

BADGER ECOLOGY AND MITIGATION

Proof of Evidence of

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On behalf of the White Horse Alliance

**Public Inquiry into
The A350 Westbury Bypass 2008**

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1. Introduction

I graduated with an upper second class honours degree in Zoology from the University of London in 1984. I worked for five years as a research assistant at Bristol University, carrying out a survey of the density, distribution and habitat requirements of the badger in Britain. During this time, I was personally responsible for surveying over 900 square kilometres of land for signs of badger activity and setts. I was responsible for assessing the standard of the other surveyors' contributions to the survey and for co-ordinating and evaluating all the data. My publications include papers on the status of the badger in Britain, techniques for surveying badgers, monitoring populations and estimating the impact of past persecution on the numbers of badgers.

For the past 18 years I have been working as a self-employed environmental consultant specialising in protected species work. My work includes surveying areas of land for evidence of badger activity or setts, assessing the impact of a proposed development on badgers, advising landowners that are experiencing damage to property by badgers and carrying out licensable work on setts. I carry out work for engineering and construction companies, other environmental consultancies, as well as Network Rail, Highways Agency, county councils, district councils, health authorities and utilities companies.

I have been a member of the Mammal Society for 24 years. I am a full member of the Institute of Ecology and Environmental Management and the Society for the Environment and a Chartered Environmentalist.

2. Badger Ecology

The Eurasian badger (*Meles meles*) is a member of the *Mustelidae* (the weasel and stoat family). They are a widespread and common species in Britain, present throughout the country, but most numerous in the south and south-west of Britain. They feed largely on invertebrates such as earthworms, beetles, wasps/bees (dug out from underground nests), but their diet also includes other mammals (mice/rats/voles, occasionally hedgehogs), birds (adults and eggs), cereals, fruit, carrion, leaves and fungi (Neal & Cheeseman, 1996)¹.

Badgers used established routes or paths linking different setts together, providing access to foraging areas. These historic pathways can be used for many years, over many generations and badgers will continue to use paths, even when changes occur such as the removal of hedgerows or construction of new roads. Badgers defaecate in small (2-3 cm deep) scrapes called dung pits, and these are often used to mark pathways, setts, important feeding areas and territory boundaries.

In Britain, most badgers live in social groups (sometimes referred to as 'clans') and the members of each group jointly defend a territory. Other badgers are more or less excluded from this area, which will encompass sufficient foraging opportunities to support the group throughout the year. Badger territory size ranges from about 25-150 hectares with an average of around 50-60 hectares. Territory sizes are generally dependent on the distribution and density of available food sources. There tends to be little overlap between neighbouring territories. As a general rule territories will

¹ Neal E. & Cheeseman C. (1996) *Badgers*. Poyser, London.

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seldom extend beyond a 1km radius from the main sett, and in high density areas the minimum distance between neighbouring main setts can be as little as 300 m (Kruuk 1978)² (Kruuk, 1989)³.

Most social groups produce only one litter of young per year; some produce none; while larger groups may produce 2 or 3 litters. Badgers, therefore, do not breed rapidly and a significant local increase in mortality can adversely affect populations in both the short- and the longer-term. Cubs may be found underground between December and July. Consequently Natural England have identified the period between the 30th of November and the 1st of July as the badger's 'breeding season' during which there is a general presumption against licensing operations that involve occupied setts.

Badgers are nocturnal and spend long periods below ground in 'setts'. Setts are commonly constructed in sloping ground (embankments, cuttings), but also appear in flat ground, ditches, drainage pipes and under buildings. A number of setts of different sizes and functions may be found within the range of a single social group. Not all groups of badgers have examples of each of the types of setts within their range. However, all social groups of badgers have just one main sett, and so by counting the number of main setts, it is possible to count the number of social groups of badgers present within an area (Cresswell *et al*)⁴.

² Kruuk H. (1978) Spatial organisation and territorial behaviour of the European Badger *Meles meles*, *Journal of Zoology*, London, **184**: 1-19.

³ Kruuk H. (1989) *The social badger: ecology and behaviour of a group-living carnivore* (*Meles meles*). Oxford University Press, Oxford.

⁴ Cresswell P., Harris S., and Jefferies D.J. (1990) *The history, distribution, status and habitat requirements of the Badger in Britain*, Nature Conservancy Council, Peterborough.

3. Categories of setts

The system of sett classification that was implemented during the national survey was based largely on the work by Kruuk (1978)⁵; and this has become the standard approach to categorising setts.

Main setts are large, well established, often extensive and in continuous use. It is where the cubs are most likely to be born. There is only one main sett per social group of badgers.

Annexe setts occur in close association with the main sett, and are linked to the main sett by clear well-used paths. If a second litter of cubs is born, this may be where they are reared.

Subsidiary setts consist of, usually, up to five holes, and are not in continuous use.

Outlying setts consist of one to three holes. Usually they have small spoil heaps indicating that underground they are not very extensive.

As well as the categorising the type of sett, the national survey employed a standardised system to describe the level of activity at each of the sett entrances.

4. Legislation

In mainland Britain, The Protection of Badgers Act (1992) provides legal protection badgers and to their setts (defined as a 'place or structure showing signs of current use by badgers'). It is an offence to wilfully kill, injure or ill-treat a badger. Their setts are protected against obstruction, destruction,

⁵ Kruuk H. (1978) Spatial organisation and territorial behaviour of the European Badger *Meles meles*, *Journal of Zoology*, London, **184**: 1-19.

or damage in any part, and the animals within a sett cannot be disturbed or excluded except under licence from one of the statutory authorities.

Badgers are also listed on Appendix III of the Bern Convention on the Conservation of European Wildlife and Natural Habitats and Schedule 6 of the Wildlife and Countryside Act (1981).

5. Impact of New Roads on Badgers

New roads can have a direct impact on badgers through loss or damage to setts. New roads can also have a range of indirect impacts through increased mortality, interruption of paths, loss of access to foraging sites, loss of foraging, fragmentation of territories and isolation of social groups.

Collisions with vehicles are one of the major causes of badger mortality. Although there have been no detailed studies of the effects of road deaths on badger populations, it is generally accepted that the existing level of mortality does not threaten the conservation status of badgers in the UK: However, road deaths can have a significant impact in those situations where there is insufficient attention to mitigation, or a significant off-line component to the scheme, which can result in large numbers of badger road deaths in the first few years of opening, and it is thought that this could adversely affect the short- or longer-term viability of the species in particular areas.

On an individual basis, collisions with vehicles can also have severe implications for the animals' welfare, since many are not killed outright. In addition, there is evidence that badgers crossing roads cause road traffic accidents.

6. Badger Surveys: Good Practice Guidelines

Unlike many other mammal species, a standard methodology for badger surveys has been in use since the national survey in the 1980s. The Design Manual for Roads and Bridges (DMRB) (Highways Agency, 2001)⁶ gives a comprehensive overview of what has become the established good practice approach to badger surveys. It describes the need for a series of surveys to be carried out starting with a desk top study, progressing to a walkover survey, to record and classify all badger setts, record well-used badger paths and plot the location of dung pits and latrines, using recognised field signs. Provided the surveyor is sufficiently experienced, and the survey has been carried out at an appropriate time of year (i.e. avoiding summer), most of the information required to assess the impact of the scheme can be gathered during the walk-over survey. However, where sett ownership or status is unclear, a wider corridor, repeat surveys and the use of other techniques such as bait-marking need to be employed.

Bait-marking relies upon the well-established phenomenon that badgers mark the boundaries of their territories with dung pits (or aggregations of these, known as latrines). The principle is that indigestible markers fed at the badgers' main sett will then be deposited in dung pits throughout their range, including other setts used by that group and at the territory boundaries. Thus different coloured markers fed at putative main setts can reveal territory boundaries and sett 'ownership'.

⁶ The Highway Agency, 2001. *Design Manual for Roads and Bridges, Volume 10: Environmental Design and Management. Section 4: Nature Conservation.* HA 81/99. HMSO, London

7. RPS Badger Survey of the Proposed Westbury Bypass

A walk-over survey of the route of the proposed Westbury Bypass was carried out by ecologists from RPS between April and July 2004, with additional site visits in October 2004. In the Environmental Statement, it states that they followed the methodology for a Stage 3 badger survey given in the DMRB and that the survey encompassed a 250 m corridor either side of the route.

RPS identified eighteen setts in their 2004 survey, and these were classified (into main, annexe etc), and the overall activity levels at the sett (rather than at each of the entrances) were described. Three of the setts were identified as main setts and the extent of these group's territories was estimated based on "the location of known setts, runs and dung pits." The territories for the other groups of badgers, based on other parts of the route, were estimated based upon known localities of main setts occurring beyond the area of the survey. This extrapolation gave nearest neighbour distances of 890 to 1070 m, and ranges in excess of 250 ha in area, and range boundaries as much as 1850 m from the main sett. This would equate to a very low density populations, such as might be found in areas such as East Anglia or Scotland (Cresswell et al 1990)⁷.

RPS carried out a walk-over survey of Network Rail land 300 m either side of the proposed Bypass on 30th August 2007, in which they identified one further outlying sett. However, it was noted that the vegetation at the time was dense.

⁷ Cresswell P., Harris S., and Jefferies D.J. (1990) *The history, distribution, status and habitat requirements of the Badger in Britain*, Nature Conservancy Council, Peterborough.

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As mitigation, it is stated that the entire scheme would be fenced with badger-proof fencing and, in addition to the Chalford Accommodation Bridge, Wellhead Underpass, Bere's Mere Farm Underpass, five wildlife (badger) tunnels are proposed at:

- · A350 Warminster Road south of Madbrook Roundabout;
- · At ch200 on existing hedgerow;
- · At ch2770 south of Bratton Road;
- · On B3098 Bratton Road east of Bratton Road overbridge; and
- · At ch3070 north of Bratton Road

Figure 4.4E shows an additional wildlife tunnel at ch 3500 south of the cement works railway bridge.

8. The Badger Consultancy Dormouse Surveys

Between 2003 and 2007, The Badger Consultancy carried out a series of dormouse surveys within the Wellhead Valley. During the surveys, a number of other mammal species were noted. In particular, the presence of badger setts, tracks, paths, dung pits and foraging signs were noted. As a consequence of these surveys, at least one additional main badger sett, to those reported by RPS, was known to be present (near Bere's Mere farm).

9. The Badger Consultancy Bait-marking Survey

A bait-marking survey of three main setts within the Wellhead Valley between Wellhead Springs and Newtown Road was carried out by The Badger Consultancy during March/April 2008 according to the stage 3 methodology outlined in the DMRB. The objective of the survey was to

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confirm the status of the known setts in the Wellhead Valley and establish the number of separate social groups of badgers. Bait containing different coloured beads was placed at the main sett in Wellhead Springs wood (3 in RPS report), the main sett north of Bere's Mere Farm, and at the main sett north of White Scar Hanging (12 in RPS report). Bait was placed at the three setts daily, for a period of one week starting on the 25th March 2008. A walk-over survey of the Wellhead valley for badger setts, dung pits and other badger fields signs was carried out on 1st April 2008 by David Lewns.

The survey was within the recommended time period for bait-marking surveys: it ensured that the vegetation did not obscure any setts or signs of activity, but was at a time of year when badgers are actively defending (and marking) territorial boundaries.

Four main setts were identified within the Wellhead Valley. Two of these were main setts previously recorded by RPS – sett 3 in Wellhead Springs wood and sett 12 north-east of White Scar Hanging. However, two further main setts were identified – north of Bere's Mere farm, and south of the stables on Newtown Road.

Dung containing coloured beads was found in 16 dung pits in four locations and a further outlying sett was identified within the Bere's Mere farm social group's range. The bead returns confirmed that the Bere's Mere sett and the Wellhead Spring setts 'belong' to separate social groups of badger. In addition, the bait-marking survey led to the identification of a further main sett immediately south of the stables on Newtown Road.

The nearest neighbour distances between main setts in the Wellhead valley was between 392 m (Bere's Mere to sett 3) and 500 m (Bere's Mere to

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sett 12) giving a range of approximately 60 ha for these social groups. This would equate to a medium to high density badger population, which would be within the normal range for badgers in the south-west of Britain (Cresswell et al 1990)⁸.

The 2008 bait-marking survey identified a number of pathways in addition to those shown in the RPS 2004 survey. In particular, there were heavily used badger paths which follow the hedgerows on either side of the track between Wellhead Springs and Newtown Road (track WEST35). Often the badger paths were on the field side of the hedge (possibly to avoid human activity).

10. Assessment of the Impact of the proposed Westbury Bypass

The RPS report states that the direct impact of the scheme on badgers would be the removal or loss of an annexe sett at Bratton Road (13) and the loss of two further outlying setts 15 and 16. They state that the scheme would have an indirect affect up to 5 social groups of badgers. However, this is based on the assumption that all the main setts had been located and that the paths, dung pits and other badger activity observed on or near the proposed Bypass during the 2004 survey related to those setts found during the survey (i.e. there were no gaps).

The Badger Consultancy bait-marking survey has shown that the RPS survey is an underestimate. Nearest neighbour distances have been correctly measured and shown to be approximately half that inferred by RPS in 2004. The number of social groups in the Wellhead valley is four, not two. Whilst it

⁸ Cresswell P., Harris S., and Jefferies D.J. (1990) *The history, distribution, status and habitat requirements of the Badger in Britain*, Nature Conservancy Council, Peterborough.

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is not impossible that these additional main setts have 'appeared' since 2004, it is unlikely since the land use, farming and crops have remained largely unchanged during this period. At least one of these main setts was known to be present in 2006 (Bere's Mere farm), and both the 'unidentified' main setts are within the corridor surveyed by RPS in 2004. It is considered more likely that these setts were overlooked by the original surveyors.

The implications of this under-recording of badger setts is that there may be further setts which have overlooked elsewhere on the route, in particular, in areas where access is difficult (due to vegetation or terrain) or for example on the Network Rail land which was surveyed during the summer. The nearest neighbour distances recorded as a result of The Badger Consultancy bait-marking survey indicate that this area is a medium to high badger density area, implying that there is likely to be one, possibly two, further social groups located in the Wellhead Valley itself, and that between Bratton road and the Cement Works railway there are likely to be two, not one, social groups of badgers, so that the total number of groups affected by the scheme is likely to be at least nine, possibly ten.

The impact of the proposed Bypass within the Wellhead Valley would be to sever and fragment at least four, possibly six social group territories (cf. the two shown in the RPS report). The impact of the loss of foraging is likely to be greater than estimated by RPS, since the proportion of the range affected by the scheme will be greater than previously thought. The implication of the bait-marking survey is that whilst the proposed Bypass would be fenced in its entirety, the proposed spacing between crossing points would mean that each group will have just one crossing point and some will

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have none (as the proposed tunnels/bridges are located within another group's territory). This will severely constrict the movements of badgers within their range and may result in some parts of a group's range being abandoned, further reducing the remaining foraging.

Where insufficient crossing points are provided or where the displacement from paths is too great, badgers will simply climb, dig under or dismantle the fence in order to cross the road. Badger-proof fencing is rarely actually proof against badgers, but rather a means of displacing them into the tunnels. The lack of provision of safe crossing points would increase the rate of mortality in badgers in certain social groups, which could have a severe adverse negative impact on the density and distribution of badger social groups in the local area (DMRB, 2001)⁹.

The lack of sufficient crossing points would also have an impact in terms of human road safety for drivers of vehicles that collide with badgers. Studies carried out by Langbein (2003-7)¹⁰ found that there are approximately 50 road traffic accidents involving badgers in England each year. Of these 10 resulted in seriously injured casualties and one in fatality. While generally deer are regarded to be the most significant risk to road users and Langbein found these to comprise approximately 50% of all incidents involving wild mammals, species such as badgers (9%) and foxes (19%) also represent a risk, both by striking the animal and damaging the vehicle in some way, or by drivers swerving to avoid hitting them. In doing so they put themselves and other road users at risk.

⁹ The Highway Agency, 2001. *Design Manual for Roads and Bridges, Volume 10: Environmental Design and Management*. Section 4: Nature Conservation. HA 81/99. HMSO, London

¹⁰ <http://www.deercollisions.co.uk/pages/links.html>

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Given that badgers are territorial and displacement too far from historic paths will not be tolerated by badgers, the DMRB gives a recommendation for a minimum of two safe crossing points per social group of badgers. The proposed scheme layout (figures 4.3 A to G in the Environmental Statement) shows five crossing points on the proposed Bypass plus a further crossing point on the realigned Bratton road. In addition, badgers would be able to make use of the underpasses/overbridges at Chalford, Wellhead Springs, Bere's Mere and Newtown Road. However, this still leaves a short fall of at least four crossing points, based on the estimate of nine social groups; and a short fall of six, if the number of social groups affected is, in fact, ten.

Additional negative impacts such as disturbance to badgers and damage to setts would arise from some of the off site mitigation and associated works. The main sett to the south of the stables is located within 50 m of the proposed Bypass, and a new public right of way is proposed to cross the main sett south of stables, and pass immediately west of main sett 12. Measures would be required to minimise or mitigate for these associated negative impacts on badgers, and additional land take would be required to allow for the realignment of the proposed path to avoid the setts.

In my opinion, the badger survey carried out in 2004 by RPS failed to identify all the badger setts affected by the proposed Bypass; it did not identify all the badger paths or routes, and it provided an inaccurate estimate of the number and extent of the badger groups' territories. Contrary to best practice guidelines, the survey was not updated in order to inform the location and design of badger tunnels for the new scheme. Therefore, the proposed mitigation measures would not adequately mitigate for the impact of the

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scheme on badgers, and in particular, it would not cater for the arrangement of badger social groups within the Wellhead Valley. As a result, the proposed Bypass would have an adverse impact on badgers, which could result in a loss of social groups. The lack of sufficient badger tunnels would also increase badger mortality and pose a significant risk to motorists as a result of collisions with badgers.