.30	49	P45 flying between the two barns
20.40	LP3	P55 coming from direction of house heading e along lane under tree canopies , plus noctule overhead unseen
20.41	LP3	another P55 pass, u/s
20.52	LP5	LHS overhead coming from pylon direction heading ne on n side of hedge
21.07	50	P55 came round corner from sw then headed back to LP9
21.11	LP9	P45 pass, unseen, plus serotine in the background
21.13	LP9	second P45 pass. Bat still unseen.
21.34	51	feint P45, unseen
21.36	52	P45 came from n along hedge heading s, unseen
21.40	53	small Myotid came from s following hedge did 2 circuits of me then headed off to w.
21.42	54	P45 flying w-e
21.44	LP10	P45 came from w following main tree line between me and Hele Park heading e, unseen
21.45	LP10	GH came from the E, following hedge. Came to within 5m of me then turned round and headed back e.
21.52	55	P55 came from n following e side of hedge towards Hele Park
21.59	LP1	P45 came from e to my corner foraged , social calls then headed back e
22.02	56	2x P45 chasing each other along hedge heading e - w, 4m high under tree canopies
22.04	57	P45 travelling e-w along hedge
22.05	58	P45 activity ahead (E) of me
22.06	LP2	3x P45 passes, followed by additional 4x P45 passes by 22.09
22.24	59	GH detected, unseen
22.25	59	P45 activity further to w of me on side of field towards big trees, another P45 pass came from w.
22.26	59	Feint GH calls to w (towards Locn 4), with P45 foraging overhead
22.32	LP4	3x P45 passes. All 3 bats come from housing direction out over field to forage, then headed back n
22.42	60	P45 foraging between barns on my RHS (to west), 1 bat
22.43	3	Bat flying and foraging between barns P45 x4 passes, flew out into lane and back to straw barn
22.48	32	feint P55 to n unseen
23.00	LP7	P55 coming along hedge from s- n, unseen
23.01	61	picking up P45s further down hedge from me
23.04	41	both P45 and P55 flying and foraging around trees, 1 of each.

24/9/15

19.33	62	1xP55 flew past the front of Mead Farm. Came from the NE and headed in NW direction
19.35	63	1xP45 foraging back & forth (b&f) over farm yard N of me. Seen silhouetted a couple of times.
19.36-37	5-LP3	1xP45 flying b&f along the lane, 2-4m high
19.41-43	3 & 49	2xP45 and 1xP55 flying and foraging b&f over the yard, and in & out of the open barns
19.45	64	1xGHB came out of the thin triangular copse, past me, and headed off in a W direction along the back of the barns
19.47-50	LP4	3min stop. Occasional P45 passes detected here (7 in total over the LP), all S of me, but none seen
19.52	2	1xP55 flying around the cottages N of me, seen silhouetted a few times.
20.00-03	LP3	3min stop. Picking up occasional P45 passes from down the lane. 4 times a P45 came up to me, flying up the lane, then headed back towards locn 5
20.05	65	1xP45 flew past, came up the lane and headed off towards the road junction
20.14-17	LP2	3min 20.14- 1xLH unseen S of me, followed by 2xP45 passes, also u/s 20.15- 3 more P45 passes, u/s 20.16- 3 more P45 passes to the S, u/s
20.21-22	66	Picking up 2xP45 active around the tree canopies above. Occasional glimpse of the bats 5m up or more.
20.24-27	LP1	3min stop 20.25- 1xP45 passes to the S of me, u/s
20.36-37	29	1xGHB came from the SW, flew past along the hedge, heading in NE direction.
20.39-42	LP10	3min stop 20.39- 1x myotis detected, u/s 20.40- 1xP45 flew past along N side of hedge, from the SW, heading NE 20.42- 1xLE detected in canopies overhead, u/s
20.56	LP5	Going through gap into field NW of me
20.59	42	1xP55 flying around the tree at the corner, did not see it leave.
21.02	26	1xP55 detected S of me, u/s
21.04-07	LP9	3min stop. Picking up continuous P45 & P55 activity to the W of me. Bats were not crossing into the field I am in. Could not tell how many.
21.10	24	1xP45 flew past me heading NE along the hedge, at 3-4

21.14	22	Picking up P45/55 activity N of me
21.16	21	1xP45 & 1xP55 flying b&f between locns 20 & 7
21.18-22	20-7-40	As above
21.20	18	1xP55 detected towards locns 12/13, u/s
21.21	39	Picking up continuing activity as at 21.18-22
21.26	16	1xP45 detected S of me, u/s
21.29	46	1x myotid detected, W of me, u/s
21.30-33	46-12	1xP45 & 1xP55 flying b&f along the back of the houses and along the main tree line. 2-6/7m high
21.34-37	LP8	3min stop. Non-stop activity 2xP45 and 1xP55 flying as above, over the monitoring period. Unable to differentiate one pass from another.
21.42	11	1xMyotid detected, u/s
21.43-46	36-41	P45 & P55 active as at 21.18-22
21.48	10	Picking up serotine activity N of me
21.50	9	1x serotine flying b&f over the w edge of the field. Mainly flying from me to LP7 N-wards.
21.52-55	LP7	3min stop. Serotine went past 11 times over the 3min period. 21.54- 1xLE detected overhead, u/s
21.56-22.00	35-8	Picked up the serotine flying mainly S and W of me all the way here
22.04	31	Picking up P45 activity S of me
22.07	30	2xP45 flying in and out of barns E of me

07/10/15

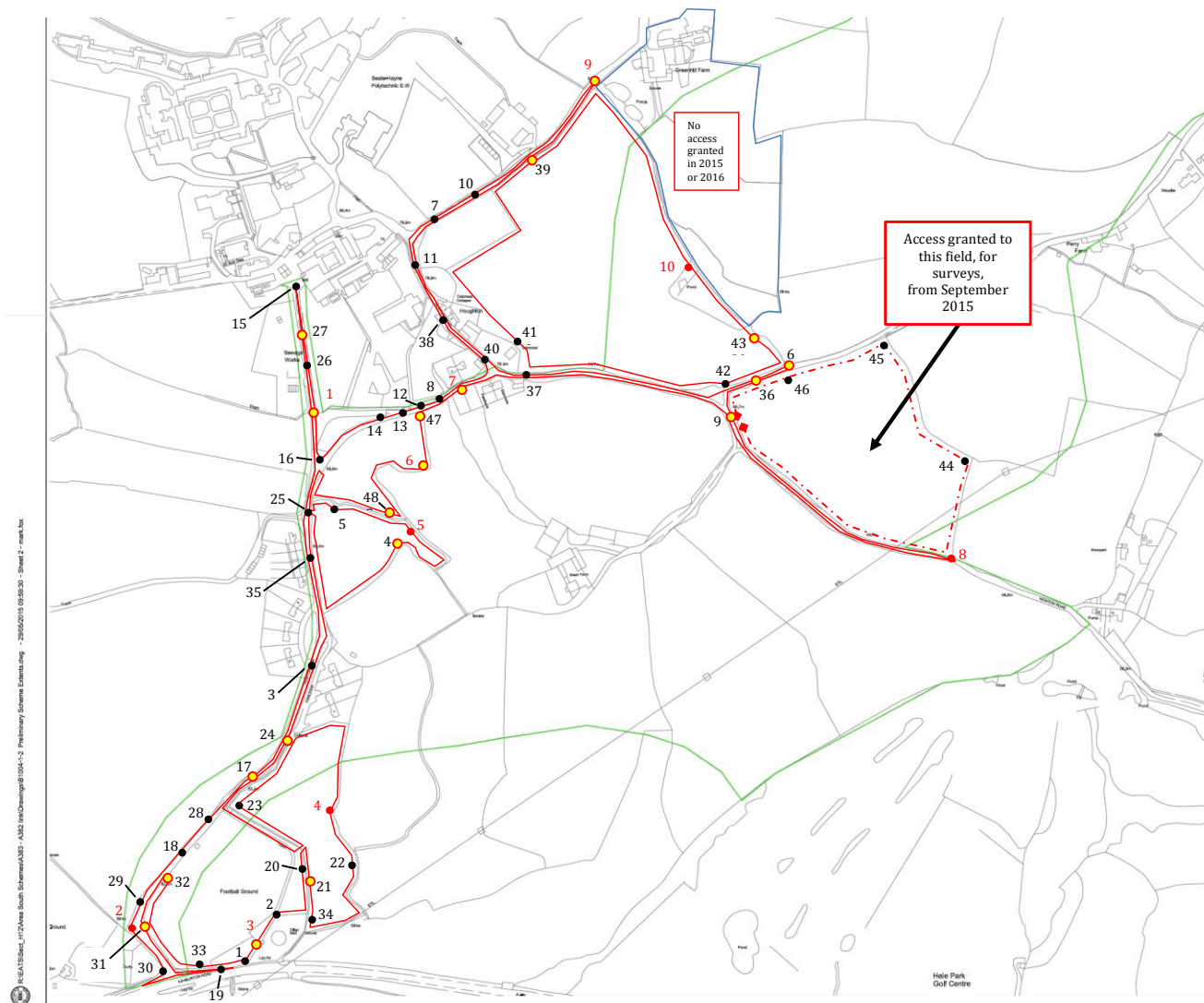
19.20	67	P55 came from n heading s along hedge between me and LP10
19.35	68	Feint Pip sp. to east, u/s
20.17	69	feint long eared to n of me
21.02	38	Myotid call towards LP8 unseen

23/04/16

21.00	1	1xP45 following the hedge, coming from the farm and heading for Hele park
21.23	LP9	1xP45 on the W side of the hedge from me, unseen, flying

21.24	LP9	1xP45 coming along the hedge from W of me, flew over the top of the hedge and headed off roughly SW
21.41	40	Myotid flying W-E along the hedge, unseen
21.49	70	LE flying along the hedge, N-S, at roughly 3m off the ground
21.54	71	P45 activity to the W of me, bats (2 min) flying quite low & not showing above the hedge currently. Social calls too.
21.56	46	1xP45 above now at the S end of the big tree line behind the houses
21.57	46-14	bat above also active within the first 20m S of the big tree line, on my side of the hedge, foraging at 2-6/7m height and going back and forth between the W and E side of the hedge.
22.15	72	Myotid overhead, unseen, seemed to come from the N.
22.17	10	1xP45 flying to the E of me in the gap between the hedge and the large tree in the field, unseen.
22.47-50	3/49/60	2xP45 flying back and forth across the farm yard and in and out of the open-sided farm buildings
23.01-04	2	Watched 2xP45s flying back and forth along the NW corner of the field, and occasionally heading to the houses N or the location. Foraging and social-calling continuously.

Map 5 & Table 5:- A detailed map of **Transect 4** showing where bats were encountered, followed by a table of observations collected during the 2015 & 2016 surveys. Locations numbered in red are listening points along the transect. Those marked by bright yellow/red spots refer to locations where bats OTHER THAN pipistrelles were recorded. All locations relate to those mentioned in the table that follows.



Note:- In the following table, cells highlighted in yellow document observations where lesser horseshoe bats were encountered during our surveys. Those highlighted in orange show where greater horseshoe bats were encountered, and those in light green where bats OTHER THAN pipistrelles were found. All data are for dusk surveys, unless stated otherwise.

Date & Time	Transect Master Location (TML)	Observations
26/05/15		
21.52	1	P55 foraging between me and road along thickly wooded southern boundary
21.55	LP3	continuous P55 activity at least 2 bats, 51 passes and 23 feeding buzzes
22.00	2	P45 overhead in tree canopies, 3 passes bat unseen
22.07	LP4	P55 flew in behind me heading n along w side of hedge, tawny owl calling from trees
22.22	3	P55 foraging ahead of me, unseen
22.33	4	P45 overhead unseen
22.41	5	P55 to w of me unseen
23.12	6	1xP45 flying & foraging N of me. 1x noctule heard NE of me, both unseen.
23.25	7	1xP45 flying up and down the road (for about 40m from here towards LP9) under luminaires. Headed for LP9 eventually.
00.10	7	Bat active as above
00.14	8	1xP45 active over the sports centre car park, unseen
17/06/15		
22:06	9	Road junction, faint P45 unseen.
22.06-09	9-6	Road junction down to Perry lane. Two P45 foraging at junction under small tree canopies, and 1xP45 foraging up and down lane, 2m high.
22.09-10	6	Two P45 and P55 foraging over lane back and forth past gateway.
22:11-13	6-9	Two P45 and P55 foraging up and down lane and at junction.
22:26	10	P45 pass unseen.

22:31-34	LP9	Brief two P55 foraging at the field corner S of me corner of field, unseen. Intermittent foraging by two P45, unseen.
22:54	10	Faint P45 pass unseen.
22:56	11	Tawny owl in the trees near amenity area
23:03	12	P45 heading east up road, 2m high.
23:05	13	P45 pass on road with feeding buzz, unseen.
23:07-09	14	2-3 P45 foraging and social calls. Very windy from the NW across field to road. Wind protection from the poplar trees affording good foraging for bats along road section between 12 & 14.
23:10-13	LP1	Can still detect foraging P45 around corner behind polar trees on road.
23:17	15	Brief P45 pass, unseen.
23:18	15	Brief foraging P45 detected towards the eastern barns.
23:22	LP1	Foraging by P45 detected around corner on road. Windy at this gate.
23:23	16	Two P45 foraging over road, unseen.
23:27	3	Brief P45 pass along road, unseen.
23:29	17	Faint P45 detected, possibly over adjacent field to either side of me.
23:32	18	Brief P45 pass along road, approaching me, unseen.
23:36-39	19	Intermittent foraging by P45 detected from field to N of me.
23:42	LP2	P45 pass, unseen.
23:46-49	LP3	P45 and LE detected over sewerage treatment area. Continuous foraging by LE.
23:54	20	P45 detected foraging, unseen.
23:57	21	P55 foraging under tree canopies along hedge, unseen.
23:59	22	P45 pass, unseen.
00:00-03	LP4	Two P45 pass, unseen.
00:05	Adjacent 17	From field, two P45 briefly detected over road or next field.
00:06	23	P45 foraging in corner near trees along banked hedge, unseen.
00:07	23-20	Continuous P45 foraging along tree-line, unseen.
00:10	24	P45 detected foraging nearby, unseen.
00:25	5	Brief P45 pass, unseen.
00:26-28	25-16	Two P45 foraging near road, unseen.

22/07/15

21:29	10	Faint P45 briefly detected, unseen. Within tree canopy to north of road.
21:31	7-11	P45 foraging back and forth above the road and under the tree canopies, cutting the corner across the field to position 3, 3m high.
21:40-43	LP1	20:40 Faint P45 foraging, unseen. Probably on the road near position 6. 20:43 P45 heading north from road past me and over gate heading up the lane towards the farm, 3m high
21:43	LP1	P45 foraging to the east of me on the boundary of the field, 4m high.
21:46	26	P45 activity nearby, unseen. Followed by P45 foraging down the lane from north to south, then east over hedge to field.
21:46	26	P45 flying up and down lane from north to south. Two P45 seen chasing each other from lane south east over field.
21:48	27	LE came from west behind single tree canopy, fluttered over lane, around me and back into tree canopy, 2-3m high. P45 foraging between positions 27 & 15.
21:54-55	26 & 27	P45 foraging along track and to the west, 4-5m high.
21:56	LP1	2 P45 foraging over road and S towards locn 16
21:57	16	P45 heading south down road towards position 19, 2m high. P45 foraging back and forth between 16 & 25.
22:06	3	P45 heading north along road and cutting across hedge towards houses, 2m high.
22:11	17	P45 foraging activity nearby, possibly below hedge to the east of me.
22:12	28	P45 foraging near oak tree next to track junction to sports field.
22:12	18	P45 flying along the road north east towards position 28, 3m high.
22:14	29	P45 foraging back and forth above road, nearly to position 18.
22:22	30	P45 foraging detected, probably on other side of hedge to sports area.
22:24	31	Es pass, unseen
22:25-27	31	Five GH passes, unseen. Must be on the other side of the edge over the sports area, not seen along road.
22:29	32	On the steps pointing down into sports area. GH pass close by, unseen. P45 foraging activity nearby.
22:33	33	P45 pass, unseen, probably over vegetation strip between here and road.
22:34-37	LP3	LE briefly detected on arrival, not recorded, unseen.
22:41	21	P45 pass along hedge, unseen. Nn pass unseen.
22:42	34	P45 pass under large ash tree in corner, unseen.
22:52	Adjacent 17	In the field adjacent to position 10, P45 detected, unseen.
22:59	3	Two P45 passes nearby, unseen.
23:02	35	P45 foraging back and forth along road under street lamp.

23:07	4	P55 brief pass, unseen.
23:15	25	Two P45 passes with foraging, unseen.
23:27	12	P45 foraging back and forth along road, unseen.
23:47	9	LE pass unseen.
23:51	36	Myotis detected, unseen.
23:59	37	P45 brief pass, unseen.
00:01	38	P45 pass back and forth over road, unseen.
00:03	11	P45 pass, unseen.

28/08/15 Dawn

05:30	10	P45 foraging along road under or within tree canopies, unseen
05:31	7	P45 foraging near bend on road, unseen.

28/08/15 Dusk

20:29	21	P45 heading north along hedge towards road, 2m high. P55 pass between me and hedge, unseen.
20:32	34	P55 foraging under canopy of ash tree and out over field. 1-3m high.
20:43	23	Brief P45 detection, unseen.
20:44	23	P45 heading north towards me, foraging loop at the corner of the field then continued north over the road to the next field, 3-4m high.
20:49	24	Es came across the field to the north of me, crossing the road and next field heading south towards football pitch, 3m high.
20:53	35	Two passes by P45 along road, unseen.
20:59	4	LE unseen pass.
21:09	16	P45 came across treeline and field next to road and bent flight path heading towards LP1, 5m high.
21:22-25	LP7	2123: GH pass heading south through copse, came across road in line with house and garden, 2m high. 2125: brief P45 foraging detected, unseen.
21:28-29	37	P45 detected, faint, unseen. P45 seen heading west along road towards cross roads, 3m high.
21:32	9	P45 foraging back and forth over the junction area, 3m high, 3 passes.

21:52-54	6	On arrival, P45 travelling S along tree-line from field to gateway, crossed lane heading SE. P45 travelling in opposite direction down tree-line. 21:54: Myotis travelling S along tree-line towards lane, then continued along lane heading SW. P55 detected, unseen.
22:00	38	P45 pass on the road, unseen.
22:03	11	P45 foraging near trees and buildings, unseen.
22:15-19	LP10	2 P45 pass unseen.
06:43	39	LE unseen pass.
22:31-33	38	P45 and P55 foraging back and forth along road, 2-3m high. Unknown bat pass.
22:34	40	P45 foraging back and forth over road junction.
22:35	LP7-12	P45 foraging over road, unseen.
22:41	LP1	P45 pass across gateway, heading S towards position 16, 2m high.
22:44	26	P45 foraging detected in adjacent field E or W of track.
22:45	27	P45 foraging back and forth between locns 26 & 27. 4m high and over adjacent fields.
22:48	15	Faint detection of P45 foraging, unseen.
22:52	35	P45 foraging back and forth near single street lamp, 2-3m high.
22:55	3	P45 intermittent foraging detected, unseen.
22:57	17	P45 pass heading N across road.
22:59	32	2 Myotis sp. passes unseen.
23:03	17	Faint, brief P45 activity detected, unseen.
23:05	3	P45 foraging detected, unseen.
23:06		Finish.

24/09/15

19.30	34	P45 detected unseen, to the W of me
19.33	20	Picking up P45 active S of my location
19.36-39	LP3	P45 active continuously over the sewage tanks and along the tree-line S of me. Occasional pass by P55 too. Occasional glimpse of bats at canopy level.
19.40-42	1-33	Still picking up P45 activity along S boundary
19.48	19	Picking up P45 activity N of me, unseen
19.53	LP2	1xP45 flying between me and locn 18, going from tree crown to tree crown along the road, 2-4m high
19.55-58	LP2-28	Followed bat above along the road. It is flying up to Locn 28, then heading back

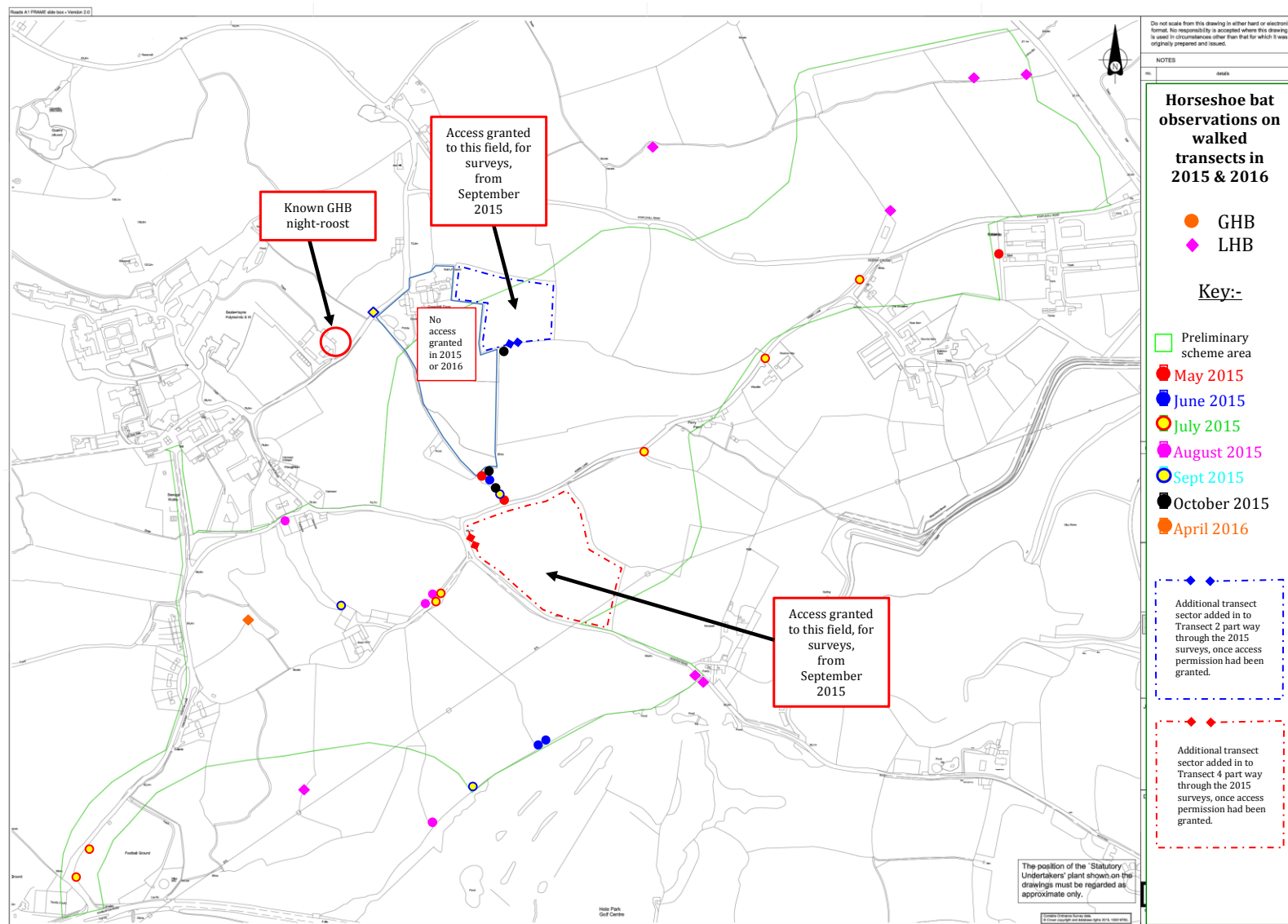
20.01	24	1xP55 flying over the field and along the S side of the last house E of me
20.03	3	1xP45 flying over the green above. Came from the E. over the gate to T3, did one circuit of the green then headed S
20.04/05	35	1xP45 flying from here to Locn 25, then headed E to Locn 5
20.08-11	LP1	20.08- Noctule detected W of me, unseen. 20.10- Picking up P45 activity E of me, unseen.
20.14	27	1xP45 appeared from the N, circled overhead, then headed off in SE direction over the pasture, 2-4m high
20.23	14	Picking up P45 activity to the N of me, as well as to the S towards LP6, both sets unseen.
20.29	12	1xP45 active over the road and along vegetation to the W. Gradually moved to the NE
20.31-33	7-39	1xP45 foraging b&f along the road, under the luminaires. Same bat as above?
20.38	41	1xP55 detected W of me, unseen
20.42	42	1xP45 and 1xP55 flying along tree overhead and towards field corner E of me.
20.44	43	1xmyotid detected, unseen
20.47-50	LP10	3 min stop
20.58	39	1xP45 still active over the road between here and Locn 10. Flying from 2-7m or so high
21.01-04	LP9	21.01- 1x myotid detected. 21.03- 1xLH detected. Bat came from the S, went round me and then headed N into orchard.
21.07-11	39-11	1P45 active along the road as before
21.12/13	38	P45 detected over the sports centre car park, unseen
21.14	40	1xP45 detected S of me, unseen
21.15	37	1xP55 seen flying along the back of the cottages W of me
21.22	36	P45 detected, unseen
21.23/24	6	P45 flying along the tree canopies immediately N of me
21.25	36	1x myotid came from W and headed off down Perry Lane, unseen
21.32-35	Adjacent to LP8	Monitoring activity from inside new field.
21.38	44	1xP45 picked up travelling from the E towards the NW, u/s.
21.41	45	P45 detected N of my location, moving fast in NE direction (on the road?). u/s.
21.44	46	1xP45 flying SW-NE, N of me along tree canopies. u/s.
21.51	37	1xP55 flying at the back of cottages W of me, u/s
21.53-56	LP7	Serotine occasionally detected SW of me, u/s. Also P45 and P55. No numbers. All unseen.

21.58	47	Crossing into field to LP6, picking up Serotine activity SE of me, unseen. Unknown number
22.00-03	LP6	1x Serotine came over hedge E of me once or 2x per minute whilst waiting here, flew a circuit over the field I am in, then headed E of S into Transect 3 area.
22.05/06	48	Picking up serotine E of me, and P45 S of here. Both unseen.
22.10/14	25-3	1xP45 flying b&f along the front of the houses. Eventually left heading N along the road.
7/10/15		
19.05	25	1xP45 detected SW of me, behind houses?, unseen.
19.08-11	LP5	19.11- 1xP45 flying & foraging E of me on the other side of the hedge/stream, unseen
19.13	4	1xP45 seen flying from the W along the hedge (2-4m high), and headed towards Mead Farm
19.17	35	1xP45 flying b&f along the front of the houses over the road. Left heading S.
19.38	34	Picking up the P55 W of me, unseen.
19.42	2	Picking up the P55 S of me, unseen.
19.43-46	LP3	Continuous P55 activity for the whole period over the sewage tanks. 1 bat seen flying from surface level to 5m+ along tree canopies.
19.47/48	33	Bat above occasionally flying more or less up to here, then heading back for the sewage tank
19.53	19	P55 activity detected/ongoing to the N of me, unseen
20.03/04	17	1x noctule detected, unseen.
20.07	3	1xP45 flying E of me, unseen.
20.12-15	LP1	20.14- 1xP45 foraging directly E of me, unseen
20.18	15	1xP55 flew past. Came from the W, headed SE.
20.25	12	1xP45 flying N of me over sports centre car park, unseen.
20.26-29	LP7	Picking up occasional P45 & P55 activity over the period. 20.27- 1xmyotis recorded S of me, unseen.
20.32	38	1xP45 flying W of me over sports centre car park, unseen.
21.06	39	1xP45 flying up and down the road along tree canopies
21.12	40	1xP55 detected S of here, unseen.
21.14/15	37	1xP55 detected behind the houses W of me, unseen. Same bat as above?
21.20/21	6	P45 active N of me, unseen.
21.37	46	P45 activity detected N of me, 1 pass, unseen

23/04/16

20.56	37	1xp45 flew by, unseen
21.05	LP6	1xP55 flying E-W via N of me, at c. 3m above ground, following road edge
21.23	4	1xLH picked up towards the stream, unseen
22.12	LP3	1xP45 flying continuously over sewage tank during 5min listening session
22.57	38	Pip sp. Flying W of me in car park to sports centre, unseen.
23.00	7	1xP55 flying back and forth over the road between corner and first luminaire, at 2-5m altitude.

Map 6:- Map showing where ALL the horseshoe bat activity was recorded across the preliminary scheme area, during walked transects in 2015 & 2016, differentiated by species and month of survey.



Map 7:- Map of static logger locations used in 2015 & 2016. Those shown as yellow/red dots were used every month, whereas those shown as orange dots were logged occasionally, as and when additional machines became available (see following table for details).

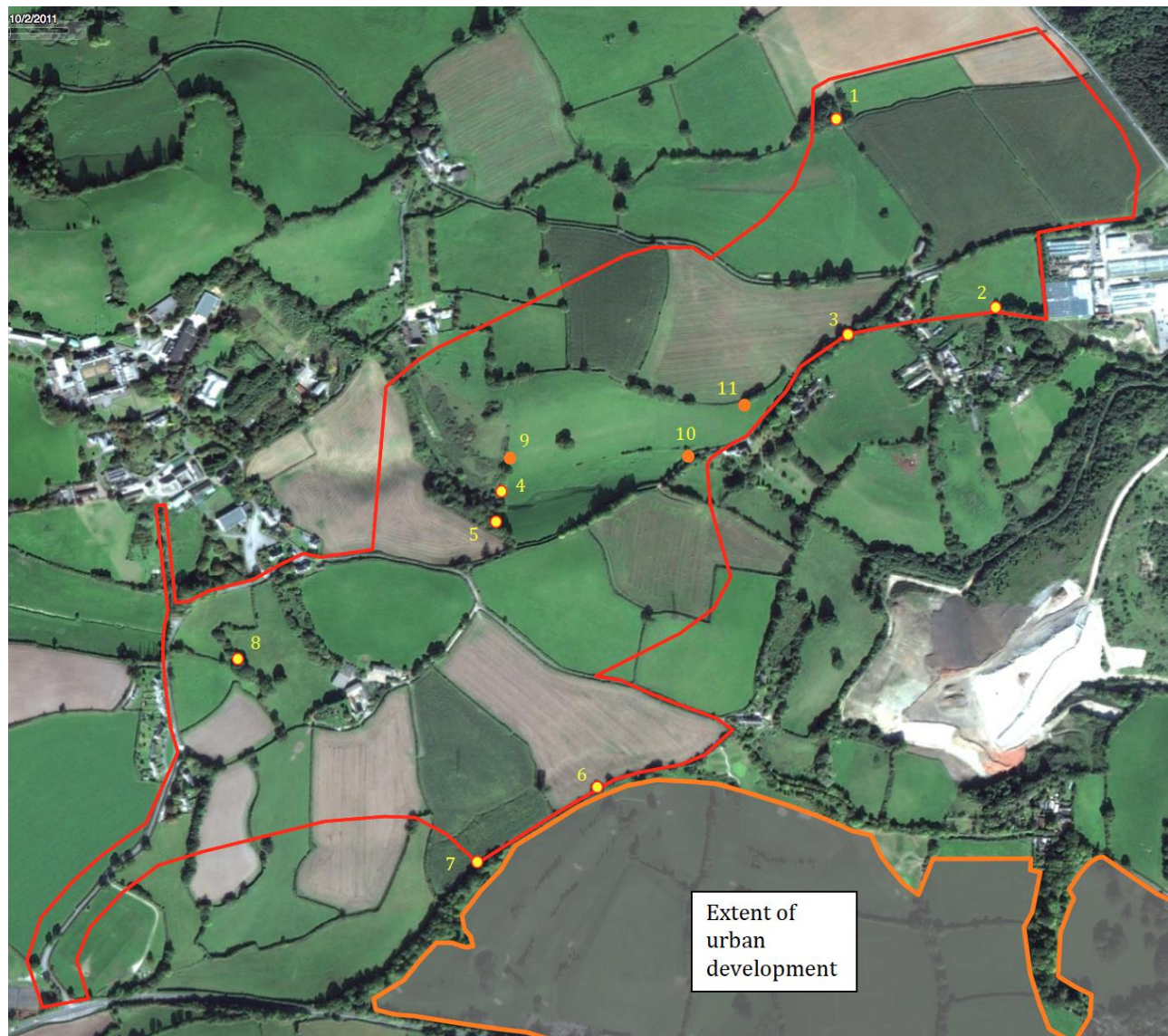


Table 6:- Static logger survey dates at each of the locations shown on Map 7 (previous page). Note:- Tri Copse- Triangular copse, EcolFld- Ecologist's field, SF- Steep field.

Survey Dates	Locations (and general site/logger reference)										
	1	2	3	4	5	6	7	8	9	10	11
	Tri Copse	EcolFld	Perry Ln	SF Central	SF South	Farm East	Farm West	Big Oak	SF North	SF gate	SF toe area
27-31/5/15	✓	✓	✓	✓	✓	✓	✓	✓			
11-15/6/15	✓	✓	✓	✓	✓	✓	✓	✓	✓		
23-27/7/15	✓	✓	✓	✓	✓	✓	✓	✓	✓		
27-31/8/15	✓	✓	✓	✓	✓	✓	✓	✓		✓	
18-22/9/15	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓
26-30/10/15	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
20-24/4/16	✓	✓	✓	✓	✓	✓	✓	✓			

Table 7:- Overall bat activity recorded at each station across all surveys carried out in 2015 & 2016.

Yearly totals per logger site															
Location	Species														Total
	Barb	GHB	LE	Leisler's	LHB	Myo sp	Noctule	NSL	P45	P55	Pnath	Pip sp	Serotine	UnID	
1	18	277	28	0	67	2857	60	0	10400	2115	0	103	21	44	15990
2	40	69	36	0	52	422	37	0	1157	144	0	35	36	3	2031
3	24	36	84	1	142	803	37	0	13316	484	0	339	5	34	15305
4	1	162	2	0	8	189	158	0	2925	61	1	63	15	24	3609
5	4	462	25	0	46	322	111	0	1655	108	0	35	144	0	2912
6	168	178	11	0	151	417	45	2	1971	1113	0	26	27	0	4109
7	74	216	15	0	119	228	44	49	2055	481	2	195	15	4	3497
8	6	37	18	0	13	166	25	0	5968	1790	1	115	221	4	8364
9	3	401	14	0	12	110	160	0	1247	80	0	13	29	2	2071
10	1	6	0	0	3	224	15	0	129	175	0	81	1	28	663
11	0	2	0	0	7	25	5	0	94	5	0	1	1	1	141
TOTALS	339	1846	233	1	620	5763	697	51	40917	6556	4	1006	515	144	58692
%	0.58	3.15	0.40	0.00	1.06	9.82	1.19	0.09	69.71	11.17	0.01	1.71	0.88	0.25	100.00

Note:- Barb- Barbastelle, GHB- greater horseshoe bat, LE- Long-eared bat (presumed brown), LHB- lesser horseshoe bat, Myo sp.- *Myotis* sp.

Bat, NSL- undifferentiated big bat (noctule/serotine/Leisler's) calls, P45- common pipistrelle, P55- soprano pipistrelle, Pnath- Nathusius's pipistrelle, Pip sp.- undifferentiated pipistrelle calls, UnID- Unidentifiable calls.

Map 8:- Map showing the total greater horseshoe bat activity recorded at each static logger station, across all surveys, in 2015 & 2016.

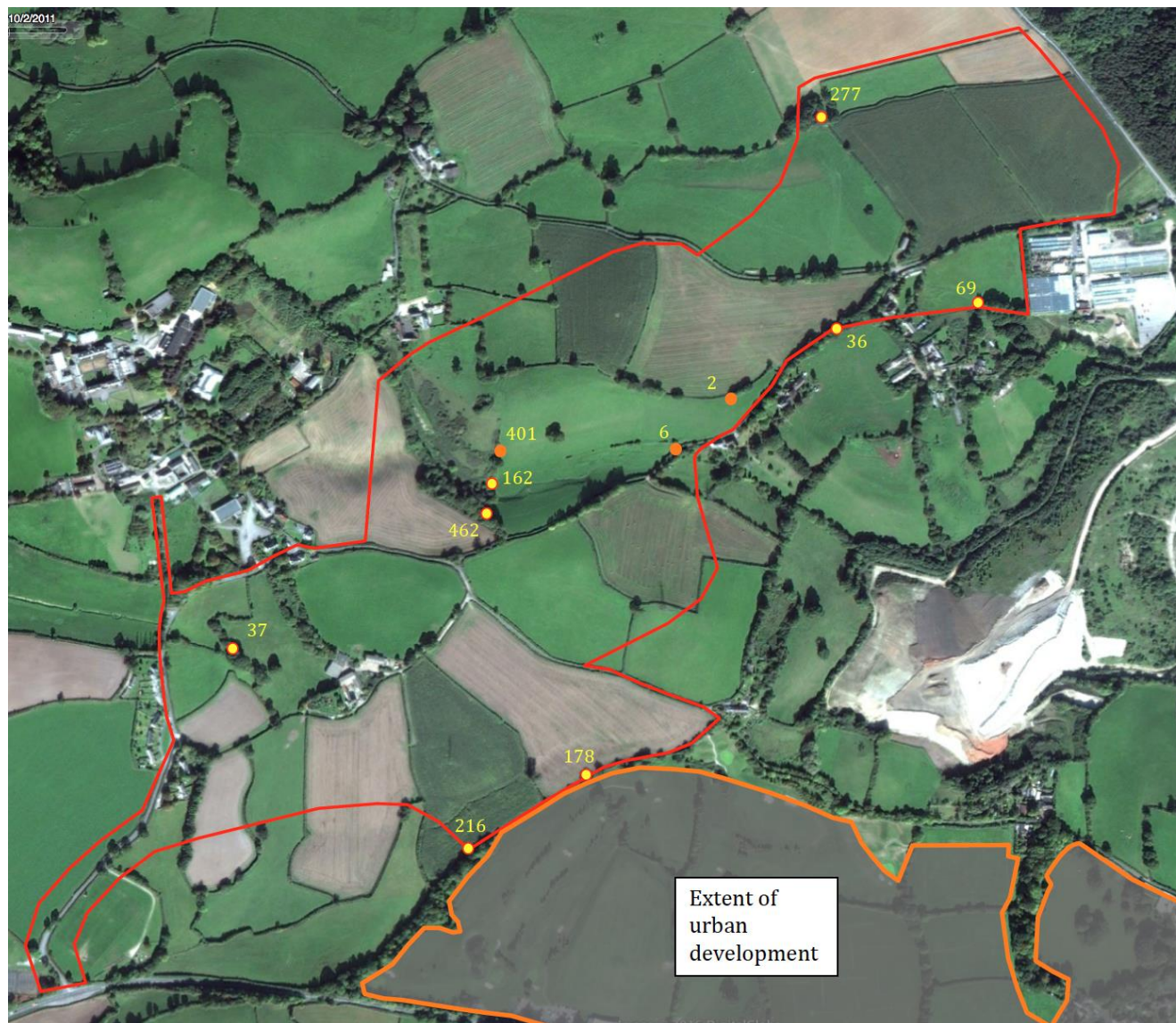


Table 8:- Monthly breakdown of bat activity recorded at each station, across all surveys carried out in 2015 & 2016, for all species.

Monthly totals per logger site																
Location	Survey period	Species														Total
		Barb	GHB	LE	Leisler's	LHB	Myo sp	Noctule	NSL	P45	P55	Pnath	Pip sp	Serotine	UnID	
1	May-15	6	70	2	0	0	87	6	0	1567	341	0	2	0	0	2081
	Jun-15	4	12	8	0	1	7	10	0	1242	341	0	0	0	0	1625
	Jul-15	0	100	7	0	0	259	5	0	2571	627	0	15	0	0	3584
	Aug-15	2	7	11	0	0	611	31	0	2743	168	0	3	7	0	3583
	Sep-15	0	39	0	0	60	1065	0	0	664	198	0	11	0	0	2037
	Oct-15	2	1	0	0	2	673	4	0	314	313	0	37	0	44	1390
	Apr-16	4	48	0	0	4	155	4	0	1299	127	0	35	14	0	1690
	Total	18	277	28	0	67	2857	60	0	10400	2115	0	103	21	44	15990
2	May-15	0	27	0	0	0	25	2	0	175	7	0	5	0	0	241
	Jun-15	0	19	9	0	5	35	14	0	194	89	0	0	1	0	366
	Jul-15	0	5	23	0	0	36	10	0	129	3	0	2	6	0	214
	Aug-15	9	7	4	0	1	41	4	0	329	12	0	2	12	0	421
	Sep-15	0	4	0	0	22	244	5	0	70	17	0	3	17	0	382
	Oct-15	25	1	0	0	5	12	1	0	79	5	0	22	0	3	153
	Apr-16	6	6	0	0	19	29	1	0	181	11	0	1	0	0	254
	Total	40	69	36	0	52	422	37	0	1157	144	0	35	36	3	2031
3	May-15	0	3	0	0	0	7	6	0	3203	37	0	15	0	0	3271
	Jun-15	0	1	22	0	0	61	3	0	2351	58	0	0	0	0	2496
	Jul-15	0	3	23	0	0	394	17	0	3815	33	0	26	3	0	4314
	Aug-15	0	3	38	0	0	106	8	0	1445	179	0	91	1	0	1871

	Sep-15	1	3	0	0	46	136	1	0	530	41	0	4	1	0	763
	Oct-15	23	4	0	1	94	51	1	0	355	24	0	193	0	34	780
	Apr-16	0	19	1	0	2	48	1	0	1617	112	0	10	0	0	1810
	Total	24	36	84	1	142	803	37	0	13316	484	0	339	5	34	15305
4	May-15	0	2	1	0	3	4	34	0	379	3	0	2	0	0	428
	Jun-15	0	4	1	0	0	1	13	0	801	18	0	0	0	0	838
	Jul-15	0	142	0	0	0	46	52	0	203	14	0	22	1	0	480
	Aug-15	0	6	0	0	0	25	1	0	185	1	0	0	0	0	218
	Sep-15	0	2	0	0	1	31	58	0	47	5	0	0	14	0	158
	Oct-15	0	1	0	0	3	1	0	0	24	0	0	23	0	24	76
	Apr-16	1	5	0	0	1	81	0	0	1286	20	1	16	0	0	1411
	Total	1	162	2	0	8	189	158	0	2925	61	1	63	15	24	3609
5	May-15	0	25	8	0	0	7	35	0	606	2	0	3	0	0	686
	Jun-15	0	1	1	0	31	8	13	0	105	21	0	0	0	0	180
	Jul-15	0	407	4	0	0	50	29	0	425	31	0	12	3	0	961
	Aug-15	0	11	8	0	0	34	6	0	226	8	0	1	16	0	310
	Sep-15	0	14	4	0	12	188	15	0	34	32	0	15	124	0	438
	Oct-15	2	0	0	0	3	4	11	0	41	1	0	2	0	0	64
	Apr-16	2	4	0	0	0	31	2	0	218	13	0	2	1	0	273
	Total	4	462	25	0	46	322	111	0	1655	108	0	35	144	0	2912
6	May-15	10	23	0	0	1	11	19	0	708	75	0	5	2	0	854
	Jun-15	0	13	1	0	1	22	12	0	76	55	0	0	2	0	182
	Jul-15	0	14	0	0	0	61	7	0	24	9	0	2	1	0	118
	Aug-15	102	14	6	0	10	40	2	0	257	839	0	2	12	0	1284
	Sep-15	0	23	0	0	75	255	0	0	160	23	0	7	9	0	552
	Oct-15	33	3	0	0	36	13	0	2	647	77	0	8	1	0	820
	Apr-16	23	88	4	0	28	15	5	0	99	35	0	2	0	0	299

	Total	168	178	11	0	151	417	45	2	1971	1113	0	26	27	0	4109
7	May-15	6	23	2	0	1	4	9	0	117	16	0	1	0	0	179
	Jun-15	1	19	7	0	0	15	5	0	83	19	0	0	4	0	153
	Jul-15	0	17	1	0	2	8	3	0	188	41	0	5	0	0	265
	Aug-15	22	18	4	0	10	30	12	0	399	42	2	2	7	0	548
	Sep-15	0	30	1	0	17	135	6	0	194	30	0	5	1	0	419
	Oct-15	11	1	0	0	38	12	1	0	860	130	0	174	0	4	1231
	Apr-16	34	108	0	0	51	24	8	49	214	203	0	8	3	0	702
	Total	74	216	15	0	119	228	44	49	2055	481	2	195	15	4	3497
8	May-15	0	5	1	0	2	12	3	0	1690	696	0	26	1	0	2436
	Jun-15	0	8	14	0	0	18	7	0	707	53	0	0	0	0	807
	Jul-15	0	2	2	0	0	23	4	0	2641	833	0	54	41	0	3600
	Aug-15	1	6	1	0	0	73	2	0	278	49	1	3	3	0	417
	Sep-15	0	3	0	0	10	23	8	0	287	94	0	0	174	0	599
	Oct-15	5	5	0	0	1	10	0	0	244	32	0	8	0	4	309
	Apr-16	0	8	0	0	0	7	1	0	121	33	0	24	2	0	196
	Total	6	37	18	0	13	166	25	0	5968	1790	1	115	221	4	8364
9	May-15															
	Jun-15	0	1	11	0	2	29	18	0	1146	12	0	0	3	0	1222
	Jul-15	0	394	2	0	0	50	102	0	76	61	0	11	2	0	698
	Aug-15															
	Sep-15	0	2	1	0	2	16	20	0	18	1	0	0	24	0	84
	Oct-15	3	4	0	0	8	15	20	0	7	6	0	2	0	2	67
	Apr-16															
	Total	3	401	14	0	12	110	160	0	1247	80	0	13	29	2	2071
10	May-15															

	Jun-15															
	Jul-15															
	Aug-15	0	3	0	0	1	18	1	0	53	7	0	0	1	0	84
	Sep-15															
	Oct-15	1	3	0	0	2	206	14	0	76	168	0	81	0	28	579
	Apr-16															
	Total	1	6	0	0	3	224	15	0	129	175	0	81	1	28	663
11	May-15															
	Jun-15															
	Jul-15															
	Aug-15															
	Sep-15	0	2	0	0	7	25	5	0	93	3	0	1	1	0	137
	Oct-15	0	0	0	0	0	0	0	0	1	2	0	0	0	1	4
	Apr-16															
	Total	0	2	0	0	7	25	5	0	94	5	0	1	1	1	141

Table 9:- Nightly breakdown of greater horseshoe bat activity recorded during all surveys carried out in 2015 & 2016, broken down into 1/2hr segments, showing their activity relative to sunset and sunrise at each static logger location. Cells highlighted in blue indicate possible foraging events in the vicinity of the detector.

Location	Date	17:30	18:00	18:30	19:00	19:30	20:00	20:30	21:00	21:30	22:00	22:30	23:00	23:30	00:00	00:30	01:00	01:30	02:00	02:30	03:00	03:30	04:00	04:30	05:00	05:30	06:00	06:30	07:00	07:30	08:00	Total	Sunset	Sunrise
Overall distribution of GHB logged data per 1/2 hour across the night		0	0	4	1	20	21	16	11	32	125	97	162	54	103	557	313	85	34	44	48	28	25	29	5	20	12	0	0	0	0	1846		
1	27/05/15													1			2	1														4	21.10	05.12
	28/05/15										1	2			3		1	1			1	4	2									24	21.11	05.11
	29/05/15											1	1	1	3	3	3															22	21.12	05.10
	31/05/15										5	8	1										6									20	21.14	05.09
	12/06/15															3		1	1													5	21.24	05.03
	13/06/15																			1												1	21.25	05.03
	14/06/15												4		1							1										6	21.26	05.03
	23/07/15											1	1																			2	21.10	05.31
	24/07/15															3	1															4	21.09	05.32
	25/07/15																1															1	21.08	05.34
	26/07/15											6	1	2	8	2	5		1	2		1										79	21.06	05.35
	27/07/15									2			1	1	6				4													14	21.05	05.36
	27/08/15							1																								1	20.09	06.22
	28/08/15																								1							1	20.07	06.24
	29/08/15																						1									1	20.05	06.25
	30/08/15																			1												1	20.03	06.27
	31/08/15														3																	3	20.01	06.29
	18/09/15											1	1		1						1	1				1						6	19.21	06.56
	19/09/15									1	1	1									1											8	19.19	06.57
	20/09/15														1	1						1				1	3					12	19.16	06.59
	21/09/15																								1	1						6	19.14	07.01

Table 10:- Notes of bats seen either emerging from, or returning to roosts during the surveys carried out in 2015 & 2016.

Location	Date	Time	Observation
Tree nearest to the access gate at the by football training ground	16/9/15 Emergence survey	20:00	Suzanne Richardson noted a Possible emergence from the most southerly tree, and the bat then entered the canopy of adjoining tree, to the north-east along the road. The bat remained silent, and could not be identified.
Large Oak standing in the steep field along Perry Ln	17/9/15 Dawn re-entry survey	05:57 06:02 06:31	Suzanne Richardson witnessed three bats returning to roost at the tree, at the times shown. All came in without any echolocation, but appeared to behave like long-eared bats. All the bats disappeared somewhere in the NE side of the tree, and the third was seen to re-enter the lower portion of the trunk/crown, where a number of possible cracks and fissures are available for roosting.
Mead Farm	19/9/15 Emergence survey	19:36/38 19:39/41	Kai Duverge saw a small bat seen emerging from the base of the chimney, peak frequency at 45 kHz, at 19:38. Likely common pipistrelle. Headed south/south-west. This bat came past PL Duverge within seconds, who logged it at 19:36, and who identified it as a common pipistrelle, based on call characteristics. It flew over the back garden and gradually headed off northwards. A second small bat was seen emerging from the base of the chimney, by KD, at 19:39, which then headed westwards. This was witnessed by PLD who was at the southern end of the western elevation at the time and logged the event at 19:41. It was identified as a common pipistrelle, from the call characteristics. It eventually followed the same path as the bat above.
	19/9/2016 Emergence survey	20:32	PLD witnessed one common pipistrelle exiting the base of the western side of the western chimney. It flew straight over the roof and headed off northwards along the rooftops.

APPENDIX B

SAC CONSERVATION OBJECTIVES AND GHB CONSERVATION STATUS

B.1. South Hams SAC Conservation Objectives

B.1.1 As required by the Habitats Directive, high-level 'Conservation Objectives' for the South Hams SAC have been identified by Natural England. An overarching objective and a list of further generic objectives aim to:

'Avoid the deterioration of the qualifying natural habitats and the habitats of qualifying species, and the significant disturbance of those qualifying species, ensuring the integrity of the site is maintained and the site makes a full contribution to achieving Favourable Conservation Status of each of the qualifying features.'

This is to be achieved by, subject to natural change, maintaining and restoring:

- *The extent and distribution of the qualifying natural habitats and habitats of qualifying species.*
- *The structure and function (including typical species) of qualifying natural habitats and habitats of qualifying species.*
- *The supporting processes on which qualifying natural habitats and habitats of qualifying species rely.*
- *The populations of qualifying species.*
- *The distribution of qualifying species within the site'.*

NOTE Natural England is in the process of preparing site-specific objectives for each SAC and SPA in England.

B.1.2 The application of these objectives will be site specific and dependant on the nature of the site and its features. The local planning authorities should take these objectives into account when undertaking Habitat Regulations Assessments.

B.2 Favourable Conservation Status (FCS)

B.2.1 Article 2(1) of the Habitats Directive states that '*Measures taken pursuant to this Directive shall be designed to maintain or restore at favourable conservation status, natural habitats and species of wild fauna and flora of Community interest'* (emphasis added).

B.2.2 The concept of 'conservation status' is therefore fundamental to the purposes of the Habitats Directive. Article 1(i) defines the conservation status of a species as:

'the sum of the influences acting on the species concerned that may affect the long-term distribution and abundance of its population within the territory referred to in Article 2' and continues that the conservation status of the species will be taken as 'favourable' when:

- *‘population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and*
- *the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and*
- *there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis’*

APPENDIX C

OUTLINE STRUCTURE FOR A GREATER HORSESHOE BAT BESPOKE MITIGATION PLAN

An evidenced based and bespoke mitigation plan for greater horseshoe bats should provide information on 'why', 'what', 'where', 'when' and 'how' the various necessary mitigation proposals will be provided and 'who' will be responsible for their implementation. As such the plan should include:

- a) Summary of greater horseshoe activity and suitable habitat features recorded on site and in the surrounding landscape – so as to provide context for on-site mitigation proposals.
- b) Purpose (e.g. overall aim) and conservation objectives for all proposed mitigation measures intended to support greater horseshoe bat conservation associated with any specific planning application²⁵.

NOTE: Where the Council has prepared a Habitat Regulations Assessment Screening Report for a Development Framework Plan, this should be used to provide context for and to inform the aims and objectives of the bespoke mitigation plan.

- c) Review of site opportunities and constraints (e.g. illustrated visually where relevant through an *Ecological Constraints and Opportunities Plan* (ECOP – see BS42020 Clause 5.4 page 17).
- d) Design concepts, principles and detailed plans and intended working method(s) for all capital works necessary to achieve stated objectives²⁶.
- e) Extent and location/area of all detailed proposed mitigation measures shown on appropriate scale maps and plans.
- f) Type and source of materials to be used where appropriate; for instance:
 - i) native species as an integral component of landscape planting and/or
 - ii) materials for any capital works e.g. bespoke bat roosts or road crossing points e.g. underpasses.
- g) Measures necessary to avoid or mitigate adverse effects during the construction of the proposed development e.g. to be secured through a *Construction Environmental Management Plan* (CEMP).
- h) Timetable for implementation demonstrating that works are aligned with the proposed phasing of development.

²⁵ It may be useful to demonstrate how the purpose and conservation objectives for proposed mitigation on site (and where appropriate offsite) may assist in the achievement of the over-arching Conservation Objectives set for the South Hams Special Area of Conservation (SAC) by Natural England.

²⁶ Design details and working methods should provide sufficient information to demonstrate that the proposed mitigation will deliver stated aims and objectives if granted consent. Particular regard should be given to:

- (i) likely effectiveness, e.g. proposed mitigation measures are appropriate to the case and technically feasible and, if implemented, likely to achieve desired outcomes;
- (ii) certainty over deliverability, e.g. there is evidence of commitment and adequate legal mechanisms to secure sufficient land and resources to implement necessary measures, and;
- (iii) whether the intention is to secure proposed measures, and the necessary resources for their delivery, through either planning condition(s) and/or a planning obligation - or other appropriate mechanism.

- i) Details for disposal of any wastes arising from works.
- j) Details of long-term management to sustain proposed features for future generations e.g. to be secured through a detailed *Landscape and Ecological Management Plan* (LEMP).
- k) Details for monitoring and remedial/contingencies measures e.g. to be secured through a detailed *Ecological Monitoring and Contingencies Strategy* (EMCS).
- l) Persons responsible for implementing the works.

The above outline is based on Annex 4.3 and 4.4 of BS42020 *Biodiversity – A Code of Practice for Planning and Development* (2013).

APPENDIX D PROTECTION AND ENHANCEMENT OF ECOLOGICAL NETWORKS

D.1.1 Across Europe, all of the Special Areas for Conservation (SACs) and Special Protection Areas (SPAs) together contribute to the European Natura 2000 network. The protection, management, and enhancement of such ecological networks, and especially those relating to the *Natura 2000* network, are identified as being particularly important in the *EU Habitats Directive*.

D.1.2 Article 3 of the Directive states:

Where they consider it necessary, Member States shall endeavour to improve the ecological coherence of Natura 2000 by maintaining, and where appropriate developing, features of the landscape which are of major importance for wild fauna and flora, as referred to in Article 10.

D.1.3 Article 10 then goes on to explain:

Member States shall endeavour, where they consider it necessary, in their land use planning and development policies and, in particular, with a view to improving the ecological coherence of The Natura 2000 network, to encourage the management of features of the landscape which are of major importance for wild fauna and flora. Such features are those which, by virtue of their linear and continuous structure (such as rivers with their banks or the traditional systems of marking field boundaries) or their function as stepping stones (such as ponds or small woods), are essential for the migration, dispersal and genetic exchange of wild species.

D.1.4 *The Conservation of Habitats and Species Regulations (2010)* transpose the above EU Directive into English legislation. Regulation 39 requires development plan policies to include policies that implement at the local level the requirements of Article 10 so as to encourage the management of features of the landscape which are of major importance for wild flora and fauna.

D.1.5 In relation to the recent and potential development discussed in this document, Regulation 39 provides Teignbridge District Council with an opportunity to link conservation objectives to the development of some if not most of the sites under consideration. In particular, the LPA has both a justification and a statutory mechanism by which they can seek through their development plan policies the management and enhancement of landscape features in and around the Local Plan area which are of major importance for GHBs.

D.1.6 For instance, planning for Green Infrastructure in and around the areas of development discussed in this document could also lead to significant biodiversity gains and substantial improvement of GHB commuting and foraging habitat providing the bats with a very much enhanced flyways around and through the settlements between Torquay and Bovey Tracey. Such measures could also contribute to wider Green Infrastructure objectives and achieve benefits that could then also be enjoyed by the local community.

APPENDIX E

RESEARCH EVIDENCE OF RISK TO BATS FROM ROADS

Recently published research by Exeter University (2016) has identified substantial evidence indicating a significant risk to bats from roads, particularly through collision risk²⁷. Some of the findings from this research are particularly relevant to the consideration of likely significant effects arising from proposed development of NA1 *in combination* with Devon County Council's road improvement proposals for the A382. For instance:

- *In addition to the direct risk of collision of bats with vehicles, roads could pose a threat to bat populations as a result of habitat loss, degradation and fragmentation, and could act as barriers to movement of bats between habitats;*
- *Based on collated records of 1207 bat road casualties in Europe, the research found that low-flying species (such as horseshoe bats) are more prone to collisions than high-flying species;*
- *Analysis identified a significant bias towards male and juvenile casualties;*
- *Casualties included rare species such as barbastelle and geographically restricted species such as horseshoe species.*
- *The bias towards male casualties could be indicative of:*
 - *lower dispersal among females;*
 - *a tendency among females to remain in or return to their area of birth;*
 - *sexual segregation in habitats of varying quality, i.e. females may occupy better quality habitats than males, and road density may be lower in better quality habitats*
- *Whether or not roads act as barriers to the movement of bats depends on a complex interplay of habitat and species-specific behaviour. For example:*
 - *the presence of favourable habitat for bats – notably woodland – was found in this review to be linked with significantly reduced barrier effects but a heightened risk of collision.*
 - *In other words, bats are more likely to cross roads through woodland but are more prone to collision with vehicles.*
- *Bat casualties were commonly reported where roads were close to or bisected other linear features, including treelines.*
- *The presence of casualties from rare species on roads, such as horseshoe bats, is of particular concern, as relatively low levels of additional mortality could potentially have an impact on the long-term sustainability of local populations.*
- *Where comparisons could be made, bat road casualties were more common at locations with greater traffic volume.*
- *Fewer bats crossed roads where there was a gap of more than 4.5 metres.*

²⁷ Grace-Fensome A. and Mathews F. (2016) *Roads and bats: a meta-analysis and review of the evidence on vehicle collisions and barrier effects*. Mammal Review. Mammal Society.

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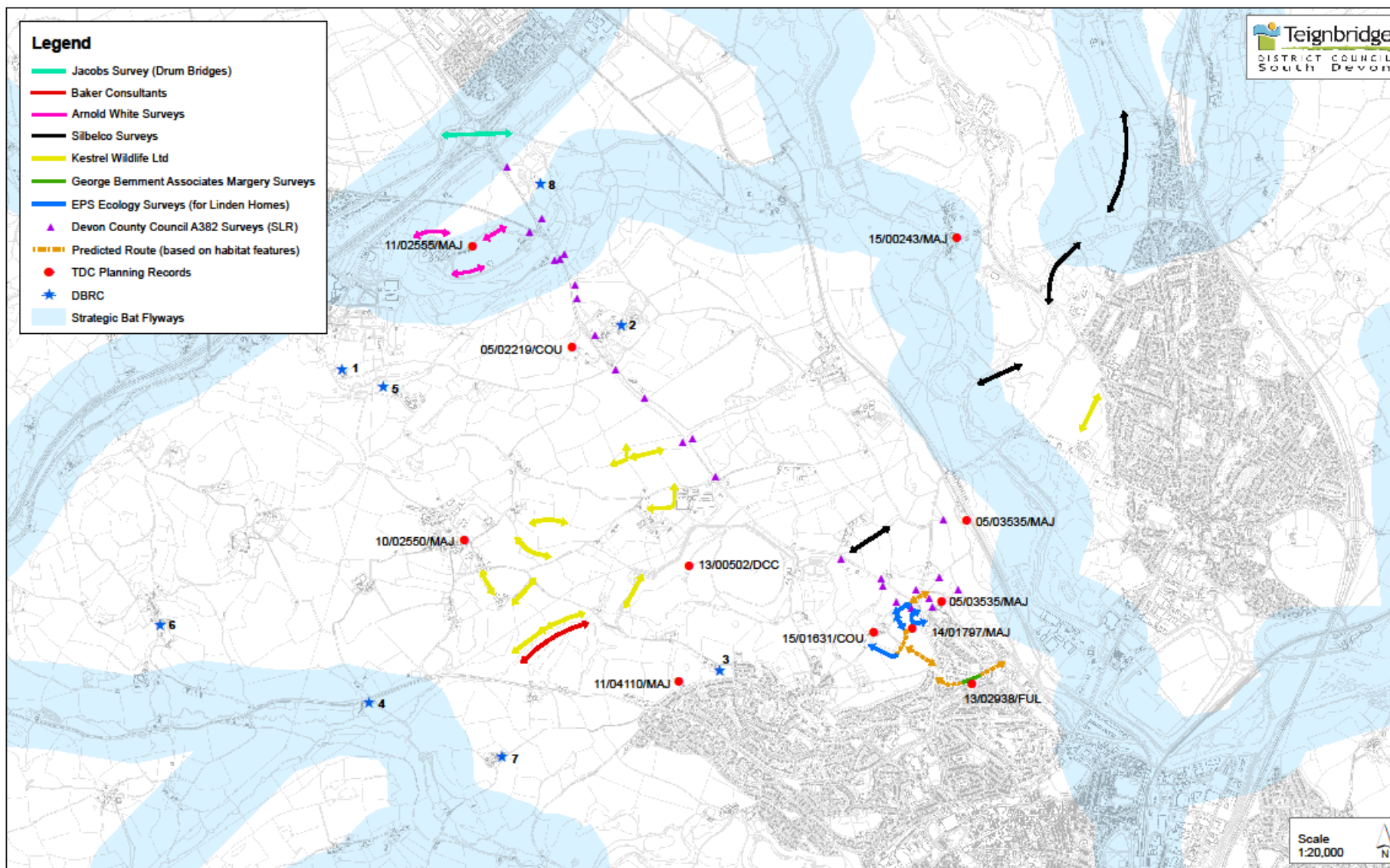
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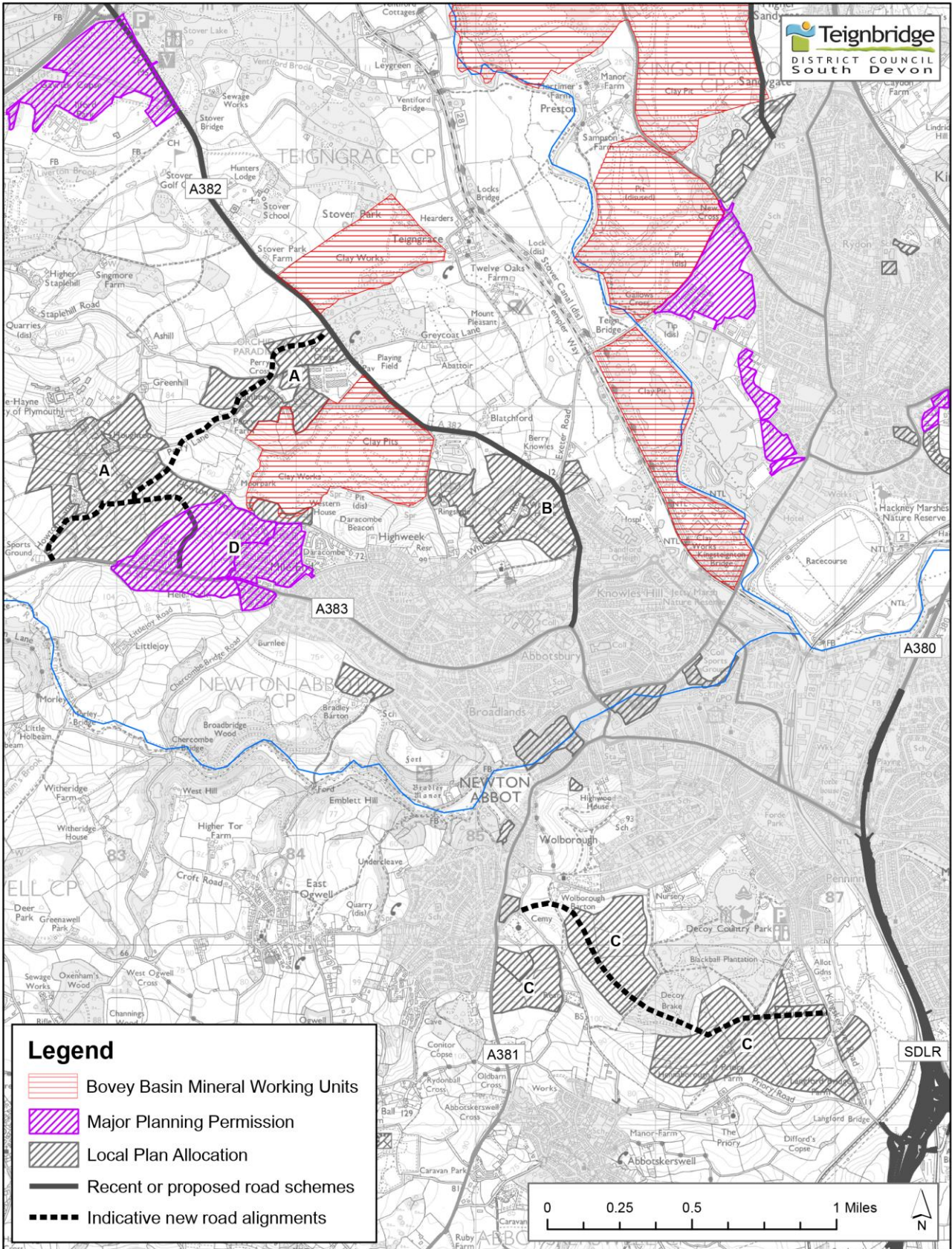
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Map 2 - Recorded GHB Activity in the Wider Landscape Surrounding NA1

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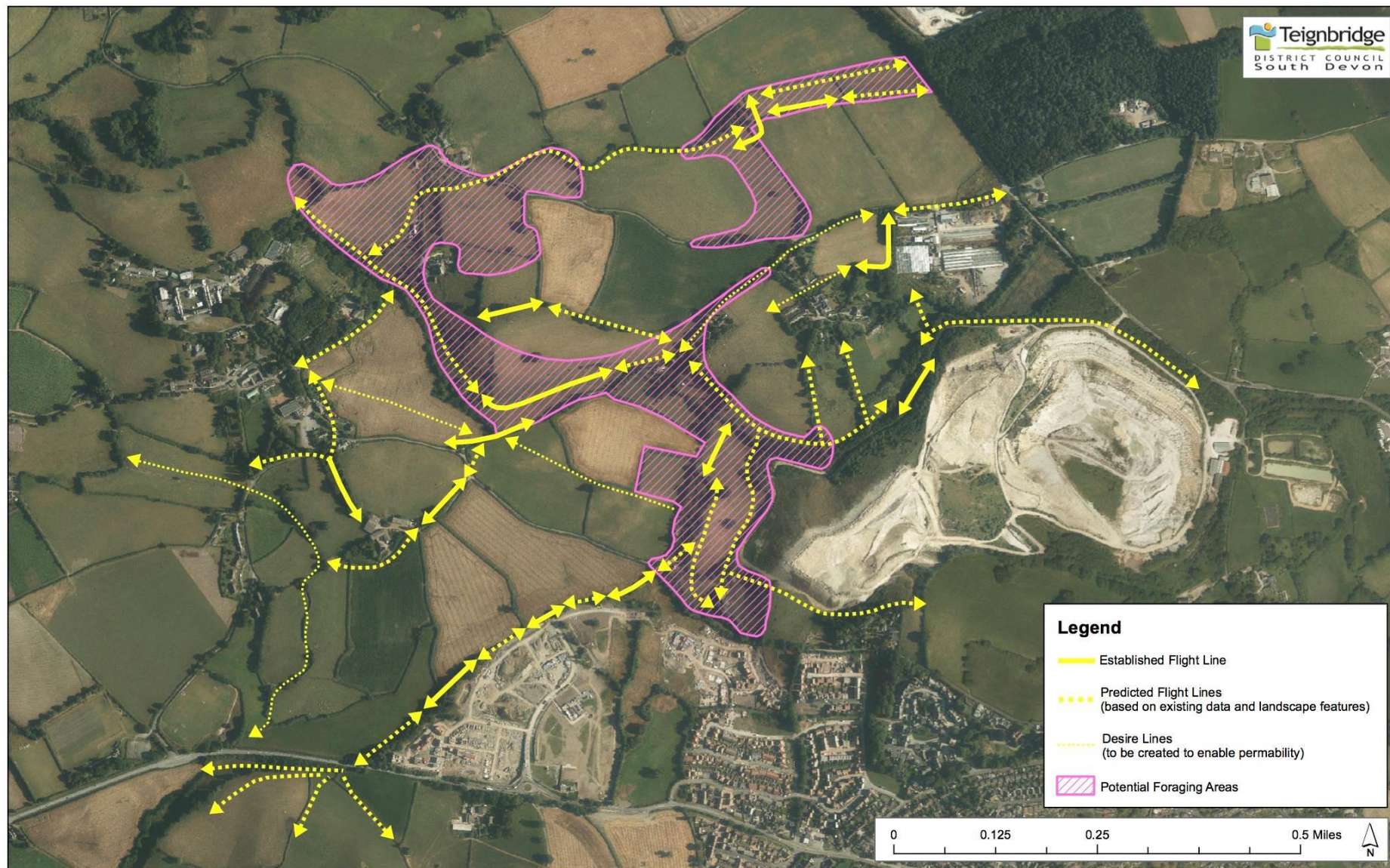
Map 3: Overview of Large-scale Development: Torquay to Bovey Tracey

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Aerial Photo 1 - Land Parcels within NA1

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Aerial Photo 2 - GHB Flight Corridors - Existing and Proposed

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FIGURE 1 Plan of buildings surveyed for greater horseshoe bats at Seale Hayne (Kestrel Wildlife Consultants Ltd July 2015) Green circles show actual or potential greater horseshoe bat roosts

