

Bexhill to Hastings Link Road

Chapter 12: Nature Conservation and Biodiversity

East Sussex County Council
County Hall
St Anne's Crescent
Lewes
East Sussex

List of Contents

Page

Volume 1

12.1	Introduction	1
12.2	Method of Assessment.....	1
12.3	Existing Conditions.....	17
12.4	Mitigation and Compensation Strategy	66
12.5	Construction Impacts.....	92
12.6	Operational Impacts	101
12.7	Conclusions.....	117

Volume 2

Appendix 12-A	Designated Sites
Appendix 12-B	Protected and Uncommon Species
Appendix 12-C	Habitats and Plant Communities
Appendix 12-D	Mammals
Appendix 12-E	Birds
Appendix 12-F	Reptiles
Appendix 12-G	Amphibians
Appendix 12-H	Fish and Crayfish
Appendix 12-I	Invertebrates
Appendix 12-J	Summary Management Prescriptions

Volume 3

Figure 12.1A-B	Principal Features of the Study Area
Figure 12.1C	Vegetation Zones in the Combe Haven Valley
Figure 12.2A-D	Habitats Present and Habitats Lost in the Urban Section
Figure 12.3A-F	Habitats Present and Habitats Lost in the Rural Section
Figure 12.4	The Linear Habitat Network
Figure 12.5	Bat Roosting Sites and Pattern of Bat Activity
Figure 12.6	Dormouse Survey Results
Figure 12.7	Water Vole and Water Shrew Records
Figure 12.8	Breeding Birds
Figure 12.9	Reptile Survey
Figure 12.10	Ponds Surveyed and Amphibians Recorded
Figure 12.11	Invertebrate Survey Areas

12 Nature Conservation and Biodiversity

12.1 Introduction

12.1.1 The purpose of this chapter is to describe and assess the potential impacts of the Scheme on significant habitats and species. It contains:

- A summary of the assessment methods and guidance used to assess biodiversity impacts;
- Summaries of the baseline surveys which describe and assess the biodiversity features of the study area, with full reports in Appendices 12-B – 12-I in Volume 2 of the Environmental Statement (ES);
- A description of the mitigation and compensation strategy proposed; and,
- Assessments of the potential impacts of the Scheme during construction and operation.

12.1.2 The supporting Figures 12.1 to 12.12 are in Volume 3 of the ES.

12.1.3 We are grateful to the landowners for access to survey and for passing on observations about the wildlife on their land. The Highways Agency and Chris Blandford Associates (CBA) kindly made available reports prepared for the A259 Bexhill-Western Hastings Bypass (BHWB) in the 1990s.

12.2 Method of Assessment

Assessment Guidance

12.2.1 Surveys and assessments have followed the Department for Transport (DfT) Transport Analysis Guidance (TAG) Biodiversity Sub-objective 3.3.10 (December 2004) which was based on advice from English Nature (EN). This guidance expands on the methods set out in the Design Manual for Roads and Bridges (DMRB) Sections 11.3.4.5, 11.3 and 11.5 for assessing biodiversity and earth heritage, and the DETR Guidance on the Methodology for Multi-Modal Studies (GOMMMS) Volume 2, March 2000 (GOMMMS 2000). In addition, the Institute of Ecology and Environmental Management *Guidelines for Ecological Impact Assessment in the United Kingdom* have been referred to. These take into account the TAG, DMRB and GOMMMS guidelines.

12.2.2 Potential direct, indirect, temporary, short-term and long-term impacts have been identified. The effects of these impacts on habitats, plant and animal communities and individual taxa of local or greater significance have been assessed according to the criteria set out in Table 12.1.

12.2.3 Criteria for the significance of impacts on habitats and species have been developed from these guidelines and are given in Tables 12.2 and 12.3.

Legislation and Policies

12.2.4 A number of species and habitat conservation assessments, legislative instruments and policies have been taken into account in this assessment. The following are relevant to the proposed Scheme:

- International Union for the Conservation of Nature (IUCN) global red lists;
- Convention on the Conservation of Migratory Species of Wild Animals (1979) (Bonn Convention);
- Convention on the Conservation of European Wildlife and Natural Habitats (1979) (Bern Convention);
- European and National Red Lists or Species of Conservation Concern;
- EU Directive on the Conservation of Wild Birds as amended (79/409/EEC) (Birds Directive 1979);
- EU Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora as amended (92/43/EEC) (Habitats Directive 1992);
- The Conservation (Natural Habitats, &c.) Regulations 1994 (Habitats Regulations);
- Wildlife and Countryside Act 1981 (as amended);
- Countryside and Rights of Way Act 2000 (CROW Act);
- The Biodiversity Convention 1994;
- The Natural Environment and Rural Communities Act 2006 s40.

12.2.5 The IUCN Red Lists and Red Data Books (RDBs) identify endangered species which are categorised according to threat: Extinct (EX), Extinct in the wild (EW), Critically Endangered (CR), Endangered (EN), Vulnerable (VU), Near Threatened (NT), Least Concern (LC), Data Deficient (DD) and Not Evaluated (NE).

12.2.6 The Bonn Convention aims to conserve terrestrial, marine and avian migratory species throughout their range by providing strict protection for the endangered migratory species listed in Appendix I of the Convention and by concluding multilateral agreements for the conservation and management of migratory species listed in Appendix II. The Bonn Convention is implemented in the UK through the Wildlife and Countryside Act 1981 (as amended), the Birds Directive and the Habitats Directive.

12.2.7 The Bern Convention aims to: conserve wild flora and fauna in their natural habitats; promote co-operation between states; and, give particular emphasis to endangered and vulnerable species, including endangered and vulnerable migratory species. Strictly protected flora species are listed in Appendix I, strictly protected fauna are listed in Appendix II and protected fauna species are listed in Appendix III.

12.2.8 European and National Red Lists and lists of Species of Conservation Concern have been produced for some taxa. For example, BirdLife International has produced lists of Species of Conservation Concern

which for the United Kingdom can be found on the RSPB website. A wealth of Red Lists have been produced in the UK on species that are considered to be at risk of national extinction. Lists exist for each of the species groups.

12.2.9 The Birds Directive provides for the protection, management and control of naturally occurring wild birds within the European Union through a range of mechanisms. One of the key provisions (under Article 4) is the establishment of an internationally co-ordinated network of protected areas, known as Special Protection Areas (SPAs) for 182 species listed in Annex I of the Directive. These are species that are considered to be in danger of extinction, vulnerable to specific changes in their habitat, rare, or requiring particular attention by reason of the specific nature of their habitat.

12.2.10 The Habitats Directive aims to contribute towards ensuring biodiversity through the conservation of natural habitats and of wild fauna and flora in the European Union. A series of sites known as Special Areas of Conservation (SACs) has been selected, designated and protected for 169 Natural Habitats of Community Interest listed in Annex I of the Directive and 623 Species of Community Interest listed in Annex II. The UK has 76 of the Habitats of Community Interest, of which 22 are Priority Habitat Types where the Member State has a particular responsibility for their conservation in view of the proportion of their natural range which falls within the EU territory. In the same way, a number of Species of Community Interest are given priority status.

In the UK, the Birds and Habitats Directive has been transposed into legislation by the Habitats Regulations. The Habitat Regulations contain five Parts and four Schedules and provide for the designation and protection of European sites and the protection of European protected species.

12.2.11 The Wildlife and Countryside Act 1981 (as amended) is the principal mechanism for the legislative protection of wildlife in Great Britain. It is the means by which the Bern Convention and the Birds and Habitats Directives are implemented in Great Britain. The Wildlife and Countryside Act is divided into four parts: Part I is concerned with the protection of wildlife; Part II relates to the countryside and national parks (and the designation of protected areas such as SSSIs); Part III covers Public Rights of Way; Part IV deals with miscellaneous provisions of the Act. Sections 1-8 of Part 1 of the Wildlife and Countryside Act relate to the protection of birds. Section 9 provides protection for wild animals and their habitats listed on Schedule 5. Section 13 identifies measures for the protection of wild plants listed on Schedule 8.

12.2.12 The CROW Act 2000 strengthens the legal protection for threatened species and brings the Wildlife and Countryside Act 1981 in England and Wales up to date. The importance of biodiversity is given a statutory basis and requires the publication of lists of species and habitats that are of principal importance for the conservation of biological importance in England and Wales respectively. The lists are based on UK Biodiversity Action Plan (UK BAP) Priority Habitats and Species lists.

12.2.13 Based on the principles of The Biodiversity Convention, the UK Government produced a consultative national action plan, *Biodiversity: the UK Action Plan* (UK Government 1994), to conserve and enhance biodiversity

within the UK and to contribute to the conservation of global biodiversity through all appropriate mechanisms. As part of the development of the UK BAP, lists were produced of Priority Habitats and Priority Species requiring conservation actions.

12.2.14 National Biodiversity Action Plans (BAPs) and the Sussex BAP have been consulted. The purpose of the Sussex BAP is to set out BAPs for the main habitats and species in Sussex. Its overall aim is to conserve and enhance the biological diversity of Sussex and contribute to the conservation and enhancement of both national and international biodiversity. The objectives are:

- To maintain, and where practicable enhance, the wildlife and habitats that give Sussex its character and natural diversity;
- To identify priority habitats and species which are important in Sussex and/or where there is a special responsibility to care for something which is important on a national or international scale;
- To set realistic, but ambitious, targets and timescales for priority habitats and species and to monitor progress of action plans against those targets;
- To ensure that biodiversity action continues as a joint initiative, evolving a dynamic framework for nature conservation; and,
- To raise public awareness and encourage involvement in biodiversity action.

12.2.15 The Hastings Borough Local BAP is in draft but the Borough Ecologist has commented on species and habitats of borough significance. Rother District Council uses the Sussex BAP.

12.2.16 Conservation organisations in Sussex have prepared a Rare Species Inventory (Sussex RSI). The criteria for selecting species on the Sussex RSI are:

- Species in the British Red Data Books (including all Notable fauna and Nationally Scarce flora);
- All taxa on the Biodiversity UK short-list, which consists of 400 species that are globally threatened or have declined in the UK by more than 50% in the last 25 years;
- Internationally rare taxa cited in the Bern Convention, IUCN Red data lists, or EU Habitats Directive which are not covered by any of the above; and county rarities.

12.2.17 Sussex also has a Protected Species Register (Sussex PSR) which consists of species of plants, fungi and animals (other than birds) which are protected under Schedules 5, 6 and 8 of the Wildlife and Countryside Act 1981. There is some overlap between the Sussex RSI and Sussex PSR.

12.2.18 The UK's birds can be split in to three categories of conservation importance - Red, Amber and Green. Red is the highest conservation priority, with species needing urgent action. Amber is the next most critical group, followed by Green. The full list of Red and Amber species is included in

Appendix 11-E. Birds in the Red and Amber lists would be subject to at least one of the relevant factors listed below.

12.2.19 Red List criteria are:

- Globally threatened;
- Historical population decline in UK during 1800-1995;
- Rapid (> or =50%) decline in UK breeding population over last 25 years;
or,
- Rapid (> or =50%) contraction of UK breeding range over last 25 years.

12.2.20 Amber List criteria are:

- Historical population decline during 1800-1995, but recovering; population size has more than doubled over last 25 years;
- Moderate (25-49%) decline in UK breeding population over last 25 years;
- Moderate (25-49%) contraction of UK breeding range over last 25 years;
- Moderate (25-49%) decline in UK non-breeding population over last 25 years;
- Species with unfavourable conservation status in Europe (Species of European Conservation Concern (SPEC));
- Five-year mean of 1-300 breeding pairs in UK;
- 50% of UK breeding population in 10 or fewer sites, but not rare breeders;
- 50% of UK non-breeding population in 10 or fewer sites;
- 20% of European breeding population in UK; or,
- 20% of NW European (wildfowl), East Atlantic Flyway (waders) or European (others) non-breeding populations in UK.

12.2.21 Green List includes:

- Species where there is no identified threat to the population's status; or,
- Introduced species, which are those which have escaped and bred in the wild or has been deliberately released into the wild at some point in the UK's history. As these species are not native to the UK, they have no conservation status.

12.2.22 The legislation is described in more detail in Appendix 12-2A. Other UK Acts and regulations of relevance are listed below:

- National Parks and Access to the Countryside Act 1949;
- Environmental Protection Act 1990;
- Water Resources Act 1991;
- Protection of Badgers Act 1992;
- Environment Act 1995;
- Wild Mammals Protection Act 1996; and,

- Hedgerow Regulations 1997.

12.2.23 The following national, regional, county and local policies and plans for nature conservation and biodiversity relevant to the Scheme are described in detail in the Chapter 5: Policy and Planning:

- *Our Countryside – the Future – A Fair Deal for Rural England* (November, 2000);
- *Working with the Grain of Nature: A Biodiversity Strategy for England* (October, 2002);
- *Securing the Future – Delivering UK Sustainable Development Strategy*, The UK Government Sustainable Development Strategy (March 2005);
- *A New Focus for England's Woodlands – England Forestry Strategy* (December, 1998);
- PPS9 – *Biodiversity and Geological Conservation* (August, 2005);
- Regional Planning Guidance for the South East (RPG9) (March, 2001);
- Regional Economic Strategy for the South East of England 2002-2012 (July, 2002);
- Draft RSS – Draft South East Plan (part 1) (July 2005);
- East Sussex and Brighton and Hove Structure Plan 1991-2011 (Adopted December 1999);
- A Biodiversity Action Plan for Sussex (July, 1998);
- East Sussex Environmental Action Plan 2002-2005;
- Hastings Local Plan (April, 2004); and,
- Rother District Local Plan (2006).

The Study Area

12.2.24 The study areas for survey and assessment have varied according to the subject of survey, but it has generally been a 500m corridor either side of the centre-line of the Scheme route as shown on Figures 12.1A and 12.1B which is in accordance with the guidance given in DMRB. A wider context for designated sites is given in the Existing Conditions section of this chapter.

Surveys Reviewed

12.2.25 The ES for the BHWB (September 1994) and in particular the nature conservation reports in Volume 2 have been reviewed, together with preparatory reports for the ES prepared by CBA. Following publication of the BHWB ES, additional work on barn owls, dormice, amphibians, waders and dragonflies was carried out, leading up to a Public Inquiry in 1995. All of these additional reports have been reviewed, together with the Ecology and Nature Conservation Proof of Evidence for that Inquiry and a report on the state of the Combe Haven Valley in 1999 (Dolphin Ecological Surveys).

Surveys Undertaken 2003-6

12.2.26 Surveys specifically related to the Scheme began in 2003 with an EN Phase 1 survey of route options (Davey 2003). In July-September 2004 the following surveys were carried out within the route corridor and the proposed Pebsham Countryside Park:

- Floodplain grassland and fen;
- Species-rich neutral grassland;
- Mesotrophic grassland, scrub and scrub woodland;
- Ditches;
- Hedgerows;
- Bats;
- Dormice;
- Water voles; and,
- Indicator wetland invertebrates.

12.2.27 The species surveys were preliminary and intended to define the scope of more detailed surveys. In 2005, the following surveys were carried out at the appropriate season for the proposed route corridor and the Pebsham Countryside Park:

- Vegetation of the immediate route corridor;
- Dormice;
- Water Voles;
- Water Shrews;
- Bats;
- Badgers;
- Wintering and breeding birds;
- Reptiles;
- Great Crested Newts;
- Dragonflies and damselflies; and,
- Indicator wetland invertebrates.

12.2.28 The following more detailed surveys were undertaken in 2006 in order to address specific issues identified in the previous surveys and to bring the data up to the level appropriate for an Environmental Impact Assessment of the proposed Scheme:

- Vegetation within the landtake for the road;
- Bats;

- Badgers;
- Breeding birds;
- Great Crested Newts;
- Indicator wetland and terrestrial invertebrates;
- Fish; and,
- Crayfish.

12.2.29 The 2004-6 reports are collated as single subject reports in Appendices 12-C to 12-I. Each feature mentioned in the reports is shown on Figs 12.1A and 12.1B in Volume 3 and has been given a reference number, which is shown in the text, as follows:

- F - Floodplain grassland and fen (Appendix 12-C.2)
- G - Species-rich neutral grassland (Appendix 12-C.4) and
- G - Mesotrophic grassland, scrub and scrub woodland (Appendix 11-3D)
- W - Woodland (Appendix 12-C.5)
- H - Hedgerows (Appendix 12-C.6), important hedgerows under the Hedgerow Regulations are numbered OA.
- D1-69 ditches and streams (Appendix 12-C.3)

Consultations

12.2.30 The consultants met with EN and the Sussex Wildlife Trust (SxWT), in 2005 to discuss the scope of surveys. Meetings to discuss mitigation have subsequently been held with English Nature and the Environment Agency. The Sussex Ornithological Society (SOS), the Hastings Badger Group (HBG) and the British Deer Society (BDS) have also been contacted. Individual biological records have been obtained through the Sussex Biodiversity Records Centre (SxBRC) (Appendix 12-B.2).

Evaluation and Significance Criteria

12.2.31 Species, species assemblages, communities, habitats or sites that would receive an impact from the Scheme are called biodiversity resources. The value of a resource is determined by the criteria in Table 12.1. Resources which have a value at local level or above are called Valued Biodiversity Resources (VBRs).

Table 12.1 Definitions of Biodiversity Resources

Level of Value	Examples
International	<p>An internationally designated site or candidate site (SPA, pSPA, SAC, cSAC, Ramsar site, Biogenetic Reserve) or an area which EN has determined meets the published selection criteria for such designation, irrespective of whether or not it has yet been notified;</p> <p>A viable area of a habitat type listed in Annex I of the Habitats Directive, or smaller areas of such habitat which are essential to maintain the viability of a larger whole;</p> <p>Any regularly occurring population of an internationally-important species, which is threatened or rare in the UK, i.e. it is a UK Red Data Book species or listed as occurring in 15 or fewer 10km squares in the UK (categories 1 and 2 in the UK BAP) or of uncertain conservation status or of global conservation concern in the UK BAP; or,</p> <p>A regularly occurring, nationally significant population/number of any internationally important species.</p>
National	<p>A nationally designated site (SSSI, ASSI, NNR, Marine Nature Reserve) or a discrete area, which EN has determined meets the published selection criteria for national designation (e.g. <i>Criteria for the Selection of Biological SSSIs</i> (EN 1989)) irrespective of whether or not it has yet been notified;</p> <p>A viable area of a priority habitat identified in the UK BAP, or of smaller areas of such habitat which are essential to maintain the viability of a larger whole;</p> <p>Any regularly occurring population of a nationally-important species which is threatened or rare in the region or county;</p> <p>A regularly occurring, regionally or county-significant population/number of any nationally important species; or,</p> <p>A feature identified as of critical importance in the UK BAP.</p>

Regional	<p>Viable areas of key habitat identified in the Regional BAP or smaller areas of such habitat which are essential to maintain the viability of a larger whole;</p> <p>Viable areas of key habitat identified as being of regional value in the appropriate Natural Area profile;</p> <p>Any regularly occurring, locally significant population of a species listed as being nationally scarce which occurs in 16-100 10km squares in the UK or in a Regional BAP or relevant Natural Area on account of its regional rarity or localisation;</p> <p>A regularly occurring, locally significant number of a regionally important species; or,</p> <p>Sites which exceed the county-level designations but fall short of SSSI selection guidelines, where these occur.</p>
Level of Value	Examples
County	<p>Probable semi-natural ancient woodland greater than 0.25ha;</p> <p>County sites and other sites which the designating authority has determined meet the published biodiversity selection criteria for designation, including Local Nature Reserves selected on county biodiversity criteria;</p> <p>A viable area of habitat identified in county BAP;</p> <p>Any regularly occurring, locally-significant population of a species which is listed in a county Red Data Book or BAP on account of its regional rarity or localisation; or,</p> <p>A regularly occurring, locally significant number of a county important species.</p>

<p>District</p>	<p>Probable semi-natural ancient woodland smaller than 0.25ha;</p> <p>Areas of habitat identified in a district BAP or in the relevant Natural Area profile;</p> <p>District sites that the designating authority has determined meet the published ecological selection criteria for designation, including Local Nature Reserves selected on district biodiversity criteria. District sites, where they exist, would often have been identified in local plans;</p> <p>Sites/features that are scarce within the district or which appreciably enrich the district habitat resource;</p> <p>A diverse hedgerow network or one of high biodiversity;</p> <p>A population of a species that is listed in a district BAP because of its rarity in the locality or in the relevant Natural Area profile because of its regional rarity or localisation; or,</p> <p>A regularly occurring, locally significant number of a district important species during a critical phase of its life cycle.</p>
<p>Local</p>	<p>Areas of habitat considered to enrich biodiversity within the immediate locality, e.g. species-rich hedgerow.</p>

12.2.32 The magnitude of an impact on a VBR is assessed according to Table 12.2. The significance of an impact is determined according to Table 12.3. This collates the value of the resource and the magnitude of the impact to identify its consequences.

Table 12.2 Assessing the Magnitude of Impacts

Impact Description	Criteria
Major Negative	The change is likely to cause a permanent adverse impact on the integrity of a biodiversity receptor.
Negative	<p>The change adversely affects the VBR, but there would probably be no permanent impact on its integrity; or,</p> <p>Within this category, impacts can be further subdivided into:</p> <ul style="list-style-type: none"> • Long-term negative • Short-term negative • Minimal negative (whether short- or long- term)
Neutral	No impact.
Positive	The change is likely to benefit the VBR, but not so far as to achieve Favourable Conservation Status*.
Major Positive	The change is likely to restore a VBR to favourable conservation status.
Uncertain	The level of information available is insufficient to identify one of the above categories; or the project has positive and negative impacts, which cannot be considered insignificant, but do not clearly indicate that the overall impact will be probably positive or negative.

Notes:

* Favourable Conservation Status is assessed in relation to the range of conditions required to maintain a habitat or species in a state where its distribution, abundance, structure or function throughout the biogeographic region is sustained over the long term. When the sum of the influences acting upon the habitat or species does not adversely affect the range and abundance of species or range and quality of habitats they are considered to be in a 'Favourable Condition'. (English Nature 2003)

12.2.33 The impact significance criteria shown in Table 12.3 is based upon guidance included in the legislation listed above.

Table 12.3 Impact Significance Criteria

Impact Significance	Examples
Critical Adverse	<p>A major negative impact on:</p> <ul style="list-style-type: none"> • A site of international or national importance; • A viable area of an internationally important habitat; • A nationally/internationally important population of an internationally important species; • A population of species which occurs in internationally or nationally significant numbers; • A population of an internationally important species which is rare or threatened in the UK; or, • A site of regional importance with limited opportunities for substitution.
Major Adverse	<p>A long-term negative impact on:</p> <ul style="list-style-type: none"> • A site of national or international importance; • A viable area of an internationally/nationally-significant habitat; • A nationally/internationally important population of a nationally/internationally important species; • A population of a species which occurs in internationally or nationally significant numbers; • A population of an internationally important species which is rare or threatened in the UK; or, • A site of regional importance with limited opportunities for substitution. <p>A major negative impact on:</p> <ul style="list-style-type: none"> • A population of a nationally important species which is rare or threatened in the region/county; • A regionally-significant population of a nationally important species; • A viable area of a regionally-important habitat; • A population of a species of regional importance on account of regional rarity; • An area of probable ancient woodland > 0.25ha in size; • A SNCI; or, • A locally significant population of a species of county importance.

Impact Significance	Examples
Moderate Adverse	<p>A short-term negative impact on:</p> <ul style="list-style-type: none"> • A site of national or international importance; • A viable area of an internationally/nationally important habitat; • A nationally/internationally important population of a nationally/internationally important species; • A population of a species which occurs in nationally/internationally significant numbers; • A population of an internationally important species which is rare or threatened in the UK; or, • A site of regional importance with limited opportunities for substitution. <p>A long-term negative impact on:</p> <ul style="list-style-type: none"> • A population of a nationally important species which is rare in the county or region; • A regionally significant population of a nationally important species; • A regionally significant habitat; • A locally significant population of a nationally or regionally scarce species; • An area of probable ancient woodland > 0.25ha in size; or, • A SINC. <p>A major negative impact on:</p> <ul style="list-style-type: none"> • A locally significant population of a species of regional/county significance; • A viable area of habitat of county importance; • An area of ancient woodland < 0.25ha in size; • A district-level SINC/SNCI; or, • A species or habitat of district importance.

Impact Significance	Examples
Minor Adverse	<p>A minimal negative impact on:</p> <ul style="list-style-type: none"> • A site of international/national/regional importance which does not affect the site's integrity; • A viable area of an internationally important habitat which does not affect its integrity an internationally/nationally important population of a nationally/internationally important species which does not affect its viability; or, • A locally significant population of a regionally important species. <p>A short-term negative impact on:</p> <ul style="list-style-type: none"> • A viable area of a nationally/regionally important habitat; • A population of a nationally important species which is regionally scarce; • A regionally significant population of a nationally scarce species; • An area of ancient woodland > 0.25ha; or, • A SNCI. <p>A long-term negative impact on:</p> <ul style="list-style-type: none"> • An area of habitat of county importance; • A locally significant population of a species of county importance; • An area of ancient woodland < 0.25ha; • A district-level SINC/SNCI; or, • A major negative impact on a species or habitat of local importance.
Neutral	<p>No impact on a species or habitat of whatever value;</p> <p>Any impact on a species/habitat of negligible value; or,</p> <p>Any impact creating a feature of negligible value</p>

Impact Significance	Examples
Minor Beneficial	<p>An enhancement of biodiversity equivalent in value to that of a site of district value or lower;</p> <p>Slight enhancements or improvements to environmental conditions in internationally, nationally or locally important sites; or,</p> <p>Site or habitat enhancements or management resulting in increased carrying capacity for species of local importance.</p>
Moderate Beneficial	<p>An enhancement of biodiversity equivalent in value to that of a site of county value or regional value but with good potential for substitution;</p> <p>Moderate enhancements or improvements to environmental conditions in internationally, nationally or locally important sites; or,</p> <p>Site or habitat enhancements or management resulting in increased carrying capacity for species of regional importance.</p>
Major Beneficial	<p>An enhancement of biodiversity equivalent in value to that of a site of national value;</p> <p>Enhancements or improvements to environmental conditions in nationally important sites;</p> <p>Major enhancements or improvements to environmental conditions in regionally (or lower) important sites; or,</p> <p>Site or habitat enhancements or enhanced management resulting in increased carrying capacity for species of national importance.</p>
Critical Positive	<p>An enhancement of biodiversity equivalent in value to that of a site of international value;</p> <p>Major enhancements or improvements to environmental conditions in internationally or nationally important sites; or,</p> <p>Site or habitat enhancements or enhanced management resulting in increased carrying capacity for species of international importance.</p>

12.3 Existing Conditions

Natural Area Context

12.3.1 The study area lies within EN's High Weald Natural Area (no. 72¹). However, the floor of the Combe Haven Valley, which is a Site of Special Scientific Interest (SSSI), consists mainly of grazing marsh. This is a habitat of high nature conservation value which is similar in some respects to the Pevensy Levels and therefore, it could be regarded as an outlier of the Low Weald and Pevensy Natural Area (no. 73).

12.3.2 The study area contains the following key nature conservation features of the High Weald that are of National Significance:

- Earth heritage;
- Lowland meadows; and,
- Lowland mixed deciduous woodland.

12.3.3 The conservation features which are of local significance are :

- Ancient and species-rich hedgerows;
- Rivers and streams;
- Standing open water; and,
- Wet woodland.

12.3.4 There are also features of local significance within the Low Weald and Pevensy Natural Area and the study area contains grazing marsh that is Nationally Significant within the Low Weald.

Geology and Soils

12.3.5 The study area is underlain by all three subdivisions of the Hastings Beds, which comprise part of the Wealden Series of Lower Cretaceous age. The youngest deposit, Tunbridge Wells Sand, is composed of fine-grained sandstones, siltstones and mudstones and is generally found on the higher ground. Beneath, Wadhurst Clay, consisting of interlaminated shales and thin siltstones, overlies Ashdown Beds, which are predominantly massive clays with subordinate sandstones and siltstones. However, within the floor of the Combe Haven Valley, the solid deposits are masked by substantial accumulations of alluvium and colluvium (Scaife and Burrin 1983). These are composed of a heterogeneous combination of estuarine clays, freshwater flood loams and peats of variable thickness. These deposits are derived from marine inundations and clearance from the Wealden hinterland and mainly from stagnogley soils.

12.3.6 The Tunbridge Wells Sand gives rise to acid-neutral soils and is found in the south-west of the study area to the west of the Sidley Fault.

¹ [Http://www.english-nature.org.uk/Science/natural/role.htm](http://www.english-nature.org.uk/Science/natural/role.htm)

To the east of the fault the route would cross the Ashdown Beds and small exposures of the Weald Clay where the soils are heavier but more fertile. The soils on the floodplains of the Watermill and Powdermill Streams are generally lighter but complex and the ditches here have been cut through layers of mineral soil and peat. These watercourses and Decoy Pond Stream separate ridges topped by Hillcroft Farm, Adam's Farm and Upper Wilting Farm. Ashdown Beds outcrop on the lower slopes, with Weald Clay on the upper slopes. North of Adam's Farm a quarry has been excavated into the sandstone of the Ashdown Beds and sand is found on the high ground around Upper Wilting Farm.

Topography and Principal Features

12.3.7 From its start to Glover's Farm the Scheme route would lie within an urban area, following the bed of the disused railway. This section of the Scheme is known as the Bexhill Connection. There is a narrow band of vegetation along this corridor comprising:

- Small patches of wetland adjacent to the Egerton Stream and in areas with impeded drainage;
- Extensive areas of Bramble (*Rubus fruticosus*) scrub; and,
- Secondary woodland and scrub on the cutting and adjacent areas.

12.3.8 From Glover's Farm Bridge, the Scheme route would then follow the disused railway for a short section before extending northwards to cross the upper reach of the Combe Haven Stream. Within this area there are widely-spaced hedges and small blocks of woodland (e.g. Fig. 12.1A, W3-5) some of which are probably ancient. It would cross the track and hedges between Little Henniker Wood and follow rising ground to Acton's Farm (OA535). To the west there is a group of woodlands comprising Hanging Wood (W12), Ring Wood (W14) and Little Henniker Wood (W9). To the east, the land is largely improved pasture.

12.3.9 As the land descends to the Watermill Valley the route would cross a more complex area comprising semi-improved grassland, fen, ditches, rush pasture and the stream itself. Wet grassland and patches of fen extend along the east bank of the Watermill Stream north of the proposed Scheme route. To the south-east fen, wet grassland, improved pasture, rush pasture and ditches extend the length of the main Combe Haven Valley as far as Bulverhythe. Where it crosses the Watermill Stream, the edge of the earthworks for the Scheme would be 90m from the SSSI and from this point eastwards the road and SSSI have similar orientation. The Greenway and earthworks would be immediately adjacent to the SSSI between chainages 3650 and 4000 and never more than 600m away until the main railway line is crossed.

12.3.10 From the Watermill Stream the Scheme route would rise up the valley side to cut through the Hillcroft Farm ridge, descending to the Powdermill Valley and cutting across mainly arable land, but also semi-improved grassland that is shown in Figure 12.1B at F16. It would cross the disused railway line on the Adam's Farm ridge with the earthworks removing a section of about 200m long to the north, but avoiding the abutment.

12.3.11 In descending to the Decoy Pond Stream Valley the Scheme would cross pasture land with widely-spaced hedges. It would be adjacent to Decoy Pond Wood to the south and be within 10m of Little Bog to the north. As the ground rises up towards Upper Wilting Farm the Scheme would cut through species-rich neutral grassland at G13 and then a largely open landscape with sparse hedges as far as the railway, but would be within 60m of the ancient Chapel Wood (W23) and 100m of the ancient woodland copses W22 and W34.

12.3.12 After crossing the railway it would be immediately adjacent to Marline Valley Woods SSSI and would cross a mosaic of species-poor grassland and scrub (G20) to Queensway.

Designated Sites

12.3.13 There are no Ramsar Sites, SAC, SPAs or National Nature Reserves within two kilometres of the Scheme. However, two SSSIs, eight Sites of Nature Conservation Importance (SNCl) and three Local Nature Reserves (LNRs) are within this distance and all of these except two SNCl are within 500m from the Scheme. The locations of these sites are shown on Fig. 12A-B and the EN and local authority descriptions are given in Appendix 12-A. The principal features are summarised in Table 12.4.

Sites of Special Scientific Interest

12.3.14 Combe Haven SSSI comprises 156ha and contains diversity of habitats including floodplain meadows, fen communities, ditches, woodland and a wide wooded railway embankment. It is of value for breeding and wintering birds and has a rich dragonfly fauna. The south-east portion comprises the Filsham Reedbed LNR, which is the largest reedbed in East Sussex and supports such breeding birds as Bearded Tit (*Panurus biarmicus*) and Cetti's Warbler (*Cettia cetti*).

12.3.15 Marline Valley Woods SSSI covers 135 acres and comprises ancient woodland including stands of the nationally-uncommon Pedunculate Oak (*Quercus robur*) and Hornbeam (*Carpinus betulus*) woodland¹. There is a large gill with a significant lower plant and fern fauna and species-rich unimproved grassland, although since designation this has become partially overgrown by scrub. Marline Valley LNR is more-or-less co-extensive within the SSSI and is managed by the Sussex Wildlife Trust.

Local Nature Reserves

12.3.16 In addition to Filsham Reedbed LNR and Marline Valley Woods LNR, there is Church Wood and Robsack Wood LNR which is ancient coppice-with-standards woodland dominated by Sweet Chestnut (*Castanea sativa*), Hornbeam and Pedunculate Oak. There are two gills, between which is small meadow. The woodland contains a very diverse ground flora including Common Toothwort (*Lathraea squamaria*) and supports Lesser Spotted

¹ Peterken Type 9A, which has no exact NVC equivalent (Peterken, 1981)

Woodpecker (*Dendrocopos minor*) and Hawfinch (*Coccothraustes coccothraustes*). The site is also of interest for its fungi.

Sites of Nature Conservation Importance

12.3.17 The following SNCIs would be within 500 m of the Scheme:

- The Disused Railway, Bexhill SNCI: The site consists of the disused railway to the south of Combe Haven and includes the track bed and the embankments and sides of the cuttings. It supports a variety of habitats including secondary woodland, scrub and tall herbaceous plants linking up with the adjacent woodland and scrub.
- The Disused Railway, Crowhurst SNCI: The site is the continuation of the same railway north of Combe Haven. It includes the track bed and the embankments and sides of the cuttings, as well as woodland, the species-rich grassland of an adjoining open area, and two disused pits at the southern end. It supports a mosaic of habitats which are intimately linked, including herb-rich grassland and exposed rock faces.
- The Churchwood Complex and Meadows SNCI: The site is ancient woodland with Sweet Chestnut coppice and a Hornbeam-dominated gill. The meadow is semi-improved.
- Wainwright Close SNCI: The site is at mixture of species-rich grassland, scrub and pond within an industrial estate. It is bounded by mature mixed hedgerows species. The grass is kept high as habitat for the uncommon grassland spider (*Argiope breunichii*).
- Wishing Tree SNCI: The site is a mixture of semi-improved meadow, a reservoir and semi-natural woodland. The meadow has abundant anthills which are an indicator of old grassland.
- Churchwood and Robsack Wood SNCI: The site is an area of ancient natural woodland with two gills in between which there is a small meadow.
- Woodland Complex at Buckholt Farm SNCI: The site comprises five ancient natural woodlands consisting predominately of abandoned Hornbeam coppice with oak standards. Throughout the area there are derelict ponds and streams.

Table 12.4 Designated Sites within Two Kilometres of the Scheme

Site Name	Area (ha)	Grid Reference	Minimum distance from centreline of the Scheme (km)	Description
Combe Haven SSSI	156	TQ 770 102	0	Wet alluvial meadows, reedbeds, one of the largest in East Sussex.
Marline Valley Woods SSSI and LNR	55	TQ 780 122	0.05	Important area of ancient woodland and neutral grassland. Rich stream flora, Pedunculate Oak-hornbeam woodland and species-rich unimproved grassland.
Filsham Reedbed LNR (within Combe Haven SSSI)	18	TQ 778 097	1.2	Largest reedbed in East Sussex, supporting breeding birds such as Bearded Tit and Cetti's Warbler.
Church Wood and Robsack Wood LNR and SNCI	29.5	TQ 785 113	0.5	Ancient natural woodland, gill woodland, freshwater streams and semi-improved meadow.
Woodland Complex at Buckholt Farm SNCI	53	TQ 74 10	0.125	Five ancient woodlands, predominantly abandoned Hornbeam coppice with oak standards. Derelict ponds and streams.
Disused Railway, Bexhill SNCI	19	TQ 746 092–TQ 761 101	0	Track bed and cuttings, which support a variety of habitats including secondary woodland, scrub, and tall herbaceous plants linking areas of adjacent woodland and scrub.

Site Name	Area (ha)	Grid Reference	Minimum distance from centreline of the Scheme (km)	Description
Disused Railway, Crowhurst SNCI	12.2	TQ 763 116	0	Track bed, embankments and sides of cuttings with woodland, species-rich grassland, open area and disused pits.
Old Filsham Golf Course SNCI	9.98	TQ 783 100	1	Part of a network of sites linking the Wishing Tree SNCI, Filsham Reedbeds LNR and Combe Haven SSSI. Developing scrub and open meadow habitats, which graduate from the wetland fen to surrounding mature semi-natural woodland.
Churchwood Complex and Meadows SNCI (Ha9)	27.6	TQ 785 113	0.5	Remnant ancient woodland with mainly Sweet Chestnut coppice and a Hornbeam dominated gill stream. Meadow is semi-improved grassland.
Ponds Wood SNCI	21.8	TQ 792 105	1.6	Two transitional meadow habitats and woodland habitats with running and standing water.
Wainwright Close SNCI	0.5	TQ 778 114	0.4	Mixed habitat of species rich grassland, scrub and pond.
Wishing Tree SNCI	20.9	TQ 780 105	0.2	Matrix of substantial habitats with semi-improved meadow, open water and woodland.

Floodplain Grassland and Fen

12.3.18 The principle features are described below and more detail is given in Appendix 12-C.2. The areas of Floodplain Grassland and Fen are shown in Figures 12.1A and 12.1B.

12.3.19 Floodplain grassland and fen within the whole of the Combe Haven Valley was identified during the Phase 1 survey in 2003 and were surveyed in detail in 2004, plotting National Vegetation Classification (NVC) communities as described in Appendix 12-C.2. The communities present were:

- M24 Purple Moor-grass (*Molinia caerulea*) - Meadow Thistle (*Cirsium dissectum*) fen-meadow;
- MG1 False Oat-grass (*Arrhenatherum elatius*) grassland;
- MG6 Rye-grass (*Lolium perenne*) Crested Dog's-tail (*Cynosurus cristatus*) grassland;
- MG7 Rye-grass leys and related grasslands;
- MG9 Yorkshire Fog (*Holcus lanatus*) – Soft Rush (*Juncus effusus*) rush pasture;
- MG10 Yorkshire Fog – Tufted Hair-grass (*Deschampsia cespitosa*) grassland;
- MG13 Creeping Bent (*Agrostis stolonifera*) - Marsh Foxtail (*Alopecurus geniculatus*) grassland;
- S4 Common Reed (*Phragmites australis*) swamps and reedbed;
- S5 Reed Sweet-grass (*Glyceria maxima*) swamp;
- S6 Greater Pond-sedge (*Carex riparia*) swamp;
- S14 Branched Bur-reed (*Sparganium erectum*) swamp; and,
- S28 Reed Canary-grass (*Phalaris arundinacea*) tall-herb fen.

12.3.20 Fourteen zones were identified, nine of which were wholly or partially within the study corridor as shown on Figure 12.1C. The main characteristics of the eight are outlined below.

12.3.21 There are three characteristic features of Zones 1-3:

- In the lower-lying parts of the fields there are patches of Creeping Bent and Marsh Foxtail. Sometimes these are sufficiently large to be recognised as MG13 in which Floating Sweet-grass (*Glyceria fluitans*) is frequent. Since several of the fields in which this occurs were recorded as MG13 by Dr TG Rich in 1994 (Rich 1995a) there may have been some drying-out in the intervening years;
- There are patches where Reed Sweet-grass is present within the sward. It is kept in check by grazing but there seems little doubt that if this were to be abandoned these patches would rapidly develop to S5; and,

- There are places generally towards the centre of the fields where rushes have invaded and MG10 rush pasture is present. In two cases the Hard Rush (*Juncus inflexus*) sub-community of MG10b, is present. MG9 is also present and is generally found in slightly drier locations than MG10. Zone 4 and 4a is a narrow band close to the edge of the main channel. MG13 is also present with F11 and F15.

12.3.22 Zones 1, 2, 6, 7 and 9 are dominated by MG6 or MG7. The distinction is sometimes difficult to make but MG6 tends to be prevalent in the drier areas and MG7 in the wetter. Meadow Foxtail (*Alopecurus pratensis*) is widespread within the floodplain and some of the grassland can probably be attributed to MG7d, the Rye-grass - Meadow Foxtail sub-community.

12.3.23 Zones 5 is characterised by dominance of MG9 and/or MG10. This latter is also present in the lower, wetter areas of Zone 6.

12.3.24 Zone 4 and the edge of Zone 7 are similar in that there are complex groundwater conditions arising from the wet flushes at the southern edge. Within Zone 3 Reed Canary-grass tall-herb fen (S28) predominates but Common Reed and Reed sweet-grass are also present. At the south edge, MG9 and MG10 are frequent and there are patches of S5 and Brown Sedge (*Carex disticha*). At the west edge F14 contains a stand of M24, which is indicative of gently moving groundwater.

12.3.25 The following fields would be directly affected by the Scheme. Their locations are shown in Figures 12.1A and 12.1B.

- F29 - The western part of the field is rough grassland broadly attributable to MG9 but with patches of MG10. Jointed Rush, Hemlock Water-dropwort (*Oenanthe crocata*), creeping bent and lesser stitchwort (*Stellaria graminea*) are common. There are patches of Rye-grass, Crested Dog's-tail and Couch Grass (*Elytrigia repens*) on the drier margins. In the south there are patches of Common Reed spreading from the ditch associated with H55. To the east Grey Willow (*Salix cinerea*) and Alder (*Alnus glutinosa*) of the W6 Alder – Stinging Nettle (*Urtica dioica*) community dominate a former lagoon. Reed Sweet-grass and Branched Bur-reed are common and there is an extensive area of Greater pond-sedge with some Lesser Pond-sedge (*Carex acutiformis*). Around the edges, there are patches of Fen bedstraw (*Galium palustre*), Water-pepper (*Persicaria hydropiper*) and other fen species. There is MG1 grassland in the north with Red Fescue, Yarrow (*Achillea millefolium*) and Hoary Ragwort (*Senecio erucifolius*) and with False Oat-grass on the raised ground around it;
- F9 - Primarily MG6, it is grass-dominated with Smaller Cat's-tail (*Phleum bertolonii*), Crested Dog's-tail, Couch Grass, Bents, Cock's-foot and Heath-grass (*Danthonia decumbens*). The principal broadleaf plants are Creeping Thistle, Creeping Buttercup and Stinging Nettle. Around the edges there are patches of Tufted Hair-grass and Reed Canary-grass. In the north corner there is MG9 on disturbed ground with Creeping Bent, Square-stalked Willowherb (*Epilobium tetragonum*) and occasional Marsh Foxtail. North of this there is more disturbed ground vegetation with docks

and Hedge Bindweed as well as Common Hemp-nettle (*Galeopsis tetrahit*), Water Pepper and clumps of Tall Fescue (*Festuca arundinacea*).

- F16 and F17 - These fields can be ascribed to the MG7d community characterised by Meadow Foxtail, but they have very varied vegetation. Meadow Barley and Creeping Thistle are common in the drier areas, while the wetter ground has patches of Creeping Bent and occasional Marsh Foxtail. At the east edge Tufted Hair-grass becomes quite frequent. Velvet Bent (*Agrostis canina*) was recorded in F16 in 2003.

12.3.26 Several floodplain fields with moderate biodiversity lie close to the Scheme and their main features are summarised on Table 12.5 below.

Table 12.5 Principal Features of Floodplain Grassland and Fen near the Scheme

Field	NVC Communities	Key Species	Comments
F1	MG7	Meadow Barley, Soft Rush, Jointed Rush	
F2	MG10, MG7	Soft Rush	
F27	MG1, MG10, W21a	Soft Rush, Tufted Hair-Grass, Burnet Saxifrage	Very varied mosaic of vegetation
F8	MG10, MG7, S6, MG7	Soft Rush, Tufted Hair-Grass, Greater Pond-sedge	
F10	MG10, MG9	Jointed Rush, Sharp-flowered Rush, Water Chickweed (<i>Myosoton aquaticum</i>)	
F11	W21, MG9, MG13,	Trifid Bur-Marigold, Marsh Foxtail	Rich ephemeral vegetation on spoil from ditches
F15	W6b, MG9, S5, MG7	Crack Willow, Tufted Hair-grass, Reed Sweet-grass	
F22	MG6, MG13	Soft Rush, Marsh Foxtail	Dry margins with anthills

Species-rich Neutral Grassland

12.3.27 The principal features of species-rich neutral grassland are G6 and G13.

12.3.28 Most of the field in which G6 lies is improved meadow but in the north-east corner, adjacent to H77a there is a good stand of MG5 Crested Dog's Tail – Common Knapweed (*Centaurea nigra*) grassland with Red Fescue, Crested Dog's-tail, Sweet Vernal-grass, Common Bent, Red Clover, Yarrow, Sorrel, Agrimony (*Agrimonia eupatoria*), a large amount of Common Knapweed, clumps of Oxeye Daisy (*Leucanthemum vulgare*) and frequent Dyer's Greenweed (*Genista tinctoria*).

12.3.29 The north-east part of G13 is generally flat, but in the east it falls increasingly steeply to the south-west. The biodiversity increases with the gradient. In the east it is largely MG6 with species such as Meadow Barley (*Hordeum secalinum*) and Sweet Vernal-grass (*Anthoxanthum odoratum*). These grasses and Common Bent (*Agrostis capillaris*) increase and the amount of Rye-grass (*Lolium perenne*) decreases down the slope, Broadleaved plants, notably Common Knapweed, Agrimony (*Agrimonia eupatoria*), Meadow Buttercup (*Ranunculus acris*) and clovers (including Zig-zag Clover, *Trifolium dubium*) increase.

12.3.30 While both fields are of floristic interest the invertebrate interest is greater and this is discussed below.

Mesotrophic Grassland, Scrub and Scrub Woodland

12.3.31 Sites with Mesotrophic Grassland, Scrub and Scrub Woodland are prefixed with G and are shown in Figures 12.1A and 12.1B. More information can be found in Appendix 12-C.4.

12.3.32 This category includes together with MG6 some areas of species-richness, usually as a result of poor soil or more intensive grazing, or both, together with patches of scrub.

12.3.33 Where grazing has been abandoned, grassland has usually developed to MG1 False Oat-grass grassland with patches of Bramble generally of the W24 Bramble-Yorkshire Fog underscrub. In contrast, around the farmsteads there are paddocks with areas of heavy grazing and trampling. There are also Bracken (*Pteridium aquilinum*) stands that can be ascribed to the W25 Bracken – Bramble underscrub or the U20 Bracken - Heath Bedstraw community.

12.3.34 G10 Adam's Farm contains a variety of other habitats in addition to grassland and scrub and would be directly affected by the Scheme. The land rises north-westwards from the farmhouse to two barns between two fields of MG6. From the barns, the land falls to a triangular-shaped area that includes fragments of woodland, mature trees and semi-natural vegetation, mown lawns and ornamental planting. Around the house and to the south the landscape is more ornamental, but to the east of the drive, there is a disused

quarry (W36) with a clearing at the southern end. A bank extends south-south westwards from the clearing towards the house. There are common ruderals and patches of MG1 around the barns. Within the quarry clearing and in small patches elsewhere there is disturbed and dry ground vegetation such as Common Centaury (*Centaureum erythrea*) Perforate St. John's-Wort (*Hypericum perforatum*) and Common Mallow (*Malva sylvestris*). There are patches of open MG1 with Common Knapweed and Hoary Ragwort. Occasional cultivated plants such as Stag's-horn Sumach (*Rhus typhina*) do not detract from the largely native character of the vegetation. Surrounding the clearing, the wooded margins are more varied than elsewhere. South of the quarry the short turf on the bank near the house has a good range of species within fine-leaved grassland of the MG5 community including Wood Melick (*Melica uniflora*), Wood Speedwell (*Veronica montana*), Harebell (*Campanula rotundifolia*), Bluebell (*Hyacinthoides non-scripta*) and Spanish Bluebell (*Hyacinthoides hispanica*).

12.3.35 The G20 area is a mosaic of scrub, scrub woodland and grassland, which has developed between the south-west edge of the Marline Wood SSSI and Queensway. It would also be directly affected by the Scheme. G20.1 is a 2-3m verge of sown Rye-grass behind which is a band of W21a Hawthorn-Ivy scrub, Ivy – Stinging Nettle sub-community with Bramble more-or-less dominant at ground level. There are young oak and slightly older Ash, with mixed shrubs and patches of MG1. G20.2 is broadly similar to G20.1 above but with fewer woody plants. G20.3 consists of W23 Gorse (*Ulex europaeus*) - Bramble scrub beyond which is MG1 with dense young tree regeneration further up the slope. Bramble is abundant throughout. G20.4 is MG1 with scattered shrubs. G20.5 is a plantation of semi-mature Grey Alder (*Alnus incana*) and Ash.

12.3.36 G20.6 is composed of disturbed MG1. G20.7 is a mixed band of rough grass and Blackthorn forming a transition between the woodland edge and the grassland of area 4. G20.8 is MG6 short turf dominated by Common Bent and Rye-grass. G20.9 is a Bramble-dominated edge within occasional Ash. G20.10 is a Hazel and Hawthorn hedge with an edge dominated by Bramble. Sycamores (*Acer pseudoplatanus*) have been planted along the east side. G20.11 is a small area of grassland between two bands of W21a and is divided-up by ditches. G20.12 is broadly similar to G20.4.

12.3.37 G20.13 is a patch of more-or-less uniform W24 Bramble-Yorkshire Fog underscrub. G20.14 is a bank of dense, over-mature Gorse of the W23 community. G20.15 is dense ash regeneration. G20.16 is a mixture of the Bracken U20 community and scrub with patches of MG7 with a gradual transition to G20.17. Within the latter, Elder and Grey Willow overlie Bracken and there is a rough grass edge. Bracken dominates much of G20.18, with Hawthorn mainly on the lower slope and Silver Birch (*Betula pendula*) on the upper, with larger birch (*Betula* sp) towards the south. There are patches of MG6 grassland.

12.3.38 At the centre of G20.19 there is a group of mature Pedunculate Oak. Around them there are scattered Elder and Bracken. G20.20 consists of bands of Bracken and MG6 grassland. G20.21 is dense Bracken with scattered Elder and occasional Bramble. On the low ground at G20.22 there are patches of scrub and disturbed wet grassland. G20.23 is largely the same

as area 6. G20.24 is a bramble-dominated edge to the SSSI. G20.25 is predominantly Bracken with a single large clump of Elder and patches of MG1. G20.26 is largely Gorse with Elder.

12.3.39 The centre of the strip of woodland at G20.27 is dominated by Ash with occasional oak and a very mixed edge. The ground flora has abundant ferns and climbers. Bracken is most frequent towards the edges. G20.28 is a scattering of mainly Hawthorn shrubs within G20.23. G20.29 is woodland of Sweet Chestnut, Oak and Ash. There is frequent Grey Willow alongside the railway line. G20.30 is Creeping Thistle-dominated MG7 and G20.31 is Bracken of the U20 community. G20.32 is Elder scrub with patches of Bracken. G20.33 is a shaw that contains oaks standards, abandoned Hazel (*Corylus avellana*) coppice and mixed shrubs. The presence of Meadow Barley and Burnet Saxifrage (*Pimpinella saxifraga*) may indicate that the grassland at the edges is long-established.

12.3.40 The principal features of grassland and scrub close to the Scheme but not directly affected by it are summarised in Table 12.6.

Table 12.6 Principal Features of Mesotrophic Grassland and Scrub near the Scheme

Area	NVC Community	Key Species	Comments
G1	MG6	Meadow Barley	
G23	MG6, MG1	Meadow Barley	
G4, G22	MG6	Bird's-foot Trefoil, Hay Rattle (<i>Rhinanthus minor</i>)	
G5 Buckholt Kennels	MG7, W24	Bluebell, Wood Anemone	Very varied vegetation pattern formed from recent clearance of woodland
G11,12	MG6b/c?	Meadow Foxtail	Access denied
G16	MG6b	Meadow Foxtail	

Woodland

12.3.41 Most of the woodland within the study area is ancient and semi-natural. Even the small copses, many of which appear to have been formed around marl pits, have ancient woodland ground flora as well as frequent Field Maple. More detail is given within Appendix 12-C.5. The latter often form a ring around the edges of the copses and small woodlands and may have been

planted. Within the larger copses and small woods there are large pits probably resulting from extraction of iron ore, as discussed in the Chapter 14: Cultural Heritage. In a few cases, there is a sharp distinction between the secondary vegetation of the pits and the ancient woodland ground flora of the undisturbed areas, although generally ancient woodland plants appear to have re-established on the disturbed areas.

12.3.42 The woods are typical of the High Weald in consisting of the NVC communities consisting of W8 Ash - Field Maple-Dog's Mercury woodland in the more base-rich areas and the W10 Pedunculate Oak-Bracken-Bramble community on the more acidic and drier areas. The principal sub-communities are:

- W8a Primrose (*Primula vulgaris*) – Ground Ivy sub-community;
- W8d Ivy sub-community;
- W10b Wood Anemone sub-community; and
- W10c Yorkshire Fog sub-community.

12.3.43 Much of the woodland is dominated by abandoned Hornbeam coppice. There are lesser amounts of younger abandoned Sweet Chestnut. Within wet areas, there are two sub-communities: W6d, the Elder sub-community and W6b, the Crack Willow (*Salix fragilis*) sub-community.

12.3.44 The principal ancient woodland ground flora plants are Bluebell and Wood Anemone. Yellow Archangel (*Galeobdolon luteum*) is also frequent. Other ancient woodland plants are confined to particular conditions such as wetter areas, e.g. Opposite-leaved Golden-saxifrage (*Chrysosplenium oppositifolium*) and dry banks with good light, e.g. Wood Melick (*Melica uniflora*).

12.3.45 Much of the secondary woodland and scrub belongs to the W21 Hawthorn – Ivy scrub and a considerable proportion to W21a, the Ivy-Stinging Nettle sub-community.

12.3.46 The woodland that would either be directly affected by the Scheme or would be very close to it are W8, W37, W34, W23 and W25, W26 and W55.

12.3.47 W8 has a varied edge. There is a canopy and shrub layer of Alder, Hazel, Ash and Common Sallow, together with lesser amounts of Hawthorn, Holly, Spindle (*Euonymus europaeus*) and Dog Rose. W8.1 in the centre of the wood is dominated by pole-stage Ash. Towards the west, there is Ash and Hazel coppice with patches of Alder together with a band of Alder along a wet flush through the wood. It contains several ancient woodland indicator plants including Bluebell, Yellow Archangel, Wood Sedge (*Carex sylvatica*), Early-purple Orchid (*Orchis mascula*) and Wood Millet (*Milium effsum*). Plants typical of secondary woodland include Male and Broad Buckler-ferns, Cow Parsley (*Anthiscus sylvestris*) and Hedge Woundwort (*Stachys sylvatica*). At the edge there is an open ditch with Crack Willow, MG1 False Oat-grass grassland and Meadowsweet. The drier areas belong to W10c and the wetter areas to W6a.

12.3.48 W37 is a shaw on the east side of the Powdermill Stream extending from H84a to the disused railway abutment. Pedunculate Oak and Ash dominate it. There are frequent Ramsons (*Allium ursinum*) in the ground flora and a fringe of Dog Rose, Hawthorn and Blackthorn merging with dense Nettles at the edge of the stream. At W37a another shaw lies alongside the track from Adam's Farm down to the bridge over the Powdermill Stream. This consists of a single line of Pedunculate Oak and Ash and a quite densely shaded bank beneath with abundant Ivy, but also Soft Shield Fern (*Polystichum setiferum*), Red Campion and Wild Arum in addition to weed species like Cleavers and Ground Elder (*Aegopodium podagraria*).

12.3.49 Much of W34 is open and there is a ground flora of Rosebay Willowherb (*Chamerion angustifolium*), thistles, Smooth Sow-thistle, Creeping Buttercup (*Ranunculus repens*) and nettles. Bracken is dominant in several areas and the principal surviving woodland plants are Hazel, Ash, Holly and Blackthorn. At the north end there is a dense, soft edge of Holly, Ash and Hazel.

12.3.50 W23 Chapel Wood is a varied north-facing wood, largely ancient, with a gradient from dry ground with Bracken at the south edge to wetland vegetation in the north. As a result of these varied ground conditions it has a diverse ground flora with a least 15 ancient woodland indicator plants, including Great Woodrush (*Luzula sylvatica*), Hard Fern (*Blechnum spicant*) and Wood Sorrel (*Oxalis aceosella*). The central part (W23.1) is dominated by abandoned Hornbeam coppice and there is a gradient from W10 that is dominated by Bluebell on the upper slopes to W8, and by Ramsons with Wood Anemone on the lower slopes. At the foot of the slope there is a wet area (W23.2) dominated by Pendulous Sedge and Hemlock Water-dropwort, with abundant Yellow Archangel. To the east is a disturbed area with many fallen trees with upturned rootplates. This is nevertheless probable ancient woodland and has a dense growth of Holly (W23.3). At the east end adjacent to Crowhurst Lane there is the remains of a small quarry (W23.4) now densely shaded by Hornbeam. The southern edge (W23.5) is very mixed, with Sweet Chestnut, Willow, Ash, Oak and Hazel. W23.6 is a disturbed area of W24 Bramble-Yorkshire Fog underscrub with Elder and patches of Bracken. There are small grassy clearings where Scaly Male-fern (*Dryopteris affinis*) is a conspicuous feature. Down the west side, outside the woodland there is a band of Gorse. Adjacent to Decoy Pond Stream there are mature Pedunculate Oak and Ash with abundant Ramsons in the field layer, similar to Decoy Pond Shaw.

12.3.51 W35 is Blackthorn and Hawthorn scrub which has been grazed by pigs so that there is now no ground flora.

12.3.52 W24 consists of secondary scrub woodland with Ash, Field Maple and Oak and a ground layer of W24 Bramble-Yorkshire Fog underscrub.

12.3.53 W24 (equivalent to OA 327) comprises of two rows of Hazel which have probably been planted and a varied woodland ground flora with abundant Ramsons and Bluebell.

12.3.54 W26 is railway-side woodlands on steep cuttings. Pedunculate Oak dominates them, although Ash, Turkey Oak (*Quercus cerris*) and Sweet Chestnut are also present. There is an intermittent shrub layer, principally of Hawthorn. Ivy dominates the ground layer in the shaded areas and Male Fern is frequent. The more open areas have dense Bramble and Stinging Nettle. Nearer the railway line there is a band of vegetation cut on a two-year cycle with frequent Hazel plus Dog's Mercury, Ivy and Stinging Nettle. The herbaceous vegetation extends into the areas nearer the track that are cut annually. Angelica (*Angelica sylvestris*), Field Horsetail and thistles are common, as are plants of dry banks like Bush Vetch (*Vicia cracca*). There are occasional wet flushes with Hemp Agrimony, Pendulous Sedge and Butterbur (*Petasites hybridus*). In these more open conditions, woodland plants such as Bluebell and Broad-leaved Helleborine (*Epipactis helleborine*) can be found. Scrambling plants, notably Wild Clematis (*Clematis vitalba*) and Hedge Bindweed, are frequent. W26a is the same as the woodland on the opposite side of Queensway, consisting of planted Field Maple and Ash with an edge of W24 underscrub.

12.3.55 W55 is a mixture of W6 Alder- Stinging Nettle woodland and W10 with Hornbeam. The Alder wood lies along a stream at the southern edge. There is a small amount of Crack Willow in the north and Stinging Nettle dominates the ground flora. The Hornbeam coppice has a ground flora of Bluebells and opens out to W24 underscrub adjacent to the railway woodland.

12.3.56 The features of woodland near but not directly affected by the Scheme are listed in Table 12.7.

Table 12.7 Principal Features of Woodland near the Scheme

Woodland	NVC Communities	Key Species	Comments
W1	W24, MG1.	Pedunculate Oak	Planted oak with dense scrub edge.
W5	W6, W24	Hazel, Alder, willows, Downy Birch (<i>Betula pubescens</i>) Hemp Agrimony (<i>Eupatorium cannabinum</i>).	Mixed canopy over fen.
W5.1	W6	Yellow Archangel, Guelder Rose, Opposite-leaved Golden-saxifrage and Wood Anemone.	Yellow Archangel and other species cited indicate ancient woodland

Woodland	NVC Communities	Key Species	Comments
W5.2		Hogweed (<i>Heracleum sphondylium</i>), Field Horsetail (<i>Equisetum arvense</i>)	Disturbed ground with piles of spoil.
W5.4	S26	Pedunculate Oak, Common Reed	Overgrown ditch with line of trees.
W31-3	W10, W8	Field Maple, Pedunculate Oak, Ash, Hornbeam coppice Bluebell, Wood Anemone Yellow Archangel.	Old marl pits with seasonal ponds
W9 Little Henniker Wood.	W10, W8	Sweet Chestnut and Hornbeam coppice.	
W9.1	W24, W10	Hornbeam coppice	
W9.4	MG1	Bluebell, Butcher's Broom (<i>Ruscus aculeatus</i>), Wood Anemone, Wood Melick, Saw-wort (<i>Serratula tinctora</i>)	Species-rich woodland edge linking to hedgerows OA535 to the east and Buckholt Lane to the west
W11 Great Henniker Wood	W10, W8, W6	Pedunculate Oak Hornbeam, Sweet Chestnut coppice, Alder, ferns	
W11.1		Scots Pine (<i>Pinus sylvestris</i>), Ash	Planted copse.
W12 Hanging Wood.	W10	Pedunculate Oak, Hornbeam coppice, Yellow Archangel, Yellow Pimpernel (<i>Lysimachia nemorum</i>), Bracken	Ancient coppice stools on an old bank.

Woodland	NVC Communities	Key Species	Comments
W36 Adam's Farm	W10, W8	Hazel, Ash, Grey Willow, Hornbeam, Spurge Laurel (<i>Daphne laureola</i>)	Scrub woodland over a disused quarry with hanging Ivy.
W36a and W36b		Field Maple	At W36a there is a holloway through the area leading north westwards. Poor groundcover.
W17	W8	Field Maple, Hornbeam, Spurge Laurel	Woodland formed within hollow
W18 Decoy Pond Wood	W8, W6	Pedunculate Oak, Wych Elm (<i>Ulmus glabra</i>), Hazel, Sycamore, Bluebell, Yellow Archangel, Greater Pond-sedge, Yellow Flag	Ponds with fen margins within disturbed ancient woodland
W19 Little Bog	Most likely W6	Panicle Sedge (<i>Carex paniculata</i>), Alder, Hemlock Water-dropwort	Fringe of dry ground vegetation around dense tall fen underneath Alder
W25 Decoy Pond Shaw	W8	Pedunculate Oak, Hazel, Ramsons	Typical dense Wealden streamside shaw
W22	W10	Field Maple, Pedunculate Oak, Bluebell	Copse around marl pit
W28	Most likely W8, MG1	Poplar, Wych Elm	Secondary woodland linking H104 and W55

Woodland	NVC Communities	Key Species	Comments
W27 Marline Wood South edge	W10	Hornbeam coppice, Bluebell	Wide ride through the centre
W57 Monkham Wood	W10	Hornbeam coppice, Bluebell	

Ditches and Streams

12.3.57 All the principal ditches and streams are shown in Figures 12.1A and 12.1B. The NVC is of limited use in the survey and classification of ditches (Rodwell 1995, 17-22) using the method devised by Palmer with a single section was used (Palmer, 2002), as described in Appendix 11-C.3. It is nevertheless convenient to refer to NVC communities for some aspects of description. Most ditches are dominated by Common Reed (*Phragmites australis*), Reed Sweet-grass, Reed Canary-grass or Branched Bur-reed (*Sparganium erectum*).

12.3.58 The average number of species per 20m length for almost all ditches is low and well below the 7 given by Palmer for a ditch in favourable condition.

12.3.59 The following NVC communities are present:

- A2 Common Duckweed (*Lemna minor*) community;
- A3 Greater Duckweed (*Spirodela polyrhiza*)-Frog-bit (*Hydrocharis morsus-ranae*) community;
- A4 Frog-bit - Water-soldier (*Stratiotes aloides*) community;
- A5 Hornwort (*Ceratophyllum demersum*) community;
- A7 Yellow Water-lily (*Nuphar lutea*) community;
- A9 Floating Pondweed (*Potamogeton natans*) community;
- A15 Nuttall's Waterweed (*Elodea nuttallii*) community; and
- S17 Cyperus Sedge (*Carex pseudocyperus*) swamp. Together with the S4, S5, S6, S12, S14, S22, S26 and S28 communities present in the Floodplain Grassland and Fen.

12.3.60 The significance of the ditches and streams within the study area needs to be placed in the context of the Combe Haven Valley as a whole and the linear habitat network shown on Figure 12.4. The largest number of ditches with scores on Palmer's system of over 7 are in the south side of the haven, downstream of the viaduct abutment, as it was in 1995 (Rich 1995).

12.3.61 Grazing, which keeps down the vigorous marginals and results in trampled, shallow edges, is undoubtedly a major factor in their species richness. But the ditches here are also wider than elsewhere with higher water levels. The other principal areas of high-scoring ditches are around new pasture just south of the Decoy Pond Wood and on the north side of the Haven from D53 westwards to D20 south of Adam's Farm.

12.3.62 Outside these areas, particularly where the land is ungrazed, the ditches are species-poor, although in several cases it was not possible to sample the ditches safely. Within the main valley outside the SSSI, adjacent to Watermill Stream Valley and the Powdermill Stream Valley, the ditches are generally poor, perhaps as a result of their steep sides, water levels and flow rates.

12.3.63 There are few species of shallow water such as Common Skullcap (*Scutellaria galericulata*) because the ditches are generally steep-sided, even when they are being managed under the Countryside Stewardship Scheme. This is likely to account for the decline of species like Water Horsetail (*Equisetum fluviatile*) and the water-dropworts since 1995 (Rich 1995a). However, allowing for the decline in the variety of ditch conditions, the range of species is nevertheless lower than on sites like Pevensy Levels, as is the case for the invertebrates discussed below. This does not necessarily mean that the biodiversity of the site is lower than other larger wetlands within the region, simply that it has a distinctive flora.

12.3.64 The following watercourses would be directly affected by the Scheme or would be very close to it: D2, D4, Watermill Stream, D19, D29, D40, D36, D35, D37 Powdermill Stream, D33 and Decoy Pond Stream.

12.3.65 D2 is the main Combe Haven Channel. It is deep with near-vertical sides overhung by the vegetation on the banks. There is intermittent Blackthorn, Hawthorn, Alder, Pedunculate Oak and Grey Willow on the banks which have a ground flora of MG1 with Stinging Nettle, Broad-leaved Dock, Cleavers, Creeping Bent, Cock's-foot, Rough Meadow-grass and similar species rich ground which overhangs the stream.

12.3.66 On the shaded banks there is Male Fern (*Dryopteris filix-mas*), Herb Robert (*Geranium robertianum*) and Ivy. Where there is more light patches of grasses, Giant Stitchwort (*Stellaria holostea*) and Common Knapweed (*Centaurea nigra*) are present.

12.3.67 The principal aquatic and wetland species are Common Reed, Reed Canary-grass, Meadowsweet (*Filipendula ulmaria*), Floating Sweet-grass, Hemlock Water-dropwort and Fool's Watercress (*Apium nodiflorum*).

12.3.68 D4 has abundant Common Reed, Fool's Watercress, Reed Canary-grass, Hemlock Water-dropwort and Great Willowherb in the south. The margins are dominated by MG1 with abundant docks. There is greater variety of wetland plants to the north, with abundant Reed-Canary Grass and Stinging Nettle as well as Marsh Woundwort (*Stachys palustris*) and Yellow Flag (*Iris pseudacorus*).

12.3.69 The lower part of the banks of the Watermill Stream within the area of landtake are dominated by Grey Willow. On the east side there is a bank 1.5 m high, covered with MG1. There is a narrow berm adjacent, then a ditch about 2m wide with a lower bank and also MG1 on the opposite side. There is Hedge Bindweed (*Calystegia sepium*) and Stinging Nettle at the edges. Within the more open areas, Branched Bur-reed, Greater Pond-sedge, Broad-leaved Pondweed, Floating Sweet-grass, Arrowhead (*Saggitaria saggitifolia*) and Lesser Duckweed are present.

12.3.70 Upstream, there is another recently-cleared section with Branched Bur-Reed, Lesser Duckweed, Water-pepper, Himalayan Balsam (*Impatiens glandulifera*), Reed Sweet-grass, Reed Canary-grass and patches of Fool's Watercress, MG1 and Stinging Nettle on the banks.

12.3.71 D19 has intermittent woody vegetation along it, comprising a clump of Pedunculate Oak, Hawthorn, Common Sallow, Dog Rose (*Rosa canina*) and Holly (*Ilex aquifolium*). There is a dense growth of Hedge Bindweed, Stinging Nettle, Bramble, Bittersweet, Creeping Bent and patches of MG1 and soft rush on the banks. The aquatics in the ditch are Bulrush (*Typha latifolia*), Branched Bur-reed and Greater Pond-sedge.

12.3.72 D29 is dominated by Reed Sweet-grass and Common Reed with frequent Reed Canary-grass. However, there are sufficient open areas to support occasional Yellow Loosestrife (*Lysimachia vulgaris*), Water Plantain (*Alisma plantago-aquatica*), Purple Loosestrife *Lythrum salicaria*), Trifid Bur-marigold (*Bidens tripartita*), Broad-leaved Pondweed (*Potamogeton natans*) and Marsh Woundwort. The edges are dominated by Tufted Hair-grass with frequent Silverweed (*Potentilla anserina*) and Creeping Bent.

12.3.73 D40 is dominated by Reed Sweet-grass and Common Reed. It is sufficiently dry for Bramble to be abundant.

12.3.74 D36 is more-or-less dominated by Common Reed with occasional Reed Canary-grass. W22, the Blackthorn-Bramble scrub community, has started to develop and there are patches of Grey Willow at the wetter edges. There are occasional Hawthorn and Pedunculate Oak and Ash (*Fraxinus excelsior*) standards, together with abundant Hedge Bindweed.

12.3.75 The margins are dominated by MG1 with Yorkshire Fog and patches of Stinging Nettle. At the north end, the ditch has almost completely disappeared adjacent to an arable field.

12.3.76 D35 has very little water and is dominated by Common Reed with the following in the damper areas: Meadowsweet; Soft Rush; Purple-loosestrife; Water-pepper; Reed Canary grass; Branched Bur-reed; Great Willowherb; Water Starwort; Hemp Agrimony; Water Forget-me-not (*Myosotis scorpioides*); Marsh Woundwort; and, Redshank (*Persicaria maculosa*).

12.3.77 D37 Powdermill Stream, lies within a deep channel and is over-arched by Alder, Field Maple, Blackthorn, Ash and Pedunculate Oak. There is a fringe of rough grassland with Yorkshire Fog, thistles, Cock's-foot and other

rough grassland species with patches of marginal vegetation including Fool's Watercress, Water Chickweed, Gipsywort and Purple-loosestrife as well as plants of damp ground such as Common Fleabane (*Pulicharia dysenterica*).

12.3.78 D33 is almost entirely dominated by Reed Sweet-grass with occasional Reed Canary-grass and Meadowsweet. There are scattered Pedunculate Oak, Willow and Hawthorn on the banks where the vegetation is MG7.

12.3.79 The Decoy Pond Stream has virtually no aquatic vegetation and lies within a deep channel overhung by tall grassland, Bramble, Dog-rose and Bracken

12.3.80 The Scheme would be close to several other ditches and the principal features of these are summarised on Table 12.8

Table 12.8 Principal Features of Ditches and Streams near the Scheme

Ditch	NVC Communities	Key Species	Comments
D3 and D4	MG1	Grey Willow, Reed Canary-grass, Common Reed, Branched Bur - reed	
D7	MG13	Water-pepper, Lesser Spearwort	More-or-less dry
D27		Branched Bur-reed, Lesser Spearwort, Trifid Bur-marigold, Frogbit	Recently cleared
D6	S26	Common Reed	Species-poor, steep sided
D14	MG10	Soft Rush	
D15		Bulrush, Gypsywort, Branched Bur-reed	
D20	S26	Hawthorn, Common Reed.	
D21	MG1, MG9	Trifid Bur-marigold, Unbranched Bur-reed, Frogbit, Water Hyacinth	Very varied
D22	S6	Reed Sweet-grass, Branched Bur-reed, Frogbit	Recently cleared
D24a	MG9, MG1	Flote-grass, Reed Sweet-grass, Branched Bur-reed	More-or-less dry
D38	S26, S6	Common Reed, Reed Sweet-grass, Fine-leaved Water-dropwort, Unbranched Bur-reed.	
D47	S6, MG10, MG9	Reed Sweet-grass, Frogbit	
D60	S6, MG1	Reed Sweet-grass, Frogbit, Fine-leaved water-dropwort	Rich open patches within dense Reed Sweet-grass

Ditch	NVC Communities	Key Species	Comments
D59	W6	Crack Willow, Reed Sweet-grass, Lesser Pond-sedge	Willows are pollarded
D28	S26	Common Reed, Frogbit	Dried out in some areas but open water at central section

Hedgerows

12.3.81 The hedgerows are shown in Figures 12.1A-B and 12.4. NVC mapping of hedgerows is of limited value because most would fall into the W21 Hawthorn -Ivy scrub community, despite a wide ranging structure and species composition. The Hedgerow Evaluation and Grading System (HEGS, Clements and Tofts 1992) was therefore used as described in Appendix 12-C.6. It provides an estimate of the biodiversity significance of a hedgerow from 4 (very low value) to 1+ (very high value). For hedgerows on or near the line of the route these records were supplemented by notes on the NVC communities present on the verges and by listing higher plant species.

12.3.82 The study area and the Weald in general has a high frequency of unmanaged hedgerows and shaws with frequent standards and a moderately wide range of shrubs, although this is not as great as on calcareous soils. The principal standards are Pedunculate Oak and Ash but Field Maple is locally frequent as a standard and as a shrub. Some of the hedges have spread to form a wide scrub edge, and while these can have significant biodiversity, they often consist of uniform Blackthorn. Some have ancient woodland indicator plants, principally Bluebell and Wood Melick. At the edge of the floodplain the unmanaged hedgerows have wet ditches.

12.3.83 Managed hedges are often cut to below 1.5m and are generally species-poor, often with only Hawthorn and Blackthorn. They are mainly within arable areas. The verges between the hedge and the pasture or arable crop are narrow and consist of weed species such as Stinging Nettle and Cleavers within MG1. Occasionally there are banks with a finer sward comprising mainly Red Fescue and Common Bent.

12.3.84 In addition to their individual habitat value, the contribution that hedgerows and shaws make to the network of habitats across the area and their value as historic landscape features needs to be considered. Figure 12.4 shows the hedges graded according to HEGS and the ditches. The latter usually have edges of MG1, and, particularly towards the edges of the floodplain, Bramble or intermittent shrubs providing continuity of habitat with the hedgerows.

12.3.85 Figure 12.4 shows five areas where there is a high concentration of hedgerows with high HEGS scores linked to copses and woodland: from

Chapel Wood south to the floodplain; around Adam's Farm; around Byne's and Hillcroft Farms; north and south of Combe Wood; and, north of Pebsham.

12.3.86 Hedgerows have cumulative significance where they are species-rich, have ancient woodland plants and historic landscape interest. In order to allow interpretation of this, the Oxford Archaeology reference numbers have been used for hedges near the route as shown on Figures 12.3A-E. In this respect, Buckholt Lane as far as Acton's Farm, the disused holloway W4 leading from the high ground into the floodplain, and the ridge-top lanes extending south past Hillcroft Farm and Adam's Farm have particular significance.

12.3.87 The main characteristics of hedgerows that would be cut by the Scheme are listed in Table 12.9.

Table 12.9 Hedgerows Affected by the Scheme

Hedgerow	HEGS Grade	Comment
OA500	2-	Large but managed hedge
OA502	3	
OA503	1-	Tall hedge significant for bats and Dormice
OA504	1-	Tall hedge significant for bats and Dormice
OA505	2	Species rich significant for Dormice
OA507	3	
OA508	3	Intermittent
OA509	2	Substantial ditch adjacent
OA510	3	Low but species rich and significant for Dormice
OA511	3	Low but species rich and significant for Dormice
OA512	3-	Low and intermittent
OA515 Powdermill Stream Shaw	1-	Substantial shaw adjacent to ditch
OA520	3	
OA521	3	
OA535	3	
OA528	3	
OA526	3	
H1	4	Very slight
Crowhurst Lane OA529, OA530	1-	Deep sunken lane with ancient woodland flora

Urban Areas

12.3.88 The urban area is divided into compartments UA1-55 which are shown on Figures 12.2A-D. South of Bancroft Road, the vegetation comprises mainly regularly-mown amenity grassland of the MG7 community with patches of ornamental planting and W24 Bramble - Yorkshire Fog underscrub. In places such as the abandoned gardens at the south end of London Road, shown as UA2 on Figure 12.2A), MG1 False Oat-grass grassland predominates. The Egerton Stream is in an open channel for much of this section, but it is often dry and has hardly any aquatic marginal vegetation.

12.3.89 Between Bancroft Road and Woodsgate Park Road there are dense, often impenetrable areas, of W24 (UA17, 18, 19 and 21 on Figure 12.2A and B) abundant Stinging Nettle and frequent willows (many of which appear to have been planted). On the drier areas (UA20) the scrub is developing as woodland and belongs to the W21a sub-community of Hawthorn-Ivy scrub. Stinging Nettle is abundant everywhere. Here the Egerton Stream (UA15) is dominated by Hemlock Water-dropwort and Pendulous Sedge.

12.3.90 Between Woodsgate Park and the ESCC depot there is a mosaic of W6a Alder- Stinging Nettle woodland dominated by Crack Willow and patches of MG1 False Oat-grass grassland (UA24-5, 27-9, 31-3 on Figure 12.2B). At UA31 there is an abandoned garden/orchard with the remains of fruit trees and coppiced Hazel. This is more varied than most of the other patches of woodland in the urban corridor, but is quite heavily used by the public. The stream vegetation and the MG1 grassland on the east side (UA30 and 26) are a little more varied than elsewhere.

12.3.91 Adjacent to the ESCC depot there is quite dense woodland (UA34) which extends northwards to W24 at UA36 on Figure 12.2B. The latter is also present on the steep slope below the rear gardens of Buxton Road (UA40 on Figures 12.2B and C). Between these two areas there are ruderal communities typical of dry, gravelly ground (UA37-9). North of the old engine shed as far as Ninfield Road Bridge, much of the ground is hard surface but there are two bands of scrub woodland (UA42,45 on Figure 12.2C) which are predominantly native but containing a few ornamental species.

12.3.92 From the Ninfield Road Bridge northwards, the banks of the cutting (UA48-9 on Figure 12.2C and D) are covered in dense secondary scrub woodland of the W21 community, with abundant Sycamore and with Ivy dominating the ground flora. A small number of ancient woodland indicator plants, notably Bluebell and Hart's-tongue Fern (*Phyllitis scolopendrium*) occur, although these areas are obviously not ancient woodland. At the south end of this area, where drainage along the surface of the railway track has been impeded (UA50), mud and stagnant water has accumulated and a small amount of aquatic vegetation is present.

12.3.93 The scrub woodland on the cutting slopes continues to just past Glover's Farm (UA 51, 52 and 55 on Figure 11.2D). At the north end there is another flooded area (UA54) which has more frequent wetland vegetation, including the locally uncommon Large Bitter-cress (*Cardamine amara*).

Habitats of Low Value

12.3.94 In the Phase 1 survey, in addition to the habitats above, species-poor improved grassland and arable land was identified and excluded from further surveys. Nevertheless, during the two years over which the surveys took place the edges of arable fields were inspected for uncommon arable weeds in the course of other surveys, but none were found. The species-poor improved grassland belongs to the MG7 or MG6 Rye-grass communities.

Rare and Uncommon Higher Plants

12.3.95 The nationally-scarce species Whorled Water-milfoil (*Myriophyllum verticillatum*) was recorded in 1995 near the abutments of the disused railway about 800m from the nearest point to the road (Rich 1995). The area was re-surveyed in 2005 (ACTA 2006) when the species was not found. It is said to be still present in one or two ditches. The Sussex Rare Plants Register notes the following species as having been found in the locality:

- Frog-bit;
- Small Pondweed (*Potamogeton brechtoldii*);
- Blunt-leaved Pondweed (*Potamogeton obtusifolius*);
- Hairlike Pondweed (*Potamogeton trichioides*);
- Ivy-leaved Crowfoot (*Ranunculus hederaceus*);
- Fringed Water-lily (*Nymphoides peltata*);
- Water-soldier (*Stratiotes aloides*); and,
- Curved Hard Grass (*Parapholis incurva*).

12.3.96 Corky-fruited Dropwort (*Oenanthe pimpinelloides*) was also found in Combe Haven in 1995 by Dr. Rich but the occurrence is not noted in the Register, nor is the more recent record for widespread Bladderwort (*Utricularia australis*).

12.3.97 The following are also of localised distribution:

- Water Violet (*Hottonia palustris*)
- Arrowhead (*Sagittaria saggitifolia*)
- Flowering Rush (*Butomus umbellatus*)

12.3.98 Of these, only Frog-bit, Water Violet, Arrowhead and Bladderwort have been found within the study area.

Badgers

12.3.99 Prior to the start of assessment it was apparent from work carried out for the BHWB that the study area has a large Badger (*Meles meles*) population. This work showed particularly dense concentrations of active setts round the edges of the Combe Haven Valley from which the Badgers feed on the grassland below.

12.3.100 In 2005 and 2006 Badger surveys were carried out in accordance with the methods described by Bennett *et al* (2005). Since many of the principal setts were already known, the study area was 300m either side of the centreline of the route searching for signs of activity, presence of setts, footprints, dung pits, snuffle holes and runways. Setts were assessed to establish the level of use.

12.3.101 The information has been brought together in a confidential report which has been submitted to Natural England. The overall pattern of Badger activity and indicative location of setts are discussed here.

12.3.102 Within the urban area, north of Woodsgate Park and as far as Glover's Farm, there are several large, active setts. The Badgers feed within the disused railway line and the adjacent residential property, but also more eastwards along the railway line at night to feed in the rural area around Glover's Farm. Within the Glover's Farm landholding there are many Badger setts. But apart from one small outlying sett they are not near enough to the Scheme to be an issue. Within the Watermill Valley the setts are away from the line of the Scheme route, but between the Watermill Valley and the Powdermill Valley there is a sett on the line of the Scheme. From the Powdermill Valley eastwards there are several setts near the road but not directly affected by it. There is, however, a widespread pattern of Badger movement across the whole of the rural area which would need to be addressed in mitigation.

Bats

12.3.103 Information from the Sussex Biodiversity Record Centre (SxBRC) received prior to the start of assessment showed that Noctule Bat (*Nyctalus noctula*), Pipistrelle (*Pipistrellus pipistrellus*) and Brown Long-Eared Bat (*Plecotus auritus*) had been recorded in the area.

12.3.104 Bat surveys were carried out in July-August 2004-6 and are reported in detail in Appendix 11-D.1 where the methods used are described in full. In summary, they consisted of:

- Daytime assessment of trees and buildings with potential for bat roosts;
- Emergence checks on trees and buildings with potential as bat roosts;
- Transects using bat detectors to identify the overall pattern of bat movements; and,

- Internal examination of buildings where roosts were suspected and of buildings that would be demolished on the line of the route where access was permitted.

12.3.105 The following species were confirmed in the 2004 survey: Common Pipistrelle; Brown Long-Eared; Myotis sp (probably Natterer's (*Myotis natteri*), Noctule and Serotine (*Eptesicus serotinus*). They indicate that the study area supports a good, but not exceptional range of bats.

12.3.106 The main centres for activity were Adam's Farm where a Brown Long-Eared maternity roost and a hibernating roost may be present (access was denied at the appropriate survey time) and Upper Wilting Farm where a Brown Long-Eared roost of unknown status was located.

12.3.107 Foraging was recorded throughout the area, but Adam's Farm, Acton's Farm notably north of the farm around hedges OA504/3 and the disused railway line were the areas with greatest activity. The mature trees of the latter provide good foraging habitat and a number of roosting opportunities in the trees and bridges.

12.3.108 Trees that are suitable as bat roosts on surveys in all years are shown on Figure 12.5. However, this survey gave only a preliminary view. Further surveys were therefore undertaken in 2005 and 2006 which indicated there were a number of trees with high and medium bat potential. The results of these completed surveys are given in Appendix 11-D.1.

12.3.109 In 2005 the study area was divided into the four sectors shown on Figure 12.5. Five species were confirmed in transects of these sectors, Serotine, Noctule, Common Pipistrelle, Soprano Pipistrelle and Long-Eared. In addition, three species of Myotis were probably recorded: Natterer's, Whiskered/Brandt's (*M.brandti*) and Daubenton's (*M.daubentonii*) but these species cannot be easily separated by their echolocation.

12.3.110 Table 12.10 details the movement of bat species based on the findings of the 2005 study.

Table 12.10 Movement of Bats – 2005 Survey

Bat Species	Number of Registrations	Comments
Myotis sp.	13	Daubenton's can be identified by its habit of flying low over the waters surface, Natterer's by its echolocations. However, this distinction cannot be made if call recordings are faint or if bats are behaving in an uncharacteristic way. These are referred to as Whiskered/Brandt's. Myotis activity was generally low along the Scheme route and registrations were usually of individuals, however, on three occasions two bats were recorded together.
Serotine	2	
Noctule	24	Registrations made in sectors 2, 3 and 4. Noctules can forage over great distances, and when flying high their echolocation can be recorded from a distance. It is thus possible that some of the registrations were of the same bats.
Common Pipistrelle	70	This species was the most common with 70 registrations in August. The favoured foraging areas were along mature hedgerows, woodland edges and around large trees.
Soprano Pipistrelle	24	This species has a greater preference for wetland than the Common Pipistrelle and is typically found foraging along watercourses or over lakes and ponds. There were 24 registrations, many of them relating to more than one bat.
Brown Long-eared	Possibly 7	This species is difficult to survey because it feeds by flying close to leaves listening for prey. Their echolocation is very quiet and is only registered by a bat detector when the bat is very close. They are often overlooked in bat surveys. There were seven registrations in all surveys, and most were associated with a roost site where the bat was seen leaving or entering a building.

12.3.111 .The surveys, which are dealt with in full in Appendix 12-D.1A, emphasise the focal points of Adam's Farm, Acton's Farm (particularly the link between OA503-8 and the hedges abutting Hanging Wood) and Upper Wilting Farm as well as discussing the urban area and buildings to be demolished.

Dormice

12.3.112 Prior to the start of the assessment in 2004, Common Dormice (*Muscardinus avellanarius*) were known to be present in Marline Valley Woods in considerable numbers and in the woods and scrub south from Marline Valley Woods SSSI up to Upper Wilting Farm (BHWB ES and SxBRC). It was also believed that they could be present in other nearby suitable habitat such as the Buckholt Woods SNCI complex shown in Figure 12.1B at W9-14 (communications with Hastings Wildlife Group and Patmore and Wheeler 2000), Fore Wood RSPB reserve (TQ753128) and the disused railway line. They had also been recorded in Combe Wood in the 1980s. They are widespread in the locality in general and are often found in hedges and even fens in locations well away from the mature Hazel coppice with climbing and scrambling plants usually regarded as their favoured habitat (Corbett and Harris 1991).

12.3.113 A preliminary survey was carried out in 2004 using the methods of the National Dormouse Survey that is contained in Appendix 11-D.2 and in Hurrell and McIntosh 1984. Habitats were identified as good or bad for Common Dormice using Bright and Morris' criteria (Bright and Morris 1989). Two principal areas with potential were identified. The first area was centred on Combe Wood (approximately 800m to the south of the proposed Scheme route). In addition, although no direct evidence was found on the disused railway line, this can probably be included since the habitat is suitable and contains several large overgrown hedges. The second area was far larger and extends from Cole Wood and Hanging Wood (W12) in the north-west to Chapel Wood (W23) and Park Wood (W47) in the north-east. Nearly all of the hedgerows within this area either had Common Dormouse-eaten nuts or were potentially good habitat for this species. The land further south along the railway line and in Monkham Wood (W57) and Redgeland Wood (W61) has suitable habitat but no signs were found. Dispersing juveniles are quite likely to use any hedgerow within the study area or even tall fen. In summary, by the end of 2004 it was established that Common Dormice are widespread in the study area.

12.3.114 In June 2005, 220 dormouse tubes and 45 dormouse boxes were put up in the hedgerows and woods. The locations are shown in Figure 12.6. They were erected in lines of between 5 and 20, often using a mix of tubes and boxes approximately 10m apart, at chest height. The tubes were checked once a month between August and October 2005 for evidence of nesting material or live animals. During October 2005 the areas where boxes were erected were also searched for evidence of foraging dormice. Attention was paid to all fruiting Hazel looking for signs of the distinctive markings and access holes that the species leaves on the nuts. The location of evidence is shown on Figures 11.6.

12.3.115 The presence of Common Dormice was confirmed over a wide area and 11 hedgerows that would be crossed by the Scheme support them. Few boxes or tubes had been used and most evidence came from nuts. The results are shown on Table 12.11.

Table 12.11 Summary of Common Dormouse Survey Results

Site	Evidence
1 Disused Railway	Nuts found throughout. 1 box with nest
2 OA535	Several nuts at east edge. No tubes or boxes used
3 H59	No tubes or boxes used, but connecting hedge has Dormice
4 OA507	No tubes or boxes used. Nibbled nuts in west and south arms
5 H55	No evidence
6 OA510/11	Nibbled nuts throughout. No tubes or boxes used
7 OA517	No evidence
8 W37	Nibbled nuts in north and one box with nest
9 Disused Railway	Nibbled nuts throughout. No tubes or boxes used
10 OA520	No evidence
11 OA521	Nibbled nuts throughout. No tubes or boxes used
12 OA521	Nibbled nuts in north. 1 box with nest
13 Chapel Wood	Nibbled nuts throughout. No tubes or boxes used
14 Crowhurst Lane	No tubes or boxes used. Nibbled nuts beneath one Hazel
15 W26 West	No evidence but present on adjacent railway line
16 W26 East	Nibbled nuts throughout. No tubes or boxes used
17 G20.9	No evidence

Otter

12.3.116 Sussex is one of the few counties where Otter (*Lutra lutra*) recovery is still tenuous (Species Action Plan for Sussex, Otter 2002). The Sussex Otters and Rivers Partnership have four records for the area, three from Filsham Reedbed and Combe Haven Valley SSSI in 2001 and one near Galley Hill, Bexhill Seafront from 2002. It is quite possible that the 2001 records were of the same individual.

Water Voles

12.3.117 Water Voles (*Arvicola terrestris*) are said to have been common in Combe Haven until recently. They were reported in 1998 (SxBRC). They are currently the fastest declining mammal in Britain (Species Action Plan for Sussex, Water Vole, 2002). In Sussex, the first national survey carried out during 1989/90 found that 71% of 63 sample sites had positive signs. The second survey in 1996/98 had only three sites that still had positive signs.

12.3.118 A search for Water Voles during 2005 was part of a more general survey across the Combe Haven Valley as a whole. An area roughly corresponding with the study area for the road plus the proposed Pebsham Countryside Park and nature reserve, shown in Figure 12.7, was surveyed by searching for field signs such as latrines, tunnels, burrows, grazed areas, paths, trails, runs and footprints (Strachan 1998).

12.3.119 For the Scheme, each watercourse was surveyed for 100m either side of the point where the route would cross it. The dense vegetation alongside many ditches and the steep banks meant that some watercourses were difficult to survey.

12.3.120 Only one Water Vole was found in the whole of the area of search. This was near the Southern Water Sewage Works, a considerable distance from the Scheme. Evidence of mink (*Mustela vison*) was extensive and it is quite likely that they have removed the water voles. Discussions with local landowners suggest that the species may still be present in some of the upper reaches of the adjacent valleys but there is no evidence for the species within the study corridor.

Water Shrews

12.3.121 Water Shrews (*Neomys fodiens*) were surveyed in August/September 2005 by laying baited tubes as used by the Mammals Society at 16 locations along watercourses across the study area as shown in Figure 12.7. Small mammals leave droppings when they enter the tubes to feed on the larvae; these were collected after two weeks and identified. Water shrews were found to be present at three of the 16 survey sites, two of which (WS3 and WS6) are on the line of the Scheme route. However, it is quite possible that the species occurs in other areas of wet grassland and fen. Terrestrial shrews were present at seven sites.

Non-Protected Mammals

12.3.122 The British Deer Society was contacted for records of deer within the study area and a small number of fallow deer (*Dama dama*) have been reported. Roe deer (*Capreolus capreolus*) were seen during the survey and have been reported by local residents. Both species are nationally common and increasing in numbers. There are no biodiversity issues arising from their presence, but there may be a risk to road safety. Pigmy shrew (*Sorex minutus*) and common shrew (*Sorex araneus*) have been reported from the

study area and the common species of mice are likely to be present. Weasels (*Mustela nivalis*) also occur.

Birds

12.3.123 The Combe Haven Valley has long been a popular site with ornithologists, so that the Sussex Ornithological Society (SOS) has been able to provide a considerable amount of data on the area. In addition, studies carried out for the BHWB which were particularly concerned with the possible impact of a viaduct across the valley produced information which is still valid.

12.3.124 The SOS records are biased towards Filsham Reedbed, Glyne Gap and Marline Wood because these are the places most visited. But, together with Combe Haven upstream of the reedbeds they are the most significant sites in the locality. Filsham Reedbed supports the RSPB Red List species Marsh Warblers (*Acrocephalus palustris*), Reed Bunting (*Emberiza schoeniculus*) and Song Thrush (*Turdus philomelos*) and the Amber List species Water Rail (*Rallus aquaticus*), Teal (*Anas crecca*) and breeding Bearded Tit (*Panurus biarmicus*). It has substantial late summer roosts of hirudines and, like Glyne Gap and the whole of the Combe Haven Valley is a notable site for migrants. Wintering birds include the Red List species Bittern (*Botaurus stellaris*) and the Amber List Marsh Harrier (*Circus aeruginosus*).

12.3.125 Marline Wood supports breeding Turtle Dove (*Streptopelia turtur*), Bullfinch (*Pyrrhula pyrrhula*), Lesser-spotted Woodpecker (*Dendrocopos minor*), Marsh Tit (*Parus palustris*) and Willow Tit (*Parus montanus*) which are on the Red List and Mistle Thrush (*Turdus viscivorus*), Goldcrest (*Regulus regulus*) and Hawfinch (*Coccothraustes coccothraustes*), which are on the Amber List, among other species.

12.3.126 Ecoscope (1992) recorded 65 species in the Combe Haven as a whole in late spring – early summer, although this does not necessarily mean that all were breeding. Three of these were Red List species: Reed Bunting, Savi's Warbler (*Locustella luscinioides*) and Skylark (*Alauda arvensis*). Seven were Amber List species: Hawfinch (in Monkham Wood), House Martin (*Delichon urbica*), Lapwing (*Vanellus vanellus*), Mute Swan (*Cygnus olor*), Snipe (*Gallinago gallinago*), Redshank (*Tringa totanus*) and Water Rail. A study of Barn Owls (*Tyto alba*, Ecoscope 1995), an Amber List species, concluded that there was a minimum population of 1-2 pairs.

12.3.127 The Redshank and Lapwing were prospecting and did not appear to have bred. In the following year only a pair of Snipe bred, although 1-2 breeding pairs of Lapwing have been recorded in most years since. Breeding waders were said to be a feature of Haven when it was designated an SSSI in 1985, although local ornithologists state the last significant breeding by waders was in the mid-1970s when Redshank, Snipe and Lapwing were frequent, as were the Amber List Yellow Wagtail (*Motacilla flava*).

12.3.128 Some information on the proposed road corridor has been provided by local ornithologists who have noted that Skylark, Reed Bunting, Reed and Sedge Warbler nest within it. Little Owls have bred twice in recent years and sometimes form winter roost in the scrubby areas. They also note

that Water Rails winter in the area once it becomes wet enough, and the occasional pair breeds.

12.3.129 The Red List species Starling (*Sturnus vulgaris*) and Yellowhammer (*Emberiza citrinella*) and the Amber List Fieldfare (*Turdus pilaris*), Stock Dove (*Columba oenas*), Ruff (*Philomachus pugnax*), Lapwing and Redshank, together with a number of finches, have been recorded in winter.

12.3.130 The Combe Haven Valley as whole is important for spring and autumn passage. Survey for the BHWB noted 83 species in late summer/early autumn, principally on passage, including: Red List Wryneck (*Jynx torquilla*), Stone-curlew (*Burhinus oedipnemos*) Spotted Flycatcher (*Muscicapa striata*) and Reed Bunting; Amber List Widgeon (*Anas penelope*), Gadwall (*Anas strepera*), Kestrel (*Falco tinnunculus*), Snipe, Kingfisher (*Alcedo atthis*), Sand Martin (*Riparia riparia*), Swallow (*Hirundo rustica*), House Martin (*Delichon urbica*), Tree Pipit (*Anthus trivialis*), Yellow Wagtail (*Motacilla flava*) and Redstart (*Phoenicurus phoenicurus*). Green List species included Sparrowhawk (*Accipiter nisus*), Hobby (*Falco subbuteo*), Jack Snipe, Whinchat, Wheatear (*Oenanthe oenanthe*), Sedge Warbler, Reed Warbler, Lesser Whitethroat, Whitethroat and Blackcap (*Sylvia atricapilla*).

12.3.131 This information was supplemented by breeding bird surveys in 2005-6 and a wintering bird survey in 2006. Breeding birds were surveyed within a corridor 100m either side of the centreline of the route in 2005 and 2006 in accordance with standard Common Bird Census (CBC) method but making four visits rather than 10. The simplicity of the habitat structure meant that a high degree of confidence could be placed on a smaller number of visits.

12.3.132 The objective of the surveys was to identify the approximate number of breeding territories for each species that might be directly affected by the Scheme. There was considerable variation between the two surveys which is probably due in part to the ephemeral nature of some of the open habitats.

12.3.133 The following Red List species were recorded: Turtle Dove, Skylark, Song Thrush, Starling, House Sparrow, Linnet (*Acanthus cannabina*), Bullfinch, Yellowhammer and Reed Bunting. The territories are shown on Figure 12.8 and the principal features are summarised on Table 12.12. The following Amber List Species were recorded:- Mute Swan, Kestrel, Black-headed Gull (*Larus ridibundus*), Herring Gull (*Larus argentatus*), Stock Dove, Cuckoo, Barn Owl, Green Woodpecker (*Picus viridis*), Sand Martin (*Riparia riparia*), Swallow, House Martin, Meadow Pipit, Yellow Wagtail, Dunnock (*Prunella modularis*), Stonechat, Mistle Thrush and Hawfinch. The data for these are shown in the same way.

Table 12.12 Summary of Red and Amber List Breeding Bird Survey Results

Species	Territories 2005	Territories 2006
Turtle Dove	0	1 record. Possible migrant
Skylark	6	4
Song Thrush	7	10
Starling	6	2
House Sparrow	17	10
Linnet	7	2
Bullfinch	2	2
Yellowhammer	17	13
Reed Bunting	8	6
Hobby		2 flying over on 1 day
Mute Swan	1	1 sighting
Kestrel	0	1
Stock Dove	1	2
Cuckoo	1	1
Green Woodpecker	2	3
Sand Martin and House Martin	Feeding only	Feeding only
Swallow	2	3
Meadow Pipit	1	1
Duncock	17	17
Stonechat	1	1
Mistle Thrush	3	1
Goldcrest	0	3

12.3.134 Barn Owls are a particular issue in the area, not least because of their disastrous breeding season nationally in 2006. They breed at Byne's Farm and Adam's Farm. It is not known if they were successful in 2006, although they were regularly seen hunting over the rough grassland of the

floodplain between Acton's Farm and Adam's Farm. The species is listed under Schedule 1 of the Wildlife and Countryside Act 1981 (as amended) and under this Act is afforded additional protection against disturbance at the nest.

12.3.135 A wide range of species not on the Red or Amber Lists was recorded. The results of this are summarised on Table 12.13 and given in detail in Appendix 12-E.

Table 12.13 Green List Species Breeding 2005-6.

Species	Territories 2005	Territories 2006
Mallard	3	1
Sparrowhawk	Not Confirmed	1
Moorhen	3	3
Wood Pigeon	3	10+
Collared Dove		5
Great Spotted Woodpecker	3	2
Pied Wagtail	4	1
Wren	4	40
Robin	4	31
Blackbird	4	21
Sedge Warbler	4	3
Reed Warbler	7	2
Whitethroat	18	10
Blackcap	6	14
Chiffchaff	5	13
Long-tailed Tit	1-2	3
Blue Tit	1-2	8
Great Tit	1-2	12
Nuthatch		1
Jay		2+
Magpie	1-2	5+

12.3.136 A wintering bird survey was carried out in 2005/6 within the five sectors described below using the method described in Appendix 12-E. In general, only species of Conservation Concern were included in the survey, but all wildfowl were recorded, including common species such as Mallard, Moorhen and Coot. Efforts were made to find and record all such key species within 200m of the centre line, but any identified at greater distances were also recorded. A brief outline of the data collected is set out below and the results are given in full in Appendix 11-E.

12.3.137 Sector 1 Queensway to Decoy Pond Stream: Small numbers of Bullfinch, Mistle Thrush, Green Woodpecker (*Picus viridis*) and Goldcrest were present. At Upper Wilting Farm up to eight resident House Sparrows were present and Dunnocks were heard singing. There were occasional sightings of thrushes in the fields and adjacent woodland to the west of the farm.

12.3.138 Sector 2 Decoy Pond Stream to Powdermill Stream: A greater number of Green Woodpeckers were present than in Sector 1 as there is a wider range of suitable habitat. Bullfinch, Song Thrush, Redwing, Dunnock and Yellowhammer were also present in this sector.

12.3.139 Sector 3 Powdermill Stream to track from Hillcroft Farm: Lapwing were a significant feature of this sector but sightings of other waders and waterfowl were sparse, comprising two Snipe, a pair of Mute Swan on the second visit, two records of Moorhen and a single Teal (*Anas crecca*) on the fourth visit although a flock of 25+ was seen on a casual visit. Skylarks were regularly seen only in this sector. Flocks of other birds present included Starlings, Yellowhammers, Fieldfares and Meadow Pipits and Dunnock, Song Thrush, Bullfinch, Green Woodpecker, Reed Bunting and Stonechat.

12.3.140 Sector 4 Hillcroft Farm track to Little Henniker Wood: The sector includes several hedgerows, which supported numerous Dunnocks and Song Thrushes. Snipe were flushed from F29 and a Woodcock (*Scolopax rusticola*, Amber List) was flushed from the adjacent field. Moorhens were also present in this area. The remaining pasture fields had feeding flocks of Starlings, Redwings (*Turdus iliacus*), Fieldfares and Meadow Pipits. The highest counts were 41 Starlings, 116 Redwings, 30 Fieldfares and nine Meadow Pipits. A Water Pipit was also recorded on the third visit. The fields are also used for feeding by resident Mistle Thrushes.

12.3.141 Sector 5 Little Henniker Wood to Disused Railway: The horse paddocks at the southern end of this sector regularly supported feeding flocks of thrushes, including Mistle Thrushes and peak counts of 74 Redwings and 80 Fieldfares. Starlings, Dunnocks, Song Thrushes, Yellowhammers, Bullfinches, Goldcrests, Sparrowhawk, Stock Dove, Siskin and Lesser Redpolls were also present in low numbers.

Reptiles

12.3.142 Prior to the start of assessment it was known from information provided by the SxBRC that Slow Worm (*Angus fragilis*), Grass Snake (*Natrix natrix*), Adder (*Vipera berus*) and lizard (*Lacerta vivipera*) occur at low density in the area.

12.3.143 An overall assessment of suitable habitat for reptiles was made in 2004 and the results are shown on Figure 12.9. A survey was carried out in 2005 within these areas. Two hundred and forty-two refugia were placed within the sectors shown on Figure 12.9. Refugia are sheets of tin or roofing felt which warm more quickly than the surrounding environment; reptiles, being cold blooded, use them to warm their bodies. Refugia were generally placed in areas that were considered suitable for supporting reptiles. Small pockets of suitable habitat and larger areas of unsuitable habitat were therefore not surveyed. The data are summarised below and given in more detail in Appendix 11-F.

12.3.144 Sector 1: This sector, which is not shown on Figure 12.9 had 22 refugia, but no reptiles were found.

12.3.145 Sector 2: Twenty-five refugia were laid and produced a single Common Lizard and a Grass Snake within F29. A single female Slow Worm was found just west of Acton's Farm.

12.3.146 Sector 3: Ninety-three refugia were laid around Adam's Farm and along the disused railway line. Only two Slow Worms were found using these, but there were several sightings of Grass Snakes around Decoy Pond.

12.3.147 Sector 4: Seventy-four refugia were laid, fifty-nine to the west of the railway line and fifteen between the railway line and Queensway. Two Slow Worms and a Common Lizard were found at the former and a Common Lizard and four Slow Worms at the latter.

Amphibians

12.3.148 Great Crested Newts were known to occur in the area (SxBRC) prior to the start of surveys carried out in 2005 and 2006. English Nature Best Practice guidelines (English Nature, 2001) recommend that four visits be made to each pond between mid-March and mid-June with at least two visits between mid-April and mid-May. In 2005 the survey was commissioned in early May. As a result, each pond was visited on two occasions unless its condition was unsuitable or a more detailed survey was required. During 2006 the full English Nature requirements were met. The methods are described in Appendix 11-G and the ponds surveyed shown on Figure 12.10. The aim of the first survey was to provide an indication of the extent of Great Crested Newt populations within the study corridor. The aim of the second was to provide precise information for mitigation.

12.3.149 All species of amphibian were identified with counts being made of Great Crested Newt, Smooth Newt (*Triturus vulgaris*) and Palmate Newt (*Triturus helvetica*). Marsh Frog (*Rana ridibunda*) was not counted as this is an introduced species which is abundant in the floodplain. There were a number of constraints which affected the survey over its two year duration. It was not possible to access Pond 4 in 2006 because dense Oilseed Rape surrounded it. However, when inspected in 2005 it was dry and may not be suitable for Great Crested Newts. Pond 19 was not inspected since access was not granted by the landowner. Pond 13, which contains Great Crested Newts, was difficult to survey due to the dense aquatic vegetation and the

murky water. Moreover, many of the ponds investigated are seasonally dry. Although Great Crested Newts will breed in such ponds, they can only be used in wet years and then probably only if there are newts in a more stable pond nearby, or if there are many terrestrial animals in the vicinity.

12.3.150 Great Crested Newts were found in the following ponds:

- Pond 5 - a peak of 7 in 2006;
- Pond 7 - 1 male in 2005;
- Pond 13 - a peak of 4 in 2006;
- Pond 16 - a peak of 2 males in 2006;
- Pond 17 - 1 female in 2005;
- Pond 41 - 1 egg found in 2005; and,
- Pond 45 - a peak of 2 in 2006.

12.3.151 These results indicate a concentration of breeding ponds at 13, 16 and 17. This pattern is typical of the species in that newts often use a cluster of ponds and form a single population.

12.3.152 English Nature guidelines on population size (English Nature 2001) state that the maximum number of adults recorded during the torch survey should be used for population estimates using the following categories:

- Small Population- for maximum counts up to 10;
- Medium Population- for maximum counts between 11 and 100; and,
- Large Population- for maximum counts over 100.

12.3.153 Using these criteria the maximum number of adults recorded on a single night was seven. However, numbers were difficult to assess in Pond 13 as aquatic vegetation was dense and the water murky. The peak number gives a score of a small population but as a precaution, the population should be considered as medium.

12.3.154 A peak of two adults was recorded on the Disused Railway at Pond 44 and eggs were found. This appears to be a seasonal pond but it retained water until at least early July in 2006.

12.3.155 Great Crested Newts were not found in any of the ditches in the floodplain, even though these are slow flowing and provide suitable potential habitat. This may be due to the high winter water levels making the floodplain unsuitable for hibernating animals.

12.3.156 Smooth Newts and Palmate Newts are reasonably widespread through the study area. Smooth Newts were found in Ponds 1, 2, 3, 5, 6, 7, 13, 17, 18, 22, 29, 30, 40, 41, 42, 44, 45 and 46. Palmate Newts in Ponds 1, 2, 3, 5, 6, 7, 10, 13, 17, 18, 20, 22, 24, 30, 40, 42, 44, 25 and 46. These species, too, avoid the floodplain. Ponds 2, 3, 5, 13, 22, 30, 40, 41 and 44 held strong populations of both species. Only in Ponds 5 and 32 were Smooth

Newt numbers greater than Palmate Newt. In Pond 46 a peak of 70 Palmate Newts was recorded.

12.3.157 Marsh Frogs, an introduced species, are abundant in the study area. Pond 16, 17 and 18 support the species. The drainage ditches through the floodplain support large numbers and they were encountered along all stretches surveyed. It was the only species of amphibian encountered within the floodplain. Since it usually hibernates in water it would not be affected by the high winter water table.

12.3.158 Common Frog and Common Toad are uncommon in the study area. Common Frog breeds in Ponds 1, 5, 6, 13, 17, 22, 41, 44 and 45 and Common Toad in 5, 6, 30, and 41.

Fish

12.3.159 Quantitative electric fishing was undertaken at the Combe Haven main channel together with Watermill, Powdermill and Decoy Pond Streams where they would be crossed by the Scheme in May 2006. The survey methods and results are described in Appendix 11-H.

12.3.160 The only species caught in the Combe Haven Stream was the Three-Spined Stickleback (*Gasterosteus aculeatus*). Sticklebacks are too small for electric fishing to offer a high efficiency of capture. It was therefore impossible to estimate population density reliably but it may be in the order of one or more individuals per m² of water surface.

12.3.161 Watermill Stream is a typical lowland cyprinid water. Silver Eel (*Anguilla anguilla*) had the highest recorded biomass for any fish at this site. Numbers for all species were too low to allow accurate estimates of fish density. The other species present were: Pike (*Esox lucius*); Perch (*Perca flavescens*); Stone Loach (*Noemacheilus barbatulus*); Roach (*Rutilus rutilus*) and Chub (*Leuciscus cephalus*).

12.3.162 Powdermill Stream is a lowland trout-lamprey nursery. Brown Trout (*Salmo trutta*), smolt density was approximately 0.2 individuals/m² of water surface. The most abundant fish in this section was Lamprey. It is difficult to distinguish between River Lamprey (*Lampetra fluviatilis*) and Brook Lamprey (*Lampetra planeri*) ammocoetes in the field, so both may be present. Both are listed in Annexes IIa and Va of the Habitats Directive, Appendix III of the Bern Convention and as a Long List species in the UK BAP. The minimum lamprey density for this stretch was calculated as 0.88 lamprey ammocoetes/m² of water surface, but true density may be above 1 individual per m² of water surface. Other species present were Gudgeon (*Gobio gobio*), Stone Loach, Roach and Silver Eel.

12.3.163 Decoy Pond Stream is a Brown Trout nursery. Smolt density for individuals > 50 mm SL was approximately 0.4 individuals per m² of water surface. Trout smolt belonging to several size classes were observed ranging in size from 21 to 124 mm SL. Stone Loaches are also present.

12.3.164 The streams hold typical fish faunas for southern English streams, but 10 species were recorded. This was an unexpectedly high given the small size of the streams, but arises from the variety of habitats present. Powdermill and Decoy Pond Streams are Brown Trout nurseries with populations of trout smolt in good condition. The gravel substrate in Powdermill Stream maybe the reason for the large Lamprey ammocoete population. In contrast, Watermill Stream is a slow-flowing deeper water.

Crayfish

12.3.165 Crayfish surveys were undertaken on the Watermill and Powdermill streams in June and July 2006 because a small Crayfish which had some features of the native White-Clawed Crayfish (*Austropotamobius pallipes*) was inadvertently caught while electric fishing in May 2006.

12.3.166 Seven crayfish of wide size/age range were found in the Powdermill Stream under stones. None were caught in the Watermill Stream. The three mature individuals that could be reliably identified were all the American Signal Crayfish (*Pacifastacus leniusculus*).

12.3.167 The White-clawed Crayfish may be present in the Powdermill Stream, but it also holds a population of the invasive alien Signal Crayfish. The White-clawed Crayfish is declining throughout southern England and this decline is attributed to the Signal Crayfish, which is a competitor and carries a fungal disease to which the White-clawed Crayfish has little resistance. It is therefore very unlikely that there is a viable population of the native species.

Invertebrates

12.3.168 It is impossible to survey all the invertebrate species on a site and it is accepted practice to look at selected taxa which are indicators of the quality of the habitats present for invertebrates in general. Four types of survey were therefore undertaken:

- The BMWP method in which several samples are taken over a season and key groups identified to give an overall score of water quality;
- Aquatic bugs and beetles to give an indication of the habitat quality of the floodplain ditches;
- Dragonflies and damselflies; and,
- Selected terrestrial invertebrates taxa at sites which have been identified as having potential by an experienced entomologist in accordance with English Nature guidelines. The results of these surveys are given in Appendix 11-I.1 to 11-I.4 and are summarised here.

12.3.169 Combe Haven and the Decoy Pond Stream had the lowest BMWP scores, but this is still a high absolute score indicating that these water courses have a very low level of pollution. However, the dense overhanging vegetation at all sample points along the Decoy Pond Stream reduced the BMWP scores since heavily-shaded water courses are usually species-poor.

12.3.170 All remaining sites had high scores with the Powdermill Stream being ranked as an unpolluted and high value water course. Most of the ditches had similar high scores indicating a high sensitivity to pollution amongst the genera present and that each water course has a high biological quality.

12.3.171 Aquatic bugs and beetles (*Hemiptera* and *Coleoptera*) are widely used as indicators of the richness of invertebrate communities and waterbodies in general because a large number of species can be identified moderately easily and because there is an established method known as the Species Quality Score (SQS). This is dependent on the occurrence of Red Data Book (RDB) and Nationally Notable species. These terms are explained in Appendix 11-I.4.

12.3.172 Within the Combe Haven floodplain the fauna of an individual ditch will change quite rapidly as it goes through a cycle of vegetation growth. One with a high score is very likely to have a low score soon after clearance when it is choked with Common Reed. It is therefore essential to know whether the open ditches in an area have a high SQS so that any one ditch in the system can be colonised when conditions are right. On the other hand, some ditches will never achieve a significant SQS because the profile is too steep or because it has insufficient water in summer. The objectives of this survey were therefore to:

- Identify the overall aquatic bug and beetle richness of the area; and,
- To provide specific information in individuals ditches.

12.3.173 In 1991 ditches at the centre of the Combe Haven Valley were sampled for aquatic *Coleoptera* and *Hemiptera* as part of the assessment of the BHWB, detailed further in Appendix 11-I.1 and Figure 12.11. The nearest sampling sites to the current Scheme were over 500m away. In all, 35 species of RDB or Notable status were found.

12.3.174 A further survey was carried out in 2004 as part of the initial assessment of the Scheme to inform the future management of the proposed Pebsham Countryside Park. Ten ditches were re-sampled and they had an average SQS of 1.34 in 2004 as opposed to 1.73 in 1991. The difference is not statistically significant since it largely results from the presence of one RDB species in one ditch. In general, there was little change in individual scores, although there was a substantial change in the species present.

12.3.175 For the Combe Haven area as a whole 47 species were recorded in 2004 as opposed to 66 in 1991, although the average SQS had risen from 2.1 to 2.4 largely because of the presence of a small number of RDB and Notable species in 2005 and 2006. This is detailed further in Appendix 11-I.1.

12.3.176 There is a good body of data on Dragonflies and Damselflies (*Odonata*) within the study area and the Combe Haven Valley. They were studied for the BHWB between 1988 and 1995 and it was concluded that the following were breeding: Emperor Dragonfly (*Anax imperator*); Brown Hawker (*Aeshna grandis*); Migrant Hawker (*Aeshna mixta*); Common Hawker (*Aeshna juncea*); Hairy Dragonfly (*Brachytron pratense*); Broad-bodied Chaser

(*Libellula depressa*); Four-spotted Chaser (*Libellula quadrimaculata*); Common Darter (*Sympetrum striolatum*); Ruddy Darter (*Sympetrum sanguineum*); Banded Demoiselle (*Calopteryx splendens*); Emerald Dragonfly (*Lestes sponsa*); Azure Dragonfly (*Coenagrion puella*); Variable Dragonfly (*Coenagrion pulchellum*); Common Blue Damselfly (*Enallagma cyathigerum*); Blue-tailed Damselfly (*Ischnura elegans*); Large Red Damselfly (*Pyrhosoma nymphula*); and Red-eyed Damselfly (*Erythromma najas*)

12.3.177 Other species present included Scarlet Emerald (*Lestes dryas*) and the continental migrants Yellow-winged Darter (*Sympetrum flaveolum*) and Red-veined Darter (*S. fonscolombeii*) have also been recorded.

12.3.178 In 2005 transects divided into the 18 sections, as shown on Figure 12.11, were walked. Fifteen species were recorded. Most of the species recorded are widespread and common although the British Dragonfly Society describes the Emerald Damselfly as being locally common and the Ruddy Darter is local but having increased considerably in recent years.

12.3.179 The Small Red-eyed Damselfly (*Erythromma viridulum*) was recorded in this survey. It was first recorded in Britain in 1999 and subsequently has spread very rapidly through much of south-east England and East Anglia.

12.3.180 The Red-veined Darter is a migrant species that breeds scarcely and sporadically in the United Kingdom. Species richness on the line of the proposed route was moderate and considerably less than on a transect that was made through the proposed Pebsham Countryside Park.

Terrestrial Invertebrate Survey

12.3.181 A terrestrial invertebrate survey was carried in summer 2006. This identified three sites of particular interest. The grassland at G13 supported 10 Notable or RDB species. There were seven species present on G6 and 14 on F8, which are detailed further in Appendix 11-I. Although F29 has a large area of unmanaged vegetation it had only two notable species.

Summary of Valued Biodiversity Resources

12.3.182 Table 12.14 summarises the valued biodiversity resource affected by the Scheme.

Table 12.14 Summary of Valued Biodiversity Resources

	Resource	Significance
Designated Sites	Combe Haven SSSI	National
	Marline Woods SSSI	National
	Filsham Reedbed LNR	National
	Woodland Complex at Buckholt Farm SNCI	County
	Marshy Grassland and Reed-Bed at Glyne Gap SNCI	County
	Disused Railway South Section, Bexhill SNCI	County
	Disused Railway North Section, Crowhurst SNCI	County
	Old Filsham Golf Course SNCI	District/County
	Bulverhythe Single Beach and Cliffs SNCI	District/County
	Caves Road Cliffs SNCI	District/County
	Gorringe Stream, Gorringe SNCI	District/County
	Ponds Wood SNCI	District/County
	Wainwright Close SNCI	District/County
	Wishing Tree SNCI	District/County
	Water Tower SNCI	District/County
	South Saxons SNCI	District/County
	West St. Leonards SNCI	District/County
Railway Embankments SNCI	District/County	

	Resource	Significance
Habitats	Floodplain grassland within SSSI	National
	Floodplain grassland outside SSSI	County
	Fen	County
	Floodplain ditches	National/Regional
	Neutral grassland G13	District
	Ancient woodland (all NVC communities)	County
	Secondary woodland	Local
	Hedgerows (as clusters)	County
	Hedgerows (isolated)	Local
Species	Frog-bit	County
	Divided Sedge	County
	Water Hyacinth	County
	Bladderwort	County
Badgers	Rural areas	Local
	Disused Railway urban area	District
Bats	Focal points and roost at: Acton's Farm	District
	Adam's Farm	District
	Upper Wilting Farm	District
Dormice	All hedges and woodland edges with good overgrown shrub structure	County

	Resource	Significance
Red List Breeding Birds	Turtle Dove	Local
	Song Thrush	Local
	Starling	Local
	House Sparrow	Local
	Linnet	Local
	Bullfinch	Local
	Yellowhammer	Local
	Reed Bunting	Local
Amber List Breeding Birds	Mute Swan	Local
	Kestrel	Local
	Stock Dove	Local
	Cuckoo	Local
	Barn Owl	District
	Green Woodpecker	Local
	Swallow	Local
	Dunnock	Local
	Stonechat	Local
	Mistle Thrush	Local
	Goldcrest	Local
	Migrant Birds	All
Reptiles	All	Local
Great Crested Newt	Site16/17	District
	Site 44	Local
Invertebrates	In ditches	Regional
	G13,G6,F8	District

	Resource	Significance
	Dragonflies and Damselflies	Regional

12.4 Mitigation and Compensation Strategy

Overall Approach

12.4.1 Throughout the design of the Scheme, the following categories recommended by TAG Unit 3.3.10 - *The Biodiversity Sub-Objective* have been considered:

- Design proposals to minimise the impact of the Scheme on the site (e.g. by reducing run-off);
- On-site, or near-site, mitigation to help conserve existing biodiversity interest where the impacts cannot be mitigated (e.g. dedicated animal crossings and habitat management); and,
- Off-site proposals (such as habitat creation) to compensate for biodiversity losses.

12.4.2 While it is recognised that some elements of the mitigation strategy could be more accurately described as compensation, this chapter does not distinguish between the two since its objective is to assess the effects of the strategy.

12.4.3 The road, earthworks, Greenway and associated grading-out for landscape mitigation would result in the loss of the following habitats:

- Floodplain grassland and fen;
- Species-rich neutral grassland;
- Mesotrophic grassland scrub and secondary woodland;
- Ditches and streams;
- Hedgerows including hedgerows with wet ditches;
- Agriculturally improved grassland; and,
- Arable land.

12.4.4 The first five of these habitats have significant biodiversity. Improved grassland has limited biodiversity but is valuable in particular contexts, e.g. as foraging for Badgers or as roosting sites for wintering waterfowl. Arable land is a BAP priority habitat in Sussex but the areas present on the site are not significant. The habitat losses and the areas that would be used to mitigate or compensate for these losses are shown on Table 12.15. Only a very small area of ancient woodland would be directly affected which is contiguous with the Marline Valley Woods SSSI by outside the boundary, as described later in this section. Decoy Pond Shaw could also be considered as ancient woodland.

12.4.5 In addition, the Scheme would:

- Create a barrier between habitats, possibly isolating smaller areas of habitat to the extent that they would be unable to support viable populations of some species of biodiversity significance ;

- Sever habitat links, particularly the network of hedges, copses and ditches shown on Figure 12.4 and specific links for Badgers, bats and Common Dormice; and,
- Create noise and visual disturbance arising from vehicles and users of the Greenway.

12.4.6 There are also potential impacts from the discharge of road drainage, leachates from construction materials and alteration of air quality and the chemical environment near the road (English Nature 1996, 2004).

12.4.7 The approach taken to mitigation is described in the following paragraphs and is summarised on Table 12.15, dealing firstly with habitat loss and degradation, then with sites and subsequently with species.

Table 12.15 Habitat Mitigation

Habitat	Habitats Lost or Severed	Area/ Length	Replacement	Area/ Length
Floodplain grassland and fen	Areas with significant biodiversity		New habitat contiguous with SSSI	
	Field F29	2.6ha	Wetland adjacent	1.5ha
	Field F17	1.4ha	Combe Haven Wetland between SSSI and road	6.7ha
	Field F16	3.4ha	Attenuation ponds with the above	2.7ha
	Total	7.5ha	Total	10.9ha
	Areas with low biodiversity			
	Field F9	4.0ha		-
	Field F32 (part)	4.0ha		-
	Total	8.0ha		-
	Severed Wetland north of the road			
	Fields F8 and F31	2.0ha		-
	New wetland north of the road			
	Watermill Valley	-		1.5ha

	Powdermill Valley	-		7.6ha
	Wetland and trees	-		1.9ha
	Attenuation ponds	-		0.3ha
	Total			22.2ha
Habitat	Habitats Lost or Severed	Area/Length	Replacement	Area/Length
Species-rich neutral grassland	G6	0.3ha	Bank below Buckholt Wood	2.0ha
	G13	2.2ha	Bank below Acton's Farm	1.5ha
			Viewpoint	0.5ha
			Adjacent railway abutment	5.1ha
	Total	2.5ha		9.1ha
Mesotrophic grassland, scrub and secondary woodland	Urban area	3.0ha	Neutral grassland with scrub	22.2ha
	Disused railway	1.6ha	New woodland and copses	1.7ha
	G20	2.0ha	Shaws	8.7ha
	Total	6.6ha	Total	32.6ha
Managed woodland			W8	0.3ha
			Adam's Farm	1.0ha
			North Abutment	1.0ha
			Decoy Pond Wood	1.9ha
			Little Bog	0.6ha
	Total	4.5ha	Total	4.5ha
Badger foraging			As shown on mitigation drawings	17.9ha
Hedgerows		5333m		8674m
Ditches		2600m		3970m

Floodplain Grassland and Fen

12.4.8 Some of the landscape mitigation measures on the floodplain would have biodiversity benefits. In particular it is proposed to plant wet ground trees within or at the edges of the floodplain in order to screen, or at least to break-up views of the road. At present, there is no woodland on the floodplains, but the scattered willows, particularly the pollarded ones have wildlife value. There is the opportunity to plant these and possibly the native Black Poplar (*Populus nigra*) if this is acceptable to Natural England.

12.4.9 Table 12.15 shows that the floodplain grassland and fen of high biodiversity interest can be replaced by new habitats with at least the two for one replacement ratio agreed with the local authority. This assumes that the whole of the borrow pit in the Powdermill Valley would be sufficiently shallow to enable wet reedbeds and similar habitats to be created. However, the road would reduce the overall amount of land within the floodplain where there is the potential for development of wetland habitats in the medium-long term and this needs to be taken into account. In addition, it may be a barrier to the free movement of wildlife between the land north of the road and the land to the south, although particular emphasis has been given to developing new habitat contiguous with the SSSI.

12.4.10 Severance on the Powdermill Valley is unlikely to be an issue since a new area of wetland of at least 7.6ha is likely to support viable populations of most wetland wildlife. In the Watermill Valley there is fen of significant interest within F8 and intermittently in small patches to the north. It is proposed to create approximately 1.5ha of rush pasture on low ground adjacent to the Watermill Stream owned by East Sussex County Council (ESCC) at Hye House Farm. The area is at present species-poor MG7 grassland with Meadow Foxtail grassland which is cut annually for silage. The new area would be close to F8 and linked to it by fen vegetation along the stream. The hedges around the fields at Hye House Farm are dominated by Hawthorn and have a very limited ground flora. These would be enhanced by a change in cutting regime. The resulting pattern of vegetation along this section of the valley would be similar to that in other Wealden-edge valleys, but there is no reliable information on whether the areas involved would be sufficiently large to retain significant biodiversity in the long term.

12.4.11 New floodplain grassland and fen would be created according to the prescriptions in Appendix 12-J and as shown in the Environmental Design drawings in Figure 3A.38 – 3A.44.

Habitat Enhancement within the SSSI

12.4.12 There is thus some uncertainty over whether the measures proposed would fully compensate or mitigate the impact on the actual and potential biodiversity of the floodplain. In addition there are potential adverse impacts on the SSSI from increased noise levels and visual disturbance. It is therefore appropriate to seek a mechanism for enhancement of the SSSI, as the principal area of floodplain grassland and fen to compensate for these potential impacts. At present the summer water levels in the ditches and fields

within the SSSI are below their optimum for wildlife. In order to enable the water levels in the SSSI to be raised, sluices could be installed as described in Chapter 9: Water Quality and Drainage. In conjunction with this, ESCC could provide funds to enable the holders of land within the SSSI to place their holdings in the Higher Level Environmental Stewardship Scheme (RDS 2005). This has supplements for the management of wetland habitats which could be implemented if the water levels are raised. With this in mind, ESCC could work with the landowners, the Environment Agency and Natural England to develop management based on the following strategy..

12.4.13 The 14 vegetation zones within the Combe Haven Valley shown on Figure 12.1C have developed in response to water regime and grazing pressure and this would be the basis of future management. Zones 1 and 2 are outside the SSSI but the remainder are within the designation. Zone 13 is managed by the Sussex Wildlife Trust and is not discussed. In all areas ditches would be brought within a 5-10 year clearance cycle as described in Appendix 12-J and re-cut to profiles that are better for wildlife.

12.4.14 Zone 3 has a good range of fen communities, particularly at the southern edge where there is water moving from the higher ground allowing plants such as Purple Moor-grass to establish. But the main fields are fairly dry and dominated by Reed Canary-grass and Common Reed. Access to ditches is difficult, but where they are open they are similar to those in Zone 7.

12.4.15 The proposals would enable higher water levels to be maintained in the reed beds, grazing to be introduced to part of the zone and ditches to be widened and kept open in part by grazing. In addition within the larger fields the natural depressions and hollows could be enlarged to form areas of tall-herb fen. These measures would benefit a wide range of invertebrates, wetland birds such as Reed Bunting and Sedge Warbler and a wide range of fenland plants.

12.4.16 Zones 4, 11 and 12 at the sides of the valley have moisture gradients which give rise to complex vegetation patterns. They are now ungrazed and as a result the variety of species and plant communities is probably declining. The principal management requirement is to reintroduce grazing after clearance of scrub, young tree regeneration and to diversify the dense, dry stands of Common Reed. Light grazing at no more than 0.5LU/ha would then maintain a mosaic of rough grassland and scrub which would comprise richer versions of the NVC communities shown on Fig 12.1C and would support birds and invertebrates that require low scrub and floriferous tall grassland and tall-herb fen.

12.4.17 Zones 5 and 8 are mainly rush pasture and MG9 Yorkshire Fog - Tufted Hair-grass grassland on low-lying fields. The ditches are shallow and generally species poor. Raised water levels would enable inundation grassland and species-rich forms of rush pasture to be developed and would also allow the ditch flora which already contains species like Frog-bit to develop

12.4.18 The part of Zone 6 within the SSSI is an interesting area, perhaps designed to be flooded from the Powdermill Stream and diverted to act as a carrier. At present, however, the ditches are more-or-less dry in summer. The raised water levels would allow the ditches to be kept wet in summer and would enable inundation grassland to be developed on the low ground.

12.4.19 Zone 7 has grassland of limited interest, but there are wetland grasses within the sward which will spread quickly if water levels are raised and grazing is reduced. This would result in tall-herb fen and inundation grassland. Because the water level is kept high in summer and there is regular clearance and cattle grazing of the edges, the ditches have areas of good invertebrate fauna, but the proposals would secure this for the medium term.

12.4.20 Zone 9 appears to have been re-seeded recently. It is already turning to rush pasture. By making it wetter, species-rich forms of rush pasture mixed with tall-herb fen could be developed. Depressions and the hollows resulting from filled-in ditches could be enlarged to form areas of fen or permanent water.

12.4.21 Zone 10 is a complex mosaic of fen communities which has developed quite recently and the ditches are completely overgrown. There is nevertheless considerable variety of plant communities and species. If the water levels can be raised the ditches cleared and re-profiled and grazing reintroduced to at least part of the site, then this would be a valuable area of fen and reedbed contiguous with Filsham reedbed. Some of the significant species in the reedbed may spread to it.

12.4.22 Zone 14 consists of dry reedbed and scrub and appears to have developed quite recently. Higher water levels would enable wet reedbed to be developed which would be a short distance from the wet reedbed within the LNR on the other side of the river.

12.4.23 There are a number of practical difficulties to be faced in implementing these proposals and at present they represent only an aspiration by ESCC and have therefore not been included in the assessment as incorporated mitigation.

Species-rich Neutral Grassland

12.4.24 Approximately 2.3ha of neutral grassland would be lost at G6 and G13. Following the rule of thumb cited above, a minimum of 4.6ha would be required as a replacement. The grassland of greatest interest, G13, has developed over a long period on a warm, sheltered south-west facing slope. These conditions need to be replicated if this habitat is to be replaced.

Mesotrophic Grassland, Scrub and Scrub Woodland

12.4.25 Approximately 3 ha of scrub would be lost in the urban area, 1.6ha of scrub and scrub woodland on the disused railway embankments and 2ha of a mosaic of habitats adjacent to the railway and within G20 adjacent to Queensway. The total lost would be approximately 6.6ha. Within the urban

area, biodiversity is limited by aspect and nutrient-rich ground conditions. The railway vegetation is more varied and G20 has a good habitat mosaic. Approximately 10.4ha of woodland and shaws are required for landscape mitigation. Since these would have to be in narrow, long strips there will be abundant 'soft' edges to replace the much smaller area of this habitat that would be lost. In addition there is the opportunity to create approximately 22ha of scrub and rough grass at the locations shown on the Environmental Design drawings in Figures 3A.38 to 3A.44. Some of these sites have a southerly or south-easterly aspect and can be managed for invertebrates.

Woodland

12.4.26 The small, mainly ancient, woods adjacent to the Scheme such as Little Bog and Decoy Pond Wood are unmanaged. Bringing them into active management would in part compensate for impacts on other habitats. The principles of the management of these areas are given in Appendix 12-J.

Species-poor Mesotrophic Grassland and Badger Foraging Habitat

12.4.27 A substantial area of mesotrophic grassland comprising mainly species-poor Rye-grass pasture would be lost through earthworks and planting or would be re-graded. About 18ha of land at the southern end of the rural section would be designed as Badger foraging habitat with rich pasture and areas of berry and fruit-bearing scrub. The remaining loss is not significant because the land would be replaced by scrub and neutral grassland of greater wildlife value.

Arable

12.4.28 All of the arable land would be replaced by other habitats which are generally of higher wildlife value.

Ditches and Streams

12.4.29 The following ditches and streams, measuring 2600ml, would be affected by the Scheme:

- Main Combe Haven Channel (D2);
- Ditches around F29;
- Watermill Stream;
- D19;
- D20;
- OA509;
- D29a;
- D33;
- Powdermill Stream; and,
- Decoy Pond Stream.

12.4.30 The Watermill, Powdermill and Decoy Pond Streams are of district significance and have marginal vegetation and aquatic invertebrates of local significance, but the route would almost entirely avoid direct impact on significant ditches. In all, 3970m of ditch would be excavated and managed to the prescription given in Appendix 12-J, or re-aligned/re-profiled in accordance with the same specification.

12.4.31 There may be severance of invertebrate populations through the culverting of ditches however there would not be severance of aquatic plants, since propagules would drift through the culverts. The impact of this is difficult to predict because so little is known about the ecologies of individual species. The ditches are stagnant or very slow-moving so invertebrates would not be borne along by a current, and in principle they would move around the edges of areas where the microclimate has changed significantly, rather than across it. But during floods everything would be swept through. This has been taken into account in the mitigation strategy.

Hedgerows

12.4.32 The Scheme would require removal of 5.3km of hedgerow. Only OA500, OA535, OA502, OA503, OA504, OA507, OA508, OA509, OA510, OA511, Powdermill Stream Shaw (W37b), Decoy Pond Stream Shaw and Crowhurst Lane are significant for the habitats and species that they support. These lie mainly in the way that they provide edge habitats with a varied horizontal and vertical structure of shrubs, trees and rough grassland. Loss of this habitat would be mitigated by the planting of 8.7km of new hedge and by the creation several kilometres of 'soft' woodland edge/shaw habitat. These would be managed in accordance with the prescription given in Appendix 12-J.

12.4.33 However, the bat and Common Dormice surveys have shown that the network of hedges shown on Figure 12.4 is significant for the feeding and movement of these species. There is thus a potential impact on two protected species from the severance caused by the road. Green bridges have been considered as a method of mitigation, but their effectiveness is questionable and it would be impossible to reinstate all of the links by this means. There are strong populations of both bats and dormice across the area, and therefore severance resulting in isolated populations is not an issue. However the availability of habitat and free movement within the area is. The strategy adopted has therefore been to provide substantial band of shaws, woodland strips and hedges alongside the road which link to the existing ones and reinforcing poor-quality hedges while linking them to this roadside network. This is shown on the Environmental Design drawings in Figures 3A.38 to 3A.44.

Road Drainage

12.4.34 The potential effects of runoff from the road would be mitigated through the measures described in Chapter 9: Water Quality and Drainage. The attenuation areas that would be created have been included within the new wetland areas described above.

Noise Disturbance

12.4.35 Recent research has shown that breeding densities of some bird species can be significantly reduced adjacent to roads. This appears to be the result of increased noise levels (Reijnen and Foppen 1995). The effects vary with species but current estimates from the latest Highways Agency publication suggest a generic figure of about 250m for open areas and 160m for woodland (Ecoscope 2001). The information on noise threshold for individual species is very sparse and it has been generated under specific site conditions, but as an indication for species known to, or likely to, use the route corridor the figures are: Mute Swan 36dB, Lapwing 47dB, Skylark 48dB, Meadow Pipit 59 dB (Reijnen et al 1996), Willow Warbler 39dB and Hawfinch 26dB (Reijnen et al 1995). These figures correspond with ornithologists' anecdotal experience that particular birds are 'shy'. Increased noise may not necessarily lead to an impact on individual species; densities may increase in areas further away from the road if these are below their carrying capacity resulting in no significant change, although the area's potential is obviously reduced. Although animals other than birds may well be disturbed by noise there does not appear to have been much research undertaken on this topic, which means it is not feasible to take into account potential impacts with any degree of accuracy.

12.4.36 Every effort has been made to minimise the noise from the Scheme as described in Chapter 11: Noise and Vibration. There would nevertheless be a probable ill-defined residual impact, which can be partially mitigated through the increased capacity of the area for breeding by some of the species affected.

Visual Disturbance

12.4.37 Birds, particularly waders and waterfowl, are also disturbed by moving traffic and by obstructions such as trees and embankments introduced into open landscapes. In the case of the Scheme there is a potential impact up to about 1km from the road, which would affect a substantial proportion of the SSSI. The effects of disturbance on individual breeding species, particularly those mentioned in the SSSI citation, are discussed below. The wintering bird survey showed quite light use of the corridor by these species. But the SOS records, anecdotal accounts of local ornithologists, and the fact that waders and waterfowl are likely to use land alongside the road when it floods suggests that use may be greater. There is thus a potential residual effect which can only be mitigated by providing compensatory habitat and improving carrying capacity of existing habitat.

12.4.38 Although there has been some discussion of this visual disturbance from vehicle headlamps in the scientific literature, it relates mainly to a small number of North American mammals and there is no reliable evidence that this is a significant impact.

Use of the Greenway

12.4.39 The estimated net increase in public use of the area is low. Nevertheless, there is likely to be disturbance from users of the Greenway and

as it would be at some distance from the road, therefore the corridor in which disturbance occurs would be wide. As far as can be judged, users of the Greenway would not appear against the skyline when viewed from the floodplain, so that one of the major impacts on birds may be avoided. There would nevertheless be increased noise and movement that would affect 'shy' species together with the impacts on wildlife associated with increased access such as trampling and accumulation of litter. Dogs, particularly when off the leash have been shown to have a significant impact on birds and other animals. This impact could be at least partially mitigated through countryside management, notably through the ranger service that would be attached to the proposed Pebsham Countryside Park.

Indirect Impacts on Combe Haven SSSI

12.4.40 The route would avoid direct impact on the Combe Haven SSSI. However, there are potential indirect impacts:

- Where the Scheme crosses the Watermill and Powdermill valleys, the route would sever the SSSI from floodplain grassland and fen as discussed above. This could fragment populations and affect size and sustainability of species using these habitats within the SSSI;
- The Scheme would be roughly parallel to the SSSI boundary for about 1.2km, so that a pollution incident could affect a substantial area of the SSSI and road run off could affect water quality; and,
- Noise and visual disturbance could inhibit the return of species like breeding Redshank and the Scheme could have an impact on migrant birds.

12.4.41 The approach to mitigation of these impacts would follow the principles given at the start of this section. In particular the severed 'hinterland' adjacent to the SSSI could be supplemented by the new habitats described and measures for individual species that are described later in the chapter. It is not considered that air quality changes would have a significant effect.

12.4.42 The impacts that the Scheme would have on Water Quality are dealt with in Chapter 9: Water Quality and Drainage.

12.4.43 The road would be too far away from Filsham Reedbed to have an impact on the birds there, but it could affect breeding Lapwing, Redshank and Snipe further west through noise and visual disturbance. Planting for landscape mitigation would also restrict the areas of open grazing marsh that these species require. One or possibly two pairs of Lapwing breed within the SSSI but there have not been significant numbers of all three species since the 1970s. The decline in breeding waders was reviewed in 1992/3 (Ecoscope 1992) when it was suggested that it may have been caused by predators attracted to the Pebsham Landfill site. However, it seems at least as likely that the site is a marginal one for species that have experienced a long-term decline. There is no indication, therefore that breeding waders would return to the SSSI in significant numbers even if conditions were ideal. This remains a potential impact, but no specific mitigation is proposed.

12.4.44 Passage migration within the Combe Haven SSSI is of regional significance. Most records of passage birds are for lower down the valley, but work in 1992 (Ecoscope 1992) showed that movement of passage birds extended as far as the proposed Scheme route. It was demonstrated that the viaduct proposed for the Orange Route, half way down the valley, would not have a significant impact on passage birds, so it can be reasonably assumed that the present route would not have a major impact either. No specific mitigation is proposed.

Direct Impact Adjacent to Marline Wood SSSI

12.4.45 The Scheme would be close to Marline Valley Woods SSSI at its south-western tip and would remove an area of probable ancient woodland adjacent to, but outside the SSSI. As ancient woodland, its loss cannot be mitigated, but overall there is a net gain in woodland on the Scheme, and ancient woodland would be brought into active management. In addition it is proposed to manage the land between the road and the SSSI to provide a buffer and a long, wide, south-facing scrub edge.

Indirect Impacts on Marline Wood SSSI

12.4.46 There are potential indirect effects of runoff from the embankment section of the road, noise, air pollution, visual disturbance and lighting. The indirect impact on dormice also needs to be considered here since they are regarded as a particular feature of the site. Salt spray damage is unlikely to be an issue since this is generally not significant beyond 10m from the carriageway.

12.4.47 The impacts from road runoff would be mitigated by intercepting the runoff with a cut off drain. The lower plants of significant interest are over 200m away from the Scheme, so that air pollution would not be significant. There is unlikely to be a significant visual disturbance. There would be a steep wooded embankment changing to a cutting. There would, however, be significant noise disturbance, particularly to Hawfinch and there is little that can be done about this. There would be loss of dormouse habitat continuous with the SSSI but not within it. The management of the vegetation within G20 would take account of the optimum habitat. The vegetation of the embankment over the railway would be designed to allow free movement of dormice from east to west, so the effectiveness of the wood as a focal point for dormice would be maintained, albeit with a different pattern of movement.

SNCl's

12.4.48 The SNCl's listed in the Methods of Assessment section of this chapter are too far from the road for there to be any potential impacts, other than on the Woodland Complex at Buckholt Farm and the two sections of disused railway.

12.4.49 The Woodland Complex at Buckholt Farm would be 200m from the centreline of the Scheme at the nearest point. There would be severance of bats flight lines to and from the woodland edge. In order to mitigate this

impact, the hedgerows would be reinforced to give a better structure as shown on the environmental scheme drawings and described in Appendix 12-J. In addition, fences would be erected where the road cuts these hedgerows to force the bats to follow the hedgerow upwards, crossing the road at about 3-4m high and thus avoiding collision with cars. Because the road is roughly parallel to the edge of the woods, there would be a potential noise impact on much of it, particularly on Hawfinches. No specific mitigation is proposed.

12.4.50 Scrub and rough grassland in the Bexhill disused railway would be removed by construction of the road. This is secondary vegetation of limited biodiversity. The loss would be mitigated by planting of a much larger area of woodland and scrub as shown on the Environmental Design drawings in Figures 3A.38 to 3A.44 and discussed in Appendix 12-J. The impacts on dormice, bats and badgers are discussed under individual species below.

12.4.51 Scrub on the disused railway, Crowhurst would be removed for construction of the Main Scheme and the Greenway and for the landscape scheme. There would be a gap of 700m between the unaffected end of the disused railway in the north and the north abutment of the former viaduct within the SSSI in the south. The habitats that would be lost are secondary woodland, scrub and rough grassland. This loss would be mitigated by the development of larger areas of these habitats alongside the road. The north-south link along the wooded edge would be severed, but a new east-west link north of the road would be created.

12.4.52 Table 12.16 identifies the potential impacts of the Scheme and summarises proposed mitigation measures.

Table 12.16 Potential Impacts on Designated Sites and Summary of Proposed Mitigation Measures

Site	Activity	Potential Impact	Proposed Mitigation
Combe Haven SSSI	Construction of road	Severance from rest of floodplain	Individual measures for protected species New habitat north of the road New areas adjacent to SSSI
	Use of road	Pollution from runoff or accident	Attenuation ponds
		Noise lowering breeding bird densities Noise preventing wintering birds from feeding	Noise from road minimised
		Moving traffic preventing key breeding species re-establishing	None. Species most likely to be affected unlikely to re-colonise
		Casualties to migrant birds	Planting set back from road
	Use of Greenway	Disturbance of birds	Sited to avoid users appearing on skyline. Countryside management
Marline Woods SSSI	Construction of road	Loss of habitat at edge of SSSI	Habitat management and creation of new woodland
		Severance of dormouse habitat	Construction of new links
	Operation of new road	Run off	Cut off drain
		Increased bat feeding at lights	None
Woodland Complex at Buckholt Woods SNCI	Construction of road	Severance of bat links	Implement new links strategy Reinforce hedges and erect fences
	Operation of road	Noise impact on breeding birds	Reduce noise to minimum
Disused railway	Construction of road	Habitat loss	Development of larger area of better

Site	Activity	Potential Impact	Proposed Mitigation
SNCIs at Bexhill and Crowhurst			habitat elsewhere
		Noise impact on breeding birds	Reduce noise to minimum

Habitats

12.4.53 The mitigation approach is explained at the start of this section and the potential impacts are summarised in Table 12.17.

Table 12.17 Potential Impacts on Habitats and Summary of Proposed Mitigation

Habitat	Scheme Activity	Potential Impact	Proposed Mitigation
Floodplain grassland and fen	Construction	Severance from SSSI	Creation of new habitat between SSSI and road New habitat north of road
		Severance of aquatic invertebrate populations	None. Resolved by periodic flooding
Ditches and streams	Construction	Habitat loss	Replacement ditches and improved profiling and management of existing
	Operation	Road runoff	Attenuation ponds
Neutral grassland and scrub	Construction	Habitat loss	Creation of new neutral grassland and scrub Improved management of retained areas
		Nitrogen deposition	Not at significant levels
	Operation	Salt spray	Carriageway too far away for it to be an issue

Woodland	Construction	Loss and degradation of other habitats	Improved woodland management as compensation
	Operation	Noise impact on woodland birds	Reduce noise to minimum
Hedgerows	Construction	Loss of habitat	Planting new hedges, bulking up existing, new scrub planting
		Severance of linear habitat network	Implement linear habitat strategy

Badgers

12.4.54 There are two substantial active setts within the rural area that would have to be relocated according to well-established procedures and an outlying sett that would have to be closed. Closure requires the provision of replacement artificial setts in advance of works and erection of Badger exclusion fencing with gates around the active sett, once the new sett has been discovered and used by the badgers. Once the Badgers have become accustomed to using the gates, they are adjusted so that Badgers can leave the sett but not return. The original sett is destroyed when it is certain that all the badgers have left. Although, the artificial setts can be constructed at any time of year, the sett exclusion and destruction must be done between the beginning of July and the end of November when the badgers are at their most active to ensure all resident animals have been excluded. Two other setts would be very near the road but not directly affected by it.

12.4.55 Within the urban area the structure of individual Badger clans has broken down and between Woodsgate Park and Glover's Farm there are many sett entrances indicating a large Badger population. Most of these urban setts would probably not require closure but they would be sufficiently near the works for them to require a Natural England licence. Work within 30m of active setts would be licensed by Natural England and timed to avoid disturbance during breeding and the period when cubs are below ground. It would also be necessary to provide badger tunnels to give east-west links

12.4.56 Badger activity would be monitored between the completion of the ES and the start of the construction period. Should badgers dig new setts within the Scheme land-take area in this period this would be taken into account in the application for licences.

12.4.57 Loss of foraging areas would be mitigated by the creation of 17.8ha of foraging habitat north of the disused railway according to the prescription set out in Appendix 12-J. Badger-proof fencing would be provided along the entire Scheme allowing badger movement through culverts and under clear-span bridges. Within the urban area, east-west crossing points would be provided at several locations.

Bats

12.4.58 Bat roosts are probably present in the barns at Adam's Farm and the school on London Road. Demolition of these would be under Natural England licence. The timing of the work would depend on the type of roost and would follow standard Natural England and Bat Conservation Trust guidance to ensure that no bats were harmed. This would include re-survey prior to the start of the works and careful destruction of parts of the building likely to harbour bats with a licensed ecologist present. Several trees with some potential as bat roosts would be felled for the Scheme. Some bats use trees exclusively and others use them for part of the year. Trees would be inspected before any felling takes place. Standard guidance would also be followed in these cases.

12.4.59 Within the urban area, the removal of structures, derelict buildings and trees would result in a shortage of bat roosting sites along and adjacent to the disused railway which is a locally significant site of bat activity. It is therefore proposed to provide bat boxes within the Scheme area at locations to be agreed with the planning authority.

12.4.60 In the rural area there are many derelict buildings and mature trees that would be available for displaced bat roosts, but bat boxes would also be provided as a precaution.

12.4.61 There are two other impacts on bats that require discussion. Firstly, the road would be lit from its start to the proposed interchange with the distributor road for the North East Bexhill Development and at the Queensway junction. Bats are attracted to highway lighting because they feed on the insects that congregate there. The principal species concerned are fast-flying ones such as Common Pipistrelle. There has been a great deal of discussion of this issue and the most recent reputable review (Bieir 2006) concluded that it is now such a widespread feature of bat behaviour that there is little to be done in individual cases.

12.4.62 Second, there is a potential adverse impact from severance of hedges used as flight lines and feeding routes as follows:

- The hedgerow commuting route leading from the south section of disused railway west to the copse at TQ 745 097;
- Three hedgerow commuting routes extending east from Hanging Wood to hedgerow extending north from Acton's Farm;
- Watercourses across the flood plain which function as foraging and commuting routes;
- Commuting route and foraging area along disused railway line to east of Adam's Farm;
- Loss and severance of foraging areas and commuting routes in the Decoy Farm Wood area; and,
- Severance of hedgerows in the vicinity of Upper Wilting Farm that are used for foraging and commuting.

12.4.63 To combat this, hedgerows would be reinforced to give a better structure as shown on the Environmental Design drawings in Figures 3A.38 to 3A.44. In addition, fences would be erected where the road cuts these hedgerows to force the bats to follow the hedgerow upwards, crossing the road at about 3-4m high and thus avoiding collision with cars.

Dormice

12.4.64 The baseline surveys indicate that any hedgerow or woodland with mature shrubs has the potential to contain Common Dormice. Habitat loss would be mitigated by planting new hedges, together with scrub and woodland edges rich in plants used by foraging dormice. There would be supplementary planting in existing hedgerows and the hedgerow strategy described above would be implemented. Typical food sources are Hazel, Bramble, Honeysuckle, Hawthorn, Blackthorn, and Field Maple.

12.4.65 Because the hedgerows affected by the Scheme are narrow they would be cleared of Common Dormice by destructive searches prior to construction of the Scheme. It would be necessary to provide up-to-date survey information for the Natural England licence application that would be made if planning permission is obtained. The 2005 survey would therefore be updated through the summer prior to the proposed start of the works. Moreover, the presence of Common Dormice has been established from indirect evidence and direct evidence is normally required for a Natural England licence. The additional survey would therefore consist of:

- Erection of additional boxes and tubes during March; and,
- Regular inspection of boxes and tubes between June and October.

Water Voles and Water Shrews

12.4.66 No specific measures would be undertaken for Water Shrews since the management of ditches and floodplain grassland would provide ample additional habitat. Water Voles were not recorded in the study area but the measures proposed for floodplain grassland and ditches would provide more good-quality habitat than is present now.

Deer

12.4.67 No mitigation measures are proposed for deer.

Birds

12.4.68 The habitat mitigation measures described at the start of this section would mitigate the loss of habitat for several species and would provide a net gain for others. The following paragraphs identify specific mitigation for Red and Amber List species.

12.4.69 Although Turtle Dove was not proved to breed within the Scheme corridor, this is quite likely. The increase in scrub edges and hedgerows would provide more habitat, but birds may be adversely affected by road noise and

disturbance caused by users of the Greenway. No specific mitigation is proposed.

12.4.70 The area crossed by the Scheme on and around the floodplain supports between four and six pairs of Skylark. Although it is proposed to develop new floodplain grassland this may be too wet for Skylarks because it is meeting other biodiversity objectives. Moreover, the mitigation requirement of woodland, ponds and the lake north of the road would result in a considerable net loss of actual or potential Skylark habitat. Road noise may affect breeding densities but if the published tolerance threshold is correct this effect would be slight. No specific mitigation measures are proposed.

12.4.71 There are likely to be 7-10 territories of Song Thrush on the line of, or close to, the road. In the long-term, the woodland belts, dense hedges and managed woodlands would provide a net increase in Song Thrush habitat, although there may be noise and visual disturbance from the road and users of the Greenway.

12.4.72 The breeding habitat for Starling would be largely unaffected and there is likely to be minimal extent of change to feeding habitat. Within the rural areas they prefer the short grass to be found in horse paddocks and it is not clear if there would be a net gain in this. They may not be affected by noise and recreational use to a significant degree, so no mitigation is proposed.

12.4.73 The breeding habitat for House Sparrow in the rural areas would be largely unaffected by the Scheme. The demolition of buildings and structures within the urban area would result in a minor reduction in the potential breeding habitat but the new hedges and scrub edges would provide a net increase in feeding habitat.

12.4.74 There is an abundance of low scrub and hedges in the road corridor providing breeding and feeding habitat for Linnet. There would be a net increase in this habitat as the mitigation measures mature. The impact of noise and visual disturbance is unknown, but anecdotal evidence suggests that it may be slight.

12.4.75 Bullfinch may be attracted to the dense hedgerows that would be developed along the route corridor but there may be some noise disturbance. However management of the woodlands which are a little further away would have Bullfinch as one of the target species. The Greenway is distant from some of the woods, so that there is likely to be limited impact of human disturbance.

12.4.76 Yellowhammers are abundant in the locality generally. The scrub, woodland edges and rough grass that would be developed by the Scheme would provide a net increase in breeding and feeding habitat.

12.4.77 Potential territories for at least eight pairs of Reed Bunting lie close to the line of the road. The new fen and ditches with rough grass edges plus the habitats around the new lake would be ideal for this species, so that there

would be an overall net increase in suitable habitat. Because of the location of these, noise and visual disturbance are likely to be limited.

12.4.78 The Mute Swan nests in the area but is unlikely to be affected by development of the Scheme. Only one territory for this species was found during two years' survey.

12.4.79 The Kestrel is well known as a species that exploits roadside habitats such as grass verges, and there would be a net increase in potential habitat for this species. However, there may have to be some compromise with the management of verges in order to minimise the risk to Barn Owls, as discussed below.

12.4.80 It is likely that there are more pairs of stock dove breeding adjacent to the road than registration mapping shows. By reintroducing coppicing and developing a much more open canopy layer, the proposed woodland management would create habitat for this species whilst existing large mature trees would be unaffected. Disturbance from people and road noise is likely to be limited.

12.4.81 The mitigation would result in a net increase in habitat for Dunnocks and Whitethroats so that by increasing the numbers of potential hosts, there could be a net benefit for Cuckoo. The response of this species to noise and visual disturbance is not clear, but although adults are 'shy' birds this may not affect its breeding success.

12.4.82 Barn Owl is of particular concern because it has long been established that road casualties are the single most significant cause of death, being responsible for 75% of mortalities amongst young birds. Barn Owls hunt small mammals in the grass on the floodplain and would move across the line of the Scheme route frequently. The barn at Adam's Farm that is used for breeding would be demolished. There are a number of potential Barn Owl breeding sites in the locality and it would be better to let the birds relocate to one of these, but nesting boxes would be put up as a precautionary measure. The breeding site for Barn Owls at Byne's Farm would be unaffected. Road casualties arise because the owls feed in the short grass adjacent to the highway verge. The risk to them can be reduced by minimising the amount of grass verge and by keeping the grass higher thus making it unsuitable for hunting. There is nevertheless a significant residual risk

12.4.83 Green Woodpecker breeding habitat would be unaffected by the Scheme. Since the bird's main feeding habitat is open grassland that supports ants and other invertebrates there would be a net gain in habitat, although these areas would be liable to disturbance by users of the Greenway. Suitable breeding habitat is probably far enough away from the Main Scheme for noise not to be an issue.

12.4.84 Swallow and House Martin breeding habitat would be unaffected by the Scheme. The proposed fen and wet grassland created would provide good feeding habitat. The birds are unlikely to be disturbed by users of the Greenway, nor is road noise likely to be an issue.

12.4.85 Although only one Meadow Pipit territory was recorded in each of the two surveys, areas near the Scheme have good potential for this species. Its habitat requirements are broadly similar to those of Skylarks, so that there would probably be a similar negative impact on this species.

12.4.86 The new areas of scrub, woodland edge and rough grass that would be created are ideal for Stonechat, giving a net increase in habitat. However, the most suitable areas would be vulnerable to disturbance by users of the Greenway and the effects of road noise are unknown.

12.4.87 The study area supports a substantial Dunnock population and several breeding birds would be displaced by the Scheme. However, the extensive areas of new hedge and scrub edge would provide a net increase in good-quality breeding habitat. It is possible that the impact of noise and disturbance would be slight and no specific mitigation is proposed.

12.4.88 Mistle Thrushes breed close to the Scheme route in open woodland and mature hedgerows adjacent to grassland. This habitat would largely remain. In the longer term, as woodland are opened-up and new hedges mature there would be a net increase in habitat. Mistle Thrushes are unlikely to be affected by users of the Greenway, and the impact of road noise may be slight.

12.4.89 Goldcrests nest in dense woodland, and there would be no significant change to the amount of this habitat. Because of its location, there is unlikely to be a disturbance from use of the Greenway, and the noise impact is likely to be slight.

12.4.90 It is not certain that Hawfinches breed within the Scheme route corridor other than at Marline Valley Woods, but it seems likely. The amount of its habitat - mature deciduous woodland - would be unaffected by the Scheme, but it would be a long time before new planting reaches the maturity that is favoured by Hawfinches. Because of the location of these woods, it is unlikely that disturbance by users of the Greenway would have an impact, but it is very vulnerable to increased noise levels and there is no mitigation that can be provided other than to minimise the noise arising from the road.

Reptiles

12.4.91 The populations are low and reptiles can be captured and released on similar habitat on adjacent land without the need to move them to distant receptor sites.

Amphibians

12.4.92 The mitigation strategy would comprise:

- Maintaining links between habitats;
- Creation of new breeding and terrestrial habitat; and,
- Removal of animals from the construction area.

12.4.93 A Natural England licence would be obtained for the construction of the road close to Ponds 13, 16 and 17 that are shown in Figure 12.10 and for the loss of site 44. This licence would also cover the location of the road within 500m of Pond 5.

12.4.94 A newt tunnel of sufficient height and width would be installed to allow newts to move beneath the road where it passes very close to Pond 17 and passes between this pond and Pond 13 and 16. There would be newt-proof fencing that would prevent animals crossing the road while guiding them towards the tunnel.

12.4.95 The construction of the road would result in the loss of the wetland on the Bexhill section of the disused railway (site 44) which supports a small population of Great Crested Newts and a significant population of Palmate Newts. These would be moved to a new pond at a location to be agreed with Natural England.

12.4.96 Other new waterbodies would be created at the locations shown on the Environmental Design drawings in Figures 3A.38 to 3A.44. Those near Great Crested Newt sites may be colonised. In particular, ponds would be created near Ponds 13, 16 and 17. They would be excavated with a range of depths and of different sizes and would have a saucer-shaped profile. They would not be stocked with fish. Landscaping would include the provision of terrestrial habitat and, if appropriate, artificial hibernacula.

Fish

12.4.97 Environment Agency guidance and advice would be followed on mitigation for watercourses in general and fish in particular. To avoid impact on fish, operations would not limit, reduce or restrict flow at the highest flow periods. Care would also be taken to reduce the erosion of the channels, their banks or margins and changes in sedimentation levels. Work would be carried out when the fish are least sensitive to silt and disturbance.

12.4.98 There are likely two breeding seasons for the fish species found in the streams. Trout will breed in November or December, depending on the local stock of fish. The coarse fish will breed mainly between February and June. Most coarse fish have sticky eggs that they attach to the surface of stones or weed. At this stage of their life cycle these fish are very vulnerable to blanketing by silt. Within a few weeks of hatching the fish are more able to cope with moderate silt levels. Spawning of lampreys occurs when water temperature reach 10 to 11°C which is often in March to April. In-river and bank-side work would therefore be carried out between July and September.

12.4.99 Where channels would be restructured the following points would be considered in order to make a waterbody suitable for trout:

- A steady constant flow of cool low-sediment water throughout as much of the year as possible;

- Pool and riffle sequences - the variation in depth is important as it allows the trout to use the clean gravels in the riffles for breeding, feeding and the deeper water for resting;
- Bank-side and marginal vegetation - the cover provided by vegetation is important to allow trout to rest in safety.
- Bends in the watercourse;
- Clean gravel with little silt is essential for the breeding of trout -the clean gravel also provides good feeding grounds for the trout; and,
- Aquatic vegetation provides food and protection in the watercourse.

12.4.100 Creating a habitat for coarse fish would also be considered. Measures that could include creating:

- A deeper and slower-flowing than the trout stream;
- Bank-side and marginal vegetation;
- Bends in the stream.

12.4.101 The riverbed is usually consolidated gravel and/or silt. Due to the lower current velocities, it will tend to have a considerably greater accumulation of silt than a trout stream.

Invertebrates

12.4.102 In general the Scheme does not appear to have a major impact on ditches with significant assemblages of invertebrates, except the Powdermill and Watermill streams. The provision of new ditches and the re-cutting of existing areas as described above would provide a net increase in habitat.

12.4.103 Management proposals would take account of the requirements of dragonflies and damselflies, which rely on a mosaic of interlinking grassland and wetland. The former habitats are used for foraging adults and by recently emerged immatures for foraging and maturing. Water bodies are used by territorial males and for breeding. The larvae of the larger dragonfly species may spend 2-4 years developing within the water. It is this juxtaposition of habitats that has resulted in the assemblage that is present in the Combe Haven Valley. Mitigation would be based on enhancing terrestrial habitat, replacing lost stretches of water course and managing areas of retained watercourse.

12.4.104 There would be a significant impact on uncommon species of terrestrial invertebrates at G13 and to a lesser extent at G6. It is not feasible to move these species because so little is known about their ecologies, but as described in Appendix 12-J, similar habitat can be developed.

12.4.105 Table 12.18 identifies all species that would potentially be impacted by the Scheme and summarises the proposed mitigation measures.

Table 12.18 Potential Impacts on Species and Summary of Proposed Mitigation

Species	Scheme Activity	Potential Impact	Proposed Mitigation
Badgers	Construction	Sett loss	Provision of replacement setts within same territory
		Habitat loss	New areas of foraging habitat
		Disturbance during construction	Compliance with Natural England guidance and licence conditions
		Fatalities from construction traffic	Appropriate site management
	Operation	Fatalities during operation and fragmentation	Fencing, enlarged culverts and tunnels
Bats	Construction	Roosting habitat loss within urban area	To be identified when urban mitigation scheme designed
		Roosting habitat loss within rural area	Possible alternative buildings for roosting may need to be identified prior to demolition
	Operation	Severance of links	Linear habitat strategy implemented
			Directional fencing where key flight paths cross the route
Dormice	Construction	Mortality through habitat destruction	Timing of operations and phasing of clearance.
			Destructive search and relocation
		Habitat loss and fragmentation	Planting of new hedges and strengthening of existing. Woodland and scrub management. Implement linear habitats strategy
Deer	Operation	Road Traffic Accident (RTA)	Risk assessment and fencing if required

Species	Scheme Activity	Potential Impact	Proposed Mitigation
Breeding Skylark and Meadow Pipit	Construction	Habitat loss and fragmentation	Gains in habitat for other species.
	Operation	Increased traffic noise and visual intrusion from footpath users	Reduce noise to minimum, effects likely to be slight
Breeding Turtle Dove	Construction	Habitat loss and fragmentation	Long-term habitat gains. Implement linear habitats strategy
	Operation	Noise	Impact of disturbance unknown: no mitigation proposed
Breeding Song Thrush	Construction	Habitat change and fragmentation	No significant loss of habitat. Net gain from new planting and management of existing vegetation.
	Operation	Noise	Reduce noise to minimum. Impact may be slight
Breeding Starling	Construction	Feeding habitat loss	Provision of new feeding habitat
Breeding House Sparrow	Construction	Feeding habitat loss	Provision of new feeding habitat
		Possible loss of breeding habitat in urban areas	Provision of artificial breeding habitat
Breeding Linnet	Construction	Habitat change and fragmentation	Net gain from new planting and management of existing vegetation and implementing linear habitats strategy
	Operation	Noise	Possibly minor effect only
Breeding Bullfinch	Construction	Habitat change and severance	Management of woodland
	Operation	Increased traffic noise	Increase in habitat away from road
Breeding Yellow-hammer	Construction	Severance and habitat change	Net gain from new planting and management of existing vegetation Implement linear habitats strategy

Species	Scheme Activity	Potential Impact	Proposed Mitigation
	Operation	Increased noise	Impact probably minor. No specific measures
Breeding Reed Bunting	Construction	Severance and habitat change	Short-term habitat loss but long-term net gain. New habitat at distance from road
	Operation	Increased noise	New habitat away from road
Breeding Kestrel	Construction	Habitat change	Short-term habitat loss but net gain
Breeding Stock Dove	Construction	Severance and habitat change	Net gain from new planting and management of existing vegetation
	Operation	Increased traffic noise	Reduce noise to minimum
Breeding Cuckoo	Construction	Severance and habitat change	Net gain for host species from new planting and management of existing vegetation Implement linear habitats strategy
	Operation	Increased noise and disturbance from users of the Greenway	Reduce noise to minimum

Breeding Barn Owl	Construction	Loss of breeding site	Nest boxes
		Loss of feeding habitat	Provision of new habitat
	Operation	Fatalities from collisions	Minimise feeding habitat adjacent to road
Feeding areas for Swallow and House Martin	Construction	Habitat loss	Long-term habitat gain
Breeding Stonechat	Construction	Severance and habitat change	Short-term habitat loss but long-term net gain Implement linear habitat strategy
	Operation	Increased noise and disturbance from users of the Greenway	Reduce noise to minimum

Species	Scheme Activity	Potential Impact	Proposed Mitigation
Breeding Dunnock	Construction	Severance and habitat change	Short-term habitat loss but long-term net gain Implement linear habitat strategy
	Operation	Increased noise and disturbance from users of the Greenway	Reduce noise to minimum
Breeding Mistle Thrush	Construction	Severance and habitat change	Short-term habitat loss but long-term net gain Implement linear habitat strategy
	Operation	Increased noise	Reduce noise to minimum
Breeding Goldcrest	Construction	Severance and habitat change	No significant habitat change Implement linear habitat strategy
	Operation	Increased noise	Reduce noise to minimum
Breeding Hawfinch	Construction	Severance and habitat change	No significant habitat change
	Operation	Increased noise	Reduce noise to minimum
Wintering birds generally	Construction	Disturbance, habitat loss	No specific measures
	Operation	Increased traffic noise and visual disturbance from traffic and users of the Greenway	No specific measures
Passage migrants	Operation	Risk of casualties	Planting set back from road
Reptiles	Construction	Casualties from habitat clearance	Trapping and relocation
		Habitat loss	Development of new habitat
		Reduction in population size from habitat fragmentation	No specific measures
	Operation	Mortality on road	No specific measures
Great Crested Newts	Construction	Loss of habitat at disused railway	Translocation and provision of new ponds

Species	Scheme Activity	Potential Impact	Proposed Mitigation
		Loss of habitat and severance of links at ponds 13,16,17	Newt tunnel and newt fencing
Fish	Construction	Habitat loss and disturbance	Habitat replacement and compliance with EA guidelines
	Operation	Pollution incident, road runoff	See drainage chapter
Dragonflies and damselflies	Construction	Loss of habitat	Development and management of new wetland
Neutral grassland invertebrates	Construction	Destruction of over-wintering stages and loss of habitat	Provision of new habitat
Ditch invertebrates	See ditch habitat		

12.5 Construction Impacts

12.5.1 Construction impacts are those arising from the process of constructing the Scheme (e.g. temporary compounds, site traffic movements, dust generation etc.). Impacts on sites, habitats and species are summarised in Tables 12.19 to 12.22 and discussed below.

Site Operation

12.5.2 The main contractor's compound would be sited on an area of species-poor mesotrophic grassland and scrub which can be reinstated as better quality habitat at the end of the contract.

12.5.3 The topsoil storage areas would be on former arable land or species-poor mesotrophic grassland, so that there would be no impact on biodiversity. There would be like-for-like reinstatement of topsoil types along the Scheme route

12.5.4 Haul routes would be confined to the permanent work corridor.

12.5.5 The construction of the Scheme would result in the clearance of the areas discussed above and the implementation of the mitigation measures described in this section. There would be a delay between removal during construction and the mitigation reaching maturity which is shown on Table 12.19.

Table 12.19 Timetable of Habitat Replacement

Habitat	Year 1	Year 5	Year 10	Year 20
Floodplain Grassland and Fen	-7.4ha	+22.2ha	+22.2ha	+22.2ha
Species-rich Neutral Grassland	-2.3ha	8.9ha new partially established	+6.8ha	+6.8ha
Mesotrophic Grassland, Scrub and Scrub Woodland	-6.6ha	+ 26 ha grassland and young scrub	+ 26ha grassland and young scrub	+ 26ha grassland and scrub and young woodland
Ditches and Streams	-2600m	+1370m	+1370m	+1370m
Significant Hedgerows	3300m	-3300m	+4400m scrub stage	+4400m established hedgerows

Designated Sites

12.5.6 Table 12.20 outlines the significance of the Construction Impacts of the Scheme on the Designated Sites.

SSSIs

12.5.7 Water quality management during construction and the avoidance of pollution incidents to Combe Haven SSSI would be addressed in the Construction Environmental Management Plan (CEMP) as discussed in the Chapter 3B: Construction Strategy, together with the issue of the use of calcareous construction materials on a site with acidic soil and groundwater.

12.5.8 The irregular pattern of loud noises from piling would disturb birds. If carried-out during the breeding season it may cause desertions or failures. In addition, movement of plant and machinery may disturb birds, particularly waders. These are collectively a minor adverse impact

Marline Valley Woods SSSI

12.5.9 If piling and other work generating high levels of intermittent noise are carried-out during the breeding season they may have a minor adverse impact, but this may be no greater than the existing impact of the trains. There are no obvious construction impacts apart from the severance of the area of farmland to the east while construction takes place and planting reaches the stage where it can be used by dormice etc. This would be short-term but nevertheless minor adverse impact.

Disused Railway SNCIs

12.5.10 There may be an impact from the generation of dust through the construction phase but it is difficult to quantify its significance. Habitat links would be severed while new planting matures. This is an adverse impact but is best regarded as part of the minor adverse impact of the temporary shortfall in habitat links across the Scheme as a whole.

Table 12.20 Significance of Construction Impacts on Designated Sites

Site	Activity	Impact	Value of VBR	Magnitude of Impact	Significance of Impact
Combe Haven SSSI	Work to connecting watercourses	Risk of pollution, increased silt	National	Risk low, therefore neutral	Neutral
	Scheme construction	Dust from construction	National	Short-term Negative	Minor adverse
	Use of calcareous materials	pH changes to soils and water courses	National	Uncertain	Uncertain
	Construction noise (esp. piling) Moving plant	Disturbance of breeding and wintering birds	National	Negative	Moderate adverse
Marline Woods SSSI	Construction noise. Moving plant	Disturbance of breeding and wintering birds	National	Negative	Moderate adverse

SNCIs	Construction noise	Disturbance of breeding and wintering birds	County /district	Negative	Neutral
	Moving plant				
	Short-term severance of habitat network	Loss of connectivity	County /district	Negative	Moderate adverse

Habitats and Vegetation

12.5.11 Table 12.21 outlines the significance of the Construction Impacts of the Scheme on habitats and vegetation.

Fen and Floodplain Grassland

12.5.12 Dust is unlikely to have a significant impact on this habitat. Temporary changes to flooding pattern of existing fen and floodplain grassland caused by the works/safety measures are dealt with in Chapter 9: Water Quality and Drainage. Even if these arise they are unlikely to be significant, given the present frequent and irregular pattern of flooding.

Ditches

12.5.13 The CEMP would ensure that the risk of pollution of ditches is minimised. Depending on the exact construction programme, there would be a dip in the quantity and quality of ditch habitat between the point at which work started and the first full summer season after new areas are excavated. However, given the quality and quantity of ditch and stream sections affected, this would not be a significant impact.

Species-rich Neutral Grassland

12.5.14 Two significant areas of species-rich neutral grassland would be removed. There would be a significant delay before the new areas proposed in the mitigation strategy are viable and perhaps a longer delay before they would be colonised by the uncommon species present in G6 and G13. This is a minor negative impact.

Woodland

12.5.15 There may be dust deposition on W8 which is immediately adjacent to the road and possibly also at Chapel Wood, but these impacts are unlikely to be significant.

Hedgerows

12.5.16 Hedgerows immediately adjacent to the road may be affected by dust, but this would not be a significant impact.

Table 12.21 Significance of Construction Impacts on Habitats and Vegetation

Habitat	Scheme Activity	Impact	Value of VBR	Magnitude of Impact	Significance of Impact
Floodplain grassland and fen	Construction	Possible flooding	County	Neutral	Neutral
		Dust deposition		Neutral	Neutral
Ditches	Construction	Risk of pollution	County/local	Neutral because low risk	Neutral because low risk
Species-rich Neutral grassland	Construction	Dust and other pollutants	District	Neutral	Neutral
Woodland	Construction	Dust and other pollutants	County	Neutral	Neutral
Hedgerows	Construction	Dust and other pollutants	District as clusters	Neutral	Neutral

Mammals

12.5.17 Table 12.21 outlines the significance of the Construction Impacts of the Scheme on mammals.

Badgers

12.5.18 Badgers could be killed by construction traffic if there is night-time working, but this is very unlikely. It is also possible that they could be affected by general noise from site traffic and equipment, as opposed to the specific effects discussed below, but this too, is unlikely.

12.5.19 Within the rural areas, setts would be re-located in advance of the start of construction. Within the urban area, construction work would have to be carried out under Natural England licence because of the proximity to setts. The approach would be to implement the strategy described in this Chapter in

such a way as to maintain links across and along the disused railway line throughout the construction period.

Bats

12.5.20 Bats may be affected by construction noise, but there is no firm evidence on this issue. Temporary lighting would certainly attract some species of bat, but as with permanent lighting this cannot realistically be regarded as an adverse impact.

Dormice

12.5.21 There is no research that sheds light on whether Common Dormice would be affected by construction noise and light.

Water Shrews and Water Voles

12.5.22 There is a potential impact on Water Shrews from the disturbance of ditch-side habitats. This would largely be avoided by programming to avoid disturbance at critical times. On the basis of present knowledge there would be no impact on Water Voles.

Deer

12.5.23 The risk of an accident involving deer during construction is negligible.

Table 12.22 Significance of Construction Impacts on Mammals

Species	Scheme Activity	Impact	Value of VBR	Magnitude of Impact	Significance of Impact
Badgers	Construction	Deaths from collision with construction traffic	District	Neutral	Neutral
		Disturbance of setts and movement patterns in urban area	District	Neutral if licence conditions complied with	Neutral
		Stopping-up of 2 setts in rural area	Local	Neutral if licence conditions complied with	Neutral
Bats	Construction	Noise	District	Neutral	Neutral
	Temporary lighting	Increased feeding	District	Neutral	Neutral
Dormice	Construction	Noise	District	Neutral	Neutral
		Temporary lighting	District	Neutral	Neutral

Birds

12.5.24 Birds are sensitive to loud noises at irregular intervals and so could be disturbed by piling. Where work is carried out during the breeding season there may be a risk of desertion or territories not being taken-up. There is likely to be some disturbance of wintering birds from construction noise and movement of the contractor's work force around the site. The birds most likely to be affected are waders and waterfowl, but it is likely that these would simply move further down the valley. Woodland and scrub species would be likely to move in the opposite direction. There does not appear to be feeding areas of particular significance near the Scheme route. The construction process would provide areas of disturbed ground and topsoil mounds that would be a food source for some species. Measures described in Chapter 3B: Construction Strategy and Chapter 11: Noise and Vibration would minimise the noise impact of traffic and other site equipment. However, there would still be a minor adverse impact on breeding and wintering birds as a whole. There is unlikely to be a significant impact on passage birds.

Fish

12.5.25 Fording or work in rivers by vehicles would not be allowed without the prior agreement of the Environment Agency. Only essential activities would be carried out in relation to the construction of culverts, bridges and

associated works. Any work in or around watercourses would be carried out in a manner that reduces the impact of the work on the watercourse.

12.5.26 There may be a requirement to divert short sections of streams resulting in the need to relocate the fish. As many as possible of the fish living within the section would be removed alive and placed in another section of river. Care would also be taken to ensure that the displaced fish survive capture and transportation and are subsequently able to survive in their new location.

12.5.27 Electric fishing would be used to clear the area of fish. This would be undertaken following the Environment Agency code of practice for safety in electric fishing operations, details of which are given in Appendix 12-H.

12.5.28 If the channel is to be drained this would be done gradually by closing off the upstream end of the section. The pools left would be checked for fish, which, if found, would be removed using the methods outlined in Appendix 12-H. If the pools are small a simple netting and removal is likely to suffice.

12.5.29 There are many activities during construction that could affect surface and groundwater on the site. Those activities most likely to affect the aquatic environment are:

- Fuelling, delivery and storage;
- Surface drainage from site;
- On-site facilities (sanitary/welfare);
- On-site storage of chemicals;
- Culvert and pipe construction;
- Work on river bank and in the watercourse;
- Wheel washing;
- Dewatering;
- Pumping;
- Concrete truck washout; and,
- Concrete plant.

12.5.30 As it is feasible that a little 'grey' drainage water would be released from the site, the practice would fully comply with BS6031 (Code of Practice for Earthworks - concerning the general control of site drainage).

12.5.31 Where public sewer systems are available and an arrangement has been made with the local water company, drainage water would be discharged to the sewer system.

12.5.32 Hard standing areas would be used for all plant maintenance and washing off, these areas would be remote from any drain or watercourse. The small amount of wastewater from these areas would pass through an oil

interceptor and settling tank system. Disposal of effluent from vehicle washing containing detergent would be via a foul sewer or sealed tank. Water released from this area would be of sufficient quality to meet any of the relevant Discharge Consents.

12.5.33 The layout of the site and facilities would be designed to minimise the risk of pollution reaching the groundwater or watercourses. Any potentially polluting activities would be at least 10m from any watercourse. Potentially polluting substances, where stored on site, would be kept to the minimum level required to complete the work in progress. On-site storage of chemicals, fuels, etc. would be checked regularly and any container found to be leaking removed to a suitable handling facility. Bunding capable of containing 110% of the maximum volume of stored liquid would be constructed around storage areas wherever possible.

12.5.34 Run-off from sites would, where appropriate, pass through settlement tanks or pools before discharge. Sampling to ensure water quality prior to discharge would be carried out when appropriate. Particular attention would be paid to any on-site concrete batching plants to ensure that no cementitious materials enter the drainage system.

12.5.35 Effluent water from concrete batching plants, bentonite plants, grout mixing plants and concrete washing would be recycled within the process or passed via a settlement tank to a foul sewer, soak-away or sealed tank.

12.5.36 Refuelling is a potentially polluting activity. It would be carried out as far away as feasible from any watercourse or drain. Best Practice Means, for both fixed pump sites and mobile refuelling, would be adopted. These include:

- The positioning of sites for refuelling away from sensitive receptors and areas;
- The construction of containment and bunding (capable of containing 110% of maximum volume of stored liquid);
- A regular inspection routine, with maintenance and repair as appropriate;
- Dispensing nozzles with automatic shut-off and lockable flow controls which lock when not in use;
- Provision of spillage kits, locks and other suitable security devices;
- Refuelling area should be paved with an impervious surface and drained. Drainage from the area should pass through an oil interceptor and settling tank system prior to discharge; and,
- Fuel bowsers and stores should be as far as possible vandal-proof.

Reptiles

12.5.37 Sites identified as significant for reptiles would have been cleared and fenced in advance of construction. The only impact that could reasonably arise would be from reptiles from areas that have not been cleared crossing the construction site. Given that the reptiles are at low density even within the good reptile habitat, this is not a significant issue.

Amphibians

12.5.38 Mitigation measures for amphibians would have been put in place prior to the start of construction with newt-proof fencing around the newt habitats. One or more newt tunnels would be included in the construction works. The only risk to newts is therefore from a failure to carry out the mitigation works properly or to maintain newt-proof fences. This is covered by the CEMP.

Invertebrates

12.5.39 The invertebrates within the watercourses are vulnerable to construction impacts from pollutants entering the stream, so that the issues and site management proposals described for fish also apply here.

12.6 Operational Impacts

12.6.1 Operational impacts are those arising from the process of operating the Scheme, but impacts arising from the clearance of vegetation for construction are also considered here. They are summarised in Tables 12.23 to 12.27.

General Impacts

Air Quality

12.6.2 The operational impact on air quality has been considered in Chapter 10. It has been shown that the critical load for nitrogen deposition as a result of the Scheme would not be statistically significant. It is nevertheless possible that there could be changes in the relative abundance of plants near the road with some species, such as the majority of the grasses present, growing more vigorously than broadleaved species in response to the increase in available nitrogen and a corresponding reduction in broadleaved plants that have slow growth rates. It would, however, be difficult to demonstrate cause and effect and most of the plants present are not responsive to small changes in nitrogen status in the way that plants of strictly acid soils such as Heather (*Calluna vulgaris*) would be. Therefore it is unlikely that there would be a significant impact in relation to changes in the critical load for nitrogen.

12.6.3 The deposition of nitric acid, leading to acidification of soils, has been assessed as statistically significant in Chapter 10: Air Quality. Nitric acid is rapidly absorbed on contact with surfaces such as soil and vegetation. It is difficult to quantify the effect of such deposition as there have been few relevant studies relating to the habitats present within the study area^{*}. However, there is general evidence to suggest that damage is being caused to ecosystems as a result of nitric acid deposition, and habitats that are slightly acidic such as fens and watercourses are potentially vulnerable to change as a result of relatively slight acidification altering available nutrients and pH. There is very limited information on the potential impact on individual species, but Brown Trout are known to be sensitive. As a result of this uncertainty, the potential impact upon ecosystems close to the Scheme as a result of nitric acid deposition has been assessed as minor to moderate adverse.

Noise

12.6.4 The impact of traffic on birds has been discussed in 11.4.69 – 11.4.92 and 11.5.22. The impact of noise on most other taxa is unknown. The impacts are discussed by species in 11.6.37 – 11.6.40.

Use of the Greenway

12.6.5 Use of the Greenway would cause noise and visual disturbance which may affect breeding, and possibly wintering birds as discussed in a previous section. These impacts are impossible to quantify. The species most likely to be affected are considered in previously in this chapter. None of the protected mammal species are likely to be affected by this use, so that the overall impact is probably minor adverse.

Designated Sites

SSSIs

12.6.6 There would be no direct operational impacts on the SSSI and no habitats would be removed. There would, however, be actual and potential indirect impacts.

^{*} http://www.apis.ac.uk/overview/issues/overview_acidification.htm

Combe Haven SSSI

Water Quality

12.6.7 There is a risk of pollution of the ditches and thus all the wetland habitats within the SSSI from road run-off and from accidents. These risks would be minimised by the strategy described in Chapter 3B: Construction Strategy and Chapter 9: Water Quality and Drainage. A major pollution incident would have a major adverse impact on a nationally important site, as would gradual degradation of water quality. The attenuation ponds that would be created to mitigate these risks would provide 5.5ha of fen/wet grassland, which is taken into account in the habitat gains.

Air Quality

12.6.8 The potential impacts of changes in air quality are discussed above and these can be regarded as a potentially minor to moderate adverse impact.

Noise and Visual Disturbance

12.6.9 There would be noise and visual impact on the breeding birds mentioned in the SSSI citation, as discussed previously in this chapter. If the waders mentioned were breeding in significant numbers, if their populations were expanding or if the SSSI in its present state was prime habitat for these species, then this would be a substantial issue. But none of these are the case. Noise is also likely to have an impact on the birds that are known to breed in the SSSI. Although additional habitat would be provided for species such as Reed Bunting outside the SSSI, this cannot be done for some others. Visual disturbance from the road and users of the Greenway have been discussed previously.

12.6.10 The impacts of noise, visual disturbance and visual obstruction on wintering waders and waterfowl are cumulative. These species are likely to feed and roost further away from the road as a result of the construction of the road and the landscape mitigation. The wintering bird survey and consultations with local ornithologists showed that there is limited use of the area by wintering waterfowl or waders, although this would probably change during floods. The main wintering areas are further down the valley.

12.6.11 The possible impact on passage birds has been discussed previously in this chapter. There is a residual risk of exhausted birds being killed but this is probably not significant.

12.6.12 On balance, the probable impact of noise and visual disturbance on birds within the SSSI would be minor adverse.

Severance

12.6.13 Severance of the SSSI from its 'hinterland' of floodplain grassland and fen was discussed previously. While there may be an impact on the floodplain grassland outside the SSSI, there would not be a significant impact on the SSSI because it is by far the larger area and additional habitat is being created adjacent to it. However, the effects of severance north of the road would be largely mitigated by the development of new habitats continuous with the existing ones.

12.6.14 The road would sever the disused railway north of the SSSI from the abutment to the south, which is within the SSSI. Movement of invertebrates and birds along the edges of the corridor that is now present would be adversely affected. The planting strategy discussed in this chapter means that there would be no residual impact north of the SSSI, but there would be a minor adverse impact on the abutment within the SSSI. This level of impact is a reflection of the fact that all SSSIs are of national importance. Judged on its own merits the abutment woodland is secondary and of limited value. If it were outside the designated area the impact would probably be slight.

Marline Valley Woods SSSI

Contiguous Habitat Loss

12.6.15 There would be a loss of approximately 0.4 hectares of ancient woodland habitat outside the SSSI but contiguous with it. This would be a minor adverse impact.

Air Quality

12.6.16 As stated previously, the projected level of nitrogen deposition would not be statistically significant. Lower plants are particularly sensitive to increased levels of nitrogen but those within the wood of significant biodiversity interest are over 200m away from the road and generally not within the prevailing wind direction. Acidification may also be an issue since woodlands are vulnerable to long-term changes in acid status, so that there is a potential minor to moderate negative impact.

Noise

12.6.17 Noise from the road would have an impact on breeding birds, particularly Hawfinch which is one of the most significant species in the SSSI. There is thus likely to be a minor negative impact on the SSSI from reduction in breeding bird densities near the road.

Visual Disturbance

12.6.18 This has been discussed in 11.4 and it is unlikely that there would be an impact.

Disused Railway SNCIs

Habitat Loss

12.6.19 Approximately 1ha of the Bexhill railway line and 0.6m² of the Crowhurst railway line would be removed. This loss would be mitigated by the provision of a much larger area of scrub and scrub woodland with better aspect and management. The impact would therefore be minor positive.

Air Quality

12.6.20 Air quality changes are unlikely to have a significant impact on habitats that are moderately eutrophic and the species of wide tolerance that are present.

Noise and Visual Disturbance

12.6.21 Noise and visual disturbance would be likely to reduce the breeding bird densities on both railway lines, although the most frequent species, such as Blackbird, are probably not particularly sensitive to noise. Several substantial areas of new nesting and feeding habitat would be created and although some may be affected by road noise, many would not. The impact would therefore be neutral or minor negative.

Habitat Links and Severance

12.6.22 The edges of the disused railways are flight line for bats and habitat for Dormice in their own right, as well as enabling movement of Dormice and other small mammals around the area. These links would be severed. Most of the edges are not south facing, so they are of limited value for invertebrates. New links would be provided in line with the mitigation strategy so that in the long term there would be a neutral impact. However, it would take at least 10 years for the new habitat to reach maturity resulting in a short/medium term minor adverse impact.

Indirect Impacts on SNCIs

12.6.23 The Scheme would have a noise impact on nesting birds on the Buckholt Woods SNCI since it would be parallel to it for much of its length. Some of this impact would be mitigated by the overall increase in scrub and woodland as part of the Scheme, but there would be a residual impact on Hawfinch and possibly other species with low tolerance of noise. Overall, this is a minor adverse impact.

12.6.24 Table 12.23 summarises the operational impacts on all the Designated Sites affected by the Scheme.

Table 12.23 Significance of Operational Impacts on Designated Sites

Site	Activity	Impact	Value of VBR	Magnitude of Impact	Significance of Impact
Combe Haven SSSI	Road drainage	Pollution	National	Low risk	Low risk
	RTA	Pollution	National	Low risk	Low risk
	Traffic	Nitrogen deposition	National	Neutral	Minor / Moderate adverse
	Traffic and use of the Greenway	Noise and visual disturbance	National	Negative	Minor adverse
	Construction of the Scheme	Severance from Floodplain grassland and fen	National	Neutral	Neutral
Marline Valley Woods SSSI	Construction of the Scheme	Loss of ancient woodland contiguous with site	National	Negative	Minor adverse
	Traffic	Noise	National	Negative	Minor adverse
		Nitrogen deposition	National	Neutral	Minor / Moderate adverse
Bexhill Disused Railway SNCI	Construction of the Scheme	Removal of vegetation	County/ District	Positive	Minor beneficial
		Severance	County/ District	Negative	Neutral
	Traffic	Nitrogen deposition	County/ District	Negative	Not significant
		Noise	County/ District	Negative	Neutral
Crowhurst Disused Railway	Construction of the Scheme	Removal of vegetation	County/ District	Positive	Minor beneficial
		Severance	County/ District	Negative	Neutral
	Traffic	Nitrogen deposition	County/ District	Neutral	Not significant
		Noise	County/ District	Negative	Minor adverse
Buckholt Woods SNCI	Traffic	Noise	County	Negative	Minor adverse

Habitats and Plant Communities

Fen and Floodplain Grassland

12.6.25 Approximately 7.4ha of floodplain grassland and fen of significant biodiversity would be removed and a further 2ha in the Watermill Valley would be severed. These areas are not within designated areas, but can be considered to be of county significance because they are continuous with the Combe Haven SSSI and a Sussex BAP priority habitat.

12.6.26 About 10,9ha of wet grassland and fen would be created adjacent to the SSSI and a further 11.3ha north of it, assuming the finished depth of the borrow pit allows fen to be developed across the whole area. Although there would be a habitat gain, there would be a period of 2-5 years of shortfall on this habitat while the new habitat matures. In addition, there would be a potential severance effect on the area north of the road in the Watermill Valley but not in the Powdermill Valley.

12.6.27 The severance caused by the Scheme is likely to affect the invertebrate populations of the grassland and fen outside the SSSI because these would be fairly small fragmented areas. This would be compensated by the fact that the new habitats would be more-or-less contiguous within the SSSI.

12.6.28 Provided that the habitat creation proposed is successful, there may not therefore be a severance impact in the long term. However, there would be a permanent loss of land within the floodplain with potential as wildlife habitat. The sum of these uncertainties is best expressed as a potential minor adverse impact.

Ditches and Streams

12.6.29 Approximately 2600m of ditches and streams would be removed. The ditches, which are mainly of low higher plant and invertebrate interest, would be replaced by 3.9km of new ditches. In addition, retained ditches within the areas proposed for mitigation would be re-profiled to a better form for marginal plants and invertebrates. The four main streams would also be crossed. The loss of marginal vegetation and invertebrate habitats would be more than compensated by the new habitats created.

12.6.30 The crossings would create a barrier to movement of invertebrates, although probably not to fish and crustaceans. But if the present pattern of flooding continues, major summer floods would occur every 5-10 years and this would be sufficient to disperse invertebrates across the ditch and stream network. On this basis the overall impact on ditches and streams would be minor positive.

Woodland

12.6.31 An area of 0.4ha of ancient woodland would be lost and extensive areas of new shaws and woodland would be planted. Moreover, it is proposed to bring approximately 4.5 ha of ancient woodland adjacent to the Scheme into active management. There would be a noise impact on woodland birds as discussed below, but overall there would be a minor positive impact on woodland.

Dry Grassland and Scrub

12.6.32 Approximately 2.3ha of species-rich neutral grassland would be removed at sites G6 and G13 and 6.6ha of scrub, rough grassland and secondary woodland elsewhere. The 6.6ha would be compensated by the creation of 32.6ha of new rough grassland, scrub and secondary woodland, resulting in a minor positive impact for this habitat.

12.6.33 The loss of the grassland at G6 and G13 would be mitigated by the development of 9.1ha of new grassland with roughly the same species composition and aspect. It would be difficult to establish the right ground conditions and sustainable management, but if these can be achieved there would be a minor positive impact in the long-term although a short-term shortfall.

Hedgerows

12.6.34 Table 12.24 shows the lengths of hedgerow that would be lost as a result of the Scheme.

Table 12.24 Lengths of Significant Hedgerow that would be removed by the Scheme

Hedgerow	HEGS Grade	Approximate Length Lost (m)
OA500	2-	250m
OA502	3	125m
OA503and OA504	1-	Earthworks very close but hedgerow not directly affected
OA505	2	Earthworks very close but hedgerow not directly affected
OA507	3	175m
OA508	3	150m
OA509	2	125m
OA5010	3	175m
OA5011	3	175m
OA5012and H79	3-	425m
OA515 Powdermill Stream Shaw	1-	90m
OA520	3	220m
OA521	3	125m
OA527 Decoy Pond Shaw	1-	80m
OA535	3	300m
OA513 and 539	3	20m
OA526and 538	3	20m
OA533		40m
H81	3	500m
H157	3	100m
Crowhurst Lane OA 529,530	1-	150m

12.6.35 About 8.7km of new hedge would be planted, giving a significant net gain although these would take up to 20 years to reach the state where they would compensate for the habitats lost. In addition, existing hedgerows would be brought into nature conservation management. These gains would be offset to some extent by the severance of the network of hedgerows. This would be gradually mitigated as the new network developed so that there

would be a short-term minor adverse impact but a long-term minor positive one.

12.6.36 Table 12.25 outlines the significance of operational impacts of the Scheme on habitat and plant communities.

Table 12.25 Significance of Operational Impacts on Habitat and Plant Communities

Habitat	Activity	Impact	Value of Habitat	Magnitude of Impact	Significance of Impact
Floodplain grassland and fen	Construction of road	Habitat change	County	Neutral	Neutral
Ditches and streams	Construction of road	Habitat change	Ditches local, streams district	Positive	Minor beneficial
		Severance	Ditches local, streams district	Neutral	Neutral
Woodland	Mitigation works	Habitat management	District	Positive	Minor beneficial
Neutral grassland	Construction of road	Habitat change	District	Positive	Minor beneficial
Scrub, secondary woodland and rough grassland	Construction of road	Habitat change	Local	Positive	Minor beneficial
Hedgerows	Construction of road	Habitat change	District	Positive	Minor beneficial
		Severance of network	District	Neutral	Neutral

Mammals

Badgers

12.6.37 The mitigation measures allow for re-locating two setts in the rural area where it would be necessary to provide one or more tunnels and for badger-proof fencing along both sides of the whole Scheme. Badgers within the Powdermill Valley with setts on the higher ground and feeding areas on the valley floor can be directed through the crossing of the Powdermill Stream. If these measures are effective, the impact on Badgers in the rural area would be neutral.

12.6.38 Within the urban area, Badger fencing would be installed throughout the Scheme between Belle Hill and Glover's Farm. This fencing would be positioned on the revetment just above the road near Ninfield Road and would extend for the full length of the road. At places like Glover's Farm Overbridge, Woodsgate Park Overbridge and at the Badger pass installed on the Ninfield Road Overbridge, the fencing would be returned up-slope so as to guide Badgers to cross the link road at these points.

12.6.39 Closure of setts can largely be avoided between Belle Hill and Glover's Farm although between Belle Hill and Woodsgate Park, setts would be closed under licence from Natural England. These setts are all low-status, however one main sett would probably be partly lost due to the construction of the Scheme. If this is the case an artificial sett would be provided.

12.6.40 A suitable location for this would be in a green corridor that is to be maintained on the east side of the Scheme between Woodsgate Park and Ninfield Road just to the north of Egerton Stream.

12.6.41 All spoil mounds would be fenced with Badger-proof fencing to prevent Badgers from excavating setts within them.

12.6.42 There is a further risk that Badgers within the urban areas, whether from the disused railway or outside it would find their way around the ends of the Badger-proof fencing, however extensive the 'return' is and onto the road.

12.6.43 Subject to a satisfactory resolution of the urban area issue the residual impact on Badgers is likely to be minor adverse.

Bats

12.6.44 Bat roosts at the barns at Adam's Farm and a school building on London Road would have to be demolished. The procedures for doing this are well established and when followed would not have an adverse impact on the individual bats or bat populations. There are plenty of alternative roost sites in the rural area and new artificial roost sites would be provided. Within the urban area artificial roost sites can be built into the mitigation scheme.

12.6.45 The strategy of using the new planting alongside the road to establish a new network of flight lines has been set out in this chapter. This would be combined with fencing to minimise bat casualties at the important crossing points at Acton's Farm and Adam's Farm. In the long term the fences would become redundant as the trees mature. The impact of lighting is probably not significant.

12.6.46 In summary there is likely to be a short to medium-term negative impact on bats but this would diminish as the mitigation measures mature. They would nevertheless be deprived of the complete freedom of movement that they have across the area at present so that the residual impact would be minor adverse.

Water Voles

12.6.47 A survey for Water Voles carried out in 2005 using the then current English Nature guidelines found no evidence of them in the Combe Haven Valley except a single individual near Bulverhythe. Surveys have not been carried out according to the new Natural England guidelines published in September 2006. Despite the results of the 2005 survey it is possible that Water Voles are still present in the valley, but at a very low level.

12.6.48 The proposed ditch management would benefit Water Voles if they are present or if they recolonise, but no specific mitigation measures are proposed. On the basis of current knowledge the impact would be neutral.

Dormice

12.6.49 Hedges and woodland edges supporting Common Dormice would be removed. Direct impact on individual Dormice would be mitigated by the destructive search by licensed Dormouse handlers.

12.6.50 The loss of habitat would be mitigated by the planting of new hedges and the management of new and existing scrub edges which would have Common Dormice as one of the target species. Overall this would provide a net gain in Common Dormouse habitat. This would partially mitigate the loss of habitat for Common Dormice around the study area, but although there are good Dormouse populations either side of the road, freedom of movement would not be complete. It is possible that small isolated populations may be formed and these could be vulnerable to extinction. There would therefore be a minor adverse impact on Common Dormice.

Water Shrews

12.6.51 Water Shrews are found in two of the hedges that would be crossed by the road and the direct impact on individuals can be mitigated by a destructive search. The work to ditches proposed and the increase in fen and floodplain grassland would result in a net increase in habitat. The culverting of ditches is unlikely to cause severance of populations, so that overall there is likely to be a slight beneficial impact on Water Shrews.

12.6.52 Table 12.23 summarises the operational impacts on all the mammals affected by the Scheme.

Table 12.26 Significance of Operational Impacts on Mammals

Species	Scheme Activity	Impact	Value of VBR	Magnitude of Impact	Significance of Impact
Badgers	Construction	Road near setts in rural area	Local	Neutral	Neutral
		Road near setts in urban area	District	Negative	Moderate adverse
		Change to foraging areas	Local	Neutral	Neutral
Bats	Construction	Destruction of roosts	Local	Negative	Neutral
		Severance of flight lines	Local	Negative	Minor adverse
		Severance of habitat network	Local	Negative	Minor adverse
	Operation	Street lighting	Local	Neutral	Neutral
Water Voles	Construction	Culverting/ bridging of watercourses	National	Neutral	Neutral
Dormice	Construction	Habitat change	District	Positive	Minor beneficial
		Severance of habitat network	District	Negative	Minor beneficial
Water Shrew	Construction	Habitat change	Local	Positive	Minor beneficial

Birds

12.6.53 Breeding birds would be affected to varying degrees by habitat change. With the exception of Skylark and Meadow Pipit, which are birds of open farmland, there would be a net increase in habitat in the long term for the Red and Amber list species recorded in the 2005 and 2006 surveys. There

would also be fragmentation of habitat, which is likely to affect Skylark and Meadow Pipit, but probably not the remainder.

12.6.54 As discussed in previously in this chapter, Barn Owls are vulnerable to collisions because their favoured feeding habitat is the type of grass generally found on road verges. The extent of this can be minimised, but there is nevertheless a minor adverse impact.

12.6.55 It is unlikely that noise and visual intrusion would have a significant impact on wintering passerines. The impact on wintering birds of open farmland would be the same as for breeding birds.

12.6.56 It is likely that there would be some impact on wintering wildfowl and waders in that they would not feed or roost near the road and might be disturbed by a particular noise or vehicle, but in most years the impact is unlikely to be substantial. There is also the slight risk of casualties to exhausted passage migrants in road collisions.

12.6.57 Table 12.27 summarises the operational impacts on all the birds affected by the Scheme.

Table 12.27 Significance of Operational Impacts on Birds

Group/Species	Scheme Activity	Impact	Value	Magnitude of Impact	Significance of Impact
Breeding Skylark and Meadow Pipit	Construction	Loss of habitat and fragmentation	Local/District	Negative	Minor adverse
	Operation	Visual intrusion	Local/District	Negative	Minor adverse
Breeding Turtle Dove	Construction	Habitat change and fragmentation	Local	Neutral	Neutral
	Operation	Increased noise	Local	Negative	Minor adverse
Breeding Song thrush	Construction	Habitat change and fragmentation	Local	Neutral	Neutral
	Operation	Increased noise	Local	Negative	Minor adverse
Breeding Starling	Construction	Feeding habitat change	Local	Positive	Minor beneficial
Breeding House Sparrow	Construction	Habitat change	Local	Positive	Minor beneficial

Group/ Species	Scheme Activity	Impact	Value	Magnitude of Impact	Significance of Impact
Breeding Linnet	Construction	Habitat change and fragmentation	Local	Positive	Minor beneficial
	Operation of	Noise	Local	Minor negative	Minor adverse
Breeding Bullfinch	Construction	Habitat change and fragmentation	Local	Positive	Neutral
	Operation	Noise	Local	Negative	Minor adverse
Breeding Yellow- hammer	Construction	Habitat change and fragmentation	Local	Positive	Minor beneficial
	Operation	Noise and visual disturbance	Local	Negative	Minor adverse
Breeding Reed Bunting	Construction	Habitat change and fragmentation	Local	Positive	Minor beneficial
	Operation	Noise and visual disturbance	Local	Neutral	Neutral
Breeding Kestrel	Construction	Habitat change	Local	Positive	Minor beneficial
Breeding Cuckoo	Construction	Habitat change and fragmentation	Local	Positive	Minor beneficial
	Operation	Noise	Local	Negative	Minor adverse
Breeding Barn Owl	Construction	Loss of breeding site	District	Neutral	Neutral
		Loss of feeding habitat	District	Negative	Minor adverse
	Operation	Collisions	District	Negative	Minor adverse
Feeding Swallow, House Martin, Swift	Construction	Habitat change	Local	Positive	Minor beneficial
Breeding Stonecha t	Construction	Habitat change	Local	Positive	Minor beneficial

Group/ Species	Scheme Activity	Impact	Value	Magnitude of Impact	Significance of Impact
	Operation	Noise and visual disturbance	Local	Negative	Minor adverse

Amphibians

12.6.58 The Scheme avoids direct impact on Great Crested Newts except a small population in the flooded section of the Bexhill disused railway. These can be moved to a purpose-built pond within the rural area in advance of the construction contract, following Natural England guidelines. There is also a focus of newt activity around the pond north of Decoy Pond Wood. The crossing of Decoy Pond Stream would need to be supplemented by a newt tunnel under the road and by newt fencing to direct movement. If these measures are implemented and are successful the impact on Great Crested Newts and other newt species would be neutral.

Reptiles

12.6.59 The 2005 reptile survey showed a low density of reptiles within the study area. These can be cleared by destructive search of the areas of suitable habitat identified in the survey. The receptor sites would be either areas of suitable habitat identified in the 2005 survey and unaffected by the Scheme or areas away from the road to be agreed with landowners, such as the extensive areas adjacent to Marline Valley Nature Reserve. Overall, therefore, the impact on reptiles would be neutral.

Fish

12.6.60 The Powdermill Stream and to a lesser extent the Watermill Stream have significant fish populations. About 20m of the Powdermill Stream and 20m of the Watermill Stream would be crossed by an open span structure. This is unlikely to have a significant impact on fish populations. The principal risk in this case lies in the construction process that has been discussed in this chapter.

12.6.61 Fish are vulnerable to pollution from road runoff or arising from a road traffic accident. The measures to mitigate this are discussed in previously in this chapter.

Invertebrates

12.6.62 Ditches with significant aquatic invertebrate populations would be avoided. The streams further from the Scheme have slightly richer invertebrate populations than the streams where they are crossed by the road. The proposed new ditches and the improved management of existing ones would provide a net gain in habitat, particularly for the less common species because of the increase in shallow water. The impact is therefore minor beneficial.

12.6.63 The culverts and crossings would create darker and colder areas, which invertebrates would usually move around rather than cross. However, if the current pattern of flooding continues, invertebrates would be swept through the culverts in a summer flood, which in this section of the Combe Haven is likely to take place every 5-10 years so that the impact of this severance is probably neutral.

12.6.64 *Odonata* would benefit from the increase in ditch, fen and floodplain grassland habitat so that there is a slight beneficial impact in this respect. Dragonflies are strong fliers and so their movement is unlikely to be inhibited by the road. Some species of damselfly may be inhibited, but the extent of habitat either side of the road would be such that there is unlikely to be a severance effect, so this can be regarded as neutral.

12.6.65 The significant areas for terrestrial invertebrates are G13 and G6. The neutral grassland would be re-created in areas with suitable aspect, but as already stated in this chapter, it is not feasible to re-locate the uncommon invertebrates. These would eventually colonise the new grassland from sites such as the meadows within Marline Valley Nature Reserve, but it is impossible to say whether a similar species assemblage would eventually be achieved. The impact on terrestrial invertebrates would therefore be minor adverse.

12.7 Conclusions

12.7.1 During the construction phase the principal impact would be the shortfall in habitats and the severance of habitat links while new areas of habitat become established. These are set out in Table 12.19. Particular care would be needed in relation to site management measures to safeguard vulnerable habitats, such as watercourses. Provided that these measures are implemented, the main other impact would be likely to be the moderate adverse impact of noise on birds.

12.7.2 One of the reasons for the choice of the proposed alignment is that it would avoid direct impact on the Combe Haven and Marline Valley Woods SSSIs. Once the Scheme is operational, there would nevertheless be minor adverse impacts of noise and visual intrusion on birds within these sites and a minor/moderate adverse impact as a result of the uncertainty of the effects of potential acidification resulting from changes in air quality. It is possible that there may be other impacts including the severance of invertebrate movement and casualties to passage birds but it is unlikely that these would be significant.

12.7.3 There would be a gain in all of the principal habitats present: floodplain grassland and fen, hedgerows, wet ditches, species-rich neutral grassland, mesotrophic grassland, scrub and woodland. The changes to the distribution of floodplain grassland and fen and the reduction in the available land for establishment of this habitat in the future would result in a minor adverse impact.

12.7.4 There would be a reduction of open farmland. This would have a minor adverse impact on Skylarks and Meadow Pipits and other species that use this habitat.

12.7.5 It is possible that there may be changes to the species composition of floodplain grassland and fen and aquatic communities as a result of acidification arising from changes in air quality, but these would probably be unlikely to affect mesotrophic habitats resulting in only a minor adverse impact.

12.7.6 The severance effect of the road on plants and invertebrates where it crosses ditches and streams would probably be slight to neutral since propagules and animals would be washed through by the periodic summer flooding. However the habitat network of lanes and hedgerows, which is of importance to bats and Dormice and some species of birds, would be severed. A planting strategy is proposed to mitigate this impact. The road would nevertheless inhibit the free movement of wildlife across the area.

12.7.7 The impact on Badgers in the rural areas can be mitigated by sett relocation and badger tunnels so that there would be no net impact if these measures are successful. Within the urban area a number of complex issues of site management and construction have to be addressed in order to safeguard Badgers and the impact is likely to be minor adverse.

12.7.8 The Scheme corridor has a large Dormouse population. Mitigation, based on enhancing the habitat networks either side of the road would largely mitigate its impact, but it is possible that small populations south of the road could become isolated.

12.7.9 No Water Voles have been found in the area and no specific mitigation measures for this species are proposed. The mitigation measures are likely to provide increased habitat for Water Shrews.

12.7.10 Two bat roosts may have to be removed, but there is an abundance of roosting sites in the area and new roosting sites would be provided. Flight lines would be severed by the Scheme, but this can be mitigated by reinforcing the hedgerow network either side of the road and providing fencing to force bats upwards where important flight lines are crossed. There is nevertheless a minor adverse residual impact through inhibition of movement across that area.

12.7.11 Overall, there would be a net gain in breeding and feeding habitat for the Red List and Amber List birds present, with the exception of those of open farmland. However, breeding densities would probably be reduced adjacent to the road for some species. Barn Owls breed within the proposed road corridor and although the possibility of deaths from collision with vehicles can be mitigated to some extent by verge management there remains a significant risk

12.7.12 It would be necessary to relocate one group of Great Crested Newts and to provide a tunnel for another, but overall the impact on

amphibians and reptiles would be neutral if the mitigation measures are successful.

12.7.13 Impact on aquatic invertebrates would be largely avoided and there would be a net increase in good quality habitat. However, two species-rich neutral grassland sites of district significance would be lost. While it would be possible to re-create similar grassland with similar aspect, it is uncertain how these areas would be recolonised, so this is a minor adverse impact.

12.7.14 In summary, while there are some positive impacts of the Scheme there are also several minor adverse impacts resulting on balance in an overall minor adverse impact. If the proposed strategy for improvements to the SSSI could be implemented and all of the wetland within the designated area brought into conservation management this would offset much of the adverse impact of the Scheme. This is dependent on the agreement of the landowners to enter into the Higher Level Environmental Stewardship Scheme and the success of the complex management operations that would need to be carried out within that Scheme.