CORSHAM BATSCAPE STRATEGY

2016 - 2026

Corsham Town Council. November 2019. Final version

Corsham TOWN COUNCIL

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CORSHAM BATSCAPE STRATEGY

CORSHAM: PROUD OF ITS PAST, PREPARED FOR ITS FUTURE

Prepared for and in association with

Corsham Town Council

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CONTENTS

EXECUTIVE SUMMARY

Consultation with stakeholders identified the environment as a key topic for the Neighbourhood Plan. Core Neighbourhood Plan policies seek to improve the quality of our green infrastructure and promote biodiversity for the benefit of people and wildlife.

Bat populations are an important indicator of a healthy environment, as bats do not thrive in places where there are little or no suitable food sources, roosts, 'swarming' sites or connective habitat. Corsham's bat population includes three very rare species – Bechstein's, greater horseshoe and lesser horseshoe – which are so rare and threatened that they are protected under European legislation and live in only a handful of places in the UK.

The wider landscape surrounding Box and Corsham is therefore of international importance for bats. Locally, their habitat is protected through a Bat Special Area of Conservation (SAC) which is focused around the Box mine complex, just outside of the Corsham Neighbourhood Plan boundary.

However, essential foraging and commuting routes supporting this SAC extend for several kilometres outside the SAC boundary, including the entire Corsham Neighbourhood Plan area. Therefore, development within this area can have a significant negative impact on these species despite being situated a considerable distance from the SAC in areas of apparently low conservation value.

This Batscape Strategy sets out to influence and enhance the sustainable development of Corsham through protecting important bat habitats within the designated Neighbourhood Plan area. The Strategy provides an ecological overview of the area including the important protections and designations already in place. The document also explains how to protect and enhance the integrity of existing bat habitats, as well as create new ones.

The maps within this Strategy have been produced specifically to identify important key areas and features within the wider landscape that are vital to the bat populations using the SAC. The maps will be reviewed periodically when further evidence is gathered through the development control process and survey work to ensure that they remain relevant throughout the life of the plan and that cumulative development impacts can be accurately assessed and modelled. Corsham Town Council will be responsible for this review and update of the Batscape Strategy.

Design guidance is provided to assist developers prior to submitting their planning applications. The Strategy will also help determine what measures would be appropriate to adequately mitigate the effect of a particular development. A Quick Reference Guide has been provided upfront within the Batscape Strategy that sets out in simple terms the steps that applicants will need to take to ensure that they properly consider the impact of their development on bats and identify appropriate mitigation when required.

Proposals for development which are designed to protect and enrich the habitat of protected bat species by employing measures to reduce light-spill, restore and create new species rich hedgerows and create new areas of deciduous woodland are supported in the Corsham Neighbourhood Plan.

1 INTRODUCTION

1.1 Purpose of this document

1. Corsham is located in close proximity to the European-designated 'Bath and Bradford on Avon Bats' Special Area of Conservation (known as 'the SAC' within this document) focused around the Box mine complex; and bat populations associated with this designated site are reliant on the landscape within the Neighbourhood Plan area for foraging and commuting between roosts.

2. The SAC is of known international importance for the bat roosts it supports and as a result, is subject to stringent legal protection under the 2010 Habitats Regulations. However, habitat features in the surrounding landscape used by the bats are susceptible to loss and damage, particularly as the available bat data is sparse with significant gaps. This means that the impacts of incremental development have the potential to result in significant impacts on the bat populations, and therefore the SAC, through cumulative loss of habitat; and degradation of habitat through increased light levels. There is potential for significant cumulative impacts to arise even where individual developments would have de-minimis impacts on the SAC when assessed in isolation.

3. This situation highlights the importance of taking a strategic approach to preserving and enhancing both the built and natural heritage features within the town and its surrounding landscape. This document aims to guide all future development towards the preservation and enhancement of suitable landscape permeability and connective habitats within the Corsham area in order to ensure conservation of the SAC's bat populations in the long-term.

4. The Corsham Batscape Strategy provides supporting guidance for the Corsham Neighbourhood Plan. It provides further detailed spatial guidance on how policy E1 relating to the SAC should be applied and implemented in order to retain, protect and enhance landscape features of importance for bat populations associated with the SAC. The Corsham Design Guide also sits alongside the Batscape Strategy as supporting guidance for the Corsham Neighbourhood Plan; and this document aims to establish an overall design structure for Corsham as well as a design guide for each neighbourhood. The Corsham Design Guide captures the main landscape and townscape elements of each of the 22 Character Areas identified within the Corsham Neighbourhood Plan area, selecting the defining characteristics of each area to form the principles for its future development in order to respect the individuality of each neighbourhood. The aims and objectives of the Corsham Batscape Strategy, together with specific spatial requirements for bats associated with each of these 22 character areas, have also been integrated into the Corsham Design Guide.

5. This document should be read in conjunction with the Bat Special Areas of Conservation (SAC) Planning Guidance for Wiltshire (Natural England and Wiltshire Council, September 2015) and is intended as a local supplement to this guidance document. The Batscape Strategy is also in accordance with, and helps deliver the requirements of, paragraph 117 of the National Planning Policy Framework (NPPF), namely to identify and map components of local ecological networks. It is aimed primarily at development controlled through the planning system and is aimed at several audiences as follows:

- Prospective developers within Corsham, including landowners, developers, architects, planners and urban designers, landscape architects and contractors;
- Ecological consultants working on behalf of developers;
- Local planning and highways officers within Wiltshire Council and Corsham Town Council; and
- Key consultees with regard to future development proposals for Corsham, including, but not limited to Natural England, Wiltshire Council, the Environment Agency, the Canal and Rivers Trust and Wiltshire Wildlife Trust.

6. This document is based around a central Batscape map (Phase 2 Batscape Maps - overview page 29) which models the landscape features likely to be of importance for the Bechstein's, greater horseshoe and lesser horseshoe bat populations associated with the SAC. The model is based on known and available records of these species within the Neighbourhood Plan area and surrounding areas together with the established understanding of roosting, foraging and commuting preferences of the species in question. Guidance is provided within this document on how to use and apply the Batscape mapping to prospective development proposals.

7. The maps that have been created using this methodology must be considered dynamic documents as the relative importance of landscape features will alter as the area is subject to further development and habitat change. It is also possible that the map will need to change in the future based on the results of further detailed bat surveys on the ground and / or new information in the scientific literature regarding the known ecology of the target bat species. The intention is that this document and the corresponding mapping outputs will be periodically reviewed to ensure that it remains relevant to the present landscape.

8. The latter part of this document provides some generic guidelines on mitigating some of the impacts of development on foraging and commuting bats. The

guidelines cover the basic standards that will be required in respect of lighting for known or newly created bat habitats; and also for buffer zones associated with flight-lines. This generic guidance does not preclude the need for detailed and bespoke surveys and mitigation but rather provides some minimum benchmarks that must be met.

9. The guidance in this document is limited to the bats listed as the qualifying features for the Bath and Bradford On Avon SAC, namely Bechstein's bat, greater horseshoe and lesser horseshoe species. Whilst the assessment of habitat features has been completed with a focus on these species, the habitats that have suitability for commuting and foraging for these species are very likely to be of importance for the majority of bat species present in any given area.

1.2 Layout of this Document

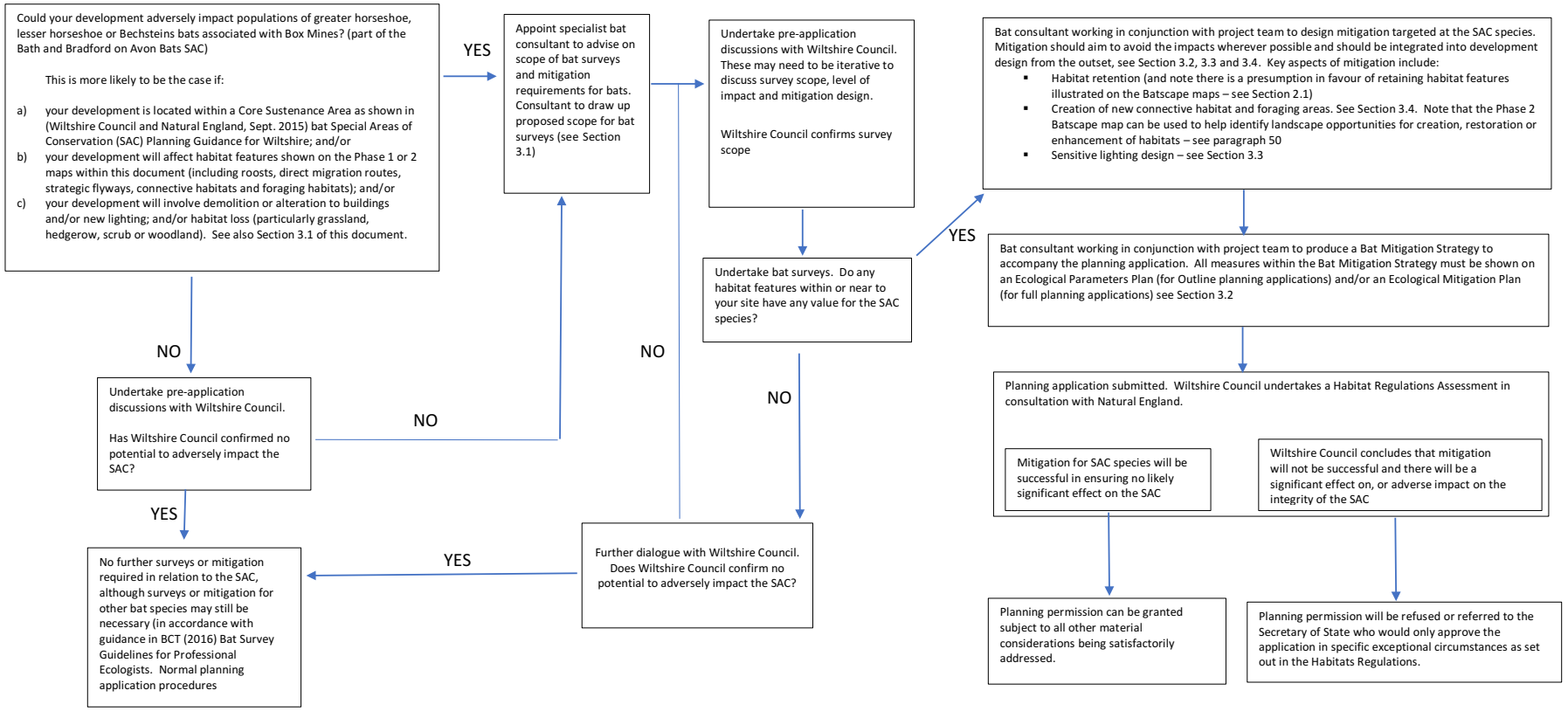
10. The Corsham Batscape Strategy document is structured as follows:

- Section 1 provides background and context, including information on the SAC and the known ecology of Bechstein's, greater horseshoe and lesser horseshoe bats.
- Section 2 provides guidance on how the Batscape maps should be interpreted and applied. A summary of the key important features and areas drawn out from analysis of the maps is provided in Section 2.2. Suggestions for future evolution and application of the maps are made in Section 2.3.
- Section 3 presents generic minimum standards that will be expected for mitigation associated with development affecting the target bat populations. The standards cover basic content that needs to be submitted to support the planning application; lighting; and buffer zones associated with retained/created bat habitats.
- The detailed methodology applied in derivation of the Batscape maps is appended to this document.

Batscape Strategy: Quick Reference Guide for Applicants

11. The flowchart on page 9 has been prepared as a quick reference guide for applicants (and also their appointed ecological consultants) wishing to secure planning permission for development within the Corsham Neighbourhood Plan area. It sets out the process that must be followed in relation to considering potential impacts on the species populations associated with the Bath and Bradford on Avon Bats Special Area of Conservation (SAC); and the requirements at each stage of the process (including bat surveys and mitigation). The flowchart provides cross references to text within the main Batscape Strategy document for further detailed information. Note that this Batscape Strategy should be read in conjunction with the Bat Special Areas of Conservation (SAC) Planning Guidance for Wiltshire (Natural England and Wiltshire Council, September 2015). The Wiltshire Council guidance establishes core sustenance zones for strategic roosts in a Wiltshire context; and the requirements set out in this document must also be satisfied in terms of the information required to support planning applications.

Batscapes Strategy – A Quick Reference Guide for Applicants

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1.3 Background

1.3.1 Bath and Bradford-on-Avon SAC

12. The following has been taken from Bat Special Areas of Conservation (SAC) Planning Guidance for Wiltshire (Wiltshire Council, 2015):

"The internationally important designation of Bath and Bradford-on-Avon Bats SAC is comprised of a network of significant underground sites in both the Wiltshire and BANES administrative areas, including four nationally important Sites of Special Scientific Interest (SSSIs), namely Box Mine, Winsley Mines, Combe Down and Bathampton Down Mines, and Brown's Folly. These component sites comprise extensive networks of caves, mines and man-made tunnels which are used by bats for hibernation, breeding, mating and as a staging post prior to dispersal."

13. The grassland, watercourses, scrub and woodland surrounding them are used by bats for feeding and commuting. Although these habitats are not included in the SAC designation, they are vital to support the bats which are features of the SAC. Bat species using these sites include the rare Bechstein's bat, greater horseshoe bat and lesser horseshoe bat. As such, the designated sites themselves should be seen as the main hubs or nodes. Beyond these lie an integrated network of commuting routes, foraging areas and roosts which are used throughout the year. Even activities which occur some distance from the designated sites may damage important elements of the network and disrupt population dynamics.

14. All three species are highly mobile throughout the year and use a network of other important roost sites in the surrounding landscape including Iford Manor SSSI, which is the fourth largest breeding colony of greater horseshoe bats in England and one of only 15 breeding roosts in the country. Bats which use the above hibernation sites are known to breed at Iford Manor each year. The network of significant roosts includes sites that are not covered by any statutory designation, such as the breeding colonies of Bechstein's bats at Biss Wood and Green Lane Wood, a pair of ancient woodlands to the east of Trowbridge. This colony is known to swarm at Box Mine SSSI and uses the intervening landscape to commute between these sites.

1.3.2 Bat Ecology - General

15. Bats have a complex life-cycle in which they rely on a network of different sites for roosting throughout the year. Hibernation and maternity roosts are the most critical, but a series of other "transitory" roosts are also used as bats move around from one area to another, using different food sources from a variety of habitats as the seasons unfold. "Swarming" sites where bats congregate for socialising and mating in the autumn are also vitally important for maintaining populations. The roost network used by the SAC species throughout the year can include a wide range of features including:

- Mines, shafts and adits
- Caves
- Culverts and tunnels
- Buildings – particularly loft voids and cellars
- Trees – rot holes, flaking bark, woodpecker holes

16. Foraging areas used by bats vary between species and throughout the year, and include a wide range of habitats which support their invertebrate prey. Suitable semi-natural habitats such as woodlands, mature hedgerows, grazed pasture, rough grassland, watercourses and wetlands closest to bat roosts are most likely to be important to the bat populations, particularly for juveniles, however some species are highly mobile and may forage several kilometres from their roosts on a regular basis.

17. In order to migrate between the network of summer, winter and transitory roosts, and commute to and from their numerous foraging areas, bats use established 'commuting corridors'. Although bats are capable of crossing (and frequently do cross) large open areas, good quality connective habitats are preferred. These are generally well vegetated, sheltered linear features, that provide direct routes between foraging areas and roosts. They generally provide some protection from predators; and the sheltered conditions also ensure that the bats use less energy in flight rather than flying into the wind. Such connective linear habitat includes:

- Hedgerows, stone walls and tree lines
- Woodland edges and scrub belts
- Riparian corridors e.g. rivers, stream, brooks, canals etc
- Embankments and cuttings e.g. railways, roads, visibility bunds etc.

1.3.3 Species Accounts

18. The following species accounts have been taken from Mammals in Wiltshire, Second Edition (Harris et al, 2017) with supplementary local contextual information added where appropriate.

Greater Horseshoe Bats

Ecology

19. The horseshoe bats can be distinguished from other British bats by the 'noseleaf', which is thought to act as an 'acoustic lens', focusing echolocation pulses that are emitted from the nose. The greater horseshoe bat is the largest European horseshoe species. When roosting, they hang free with the wings enfolding their body, resembling small pears. They are long-lived animals and individuals have been known to live for up to 30 years. Greater horseshoe bats were originally cave dwellers, but most maternity colonies today are in buildings, choosing sites with large entrance holes which the bats can fly through with access to open roof spaces warmed by the sun. Greater horseshoe bats require a number of night roosts in the landscape near to the maternity roost (usually up to 4 km, but exceptionally up to 14 km) for resting between foraging bouts.

20. In winter, the greater horseshoe bat uses a series of caves, disused mines, cellars and tunnels as hibernation sites. These sites can be some distance from the breeding roost (> 50 km). Hibernation is interrupted between once a day and once every 6-10 days (depending on the temperature and time of year) to feed near the cave entrance or change roost site. Transitional roosts used during the spring and autumn are important staging posts for the population moving between breeding and hibernation roosts.

21. Greater horseshoe bats require a diverse habitat mosaic, including:

- grazed pastures are critical foraging habitat for greater horseshoes. Cattle are preferred to smaller grazers, since they create the ideal structural conditions for perch-hunting bats in hedgerows and woodland edge. Large dung beetles, Geotrupes spp., can provide a major dietary component of Greater Horseshoe bats. Most favour cattle dung, but some also use sheep dung; and Aphodius dung beetles live in cow, sheep and horse dung. Short grazed habitat, such as produced by sheep, also benefits Melontha and Tupilid species which require short grass to oviposit. Within 1 kilometre of the roost the presence of permanent grazed pasture is critical for juvenile greater horseshoe bats. A high density of grazing animals should be present giving high presence of dung;
- mature semi-natural woodlands including riparian woodland. Rides and footpaths are used by greater horseshoe bats when flying in woodland feeding areas. Grassy rides and glades in woodland increase the range of food and provide opportunity for perch hunting. Woodland supports high levels of moth abundances. Macro (and micro) moths are densest where there is grass or litter, less so where there are ferns, moss, bare ground or herbs. They are richer where there is native tree diversity and trees with larger basal areas. Species such as oak, willow and birch have large numbers of moths, whereas beech has small numbers even when compared to non-native species such as sycamore. Uniform stands of trees are poorer in invertebrates than more diversely structured woodland;
- other grasslands, including meadows kept for hay and silage; and flower-rich grasslands on road verges, grassy embankments and brownfield sites. Longer swards benefit the larvae of noctuid moths, for example, the main moth species eaten by greater horseshoe bats associated with the maternity roost at Woodchester Mansion, Gloucestershire are all species associated with grassland habitats, including large yellow underwing, small yellow underwing, heart and dart and dark arches (Ransome, 1997);
- scrub, for example, Billington (2000) recorded frequent foraging use of scrub habitat, particularly Buddleia scrub within disused quarries, during radio tracking carried out for the Mells Valley SAC in June. However, large areas of continuous scrub are likely to be avoided by greater horseshoe bats.
- well-developed hedgerows or lines of trees. Larger hedgerows are required for commuting as well as foraging. Substantial broad hedgerows with frequent emergent trees can provide suitable structure for foraging conditions for greater horseshoe bats if woodland is scarce; and
- watercourses. Tipulid larval development is favoured by damp conditions. Therefore, any aquatic environments and/or marshes can provide a secondary prey source. Aquatic environments could also favour the production of caddis flies in certain months, such as May and late August / September when other food supplies may be erratic. There is significant caddis fly consumption at roosts close to extensive river or lake habitats (Ransome, 1997). Extensive use of the Bristol Avon by greater horseshoes was recorded during radio tracking in the Bradford on Avon area (Fiona Mathews, pers. com.); and in Devon the River Dart, a large river system, mostly banked by broadleaved woodland was also found to be a key habitat (Natural England, 2003).

22. These habitats are not used consistently throughout the year but change with the seasons. Woodlands and pasture adjoining wood are used in spring and early summer. As summer progresses, feeding switches to areas further

away and tends to be fields used for grazing cattle and other types of stock. Meadows that have been cut and where animals are grazing are also used. A balance of woodland and pasture of about 50% and 50% provides optimum resources for greater horseshoe bats.

23. Dietary analysis of greater horseshoe bat droppings shows that this species is conservative in its food sources and there are three main prey items: cockchafer Melolontha melolontha; dung beetles Aphodius sp. (Coleoptera: Scarabaeidae); and moths (Lepidoptera). Of these moths form the largest part of the diet but the other two are important at certain times of year. Three secondary prey sources are also exploited: crane flies (Diptera: Tipulidae), ichneumonids (Hymenoptera: Ichneumonidae) of the Ophian luteus complex, and caddis flies (Trichoptera).

24. The preferred key prey in April for all bats that have survived the previous winter is the large dung beetle Geotrupes. In May, the preferred key prey is the cockchafer Melolontha melolontha. In June and early July, pregnant females feed on moths, their key prey at that time, and continue to do so after giving birth, until late August. Moth supplies usually fall steadily in August and September, due to phonological population declines, or rapidly at a particular dawn or dusk due to temporary low temperatures. If either happens adult bats switch to secondary, single prey items, or combine moths with them. In very cold spells ichneumonids, of the Ophion luteus complex are consumed. They are common prey in October and through the winter as they can fly at low ambient temperatures.

25. Juvenile bats do not feed at all until they are about 29 or 30 days old, when they normally feed on Aphodius rufipes, which is their key prey. This dung beetle species is a fairly small (90mg), easily-caught and usually abundant prey, which reaches peak numbers at the time that the young normally start to feed in early August.

26. Favoured prey is caught on the wing or by gleaning prey from the surface of vegetation; flight is typically slow and often low above the ground. Greater horseshoe bats also frequently use a 'sit and wait' tactic whilst hanging from twigs and small branches within the vegetation, 'watching' from a regular perch and flying out to take passing insects.

Local Context

27. Only two maternity roosts are currently confirmed in Wiltshire at the time of writing (February 2018): one in Box Mine SSSI and the other at a residential property in Westbury Leigh. In compiling the baseline for this Batscape Strategy, an additional historic record was found of a greater horseshoe maternity roost at Gastard. This record has not been confirmed by the County Recorder, however, it has been included on the Phase I Batscape maps on a precautionary basis, thus taking the total count of assumed greater horseshoe maternity roosts in Wiltshire to three. Note that Iford Manor SSSI lies adjacent to the county boundary, just outside Wiltshire – this is one of the largest maternity colonies in Great Britain.

28. During 1996-2016 over 4100 records of greater horseshoe bats had been submitted, of which over 3500 records relate to hibernation counts at Bath and Bradford-On-Avon Bats SAC and a lesser number at Chilmark Quarries SAC. Ongoing hibernation counts at sites within, and associated with, the Bath and Bradford-on-Avon SAC, coordinated by Dr Fiona Mathews and Wiltshire Bat Group, have confirmed that these sites continue to support significant numbers of greater horseshoe bats, and furthermore, ringing studies are now providing an insight into how individuals move regularly between sites during the winter. An approximate total of 19 separate hibernation sites (the large Box Mine complex has been treated as a single site) are represented in the records. Low numbers have been captured at some of these hibernation sites during autumn swarming surveys indicating that they are also used as mating and/or transitional roosts. Box Mine SSSI is also subject to more detailed monitoring, formerly by Ian Davidson-Watts, latterly by Roger Martindale, whose more extensive surveys of the complex yield higher counts at this location. Sites monitored in the Bath and Bradford-on-Avon SAC offer a 10-year peak mean of 414 greater horseshoe bats, with Box Mine SSSI supporting the majority of these. Peaks between winters and sites vary according to weather conditions and disturbance, with Box Mine alone ranging from 6 to 629 bats recorded during the period 2005/06 to 2015/16. Further more detailed analyses are required so these figures are provisional.

Lesser Horseshoe Bats

Ecology

29. The lesser horseshoe bat is the smallest European horseshoe species and when roosting they hang free with the wings enfolding their body, resembling small plums. Lesser horseshoe bats mainly roost in buildings that allow uninterrupted flight access during the summer months, often with stone walls and slate roofs. Maternity roosts are typically associated with buildings that offer a range of micro-climates (e.g. attics, cellars and chimneys), thus allowing bats

to shift location depending on the external temperature. Lesser horseshoe bats hibernate during the winter in underground caves, mines and cellars, which are humid and range between 4-12 degrees Centigrade. Hibernation roosts are typically within 5km of the maternity roost (maximum known distance 32km away).

30. Lesser horseshoe bats are specialised for foraging in cluttered environments, particularly woodlands, wooded riparian corridors, and mature treelines and hedgerows, feeding within or below the canopy, mainly taking small flying insects including diptera (flies including midges, gnats and dung flies), tipulids (crane flies) and lepidoptera (moths). Landscapes which are of most importance for lesser horseshoe landscapes that were most important contain a high proportion of woodland, parkland and grazed pasture, linked with linear features, such as overgrown hedgerows.

31. Woodland, particularly broad-leaved woodland, comprises the most important foraging habitat for lesser horseshoe bat. However, radio tracking research (Cresswell Associates, 2004) shows lesser horseshoe will forage over pasture, but cattle must be actively grazing the field. Once cattle are removed from a field foraging by lesser horseshoe bats ceases immediately. However, pasture in such use offers a valuable and predictable food source at a time of year when bats are energetically stressed (pre- to post-weaning), because they are feeding their young. Scatophagidae (dung flies) can be one of the major prey categories in the diet of lesser horseshoe bats; and the larvae of the yellow dung-fly Scatophaga stercoraria develop in cattle dung. The presence of pasture is also indispensable to the larval stage of development for certain species (Tipulids), which form a significant proportion of the prey hunted by lesser horseshoe bats.

32. Lesser horseshoe bats fly an average of 2km per night from roosts during the summer. Band widths for foraging lesser horseshoe bats during the summer are derived from radio tracking studies. Knight (2006) found that the maximum distance travelled in one night in a lowland area in North Somerset was 4.1km for an adult female and 4.5km for a nulliparous female. The mean maximum range was 2.2km. Bontadina et al (2002) found a similar maximum foraging range; and recommended that conservation management should be concentrated within 2.5km of the roost with special consideration within 600 metres of the roost where the colony foraged half the time.

33.Lesser horseshoes exhibit multi-modal behaviour and fly for just over 50% of the night, resting after each foraging bout in night roosts, which appear fundamental to the conservation of lesser horseshoe bats, particularly during pregnancy and lactation (Knight and Jones, 2009).

Local Context

34. During 1996-2016 a total of 925 records of lesser horseshoe bats had been submitted, of which 186 relate to hibernation counts at sites within the Bath and Bradford-On-Avon Bats SAC and 23 at Chilmark Quarries SAC. Ongoing hibernation counts continue at sites within, and associated with, the Bath and Bradford-on-Avon SAC, coordinated by Dr Fiona Mathews and Wiltshire Bat Group. Of the records from the Bath and Bradford-on-Avon Bats SAC, Box Mines SSSI supports significant numbers of hibernating lesser horseshoe, with hundreds of bats regularly recorded. Several other disused limestone quarry hibernation sites feature in the records in the vicinity of the Bath and Bradford on Avon Bats SAC.

35. Forty-eight of the recorded roosts within Wiltshire comprised maternity roosts of which several were in the area around Bradford-on-Avon and Corsham (thereby close to known hibernation sites).

Bechstein's Bats

Ecology

36. A medium-sized bat, with a grey-brown dorsal surface and pale belly, the Bechstein's bat is usually easily distinguished from other species by the very long ears which extend beyond the nose when pushed forwards over the muzzle. The Bechstein's bat inhabits wooded landscapes across Europe, from southern England to central Europe and the Balkans, east to the Black Sea, Iran and the Caucasus, typically utilising broad-leaved woodlands, often with watercourses.

37. In Great Britain, the species is restricted to southern England, with strongholds in southern counties, including Sussex, Hampshire and Dorset. British populations appear to favour oak woods however European populations also adopt beech woods and conifer woodlands where adequate under-storey is present. The Bechstein's bat typically summer roosts within woodlands, using cavities such as woodpecker holes and often bat boxes, breeding within these tree roosts; in recent years, maternity colonies have been found in mature trees outside of woodlands. Most individuals will hibernate in tree roosts but an unknown proportion of the population hibernates in underground sites. A small but noted proportion of bats at autumn swarming sites, typically the entrances to underground sites such as mines and tunnels, will include Bechstein's bat, enabling gene flow between otherwise distant breeding colonies. The Bechstein's bat is considered generally rare throughout its Great Britain range, sparsely

distributed, and considered one of Great Britain's rarest mammals in part due to genuine scarcity but also a result of difficulties in achieving reliable surveys.

38. The Bechstein's bat is difficult to differentiate from the other Myotis species through acoustic surveys and so trapping surveys with acoustic lures (such as the Sussex Autobat, Hill & Greenaway, 2005) are considered the most reliable survey method. This led to the national Bechstein's Bat Project, coordinated by Bat Conservation Trust, building upon the pilot studies of Dr David Hill and Frank Greenaway (Miller, 2011). In 2015 a joint postgraduate research project was launched by Exeter University and Vincent Wildlife Trust as a result of concerns over inbreeding of isolated populations (see Wright 2016). Wiltshire has seen extensive study in recent years on Bechstein's bats, focussed in particular upon the breeding populations at Trowbridge, particularly the long-term studies at Green Lane Wood and Biss Wood, following their discovery here in 1999.

39. Bechstein's bats have been traditionally closely associated with deciduous woodland, especially wet woodlands. Recent radio tracking studies of the Bechstein's population in Green Lane and Biss Woods has shown that they will use standard trees and linear features beyond the boundary of the core woodland areas. Bechstein's bats have also been recorded roosting 2.5km from their core foraging woodland (English Nature, 2004).

40. Maternity colonies range from 10-50 females, rarely to 100 bats, exhibiting fission-fusion societies, i.e. they subdivide and recombine frequently, changing roosting sites every 2-3 days. Bechstein's bats are considered to typically forage in broad-leaved woodland with a dense understorey, gleaning invertebrates from vegetation and often foraging over the shrub layer. More recent research and radio tracking data indicates that they utilise the wider landscape, including pasture and hedgerows, often commuting to foraging grounds. Cohen (in Aspect Ecology 2014 and Cohen 2014) comments that during radio tracking of bats.

Local Context

41. Bechstein's bats are very localised in their home ranges and no breeding populations of Bechstein's bats have been found within the Corsham area. However, Box Mine SSSI is an important hibernation site for this species.

42. Box Mines SSSI is also an important site for swarming Bechstein's which is extremely likely to be frequented by bats whose core ranges are a considerable distance from the site. Bechstein's bats are regularly recorded during autumn swarming trapping surveys at a range of stone mines within the Bath & Bradford-on-Avon SAC (amounting to 40 records or 184 Bechstein's bats trapped and ringed during this time) and Chilmark Mines SAC, with small numbers noted hibernating. Whilst the swarming function is not a qualifying feature of the SAC, it is nonetheless a vital element of their ecology and therefore any impacts on the use of this site for this function would therefore have a significant impact on the favourable conservation status of the SAC.

43. Ringing records obtained from Dr Danielle Linton have confirmed links between bats swarming at Box Mine and three additional sites in Wiltshire (the maternity colonies at Green Lane and Biss Woods, Trowbridge; and a roost at Drews Pond Wood Local Nature Reserve (LNR), Devizes). It is therefore likely that Bechstein's bats annually migrate between the SAC and other hibernation and breeding sites that constitute the wider SAC network and will make use of foraging habitat around the SAC. Therefore, it is vitally important to preserve the connectivity across and beyond the Corsham Neighbourhood Plan boundary.

1.3.4 Common Habitat Preferences

44. Studies of landscape use by lesser and greater horseshoe bats in south west England have shown clear preferences for the following habitat types:

- Grazed pasture (particularly cattle grazed and especially in combination with suitable boundary/linear habitats)
- Meadows (particularly wet meadows and again in combination with suitable boundary/linear habitats)
- Riparian woodland
- Deciduous woodland
- Tall, outgrown, continuous hedgerows

45. Bechstein's bats show a clear association with ancient woodland for their core colony areas for both roosting and foraging but will extend from these core areas to smaller areas of woodland and mature hedgerows.

46. Given the overlapping habitat requirements of lesser horseshoe, greater horseshoe and Bechstein's bat in terms of commuting, the connective habitats have been included that are likely to be used by all three species.

47. All three species are known to be extremely light-sensitive (Rydell, J 1996; Emery, M 2008; Stone, E.L. 2013) to the extent that bats will not cross well-lit roads and will cease to use otherwise suitable landscape features if they are subject to lighting. The introduction of new lighting is therefore a significant issue

for bats.

48. Lighting within the natural landscape may have additional significant detrimental effects on the behaviour of insect prey species (although the precise effect and mechanism of effect of lighting on insect prey species is not yet proven) (Buglife, 2011). It is therefore vital that lighting within development proposals is kept to an absolute minimum and is carefully designed to avoid light spill onto surrounding habitats. Further guidance on lighting can be found in guidance notes published by the ILP (Institution of Lighting Professionals, 2011).


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2 HOW TO USE THE BATSCAPE MAPS

2.1 Features to be protected

49. Appendix 1 describes the detailed methodology that has been applied in production of the Batscape maps to determine which features in the landscape are likely to be important for the three target species. In summary, the Batscape maps have been produced by: firstly mapping and identifying roosts, foraging areas and connective flightlines confirmed from data obtained from the Wiltshire and Swindon Biological Records Centre (WSBRC) and through bat surveys, predominantly undertaken to support planning applications (as shown on the Phase I Batscape maps); secondly identifying the likely core sustenance zones associated with those roosts which have been identified as 'core roosts'; and thirdly by undertaking analysis of aerial photography within these core sustenance zones to identify and classify habitats likely to be of importance to the target species (as shown on the Phase 2 Batscape maps).

50. In summary, the majority of the Corsham Neighbourhood Plan area is covered by a core sustenance zone; and as such, all habitat within the area has been analysed and mapped on the Batscape Map. The Phase I and 2 Batscape Maps appended to this document illustrate five different habitat feature types analysed as likely to be used by bat populations associated with the SAC:

- **Roosts.** As described in section 1.3.2, bats rely on a network of different sites for roosting throughout the year. Hibernation and maternity roosts are the most critical, but a series of other roosts are also used as bats move around from one area to another, and these can be critical to the local population. All known roost records for the target species have been shown at relatively low resolution on the Phase I Batscape maps. It is important to note that the available data is patchy in nature and there are likely to be many more roosts in buildings and trees used by the bat SAC populations across the landscape. Where these are discovered and verified, they will be added to the Batscape map as part of a regular review process.
- **Foraging areas**. The three different bat species rely on subtly different foraging strategies depending on their prey items. As such, each species will be associated with different foraging areas, although these are likely to overlap in practice (e.g. both Bechstein's and lesser horseshoe bat are known to forage in woodland) although greater horseshoe bats are considered to forage predominantly over pasture, using woodland edges as connective habitats and night roosting/fly-catching perches. For all species combined, the following habitat types have been included as 'foraging areas' on the Phase 2 bat maps, categorised into the following: Grass Cropping & Grazed pasture (particularly cattle grazed and especially in combination with suitable boundary/linear habitats); Rough Grassland and Woodland & Scrub. Areas of amenity grassland have been categorised and plotted but have been removed from the output maps as they do not support sufficient prey species for bats.
- **Connective habitat.** All target species need to traverse the landscape when travelling between different foraging areas and roosts and will typically use sheltered well-vegetated linear features where possible to do this rather than crossing open fields (with the exception of greater horseshoe bats in certain circumstances). For all species combined, the following habitat types have been categorised as 'connective habitat': Hedgerows; tree lines; woodland edges; scrub belts; riparian corridors e.g. rivers, stream, brooks, canals etc and well-vegetated embankments and cuttings e.g. railways and to a lesser extent all other amenity and open space.
- **Strategic flyways.** All target species have been recorded as migrating tens of kilometres between roost sites, particularly when moving between summer and winter roost sites, but also when moving to swarming sites in the autumn. These types of 'long-distance' movements have been relatively-little studied in the target species populations; and as such, the importance of long distance commuting routes for bats to move through the landscape is poorly understood. Within this document, a precautionary approach has been taken and it has been assumed that well-vegetated and largely continuous dark linear corridors providing the most direct links to even larger commuting routes (such as the River Avon) north to south and east to west are of key importance in allowing bat populations associated with the SAC to move across the landscape.
- **Direct migration routes.** Radio tracking experience has shown that Bechstein's bat will commute over habitat traditionally considered unsuitable for this species, with direct crossings recorded over open fields, lighted roads and hamlets (Keith Cohen, pers. com.) Bats are likely to take the shortest route possible when travelling between two sites in order to conserve energy; and bats may therefore be traversing relatively open habitats as a necessary step in a landscape of patchy connectivity. As such, and on a precautionary basis, three direct migration routes have been added to the Phase 2 maps. These comprise straight line routes between Box Mines and the three sites known to be linked (Green Lane Wood and Biss Wood (collectively termed the 'Trowbridge Woods'); and Drews Pond Wood LNR, Devizes). Another direct migration route representing a straight line between Box Mines and woods in the Braydon Forest has also been added to the Phase 2 maps on a precautionary basis. Although no direct ringing link has been established between the sites, Braydon Forest is located a similar distance from Box compared to Trowbridge and Devizes, and it is entirely possible that the maternity colony recorded within the Braydon Forest also uses Box Mines for swarming and/ or hibernation. Although the habitat

along the Direct Migration Routes shown on the Phase 2 maps may appear poor, bats are still likely to be using the most direct route between key sites. As such, there needs to be an emphasis on avoiding lighting impacts and reduction in habitat connectivity; and also enhancing and restoring habitat connectivity along the Direct Migration Routes wherever possible.

- **Existing committed bat mitigation.** Other existing development or future development sites with planning permission may have a series of associated bat mitigation measures, including compensatory roosts and new or retained flightlines and foraging areas. Care needs to be taken that mitigation proposals for new development proposals do not impact existing mitigation already provided for development or intended to be provided in the near future when a planning permission is implemented. This applies to indirect impacts, particularly lighting, as well as direct habitat loss. The integrity of existing committed mitigation has to be retained.

51. The habitat types shown on the Phase I and Phase 2 Batscape maps have been identified as being likely to be of importance or value for the bat populations associated with the SAC. In accordance with the Conservation of Habitats and Species Regulations (2010) (as amended), the precautionary principle must therefore apply, and the emphasis must be on retention and protection of these features.

52. Policies CNP ED1 and CNP E1 in the Corsham Neighbourhood Plan therefore seeks to retain and protect the features illustrated on the Batscape maps. Pro-tection means protection from physical damage or destruction of habitat as well as protection from indirect impacts such as increase in light levels.

53. It is acknowledged that the Batscape maps have limitations due to the patchy nature of available baseline data and also the lack of ground truthing surveys (see Section 2.5). It is also acknowledged that effective mitigation measures can sometimes be put in place; and as such, the protection conferred to the features shown on the Batscape map is not absolute (as it enables development to proceed where adequate mitigation can be put in place to retain the functionality of the habitat).

54. However, policy E1 in the Corsham Neighbourhood Plan requires that the starting position is to assume that features illustrated on the Batscape maps form part of the essential network of habitats required by the SAC populations; and evidence from adequate field surveys undertaken to support planning applications (see Section 3) would be required to demonstrate otherwise. Where development proposals would impact on features illustrated on the Batscape maps, evidence from adequate field surveys would also be required to inform a mitigation strategy; and this mitigation strategy must demonstrably maintain the overall functionality of the landscape for Bechstein's, greater horseshoe and lesser horseshoe bats (see Section 3).

55. Where new habitat features are identified subsequent to publication of the Corsham Batscape Strategy, particularly new roosts, they will be added in due course to the Batscape map. In the interim period, where verified by the County Recorder, they will enjoy the same policy status as habitat features already shown on the Batscape map.

2.2 Summary of important key areas and features identified

56. The provision of connective habitats that transverse the Corsham area must be retained for locally migrating bats for the SAC. Key connective habitats have been identified to retain landscape permeability for locally migrating bat species using the hibernation and breeding sites within the SAC and other important breeding and hibernation sites to the north, east and south of the Corsham area.

57. These have been identified as the railway corridor, the southern Corsham district boundary and the By Brook corridor. It is likely that bats using the SAC will take the shortest but least exposed/disturbed route, comprising these strategic flyways, to significant established migration routes (such as the River Avon). There are many permutations of these routes and little is known about the habitat preferences and behaviour of bats during these local migrations (e.g. whether they will take detours to foraging habitats/night roosts or are more likely to cross exposed habitats). Survey work at the site level will be required to demonstrate actual use of features and habitats.

2.3 Opportunities for habitat enhancement and creation

58. As well as identifying valuable habitat features, creation of the Phase 2 Batscape map has identified some obvious areas of weakness in the landscape for bats. In summary, these are:

- Areas dominated by arable cropping with hedgerows removed or degraded
- The patchy and fragmented nature of woodland habitat and hedgerow network within the Neighbourhood Plan area. The availability of woodland habitat is likely to be the key limiting factor for lesser horseshoe and Bechstein's bat in particular.
- Built-up areas, particularly the main settlement of Corsham, provide little suitable foraging habitat for the three target species; and light levels are elevated in urban areas, further reducing habitat suitability. However, the presence of undiscovered significant roosts in buildings in urban areas should not be ruled out, particularly where dark corridors are available to connect to foraging habitat in the surrounding countryside. The likelihood or suitability of buildings and trees to support roosts of Bechstein's, lesser and greater horseshoe bats is beyond the scope of this document. Likewise recommendations for the enhancement of character areas does not include for the provision of additional roosts as the success of additional roosts is dependent on a large number of variables and must be considered in detail at site level. However, where there is significant, high quality foraging habitats with a good network of connective habitats within the vicinity of suitable structures, the likelihood that a bat roost may be present is significantly increased.
- At a national level, habitat loss and the reduction in the availability of suitable roost sites for these species is a major contributing factor to their decline and therefore any increase in the provision of suitable roost sites for these species should be considered to be of significant benefit to the population.

59. The Batscape Phase 2 map can be usefully scrutinised to crudely identify the landscape opportunities for creation, restoration or enhancement of habitats that will provide the greatest benefit to the SAC bat populations. Examples include:

- enhancement and creation of new connective habitat along the Direct Migration Routes;
- creation of new connective habitat that would result in shorter direct routes between foraging areas; and
- tree planting to provide stepping stones between existing woodland blocks; or even to establish a significant new woodland in areas devoid of this habitat.

60. Specific opportunities for creation, enhancement or restoration of habitats have been described within the 22 character area guidelines set out within the Corsham Design Guide. Within this urban and surburban context, the opportunities described in the Design Guide are deemed to provide the best potential gain to the 'batscape' utilised by the three target species, particularly in terms of providing connective habitat to link up fragmented foraging habitat.

61. Over time, it is hoped that the Phase 2 Batscape map for the entire Corsham Neighbourhood Plan area can be developed further to show specific opportunities for habitat creation, restoration and enhancement. These opportunities should be strategically targeted to provide the maximum gain when looking at the landscape as a whole for the bat SAC populations. Ideally, this next stage of mapping would be informed by additional bat survey data, in particular, establishing the presence or absence of 'core roosts' in areas which are currently data-deficient.

62. In the long-term, it is envisaged that there are a number of potential exciting future applications for the Batscape Phase 2 map. For example, the GIS database can be easily adapted to plot planning applications and provide quantitative measurements of areas of each habitat type to be lost. This would be particularly useful to accurately measure cumulative habitat loss and therefore as a tool to assist with Habitats Regulations Assessment (HRA).

63. Another potential application in the long-term is to use the Batscape maps to target future biodiversity offsetting and compensatory policy. The maps could illustrate at a landscape scale where the best locations for new bat roost buildings and foraging and connective habitat would be for the SAC populations. Where developers are required to make a payment under the Community Infrastructure Levy (CIL), the money could contribute to a strategic pot, managed by Corsham Town Council, that would be used for creation, restoration and enhancement of bat habitats on the ground. Over time, it is intended that future Corsham Neighbourhood Plan policy will develop in this direction to: 1) require a standard CIL payment from developers for batscape work; and 2) to establish a strategic mechanism for ring-fencing, managing and spending this money to benefit the SAC bat populations. Key policy in the NPPF as set out in paragraphs 109 and 117 supports this approach, including the requirement to identify and map components of the local ecological networks; and the requirement to provide net gains in biodiversity where possible, including by establishing coherent ecological networks that are more resilient to current and future pressures.

2.4 Review and update of Batscape maps

64. The maps that have been created during this process must be considered dynamic documents as the relative importance of landscape features will alter as the area is subject to further development and habitat change. The intention is that this document and the corresponding mapping outputs will be periodically reviewed to ensure that it remains relevant to the present landscape.

65. The importance of landscape features and habitats for bats, particularly relating to those species associated with the Bath and Bradford on Avon SAC, has been assessed for the purposes of this document based on the current scientific research and understanding of the ecology of these species. As further research is published that alters our understanding, this assessment should be revised to accommodate any new information. For example, the core sustenance zones (CSZ) applied to this assessment are only a rough guide to the kind of important range evidenced so far. The actual location of key foraging elements may in some cases be beyond the CSZ range and asymmetry in habitat dispersal may strongly influence bat activity. It is therefore essential to maintain a feedback loop in the process to allow additional areas to be added to the CSZ where necessary.

66. It is therefore recommended that this document is reviewed as a minimum once every five years to ensure that any significant changes are captured and the relative importance of landscape features can be updated to ensure that the document is relevant and does not become outdated.

2.5 Limitations of Batscape

67. Aerial photography varies in date, accuracy, definition and coverage. Ideally these habitat assessments would be followed by a ground truthing exercise and must be considered in this context. Ground truthing of habitats has not been conducted during this assessment. Minimal habitat condition data is available; this assessment takes the precautionary approach and has considered all habitats that qualify within the broad criteria in section 2.1 to be of suitably high quality to support bats. Therefore, any subsequent reference to the habitats as they have been categorised within this document must be evidenced by specific, detailed ecological field surveys.

68. The assessments of the importance of the foraging and connective habitats contained within this document have been conducted with the sole purpose of creating a tool to allow an interpretation of how bats utilise the Corsham landscape. This has been conducted on a theoretical basis and must not be taken as evidence of the importance of any given landscape feature in the absence of full, detailed field surveys in accordance with Bat Surveys for Professional Ecologists: Good Practise Guidelines (3rd Edition) (Bat Conservation Trust, 2016). These surveys will be a necessary supporting document for planning applications.

69. There is a clear bias in the volume of survey effort with respect to development pressure to the west of Corsham. This area is therefore disproportionately represented, with the remaining area appearing largely devoid of important records. This is extremely unlikely to be the case. The absence of bat records is highly likely to be due to the lack of development pressure and the associated professional survey effort. In the absence of development pressure, the records are supplied by volunteers and the data, by its very nature, is patchy and biased towards the location of individual local recorders and known roost sites. Therefore, the absence of bat records must not be considered evidence of the absence of important roosts or habitat features for bats. This can only be robustly assessed through comprehensive field survey. It is the responsibility of the applicant to provide further evidence in the form of ecological reports.

70. Changes in disturbance, lighting and habitat management are not necessarily captured where they have been delivered outside the planning process and the suitability of linear habitat features should be reassessed. The impacts of existing lighting levels on connective and foraging habitats adjacent to developed areas cannot be accurately assessed without field surveys at night. The suitability of habitats adjacent to residential and commercial estates has been considered in the absence of any assessment of lighting impacts degrading these habitats.


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3 Generic Guidance for Developers

71. This section sets out some minimum standards that will be expected for planning applications for development likely to affect habitat features of importance for the SAC bat populations. It is important to note that this generic guidance does not preclude the need for detailed and bespoke surveys and mitigation but rather provides some minimum benchmarks that must be met.

3.1 Potential impacts and survey requirements

72. Section 4 and Table 1 of the Bat Special Areas of Conservation (SAC) Planning Guidance for Wiltshire (Wiltshire Council, September 2015) set out the potential impacts on SAC bat populations arising from development that need to be considered at an early stage. In summary, these include:

- Physical changes – alteration/demolition/removal of a potential roost feature including environmental conditions (temperature, humidity, internal light levels etc), loss, damage or change of management of potential foraging habitat, removal / fragmentation / modification of habitats in a potential commuting corridor;
- Lighting – artificial lighting close to potential roosting, foraging and commuting features;
- Noise and vibration – construction / demolition activities close to potential roost features;
- Recreational disturbance – increasing the risk of recreational visits both organised and informal;
- Pollution – dust and fumes close to potential roost features; and
- Mortality – predation by domestic cats at roost entrances, collision risk from wind turbines.

73. Section 4 of the Bat SAC Planning Guidance for Wiltshire also sets out the survey requirements for development with potential impacts on the bat SAC populations. This document does not seek to duplicate the Bat SAC Planning Guidance for Wiltshire, however, the following critical points are emphasised:

- Where development has potential to result in impacts to the Bat SAC populations as described above, early engagement of an ecological consultant is critical to assess the site and advise on the scope of survey and mitigation that will be required;
- Early support and engagement with ecological consultees (including Wiltshire Council and Natural England) is also critical to ensure that survey and mitigation scope are adequate;
- Bat surveys are seasonally constrained. A substantial suite of surveys may take up to 12 months to complete and should therefore be programmed into the project delivery plan at an early stage to avoid delays. Surveys may need to cover the hibernation, transitional, mating and swarming periods in order to provide adequate information to support the planning application;
- Developers and consultants should adhere to guidance on survey scope as set out in Bat Surveys for Professional Ecologists: Good Practise Guidelines (3rd Edition) (Bat Conservation Trust, 2016). However, additional survey effort may be required in some circumstances. Advanced techniques such as trapping, acoustic lures and radio tracking may be required for certain sites. Use of these techniques will require a bespoke approach agreed in advance with consultees.

74. Failure to provide the necessary survey information to support a planning application is likely to result in delays in determination, amendments to the scheme and ultimately may result in refusal of the application. It is recommended that applicants make use of Wiltshire Council's pre-application service. Early pre-application discussions can be invaluable to avoid delays to planning applications; and to avoid spending pre-emptive time and money on unnecessary or inadequately-scoped bat surveys.

3.2 Minimum standards for mitigation strategy

75. Section 5 and Table 1 of the Bat Special Areas of Conservation (SAC) Planning Guidance for Wiltshire (Wiltshire Council, September 2015) set out the mitigation that should be adopted to ensure potential impacts on the SAC bat populations are eliminated or reduced to a level that is not likely to result in significant effects to the SAC. The Wiltshire Council guidance establishes core sustenance zones for strategic roosts in a Wiltshire context; and requirements set out in this document must also be satisfied in terms of the information required to support planning applications. This Batscape Strategy does not seek to duplicate the Bat SAC Planning Guidance for Wiltshire, however, the following critical points are emphasised:

- Early engagement of an ecological consultant, followed by early consultation with Wiltshire Council and Natural England, is essential to inform miti-

gation design;

- The requirements for ecological mitigation must be used to guide development design from the outset. The necessary mitigation measures for bats will work when integrated as a fundamental component of the scheme design; but conversely, are unlikely to be successful when tacked on to a scheme retrospectively. Mitigation proposals therefore need to be developed in close consultation with other professionals such as highways/lighting engineers, landscape architects and urban designers to ensure that they are realistic, achievable and deliverable, and can be maintained in the long-term without creating conflicts with the needs or aspirations of highways uses and local residents;
- A Mitigation Strategy must be submitted with the planning application. The mitigation strategy must set out how potential impacts will be avoided as part of the application. The scope of this document will be dependent on the nature and scale of the anticipated impacts, but will need to include full details of any replacement roosts (including location and detailed design). Other items that might be required include a construction method statement; a post-construction monitoring scheme; pre and post development lux contours (see Section 3.3 below) and a long-term Habitat Management Plan (HMP) (see below). Further details that will be expected in terms of lighting and retained/created connective and foraging habitats (including buffer zones) have been provided below.

76. The Bat SAC Planning Guidance for Wiltshire states that an Ecological Parameters Plan must be submitted for Outline applications for major development with detailed design including layout as a reserved matter. For outline planning applications, the EPP must clearly identify those areas of the site which are unconstrained, those areas where sensitive design or restrictions may be required (specifying the principles to be applied), and any areas of the site which are to remain undeveloped or form part of the landscaping; and should be accompanied by an indicative masterplan (see the Bat SAC Planning Guidance for Wiltshire for full details). The EPP will be an approved document of any outline permission granted and any reserved matter application will need to be in compliance with this plan.

77. The guidance in this Corsham Batscape Strategy supports the Wiltshire Council current approach but also requires an Ecological Mitigation Plan (EMP) to be submitted as a formal planning application drawing for every full planning application affecting habitat features associated with the SAC bat populations (i.e. those features shown on the Phase 2 Batscape mapping). The EMP must be a scaled plan that has clearly been informed by the ecological assessment and should include:

- Location and dimensions of replacement roosts plus separate architectural drawings to show detailed design and materials for bat houses;
- The EMP should be based on topographical survey and must show the accurate location, extent and area of connective / foraging habitat to be retained, created or enhanced;
- Any proposed tree or shrub planting and areas of wildflower grassland to be seeded must be scaled and accurate with the extent and areas shown and with full landscape specifications. Further details are provided in Section 3.4 below;
- The EMP must take full account of required construction working areas as well as the boundary of the permanent built development. Accurate development boundaries should be overlaid on the EMP to allow accurate scaling and location of mitigation measures;
- The EMP will be an approved document of the full planning permission granted and must be implemented as part of the permission;
- The planning submission should also indicate how retained and created habitats will be maintained and managed for the long-term. A Habitat Management Plan (HMP) is likely to be required that specifies the mechanism for long-term habitat management (in terms of who will be responsible for undertaking the management as well as mechanisms of funding) together with aims and objectives of management. Initial management prescriptions and time scales should be specified together with a review mechanism for updating the HMP as required; and
- All mitigation and specifications included on the EMP must be properly integrated into all other planning application drawings, including the Site Plan, the Block Plan, the Landscape Masterplan and all other layout and elevation drawings.

78. Commuting routes and foraging areas should be retained within the public realm where they can be effectively protected and appropriately managed for bats in accordance with the approved Habitat Management Plan in perpetuity under the terms of an enforceable planning condition or legal agreement.

79. Implementation of the overarching mitigation strategy and EPP and/or the EMP and/or the HMP will be secured either through a condition or legal agreement of any permission granted. If insufficient mitigation measures are provided to demonstrate that the bat populations would be adequately protected, the local authority will have no legal alternative but to refuse the application.

80. Further details of the information that will be expected on lighting and buffer zones associated with connective and/ or foraging habitat have been provided in Sections 3.3 and 3.4 below.

3.3 Lighting

3.3.1 Summary of known impacts of lighting on bats

81. Artificial lighting is known to have severe impacts on bats, acting through a range of different mechanisms. Light falling on a bat roost exit point, regardless of species, will at least delay bats from emerging, which shortens the amount of time available to them for foraging. As the main peak of nocturnal insect abundance occurs at and soon after dusk, a delay in emergence means this vital time for feeding is missed. At worst, the bats may feel compelled to abandon the roost. Bats are faithful to their roosts over many years and disturbance of this sort can have a significant effect on the future of the colony.

82. In addition to causing disturbance to bats at the roost, artificial lighting can also affect the feeding behaviour of bats and their use of commuting routes. There are two aspects to this: one is the attraction that short wave length light (UV and blue light) has to a range of insects; the other is the presence of lit conditions.

83. Many night-flying species of insect are attracted to lamps that emit short wavelength component. Studies have shown that, although noctules, serotines, pipistrelle and Leisler's bats, take advantage of the concentration of insects around white street lights as a source of prey, this behaviour is not true for all bat species. The slower flying, broad-winged species, such as long-eared bats, barbastelle, greater and lesser horseshoe bats and the Myotis species (which include Brandt's, whiskered, Daubenton's, Natterer's and Bechstein's bats) generally avoid external lights.

84. This means that light that spills onto bat commuting routes or foraging areas can cause avoidance behaviour by some species (including greater horseshoe, lesser horseshoe and Bechstein's) and isolate or fragment habitat in the landscape. This will mean that bats may be forced to abandon foraging areas or commuting routes for sub-optimal habitat (which may ultimately result in abandonment of roosts if that alternative habitat is insufficient to sustain the colony). Lighting can be particularly harmful if it illuminates important foraging habitats such as river corridors, woodland edges and hedgerows used by bats. Studies have shown that continuous lighting along roads creates barriers which some bat species cannot cross.

85. It is also known that insects are attracted to lit areas from further afield. This could result in adjacent habitats supporting reduced numbers of insects, causing a further impact on the ability of light-avoiding bats to feed.

3.3.2 Mitigation standards for lighting

86. It can therefore be seen that the impacts of artificial lighting on bats can be severe; and it is consequently essential to mitigate these impacts arising from new development. It should be noted that each development scheme is likely to require bespoke lighting mitigation, designed by a lighting engineer, working in collaboration with a specialist bat ecologist. However, some common principles, together with minimum mitigation standards that will be expected in planning application submissions, have been outlined below.

87. As an overarching principle, dark corridors must be maintained around roosts, foraging areas and commuting corridors with no net increase in light levels as a result of the development in areas used by bats. It should be noted that enhancements would also be welcome i.e. development schemes that actively reduce lux levels associated with bat habitat features. These principles should be achieved through the following:

- Planning applications should be submitted with pre and post development lux contour plans, which should be based on topographic survey and prepared by a lighting engineer;
- Derivation of post-development lux contours must include the illuminance arising from all light sources, including highways lighting, flood lighting, security lighting, other external lighting and internal lighting (i.e. light spill from windows). The latter is particularly important where buildings are designed as glass-fronted or are located in close proximity to bat habitat features;
- Post-development lux contours need to be considered and presented at the height at which bats fly i.e. not just at ground level. As such, consideration needs to be given to calculating vertical illuminance in lux for given habitat features, as well as horizontal lux contours at different heights. Post-development lux contours must be based on lux levels from newly installed lights rather than 'worn-in' lighting levels;
- Lux levels for important bat habitat features to be retained or created would ideally result in no increase on existing levels and where possible a reduction. As a minimum requirement, lux levels at the height at which the target species fly must be < 1 lux measured at the outer perimeter of the habitat feature;
- It is likely to be necessary to buffer bat habitat features considerably from development in order to secure suitable light levels, taking into account the potential for private owners to fit their own external/security lighting in the future. A minimum standoff distance of 15m has been suggested in the Bat Special Areas of Conservation (SAC) Planning Guidance for Wiltshire (Wiltshire Council, September 2015);

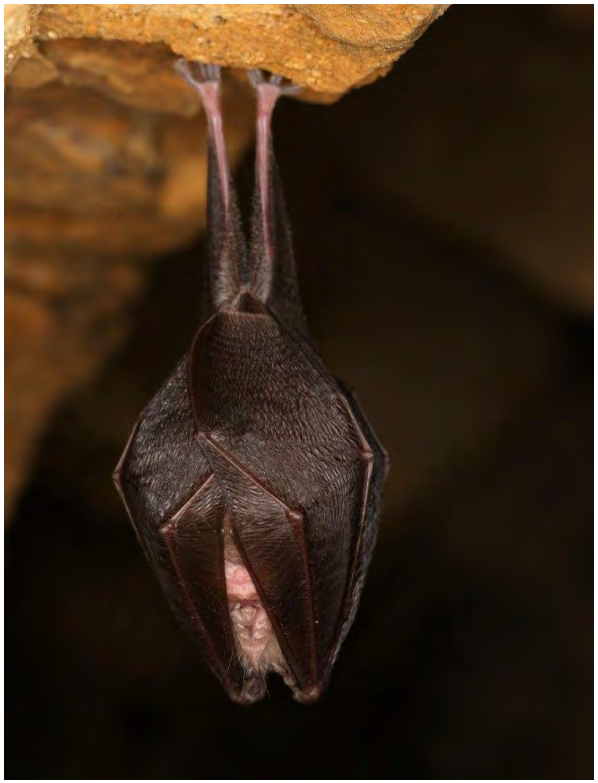
- A competent lighting designer should be employed who will apply the principles of providing the right light, in the right place, at the right time and controlled by the right system e.g. motion sensors are not always suitable and switched timed lights might be more appropriate;
- There are a range of guidance documents available that set out excellent design principles that could be considered for lighting ; and these should be used to assist with design of lighting schemes that are sensitive to bats. As a starting point, it is important to consider whether lighting is necessary at all before going on to consider design. Consider no lighting solutions where possible such as white lining, good signage and LED cats eyes;
- Minimise the spread of light to at, or near horizontal and ensure that only the task area is lit. Flat cut-off lanterns or accessories should be used to shield or direct light to where it is required. Consider a range of design solutions to target light to where it is needed i.e. not the bat habitat features, including height of lighting, low intensity luminaires with shielding designed to prevent light spill, deployment of fencing and tree/ shrub planting to screen light sources;
- There is frequently a conflict between highways lighting requirements and requirements for bat dark corridors i.e. there is typically only a limited design that will be acceptable to the Highways Authority before they will adopt a new road. **These conflicts must be identified at the earliest opportunity**; and developers will be expected to find innovative solutions to these conflicts, including consideration of sections of non-adopted private highway if necessary.

3.4 Standards for mitigation involving new connective habitat

88. Where mitigation proposals would involve new connective habitat such as a new hedgerow or woodland strip, it is critical that adequate information is submitted to provide the confidence that the new feature will function as required i.e. will provide suitable commuting habitat for the target species.

89. Consideration must be given to timescales for the new planting to become effective: new connective habitat should be in place at the earliest possible stage. It is important that the interim impacts of the development are assessed during the time it takes for trees to mature (for example, Bechstein's bats typically fly high in the canopy and are therefore likely to require mature tree vegetation for effective commuting routes). The following information must be provided:

- Detailed cross-sections linked to the Ecological Mitigation Plan (see example overleaf). These should show all structures and vegetation to be provided together with minimum widths and distances for each component;
- New tree and shrub planting specified in detail, including a planting schedule that specifies species, stock, ground preparation, planting density, timing, planting methodology, weed control, plant protection and long-term maintenance. Areas of wildflower grassland must also be specified in detail (including seed mix, ground preparation, sowing methodology and aftercare);
- A long-term habitat management plan will be required to demonstrate that the habitat will remain effective for bats (see paragraphs 77 and 78 above)



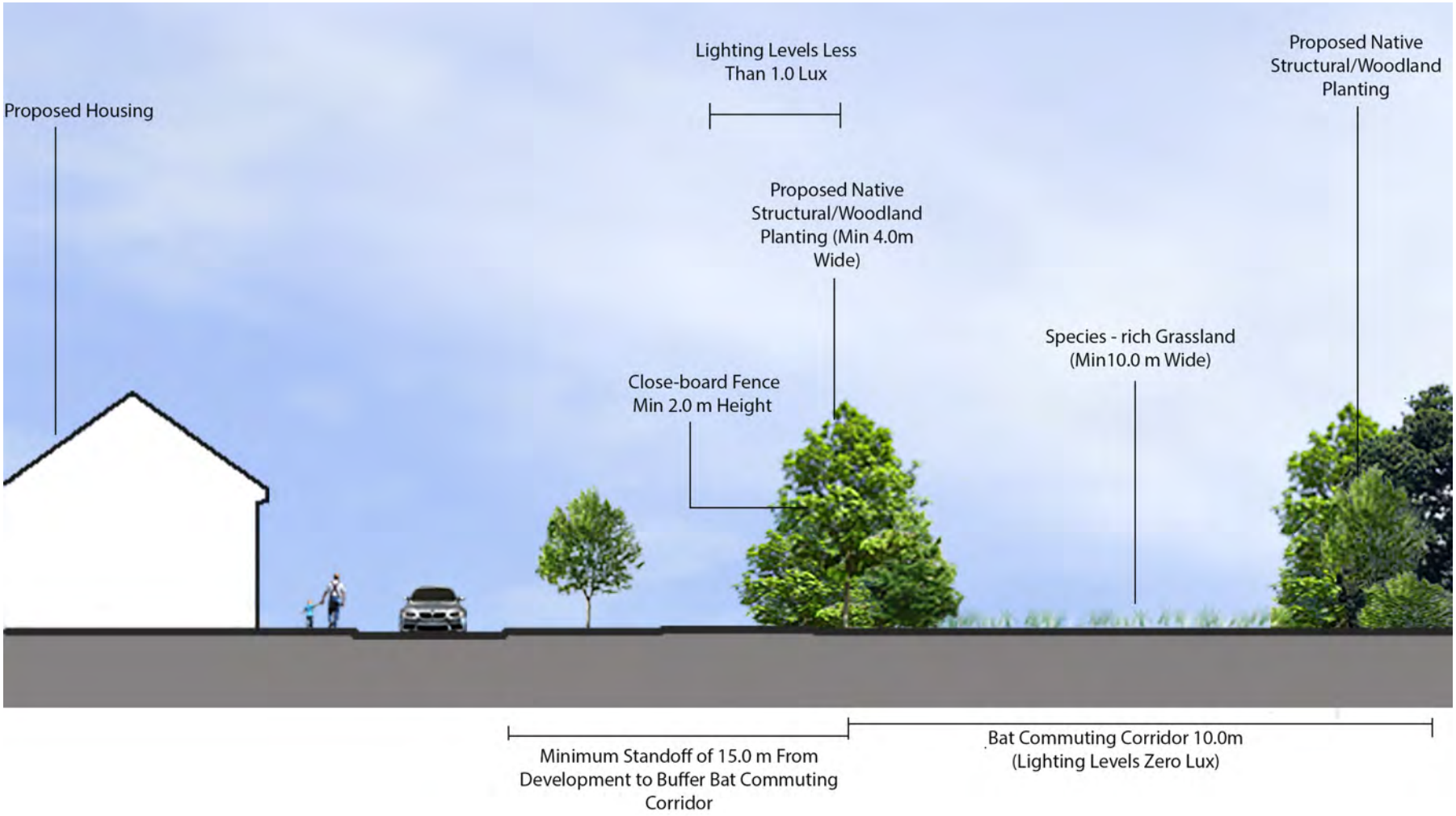
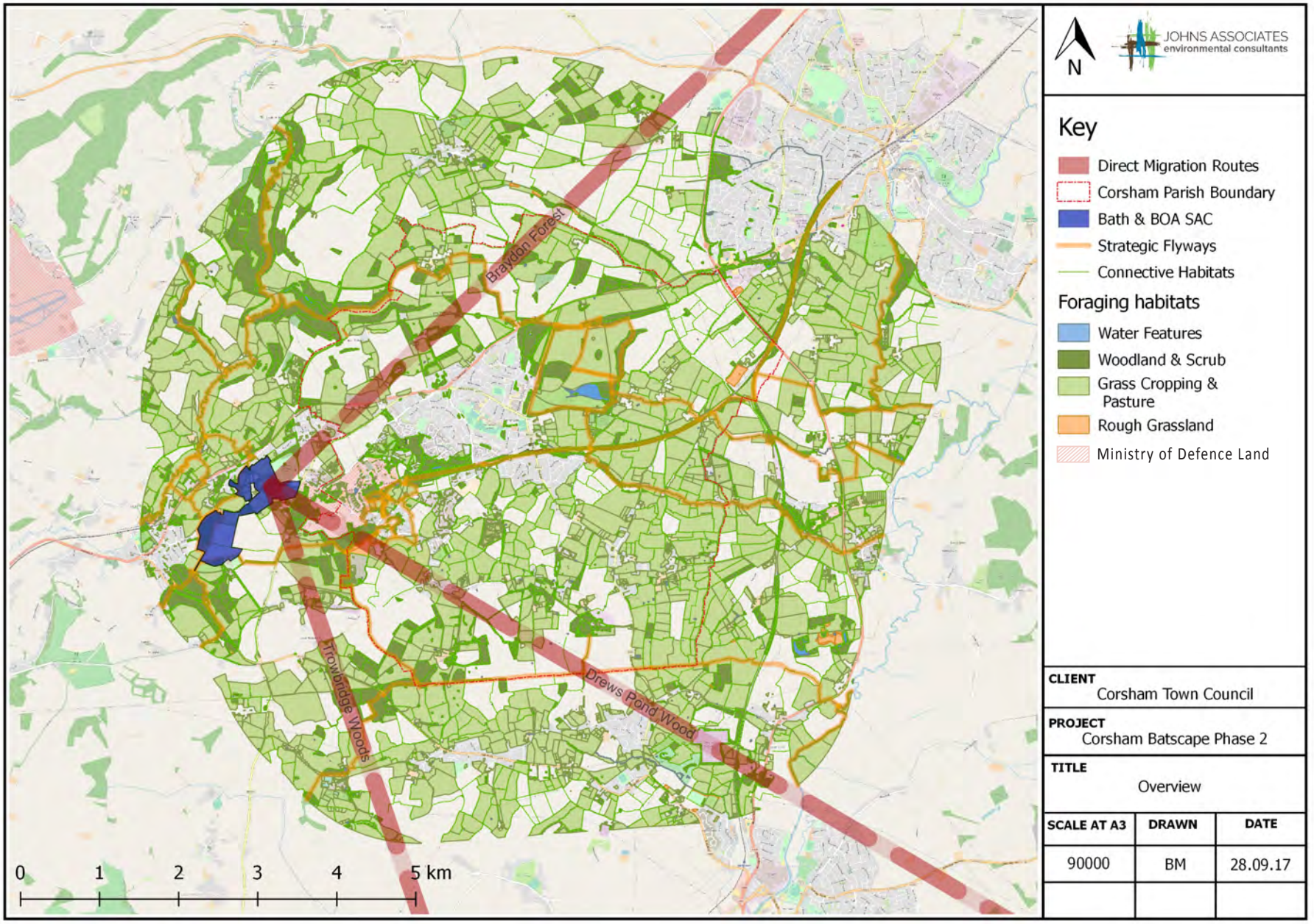
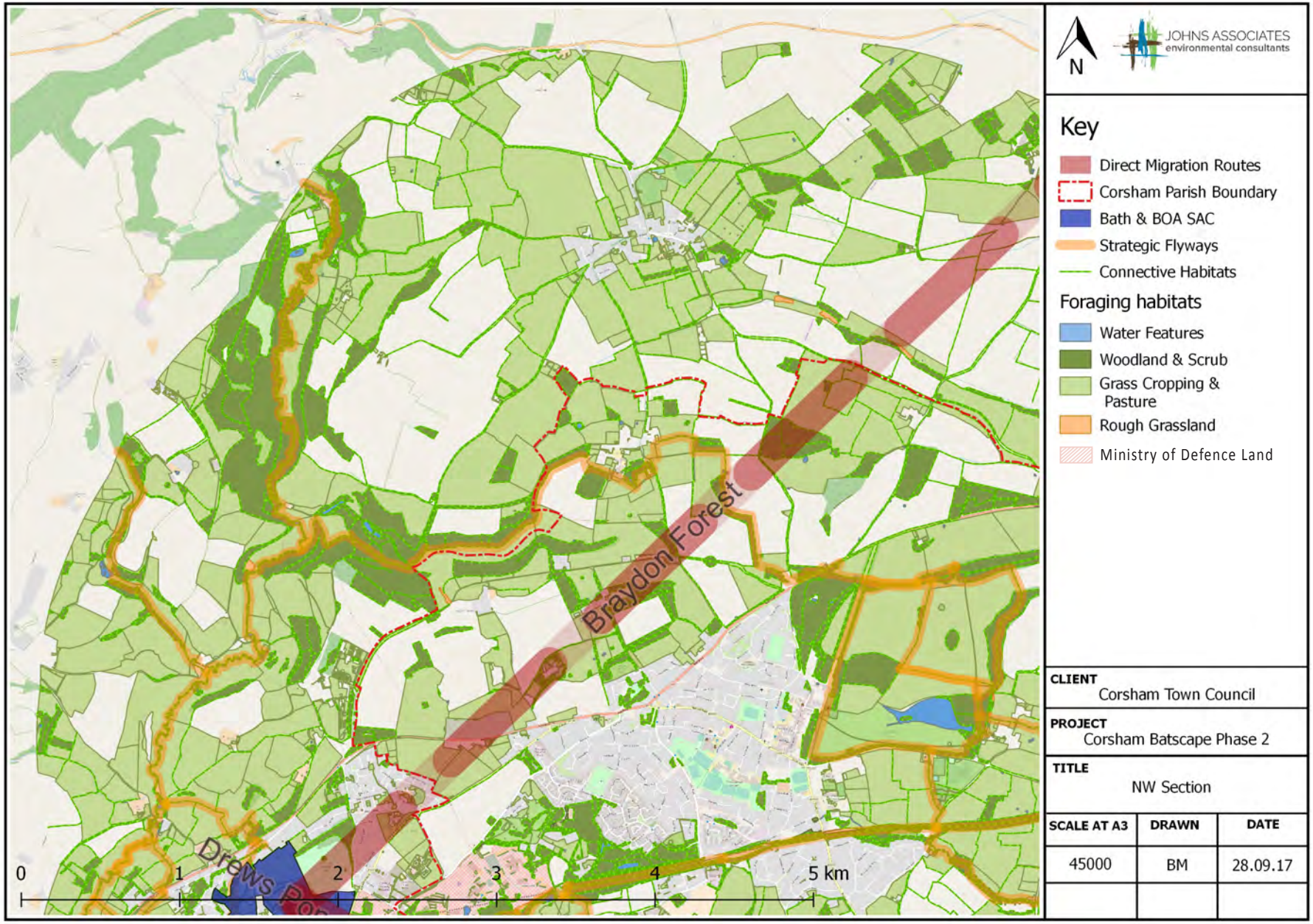


***Figure 1*:** Example cross-section (connective habitat and associated buffer zone)

Phase 2 Batscape Maps - Overview



Phase 2 Batscape Maps - NW Section



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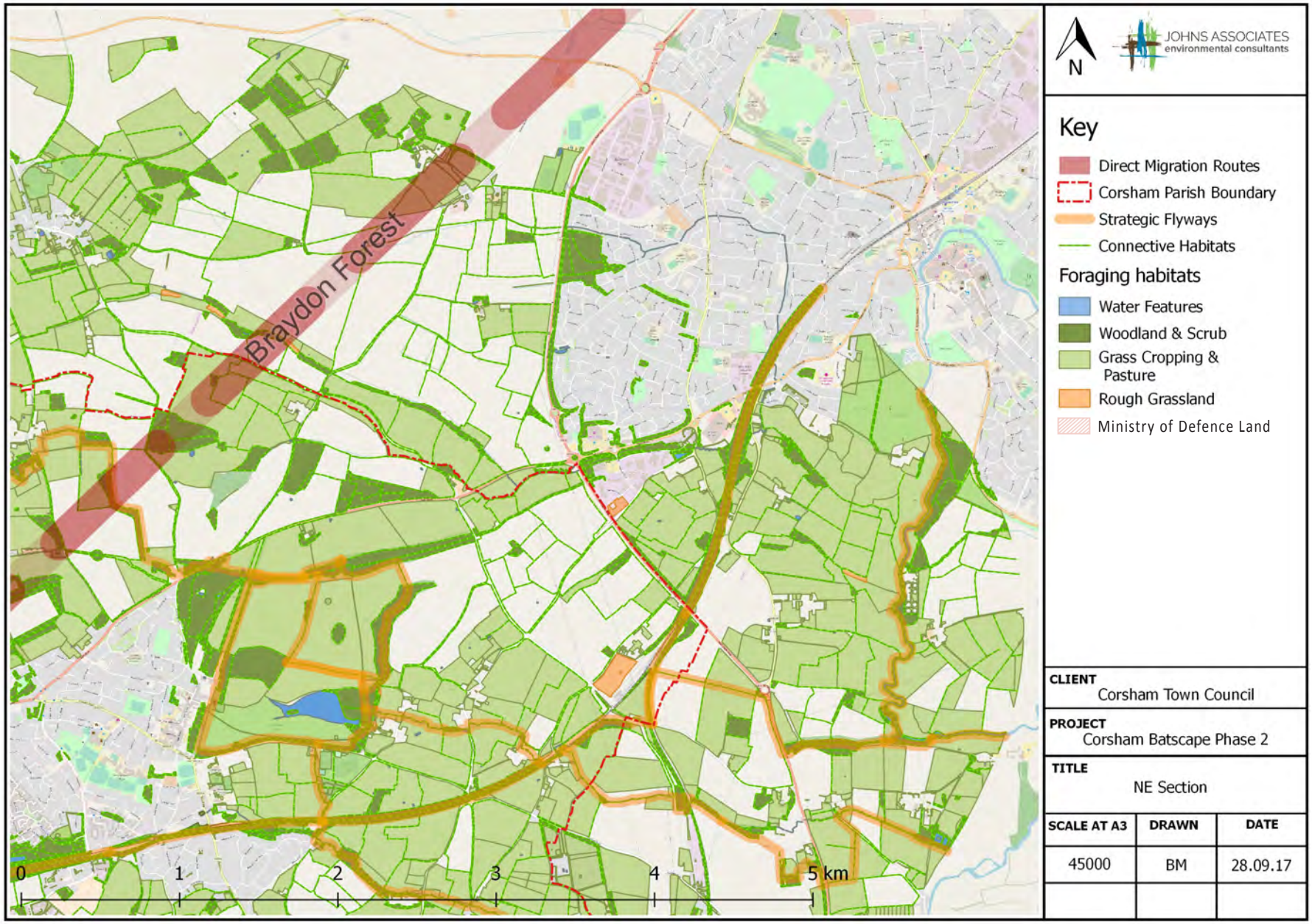

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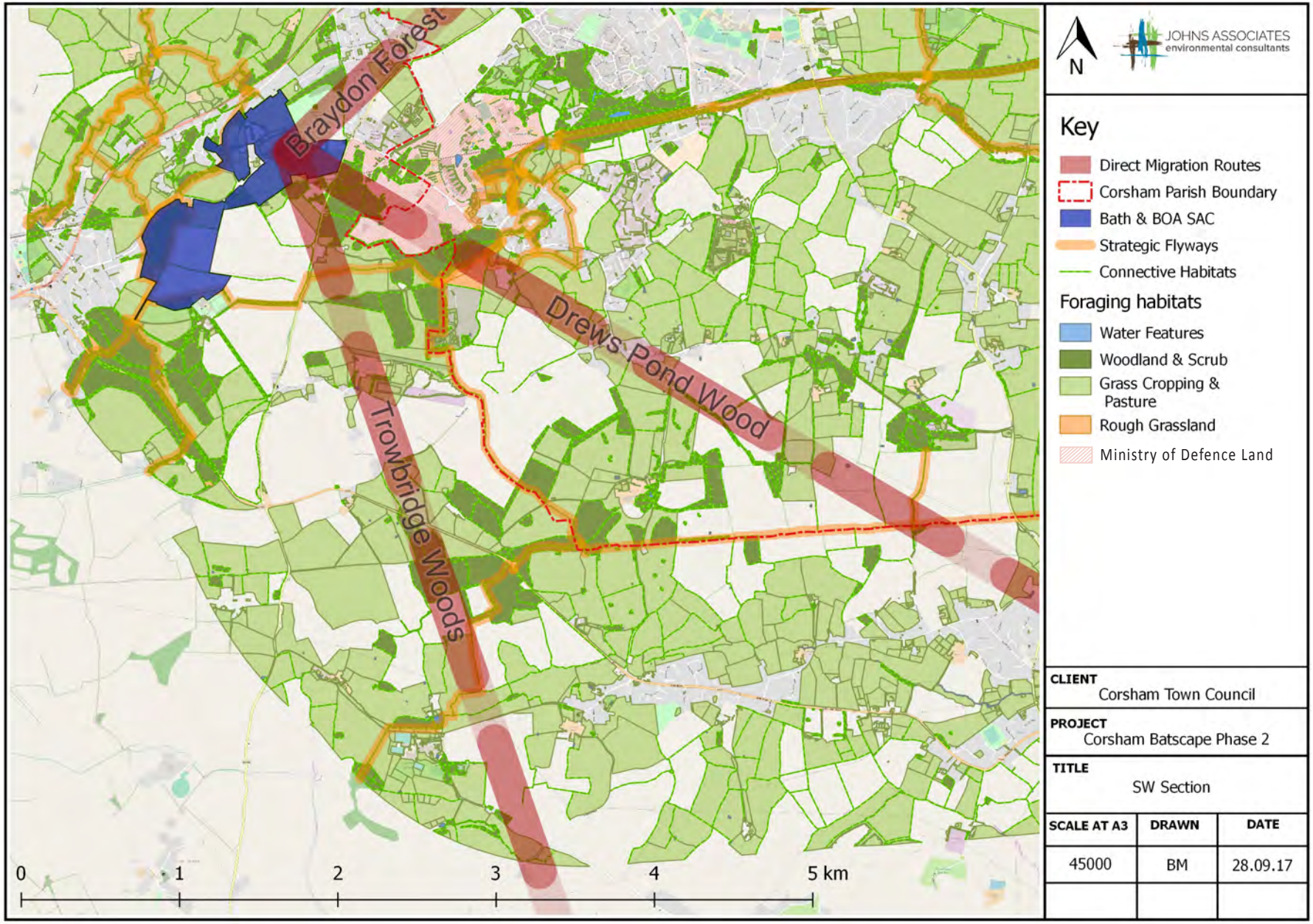

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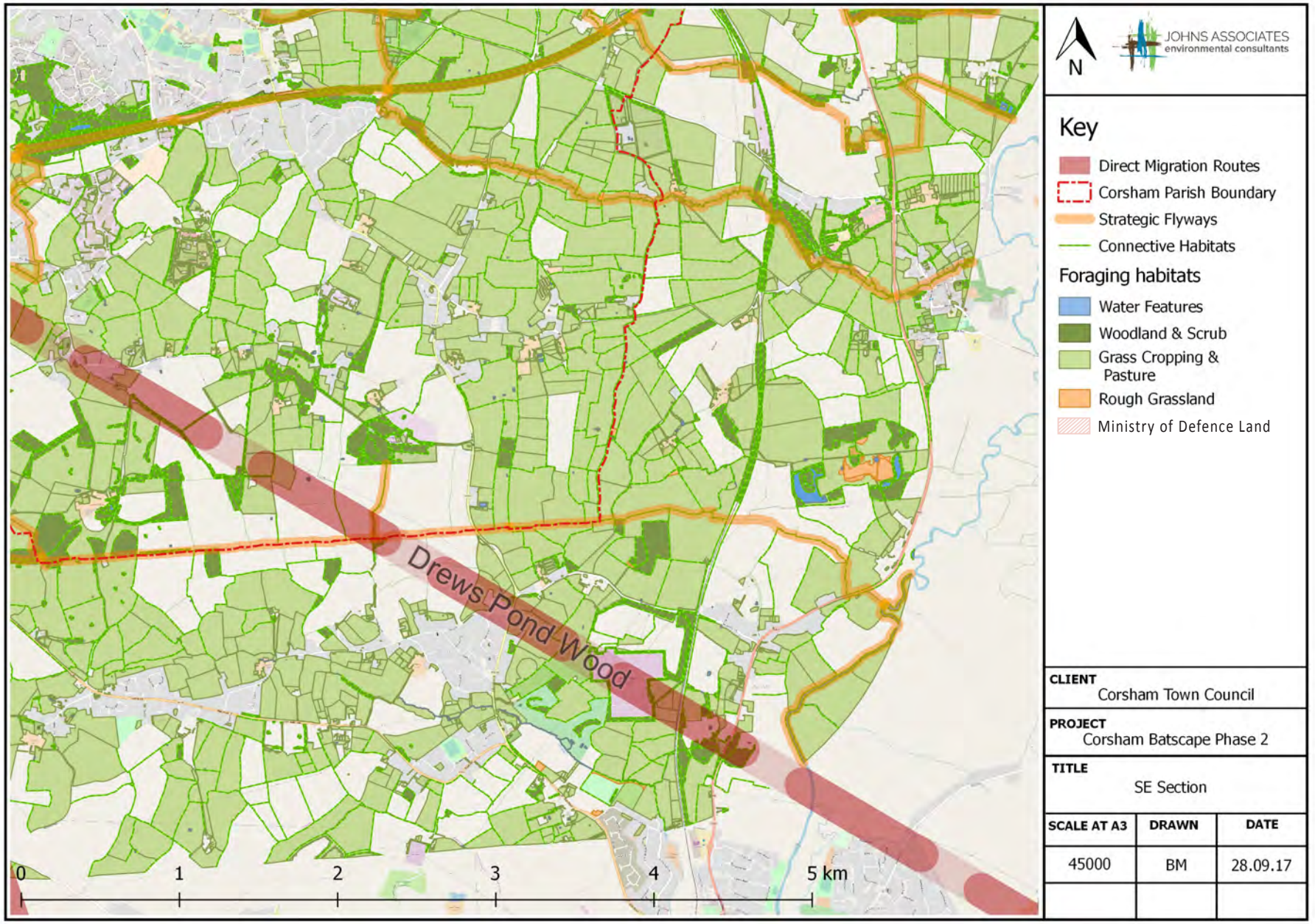

APPENDICES

Appendix 1: Methodology for Production of Batscape Maps

A.Batscape Phase 1

A.1 Data Sources

90. The initial data gather exercise sought to compile all existing records for the SAC species:

- Greater horseshoe – 4km radius
- Lesser horseshoe – 2km radius
- Bechstein's bats – 2km radius

91. The search radii are in accordance with the Bat Special Areas of Conservation (SAC) Planning Guidance for Wiltshire (Wiltshire Council, 2015) and compliant with the zones of influence of roost criteria described by BCT (Bat Conservation Trust, 2016).
This data search prioritised the following records:

- Roosts
- Flight lines
- Radio tracking data
- Ringing data
- The following sources were approached for data:
- Wiltshire & Swindon Biological Records Centre (WSBRC)
- Wiltshire County Council (Jon Taylor, Fiona Elphick, Emma Glover)
- Wiltshire Council Planning Portal
- Natural England (Katie Lloyd)
- Bath and North-East Somerset Council (Karen Reinshaw)

92. In addition to the reports published on the Wiltshire Planning Portal, the following Ecologist/Consultancies were also contacted as they have carried out work in this area:

- Dr Fiona Mathews (University of Exeter)
- Gareth Harris (County Bat Recorder)
- Dr Danielle Linton
- Keith Cohen
- RSK
- BSG
- NPA
- Dr Ian Davidson-Watts
- Dr John Knight

93. A number of sources have not been included in this document but as this data becomes available this should be added during the periodic review.

A.2 Data Interrogation

94. This data was then interrogated and the records were authenticated and amended as appropriate.

- Wiltshire Council Planning Portal was used to investigate planning applications occurring within the parish of Corsham.
    - Planning applications with known bat survey data were searched for by specific reference.
    - Planning applications with potential bat survey data attached were searched for using the map tool.
- Bat features were extracted from associated ecological reports which comprised a bat roost, foraging area or flight line for Bechstein's, lesser horseshoe or greater horseshoe bat.
- The following criteria were applied for making a feature record:
    - If the original surveyor had determined survey data was adequate to comprise a bat feature then it was included in the dataset (ie. a true flight line rather than a single call)
    - If the feature is identified as due to be removed by the proposals, and the planning application had been approved, the feature was not included in the dataset.
    - If the feature is identified as due to be removed by the proposals, and the planning application had been refused, the feature was included in the dataset.
    - If compensatory bat barns for the prescribed species had been proposed for an approved planning application, it is included within the dataset as a Mitigation Roost, if no post construction monitoring report is available to confirm use as a roost.
- Roost features were split into the following categories: Maternity Roost, Hibernation Roost, Satellite Roost, Transitional Roost Other Roost, Mitigation Roost, Swarming Site.
- Assumptions made to collate the list of bat features were noted, assumptions made by authors of reports have not been included.
- The survey method producing most evidence of a bat feature has been listed as the survey method. Additional surveys were undertaken.
- Flight lines have not been extended along linear features beyond the site boundary surveyed

A.3 WSBRC Conditions of Data Use

95. By using the data provided, WSBRC has specified the following conditions. Any further use of or reference to the data contained within this document is bound by these conditions unless specific consent is obtained from WSBRC:

- The data are still protected by copyright, and this is held by WSBRC unless otherwise stated.
- The raw data may not be copied to third parties, published in any form, placed on the Internet or supplied to the recipient's client or consultees without written permission from WSBRC except as in the circumstances given below.
- Reports which include an interpretation or summary of the data supplied by WSBRC may be provided to the recipient's client and consultees provided that:
    - Any special arrangements made in respect of confidential data are adhered to (see below)
    - Full acknowledgement is given in the report to WSBRC and where appropriate, the original recorders
    - Any specific copyright conditions attached to the data including Crown Copyright must be strictly adhered to
    - The data supplied by WSBRC is not amended in any way
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- Data from WSBRC will only be used for the purpose stated and will not be stored beyond the life of the project for which it was acquired or for longer than 12 months.
- Whilst WSBRC takes all reasonable steps to ensure that the information supplied is validated and verified, it cannot be held liable for the accuracy or comprehensiveness of the data due to the varied sources and time periods that may apply to some of the original data and to the dynamic nature of biological recording. It therefore cannot accept liability for any consequential, incidental or indirect loss, damage or adverse effect arising from the use of the data.

B.Batscape Phase 2

B.1 Rationale

96. The relative importance of landscape features and habitats has been modelled based on a number of assumptions supported by academic research into the ecology of lesser horseshoe, greater horseshoe and Bechstein's bats.

97. A number of formal references have been cited in this document but this list is by no means exclusive and a number of informal sources have also been consulted/accessed to inform the interpretation of these assumptions.

98. The following habitats have been included as key foraging and connective habitats:

- Grazed pasture (particularly cattle grazed and especially in combination with suitable boundary/linear habitats)
- Rough Grassland (as categorised by Ordinance Survey and assumed to indicate permanent pasture)
- Woodland (Particularly deciduous and riparian woodlands)
- Tall, outgrown, continuous hedgerows
- Scrub

99. Additional priority should be given to connective and foraging habitats within Core Areas of known core roosts. These are defined as:

- Breeding Roost
- Hibernation Roost
- Swarming Site
- Mating Roost
- Transitional Roost

100. This differs from the SAC planning guidance as this assessment does not include a lower threshold for a core roost and, as such, all the above roosts have been included irrespective of peak counts of individuals.

101. The suitability of habitats within the wider Corsham landscape has been conducted using aerial photography to make very broad assessments of the character and condition of the habitats present. Google Street View photos have also been referenced, where possible, to assess the impact of lighting and disturbance.

102. Whilst linear features are commonly referred to as commuting features, bats are regularly observed foraging along linear features and therefore the term connective habitat has been used in this assessment as significant linear features will also provide an important foraging resource (English Nature, 2002). The assessment of whether a bat is foraging or commuting is very difficult in the field as a bat is assumed to be commuting unless feeding behaviour is observed. The exception to this is when using radio tracking where a bat has been observed spending a longer time within a restricted area of suitable foraging habitat. In this case Bats are opportunistic feeders and will take prey wherever they are encountered. A number of formal references have been cited in this document but this list is by no means exclusive and a number of informal sources have also been consulted/accessed to inform the interpretation of these assumptions.

B.2 Assessment of Key Habitats

B.2.1 Hedgerows

103. The structure, species composition and height of hedgerows cannot be accurately assessed from aerial photography for all hedgerows. However, a number of key characteristics of hedgerows can be identified with a sufficient level of confidence and have been assessed using the following criteria:

- Continuity
  - No gaps > 10m (JNCC, 2001)
- Connectivity
  - Connected to at least one other suitable linear feature (hedgerow/ woodland/watercourse) (JNCC, 2001)
- Structure
  - Estimated height >2m (JNCC 2001) (Bates FS 2010)
  - Width >2m for the majority of its length (Duverge & Jones 2003) (Bates 2010)
  - Presence of standard trees is preferred (JNCC 2001) (Boughey KL, 2011) (English Nature, 1996)
- Lighting/disturbance
  - Absence of artificial lighting (Buglife, 2011) (Rydell, J 1996) (Emery, M 2008) (Stone, E.L. 2013)

B.2.2 Woodland and Scrub

104. A number of radio tracking studies within the Corsham area have identified key foraging areas of deciduous woodland habitat. Areas of woodland in the wider landscape matching these habitats have been identified as key foraging areas, particularly for lesser horseshoe and, potentially, Bechstein's bats.

105. The composition of woodland cannot be accurately assessed from aerial photography, but it is possible to identify broadleaved/coniferous woodlands with a sufficient degree of confidence. The nature of the woodland i.e. understorey structure, species composition and management clearly remain unknown and therefore a precautionary approach has been taken to assume that all areas of deciduous woodland provide suitable foraging and commuting habitat for both horseshoe species and Bechstein's bats until further, more detailed assessment show otherwise.

106. There has been no specific assessment of the minimum size of a woodland to support bats and the assessment of the suitability of this habitat has been considered to be high, irrespective of the size of individual woodlands. Colonies are likely to use a complex of individual woodland and scrub areas within their core range.

107. As scrub will naturally succeed into woodland, areas of this habitat have been included within the woodland & scrub layer as they display similar foraging and connective appeal as woodland. Given the wide range of structural and species composition of this habitat, it has been included on a precautionary basis as providing suitable invertebrate resource as well as shelter/connectivity but as these have been identified by Ordinance Survey mapping they would benefit from ground truthing.

B.2.3 Agricultural Habitats

108. In particular, the assessment of artificial and ephemeral habitats found throughout the agricultural landscape make any assessment a snapshot in time that is subject to annual variation. However, the relative extent of arable and grazed pasture habitats should be relatively consistent during the rotation of field use. Individual farms should therefore maintain a fairly consistent area of foraging habitat for greater horseshoe bats, albeit in different configurations on an annual basis. For example, dairy farms will maintain areas used rotationally for grazing and silage, that may change year to year, but the extent of each area will be the same, as it is required to support a similar size of herd year on year.

Arable

109. Arable habitats support low densities of prey species and are therefore very poor foraging habitat. These are also very open, monotonous habitats that are largely avoided by bats with the exception of those with suitable boundary habitats. In this situation, it is the boundary habitats that are of interest and the open arable habitat is still largely avoided. (Linton et al, 2015)

110. Therefore, open arable habitats have been excluded as foraging habitat in this assessment (although suitable linear habitats immediately adjacent to arable crops have been included).

Pasture

111. Whilst some agricultural habitats (e.g. silage crops) support low diversity of invertebrate prey species, they can nonetheless support a high abundance of single prey species (e.g. cockchafers and crane flies) that can provide a valuable seasonal resource at certain times of the year, particularly in spring (Jones et al, 2015). In addition, these habitats are likely to be used on a rotational basis by dairy farms and will therefore be grazed in some years. These habitat areas have therefore been included as a foraging resource.

112. Grazed pasture, particularly permanent grazed pasture, is a key foraging habitat for greater horseshoe bats (English Nature ENRR174, 1996). Farms which have evidence of grazing livestock have, therefore, been included as important foraging habitat.

113. Some small areas of unclassified grassland areas have been included in the grazed pasture layer remain in this layer at this point as removing these individual polygons is extremely time consuming and does not affect subsequent analysis.

B.2.4 Amenity Grassland

114. Where grasslands could clearly be identified as amenity grassland habitats, they have been reclassified as amenity grassland habitats for the purposes of this assessment. Areas of amenity grassland.

115. Areas of amenity grassland are predominantly located within the developed areas of Corsham and provide negligible connective and foraging resource for the bat species included in this document.

116. Some larger areas of this habitat could provide a limited and seasonal foraging resource for greater horseshoe bats in the form of crane flies but this is considered to be insignificant on a landscape scale when considered against the extent of agricultural pasture habitats.

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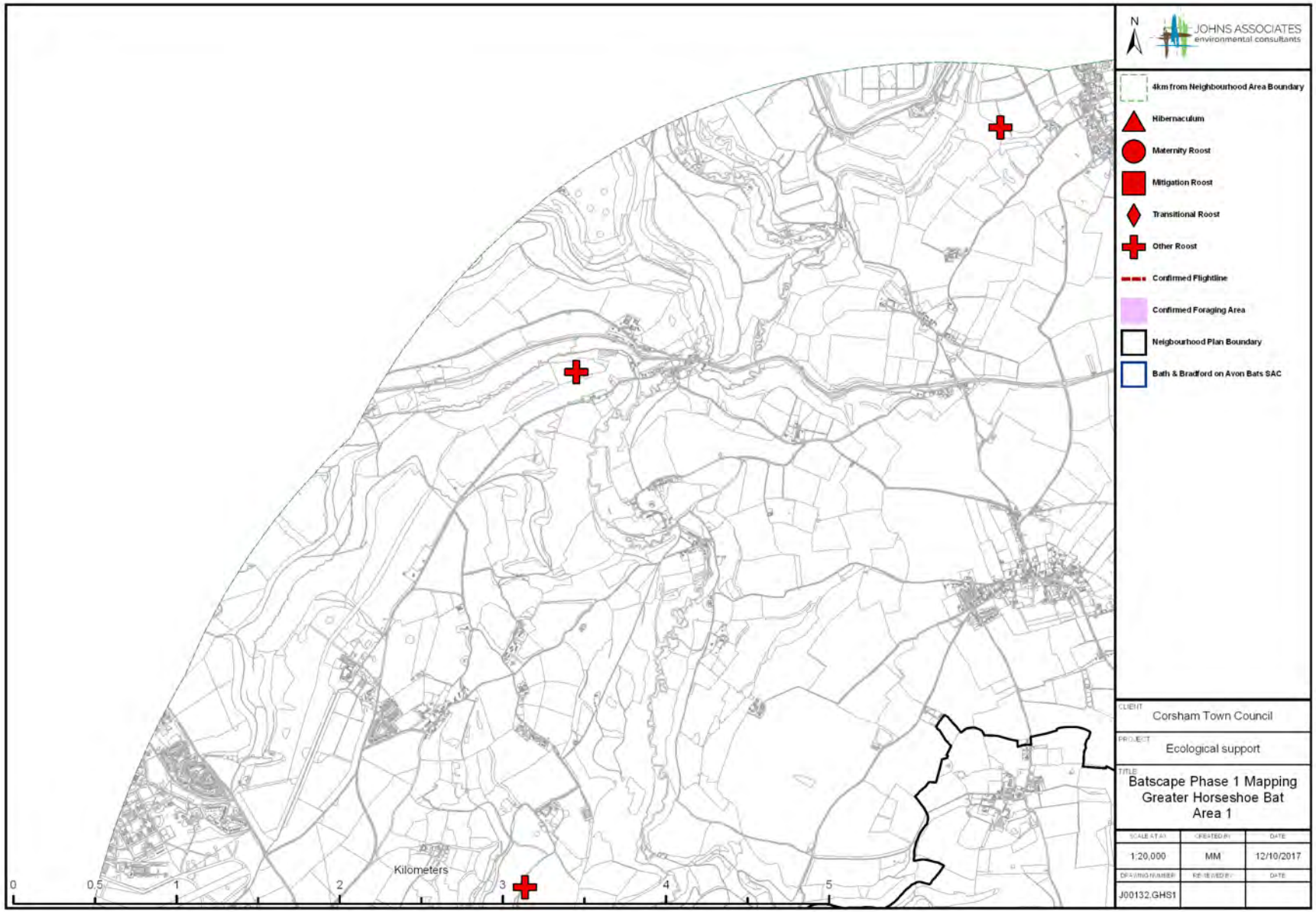

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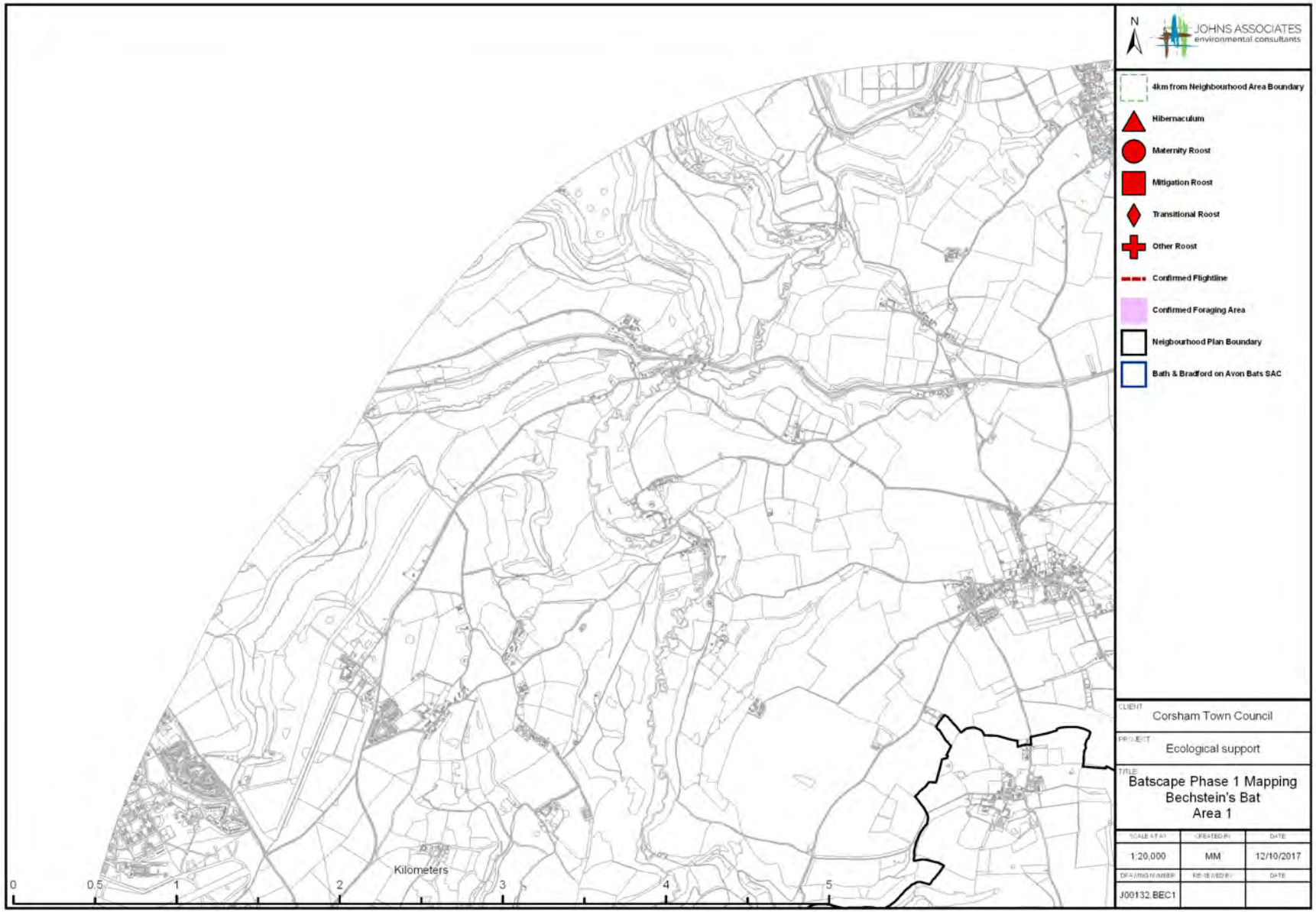

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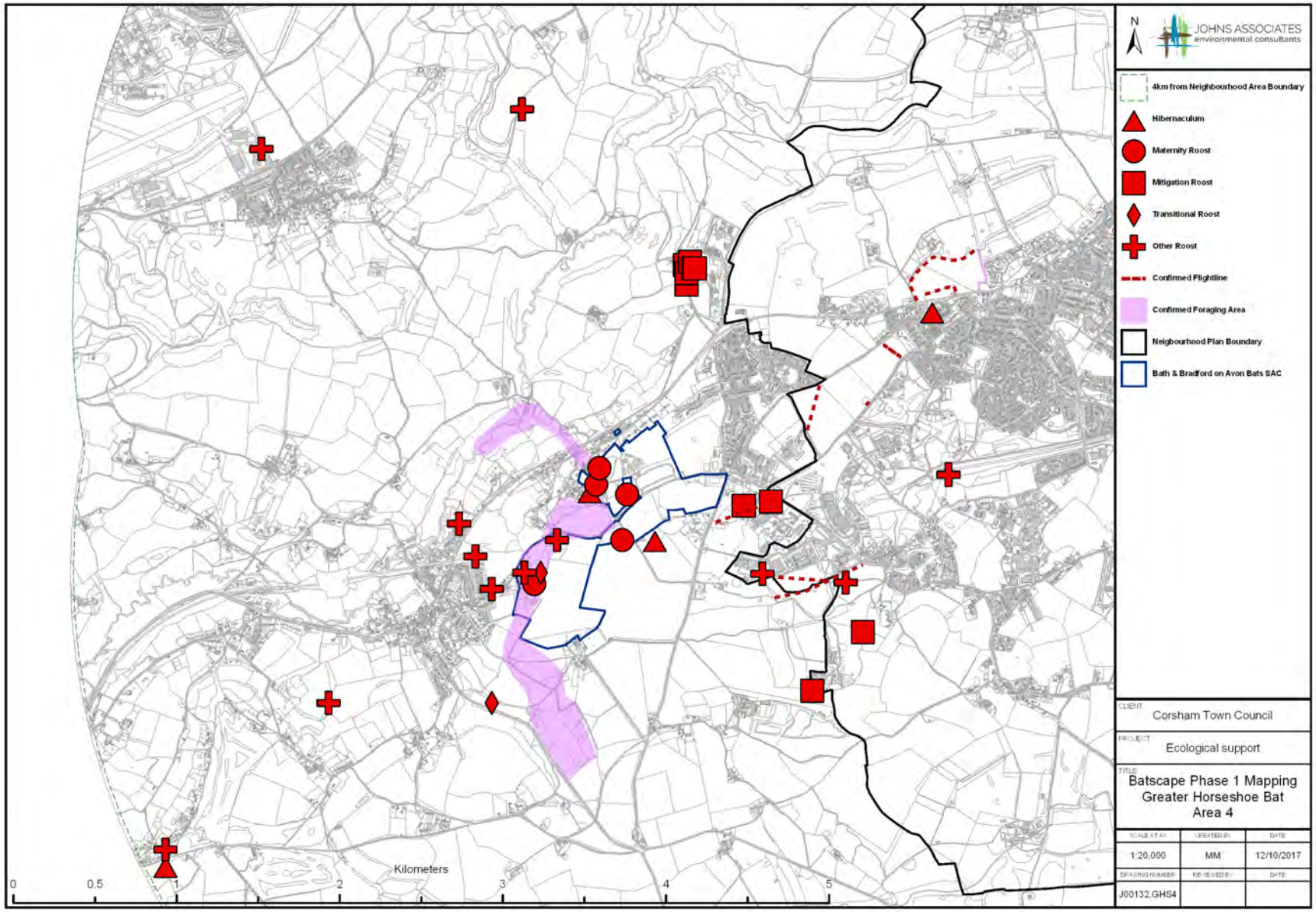

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Phase 1 Batscape Maps - W BEC

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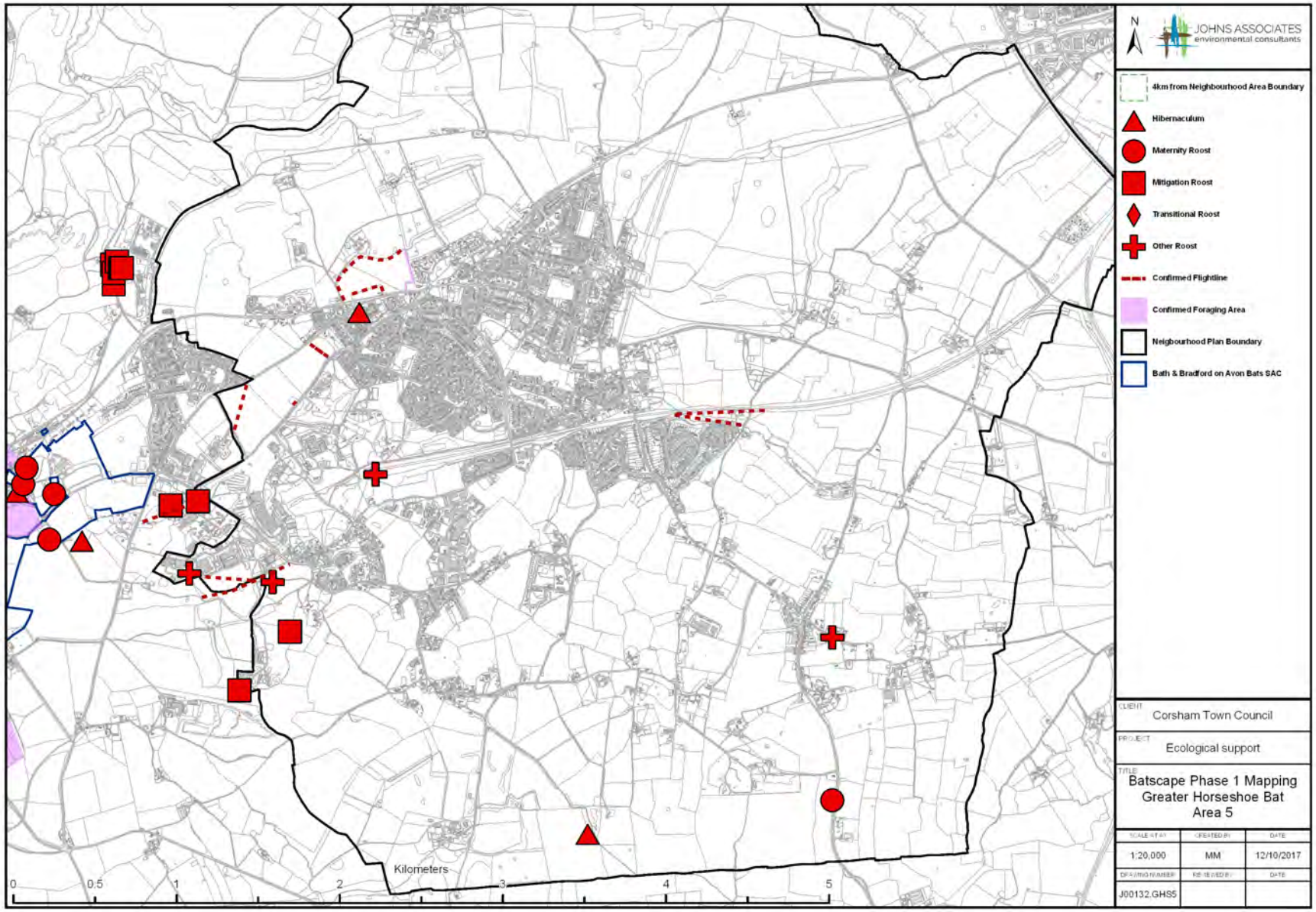

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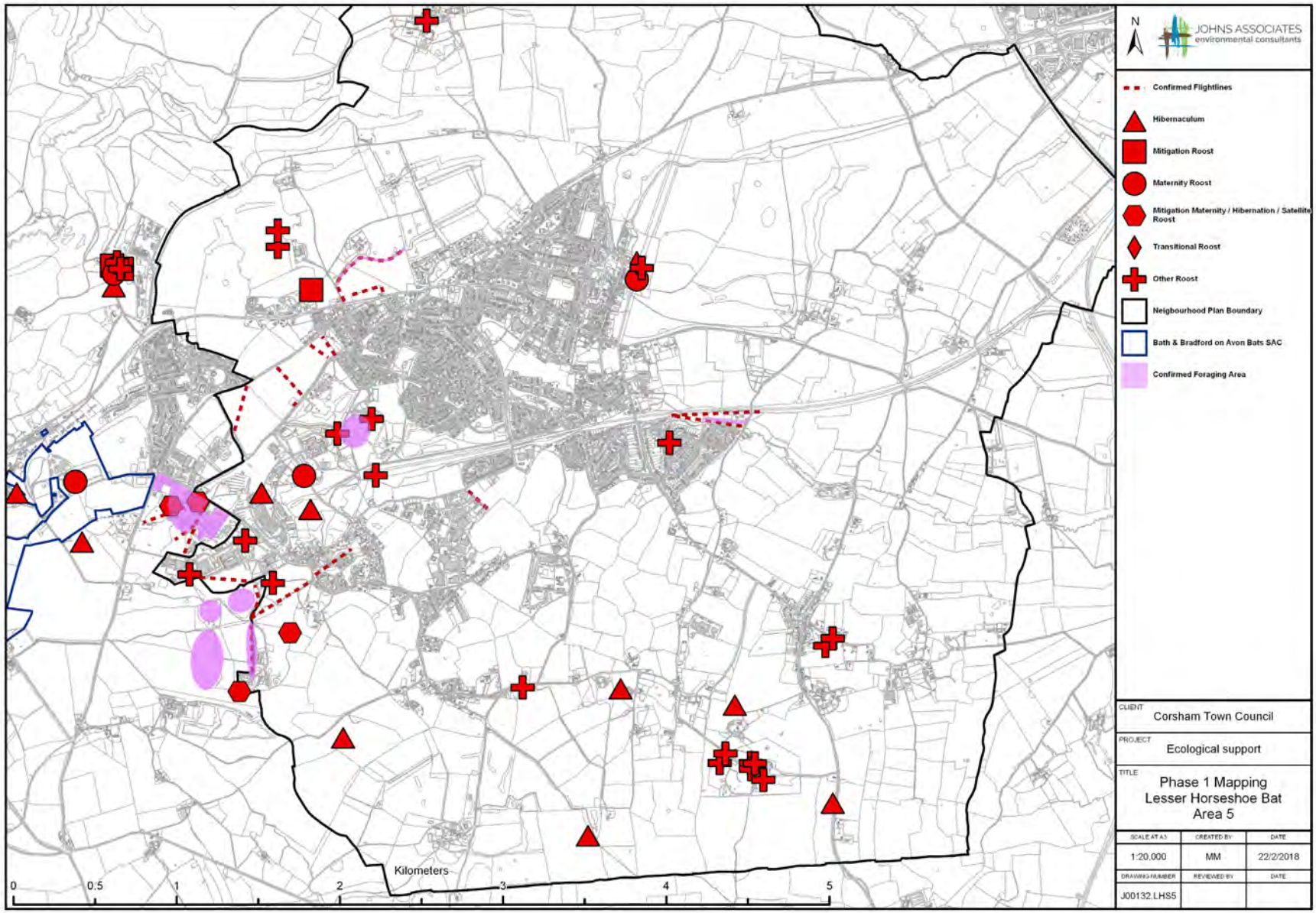

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Phase 1 Batscape Maps - E LHS

Phase 1 Batscape Maps - E BEC

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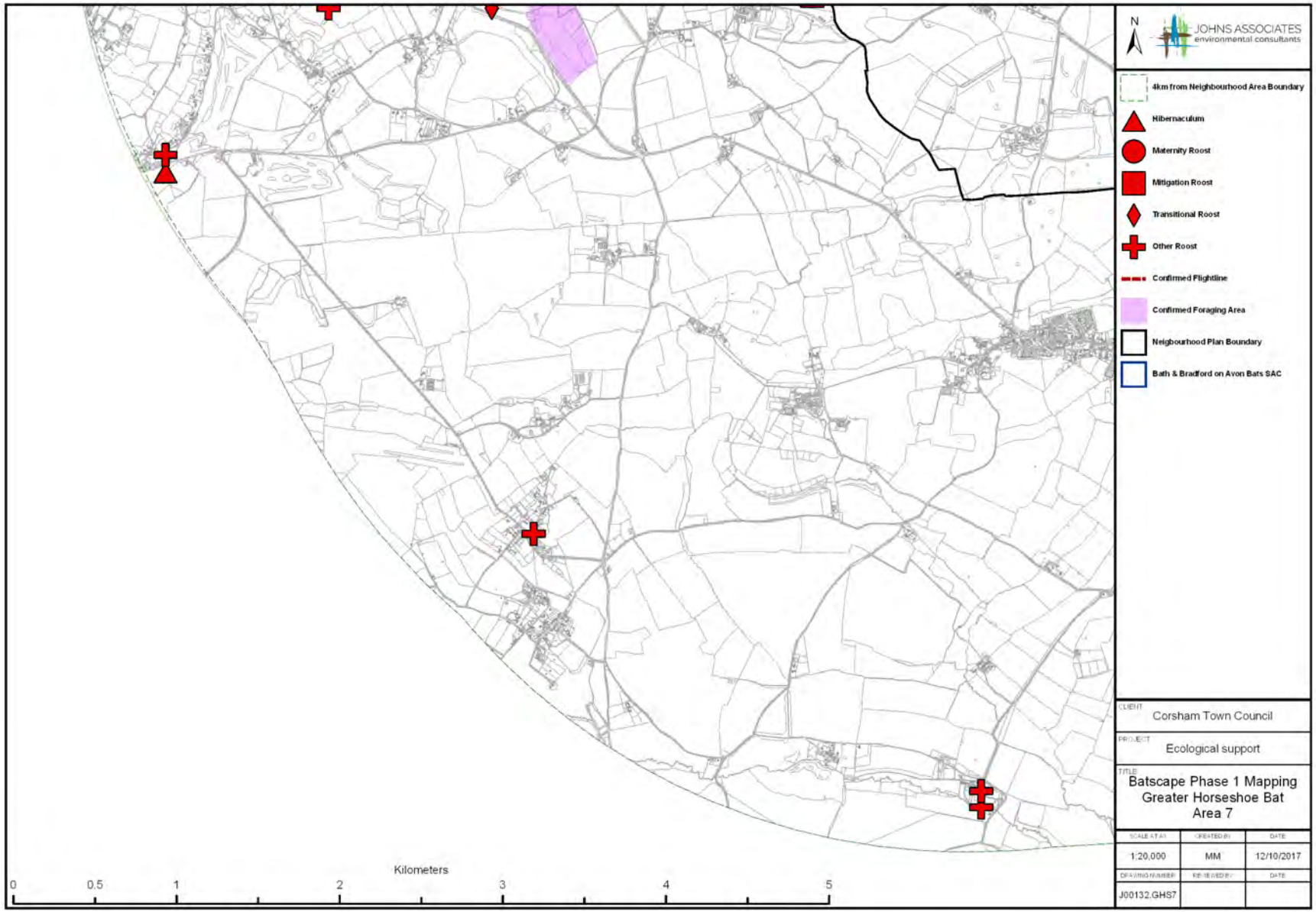

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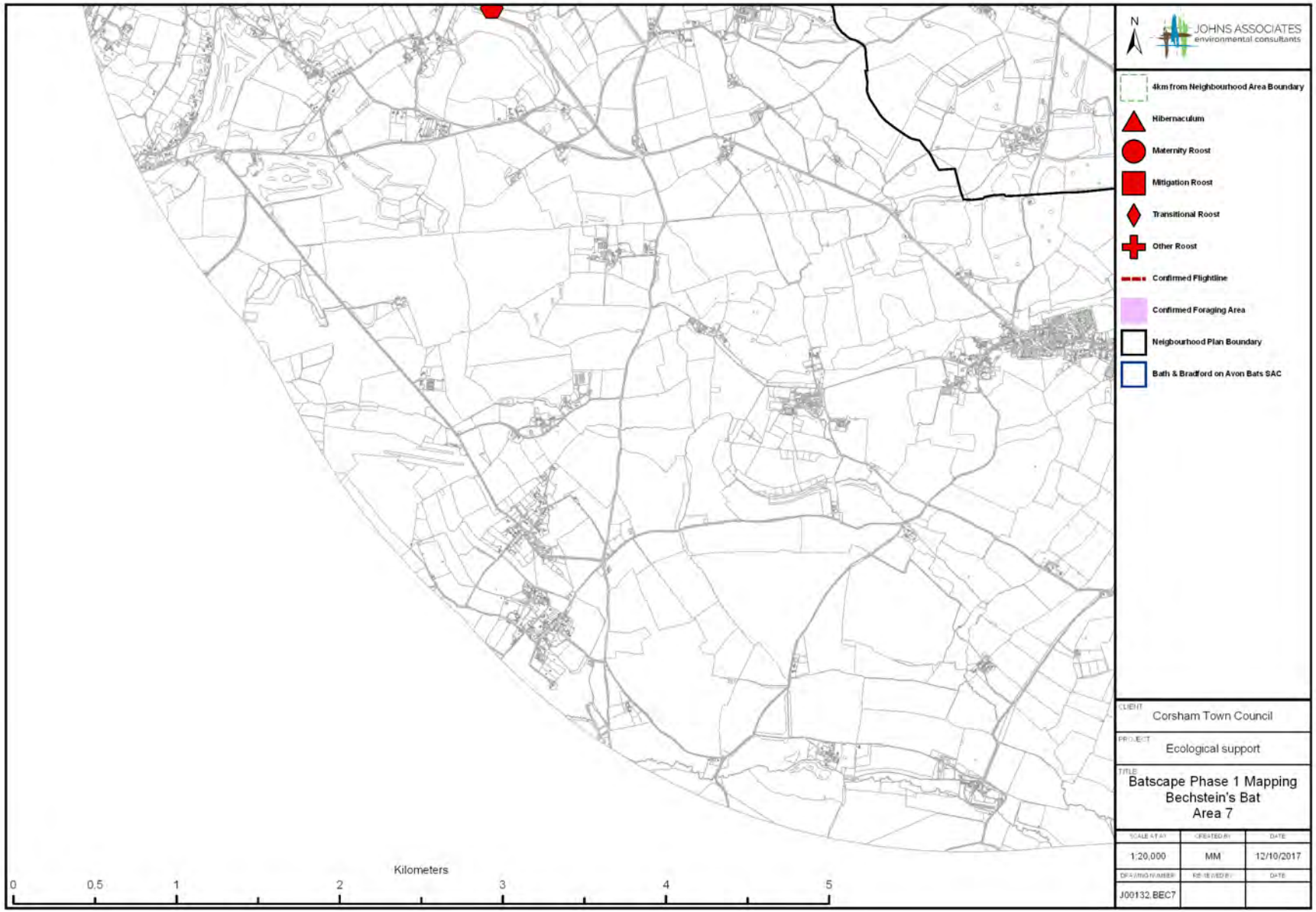

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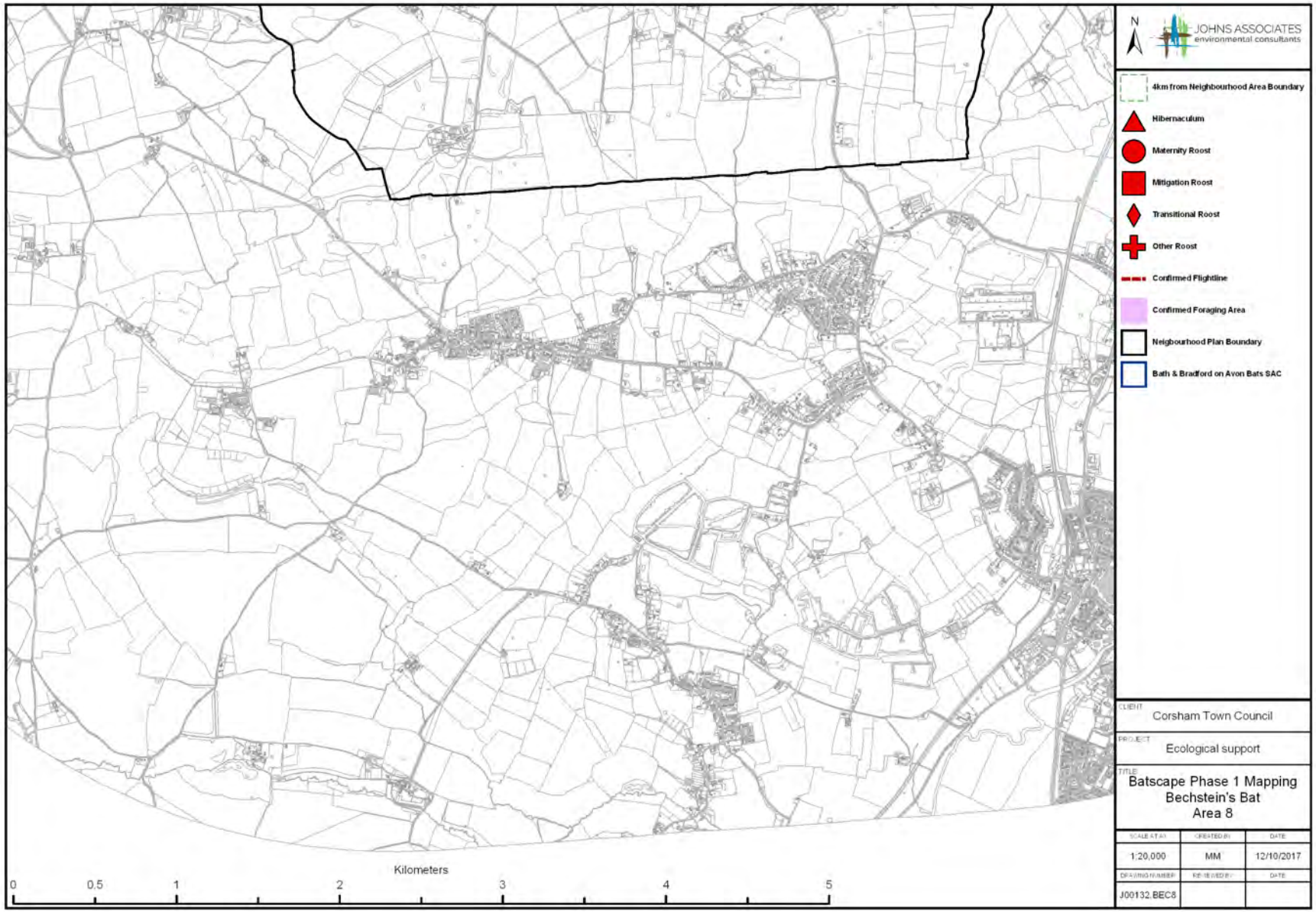

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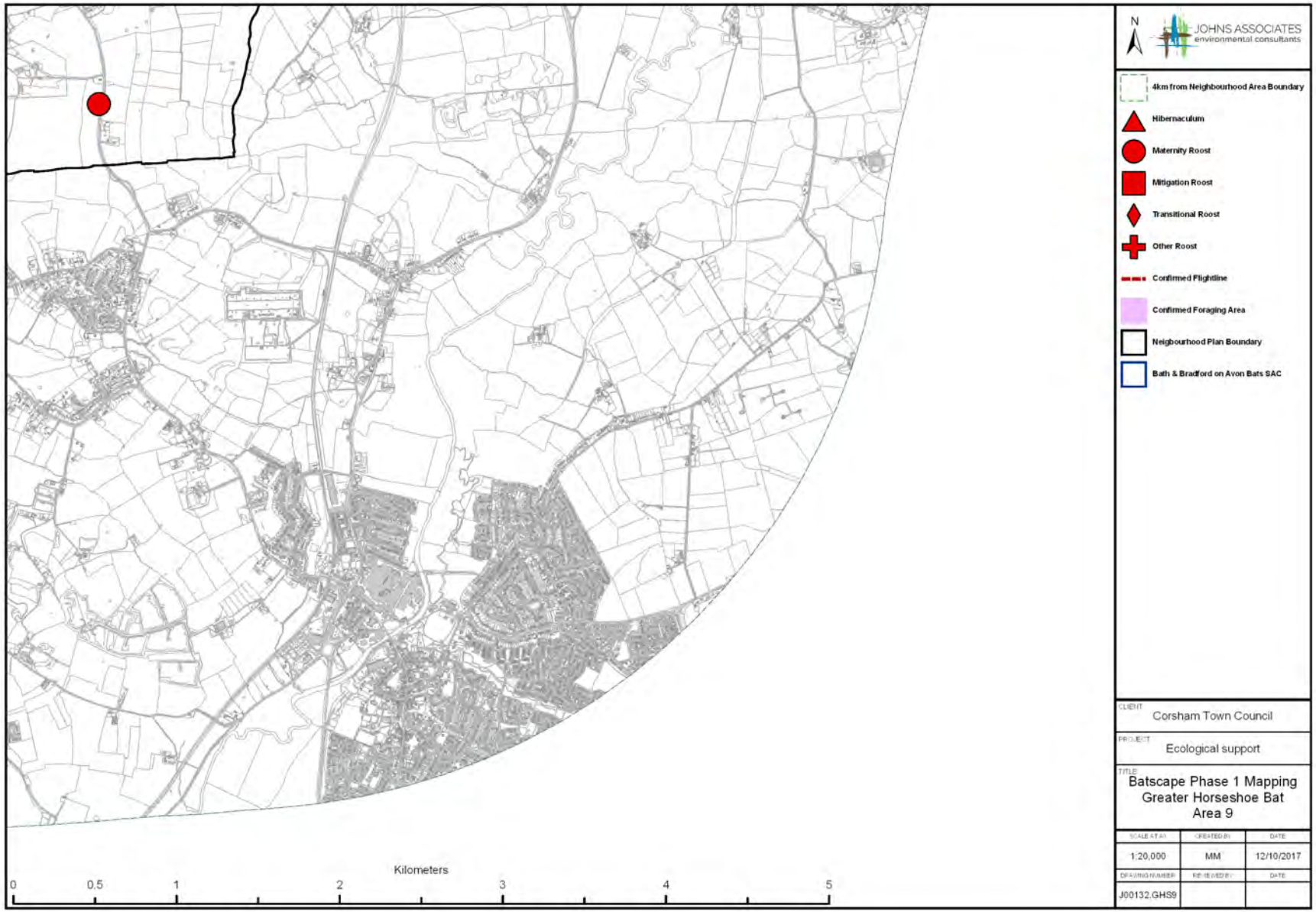

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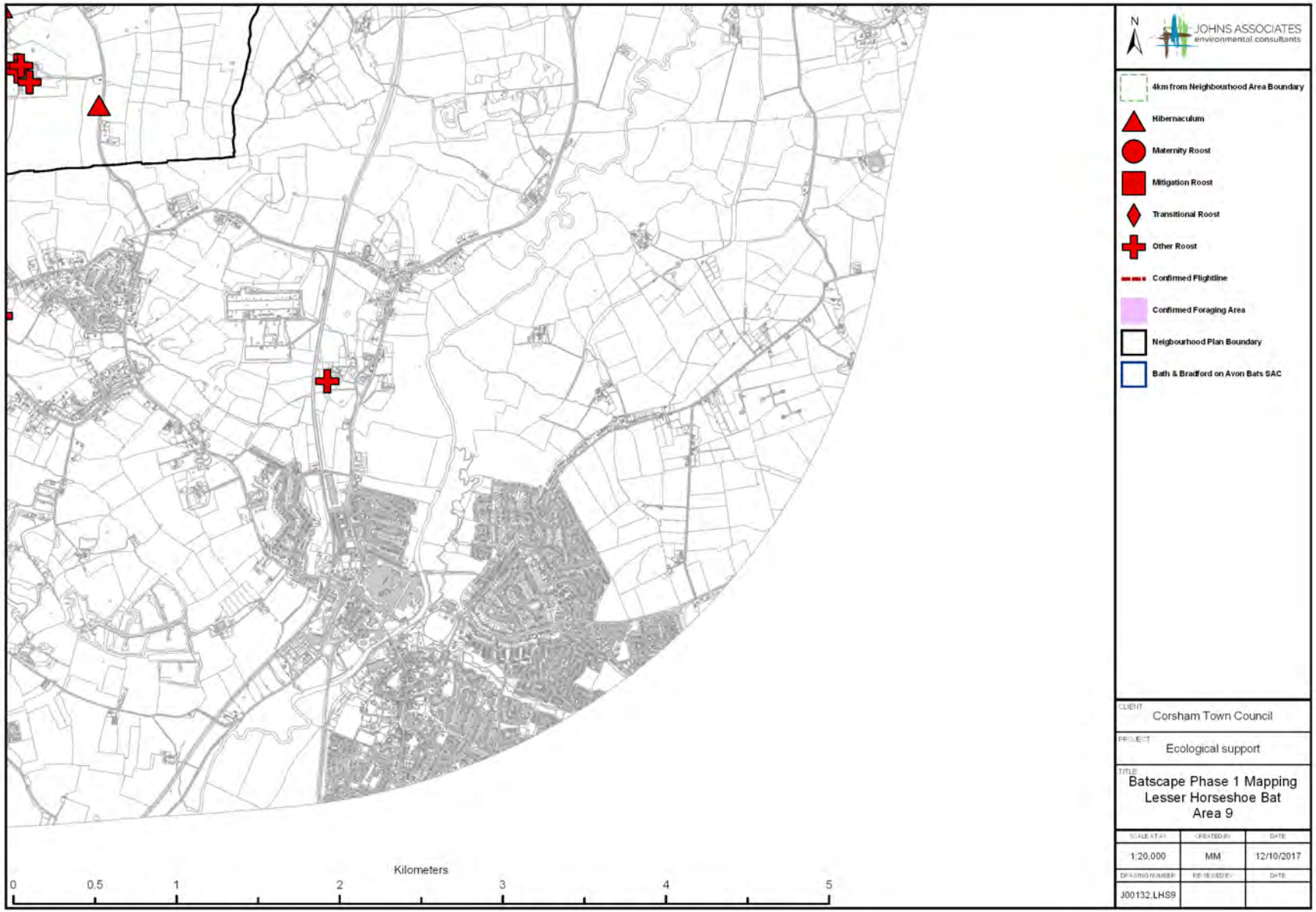

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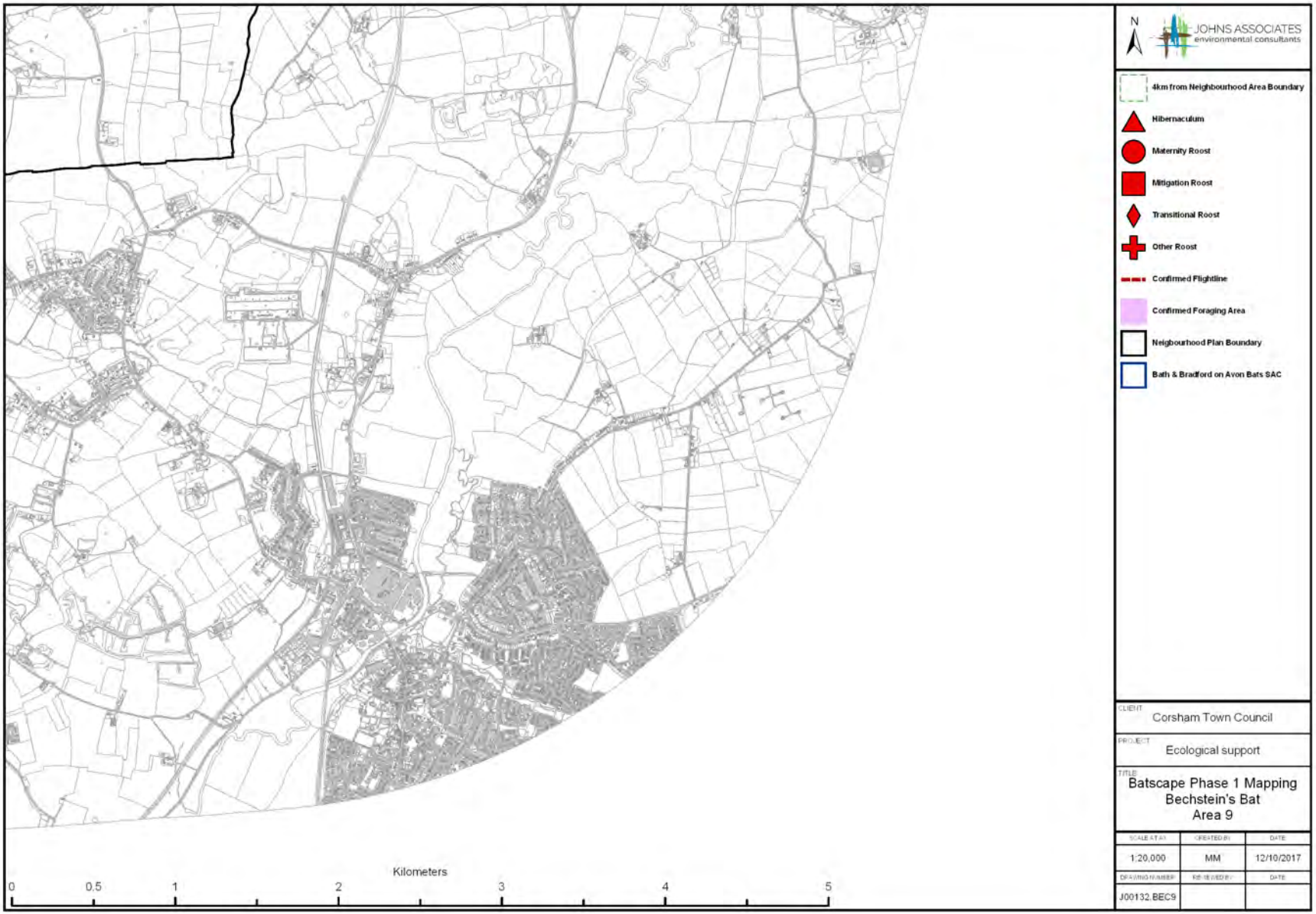

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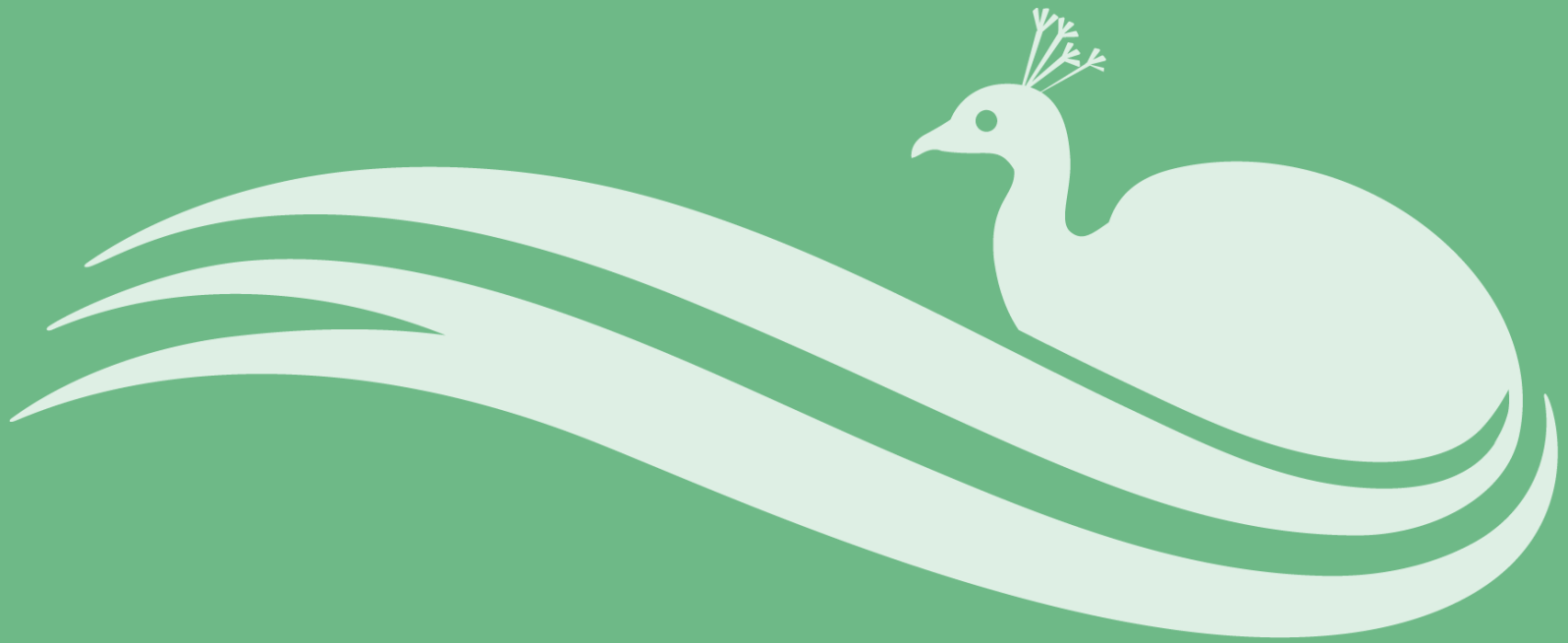

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