

**HEYSHAM TO M6 LINK
(WESTERN ROUTE)
ENVIRONMENTAL IMPACT
ASSESSMENT
Non-technical Summary**

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1 Summary

A wide range of ecological studies was undertaken by ADAS throughout the Western Route Field Survey Area and within other areas defined within individual study protocols. The studies focused on species and habitats that are protected or are of conservation concern; it also identified areas where the overall wildlife resource would be affected by the scheme.

It was considered particularly important to identify the effects of the scheme on:

- the Lune Estuary which is designated as a candidate Special Area of Conservation (cSAC), Special Protection Area (SPA), Ramsar Wetland of International Importance and Site of Special Scientific Interest (SSSI).
- European Protected Species such as Bats, Great Crested Newts, Otters and Salmon.
- the severance by the route of hedgerows and other linear features on which wildlife depend for navigation, breeding, refuge and feeding.

Following mitigation impacts on the integrity of the Lune Estuary designated cSAC/SPA were considered possible. Uncertainty concerning potential impacts and the likely success of mitigation measures was such that a precautionary approach is advised. This would involve identification of an alternative route that would not create the risk of such impacts.

Negative impacts anticipated as arising from the route, after implementation of the recommended mitigation, enhancement and compensation measures, concern:

- Bats - Critical
- Great Crested Newts - Critical
- Birds - Major
- Veteran trees - Major
- Hedgerows - Major
- Salt-marsh - Moderate

Impacts on Bats would concern loss of roosts in veteran trees, loss of hedgerows, disturbance and increased road kill resulting from the proximity of the route to a number of significant Bat roosts. Activities involving removal or disturbance Bat roosts would require a licence from Defra and involve consideration of alternatives to avoid the need for removal of roosts.

Mitigation and compensation proposals for Great Crested Newt would require a licence from Defra and involve consideration of alternatives to avoid the need for translocation and isolation of small populations (refer last paragraph and Great Crested Newt report). Compensation measures would need to include planting hedgerows to compensate for those severed and lost and the construction of appropriately designed and managed ponds to provide replacement habitat. The time available within the development programme may not be sufficient to allow these measures to be functioning effectively before the impacts of the development occur.

Residual negative impacts after mitigation and compensation are predicted on bird populations using the hedgerows and fields adjacent to the route. Residual negative impacts are also predicted to result from increased road kill along the length of the route and particularly at the River Lune crossing point.

The loss of veteran trees cannot be mitigated or compensated in any reasonable timespan. Long-term planning and management of trees would be necessary to ensure that younger trees in the locality are retained and protected, to allow them to replace the veteran trees lost.

The loss of hedgerows would only be compensated in the longer term of approximately 15 years. The alignment and interconnection of new hedgerows would be different from the current network. In particular, a significant number of hedgerows which are aligned east-west would be severed by the north-south alignment of the route. This is predicted to result in the isolation of wildlife populations on either side of the route and their separation from their feeding areas across the carriageway.

The route would damage or destroy a number of locally designated Biological Heritage Sites including salt-marsh at Oxcliffe Marsh and woodland.

The cumulative impact of the length, nature and area occupied by the proposed Western Route would have a significant negative impact on the wildlife of the area. Negative impacts on nature conservation interests are also considered likely to arise from future development induced by the presence of the route and by its possible future dualling.

The route would impact on internationally protected species (Bats and Great Crested Newts) for which the primary mitigation is to consider an alternative route. The recommendation of this report is that an alternative route is identified.

2 Introduction

ADAS was commissioned by Lancashire County Council to undertake an environmental impact assessment of a proposed road link from the M6 to Heysham to the west of Lancaster, focussing on nature conservation and ecology impacts. Work started in September 2002 and surveys were completed in March 2004. The environmental impact assessment process involved:

- Identifying from past studies, consultation and field surveys the habitats and wildlife that may be affected. Habitats and wildlife are referred to as "receptors" in the report.
- Carrying out detailed studies to establish the species, distribution, feeding, nesting and movements of wildlife and the habitats on which they depend.
- Analysing the results of surveys, consultation and desk research.
- Identifying the impact that constructing the proposed road would have on habitats and wildlife.
- Identifying methods to prevent or reduce the impacts identified (referred to as "mitigation"), actions to compensate for damage to or loss of habitats and actions to enhance habitats for the benefit of wildlife.

This report presents the results of the impact assessment studies and describes the significance of the impacts of the proposed Western Route on the habitats and wildlife likely to be affected.

3 Evaluation Process

The ecological evaluation process broadly follows the Institute of Ecological and Environmental Management (IEEM) guidelines. The process comprises a series of stages:

1. Assessment of the status of the habitat, species or group of species, based on their importance at a local, county, regional, national or international level.
2. Determination of the level of significance that impacts would have on these receptors. This is done by estimating the magnitude of the impacts, both negative and positive, and consideration of the duration of impacts as temporary (short-term, medium-term, long-term) or permanent.

The assessment process is undertaken for pre-mitigation impacts¹ and for post-mitigation or residual impacts² and assumes that all proposed mitigation options are in place and functioning effectively. The aim is to identify and assess the impacts before mitigation and to identify whether and to what extent impacts would be reduced or removed following mitigation.

Following the assessment of potential impacts an Environmental Management Plan was prepared as a separate document. The Plan summarises the mitigation, enhancement and compensation measures needed and prioritises measures needed to comply with legislative requirements or to mitigate or make adequate compensation for loss or damage to receptors.

4 Description of Proposed Western Route Scheme

The proposed Western Route links the M6 motorway at Junction 33, south of Galgate, with the A683 west of Lancaster. The route crosses the Lancaster Canal and the River Conder, passing mainly over agriculturally improved grassland, crossing the River Lune at Oxcliffe before joining the A683. An additional road near Whinney Carr Farm would link to the A6 south of Scotforth. This road link would also cross the Lancaster Canal.

At its northern end the route crosses the River Lune immediately adjacent to an internationally important candidate Special Area of Conservation under the Habitats Directive EC Directive (92/43/EC Conservation of Habitats and & Wild Flora & Fauna) and a Special Protection Area (designated under the EU Birds Directive 79/409/EEC). The area is also designated as a Wetland of International Importance under the Ramsar Convention and as a Site of Special Scientific Interest, under the Wildlife & Countryside Act 1981.

The majority of the scheme would be crossing improved, agriculturally managed grassland and would be severing a large number of hedgerows and other linear features used by

¹ The impact that would occur in the absence of any mitigation, enhancement or compensation.

² The impact that would remain after mitigation, enhancement or compensation measures are undertaken, where these measures are as effective as predicted.

animals for moving around the countryside. These features are used by animals for migration, hibernation, feeding, resting and dispersion.

4.1 Survey Areas

A number of survey areas with defined survey limits, were set for the individual studies as follows:

- **Field Survey Area:** Follows identifiable features on the ground and extends up to 1.5 km from the proposed route.
- **Scheme Corridor:** A linear strip expected to form the maximum extent of the construction area. The corridor extends approximately 100 metres to 150 metres either side of the expected centre-line of the road.
- **Ditch Survey Area:** Ditches identified as likely to be affected by the proposed road.
- **Hedgerow Corridor Area:** Hedgerows likely to be affected, directly or indirectly by the proposed road.
- **Pond Survey Area:** Ponds that may be affected directly or indirectly by the proposed road.
- **River Corridor and River Habitat Survey Areas:** Lengths of watercourse and their banks on either side of the road that may be affected by the road.

Each study was assigned a particular survey area, or extent. The initial study areas for each receptor were provided within the tender document (LCC 2002). As surveying proceeded ADAS identified additional surveys (habitats, locations and wildlife) that were considered by LCC and, where appropriate, defined study areas were allocated to areas of such new work. These are indicated in the appropriate survey reports and in Table 1 below.

Certain studies were undertaken on specific and defined areas, e.g. Belted Beauty Moth and other Salt-marsh Moths were sampled on the Lune Estuary.

4.2 Studies

The primary objective of the studies undertaken during 2002-2003 was to identify significant wildlife habitats and species likely to be affected by the development of the scheme. The list of initial studies is presented in Table 1. The table also indicates where additional studies were undertaken, where original studies were extended and which studies were proposed but not undertaken.

Table 1 - List of Original Studies, Additions & Extensions & Studies Proposed but Not Undertaken

Receptor Study	Original Study	Additional Study	Extension of Study	Not Undertaken
Within the Field Survey Areas				
Badger	Y			
Barn Owl	Y			
Bats	Y		Y	
Birds Summer/Breeding	Y			
Birds Winter/Passage	Y			
Birds – Snipe			Y	
Brown Hares	Y			
Butterflies	Y			
Deer	Y			
Desk Study	Y			
Dormouse				Y
Great Crested Newt	Y		Y	
Harvest Mouse				Y
Hedgehogs				Y
Marine Invertebrates	Y			
Moths – Belted Beauty		Y		
Moth Trapping - Fixed Sites		Y		
Moth Trapping – Salt-marshes		Y		
Otters	Y			
Phase 1 Habitat Survey	Y			
Phase 2 Habitat Survey of Statutory Wildlife and Non-statutory Wildlife Sites	Y		Y	
Phase 2 Habitat Survey – Salt-marshes		Y		
River Corridor Surveys	Y			
River Habitat Surveys	Y			
Small Mammals				Y
Vascular Plant Survey	Y			
Water Voles	Y			
Within the Scheme Corridors				
Fish	Y			
Fungi	Y		Y	
Invertebrates	Y			
Lichens	Y		Y	
Mosses and Liverworts	Y		Y	
Reptiles	Y		Y	
Terrestrial Molluscs		Y		
Veteran Trees		Y		
Within other Defined Areas				
Ditches - Ditch Survey Area	Y			
Flowing Freshwater Macro-invertebrates – selected watercourses		Y		
Hedgerow Survey – Hedgerow Survey Area	Y		Y	
Pond Surveys - Pond Survey Area	Y		Y	
White-clawed Crayfish				Y

5 Ecological Resource & Predicted Impacts of Western Route

The route lies adjacent, in its northern area, to Morecambe Bay. This is internationally designated under the Ramsar Convention, the Birds and Habitats Directives and as an SSSI. The Field Survey Area also supports a number of European Protected Species, namely Bats, Great Crested Newts, Otters, Salmon, Bullhead and Lamprey.

In addition to international protected areas and species, the Countryside & Rights of Way Act 2000 s.74 imposes a new obligation on the Secretary of State and all government departments to promote the conservation of biodiversity, including listing species and habitats necessary to achieve that purpose. In response, Biodiversity Action Plans for habitats and species and Species Recovery Programmes to restore species to Favourable Conservation status have been developed and a range of BAP habitats and species are supported in the survey area.

In addition to identifying the individual habitats and species likely to be affected by the scheme it was necessary to obtain an overview concerning which species and habitats are inter-dependent and whether cumulative impacts may result from damage to individual receptors. An additional important consideration is the wide-ranging behaviour of many wildlife species and their dependence on linear features such as hedgerows, rivers, canals, streams and ditches for food, breeding, protection and navigation. Such usage of the wider countryside can be significantly impacted by road schemes that sever such networks.

Table 2 illustrates this inter-dependence. The main habitats and ecological features likely to be affected by the development of the scheme are listed as column headings. The table is divided into three sections that broadly deal with area features, such as woodland or grassland, point features, such as individual trees, and linear features, such as hedgerows and rivers.

The area features column labelled "Wider Landscape" indicates which species are wide-ranging and may be significantly affected by interruption of their movement by the road scheme. The linear features column headed "Linear Connectivity" highlights the importance of linear features for species that move along them through the countryside. Linear features include hedgerows, walls, lanes verges etc. The entries in the rows of the table are based on the individual studies of habitat, species and species group receptors.

The table can be read by following columns down to see which species or groups of species are dependent on a particular habitat or countryside attribute and how important the habitat or attribute is to them.

The table can be read across to determine which habitats or features are of importance to individual receptors (habitats, species or groups of species). It does not include species or groups that were not found during surveys on the Western Route, such as the Water Vole. Although surveys were undertaken for this species (see Table 1 above) it was not found. There were potentially suitable areas, but there was no evidence of this species and it was therefore not considered an important receptor on this route.

Each of the features or attributes (column headings) was assigned a significance of impact based on the expected impact resulting from the scheme. For example, it is expected that a large area of improved grassland would be destroyed in the construction of the road. This would be considered of minor negative significance (☒) as this habitat is of relatively low ecological value. In contrast, a large number of hedgerows would be severed as a result of the scheme. Hedgerows are of high ecological value and provide key linear habitats for

wildlife. The significance of this impact may therefore be considered to be between moderate and major (☒☒☒), in the absence of effective mitigation.

Table 2 - Inter-dependence Matrix of Receptors, Habitats and Landscapes Attributes

Receptor	Area Features/Countryside Attributes												Point Features			Linear Features/Countryside Attributes					
	Wider Landscape	Improved Grassland	Semi-improved Grassland	Marshy Grassland	Salt-marsh	Estuary	Arable	Woodland	Scrub	Waste Ground – Ruderal	Ponds	Trees	Veteran Trees	Linear Connectivity	Hedgerows	Walls/Masonry/Rock	Canals	Rivers	Ditches/Streams	Lanes/verges	
Key: Significance of impact: <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> = Major -ve <input checked="" type="checkbox"/> <input type="checkbox"/> = Moderate -ve <input checked="" type="checkbox"/> = Minor -ve <input type="checkbox"/> = No Impact Dependency: <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> = Critical <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> = High <input checked="" type="checkbox"/> <input type="checkbox"/> = Moderate <input checked="" type="checkbox"/> = low <input type="checkbox"/> = none	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
Significance of Impact	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
Badger	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
Bats	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
Birds – Barn Owl	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
Birds – General	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
Birds – Waders/Wildfowl	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
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Great Crested Newt	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
Invertebrates – Aquatic	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Invertebrates – Terrestrial	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
Invertebrates – Marine	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
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Mosses & Liverworts	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
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Slugs and Snails	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>											

5.1 Habitats

Impacts from the Western Route are predicted on a range of habitats of sufficient value to require mitigation.

The Wider Landscape

Many receptors within the Western Route are dependent on use of the wider landscape. These include Badgers, Bats, birds, Brown Hare, Deer and Otters. Some of these are wide-ranging species liable to be affected by the severance of pathways that would result from development of the Western Route. Some of these species and groups are also dependent on linear features for navigation through the wider landscape.

Species such as the Badger have large territorial ranges that could potentially be separated by the route, isolating social groups from each other and significantly affecting the species' local populations. Great Crested Newt, Butterflies and Moths occupy smaller areas but can also be impacted by the introduction of a route that isolates local populations from one another and from habitats upon which they depend.

The intermixing of populations is considered important in maintaining the genetic diversity of species. Preventing or interrupting the pathways by which populations can interact has a negative impact on those species.

Improved Grassland

The majority of the farmed landscape on the Western Route is agriculturally improved grassland. Generally this habitat is of relatively low wildlife value as it is species-poor and intensively managed for grass production. However, it is a significant element in the requirements of Badgers and some bird species for feeding. Biodiversity Action Plan bird species, such as Lapwing and Skylark, may also nest in improved grassland.

Marshy Grassland

Some areas of marshy grassland are expected to be lost under the scheme footprint. Although these may provide feeding habitat for waders, it is unlikely that the losses would be significant locally.

Semi-improved Grassland

A number of grass fields containing semi-improved swards are expected to be lost, or damaged, by the route. In particular, fields of semi-improved grassland that are regarded as Biodiversity Action Plan Priority Habitats would be affected. These are mainly in the vicinity of Tarnwater Farm and at the Lancaster Canal crossing point nearby.

The Lune Estuary: Salt-marsh & River Habitats

The Lune Estuary is designated as a candidate Special Area of Conservation (cSAC) and Special Protection Area (SPA), Ramsar Wetland of International Importance and a Site of

Special Scientific Interest (SSSI), because of its value to bird species, notably waders and wildfowl.

The Habitats Directive includes obligations to maintain or restore the integrity and the favourable conservation status of the species and habitats for which the cSAC was designated. Obligations include a requirement to control activities undertaken outside the actual site boundaries of designated sites where such activities would affect the favourable conservation status of the protected habitat or species.

The area is designated partly because of the diversity and numbers of waders and wildfowl it supports and the study assessed the use these groups make of the surrounding land. Impacts on waders and wildfowl are predicted as a result of reduced feeding and roosting opportunities that would be available and an increased risk of road kill.

The Western Route at its northern end crosses the River Lune at Oxcliffe Marsh. An area of 2.43 ha of salt-marsh outside and adjacent to the cSAC/SPA would be lost as a result of the construction of the route.

Damage to salt-marsh downstream of the bridging point within the cSAC/SPA/SSSI/Ramsar may result from the bridge construction. Scouring of the riverbed within the cSAC/SPA resulting from the proposed bridge may cause the release of contaminants from the Salt Ayre landfill site, which unless effectively mitigated, would cause additional contamination leaching into the river and surrounding salt-marshes and potential impacts on the cSAC/SPA. The certainty of success of such mitigation has not been established. It is not certain whether or not the localised changes caused by the bridge to the flow and accretion/erosion within the cSAC/SPA would adversely affect its integrity.

It is difficult to predict the certainty of damage occurring to salt-marsh within the cSAC/SPA because the extent of potential damage depends on the interaction of the complex estuarine system with the design and construction method adopted for the bridge, combined with the prevailing weather and river flow conditions. The main period for potential damage to occur would be during the construction phase when the river channel would be narrowed. The extent of narrowing and the duration of this restriction would depend on the design and operation of various construction causeway options.

In cases where the certainty of damage occurring to a cSAC/SPA cannot be confirmed a precautionary approach is considered appropriate.

The existing salt-marsh may become increasingly nutrient-rich during the road's operational phase, due to increased deposition of vehicle emissions. This may encourage an increase in nutrient-loving species, such as coarse grasses and a corresponding reduction in the existing plant diversity. The result of this would be a decrease in plant diversity across the marsh.

Negative impacts on the cSAC/SPA's integrity would be of critical significance. Ensuring that the integrity of the cSAC/SPA is not affected by the scheme would depend on either identifying an alternative route away from the site or by building a single-span bridge with piers outside the river and no construction causeway in the river. This option is not currently under consideration.

Woodland

Current understanding of the scheme footprint indicates that areas of Biological Heritage Site woodlands at Freeman's Wood and Crane Wood would be removed. The eastern edge of

Crane Wood is expected to lie on the edge of a proposed cutting. This would affect the local hydrology and drainage, resulting in negative effects on the wood. Negative impacts would also result on Bats as a result of their extensive use of the wood for feeding.

Veteran Trees

Veteran trees are a valuable resource throughout the Western Route and they cannot be replaced within a reasonable timescale. Until precise scheme plans are prepared, it is not clear how many veteran trees identified during the survey would be removed or how many would potentially suffer adverse impacts resulting from earth-moving and changes in drainage and hydrology associated with the scheme.

Many of the veteran trees are becoming increasingly valuable to wildlife, as a result of their numerous broken branches, rips, tears and holes that offer opportunities for birds and Bats and the many species on which they feed. Bat roosts were confirmed in two trees surveyed. Additional roosts may be found in the period between the 2003 surveys and the commencement of work on the Western Route.

Many veteran trees are also the host habitat for a range of lichens, mosses and liverworts. In some cases the combination of lichens, mosses and liverworts associated with veteran trees are unique and are related to the age of the individual trees.

Linear Connectivity

Linear ecological connectivity within the proposed Western Route is mainly associated with hedgerows. Other linear features that would be interrupted or affected by the scheme include the Lancaster Canal, streams, brooks and ditches, in addition to stone walls and tracks.

The impact of loss of habitat connectivity can affect a wide range of species, including those that use linear features for migration and dispersion within the wider landscape. Linear features are often used by wildlife such as amphibians to move to hibernation sites, and, in the case of hedgerows, may be used by species such as the Great Crested Newt for hibernation.

Critical severance of connecting routes would occur where receptors regularly commute across the scheme corridor. For example, this would occur where a significant Bat roost lay to the east of the scheme and the primary feeding area lay to the west. Without effective mitigation, the scheme may sever connectivity, increase road kill significantly or isolate animals within habitats on one side of the scheme if the distance is too great for the particular species to cross. The proposed future dualling of the route may create a barrier to some species (including some Bat species) while increasing road kill of other species (including other Bat species) which are prepared to attempt to cross the route.

A total of 131 hedgerows is predicted to be partly or completely removed. Of these, approximately 45 cross the footprint from one side to the other. Other hedgerow sections scheduled for removal link with these and currently form an interconnected network within the survey area. The combined impact of hedgerow loss would result in major severance of ecological connectivity in the area.

Hedgerows

Hedgerows provide vital linear connections for wildlife, allowing them to use the landscape. They are also key habitats in their own right, providing food, protection and breeding habitat. They are an important resource for nesting birds and the un-managed ground flora of hedgerows is frequently used by small mammals. Small birds and mammals provide food for predators including Sparrowhawks, Kestrels, Owls and, in the case of small mammals, Stoats and Weasels.

In addition to acting as key habitat, hedgerows are also used as navigation routes along which wildlife migrate and feed. Such wildlife includes a wide range of bird and Bat species and some larger mammals such as Foxes, Badgers, Stoats and Weasels.

Hedgerows form a key element for hibernating amphibians and they support a wide variety of invertebrate species throughout the year, including slugs and snails, spiders, beetles and they are also important over-winter refuges for invertebrates. Many species of insects, including moths and butterflies, over-winter in hedgerows as eggs, larvae, pupae or adults. Such invertebrates provide food for birds and other species.

The significant, unmitigated, loss of hedgerows on the Western Route would result in a major negative impact of major significance. The loss could not be mitigated because of the long period required for new hedgerows to become established as wildlife habitats.

Compensation in the long-term for the habitat lost is therefore proposed. The compensation measures proposed are, as a minimum, to replace the length of hedgerow expected to be removed to accommodate the scheme footprint³. Although this compensation planting would, in the long-term, eventually replace the length and/or volume of hedgerow lost, it would not compensate for the severance of hedgerows as linear connecting routes across the scheme corridor. Although animals will seek to adapt to the new alignments of hedgerows, it cannot be assumed that these will adequately provide access to the resources on which such species depend.

Walls and Masonry

Walls are not generally a significant component of the field boundaries on the Western Route. There are a number of walls to the east of Whinney Carr Farm and a significant mortared wall around the Ashton Hall Golf Course. These are important habitats supporting lichens, mosses and liverworts. They are also frequently covered in ivy, which may form a suitable habitat for slugs and snails and, if sufficiently dense, provide nesting opportunities for small birds.

Dry-stone walls are particularly valuable for animals such as spiders and beetles, in addition to being used by amphibians for hibernation and as habitat for small mammals. The removal of sections of wall would have an impact on such species. As with hedgerows, dry-stone walls can be regarded as both a habitat and as a linear connecting feature in the wider landscape.

³ The area of land predicted to be physically affected by elements of the scheme, including landscaping plans.

Canals

The Lancaster Canal and Glasson Branch are important ecological features on the Western Route and are classified as Biological Heritage Sites. The margins of the Canal support a range of typical emergent wetland flora and the banks and cuttings are of significant wildlife value along sections of their length. Of particular value is the section of cutting in the vicinity of Whinney Carr Farm. This area is a heavily wooded and is extensively used by a range of Bat species that were observed emerging from a large Bat roost at the bungalow at Whinney Carr.

The canal and its branch are significant wildlife habitats and also act as linear features that facilitate the movement of animals through the landscape.

Ditches and Streams

A number of small streams and brooks would be affected by the route. Many of these cross the scheme footprint and would require culverting or diverting.

Some of the smaller streams and ditches were prone to drying out during the summer months. This can be detrimental to aquatic animals dependent on them. However, some species of freshwater invertebrates are mobile and will move to other water bodies as ditches and streams dry up.

Lanes and Verges

Lanes and verges are important linear features in the landscape. They are frequently lined by double hedges and offer seclusion and shelter for wildlife, notably butterflies and moths. Roadside and laneside verges are frequently dominated by tall rough grassland valuable to a range of invertebrates and small mammals. Small mammals, in turn, provide food for predators such as Stoats and Weasels and birds such as Kestrels and Owls.

5.2 Species/Species Groups

Badger

The Badger is protected under national legislation (Badgers Act 1992) which aims primarily to prevent cruelty to the species. It is a wide-ranging animal that holds extensive territories that are based on social or family groups. Considerable movement of individuals occurs within, and between, these social groups and such movement would be significantly interrupted by the route in the absence of mitigation. High levels of Badger mortality are associated with road schemes.

Badger activity on the Western Route was extensive but relatively low in intensity compared with the other parts of the country where Badgers are more common. This is consistent with the fact that Badger populations are generally less dense in the North of Britain.

Numerous Badger setts were identified in woodland along the length of the route. Low levels of activity were recorded away from the setts, which is believed to be due to the low density of social groups and consequent reduced territorial marking behaviour. One of the most significant Badger setts was located immediately north of the route.

It is believed that a number of Badger setts contain animals that would forage across the proposed scheme footprint and would potentially be at significant risk of being killed on the road.

Bats

Bats are internationally protected species that depend on a variety of conditions to ensure their survival. They require adequate opportunities for roosting, both in winter and in summer, and, during summer, adequate access to feeding grounds.

Bat activity across the Western Route was extensive and as an internationally important species any threat to this group must be carefully considered. The evidence collected during the current surveys suggests that Bats are using the Lancaster Canal, hedgerows and other linear features, as feeding and commuting routes, in addition to using ponds for feeding.

Concentrated activity was recorded emanating from numerous Bat roosts along the length of the scheme. There are a large number of summer roosts in a number of buildings, including farm buildings and modern houses and bungalows. Many of these roost sites lie close to the Western Route. Some species of Bat moving from these roosts to reach their feeding grounds would be likely to cross the route and be at risk of being killed on the road.

There is an expectation that some of the bridges across the route may facilitate movement and that the compensatory scheme perimeter hedge planting will focus Bats towards these crossing points. This cannot be guaranteed and also the additional energy expended by Bats to reach these crossing points may result in these bridges not being used. This would effectively reduce the territory size and could reduce the size of some off-site roosts.

Two Bat roosts were confirmed in veteran trees during the surveys. One of these would be removed as part of the site clearance. The other would be subject to disturbance during the construction and operational phases.

Should the route be widened to a dual carriageway, as proposed, the additional width would be more of a deterrent to certain Bat species while those species prepared to cross the route would be at greater risk of road kill.

Birds

The proposed Western Route lies parallel, and in places, immediately adjacent to the Lune Estuary. Impacts may arise on the Lune Estuary cSAC, SPA, Ramsar site and SSSI. The designated area could be compromised by the development of the Western Route. Although the route would not impact directly on the designated area, it may affect the integrity of the site by having an adverse impact on species that normally use the Estuary and move inland at times of high tide or adverse weather. This includes a number of internationally protected species of wader and wildfowl.

Two species of wader specifically surveyed were the Snipe and Jack Snipe. These are secretive species that use the salt-marsh. During the survey period very high tides were considered likely to drive this species off the salt-marsh and a survey of Aldcliffe Marsh confirmed that the birds left the salt-marsh and moved onto the fields inland. This indicates that if the scheme was developed, in future there would be a reduced area available for these species to obtain refuge under these conditions. The species may also attempt to cross the route resulting in increased road kill. Other waders and wildfowl are also known to use the inland fields for feeding and nesting.

Birds that use the inland habitats of the grass fields and hedgerows would be significantly affected by the loss of hedgerows and the associated habitat connectivity they provide. A wide range of species use the hedgerows as feeding and nesting habitat or for moving through the landscape. Species that use hedgerows in particular include a number of Biodiversity Action Plan Species such as the Grey Partridge and Linnet.

The hedge compensation planting might be expected to replace the losses predicted, but there is evidence that roadside hedges support fewer breeding pairs than those further away. This is partly due to disturbance and also because the noise interferes with the territorial singing of birds. The scheme is expected to have varying distances between the road surface and perimeter hedges due to the different areas of land-take necessary to accommodate embankments and cutting. Some bird species may avoid hedges planted close to the carriageway while may those which are prepared to nest in hedgerows along the scheme perimeter would be at risk of significant levels of road kill, as a result of the length of the road involved.

Barn Owl

The Barn Owl is an uncommon species locally, with evidence that it is beginning to move northwards into the Western Route Field Survey Area. It is protected under the Wildlife and Countryside Act 1981, Schedule 1 and was recorded initially during Bat surveys at a barn towards the northern end of the Western Route, where there was subsequently a record of a Barn Owl killed on the road.

Although it could not be confirmed that the species was breeding at this location, evidence suggests from subsequent records that Barn Owls are beginning to move into the area. The development of the Western Route is likely to create additional feeding resource for the species with the creation of significant roadside verges. However, high levels of road fatality are associated with the Barn Owl and when in operation the scheme would increase the risk of road kill.

In addition to nesting in "traditional" barns, Barn Owls also nest in hollow trees. A number of likely Barn Owl nest sites in veteran trees would be removed as a result of site clearance for the route.

Brown Hare

The Brown Hare is a Biodiversity Action Plan Species that was recorded mainly towards the southern end of the Western Route in moderate numbers. The development of the scheme would divide the species' ranging area and may isolate breeding populations. Increased road kill may result as individuals attempt to continue to move across the route corridor.

Butterflies

Butterflies have specific habitat requirements. They need appropriate larval food plants and, at maturity, benefit from secluded and flower-rich areas in which to obtain nectar and to continue their breeding cycle. The main threats posed by the scheme would be the direct loss of habitat containing food plants and the fragmentation of colonies of species dependent on particular plants for their larvae.

In contrast, many butterfly species are dependent on grasses of various types for their larval food and it is expected that, in the absence of specific mitigation, additional roadside verge habitat would be created as part of the Western Route Scheme.

A further significant component is expected to be the loss of hedgerows. These contain a range of plant species favoured by butterflies and also, particularly in the case of double hedged lanes and roads, provide sheltered environments for the adults to obtain nectar and to breed.

Deer

Deer were recorded relatively frequently across much of the Western Route, particularly in association with the Lancaster Canal, which runs parallel to the proposed scheme. Animals were also recorded in association with the golf course at Ashton Hall. Deer are strongly associated with road accidents, including human fatalities, and a road safety issue concerns the scheme in relation to deer moving across the route.

Fish

A range of internationally protected fish species were recorded on the Western Route, notably Brook and River Lamprey, Bullhead and Salmon. The main threat to these species would be from the construction phase when culverts and river and brook diversions are created. This could significantly impact on breeding grounds and individuals by causing excessive silt burdens to be released into water bodies. It is anticipated that much of this impact could be ameliorated by best practice during construction and that there should be little or no effect during the operation of the route. Potential residual impacts may persist, however, if there are significant changes to the speed of flow in these watercourses.

Fungi

A typical range of fungi were recorded on the Western Route. No species of particular importance were recorded.

Great Crested Newt

The Great Crested Newt is an internationally protected species. The species spends part of the year in ponds and ditches where it breeds. During the remainder of the year it lives on land and requires a considerable area of relatively unimproved habitat in which to feed. It also has a requirement for secluded environments such as hedgerows in which to hibernate. Although Great Crested Newts are associated with ponds, terrestrial habitat is of major importance to support the species, including hedgerows, which are used for movement between breeding ponds and terrestrial habitat and for hibernation.

A number of historic records existed of Great Crested Newt in ponds towards the southern end of the Western Route. The surveys conducted by ADAS during 2003 confirmed their presence in two of these ponds and identified an unknown site in a pond towards the northern end of the route. This latter location is remote from the route and is unlikely to be significantly affected by the scheme.

The pond locations towards the southern end of the route are of significant concern in that the route would pass between the two sites. Although neither site would be directly impacted by the route, the terrestrial habitat linking the two sites would be destroyed as a result of the construction of the route. General guidance suggests that potential Great Crested Newt resting places could be as much as 500m from their breeding ponds and this would mean that the hedgerows scheduled to be removed would be within this distance and this would be a licensable operation

The proximity of the two ponds creates a very high level of certainty that there is movement of Great Crested Newts between the ponds and that they form part of a “meta-population”. This is a population that comprises a closely associated grouping of individual colonies between which there is movement which allows the overall population of the area to be maintained.

Severing the linkage between the ponds is predicted to adversely impact breeding populations in both ponds and creates the risk that either, or both, populations may become extinct.

Significant mitigation or compensation would be required to ensure that the overall population of Great Crested Newts in the area is not reduced. Such measures need to be in place and functioning effectively by the time the scheme is developed. Some of the necessary measures would require the issue of a licence from Defra and would involve the need to consider alternatives to avoid the need for capture or disturbance of individuals.

Invertebrates – Aquatic⁴

Seven ponds are expected to be lost under the scheme footprint. This would have a significant negative impact on the overall resource of ponds on the Western Route. Aquatic invertebrates may be adversely impacted by the disturbance and destruction involved in culverting and diverting some of the streams and brooks that cross the Western Route Scheme.

Many aquatic invertebrates have a terrestrial phase in their life cycle and it is therefore important to consider the terrestrial habitat adjacent to watercourses when considering aquatic macro-invertebrates. A detailed mitigation and compensation plan would need to be developed (in response to the detailed route design) for lost channel length and incorporating features required by aquatic macro-invertebrates during their aquatic and terrestrial phases. Evidence gathered during the 2003 surveys suggests that many of the ponds and linear water features are used extensively by Bats for feeding on both aquatic and terrestrial invertebrates.

As with fish aquatic invertebrates in streams, brooks and rivers could be adversely affected by silt or accidental pollution incidents during the construction phase, and similar appropriate mitigation and compensation measures would be needed to prevent such impacts. The impacts during the operation of the route are not anticipated to be significant.

Invertebrates – Terrestrial⁵

The terrestrial invertebrate surveys assessed ground-living invertebrates both in Biological Heritage Sites and in other sites identified as being of relatively low intrinsic value in terms of the species recorded, but which were of significant value as food sources for other species.

The species recorded were mainly typical of unimproved grassland. This type of grassland was mainly associated with the BHS sites, hedge bottoms and verges, rather than the agricultural fields that were normally species-poor and classed as 'improved'. A quantity of 'unimproved' grassland habitat would be lost under the scheme, but a significant area would be created within a relatively short period as part of the landscaping and mitigation

⁴ The larger aquatic insects, snails, leeches, worms etc that can generally be seen easily with the naked eye and without a microscope. Some species emerge from the water as adults to breed e.g dragonflies

⁵ Insects, beetles, spiders, grasshoppers etc. that live entirely on dry land.

proposals. It is therefore expected that there would be minor positive impact after mitigation.

Lichens⁶

The lichen flora within the proposed Western Route was assessed as being typical for the local area, containing no significantly rare species. Lichens were mainly recorded on veteran trees and on rock outcrops and walls. Predicted impacts on lichens are likely to result from the direct loss of habitat, removal of veteran trees and destruction of rock and wall features.

The crust-forming lichens found on dry-stone walls were often difficult to identify as they had been significantly grazed by terrestrial slugs and snails, emphasising the inter-dependence of these two groups.

A significant impact on lichens is expected to arise from the increase in airborne pollution and dust. Evidence from other studies suggests that lichen floras are impoverished close to existing roads and it is predicted that such impoverishment would result from development of the proposed route.

Marine Invertebrates⁷

Marine invertebrates are an important food source for birds and fish within the Lune Estuary. Because of the significant proposed engineering works at the Lune Bridge crossing point it was therefore important to assess potential impacts on marine invertebrates in this vicinity. The construction of a causeway and the eventual installation of bridge piers may affect the flow of water in the river channel. This could cause movements of materials within the Estuary that could affect marine invertebrate faunas, which could consequently affect species of fish and birds that feed on marine invertebrates.

Mosses and Liverworts

A typical range of mosses and liverworts were recorded within the Western Route. Isolated areas contained uncommon communities of mosses and liverworts. Mosses and liverworts are sensitive to airborne pollution and some of these communities may therefore be affected by emissions from vehicles on the road. There is also expected to be a loss of supporting habitats in the form of walls, masonry and veteran trees.

Moths

Impacts on moths would be similar to those on butterflies as both have specific food requirements for their larva and tend to associate with other habitat features when they emerge as adults. They are important food for wildlife such as insectivorous birds and Bats. Insectivorous birds will feed on the eggs, larvae and pupae of moths and some of the smaller moth species are taken by various species of Bat at night. There is an association between moths and large, bushy hedgerows and woodland edges, in addition to open water such as the Lancaster Canal and River Lune.

⁶ A combined organism comprising a fungus and an alga living together, most frequently found as coloured patches on walls, roofs and rocks.

⁷ Worms and shrimps etc. that live in water or in mud/sand.

In addition to conducting fixed-position moth trapping surveys on the Western Route, information and previous surveys identified the potential for unusual species to be present in salt-marshes. Additional surveys were undertaken for Belted Beauty Moth and other salt-marsh specialist species. These focussed on identifying whether any sensitive species were likely to be affected by the engineering works in the vicinity of the Lune bridge. No evidence was found to suggest such effects.

Otter

The Otter is an internationally protected species that was not recorded during the current surveys. However, previous information from the Environment Agency and other sources indicates that this species is present on the River Lune and that it should be considered as part of the proposed scheme.

Licence applications are not anticipated to be necessary as a result of the development of the route as there should be no requirement to disturb Otters or their resting places. High levels of Otter fatality are associated with roads and the route would present such a risk during its operational phase. Appropriate mitigation, including the construction of "Otter ledges" within certain culverts under the road would reduce the need for Otters to cross the road and significantly reduce the risk of road fatality. The risk of road fatalities cannot be completely removed as a result of the wide ranging behaviour of Otters, especially when young individuals are seeking new territories, and because of the length of the route which would intervene between the habitats attractive to Otters, which are the watercourses passing from east to west and the estuarine coastal habitats to the west.

Slugs and Snails

No species of significant conservation value were recorded during surveys. However, slugs and snails are an important component in the ecology of the area and are a food source for Biodiversity Action Plan bird species such as the Song Thrush. No specific mitigation measures are proposed, on the assumption that the design features of the road and habitat mitigation proposals would benefit molluscs.

6 Pre-mitigation Impacts

Table 3 summarises the predicted impacts on each of the habitats, species, or species groups, considered in Section 5, likely to affect receptors identified as being of ecological importance in the absence of any mitigation, enhancement or compensation measures. The impacts are divided into those that would have negative effects and those with positive effects.

Negative impacts include damage or loss of roosts, habitat and the potential for road kill of wildlife and the potential for water and air pollution affecting species or habitats. Depending on its exact design, the scheme could also alter the alignment of connectivity corridors along the length of the route, which could affect a wide range of species including Bats and birds. For example, birds of the farmed landscape and Bats are likely to suffer significantly from the fragmentation of habitat resulting from the severance of the hedgerow network on which they rely for movement and feeding and, in the case of birds, also for breeding and taking refuge.

Positive impacts would include the formation of additional habitat in the form of the grass verges bordering the new scheme. This habitat would be created independent of proposed mitigation or enhancement.

Habitat enhancement could occur where the roadside verge borders existing habitat where it may augment and enhance the value of the existing nearby habitat if appropriately managed.

Table 3 - Pre-mitigation Impacts on Receptors/Ecological Resource

Receptor	Negative Impacts											Positive Impacts							
	Land Take	Damage/Loss of Habitat	Fragmentation of Habitat	Disturbance/Displacement	Road Kill	Barriers to Movement	Water Pollution	Air Pollution	Salt Deposition	Disruption of Hydrology	Soil Structure Damage	Spoil Disposal	Foreign Materials	Induced Development	Public Pressure	Additional Habitat	Enhanced Habitat	New/Improved Connectivity	New/Improved Habitat Distribution
Arable	☒	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Badgers	☐	☒☒	☒☒	☒☒☒	☒☒☒	☒☒☒	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Bats	☒☒☒	☒☒☒☒	☒☒☒☒	☒☒☒☒	☒☒☒☒	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Birds – Barn Owl	☐	☐	☐	☐	☒☒☒	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Birds – General	☐	☒☒☒	☐	☒☒☒	☒☒☒	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Birds – Waders/Wildfowl	☐	☒☒☒☒	☐	☒☒☒☒	☒☒☒☒	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Brown Hare	☐	☐	☒	☐	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Butterflies	☐	☒	☒	☐	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Canals	☐	☒☒☒☒	☒☒☒	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Deer	☐	☐	☐	☐	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Ditches/Streams	☐	☒☒☒	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Fish	☐	☒☒☒☒☒	☐	☒☒☒☒	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Fungi	☐	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Great Crested Newt	☒☒☒	☒☒☒☒☒	☒☒☒☒	☐	☒☒☒☒	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Hedgerows	☒☒☒	☒☒☒☒	☒☒☒☒	☒☒☒	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Invertebrates - Aquatic	☒☒	☒☒☒	☒☒☒	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Invertebrates - Land	☐	☒	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Invertebrates - Marine	☐	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Lanes/Verges	☒☒	☒☒☒	☒☒	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Key:
Significance of Impact
☒☒☒☒ = Critical -ve
☒☒☒☒ = Critical +ve
☒☒☒☒ = Major -ve
☒☒☒☒ = Major +ve
☒☒☒☒ - Moderate -ve
☒☒☒☒ - Moderate +ve
☒☒ = Minor -ve
☒☒ = Minor +ve
☐ = No Impact

Table 3 - Pre-mitigation Impacts on Receptors/Ecological Resource

Receptor	Negative Impacts											Positive Impacts								
	Land Take	Damage/Loss of Habitat	Fragmentation of Habitat	Disturbance/Displacement	Road Kill	Barriers to Movement	Water Pollution	Air Pollution	Salt Deposition	Disruption of Hydrology	Soil Structure Damage	Spoil Disposal	Foreign Materials	Induced Development	Public Pressure	Additional Habitat	Enhanced Habitat	New/Improved Connectivity	New/Improved Habitat	Distribution
Lichens	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Linear Connectivity	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Marshy Grassland	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Mosses & liverworts	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Moths - Generally	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Otter	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ponds	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Rivers	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Salt-marsh	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Scrub	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Semi-improved Grassland	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Slugs and Snails	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Trees	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Veteran Trees	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Walls/Masonry	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Waste Ground	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Woodland	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Key:
Significance of Impact
 = Critical -ve
 = Critical +ve
 = Major -ve
 = Major +ve
 - Moderate -ve
 - Moderate +ve
 = Minor -ve
 = Minor +ve
 = No Impact

7 Mitigation

Mitigation, enhancement and compensation proposals are made that should be undertaken to ameliorate the adverse impacts of the scheme, to enhance existing habitats or to provide additional habitat which is not currently present.

The assessment of impacts is based on the assumption that these proposals are adopted, managed and effective in their purpose when implemented. On this basis it is expected that many of the pre-mitigation impacts would be ameliorated or nullified following the implementation of the proposed mitigation measures.

However, there are a number of habitats, species and species groups for which no adequate mitigation or compensation is possible. For example, some veteran trees, scheduled to be removed, cannot be replaced within a reasonable time period. Compensation planting would take many centuries to replace such losses and become effective. Such an impact would be represented as of major negative significance before mitigation and as of major negative significance after mitigation.

8 Post-mitigation Impact

The anticipated residual, post-mitigation impacts on receptors are summarised in Table 4. The residual impacts are based on the assumption that the recommended mitigation, enhancement and compensation measures are implemented and prove effective. In many cases the impacts predicted before mitigation are anticipated to be largely removed as a result of the implementation of effective mitigation measures. However, there remain some species and groups for which no adequate mitigation or compensation is possible.

The positive impacts after mitigation (Table 4) indicate wildlife gains that are anticipated should arise from the development of the route. It is expected that additional and enhanced habitat should be created which, in the long term, should compensate to some extent the loss of landscape connectivity and spatial distribution of habitats.

Table 4 - Residual, Post-mitigation Negative and Positive Impacts on Receptors/Ecological Resource

Receptor	Negative Impacts												Positive Impacts						
	Land take	Damage/Loss of Habitat	Fragmentation of Habitat	Disturbance/Displacement	Road Kill	Barriers to Movement	Water Pollution	Air Pollution	Salt Deposition	Disruption of Hydrology	Soil Structure Damage	Spoil Disposal	Foreign Materials	Induced Development	Public Pressure	Additional Habitat	Enhanced Habitat	New/Improved Connectivity	New/Improved Habitat
Arable	☒	☒																	
Badger																			
Bats	☒☒☒	☒☒☒☒	☒☒☒☒	☒☒☒☒	☒☒												☒		
Birds - Barn Owl					☒☒☒														
Birds - General		☒☒☒		☒☒	☒☒														
Birds - Waders/Wildfowl		☒☒☒		☒☒	☒☒														
Brown Hare			☒		☒														
Butterflies		☒	☒		☒												☒		☒
Canals		☒☒☒	☒☒						☒☒										
Deer					☒														
Ditches/Streams		☒☒☒	☒					☒☒											
Fish																			
Fungi		☒							☒										
Great Crested Newt	☒☒☒	☒☒☒☒	☒☒☒☒		☒			☒☒☒									☒		
Hedgerows	☒☒☒	☒☒☒☒	☒☒☒☒	☒☒					☒								☒		
Invertebrates - Aquatic		☒☒	☒																
Invertebrates - Land		☒	☒															☒	
Invertebrates - Marine																			
Lanes/Verges	☒☒	☒☒	☒☒																

Key:
Significance of Impact
☒☒☒☒ = Critical -ve
☒☒☒☒ = Critical +ve
☒☒☒☒ = Major -ve
☒☒☒☒ = Major +ve
☒☒☒☒ - Moderate -ve
☒☒☒☒ - Moderate +ve
☒☒ = Minor -ve
☒☒ = Minor +ve
☐ = No Impact



Table 4 - Residual, Post-mitigation Negative and Positive Impacts on Receptors/Ecological Resource

Receptor	Negative Impacts												Positive Impacts						
	Land take	Damage/Loss of Habitat	Fragmentation of Habitat	Disturbance/Displacement	Road Kill	Barriers to Movement	Water Pollution	Air Pollution	Salt Deposition	Disruption of Hydrology	Soil Structure Damage	Spoil Disposal	Foreign Materials	Induced Development	Public Pressure	Additional Habitat	Enhanced Habitat	New/Improved Connectivity	New/Improved Habitat
Lichens	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Linear Connectivity	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Marshy Grassland	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Mosses & liverworts	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Moths - Generally	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Otter	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ponds	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Rivers	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Salt-marsh	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Scrub	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Semi-improved Grassland	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Slugs and Snails	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Trees	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Veteran Trees	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Walls/Masonry	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Waste Ground	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Woodland	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Key:

Significance of Impact

= Critical -ve

= Critical +ve

= Major -ve

= Major +ve

= Moderate -ve

= Moderate +ve

= Minor -ve

= Minor +ve

= No Impact

9 Summary of Impacts

The negative impacts predicted for the Western Route Scheme are described below.

9.1 Damage/Loss of Habitat

The main, significant habitats affected by the scheme would be the loss of hedgerows, veteran trees, ponds and semi-improved grassland. In the majority of cases this loss cannot be mitigated and compensation is the only option. The level of significance of these impacts are predicted to remain the same before and after the mitigation proposals are implemented, except in the case of ponds for which there is evidence that pond ecosystems can be re-established relatively quickly.

9.2 Fragmentation of Habitat

Fragmentation of habitat would largely result from the removal of hedgerows and the ditches and walls associated with them. Some fragmentation of area features, such as improved grass, fields would occur. These areas are of relatively low wildlife value, except for their use by Badgers and as a feeding and breeding resource for birds.

9.3 Disturbance/Disruption

Receptors were identified on the Western Route that are liable to be adversely affected by the disturbance caused by the movement of traffic. The Bat roost in the Black-poplar at Freeman's Wood would be subject to disturbance both during the construction and operational phases.

Disturbance is predicted to deter small birds from nesting in the scheme perimeter hedgerows, where these are closer to the carriageway. But, where they choose to nest close to the carriageway they would be increasingly prone to road kill.

The bridge across the River Lune is not considered likely to disturb movement of birds up and down the Estuary. However, an increased risk of road kill to some species is predicted (see below) as result of the operational phase of the road.

9.4 Road Kill

The operation of the proposed scheme would increase the risk of road kill, potentially affecting a range of species including Bats, Badgers, Deer, birds and amphibians. Vehicle collision with Deer also represents a road accident hazard due to the size of the animals.

Road collisions with birds may affect the range of species including waders and wildfowl crossing at the River Lune bridge and small birds flying across the scheme from hedge to hedge.

9.5 Barriers to Movement

A number of hedgerows would be removed on the Western Route. This is predicted to result in a negative impact of major significance in terms of fragmentation of this habitat and would create barriers to movement for species that use these to move around the landscape. The proposed creation of an equivalent length of hedgerow along the scheme boundary cannot be assumed to adequately compensate, in the long-term, for the connections severed as part of the Western Route and may not remove the barriers to movement imposed by the scheme.

9.6 Water Pollution

A risk of water pollution incidents would exist during the construction and operational phases of the scheme. Mitigation measures are proposed to ensure that such risks are minimised.

9.7 Air Pollution

During the operational phase it is predicted that there would be an increase in airborne pollutants entering the ecosystem in the vicinity of the route. These would affect some receptors. It is predicted that lichens, mosses and liverworts would be adversely affected and that some of the nearby water bodies could receive airborne pollutants and dusts that may adversely affect them. These impacts are not currently considered likely to be significant.

9.8 Salt Deposition

Salt deposition is an inevitable consequence of winter de-icing operations. Salt is likely to enter the ecosystem from atomised spray as well as from run-off from the road surface into balancing ponds specifically created as part of the scheme. The significance of this is difficult to predict, but it is likely to impact on ponds, watercourses and on the roadside vegetation immediately next to the road surface. This impact is not considered likely to be significant.

9.9 Disruption of Hydrology

Changes in hydrology and drainage could significantly affect ponds, streams, ditches and veteran trees. Where the route is within a cutting there could be significant impacts on the hydrology, causing adjacent land to become drier. Conversely, embankments or the road itself could impede drainage across the route increasing the likelihood of waterlogging.

9.10 Soil Structure Damage

It is predicted that damage to soil structure may occur as a result of the construction operations within the scheme footprint. These may affect local hydrology and influence vegetation, notably veteran trees. Veteran trees have been shown to be sensitive to changes in drainage to a considerable distance away from the trunk. Soils and hydrological changes 50m away could accelerate tree senescence significantly and, in a worst cases, could result in the death of the tree.

9.11 Foreign Materials

During the construction phase of the scheme there is potential for foreign materials to enter the ecosystem and have adverse impacts on receptors. Cases might include the import of limestone. This would alter the pH of nearby soils, affecting the nature of the flora. Similarly materials may leach chemicals into watercourses causing a negative impact. Best practice should avoid negative impacts and the project ecologist should provide guidance.

9.12 Induced Development

The presence of the route is anticipated to encourage future pressure for development along the route and in areas that would become accessible from the route. Such further induced development would create potential impacts on the receptors already identified.

9.13 Public Pressure

The route may increase public awareness of the recreation potential of the Lune Estuary and consequently increase public pressure on the habitats and species within the designated cSAC/SPA/SSSI area.

9.14 Additional Habitat

Mitigation and compensation proposals are expected to create wildlife habitat. The road scheme design would include additional tall rough grassland habitat within roadside verges. Balancing ponds would be created which, if properly designed and managed, may contribute to the aquatic wildlife resource associated with the route, although evidence suggests that these often become too polluted to be of value to wildlife.

9.15 New and/or Improved Connectivity

The predicted fragmentation of habitats and loss of connectivity is expected to have a significant negative impact on the overall wildlife resource adjacent to the route. However, in some instances, and for some receptors, the new alignments may be beneficial. The scheme boundary hedges may create a pattern of smaller fields either side of the route that may provide additional habitat and shelter in proximity to existing hedgerows. This could have a limited benefit to receptors such as terrestrial invertebrates and molluscs, as well as butterflies and moths. There may be some benefit to other species such as small mammals. While there may be an improvement in local connectivity on either side of the scheme, the scheme would nevertheless bisect the landscape and isolate populations, affecting genetic flow within some species⁸.

The alignment of hedgerows would be different from the current alignment. It is predicted that some wildlife using these features would adapt to the new alignment over time but that the majority, and particularly sensitive species such as Bats, Birds, Badgers, Otters and Great Crested Newts, would be affected by the route's bisection of the landscape which would interrupt their movement. Compensation hedgerow planting would take at least 15 years to become fully effective. The proposed dualling of the route would remove the compensation

⁸ a healthy intermixing and interbreeding of populations.

planting along the eastern edge together with the benefits it would be beginning to provide as it matures. Further compensation planting for the loss would take a further 15 years to become fully effective.

The benefits of compensation hedgerow planting would not outweigh the negative impacts of hedgerow removal and the severance of habitat connectivity for the majority of receptors affected and particularly the more significant receptors like Badgers, Bats, birds and Great Crested Newt. The incidence and activity of these groups, coupled with the considerable length of the route will result in an overall residual negative of major significance, with minor benefits of the compensation planting for a restricted range of receptors.

10 Significance of Impacts

The inter-dependence of habitats and species and the use of the wider countryside by wildlife are important factors in determining the significance of impacts after mitigation. Many of the individual studies have identified significant negative impacts. Many of these impacts would combine to produce cumulative impacts that are more difficult to assess and quantify. The extensive removal of hedgerows would have a significant effect on other species and receptors.

A number of the predicted negative impacts are critical, in the case of removal of a Bat roost and for Great Crested Newt through loss of habitat and may not be adequately mitigated or compensated. The following receptors would be subject to residual significant impacts:

- Bats - Critical
- Great Crested Newts - Critical
- Birds - Major
- Veteran trees - Major
- Hedgerows - Major
- Salt-marsh - Moderate

The development of the Western Route is likely to have an impact of major significance. This would mainly be attributable to significant impacts on internationally protected species, Bats (destruction of a Bat roost, disturbance of a Bat roost and disruption of connectivity) and Great Crested Newt (isolation of populations and the destruction of terrestrial resting places). To proceed with the Western Route would require an application for a licence in which the applicant would have to satisfy the licensing authority that there is no acceptable alternative

The scheme would have a significant physical impact on the wider countryside and on the linear connectivity of habitats, particularly associated with the loss of hedgerows. When assessing the overall significance of impacts it is necessary to determine whether there would be a significant depletion in the overall environmental capital of the area resulting from the development. The Western Route would affect a considerable length and area in its construction and operation and sever movement routes. This would impact a wide range of wildlife receptors in the vicinity. It is predicted that the scheme would create a major significant obstacle to the movement of animals within the area.

It is difficult to identify the point at which development would cause the area's environmental capital to fall to a critical level, below which it could not function. If the scheme proceeds it may create opportunities for further development along the Scheme Corridor. This would impact on the wildlife resource already identified and may reduce the area's environmental capital to a point at which it may not recover.

Significant residual negative impacts are predicted to remain after appropriate mitigation, enhancement and compensation are implemented, including impacts on internationally protected species for which licences would be required. Consideration of alternative routes is mandatory in the case of such species. There is also predicted to be a residual negative impact of major significance resulting from the removal of hedgerows over the distance of the route.