

A350 WESTBURY BYPASS – ENVIRONMENTAL STATEMENT**EXTRACT OF VOLUME 1 CHAPTER 9 ECOLOGY AND NATURE CONSERVATION***Bats*

- 9.261 The basis for the environmental design to accommodate those species of bat that commute and forage across the route corridor was established from the results of the bat surveys undertaken in 2002, 2003 and 2004. Refinements, including the need to address potential cumulative effects, were made as a result of the 2006 surveys undertaken by NPA.

Madbrook Roundabout

- 9.262 A number of studies have been undertaken on the effect of nocturnal lighting on bats, and it has been demonstrated that the foraging and commuting patterns of certain species, including horseshoe bats, long-eared bats and Myotis bats are adversely affected by nocturnal lighting (Rydell, 2006; Rydell & Racey, 1995).
- 9.263 The design concept for the proposed bypass in respect of lighting was that as little as possible permanent artificial lighting would be introduced, with lighting being limited to roundabouts. Planting along road verges, and the appropriate use of earth mounding and other screening as part of the scheme design, would reduce light pollution from road traffic.
- 9.264 Surveys undertaken in 2003 and 2004 revealed Greater Horseshoe, Barbastelle and Bechstein bats, all of which are endangered or rare, in the general vicinity of Madbrook Roundabout. In 2004 a male Bechstein was radio-tracked over a period of seven days during which it was shown to cross the A350 between Wellhead Farm and Madbrook Farm to the north of the proposed roundabout. Radio-tracking of a Whiskered bat in 2006 recorded it crossing the A350, using a hedgerow as a commuting corridor, the western section of which will be lost to the proposed roundabout.
- 9.265 Whilst it is normal highway practice to light roundabouts and their approaches the lighting of Madbrook Roundabout would introduce a significant new light source into an area utilised by bats that is currently not illuminated at night. To minimise the impact on bats, in particular *Myotis* sp. (to which family Bechstein's and Whiskered bats belong), the proposed roundabout will be unlit (see Chapter 4), and planting will be undertaken prior to hedge removal. The centre of the roundabout will also be planted in an attempt to maintain connectivity of the commuting bat corridor.

Chalford Accommodation Bridge

- 9.266 Chalford Accommodation Bridge will be built over the proposed bypass on the line of a double hedge lined track that forms bridleway West36. Surveys from 2002 to 2006 identified a total of at least eleven bat species, including all four endangered or rare species: Lesser Horseshoe, Greater Horseshoe, Bechstein's and Barbastelle bat (Table 9.7). Evening surveys including transects and static surveys, together with dawn static surveys in 2006, recorded a high number of bat passes along the bridleway. A Bechstein's bat and a Greater Horseshoe bat were shown by radio tracking to use the bridleway as a commuting path in 2004. Further radio-tracking surveys in 2006 showed that this bridleway was used by commuting Whiskered bats.

- 9.267 The choice of an at grade bridge was determined by numerous factors other than those relating to bat behaviour (see Appendix 9.15 for a discussion), including integration into the landscape and engineering constraints.
- 9.268 The design for the Chalford Accommodation Bridge is for a green bridge with a span of over 25 m. In order to maintain the current flight path a double hedge would be planted in the centre of the bridge along the course of the current flight path. This would be connected through additional planting to the present hedgerow, providing a funnel effect for bats crossing the road. An additional width of up to 8.7 m either side of the planting provides an additional crossing point for bats that may follow either side of the hedge planting rather than between the parallel hedgerows. Erection of close-boarded fencing 2 m in height either side of the green bridge would reduce the effects of light spill from cars beneath affecting the bats' flight patterns. In addition, a further 2 m high 50 x 50 mm mesh will be erected above the boarding to encourage any bats that come off the flight path to cross at height. Furthermore, bollard lighting such as that used to discourage horseshoe bats crossing the A487 in Wales (Catherine Bickmore Associates, 2003) will be placed within the road tunnel beneath to reduce the possibility of horseshoe and Myotis bats commuting through it and potentially into the path of traffic. Where works would require removal of sections of the hedgerow, 4 m tall planting would replace removed sections.

Wellhead Underpass

- 9.269 The Wellhead Underpass would be built under the proposed bypass on the line of a double hedge lined track that forms bridleway West37. In common with the route of bridleway West36, surveys from 2002 to 2006 identified a total of at least eleven bat species including all four endangered or rare species: Lesser Horseshoe, Greater Horseshoe, Bechstein's and Barbastelle bat (Table 9.7) using this route, with a high number of bat passes. A Bechstein's and a Greater Horseshoe bat were shown by radio-tracking to use the track as a commuting path during the 2004 survey, and during the 2006 radio-tracking surveys, commuting Whiskered and Daubenton's bats were shown also to use the track.
- 9.270 The bypass being on embankment at Wellhead determined the use of a tunnel. The size of the tunnel was concluded by a combination of numerous factors, notably engineering constraints including the vertical alignment and the height of the embankment, which itself was constrained by needing to be sympathetic to the locally designated Special Landscape Area, the presence nearby of a public water supply borehole, and the use of different sized tunnels by bats on the continent (see Appendix 9.15 for a detailed discussion).
- 9.271 The practical application of using culverts as bat tunnels (e.g. Cresswell Associates, 2003) and research in Germany and the Netherlands (Duverge, 1996; Bontadina *et al*, 2002; Limpens *et al*, 2005) has demonstrated that bats will fly through tunnels that range in size from 2.3m to 6m in diameter. The size of tunnel required appears to be dependent on the bat species present, the success of the funneling effect of vegetation at the tunnel entrance, and local circumstances.
- 9.272 At the lower end, Cresswell Associates, as part of their post construction monitoring of the A477 improvements at Sageston, Pembrokeshire in 2002, recorded various low flying species including both Greater Horseshoe and Lesser Horseshoe bats flying through culverts as small as 2.3m in diameter (Cresswell Associates, 2003). However the authors also recorded that it was too early to assess the success of the bat culverts due to greatly reduced levels of horseshoe bat activity recorded in 2002 compared with the previous year.

- 9.273 At the other extreme, Limpens *et al* (2005) recommended that a tunnel 6 m in height and breadth would provide a suitable crossing point for Serotine and Noctule bats, both species which tend to fly high. For Bechstein and Barbastelle, both of which potentially use the Wellhead track, Limpens *et al*, (2005) suggest that a 4m x 4m tunnel would be suitable. Given the current level of knowledge, the uncertainties surrounding the level of success of different tunnel sizes and the importance of the foraging and commuting flight path at Wellhead, a series of measures were developed to accommodate both low and high flying bats.
- 9.274 The final design for the Wellhead Underpass is that proposed by NPA in their 2006 report (Appendix 9.15). It would comprise an on-line bat tunnel measuring 4 m in height and breadth. This would be connected through additional planting to the present hedgerow (where required), providing a funnel effect for bats into the tunnel. Where works would require removal of sections of the hedgerow, 4 m tall planting would replace removed sections. A long length of the close-boarded fence – mesh combination to be used at Chalford Accommodation Track would be erected parallel to the road above the tunnel, and for the length of the woodland present either side of the road. This is designed to encourage bats that do not use the tunnel to cross the road at height, and follows current research to encourage bats to cross at height (Limpens *et al*, 2005). In addition to this, bollard lighting as specified for Chalford Accommodation Track would be placed between the fencing and the road. This is designed to discourage bats, in particular horseshoe species, from flying at low height across the road once they have come over the fence.
- 9.275 Whilst the key bat crossing point is considered to be the tunnel, further mitigation for those bats that may not use the tunnel, including Serotine and Noctule, would be provided in the form of a bat gantry. Whilst the research of such crossings is in its infancy, their success has been demonstrated at a number of locations. In 2004 Caerphilly Council erected a green crossing at Oakdale, near Blackwood, based on a design by Stebbings (see Appendix 9.15). This structure comprised two parallel horizontal rigid steel tubes of approximately 100 mm diameter set across the road and spaced approximately 1.3 m apart. Between these, a horizontal wire mesh was set with a hole diameter of approximately 100 mm (to prevent snow and ice build up). It was attached to 'Y' shaped posts at the sides of the road. The crossing was designed principally for *Myotis* bats and two key aims were to provide a crossing for the bats and to retain some form of darkness. The crossing was erected adjacent to a large Beech *Fagus sylvatica* tree, with conifers on the opposite side of the road. Whilst the Countryside Council for Wales state that the structure has been used by bats, details of the success rate of the crossing has yet to be published.
- 9.276 Another high level wire bat crossing has been designed by Billington. The structure was suspended at tree canopy height above the A66 Stainburn and Great Clifton Bypass, Cumbria. This crossing was initially designed as a joint mitigation measure for commuting bats and Red Squirrel *Sciurus vulgaris*. Bats found to be present included both species of pipistrelle, Brown Long-eared, Daubenton's and Whiskered/Brandt's bats. The temporary structure used during scheme construction incorporated three sets of 4-5 lines of thick nylon webbing with ribbons attached. This was found to be successful with a 90% rate of use by crossing bats. However the final version comprised three steel 8mm cables with plastic balls, which was only used by 30 - 31% of crossing bats.
- 9.277 The bat gantry design for Wellhead Springs takes design elements from both the Caerphilly and Cumbrian bat crossings and would be positioned above the tunnel following the course of the eastern section of the dual-lined hedgerow. The gantry would be placed at this point as the vegetation of the eastern of the two hedgerows borders a narrow woodland and was substantially higher than the western hedge, thus providing a greater connectivity for bats that may cross above the tunnel.

Bere's Mere Farm

- 9.278 Prior to 2006, only Common Pipistrelle, long-eared, and unidentified bats had been identified using the hedgerow due south of Bere's Mere Farm, although a Barbastelle was recorded on a track at the northern point of the hedgerow. However, survey in August and September 2006 recorded at least six species of bat, including Lesser Horseshoe along the hedgerow (Table 9.7), and bat activity was markedly high during the evening survey, particularly in August.
- 9.279 In view of the demonstrated use by bats, and the species and numbers of bats recorded using the hedgerow in August and September 2006, a precautionary approach has been applied to the mitigation for this hedge cutting. A tunnel 4 m in height and breadth would be constructed beside the current single line hedgerow. In order to funnel the bats into the tunnel, and provide an enhanced commuting path, the current hedgerow would have additional planting, and a parallel hedge with standard trees every 20 m would be planted. To encourage bats that do not use the tunnel to cross the road at height, the close-boarded 2 m tall fencing with attached 2 m high mesh fencing, together with bollard lighting like that proposed for the Wellhead Underpass, would run parallel to the road above the tunnel. In addition to this, a bat gantry to the same specification as that described for the Wellhead Underpass would be positioned in line with the current hedgerow. In order to enhance the likelihood of use of this feature by bats, trees would be planted within the current hedgerow on either side of the bat gantry.

Bratton Road Bridge and Underpass

- 9.280 Surveys prior to 2006 in the Bratton Road and bridleway West51 area, only recorded Common Pipistrelle and Noctule bats (Table 9.7). It is not known if the low level of bat records for the area was due to low numbers of bats, or the area not having the same level of survey effort as other sections of the route corridor.
- 9.281 Surveys in 2006 by NPA recorded good numbers of Serotine, Noctule, Common Pipistrelle and *Myotis* bats in the general area of Bratton Road (Table 9.7). Internal building surveys in 2006 by Geoff Billington (see Appendix 9.15) recorded a night roost and potential day roost of Greater Horseshoe bats within a cemetery building on the Bratton Road in close proximity to the proposed works. During evening netting sessions, one Greater Horseshoe was noted commuting directly north from the cemetery, whilst on another occasion a Greater Horseshoe was recorded commuting east towards the existing Bratton Road. Radio-tracking of a Greater Horseshoe in 2006 found that this bat commuted east from the cemetery before heading north-east along bridleway West51. Whilst the number of Greater Horseshoe bats roosting at the cemetery is not known, this route is nevertheless considered to be a key commuting corridor for this bat.
- 9.282 In order to mitigate for the known Greater Horseshoe flight path, and the potential that higher numbers of this species may utilise this same path, a semi-circular shaped tunnel with a width of at least 4 m and a height above 3.7 m is proposed along the course of the current horseshoe flight path. In order to funnel the bats into the tunnel, and provide an enhanced commuting path, the current bridleway to the east of the bypass would have additional planting in the form of a parallel hedge with standard trees every 20 m.

- 9.283 To encourage bats that do not use the tunnel to cross the road at height, close-boarded 2 m tall fencing with attached 2 m high mesh fencing, together with bollard lighting like that proposed for the Wellhead Underpass, would run parallel to the road above the tunnel. In addition to this, a bat gantry to the same specification as that described for Wellhead, would be positioned above the tunnel. This additional mitigation would provide connectivity for those bats, including Serotine and Noctule, which may not use the tunnel.

Bitham Bridges

- 9.284 The three branches of the Bitham Brook are bordered on one bank by a hedgerow, and each would be crossed by the proposed road. Whilst the western and central hedges comprise a line of mature trees (principally willows), the eastern hedge is extremely gappy. Despite these differences a variety of bat species have been recorded using all three hedgerows, particularly during the 2006 surveys (Table 9.7). Of particular note were the two possible Bechstein's and a potential Barbastelle recorded by NPA in 2006.
- 9.285 Separate low-lying bridges would cross the three branches of the Bitham, the height beneath each reducing the likelihood of bats passing under (with the possible exception of Daubenton's and Natterer's). The western and central hedgerows support large willow trees and outgrown pollards and these provide the opportunity for bats to approach the crossing at height. Additional 4 m high planting would be undertaken adjacent to the road crossing. To encourage bats to cross the road at height, close-boarded 2 m tall fencing with attached 2 m high mesh fencing, together with bollard lighting like that proposed for the Wellhead Underpass, would run parallel to the road above each of the three bridges. In addition to this, a bat gantry to the same specification as that described for Wellhead would be positioned in line with each of the three hedgerows. To increase the likelihood of bats crossing at height, and to funnel them towards the bat gantry, the eastern hedgerow would be gap-filled.

Shallow Wagon Lane

- 9.286 A section of Shallow Wagon Lane would be removed for the proposed scheme. Survey in 2004 (Appendix 9.14) recorded Noctule and Common Pipistrelle using this feature. A transect survey in 2006 (Appendix 9.15) recorded an additional three species including Lesser Horseshoe, Soprano Pipistrelle and Whiskered/Brandt's bats (Table 9.7).
- 9.287 To encourage bats to cross the road at height, close-boarded 2 m tall fencing with attached 2 m high mesh fencing, together with bollard lighting like that proposed for the Wellhead Underpass, would run parallel to the road as it crosses the track. In addition to this, a bat gantry to the same specification as that described for the Wellhead Underpass would be positioned in line with each of the three hedgerows.

Other hedgerow and woodland crossings

- 9.288 A number of other crossings of hedgerows/woodland would be necessary in addition to those described above, and this would involve vegetation removal. Whilst surveys in 2004 and 2006 did not record the same number of bat species and high degree of use as that within the vicinity of the Wellhead Springs woodland and the Chalford Accommodation Bridge, without suitable mitigation it is considered that there could be a cumulative impact on bat species, particularly between Bratton Road and the Cement Works Roundabout.

To encourage bats to cross at height those hedgerows and one short width of mixed woodland shown on Figures 4.3e to 4.3g would have close boarded 2 m tall fencing with attached 2 m high mesh fencing either side of the crossing point. To further encourage bats to cross at height 6 m tall planting would be planted between the road and the 4 m tall fencing on the field side at two crossings (Figure 4.3e, see also Appendix 9.15).

Additional planting

- 9.289 Planting of new hedgerows along the road is incorporated into the design in order to maintain and improve the connectivity of the hedgerow network and associated wildlife corridors. High numbers and species of foraging and commuting bats use some of these hedgerows. Not only would foraging and commuting routes be reconnected, but in a number of instances the additional planting and habitat enhancement would provide new opportunities for bats, thus reducing the overall impact of the scheme. For example, the new highway boundary hedgerow on the north side of the road between bridleways West36 and West37, together with other improvements to the hedgerows along both bridleways and Wellhead Drove, would provide a foraging area that would not involve crossing the proposed bypass. Similar foraging areas would be created on the south side of the road between Madbrook roundabout and Newtown Road.
- 9.290 Elsewhere the proposed habitat enhancement at the Chalford Accommodation Bridge, Wellhead Underpass, Bere's Mere Farm Underpass, and the eastern ditch south of Blenches Mill Farm (see Figures 4.3a and 4.3b) would assist in providing safe passage for bats above or under the road by funneling them towards the bat road crossings. Enhancement of the hedgerow connecting the northern point of White Scar Hanging woodland and Beggar's Knoll woodland (Figures 4.3b and 4.3c) would improve this foraging and commuting corridor providing a link for bats between the two woodlands, without the necessity of crossing the proposed scheme.
- 9.291 Additional areas identified by NPA in their 2006 Bat Survey report (see Figure 15 in Appendix 9.15) for further potential off site mitigation planting for bats have not been included in this ES. These areas are not essential to the scheme, nor to local bat populations, but were included as additional potential mitigation. These are subject to agreements between Wiltshire County Council and the respective landowners, and until such time as those agreements are signed any off site planting cannot be guaranteed.