MAVES

The Mid Arun Valley Environmental Survey of the Arun Countryside Trust

RESPONSE TO THE A27 ARUNDEL BYPASS SCHEME OPTIONS 2019




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EXECUTIVE SUMMARY

- Following Highways England's (HE) publication of the six proposed A27 route Options; this report reviews Chapter 8 of the Environmental Assessment Report (EAR), Biodiversity. This is in order to establish whether the information is presented in an accurate and clear manner for consultation.

- This report was commissioned by MAVES (Mid Arun Valley Environmental Survey). MAVES is the environmental division of Arun Countryside Trust CIO (registered charity number 1180078). Partner organisations include the Sussex Wildlife Trust and Arundel Agenda 21.

The Environmental Assessment Report

- HE's EAR ends with two summary tables: the *Construction Phase likely significant effects* and the *Operational Phase likely significant effects*.

- The significant effects on species and habitats outlined in these two tables have been copied into the consultation pamphlet under the headings '*Construction*' and '*Operation*' with an explanation for operation as follows: '*operation refers to summer 2041 when the new road is expected to have been in place for 15 years'*.

- However, these published tables do not include the *residual* effects. These are the remaining environmental 'costs' of the project that could not be reasonably avoided or mitigated. These are a key consideration in deciding whether the project should be permitted or not.

- As such, the reader is wholly unaware of the real 'costs' of the project and may assume that the *operational* effects are all that remain. Yet it is the residual effects and the on-going operational effects that facilitate understanding of the Scheme impact on the local area and the wider countryside.

Construction effects (impacts)

- A number of irreplaceable habitats will be lost including a traditional orchard, ancient woodland, wood pasture and parkland, veteran trees and deciduous woodland. Many species will be impacted and require removal from the construction footprint. A large amount of habitat used by protected species will be lost.

Residual effects (impacts)

- In HE's 2017 EAR, a clear table of Residual effects (as per CIEEM 2018 guidelines) was provided with a clear conclusion yet the 2019 EAR is unclear, with the residual effects immersed in text and jumbled with the construction effects.

- There are significant residual effects for bats, Barn Owl, Hedgehog, Hazel Dormouse, Water Vole, woodland birds, woodland invertebrates, notable plants, grazing marsh (including reedbed and fen).

- HE states that, with the Crimson Option, Hedgehogs face road mortalities to the extent that the population may not sustain itself. This road mortality impact is not considered significant for Hedgehogs outside the woodland (although it was in 2017).

- HE's surveyors found that the assemblage of dead wood invertebrates was particularly important with many notable species present. This group is found in parts of the woodland with dead wood habitat and in hedgerows. HE has assigned significance of effect according to the amount of woodland in each Option – though this is not necessarily the case due to the large amount of dead wood habitat outside the woodland.

- Common Toad is not mentioned in residual impacts despite being included in 2017 due to a barrier (Amber Option) separating breeding sites from terrestrial sites. A barrier is also present in the Grey, Magenta and to a lesser extent Crimson Options.

- A revision of HE's residual effects has included habitats not stated in their 2019 EAR report, such as ancient woodland, veteran trees and Traditional Orchards (due to irreplaceability) and Brown Hare and Harvest Mouse due to barriers for dispersal and fragmentation.

Operational effects (impacts)

- HE only includes the Binsted Woods Complex (due to edge effects with some Options) bats and Barn Owls (close to the operational scheme) in their assessment of significant operational impacts.

- A revision of the operational effects has included more mobile species such as Common Toad, reptiles (Grass Snake and Adder), Badger and Hedgehog as these are highly mobile species and will continue to suffer road kills along the Grey, Amber, Magenta and, to a lesser extent Crimson Options as long as the road is in operation.

Connectivity & Severance

- The Arundel Water Vole population is central to a large interconnected habitat extending from Mid Sussex to the coasts at Climping Gap and at Chichester with implications for the wider population with additional barriers to dispersal.

- A Dormouse corridor survey along hedges radiating from the Binsted Woods Complex to the west has found Dormice and multiple nests as far as Binsted Rife demonstrating the importance of these corridors and possible negative implications for small and unstable Dormouse populations in the wider area from this large source population.

- The off-line options will present significant barriers to dispersal and cause avoidable habitat fragmentation. The Grey, Magenta and Amber Options will, in effect, with up to 8 km of new carriageway, turn the Binsted Woods Complex into an 'island' trapped between two busy roads.

- Barriers and fragmentation are likely to have a negative impact on some bats, Badger, Brown Hare, toads, reptiles (Adder and Grass Snake), Hedgehogs, Harvest Mice, Dormouse and Water Vole as well as some invertebrate species. Barriers limit movement between populations thus reducing gene flow and halting the recovery from local population declines (i.e. dispersing dormice).

- There are fifteen habitats of principal importance in the Mid Arun Valley (though some are fragments and corridors), which, by providing areas, ribbons and islands of good quality habitat throughout the area enable a high proportion of rare and declining species to survive in a largely farmed environment.

- Hidden impacts include the mortality of invertebrates when trying to cross a road; the avoidance of roads by some invertebrates; changes in invertebrate and floral assemblages due to pollutants and

run off by roads; a dead zone around a busy road devoid of breeding birds due to the noise of the carriageway. The Mid Arun Valley currently has a good representation of predatory birds such as Marsh Harrier, Peregrine, Red Kite, Short-eared Owl (all Annex 1 species) and Kestrel, Buzzard and Hobby. Impacts on the lower trophic levels are likely to reduce the abundance of predators.

Additional impacts

- The wider ranging impacts of the Scheme are likely to be negative for a number of species within and around the Scheme Options for a variety of reasons.
- Much emphasis has been put on the woodland bat assemblage but there is little information on bats outside the woodland across the landscape that may rely on commuting to the Binsted Woods Complex and its surrounding habitats in order to forage, such as a maternity colony of Serotine bats at Barnham (GB Red List Vulnerable).
- HE have failed to provide ecological data on bat activity in the Magenta and Grey route corridors to the same level as they provided for the other routes (see para 2.67).
- An emergence survey of buildings under the Magenta Option (Lake Copse) recorded five bat species including a Brown-eared species and Serotines.

Mitigation

- HE has stated that appropriate mitigation measures will be required to adequately mitigate the impact of habitat severance on protected species. These measures include the provision of wildlife crossing structures, underpasses and tunnels.
- HE acknowledge shortcomings in crossing structures due to lack of evidence as to the efficacy of such structures and thus (for bats and Dormice) the mitigation technique should be viewed as partly experimental. With the exception of Badger, there is a dearth of evidence of other mobile species using such structures i.e. Grass Snake, Harvest Mouse, toads etc.
- Yet, despite this knowledge of the ineffectiveness of such structures, HE state that for the range of other species in the area it may be necessary to construct multiple mitigation structures to ensure species are able to cross the scheme without being exposed to collisions with vehicles or to replace severed movement paths.
- Comments (regarding birds) such as '*there are ample areas outside the Scheme that will not be affected*' are worrying as most such areas (for breeding birds) are at carrying capacity (limited by suitable nest sites).
- There is no guarantee that mitigation measures in the form of translocation or habitat creation will work or be maintained etc. Such measures are only as good as the sub-contractor undertaking the work and are surrounded by uncertainty i.e. pond maintenance, succession, vandalism (owl boxes) etc.

Planning policy

- Planning Policy Guidance states that the purpose of the Environmental Assessment Report is that '*the local planning authority when deciding whether to grant planning permission for a project, which*

is likely to have significant effects on the environment, does so in the full knowledge of the likely significant effects, and takes this into account in the decision making process'.

- Planning Policy Guidance states that the purpose of the Environmental Assessment Report is *to ensure that the public are given early and effective opportunities to participate in the decision making procedures.'*

The clarity of information for public consultation

- The 2019 HE EAR is long, complex, unclear and inconsistent in places with some of the most relevant information buried in the text. A number of the residual and operational efffects are misguided. Unlike the HE 2017 EAR, there is no conclusion or clear table of residual impacts (the environmental cost of the Scheme) to aid readers.

- The information given in the public consultation pamphlet has been drawn from two tables in the EAR: the construction impacts and the operational impacts giving the reader the misguided impression that there will be little lasting impact on wildlife within the Mid Arun Valley area with the exception of bats and Barn Owl.

- The extent of the woodland loss with the Cyan and Beige Options has been misrepresented in the consultation pamphlet as has it has been counted as woodland when in fact it is an area of semi-improved grassland.

- The bulleted summaries state that the Cyan and Beige Options would feature 4.5 km of new dual carriageway as opposed to 7.2 km, 6.9 km or 8 km for the Magenta, Amber and Grey options respectively. However, if it was worded that the Beige and Cyan Options require an approximate 1.7 km stretch of new road, with the remainder (2.8 km) being upgraded from the existing road, although broadly similar, it presents a very different scenario.

- Based on the information given in the consultation pamphlet, the reader would find it very difficult to understand the extent, richness and diversity of the wildlife and to usefully decipher which Options would be more damaging.

Legislation and policy

- The legislation and policy framework is extensive with European directives feeding into national policies, which in turn feed into the National Planning Policy Framework. Yet, much of this legislation stipulates that biodiversity must not be reduced at the *national* level, or that a particular scheme or development must show *net gains* in biodiversity.

- Such legislation provides for the translocation of species to other areas, and often, the monitoring is for a limited time only. The protection of areas with important assemblages of species, with the exception of statutory and non-statutory sites, is not considered.

Conclusion

- Within the Mid Arun Valley, the natural habitats and landscape as at present managed, support rich biodiversity, including thriving bird communities, a large and stable Dormouse population, thousands of breeding toads, key reptile sites, a nationally important bat assemblage and several important invertebrate communities These communities have persisted for millennia, despite a changing world.

Mitigation and compensation (that may be maintained for 25 years and monitored for fewer years) are unlikely to result in net biodiversity gains for such a rich and largely interdependent assemblage.

- The current Scheme is being proposed against a backdrop of continual species decline in the face of yet another factor - **climate change** - resulting in a layer of unpredictability (i.e. ponds drying, cold snaps, localised flooding, lack of availability of prey source at critical times etc.)

- The numerous impacts mentioned in this report should not be used, as with other schemes, as a way of navigating the system in order to achieve an expensive and environmentally unsound infrastructure outcome come what may. If this were the case then the accumulation of information by HE would amount to nothing more than a 'box-ticking' exercise as with many other schemes.

- **The numerous impacts should be used as a way to navigate to the least damaging Option for Arundel and its rich assemblage of wildlife, which, evaluating the operational and residual effects is the Cyan or Beige Option.**

1 INTRODUCTION

BACKGROUND TO THE STUDY

1.1 HE has published six proposed options for the A27 Arundel Bypass scheme based on the latest available information. This report is a review of the Environmental Assessment Report Chapter 8, Biodiversity and evaluates whether the information is accurate, clear and informative.

1.2 This report was commissioned by MAVES (Mid Arun Valley Environmental Survey). MAVES is the environmental division of Arun Countryside Trust CIO (registered charity number 1180078). Partner organisations include the Sussex Wildlife Trust and Arundel Agenda 21.

HIGHWAYS ENGLAND'S ANALYSIS AND PRESENTATION

1.3 HE has commissioned a suite of habitat and species surveys within the Mid Arun Valley. These surveys are presented in the Environmental Assessment Report (EAR) Appendices to the Chapter 8, Biodiversity.

1.4 The biodiversity input into the public consultation pamphlet 'A27 Arundel Bypass Further Public Consultation Have Your Say' has been informed by the EAR, particularly two summary tables: the Construction Effects and Operation Effects.

AIMS

1.5 The aims of this report are as follows:

- To review HE's environmental impact analysis regarding the construction, operation and residual impacts (effects) of the Scheme.
- To review additional impacts which are routinely not captured in an environmental impact assessment.
- To ascertain whether the information presented in the public consultation document is clear, balanced and usefully informative.

2 HIGHWAYS ENGLAND ANALYSIS

BACKGROUND

2.1 HE has undertaken an analysis of the six Scheme options with the results presented in the Environmental Assessment Report, Chapter 8, Biodiversity. At the end of the report, where the conclusion would be expected, there are two tables summarizing findings. The first table summarizes the *Construction Phase likely significant effects*. The second table summarizes the *Operational Phase likely significant effects*.

2.2 Significant effects are those impacts that must be taken into account during the evaluation of features, and are based upon the extent of the impact and the importance of the feature (be it of local, county, regional or national importance).

2.3 The effects on species and habitats outlined in these two tables have been copied into the consultation pamphlet under the headings '*Construction*' and '*Operation*' with an explanation for operation as follows: '*operation refers to summer 2041 when the new road is expected to have been in place for 15 years'*.

2.4 However, these published tables do not include the *residual* effects. The effects that remain after all assessment and mitigation are the 'residual effects'. These are the remaining environmental 'costs' of the project that could not be reasonably avoided or mitigated. These are a key consideration in deciding whether the project should be permitted or not. For this reason, it is important that residual effects are clearly described in accordance with the system of effects.

2.5 As such, the reader is wholly unaware of the 'costs' of the project and may assume that the *operational* effects are all that remain in the area. Moreover, the effects published in the public consultation pamphlet are numerous and impossible to unpick in a meaningful manner. The written '*Environmental context'* of the consultation pamphlet (page 20) does little to elaborate or aid understanding.

2.6 Publiished guidelines for an Ecological Impact Assessment (CIEEM 2018) state that it should clearly and simply describe the significant effects of any project so that all interested parties understand the full implications of what is proposed.

2.7 The construction phase will impact on most species and habitats. Large areas of habitat will be lost and many species will be negatively impacted. However, it is a finite phase of the project and, once over, it is the residual effects and the on-going operational effects that facilitate understanding of the Scheme impact on the local area and the wider countryside.

THE CONSTRUCTION PHASE EFFECTS

2.8 The table below is copied from HE EAR Chapter 8 Biodiversity (2019). It lists the significant potential impacts (within and around the site) of the construction phase. Other impacts on surrounding statutory and non-statutory sites (neutral or positive) are included in the original table but they are not the focus of this report.

Table 1: *Construction phase likely significant effects (modified from HE EAR 2019)*

	Cyan/Beige 1V5/1V9	Crimson 3V1	Magenta 5AV1	Amber 5AV2	Grey 5BV1
Binsted Woods Complex	Large Adverse +	Very Large Adverse	Large Adverse +	Very Large Adverse	Neutral
Rewell Woods Complex	Large Adverse +	Large Adverse +	Neutral	Neutral	Neutral
Avisford Notable Road Verge	Neutral	Slight Adverse	Slight Adverse	Slight Adverse	Neutral
Ancient woodland HPI	Large Adverse +	Very Large Adverse	Moderate Adverse +	Very Large Adverse	Neutral +
Wood pasture and parkland HPI	Moderate Adverse +	Neutral	Neutral	Very Large Adverse	Neutral
Ancient or veteran trees HPI	Very Large Adverse	Neutral	Very Large Adverse	Very Large Adverse	Very Large Adverse
Deciduous woodland HPI	Large Adverse +	Very Large Adverse	Slight Adverse	Very Largo Adverse	Slight Adverse
Traditional Orchard HPI	Neutral	Neutral	Moderate Adverse	Neutral	Neutral
Grazing marsh (incl reedbed and fen) HPI	Moderate Adverse	Large Adverse +	Large Adverse +	Large Adverse +	Large Adverse +
River corridor HPI	Neutral	Neutral	Neutral	Neutral	Neutral
Other HPI habitats	Neutral	Neutral	Neutral	Neutral	Neutral
Amphibians GCN and Common Toad	Neutral	Neutral	Neutral	Neutral	Neutral
Aquatic ecology	Neutral	Neutral	Moderate Adverse	Moderate Adverse	Moderate Adverse
Badger	Neutral	Neutral	Neutral	Neutral	Neutral
Bats	Moderate Adverse	Very Large Adverse	Large Adverse	Very Large Adverse	Moderate Adverse
Breeding birds (wetland / arable)	Neutral	Neutral	Neutral	Neutral	Neutral
Breeding birds (woodland)	Slight Adverse +	Large Adverse +	Slight Adverse +	Moderate Adverse	Neutral
Barn Owl	Moderate Adverse	Moderate Adverse	Moderate Adverse	Moderate Adverse	Moderate Adverse
Hazel Dormouse	Moderate Adverse	Large Adverse +	Moderate Adverse	Large Adverse +	Moderate Adverse
Reptiles	Neutral	Neutral	Neutral	Neutral	Neutral
Invertebrates terrestrial	Moderate Adverse +	Very Large Adverse +	Slight Adverse +	Very Large Adverse +	Slight Adverse +
Water Vole	Neutral	Moderate Adverse	Moderate Adverse	Moderate Adverse	Moderate Adverse
Notable plants	Moderate Adverse	Large Adverse +	Large Adverse +	Large Adverse +	Large Adverse +

2.9 A number of irreplaceable habitats will be lost including a traditional orchard, ancient woodland, wood pasture and parkland, veteran trees and deciduous woodland. Much of the deciduous woodland is intermixed and of similar species composition to the ancient woodland and so, in effect, that too is an irreplaceable habitat.

2.10 The exact extent of deciduous woodland to be lost does not appear to have been presented accutately, for an area of semi-improved grassland with scattered trees (Figure 2 taken from Appendix 8.20 *Phase 1 Habitat Survey Baseline*) has been incorrectly classified as deciduous woodland in the Arboriculture Report (Appendix 7.3). Both are shown below in Figures 1 and 2

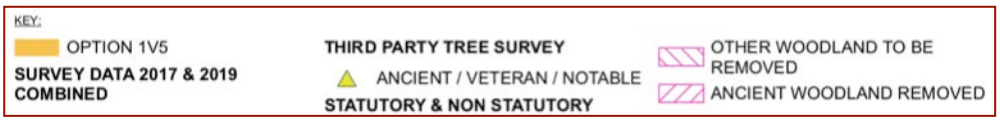
with the key from the arboricultural figure below. The Google Earth image also shows that, quite clearly, the area is a field with scattered trees and scrub and not deciduous woodland.

2.11 The information given in the public consultation brochure (page 17) is therefore inaccurate and misleading.

Figure 1: *HE Phase 1 map taken (copied from HE Phase 1 Report Appendix 8.20)*

Figure 2: *HE assessment of woodland and trees along the Cyan route (copied from HE Arboricultural Report Appendix 7.3)*

The accompanying key to Figure 2 above



2.12 HE has counted the veteran and ancient trees along all route Options and reached figures for each. However, this does not quite capture the complexity of this class of trees. The parameters

used to classify such trees have not been made clear and there are numerous ‘notable’ trees that do not quite reach the age class of ancient and veteran trees, but are over 3 m in circumference, have veteran features of importance to wildlife and are the next generation of veteran trees.

2.13 In the Highways England 2017 Environmental Assessment Report (Chapter 8) it was considered that the construction and operation would have a negative impact on Common Toad. In that report Table 8.14: *Summary of impacts on Great Crested Newt and Common Toad* states that ‘*Dependent on the size of the population affected a significant adverse effect at between the local level and the county level is possible for common toad and great crested newt (not yet confirmed as present). The risk of a significant effect at the county level is considered higher given the larger area of aquatic habitat affected and proximity to several common toad populations reported in the desk study.’*

2.14 HE is aware (from MAVES reports and correspondence) of the extremely high population of toads around the Grey, Magenta and Amber Options and yet have considered the impact (formerly significant up to the local level presumably for toads) during construction to now be ‘*neutra*l’.

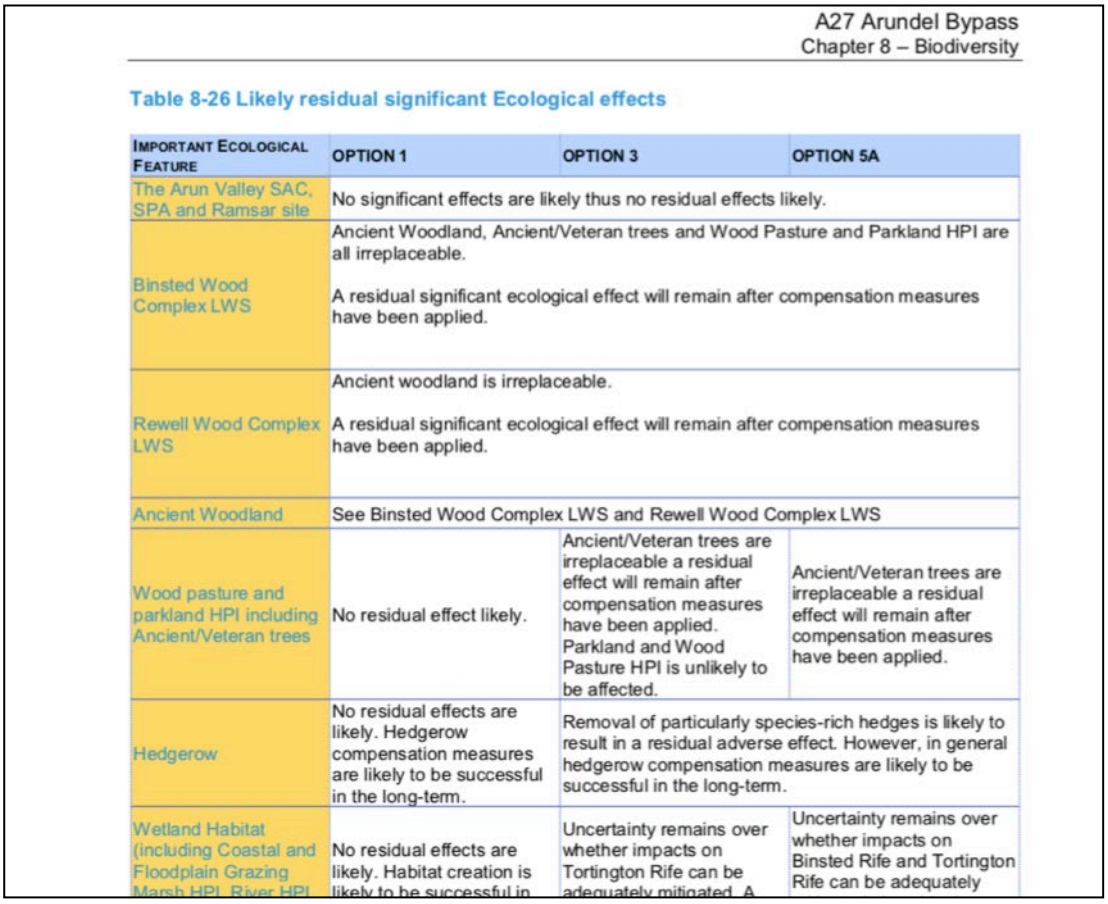
THE RESIDUAL EFFECTS

2.15 Residual effects, as previously stated, are those effects that remain following the application of mitigation measures to avoid or reduce adverse effects. Any residual impacts that will result in effects that are significant after the proposed compensatory measures, will be the factors considered against ecological objectives (legislation and policy) in determining the outcome of the application.

2.16 Ecological Impact Assessment (EIA) guidelines (IEEM 2018) state that that a summary table should be provided listing the significance of residual effects for each ecological feature, the compensation measures required and the means by which compensatory measures can be secured to allow the local planning authority to ensure that appropriate planning conditions / obligations are included with any consent.

2.17 A very clear table of the residual effects (Figure 3) was published in the 2017 EAR. This adds clarity to the understanding of the longer-term impacts after the construction phase has been completed.

Figure 3: *Likely significant residual ecological effects (HE 2017)*



A27 Arundel Bypass
Chapter 8 – Biodiversity

Table 8-26 Likely residual significant Ecological effects

IMPORTANT ECOLOGICAL FEATURE	OPTION 1	OPTION 3	OPTION 5A
The Arun Valley SAC, SPA and Ramsar site	No significant effects are likely thus no residual effects likely.		
Binsted Wood Complex LWS	Ancient Woodland, Ancient/Veteran trees and Wood Pasture and Parkland HPI are all irreplaceable. A residual significant ecological effect will remain after compensation measures have been applied.		
Rewell Wood Complex LWS	Ancient woodland is irreplaceable. A residual significant ecological effect will remain after compensation measures have been applied.		
Ancient Woodland	See Binsted Wood Complex LWS and Rewell Wood Complex LWS		
Wood pasture and parkland HPI including Ancient/Veteran trees	No residual effect likely.	Ancient/Veteran trees are irreplaceable a residual effect will remain after compensation measures have been applied. Parkland and Wood Pasture HPI is unlikely to be affected.	Ancient/Veteran trees are irreplaceable a residual effect will remain after compensation measures have been applied.
Hedgerow	No residual effects are likely. Hedgerow compensation measures are likely to be successful in the long-term.	Removal of particularly species-rich hedges is likely to result in a residual adverse effect. However, in general hedgerow compensation measures are likely to be successful in the long-term.	
Wetland Habitat (including Coastal and Floodplain Grazing Marsh HPI, River HPI	No residual effects are likely. Habitat creation is likely to be successful in	Uncertainty remains over whether impacts on Tortington Rife can be adequately mitigated. A	Uncertainty remains over whether impacts on Binsted Rife and Tortington Rife can be adequately

2.18 Section 8.9 of the current EAR Chapter 8 Biodiversity is entitled the 'Assessment of Likely Significant Effects.' The section starts by stating broad likely significant effects from the *construction* and *operation* phases of the Scheme. Each ecological feature is discussed in turn from designated sites to habitats and species. The term 'residual effect' is not used until halfway through the section, prior to which the distinction between 'construction' effects and 'residual' effects is unclear.

2.19 The significant residual effects have been extracted from the text in the EAR (2019) and are presented in Table 2 below with the HE reasoning in the following paragraphs.

Table 2: *Significant residual impacts extracted from text in the HE EAR*

Ecological Feature	1V5 / 1V9 Cyan/Beige	3V1 Crimson	4/5AV1 Magenta	4/5AV2 Amber	5BV1 Grey
Bats	Moderate Adverse	Very Large Adverse	Large Adverse	Very Large Adverse	Moderate Adverse
Barn Owl	Neutral	Neutral	Moderate Adverse	Moderate Adverse	Moderate Adverse
Hedgehog	Neutral	Slight Adverse	Neutral	Neutral	Neutral
Hazel Dormouse	Moderate Adverse	Large Adverse	Moderate Adverse	Large Adverse	Moderate Adverse
Water Vole	Neutral	Moderate Adverse	Moderate Adverse	Moderate Adverse	Moderate Adverse
Woodland birds	Slight Adverse	Large Adverse	Slight Adverse	Moderate Adverse	Neutral
Woodland invertebrates	Moderate Adverse	Very Large Adverse	Slight Adverse	Very Large Adverse	Slight Adverse
Notable plants	Moderate Adverse	Large Adverse	Large Adverse	Large Adverse	Large Adverse
Grazing marsh/reedbed/fen	Moderate Adverse	Large Adverse	Large Adverse	Large Adverse	Large Adverse

BATS

2.20 Paragraph 8.9.2.5 states that the construction and operation of the Scheme will have significant residual effects due to a lack of evidence as to whether roost replacements and measures that allow bats to cross schemes are successful. Additionally, the complex way in which bats use the environment is unpredictable.

2.21 Option 3V1 (Crimson) is likely to have the largest effect with a large loss of woodland habitat and severance of woodland habitat resulting in collisions with vehicles resulting in a Very Large Adverse effect.

2.22 4/5AV2 (Amber) would result in loss of Alcathoe roosts in Hundred House Copse and potential roosts in the Lag and the Shaw. It would sever flight lines used by rare bats including a flight line from a Barbastelle maternity roost. This would result in a Very Large residual effect.

2.23 Option 4/5AV1 (Magenta) will sever flight paths used by multiple bat species including rare bats resulting in potential collisions and there will be some loss of habitat resulting in a Large Adverse residual effect.

2.24 Options 1V9 and 1V5 (Cyan and Beige) could potentially result in the loss of roost sites uses by Bechsteins bats and would widen an operational road which may potentially reduce connectivity for rare bats. The residual effect is likely to be Moderate Adverse.

2.25 Option 5BV1 (Grey) is also considered to be likely to sever flight paths used by multiple species. However, it is considered that the severance is reduced as it is further away from the core foraging and roosting locations used by woodland bats. The residual impact is therefore considered to be Moderate Adverse.

BARN OWL

2.26 HE state that the Barn Owl is a low, slow-flying species and research has shown that where this species roosts or forages in close proximity to operating major roads it is likely that road traffic mortality will deplete local populations. A Moderate Adverse effect will therefore remain close to the orginal scheme.

2.27 HE commissioned surveys (EAR Appendix 8.4) show that there are 9 observed breeding sites within the vicinity of the road options. This high number is due to the length of the potential roads and the high quality of the landscape with abundant prey. There are also numerous potential breeding sites (usually a limiting factor for Barn Owls), most of which are in the vicinity of the Crimson, Amber, Magenta and Grey Options.

2.28 The HE report states '*Road construction can cause the direct loss and fragmentation of barn owl habitat resulting in indirect impacts such as the disruption or severance to established home ranges. However, the most significant impact comes after a new road becomes operational, affecting barn owls inhabiting the area up to one to 1.5 kilometres from the road. As a consequence, barn owls living within this distance of new roads commonly fall victim to road traffic. Following the death of these owls, recruitment of young barn owls which attempt to settle and breed in the newly vacant areas is insufficient to offset the high levels of road mortality*'.

2.29 Barn Owls will continue to fall victim to road collisions in the Mid Arun Valley as there will be a constant recruitment of young owls settling in the area due to the numerous high quallity roost and nest sites such as the nest site in Scotland Oak shown in Photograph 1 taken by Mike Tristram 05/06/19. The location map is below the photo showing its proximity to the Amber and Magenta route options.

COMMON TOAD

2.30 This species is not mentioned regarding residual impacts, however, in the HE 2017 EAR a residual Adverse impact was considered for the Crimson and Amber Options due to severance of the breeding ponds from terrestrial habitat. These two Options are combined in the second column of Figure 4 below.

***Figure 4**: Table 8.26: Likely significant residual ecological effects (Highways 2017)*

Amphibians	No residual effects are likely. Habitat creation is likely to be successful.	Uncertainty remains over whether habitat severance can be adequately mitigated. A residual adverse impact is probable.

Photograph 1: *Barn Owl nesting in a veteran Oak – Scotland Oak*

HAZEL DORMOUSE

2.31 HE EAR (para 8.9.2.29) state that due to the widening of the current carriageway and the loss of woodland a residual significant effect of Moderate Adverse is considered likely for Option 1V5 and Option 1V9 (Cyan / Beige) Options 3V1 (Crimson) and 4/5AV2 (Amber) as they will remove large areas of woodland and sever either the main block of woodland or corridors to the greater landscape. As there is much controversy and little evidence as to the efficacy of wildlife crossings such mitigation measures cannot be relied upon and therefore a Large Adverse

residual significant effect is likely. HE state that a residual impact of Moderate Adverse is expected with Options 4/5AV1 (Magenta) and 5BV1 (Grey) due to the smaller loss of woodland habitat (and presumably presence of corridors particularly for the Grey Option, though not stated).

HEDGEHOG

2.32 Paragraph 8.9.2.38 (HE EAR 2019) states that '*Owing to the large area of woodland loss associated with Option 3V1* (Crimson) *and broad area of severance, it is uncertain whether mitigation on hedgehog woodland habitat may be effectively delivered. Animals present in the severed parts of Binsted Wood Complex LWS will be exposed to mortality from road traffic, which may be unsustainable at the local population level. A Slight Adverse effect is likely'*.

2.33 In effect HE is saying that the woodland Hedgehog population may well become locally extinct. However, as '*operation*' refers to 2041 (as stated in the consultation brochure) it can be declared that there will be no impact (carried through to the Operation impacts list in the brochure). This is a clear example of why the residual effects should be stated.

2.34 Of concern is that in the HE 2017 EAR it was considered that there would be residual impacts for 'other notable mammals', (which includes Hedgehog) for *both* the Crimson and Amber Options due to habitat severance. The screen shot of this part of the residual impacts table is shown in Figure 5. The first column relates to the Cyan and Beige Options and the second and third column (combined) relates to the Crimson and Amber Options.

Figure 5: *Table 8.26: Likely significant residual ecological effects (Highways 2017)*

Other Notable Mammal Species	No residual effects are likely. Habitat creation is likely to be successful.	Uncertainty remains over whether habitat severance can be adequately mitigated. A residual adverse impact is probable.

WATER VOLE

2.35 Paragraph 8.9.2.35 (EAR Chapter 8) states that the construction of the Scheme is unlikely to have a significant adverse residual effect on the conservation status of Water Vole.

2.36 Yet the following paragraph (8.9.2.36) states that due to the disruption of larger areas of habitat triggering a greater mitigation requirement that would be technically more difficult to deliver '*a residual significant effect of Moderate Adverse is considered likely for Options 3V1* (Crimson), *Option 4/5AV1* (Magenta), *Option 4/5AV2* (Amber) and *Option 5BV1* (Grey)'.

WOODLAND BIRDS

2.37 HE state (EAR para 8.9.2.27) that there is uncertainty as to the impact of woodland removal on particularly a number of Birds of Conservation Concern Red List Species that are associated with mature woodland and dead wood habitat. This habitat clearly cannot be immediately replicated and so a Large Adverse significance of effect is likely for Option 3V1 (Crimson) which has the greatest extent of woodland loss and severance; a Moderate Adverse significance of effect is likely for 4/5AV2 (Amber) which results in lower amount of woodland loss but several instances of severance; and a Slight Adverse significance of effect for Option 1V5 (Cyan), Option 1V9 (Beige) and Option 4/5AV1 (Magenta) which have the least degree of woodland loss and severance.

WOODLAND TERRESTRIAL INVERTEBRATES

2.38 HE considers that there will be a residual impact on woodland terrestrial invertebrates (EAR para. 8.9.2.32). By the term 'woodland' terrestrial invertebrates, it is assumed that HE is referring to those associated with dead wood habitats as outlined in the invertebrate survey (EAR Appendix 8.22).

2.39 The HE invertebrate surveyors assessed habitats using ISIS Invertebrate Species-habitat Information System which generates a 'Specific Assemblage Types' score. This was originally developed to assess SSSI's in order to identify whether an assemblage associated with a location was in a 'favourable condition'.

2.40 Results showed four specific assemblage types (SATs) - rich flower resource (primarily hedgerows and boundary features along the Amber Option), bark and sapwood decay and heartwood decay (also mostly along the Amber Option) and scrub edge. These were all given 'favourable' condition. The report states that the presence of SATs with high numbers of representative species, especially those in favourable condition, provides an insight into the rarest and, often most unique invertebrate assemblages associated with an area.

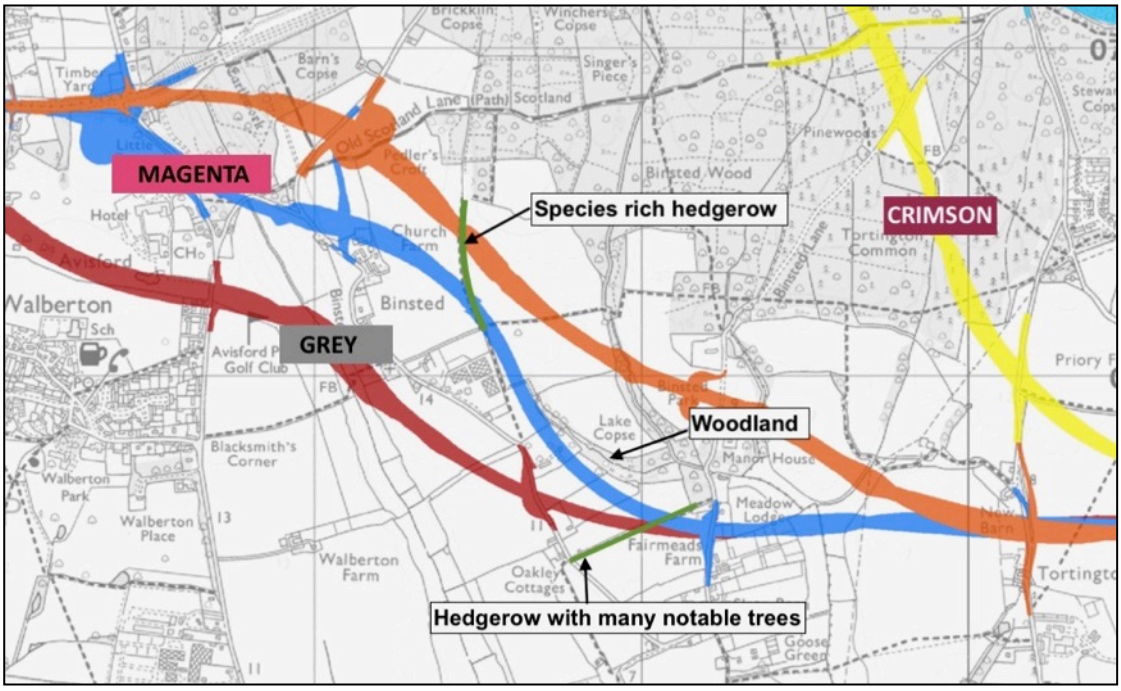
2.41 HE surveyors found 41 notable species of inverts with some crossover with MAVES findings but likely an underestimate. A total of 29% were associated with dead wood and 24% with short sward and bare ground habitat.

2.42 A MAVES survey (Grove 2016) of two hedgerows and Lake Copse (Figure 6) found high numbers of saproxylic (dead wood) invertebrates in the hedgerow with the notable trees and the woodland. Grove found 52 saproxylic species giving a Saproxylic Quality Index (which rates the importance of the dead wood habitat) of 434 (a good score). The 3 parallel hedgerows to the north of this "hedgerow of many notable trees" share many of the habitat corridor attributes of this hedgerow. All would be severed by Magenta and 2 would be severed and 1 impacted by Grey.

2.43 HE, however, have allocated the impact levels in accordance to the amount of intact woodland that each area has. However, the numerous old trees in the hedgerows must also be taken into account as these have both bark and sapwood decay and heartwood decay, as stated in the HE commissioned survey. This would immediately change the Magenta significance of effect from Slight Adverse to Large or Very Large Adverse and the Grey Option to Moderate or Large adverse – both dependant upon the number of trees with dead wood habitat.

2.44 The HE surveyors attribute the high representation of species associated with dead wood to the abundant dead wood habitat in close proximity to open areas with flowering shrubs and herbaceous species providing pollen and nectar for emerging adults. A wide dual carriageway would inhibit movement of newly emerged saproxylic invertebrates from deadwood habitats within the woodland to this herbaceous rich habitat, which mainly occurs along hedgerows outside the woodland (with the exception of spring time when some parts of the woodland floor are extremely species rich).

Figure 6: *Locations of beetle surveys undertaken by Grove*



OTHER MAMMALS

2.45 This refers to priority species or species of principal importance (UK BAP) listed under Section 41 of the Natural Environment and Rural Communities (NERC) Act 2006 known to be in the area. Brown Hare and Harvest Mouse are present and will also be impacted negatively. These have not been included in HE surveys.

2.46 Harvest Mouse has been found breeding in a field with rough relatively species rich grassland intermixed with reedbed and sedge swamp at Meadow Lodge, and there is an old record for it in a wayleave within the Binsted Woods Complex. It is likely to move around the area using hedgerows and ditches. It would also have the opportunity to breed, undisturbed by grazing cattle, along some parts of Binsted Rife.

2.47 Brown Hare is seen very occasionally but consistently in the area, with a dead hare also recorded on Binsted Lane. This species is thought to cross quiet but not busy roads.

2.48 There is likely to be a residual negative impact on these species for both will be restricted in movement and unable to use different parts of the landscape as some may become unavailable i.e. a wayleave or a field of tall and unkempt vegetation at Meadow Lodge being cut. This will make local extinction more likely over time.

NOTABLE PLANT SPECIES

2.49 In paragraph 8.9.2.39 of the EAR, HE state that due to the uncertainty surrounding the complex requirements of rare plants the likely residual significance is Moderate Adverse for Options 1V5 and 1V9 (Cyan / Beige), Large Adverse for Option 3V1 (Crimson) (due to the Arun floodplain habitats), and a Large Adverse for Options 4/5AV1, 4/5A/V2 and 5BV1 (Magenta, Amber and Grey) due to the floodplain habitat and impacts on Binsted Rife and Tortington Rife.

COASTAL AND FLOODPLAIN GRAZING MARSH (INCLUDING LOWLAND FEN / REEDBED)

2.50 The impact for this habitat has been set by HE at exactly the same as for notable plant species. Uncertainty surrounds the impact that the Options will have on hydrology and the ability to recreate the most important areas of habitat impacted.

2.51 The major groundworks required for road construction just to the north of the area of wet woodland (HPI) with springs that feed Binsted Rife does not appear to have been taken into account. Additonally, the construction of structures to elevate the road onto bridges along the Magenta and Grey Options may impact on the hydrology of Binsted Rife as there are springs and knucker holes in the area.

SUMMARY

2.52 With the exception of bats and Barn Owl, considered to be permanently negatively impacted in the area ongoing until (and beyond) 2041, and therefore incuded in the published operational effects, none of the above information (i.e. the environmental cost of the project) has been made clear or stated wihtin the HE *A27 Arundel Bypass Further Public Consultation Have Your Say* pamphlet. This document is not transparent.

2.53 Moreover, the short list of operational effects, shown wihtin the HE *A27 Arundel Bypass Further Public Consultation Have Your Say* document and on Table 3 below, is questionable in its brevity.

Table 3: *Operational effects (from HE EAR)*

Ecological Feature	1V5 / 1V9 Cyan/Beige	3V1 Crimson	4/5AV1 Magenta	4/5AV2 Aber	5BV1 Grey
Binsted Woods Complex	Neutral	Large Adverse	Neutral	Large Adverse	Neutral
Bats	Moderate Adverse	Very Large Adverse	Large Adverse	Very Large Adverse	Moderate Adverse
Barn Owl	Neutral	Neutral	Moderate Adverse	Moderate Adverse	Moderate Adverse

2.54 The main argument for bats, for example, is that the success of structures used for bat crossings is experimental and not proven and so this very mobile group is likely to be negatively impacted whilst commuting across the landscape to feed.

2.55 The argument for Barn Owl is that it is low flying and therefore continued traffic collisions are likely and as such, a Moderate Adverse effect will remain close to the operational scheme.

2.56 The argument used for Hedgehogs, regarding residual impacts, is that as such a broad area of woodland is going to be severed (Option 3V1, Crimson), mitigation (presumably in the form of safe crossing places) will not be deliverable and therefore Hedgehogs will suffer high mortality from road traffic. Not withstanding the length of time for this species to become locally extinct, it should have been included in the *operational effects* table.

2.57 These points raise a number of questions as follows:

- Would not the same theory as applied to bats and Barn Owl apply to other mobile species moving across the landscape such as Common Toad, Grass Snake and Adder?

- Why has the mobility of these species not been taken into account in the environmental impact assessment?
- The movement of some species is dependant upon uninterrupted corridors, such as Grass Snake, Harvest Mouse and Dormouse. In this event, is each important hedgerow corridor going to have a usable underpass or overpass the width of a dual carriageway? There is very litlle evidence of species, with the exception of Badger, using such structures.
- As the broad severance within the woodland is considered to have a negative impact on a population of Hedgehog moving through the woodland, why isn't the broad severance outside the woodland considered to have a negative impact on species moving across the landscape and not necessarily using corridors? For example toads move in all directions in wet / damp conditions, Badger pathways (numerous in the Mid Arun Valley) are not necessarily near defined hedgerow corridors and Brown Hare moves across an open landscape.

2.58 To summarize, within the *operational* effects, HE has given, with the exception of bats and Barn Owl, no proper consideration for mobile species that make regular movements to, from, or across the Survey Area.

THE OPERATIONAL EFFECTS

2.59 This section gives some examples of species found within the Survey Area and reconsiders the operational effects of the Scheme Options.

BADGER

2.60 Very high levels of Badger activity in the Mid Arun Valley found by MAVES have been confirmed by HE surveyors (Appendix 8.3) who stated that the '*network of woodlands, pasture, arable habitats and hedgerows provide badgers with excellent habitat for sett creation and foraging as well as providing terrestrial linkages with suitable habitats in the wider landscape'*.

2.61 Either or any combination of main setts, subsidiary setts or outliers are in the path of the route Options (with the exception of the Cyan/Beige Options). An additional main sett (found by MAVES in 2019) has been constructed in the path of the Grey Option. The population density is extremely high. An additional outlier sett found by MAVES in 2018 within 30 m of the Magenta option became a breeding sett in 2019 (video available).

OPERATIONAL EFFECTS

2.62 Badger is a widespread species and its overall conservation status is stable. However, it is a protected species and the population density and the activity levels are so high within the Mid Arun Valley Survey Area that without the construction of barriers (such as mammal exclusion fencing) along the Crimson, Amber, Magenta and Grey Options, road mortalities would be unacceptably high.

2.63 There appear to be no plans in the mitigation sections of the EAR or the Mitigation Appendix (8.12) to incorporate fencing, other than in the vicinity of underpasses, and so, as with Barn Owls and bats, an on-going negative operational effect is likely

BATS

2.64 A total of 14 bat species have been recorded in the Mid Arun Valley including 3 Annex II species and one very rare bat species: Barbastelle, Bechstein's bat, Greater Horseshoe bat and Alcathoe bat. This community is thought to be of national, possibly international Importance.

2.65 HE surveyors (Appendix 8.6) captured and tagged a number of bats in order to ascertain flighlines and foraging activity. The majority of bats were caught within woodland. They were mostly foraging within and around the Binsted Woods Complex, though some were found to be moving both north and south out of the survey area (particulary Whiskered and Barbastelle). Daubentons bats, whose roosts were to the north of the survey area, had peripheral foraging within the survey area.

2.66 Bats are highly mobile utilising different roosts for different purposes, moving between roost sites and using corridors in the form of hedgerows, treelines and woodland edges to fly good distances (sometimes many kilometres) to access rich foraging areas. HE surveyors found a number of corridors and showed that Tortingon Lane is a 'key commuting feature' within the Field Survey Area for multiple bat species. It was also shown to have high levels of Barbastelle passes recorded in April (pre-maternity colonies) and September (post-maternity colonies) (Appendix 8.5).

OPERATIONAL EFFECTS

2.67 Surveys have largely concentrated on the very important woodland assemblage of bats and their foraging areas. Surveys have not extended out to the west of the survey area along the Magenta and Grey Options (acknowledged), where the quality of the habitat is high. The operational and residual effects are considered to be lower, particularly for the Grey Option due to being further from key foraging areas for the woodland bats. This may change with further survey effort.

2.68 An example of bats commuting to the area to forage is Serotines commuting from a maternity colony in Barnham (approximatley 3.5 km to the south west (Whitby 2016)). This is shown in Figure 7, though the commuting corridors to access the Survey Area were not established.

2.69 The flight paths are of critical importance to bats reaching productive foraging areas and, as such, bats in the wider area that are dependant upon the highly productive foraging areas around the woodland for survival must also be considered.

2.70 Just outside the woodland adjacent to Lake Copse, the owners of Mill Ball commissioned a bat emergence survey at their main dwelling (Boxall 2019). This was found to support Soprano Pipistrelles, Common Pipistrelles and a Long-eared bat species. Serotines and Nalthusius' Pipistrelles were also detected and could be roosting in the outbuildings. This is in the pathway of the Magenta Option.

2.71 Given the agricultural land to the south and west of the Binsted Woods Complex and the number of agricultural buildings with potential roost sites, it may be an important foraging area for bats commuting from the south and south west as it is the only large block of woodland in the wider area with a lot of productive and sheltered dark 'edge' habitat, for example, at the edge of the woodland, along wayleaves within the woodland and in shaws and hedgelines radiating from the woodland.

Figure 7: *Location of Serotine roost sites in Barnham that commute to the Binsted Woods Complex*

COMMON TOAD

2.72 Common Toad *Bufo bufo* was added to the UK BAP list due to serious declines in central and southern England. The following information has been extracted from JNCC *UK Priority Species data collation Bufo bufo version 2 updated on 15/12/2010.*

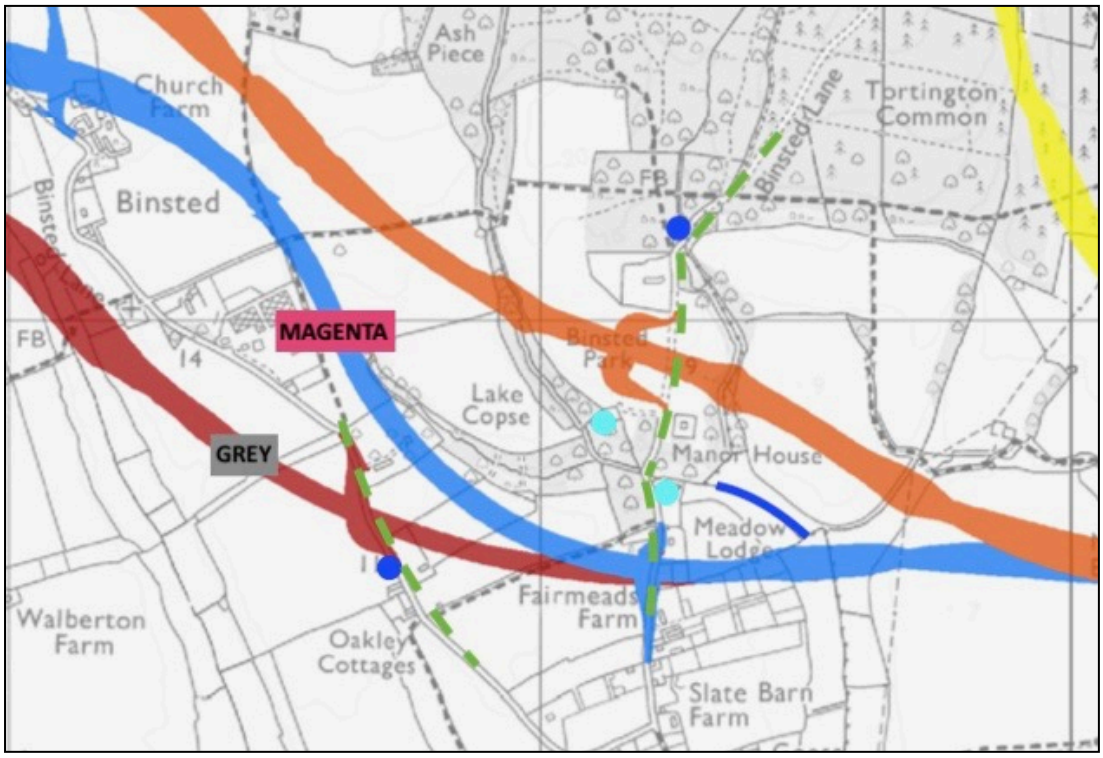
2.73 The reason for the inclusion as a UK BAP species (Species of Principle Importance) is the '*Serious decline demonstrated among many populations across large areas of S, E and C England where 50% or more of toad populations in rural areas have experienced recent declines (1985-2000) including extinction or near-extinction of some populations.'*

2.74 This document considers that wider action planning is necessary and states that '*This amphibian would benefit from recognition of its habitat and management needs at the wider landscape scale - both aquatic and terrestrial. Taking account of / or determining its presence during the early stages of local authority development plans, land allocation (particularly `brownfield sites`) and then development schemes. Habitat management schemes such as agri/env, highways schemes, and land management by public bodies could significantly enhance its current conservation status'.*

2.75 HE state that '*Common toads are a SPI and are widespread throughout the UK. They are considered to be of local importance'* (Para 8.6.4.104 EAR Chapter 8 Biodiversity). The continuing decline of Common Toad in the south and east is not mentioned.

2.76 HE did no surveys for this species despite the fact that there are three major Common Toad breeding sites are clustered in the area around the Grey, Magenta and Amber Options shown in Figure 9, together with two sites with lower numbers of Common Toads. HE, whilst undertaking Great Crested Newt surveys (Appendix 8.13), found toads in one of the woodland ponds to the north east of this area.

Figure 8: *Common Toad breeding ponds found by MAVES*



Dark blue areas – key breeding sites
Pale blue areas – water bodies with low numbers of toads seen
Green dashed areas – high numbers of toads on the lane

2.77 Toads are also found by the small woodland owners frequently and are known to be throughout much of the Binsted Woods Complex. The woodland floor comes alive during the breeding season as toads migrate towards the ponds. Common Toad is also found in gardens adjacent to Magenta e.g. Stable Cottage, Copperfield Cottage and Amber e.g. Kents Cottage.

2.78 Based on the Madonna Pond breeding population Paul Stevens, of the Arundel Wetland Centre, gave a 'conservative' estimate of a local population of 15,000. This was prior to the discovery of a large breeding site in the top of Tortington Rife and an additional major breeding site within a very large garden pond at Oakleys Barn (Grey Option) and so the population may well be higher.

2.79 Given the high population of breeding toads found to date in the western part of the survey area and the importance and connectivity of the terrestrial habitat within the Binsted Woods Complex, it may be that there are other important breeding sites for toads within the area, such as the potentially suitable ponds at Tortington and, to a lesser extent, some of the more suitable

ditches. If this were the case then there may be a large and important metapopulation of toads within the Mid Arun Valley.

2.80 It is clear from Figure 9 that this is a high and dispersed population of breeding toads. In order to access the various water bodies for breeding, toads will be moving in all directions through woodlands and across the landscape (including Binsted Lane). The Amber, Magenta and Grey Options pose significant barriers to dispersal and would result in extremely high mortality. Common Toad will also be moving through the entire woodland (based on records from small woodland owners) though the extent and density of movement in the eastern part of the Binsted Woods Complex is unknown.

OPERATIONAL EFFECTS

2.81 HE reports state that the Scheme is unlikely to have a significant adverse effect on Common Toads. It is stated that habitat can be created elsewhere in the form of ponds (and grassland).

2.82 The latest research by Froglife and the University of Zurich (Petrovan and Schmidt 2016) found that Common Toad has declined continuously in each decade since the 1980s. They conclude that given the declines, this species almost qualifies for International Union for the Conservation of Nature (IUCN) red-listing over this period (despite volunteer conservation efforts).

2.83 The Froglife and University of Zurich report states that declines could be linked to the general deterioration and fragmentation of the quality of the environment on a landscape scale and which cannot be offset by smaller improvements elsewhere, such as in well managed reserves.

2.84 Given the locations of the breeding ponds, the dispersed terrestrial habitat, and that Common Toad is very particular about where it breeds and habitually migrates to ancestral breeding ponds each year, there are likely to be on-going significant Adverse operational effects for this species.

REPTILES

2.85 All four species of ‘common’ reptiles have been recorded in the Mid Arun Valley. These species have all declined dramatically and are therefore given protection wherever they occur.

2.86 HE surveyors found 5 key reptile sites along the route options. These are denoted with green stars in Figure 9. The Key Reptile Site register is a mechanism designed by Froglife to promote the safeguard of important reptile sites. There are a number of criteria including and not limited to, for example, a site supporting 3+ reptile species; exceptional numbers of one species; 2 snake species etc.

2.87 The yellow stars in Figure 9 are additonal sites that MAVES consider to be likely candidates for additional Key Reptile Sites along the various options. The breakdown of species / numbers of each reptile at each site is given in Table 4.

Figure 9: *Key Reptile Sites (green stars) and potential Key Reptile Sites (yellow stars)*

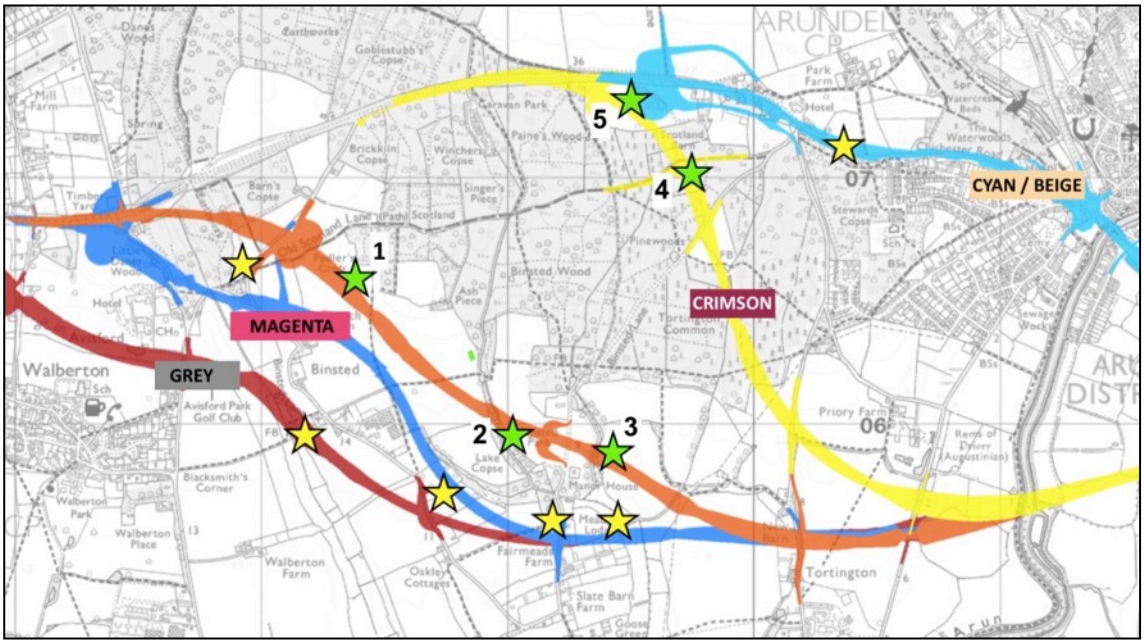


Table 4: *Numbers of reptiles found by HE surveyors at each location*

Species / location	1	2	3	4	5
Adder	0	4	0	0	0
Common Lizard	55	33	14	8	2
Grass Snake	1	17	12	5	2
Slow Worm	20	25	13	12	12

OPERATIONAL EFFECTS

2.88 HE state that scheme construction is unlikely to have a significant adverse residual effect on the conservation status of reptiles due to the ability to create habitat and translocate reptiles. It is also stated that if any of the off-line Scheme Options were used then mitigation measures would be required to restore connectivity (paragraphs 8.9.2.30-31 EAR Chapter 8).

2.89 Translocation may be suitable mitigation for Slow Worm and Common Lizard, both of which have relatively small home ranges; however no consideration has been given to the ranges of Grass Snake and Adder. These species are known to cover several kilometres in the course of an active season. They habitually travel between hibernation, foraging and breeding sites with Grass Snakes using communal traditional egg-laying sites year on year.

2.90 Adders are faithful to particular hibernation sites and will return from summer sites for the winter, tending to use communal hibernation dens, or hibernacula, with as many as several dozen snakes using an especially suitable site. Research has found that Adders will attempt to cross roads and are often killed doing so (Sherwood *et al*. 2002). Both these species have a relatively long life span of approximately 15 years.

2.91 Due to the size of the scheme and the range of Adder and Grass Snake and the high numbers of particularly Grass Snake found, even if these species are successfully removed from the

construction footprint, it is considered that there will be operational effects for these two species for the Crimson, Amber, Magenta and Grey Options.

3 ADDITIONAL IMPACTS

LANDSCAPE SCALE IMPACTS

3.1 Not-with-standing the long-term operational and residual impacts of the Scheme, in some cases it is feasible that there will be wider ranging impacts.

BATS

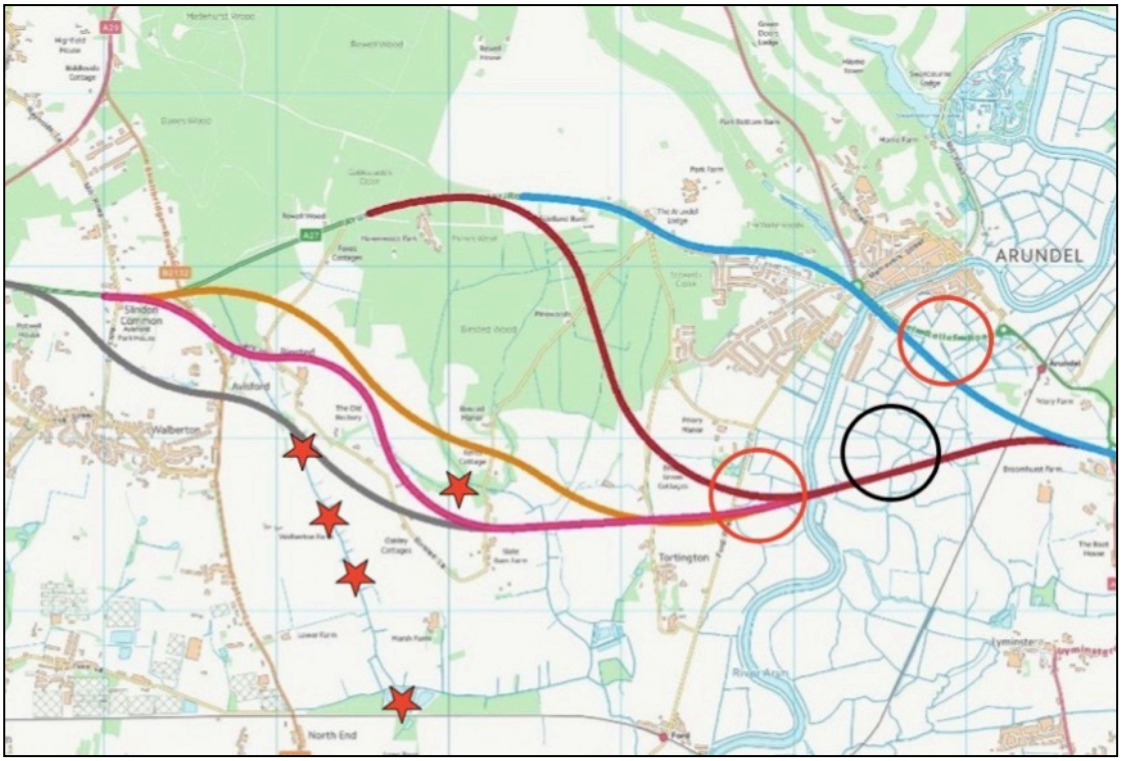
3.2 A review of the ordnance survey map of the area to the south of the current A27 shows much farmland but few pockets of woodland, and so the Binsted Woods Complex and its surrounds may be important for commuting bats from this wider landscape.

3.3 The four off-line scheme options would block a key commuting corridor to the south (Tortington Lane). The Amber, Magenta and Grey Options would, in effect, turn the Binsted Woods Complex (and its immediate surrounds) into an island isolating the area from bats in the greater landscape, who may depend on the resource.

WATER VOLE

3.4 Water Vole has been found throughout the Mid Arun Valley. The locations are shown in Figure 10 below with HE survey locations shown within circles (Appendix 8.19), with the black circle depicting the most field signs i.e. highest activity levels. MAVES findings are shown with stars – though these are 'ad hoc' sightings, as MAVES has not completed Water Vole surveys.

Figure 10: *HE and MAVES Water Vole signs and sightings*



3.5 HE surveyors concluded that the Field Survey Area should be viewed as a connected element in this wider wetland system and that there is abundant habitat to support both Water Vole and Otter.

3.6 A review of the relevant ordnance survey map shows that there is a corridor with a ditch and pond network potentially allowing movement of Water Vole from wetland areas in mid Sussex to as far as Chichester harbour without any significant barriers to dispersal.

3.7 HE state (EAR Chapter 8) that the highest impact will be across floodplain east of the Arun where watercourses are most likely to be culverted under the road. They state that this may impede Water Vole movement and cause severance of Water Vole populations on the Arun floodplain from a possible source population in the Arundel Wetlands Centre which may result in long-term decline.

3.8 Indeed, Water Vole Surveys in the late 1990's showed that this species had disappeared from the majority of the Arun Valley. In August 2005 171 animals were released at the Arundel Wetlands Centre site. These have dispersed far and wide since that time with wider Arun surveys showing that they had spread up and down stream. Studies by Dr Rowena Baker looking at genetic patterns showed that there were genes from the Arundel population as far as Amberley, where there were also genes from a population further North (likely Pulborough Brooks) mixing with the southern population.

3.9 This population is central to a large connected area of Water Vole habitat extending from Mid Sussex to the coasts at Climping Gap and at Chichester. As a result, fragmentation, leading to possible local extinctions and, more importantly impacting upon dispersal, could impact on the conservation status of this species over a far wider area.

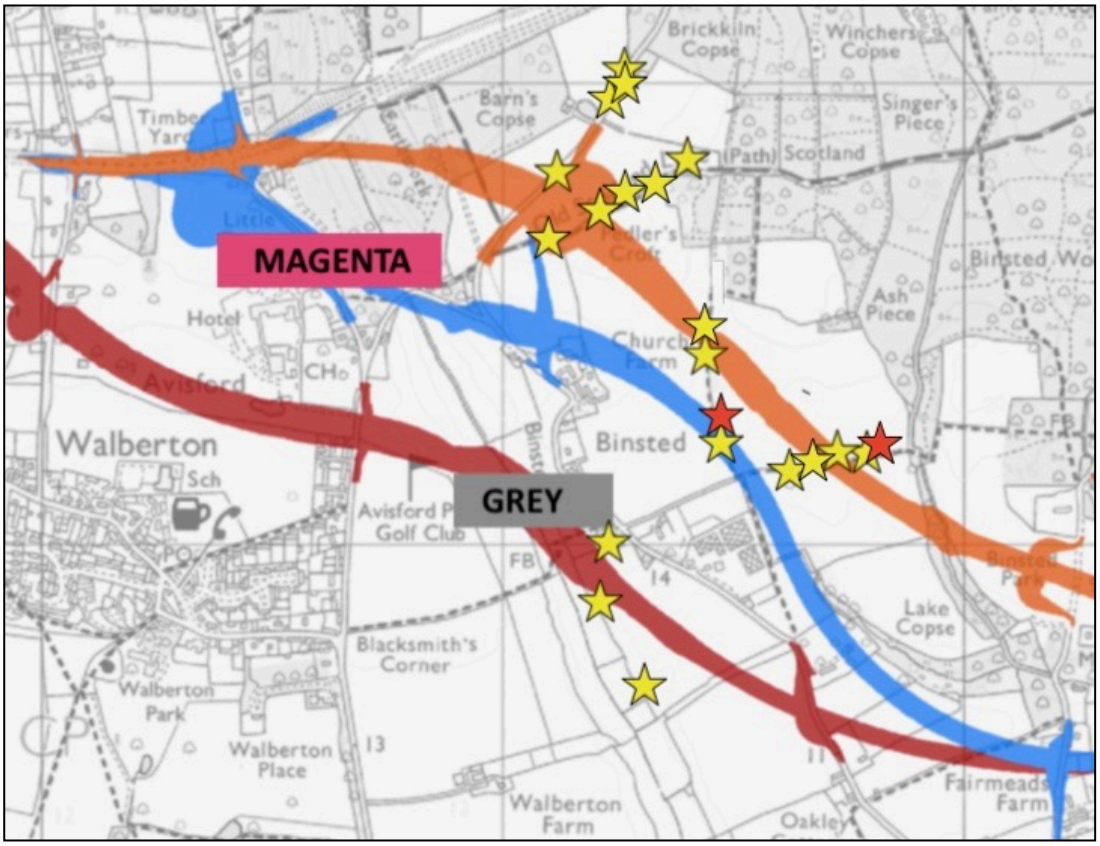
HAZEL DORMOUSE

3.10 The HE surveyors report (Appendix 8.14) states that '*The area west of the River Arun offers a very large area of high quality habitat occupied by hazel dormouse. It is possible that this hazel dormouse population may represent a core population, which may support smaller, more isolated sub-populations in the wider Desk Study Area. Such small populations which are vulnerable to extinction owing to factors such as weather, changes in habitat management or predation, have the possibility of being recolonised as they are directly connected to the population centred on the Field Survey Area*'.

3.11 MAVES have set up a corridor survey along several hedgerows radiating from the north west part of the Binsted Woods Complex. These have been checked four times in 2019 and on two occasions Dormice have been found. In addition, many Dormouse nests have been found extending along these corridors and down towards Binsted Rife (shown in Figure 11) showing constant and active dispersal from the woodland block.

3.12 The coastal plain to the south of the Binsted Wood Complex has few areas of woodland. However there are a number of copses and there is good connectivity with old hedgerows, and shaws. The population within the Mid Arun Valley is likely to be dispersing across the landscape.

Figure 11: *Dormouse dispersal corridors*



Yellow stars – Dormouse nests; red stars Dormice

3.13 Dormice have declined in both distribution and abundance in the 20th Century as a result of woodland loss and habitat fragmentation. The low population density of Dormice and its extremely slow rate of population increase make the Dormouse highly vulnerable to any change in its environment.

3.14 The impact of unseasonably wet and warm winters on the local population has been witnessed first hand through the National Dormouse Monitoring Programme within the Binsted Wood Complex. There have been high fluctuations in numbers year on year with a lack of breeding in the summer, producing litters into October and nest building in January, at times when sufficient food sources for successful breeding will be lacking.

3.15 The impact of roads on Dormouse is still not fully understood with some studies stating that this species will cross roads of up to 12 m including verges (Chanin and Gubert 2012) and others saying that wider roads are crossed but with high mortality. However, the impact of increased fragmentation coupled with the impacts of the changing climate seen locally is likely to be detrimental to this species.

BARRIERS AND FRAGMENTATION

3.16 HE has already implied that the Crimson Option would likely drive the woodland Hedgehog population to extinction in the Binsted Woods Complex. There is a realsitic possibility that, within a backdrop of climate change resulting in hightly unpredictable seasonal fluctuations in

temperature and rainfall, other species with relatively small or dispersed populations may decline over time and eventually become locally extinct.

3.17 The Cyan and Beige Options would result in the creation of approximately 1.7 km of new road over countryside, **and not the 4.5 km implied by HE in the consultation document**. This would result in one small area of floodplain grassland being trapped between two roads.

3.18 The Crimson route would create two fragmented areas of floodplain grassland: one to the east of the Arun and one to the west of the Arun. It would also divide the Binsted Woods Complex into two and cause a barrier to dispersal.

3.19 The Amber Option would create two fragmented areas of floodplain grassland: one to the east of the Arun and one to the west. It would divide the Binsted Woods Complex in two areas leaving two fragments of woodland: one at Hundred House Copse and one at Lake Copse, the Shaw and the Lag. The majority of the Binsted Woods Complex would become an 'island' separated from the remaining landscape and sandwiched between two busy roads.

3.20 The Magenta Option would create two fragmented areas of floodplain grassland: one to the east of the Arun and one to the west. It would create a tiny fragment of woodland at Barns Copse. It would turn the Binsted Woods Complex into an 'island' largely isolated between two busy roads and separated from the remaining landscape.

3.21 The Grey Option would create two fragmented areas of floodplain grassland: one to the east of the Arun and one to the west. It would turn the Binsted Woods Complex and its immediate area into an 'island' largely isolated between two busy roads and separated from the remaining landscape.

3.22 In additional the Crimson, Amber, Magenta and Grey Options would involve the creation of a new barrier across 6 km to 8 km of unspoilt countryside with a proven extremely high diversity and value of habitats and species.

3.23 Barriers may also limit the flow of individuals between populations with two major consequences. Barriers may slow or halt the recovery from local population declines since recruitment from neighbouring populations will be reduced and this will further increase the probability of local extinction. Barriers may also reduce gene flow between populations and increase inbreeding, reducing individual fitness and increasing the risk of local extinction. Gerlach & Musolf (2000) have shown that populations of bank vole are genetically different either side of a four-lane highway.

3.24 Species such as Brown Hare cannot survive in habitat fragments as they require wide open agricultural land to survive. It is well known that, for this reason, the density of busy roads has a negative effect on Brown Hare abundance (e.g. Roedenbeck, & Voser 2008). Other species as discussed in this report (i.e. Badger, toads, Hedgehog, reptiles and bats) will either be trapped in smaller areas of habitat or will be susceptible to (likely) fatal collisions if they try to move about the landscape. Other species such as Dormouse and Water Vole may not use structures provided for crossing or may be open to higher levels of predation whilst using such structures.

3.25 Habitat fragmentation is constantly cited as being one of the major threats to species. The first comprehensive review of the status of British mammal populations for over 20 years was

published in June 2018 (Mathews et al. 2018). This was to assess the trends in population status of mammals since 1995.

3.26 A number of species discussed in this report are found in the Mid Arun Valley: Dormouse (IUCN Red List Vulnerable), Hedgehog (IUCN Red List Vulnerable), Water Vole (IUCN Red List Endangered) and Harvest Mouse are all declining. The status of Serotine bat (IUCN Red List Vulnerable), Bechsteins bat and Barbastelle bat (IUCN Red List Vulnerable) is unknown but their habitats were found to be declining. The status of the Brown Hare was said to be currently stable although its habitat is declining.

3.27 The authors of the review conclude that '*The scale and nature of the impact associated with many potential future threats (e.g., major infrastructure developments; new housing allocations; increased traffic volume; and changes to farming practice in the face of climate change and altered subsidy scenarios) are extremely poorly characterised, and many of the approaches currently used to monitor them are not suitable for answering these questions. Almost nothing is known about the cumulative effects of such threats, with the loss of foraging habitat, decreased habitat connectivity, and increased light pollution being of particular concern. Most mitigation activities lack a robust evidence base, meaning that resource may be wasted on ineffective actions'.*

3.28 Should an off-line Option be decided upon for the A27, then these threats become reality within the Mid Arun Valley.

EROSION OF BIODIVERSITY

3.29 The Mid Arun Valley is a farmed landscape that has retained its high biodiversity and species richness due to the mosaic of habitats that intersperse the farmed area. The habitats are given in Table 5.

3.30 A number of these habitats are small and / or fragmented such as the coastal saltmarsh, lowland fen (intermixed with swamp, reedbed and grassland) and the traditional orchards. Two ponds (so far) are considered to be Habitats of Principle Importance due to their high populations of breeding toads (one of the selection criteria for pond HPI).

3.31 Moreover, as a consequence of the quality of these habitats which are found throughout the Mid Arun Valley Survey Area, large populations of protected, rare and declining species can be found. The main groups are shown in Table 6 below, though this does not capture the diversity and numbers of species found.

3.32 The consultation brochure fails to capture the biodiversity and status of these species. A standard list of protected species is given, but at no point does it mention that the bats have been assessed at national if not international importance, or that the invertebrates are of regional importance or that Water Vole, Common Toad, Dormouse etc. are all represented well in Arundel but declining nationally etc. **The majority of the public have no idea of such things and cannot place a considered opinion wihout the facts being more transparent**.

Table 5: *Mid Arun Valley habitats and importance*

Habitat	Importance	Comment
Ancient woodland HPI	National	Large area – high numbers of AWI and some rare plant species
Deciduous woodland HPI	National	Integrated with ancient woodland
Wet woodland HPI	National	3 areas – uncommon community in one area
Wood pasture / parkland HPI	National	2 areas
Veteran Trees (HPI)	National	Throughout area
Hedgerows & ancient shaws HPI	County	Radiating from woodland edges – many notable / veteran trees. Species rich verges.
Traditional Orchard HPI	County	2 orchards
Coastal / floodplain grazing marsh HPI	County	Large area
Reedbed HPI	County (in association with grazing marsh)	Throughout area in corridors along ditches – supports some less common species. Largest area is near bridge if built
Lowland Fen HPI	County (in association with grazing marsh)	Binsted Rife in a mosaic with other habitat types – some rare plant species on the SxRSI
River corridor HPI	County	Modified - some rare plant species
Chalk stream HPI (included with river)	County	Binsted Rife
Coastal saltmarsh HPI	Local	Fragments (one RDB species)
Arable Field Margins HPI	Local	Throughout area (three fields with a noteworthy diversity of Important Arable Plant Indicator Species – 4 RDB species).
Pond HPI	Local	High numbers of breeding toads

Table 6: Mid Arun Valley species / groups and importance

Species / group	Importance	Comment
Bats	National / international importance	Strong population with rare species
Invertebrates- terrestrial	Regional	Very high diversity including many rare / declining species
Dormice	County	Strong population (declining Nationally)
Reptiles	County	Many key reptile sites
Water Vole	County	Relatively strong population (declining Nationally)
Woodland birds	County	Many protected and declining species
Common Toad	County / local	High population / possibly metapopulation (declining Nationally)
Aquatic fish / invertebrates	County / local	Many pollution tolerant species / a few rare
Notable plants	County / local	Scattered throughout the area
Badger	Local	Extremely high population
Harvest Mouse	Local	Stable population (declining Nationally)
Hedgehog	Local	Stable population (declining Nationally)
Birds	Local	Many protected species

3.33 In addition to the obvious impacts of a major new carriageway that will erode biodiversity (i.e. direct mortalty from collisions, fragmentation, lack of ability to disperse with wider implications etc.) there are many hidden impacts that have not really been touched upon in the HE reports such as the impact of a fast road on birds.

BIRDS AND ROADS

3.34 HE surveys concluded that the following broad bird communities are present in the area: urban fringe and common garden species; woodland specialist; mosaic and scrub habitat; farmland specialist; raptors; and waterbirds (Appendix 8.10). The groups with the highest number of notable species are the waterbirds, the mosaic and scrub species and the farmland species.

3.35 HE surveys found 20 waterbird species within the Field Survey Area, 12 of which are considered notable (i.e. BoCC Red / Amber list, NERC S41, Schedule 1).

3.36 HE surveyors recorded 13 farmland birds, 9 of which are notable including the Corn Bunting (BoCC Red and NERC S41 (SPI)), Linnet (BoCC Red and NERC S41 (SPI)) and Mistle Thrush (BoCC Red). There are 14 mosaic and scrub species which include seven notable birds including three species associated with wet ditches: Cetti's Warbler (WaCA Schedule 1), Reed Bunting (BoCC Amber listed and NERC S41 (SPI)) and Cuckoo (BoCC Red listed and NERC S41 (SPI)). The Cuckoo is frequently recorded (by MAVES) along Binsted Rife, where it is thought to lay its eggs in the nests of Reed Warblers.

3.37 HE surveyors found 92 species of wintering birds (EAR, Appendix 8.11), which was attributed to the variety of habitat types present and the interconnected landscape. This includes 6 Annex 1 species: Kingfisher, Little Egret, Marsh Harrier, Peregrine, Red Kite, Short-eared Owl, which have been recorded on the Arun floodplain and the surrounding fields. The high number of raptors (also including Kestrel, Buzzard and Hobby) demonstrates a healthy environment with plenty of prey for these species.

3.38 The wintering birds survey (Appendix 8.11, para 4.1.1.8) mentions a hedgerow adjoining the Arun as being an important commuting route for passerines, though unfortunately the stated reference to the hedgerow is not in the report.

3.39 The greatest impact on individual species are likely to be on Barn Owl and Mute Swan. Mute Swan has a low flight, a long and low take off run and is slow to manoeuvre. There are reports of collisions on the existing bridge and this will likely increase should an additional bridge cross the river.

3.40 A major carriageway through the area will have a significant ‘hidden’ impact (i.e. not included in the mitigation for direct habitat loss etc.) on the species present. A 5-year research programme at Harvard University (Forman *et al*. 2002) concluded that birds might be strongly affected by traffic volume or changes in volume. With traffic of 15,000–30,000 cars per day (a two-lane highway), both bird presence and breeding were decreased for a distance of 700 m. A heavy traffic volume of ≥ 30,000 vehicles / day saw bird presence and breeding reduced for a distance of 1200 m from a road. This is due to factors such as a bird calling for a mate cannot be heard over the traffic noise, nor can a predator approaching.

3.41 This is a significant loss of useful area when considering the Crimson, Magenta, Amber and Grey Options which would entail between 6 km and 8 km of new road (as compared to approximately 1.7 km of new road with the Beige / Cyan Options).

3.42 The loss of breeding and wintering passerines will have a knock-on effect on raptors, and other predators (bird and mammal) as the prey density is reduced.

INVERTEBRATES

3.43 A recent literature review (Muñoz et al. 2015) found there to be high invertebrate mortality of some groups when crossing the road, with more impact at higher traffic volumes. They also found the unwillingness of many species to cross a road or live close to it. Roads were found to be major barriers for small or flightless species, though the response was variable for flying species. Moreover, both experimental and observational evidence support the idea that air pollutants and de-icing salt used for the road maintenance negatively affect insects.

3.44 Again, a decrease in the number of invertebrates would have repercussions through the trophic levels for a wide range of predators from birds to mammals and constitute part of a gradual erosion of species numbers and species diversity in the Mid Arun Valley.

SUMMARY

3.45 It has been demonstrated that the impact of roads on wildlife includes mortality from vehicle collisions, habitat destruction, habitat fragmentation and barrier effects. Other impacts include edge effects and habitat degradation or disturbance from light, noise and chemical pollution (not discussed in this report). Studies have shown that these impacts are not immediately obvious with multiple effects usually being cumulative in the long term and resulting in a gradual erosion of biodiversity (i.e.Balkenhol & Waits 2009).

3.46 The impact of many of these effects is very difficult to quantify and so they are largely ignored and not considered within mitigation. These ‘background’ impacts are largely invisible, but very real.

3.47 Mitigation attempts to lessen the degree of the more visible negative impacts, but there is a dearth of conclusive evidence to its efficacy.

MITIGATION AND COMPENSATION

3.48 There are a number of inevitable problems with mitigation – some of which have been touched upon in the HE EAR report. The main aims of mitigation are to compensate for habitat lost by creating habitat elsewhere, to translocate impacted species to newly created suitable habitat and to put structures in place that would aid the safe crossing of the road.

3.49 HE have stated that appropriate mitigation measures will be required to adequately mitigate the impact of habitat severance on protected species. These measures include the provision of wildlife crossing structures, underpasses and tunnels.

3.50 HE acknowledge shortcomings of crossing structures and state (HE EAR Chapter 8 para 8.8.3.13) that ‘*Although bats and hazel dormouse have been shown to use wildlife crossing structures evidence on the efficacy of such structures is not available and thus the mitigation technique should be viewed as partly experimental*’. This is unsatisfactory when there is a

nationally (possibly internationally population of bats and a large population of Dormice depending on habitat connectivity.

3.51 Likewise, there is virtually no evidence that species such as Grass Snake and Harvest Mouse would use enabling structures. They require continuity of habitat in order to move across a landscape.

3.52 In past schemes HE have used bat gantries (wood, metal and mesh structures) for bat crossings, as they are a far cheaper option to green bridges. Anna Berthinussen and John Altringham (2012) investigated whether bat gantries were effective. They found these to be ineffective and used by a very small proportion of bats, even up to nine years after construction. They reported that bats near gantries crossed roads along severed, pre-construction commuting routes at heights that put them in the path of vehicles.

3.53 A replicated study in 2014 at two bat gantries over a road in the UK (Berthinussen & Altringham 2015) found that one bat gantry was used by 3% of crossings bats and another was not used at all. At one gantry, significantly fewer bats used the bat gantry (3%, 1 of 35 bats) than crossed the road below at traffic height (80%, 28 of 35 bats). At the other gantry, no bats used the bat gantry to cross the road, but 4 bats crossed the road below at traffic height.

3.54 The report states that for the range of other species in the area it may be necessary to construct multiple mitigation structures to ensure species are able to cross the scheme without being exposed to collisions with vehicles or to replace severed movement paths. Yet this is despite inconclusive evidence to the efficacy of such structures. Moreover, each hedgerow is a severed corridor but some species, such as toads and Brown Hare, do not use such corridors.

3.55 Research has shown that other structures such as tunnels and underpasses are not effective unless they are combined with mammal fencing in order to stop mammals crossing the road anywhere. The fact that the report states that Hedgehog mortality will be unsustainable (EAR Chapter 8 para 8.9.2.38) on one hand and then states that there will be wildlife fencing to direct animals to designated crossings structures to minimise road mortality (EAR Chapter 8, para 8.8.3.18) is inconsistent. It also implies that fencing will only be close to crossing structures.

3.56 Comments in the report such as (regarding birds) '*there are ample areas outside the Scheme that will not be affected'* are worrying as most such areas (for breeding birds) are at carrying capacity (limited by suitable nest sites). In addition it is stated that if implementation measures to mitigate noise and vibration don't bring it down to an acceptable level then new habitat will be created. Such things are extremely hard to measure / quantify.

3.57 There is no guarantee that mitigation measures in the form of translocation or habitat creation will work or be maintained etc. Such measures are only as good as the sub-contractor undertaking the work and are surrounded by uncertainty i.e. pond maintenance, succession, vandalism (owl boxes) etc.

3.58 For example, the A6 Alvaston Improvement mitigation underestimated the size of the Great Crested Newt population and so the mitigation ponds were too small and also unsuitably designed so failed to hold water at critical times. After re-lining they became choked with vegetation due to a lack of maintenance. The population fell from approximately 300 to less than 10 after a second pond relining attempt (Sloman *et al.* 2017).

3.59 This highlights a number of the issues with mitigation as follows:

- Lack of methods to estimate actual population sizes – therefore the underestimation of potentially important populaitons.
- Mitigation design – limited by the ability of the subcontractor to design appropriate strctures and habitats.
- The limitations of artificial structures – pond linings leak, bat and bird boxes may be open to vandalism etc.
- The finite lifespan of artificial structures.

3.60 The points above only touch upon some of the problems with mitigation; there are many more not mentioned here.

BIODIVERSITY COMPENSATION

3.61 Biodiversity offsets are a form of compensation which may be considered when a scheme such as the A27 Arundel bypass is expected to have significant residual impacts on biodiversity despite planned mitigation measures.

3.62 The delivery of such compensation measures, including biodiversity offsets, is likely to involve access to land, or land purchase, outside the Scheme footprint and a commitment to long-term management through legal agreements. They therefore require early consideration in project design. However, none of this is clear in the documents.

3.63 As with the direct mitigation, the same potential problems with being able to achieve satisfactory results that would conclude in a net biodiversity gains for the project apply.

3.64 The mixed assemblage of habitats required to sustain the impacted biodiversity will not feasibly be replicated in another area which lacks the specifics e.g. geology, geography, hydrology and ancientness of this area.

4 REVISITING THE HIGHWAYS ENGLAND ASSESSMENT

4.1 Having reviewed the latest current information available regarding the proposed A27 Scheme, it is clear that there are three main things to consider:

1. The residual impact of the Scheme i.e. the environmental cost that cannot be compenstated.

2. The operational impact of the Scheme i.e. the on-going impact on species and habitats that are within the area.

3. The hidden costs of the Scheme i.e. those that will gradually erode the current species richness around the Scheme Options due to factors such as fragmentation, collisions, predator-prey relationships and inbreeding.

4.2 The revised significant ecological residual effects i.e. the environmental ‘costs’ of the project that cannot be compensated are shown in Table 7 below. The ancient and deciduous woodland, as integral, have been included within the Rewell Woods Complex and the Binsted Woods Complex in order to save duplicating the woodland habitat.

4.3 These significant residual effects include woodlands, wood pasture, unimproved grassland, veteran trees and traditional orchard that were not stated in the HE EAR as being residual effects, but clearly they are.

4.4 Significance levels are mostly those allocated by HE, but the following have been altered:

- The impact on Hedgehog has been extended to the Magenta, Amber and Grey Options.

- Other mammals known to be in the area, i.e. Harvest Mouse and Brown Hare, have been included (together) in the residual effects as it is unlikely and / or unproven that they will be able to move across the landscape and may succumb to impacts caused by isolation, fragmentation etc. discussed in Section 3 of this report.

- Grazing marsh, reedbed and fen is considered to be Very Large Adverse rather than Large Adverse for Options that are also likely to impact on the hydrology / pollution status of the Binsted Rife chalk stream.

4.5 No attempt has been made to change other significance levels awarded that cannot be realistically quantified at this time i.e. veteran trees and dead wood habitat along various Options for the saproxylic invertebrates.

4.6 The significance values have been colour coded to ease interpretation from red as the most significant to pale yellow. Neutral effects are left blank.

Table 7: The probable ecological residual significant effects

Ecological Feature	1V5 / 1V9 Cyan/Beige	3V1 Crimson	4/5AV1 Magenta	4/5AV2 Amber	5BV1 Grey
Rewell Woods Complex	Large Adverse	Large Adverse	Neutral	Neutral	Neutral
Binsted Woods Complex	Large Adverse	Very Large Adverse	Large Adverse	Very Large Adverse	Neutral
Avisford Road Verge LWS (unimproved grassland)	Neutral	Neutral	Slight Adverse	Slight Adverse	Slight Adverse
Wood Pasture	Moderate Adverse	Neutral	Neutral	Very Large Adverse	Neutral
Veteran trees	Very Large Adverse	Neutral	Very Large Adverse	Very Large Adverse	Very Large Adverse
Traditional Orchard	Neutral	Neutral	Neutral	Neutral	Neutral
Bats	Moderate Adverse	Very Large Adverse	Large Adverse	Very Large Adverse	Moderate Adverse
Barn Owl	Neutral	Neutral	Moderate Adverse	Moderate Adverse	Moderate Adverse
Hedgehog	Neutral	Slight Adverse	Slight Adverse	Slight Adverse	Slight Adverse
Other mammals – Harvest Mouse, Brown Hare	Neutral	Slight Adverse	Slight Adverse	Slight Adverse	Slight Adverse
Hazel Dormouse	Moderate Adverse	Large Adverse	Moderate Adverse	Large Adverse	Moderate Adverse
Water Vole	Neutral	Moderate Adverse	Moderate Adverse	Moderate Adverse	Moderate Adverse
Woodland birds	Slight Adverse	Large Adverse	Slight Adverse	Moderate Adverse	Neutral
Woodland invertebrates	Moderate Adverse	Very Large Adverse	Slight Adverse	Very Large Adverse	Slight Adverse
Notable plants	Moderate Adverse	Large Adverse	Large Adverse	Large Adverse	Large Adverse
Grazing marsh/reedbed/fen	Moderate Adverse	Large Adverse	Very Large Adverse	Very Large Adverse	Very Large Adverse

4.7 Given such factors as have been revealed in surveys about the high population densities of species, key breeding sites, the logic applied by HE to some species and not others and the movement of species across the landscape, the revised operational effects table shown in Table 8 is more realistic.

4.8 More mobile species such as Common Toad, reptiles (Grass Snake and Adder), Badger and Hedgehog have been added to the operational effects as these are highly mobile species and will continue to suffer road kills as long as the road is in operation. There is no guarantee that translocations will be successful and so the impact around the Scheme must be included.

4.9 Though population levels will inevitably decline for all these species, possibly significantly (i.e. toads and Badger), it is unlikely that Badger, Common Toad and Grass Snake will suffer local extinctions, although Adder and Hedgehog may. Local extinctions of other notable / Red List species with small populations have the potential to occur in the long term as a result of the ecological severance of a new offline dual carriageway.

4.10 The greatest impact for all mobile species, would be the off-line Options, as they sever the landscape interrupting the movement patterns of many species.

Table 8: Significant operational effects of the proposed route Options

Ecological Feature	1V5 / 1V9 Cyan / Beige	3V1 Crimson	4/5AV1 Magenta	4/5AV2 Amber	5BV1 Grey
Binsted Woods Complex	Neutral	Large Adverse	Neutral	Large Adverse	Neutral
Badger	Neutral	Slight Adverse	Slight Adverse	Slight Adverse	Slight Adverse
Bats	Moderate Adverse	Very Large Adverse	Large Adverse	Very Large Adverse	Moderate Adverse
Barn Owl	Neutral	Neutral	Moderate Adverse	Moderate Adverse	Moderate Adverse
Common Toad	Neutral	Slight Adverse	Slight Adverse	Slight Adverse	Slight Adverse
Hedgehog	Neutral	Slight Adverse	Slight Adverse	Slight Adverse	Slight Adverse
Reptiles (Grass Snake and Adder)	Neutral	Moderate Adverse	Moderate Adverse	Moderate Adverse	Moderate Adverse

4.11 The information in the above tables should have been made clear for the public consultation. These are the impacts of the various Scheme Options that will persist into the future and contribute to the gradual degradation and erosion of habitats and biodiversity around Arundel with further reaching impacts in some groups.

5 CONCLUSIONS

THE ENVIRONMENTAL ASSESSMENT REPORT

5.1 Planning Practice Guidance (PPG) states that

> '*The purpose of EIA is to protect the environment by ensuring that the local planning authority when deciding whether to grant planning permission for a project, which is likely to have significant effects on the environment, does so in the full knowledge of the likely significant effects, and takes this into account in the decision making process.'*

And that

> '*The aim of Environmental Impact Assessment is also to ensure that the public are given early and effective opportunities to participate in the decision making procedures.'*

5.2 The 2019 HE EAR is long, complex and unclear in places. Some elements have not been or only partially been taken into account. The connectively of ecological networks has only been partially considered, and there is no proper consideration for mobile species that make regular movements to, from, or across the site. As a result, some of the significant effects of the various Scheme Options are misguided.

5.3 Some of the necessary information is buried within the text with just the construction and operation effects tabulated. The residual effects are unclear and not tabulated.

5.4 The mitigation, although at a preliminary stage, is ambiguous in places. Moreover, each residual effect should be set out clearly with outline proposed compensation for that feature.

5.5 Unlike the 2017 EAR there is no conclusion or a clear summary. The 2017 EAR conclusion includes the following paragraphs:

> '*This assessment has identified adverse residual ecological effects which are likely to arise from each of the Scheme Options. For the majority of designated sites, habitat and species, Option 1 is likely to have the least potential for ecological impacts of the Scheme Options.*
>
> *Option 3 and Option 5A are likely to generate numerous significant adverse, residual ecological impacts. Comparing Option 3 to Option 5A - Option 3 has the greater ecological impact, particularly in respect of Ancient Woodland, the woodland bat assemblage and hazel dormouse. Option 5A would still significantly impact all of these features, albeit to a lower degree. Option 5A is more damaging that Option 3 in the context of impacts on Wood Pasture and Parkland HPI, Ancient/Veteran trees, Coastal and Floodplain Grazing Marsh HPI and a range of species groups including farmland birds, amphibians, water vole and notable mammal species'*.

5.6 A conclusion aids the reader's understanding of a complex document, however, the level of clarity with a clear conclusive summary has not been demonstrated for the current consultation.

THE CONSULTATION PAMPHLET

5.7 The information given in the public consultation pamphlet has been drawn from two tables in the EAR: the construction impacts and the operational impacts. This gives the reader the misguided impression that there will be little lasting impact on wildlife within the Mid Arun Valley area with the exception of bats and Barn Owl.

5.8 The residual impacts are key to understanding the environmental cost of a Scheme, yet these are not mentioned in the 2019 EAR (unlike the 2017 EAR). If there is one thing that is likely to influence a consultee's choice of which option to prefer, it would be a clear understanding of what would be permanently lost and impacted.

5.9 The cumulative value of the site with a high representation of species in decline, the important habitat connectivity, the rich assemblage of species and rich assemblage of habitats has not been conveyed.

5.10 The woodland calculations for the Cyan and Beige Options appear to have been miscalculated (Paragraph 2.10).

5.11 The bulleted summaries state that the Cyan and Beige Options would feature 4.5 km of new dual carriageway as opposed to 7.2 km, 6.9 km or 8 km for the Magenta, Amber and Grey options respectively. This sounds broadly similar, **however if it was pointed out that the Beige and Cyan Options require an approximate 1.7 km stretch of entirely new road, with the remainder (2.8 km) being upgraded from the existing road, it presents a whole different scenario**.

5.12 The Grey Option, for example, would require nearly 5 times the length of entirely new road to be laid across unspoiled countryside compared with the Cyan and Beige Options..

5.13 Based on the information given in the consultation pamphlet, the reader would find it very difficult to understand the extent, richness and diversity of the wildlife and to usefully decipher which Options would be more damaging.

LEGISLATION

5.14 The legislation and policy framework is extensive with European directives feeding into national policies, which in turn feed into the National Planning Policy Framework. Yet, much of this legislation stipulates that biodiversity must not be reduced at the *national* level, or that a particular scheme or development must show *net gains* in biodiversity.

5.15 Such legislation provides for the translocation of species to other areas, and often, the monitoring is for a limited time only. The protection of areas with important assemblages of species, with the exception of statutory and non-statutory sites, is not considered.

SUMMARY

5.16 Within the Mid Arun Valley, the natural habitats and landscape as at present managed, support rich biodiversity, including thriving bird communities, a large and stable Dormouse population, thousands of breeding toads, key reptile sites, a nationally important bat assemblage and several important invertebrate communities. These communities have persisted for millennia, despite a changing world. Mitigation and compensation (that may be maintained for 25 years

and monitored for fewer years) are unlikely to result in net biodiversity gains for such a rich and largely interdependent assemblage.

5.17 The current Scheme is being proposed against a backdrop of continual species declines in the face of yet another factor - climate change - resulting in a layer of unpredictability (i.e. ponds drying, cold snaps, localised flooding, lack of availability of prey source at critical times etc.).

5.18 The numerous impacts mentioned in this report should not be used, as with other schemes, as a way of navigating the system in order to achieve an expensive and environmentally unsound infrastructure outcome come what may. If this were the case then the accumulation of information by HE would amount to nothing more than a ‘box-ticking’ exercise as with many other schemes.

5.19 The numerous impacts should be used as a way to navigate to the least damaging Option for Arundel and its rich assemblage of wildlife, which, evaluating the operational and residual effects is the Cyan or Beige Option.

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Document Information

Wildlife Splash Limited has prepared this report, with all reasonable skill, care and diligence within the terms of the Contract with the client.

Surveys and research have been conducted to the best of our ability during the given timeframe. However, no method can completely eliminate the possibility of obtaining partially imprecise or incomplete information. We disclaim any responsibility to the client and others in respect of any matters outside the reasonable scope of works.

This report is confidential to the client and we accept no responsibility of whatsoever nature to third parties to whom this report, or any part thereof, is made known. Any such party relies on the report at their own risk.

ACKNOWLEDGEMENTS

The wealth of wildlife within the Mid Arun Valley has astounded the Highways England contracted surveyors with comments such as ‘I cannot believe how much is here’ and ‘I have never had to survey such a diverse site’ and ‘every time I turn round there is something else to record’. Unfortunately, personal feelings of awe and wonder are not allowed to creep into standard reports, and if they do, they are edited out.

MAVES surveys, work and talks have continued throughout 2019 and we still marvel at the dancing butterflies, basking lizards, dozing Dormice and birdsong ringing in our ears.

We would like to give immense thanks to those who have undertaken surveys in 2019 – Nathalie Guerin, Caroline Powell, Alison Barker and Chris Drake and his team of volunteers.

The core team at MAVES, particularly Mike and Emma Tristram, Julia Plumstead and Ian Powell continue to inform, educate and encourage with their website, talks, community projects, help and advice.

A special thank-you to Ian Powell and Andrew Davies for securing funding and setting up the Dormouse project with Ford Prison. This is a ‘win win’ situation for Dormice, for Ford inmates and for the help it gives to woodland owners, who, like Lyn Glanz, care passionately about the life in the woodlands under their stewardship.

As ever, many thanks to all the residents, locals and walkers who have contributed the 2018 and 2019 data including Lyn Southgate, Mike and Emma Tristram, Julie and Tony Upson, Lyn Glanz, Maggie Alexander, Sarah Hughes, Julia Plumstead, Paul Stevens, Vicky Clancy, Simon Mockford, Bill and Gilly Treves and Ben Knight from the Ratpack Archers.

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Finally, thank-you to all the landowners of the Mid Arun Valley area who have given us all a free reign over the area night and day.

We would like to express our thanks to all our speakers who have generously given up their time to lead informative walks and support our series of Talks: Richard Williamson, Dr Geoff Mead, Mike Edwards, Dr Dawn Scott, Jane Wilmott, Dr Tony Whitbread, Laurie Jackson, Mike Russell, Michael Blencowe, Nick & Liz Sturt and Frances Abraham, Neil Hulme BEM, Mick Jenner.

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South Downs National Park Authority
Brooklands
Woodlands.co.uk
Noor Wood
The Woodland Owners of Tortington Common
Arundel Agenda 21
Walberton History Group
HMP Ford