

# FIVE MILE LANE IMPROVEMENTS

ENVIRONMENTAL STATEMENT  
ADDENDUM

OCTOBER 2016

# FIVE MILE LANE IMPROVEMENTS

## ENVIRONMENTAL ASSESSMENT ADDENDUM

**Vale of Glamorgan Council**

Project no: 70021703

Date: October 2016

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## 1

## PURPOSE OF THE ENVIRONMENTAL STATEMENT ADDENDUM

The existing A4226 (Five Mile Lane) is a single carriageway road, in a rural location that currently fails to meet appropriate highway standards. In order to improve safety along the road and meet the aim of creating a strategic route to the St Athan and Cardiff Airport Enterprise Zones, there is a need to undertake a number of improvements to upgrade the road so it meets modern highway standards.

The Five Mile Lane Improvement Scheme (the Scheme) involves a combination of online improvements to Five Mile Lane and construction of a new road alignment that bypasses the more winding central section of the existing road. The Scheme will make use of the existing and already upgraded highway immediately off the A48 at Sycamore Cross and then go offline at a point about 1.5km south, following a southerly course for about 4km, before re-joining the existing road just north of the River Waycock Bridge, about 1.1km north of the Waycock Cross. Minor intersection upgrade works will also be undertaken at the junction of the A48 and Five Mile Lane at Sycamore Cross.

An Environmental Statement (ES) was published in February 2016 and submitted to the Vale of Glamorgan Council as part of a planning application for the Scheme, under the Town and Country Planning Act 1990 (Planning Ref 2016/00305/RG3).

The Vale of Glamorgan Council subsequently consulted with a range of statutory and non-statutory consultees on the planning application and additional information (refer to Table 1.1) has been requested to supplement that contained in the ES.

**Table 1.1: Additional information requested by consultees**

Consultee	Comment
Natural Resources Wales	<p>The designated feature of the Barry Woodland SSSI is semi-natural woodland. Table 6.8 and section 6.5.23 of the Environmental Statement (ES) incorrectly states that the appropriate nitrogen critical load for this feature is 5 – 10kgN/ha/yr. The appropriate nitrogen critical load for this feature is 10 – 20kgN/ha/yr. Therefore, as a lower nitrogen critical load has been applied, [NRW] advised that the assessment should be revised. The results should be assessed against a nitrogen critical load of 10kgN/ha/yr.</p> <p>Subsequent to the preparation of the ES, [NRW] notified the Fferm Walters/Walters Farm SSSI (on 5th November 2015). Therefore the revision should also take into account this designated site's species rich neutral grassland. A nutrient nitrogen critical load of 20 – 30kgN/ha/yr should be applied to the Fferm Walters/Walters Farm SSSI. European Protected Species: A condition is secured to any permission granted to ensure a dormouse and bat mitigation scheme is implemented.</p>
Vale of Glamorgan Council Landscape Team	<p>The following information was requested to supplement that contained in the ES:</p> <ul style="list-style-type: none"> <li>→ an additional viewpoint – Key view 10 from a Public Right of Way between the Scheme and Moulton to the west</li> <li>→ clarification with regards to the visual impact on Listed Buildings located within the Zone of Visual Influence (ZVI), and</li> </ul>

Consultee	Comment
	→ the provision of photomontages from six representative viewpoints.
Vale of Glamorgan Council Biodiversity Team	In order to adequately assess the impacts of the Scheme on breeding birds, a breeding bird survey should be undertaken at the appropriate time of the year in 2016.

This Environmental Statement Addendum (ESA) has been produced to update the published ES with the additional information requested by consultees and should be read in conjunction with the published ES and Non-Technical Summary, which remain valid.

This ESA has been issued in accordance with European Council Directive No 85/337/EEC, as amended by Directives 2011/92/EU. It is translated into law in Wales by the Town and Country Planning (Environmental Impact Assessment)(England and Wales) Regulations 1999, as amended, hereafter referred to as 'the EIA Regulations'. This ESA has been compiled in accordance with the guidance contained in the Design Manual for Roads and Bridges (DMRB) Volume 10 and Volume 11.

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## SCOPE OF THE ENVIRONMENTAL STATEMENT ADDENDUM

This ESA updates the ES published in February 2016 with the additional information requested by consultees (refer to Table 1.1).

The additional information has been presented in this ESA follow the assessment methodology stated in the published ES and is described in the following way:

- the additional information requested
- existing content and / or assessment within the published ES
- new content and / or assessment as a result of the additional information
- any changes between the existing and new content and / or assessments

The published ES was reviewed to consider whether the additional information would change the content and / or assessments made within each topic area. The following topics were scoped out as the additional information would not change the assessment made within the published ES:

- Non-Technical Summary
- Chapter 7: Cultural Heritage
- Chapter 10: Geology and Soils
- Chapter 11: Materials
- Chapter 12: Noise and Vibration
- Chapter 13: Effects on all travellers
- Chapter 14: Community and Private Assets
- Chapter 15: Road Drainage and the Water Environment
- Chapter 16: Cumulative Effects

The remaining topics would result in the content and / or assessments made in the published ES to change as a result of the additional information:

- Chapter 6: Air Quality
- Chapter 8: Landscape
- Chapter 9: Nature Conservation

The topics areas have been presented in the same order as the published ES.

The new content / assessment is summarised in Chapter 6 at the end of this ESA.



# 3 AIR QUALITY

## 3.1 INTRODUCTION

Air Quality was considered in Chapter 6 of Volume 1 of the published Environmental Statement (ES).

## 3.2 ADDITIONAL INFORMATION REQUESTED

In response to the planning application, Natural Resources Wales (NRW) issued a letter outlining their concerns in relation to the Scheme and requirements which would have to be met for the development.

### BARRY WOODLANDS SSSI

The designated feature of the Barry Woodland Site of Special Scientific Interest (SSSI) is semi-natural woodland. Table 6.8 and paragraph 6.5.23 of the published ES incorrectly states that the appropriate nitrogen critical load for this feature is 5 – 10kgN/ha/yr. The appropriate nitrogen critical load for this feature is 10 – 20kgN/ha/yr. Therefore, as a lower nitrogen critical load has been applied, NRW has advised that the assessment should be revised. The results should be assessed against a nitrogen critical load of 10kgN/ha/yr.

### WALTERS FARM SSSI

Subsequent to the preparation of the ES, NRW notified the Fferm Walters/Walters Farm SSSI (on 5th November 2015). Therefore the revision should also take into account this designated site's species rich neutral grassland. A nutrient nitrogen critical load of 20 – 30kgN/ha/yr should be applied to the Fferm Walters/Walters Farm SSSI.

## 3.3 EXISTING CONTENT AND / OR ASSESSMENT WITHIN THE PUBLISHED ES

### BASELINE

The baseline nitrogen deposition is considered in paragraphs 6.4.5, 6.5.6 and Table 6.8 of the published ES and is repeated below:

*Baseline levels of nitrogen deposition and critical load values for the types of habitats present were taken from the Air Pollution Information System. These are presented in Table 6.8 where it can be seen that the baseline deposition for each type of habitat is already in exceedence of each critical load value.*

*In the assessment of impacts at the Cwm Talwg Local Nature Reserve, the background deposition and critical load values used were identical to those used for the Lowland Beech and Yew Woodland habitats.*

**Table 6.8: Critical Load and Background Deposition for Designated Ecological Sites in the Study Area**

Designated Site	Classification	Most Sensitive Habitat	Critical Load (kgN/ha/yr)		Background Deposition (kgN/ha/yr)	
			Min	Max	Min	Max
Barry Woodland SSSI	Marshy Grassland	Neutral Grassland	10	10	12.46	15.40
	Mixed Plantation	Lowland Beech and Yew woodland	5	20	22.12	27.16
	Semi-Natural Woodland	Lowland Beech and Yew Woodland	5	20	22.12	27.16

### PREDICTED EFFECTS (WITHOUT MITIGATION)

As part of Predicted Effects (without Mitigation), the impacts of nitrogen deposition on ecological receptors is considered in paragraphs 6.5.17 to 6.5.23 and Tables 6.14, 6.15 and 6.16 of the published ES and is repeated below:

*Table 6.14 and Table 6.15 show the impact of the Scheme on ambient NOX concentrations at ecological receptors for 2017 and 2032 respectively. Table 6.16 shows the impacts on nitrogen deposition.*

*Exceedences of the objective for annual mean NOX concentrations are predicted at roadside ecological receptor locations in the baseline and in 2017 at some receptors. This is primarily due to the proximity of the sites to the roadside. The impact of the Scheme is to increase concentrations at receptors along Five Mile Lane (Middleton Plantation and Lidmore Wood) but to decrease concentrations at receptors along Port Road West/East and A4231 (Pencoetre Woods and Cwm Talwyg). At roadside receptors, the change in concentration is large and, with modelled exceedences of the objective with the Scheme in operation, the impact of the Scheme is Large Adverse for Middleton Plantation to the east and west of Five Mile Lane, and Large Beneficial for Pencoetre Wood.*

*At receptor locations more distant from the road, the impact of the Scheme decreases. Comments within Table 6.14 describe the distance from the roadside at which impacts reduce to negligible significance.*

*The overall impact of the Scheme decreases in 2032 to the extent that there are no modelled exceedences of the air quality objective for NOX that are worsened with the Scheme. Indeed, concentrations on Five Mile Lane are predicted to have decreased to within the objective but to experience a large increase with the Scheme (a Moderate Adverse impact). However, whilst exceedences of the objective are modelled without the Scheme at the roadside in Pencoetre Woods, the impact of the Scheme is to reduce concentrations (a large beneficial impact).*

*The sensitivity test on ecological receptors had the effect of increasing the distance over which large adverse or beneficial impacts were modelled, depending on location, but also increasing the distance over which exceedences of the objective occur.*

*In terms of nitrogen deposition, baseline deposition exceeded the relevant critical loads for the habitats by a considerable margin. The spatial distribution of impacts with the Scheme follows that for nitrogen oxides, with a significant increase in deposition along Five Mile Lane resulting in large adverse impacts in Middleton Plantation at the roadside, decreasing to slight adverse at distance from the road (but never falling to negligible levels). Conversely, on Port Road, the impact at Pencoetre Wood is Large Beneficial at the roadside, decreasing to Slight Beneficial to Negligible at greater distance from the road.*

*These conclusions hold for both 2017 and 2032 since no decrease in background wet deposition levels is assumed over time. This is a conservative assumption but, with the minimum critical load being 5kgN/ha/yr for the woodland habitats and existing deposition levels of the order of 22 - 27kgN/ha/yr, it is a near certainty that exceedence of the critical load will continue to 2030 and beyond, whether or not the Scheme proceeds.*

**Table 6.14: Summary of Ambient NOx Concentrations at Ecological Receptors for 2017**

Ecological Receptor	Impact At Nearest Point to Road					Magnitude of Change	Significance	Comment
	Baseline 2013 ( $\mu\text{g}/\text{m}^3$ )	2017 DM ( $\mu\text{g}/\text{m}^3$ )	2017 DS ( $\mu\text{g}/\text{m}^3$ )	Change in Concentration ( $\mu\text{g}/\text{m}^3$ )	% Change in Concentration			
Barry Woodlands SSSI (Middleton Plantation, East of A4226)	39.65	34.9	46.9	12.0	40.1%	Large	Large Adverse	Large adverse impacts, with exceedence of objective to 12m from roadside with Scheme and 4m without Scheme; Impacts fall to negligible significance at 45m and greater from roadside
Barry Woodlands SSSI (Middleton Plantation, West of A4226)	30.4	26.7	37.6	10.9	36.4%	Large	Large Adverse	Large adverse impacts, with exceedence of objective to 8m from roadside with Scheme; Impacts fall to negligible significance at 35m and greater from roadside
Barry Woodlands SSSI (Lidmore Wood)	21.2	18.3	19.1	0.8	2.6%	Small	Negligible	Impacts are small in magnitude but adverse across the entire site, no exceedence of objective; negligible significance everywhere
Barry Woodlands SSSI (Pencoetre Wood, South of A4050)	72.1	61.8	52.8	-9.0	-30.0%	Large	Large Beneficial	Large beneficial impacts with reduction in distance from road with exceedence of objective from 30m to 25m; Impacts fall to negligible significance at 50m from A4050 and 30m from A4231
Barry Woodlands SSSI (Pencoetre	55.0	42.0	41.7	-0.4	-1.2%	Small	Slight	Slight beneficial impacts

Ecological Receptor	Impact At Nearest Point to Road						Significance	Comment
	Baseline 2013 ( $\mu\text{g}/\text{m}^3$ )	2017 DM ( $\mu\text{g}/\text{m}^3$ )	2017 DS ( $\mu\text{g}/\text{m}^3$ )	Change in Concentration ( $\mu\text{g}/\text{m}^3$ )	% Change in Concentration	Magnitude of Change		
Wood, East of A4231)							Beneficial	with reduction in distance from road with exceedence of objective from 30m to 25m; Impacts are of negligible significance within 40m of A4231
Cwm Talwg LNR (South of A4050)	26.2	22.3	21.3	-1.0	-3.2%	Small	Negligible	Impacts are small and beneficial across the entire site, but no exceedence of objective; Impacts are of negligible significance everywhere

**Table 3.1: Summary of ambient NOx concentrations at ecological receptors for 2032**

Ecological Receptor	Impact At Nearest Point to Road						Significance	Comment
	Baseline 2013 ( $\mu\text{g}/\text{m}^3$ )	2032 DM ( $\mu\text{g}/\text{m}^3$ )	2032 DS ( $\mu\text{g}/\text{m}^3$ )	Change in concentration ( $\mu\text{g}/\text{m}^3$ )	% Change in concentration	Magnitude of Change		
Barry Woodlands SSSI (Middleton Plantation, East of A4226)	39.65	23.4	29.4	6.0	20.0%	Large	Moderate Adverse	Moderate adverse impacts at worst but no exceedence of objective; Impacts fall to negligible significance at 10m and greater from roadside
Barry Woodlands SSSI (Middleton Plantation, West of A4226)	30.4	18.5	24.2	5.8	19.3%	Large	Slight Adverse	Slight adverse impacts at worst but no exceedence of objective; Impacts fall to negligible significance at 10m and greater from roadside

Ecological Receptor	Impact At Nearest Point to Road						Significance	Comment
	Baseline 2013 ( $\mu\text{g}/\text{m}^3$ )	2032 DM ( $\mu\text{g}/\text{m}^3$ )	2032 DS ( $\mu\text{g}/\text{m}^3$ )	Change in concentration ( $\mu\text{g}/\text{m}^3$ )	% Change in concentration	Magnitude of Change		
Barry Woodlands SSSI (Lidmore Wood)	21.2	13.4	13.8	0.4	1.4%	Small	Negligible	Impacts are of small magnitude at worst but negligible significance everywhere
Barry Woodlands SSSI (Pencoetre Wood, South of A4050)	72.1	40.1	34.7	-5.3	-17.8%	Large	Large Beneficial	Large beneficial with reduction in distance from road with exceedence of objective from 6m to 2m; Impacts fall to negligible at 15m from A4050
Barry Woodlands SSSI (Pencoetre Wood, East of A4231)	55.0	26.1	25.8	-0.4	-1.2%	Small	Negligible	Impacts are of negligible significance across site, with no exceedence of objective whether or not Scheme is operating
Cwm Talwg LNR (South of A4050)	26.2	16.0	15.3	-0.7	-2.3%	Small	Negligible	Impacts are small in magnitude and beneficial across the entire site, but no exceedence of objective; Impacts are of negligible significance everywhere

**Table 6.16: Summary of Nitrogen Deposition at Ecological Receptors (minimum critical load = 5kgN/ha/yr for all sites)**

Ecological Receptor	Impact At Nearest Point to Road					Magnitude of Change	Significance	Comment
	Baseline 2013 kgN/ha/yr	2017 DM kgN/ha/yr	2017 DS kgN/ha/yr	Change in deposition kgN/ha/yr	% Change in Deposition			
<b>2017</b>								
Barry Woodlands SSSI (Middleton Plantation, East of A4226)	30.18	29.90	31.64	1.74	34.7%	Large	Large Adverse	Slight adverse impacts at >55m from roadside
Barry Woodlands SSSI (Middleton Plantation, West of A4226)	28.80	28.66	30.31	1.65	33.1%	Large	Large Adverse	Slight adverse impacts at >45m from roadside
Barry Woodlands SSSI (Lidmore Wood)	27.35	27.32	27.45	0.13	2.6%	Small	Slight Adverse	Slight adverse impacts falling to imperceptible at distances > 230m from road
Barry Woodlands SSSI (Pencoetre Wood, South of A4050)	34.52	33.64	32.45	-1.19	-23.8%	Large	Large Beneficial	Slight beneficial impacts at >45m from roadside
Barry Woodlands SSSI (Pencoetre Wood, East of A4231)	32.32	30.95	30.90	-0.05	-1.0%	Small	Slight Beneficial	Negligible significance at distances >50m from roadside
Cwm Talwg LNR (South of A4050)	28.14	27.97	27.81	-0.16	-3.1%	Small	Slight Beneficial	Slight beneficial everywhere
<b>2032</b>								
Barry Woodlands SSSI (Middleton Plantation, East of A4226)	30.18	28.77	29.64	0.87	17.3%	Large	Large Adverse	Slight adverse impacts at >25m from roadside
Barry Woodlands SSSI (Middleton Plantation, West of A4226)	28.80	28.03	28.89	0.86	17.2%	Large	Large Adverse	Slight adverse impacts at >20m from roadside
Barry Woodlands SSSI (Lidmore Wood)	27.35	27.26	27.32	0.06	1.3%	Small	Slight Adverse	Slight adverse impacts falling to imperceptible at distances > 230m from road
Barry Woodlands SSSI (Pencoetre Wood, South of A4050)	34.52	31.09	30.37	-0.72	-14.3%	Large	Large Beneficial	Slight beneficial impacts at >20m from roadside
Barry Woodlands SSSI (Pencoetre Wood, East of A4231)	32.32	29.16	29.11	-0.05	-1.0%	Small	Slight Beneficial	Negligible significance at distances >40m from roadside
Cwm Talwg LNR (South of A4050)	28.14	27.65	27.55	-0.10	-2.0%	Small	Slight Beneficial	Impact becomes negligible at 130m from roadside

## SUMMARY & CONCLUSIONS

As part of Summary & Conclusions the impacts of nitrogen deposition on ecological receptors is considered in paragraphs 6.9.4 and 6.9.6 of the published ES respectively and is repeated below:

*Adverse impacts were predicted at ecological receptors immediately adjacent to the Scheme. Nitrogen deposition without the Scheme in place is already in exceedence of the critical load against which concentrations are assessed, and a large increase was calculated on Five Mile Lane as a result of the Scheme. This is primarily due to the proximity of the Middleton Plantation section of the Barry Woodlands SSSI to the Scheme. Similarly, nitrogen oxides concentrations are predicted to exceed the air quality objective at the roadside and, along Five Mile Lane, concentrations increase with the Scheme. In contrast, on Port Road, the Pencoetre Wood section of the Barry Woodlands SSSI is expected to experience beneficial impacts of a corresponding magnitude.*

*In relation to ecological receptors the air quality effects related to the Scheme are likely to:*

- *Cause a large increase in nitrogen deposition (which is already in exceedence of the critical load without the Scheme in place) and ambient NOx concentration at the Middleton Plantation section of the Barry Woodlands SSSI, and a large decrease in the same at the Pencoetre Wood section of the Barry Woodlands SSSI.*

### 3.4 NEW CONTENT AND / OR ASSESSMENT AS A RESULT OF THE ADDITIONAL INFORMATION

#### BARRY WOODLANDS SSSI

The assessment has been reviewed with amended criteria for the critical load. It should be noted that the critical load recommended by NRW is less stringent than the assessed critical load. The revision had no impact on modelled concentrations within the SSSI and no material impact on the outcome of the assessment. The change in deposition (expressed as a percentage of the critical load) reduced with the new critical load, and, as a result, the descriptor of the magnitude of the change, and the description of the severity of the impact changed at some distance from the roadside. This had the effect of decreasing the distance from the road at which impacts are considered negligible.

Table 6.16 from the published ES has been updated (Table 6.16b) and presented below. Where adverse impacts were noted previously, these impacts are reduced in severity. Changes to the table as a result of the amended criteria are highlighted in red.

#### WALTERS FARM SSSI

A modelled assessment of the impacts of the Scheme was carried out on the Walter's Farm SSSI, following the same methodology outlined within the published ES. As within the ES, transects were set up in the SSSI, at 5m increments from the roadside, in order to assess the impacts of the scheme. There are two affected links in the vicinity of the boundary of the SSSI - the A4226, to the South of the SSSI boundary, and Waycock Road, to the West. The additional assessment sets out the impacts at the closest point of the SSSI boundary to each of these links.

Tables 6.14, 6.15 and 6.16 from the published ES has been updated (Tables 6.14b, 6.15b and 6.16b) with the results of this assessment and presented below. Changes to these tables as a result of this assessment are highlighted in red.



**Table 6.14b: Summary of Ambient NOx Concentrations at Ecological Receptors for 2017 (including Walters Farm SSSI)**

Ecological Receptor	Impact At Nearest Point to Road					Magnitude of Change	Significance	Comment
	Baseline 2013 ( $\mu\text{g}/\text{m}^3$ )	2017 DM ( $\mu\text{g}/\text{m}^3$ )	2017 DS ( $\mu\text{g}/\text{m}^3$ )	Change in Concentration ( $\mu\text{g}/\text{m}^3$ )	% Change in Concentration			
Barry Woodlands SSSI (Middleton Plantation, East of A4226)	39.65	34.9	46.9	12.0	40.1%	Large	Large Adverse	Large adverse impacts, with exceedence of objective to 12m from roadside with Scheme and 4m without Scheme; Impacts fall to negligible significance at 45m and greater from roadside
Barry Woodlands SSSI (Middleton Plantation, West of A4226)	30.4	26.7	37.6	10.9	36.4%	Large	Large Adverse	Large adverse impacts, with exceedence of objective to 8m from roadside with Scheme; Impacts fall to negligible significance at 35m and greater from roadside
Barry Woodlands SSSI (Lidmore Wood)	21.2	18.3	19.1	0.8	2.6%	Small	Negligible	Impacts are small in magnitude but adverse across the entire site, no exceedence of objective; negligible significance everywhere
Barry Woodlands SSSI (Pencoetre Wood, South of A4050)	72.1	61.8	52.8	-9.0	-30.0%	Large	Large Beneficial	Large beneficial impacts with reduction in distance from road with exceedence of objective from 30m to 25m; Impacts fall to negligible significance at 50m from A4050 and 30m from A4231
Barry Woodlands SSSI (Pencoetre	55.0	42.0	41.7	-0.4	-1.2%	Small	Slight	Slight beneficial impacts

Ecological Receptor	Impact At Nearest Point to Road						Significance	Comment
	Baseline 2013 ( $\mu\text{g}/\text{m}^3$ )	2017 DM ( $\mu\text{g}/\text{m}^3$ )	2017 DS ( $\mu\text{g}/\text{m}^3$ )	Change in Concentration ( $\mu\text{g}/\text{m}^3$ )	% Change in Concentration	Magnitude of Change		
Wood, East of A4231)							Beneficial	with reduction in distance from road with exceedence of objective from 30m to 25m; Impacts are of negligible significance within 40m of A4231
Cwm Talwg LNR (South of A4050)	26.2	22.3	21.3	-1.0	-3.2%	Small	Negligible	Impacts are small and beneficial across the entire site, but no exceedence of objective; Impacts are of negligible significance everywhere
Walters Farm SSSI (East of Waycock Road)	36.6	32.1	45.1	13.0	43.2%	Large	Substantial Adverse	Substantial adverse impacts with exceedence of objective to 15m from roadside with scheme and 5m without. Impacts are negligible more than 50m from roadside.
Walters Farm SSSI (North of A4226)	47.9	40.0	34.7	-5.3	-17.7%	Large	Substantial Beneficial	Substantial beneficial impacts with exceedence of objective to 5m from roadside with scheme and 10m without. Impacts are negligible more than 25m from roadside.

Table 3.2b: Summary of ambient NOx concentrations at ecological receptors for 2032 (including Walter's Farm SSSI)

Ecological Receptor	Impact At Nearest Point to Road						Significance	Comment
	Baseline 2013 ( $\mu\text{g}/\text{m}^3$ )	2032 DM ( $\mu\text{g}/\text{m}^3$ )	2032 DS ( $\mu\text{g}/\text{m}^3$ )	Change in concentration ( $\mu\text{g}/\text{m}^3$ )	% Change in concentration	Magnitude of Change		
Barry Woodlands SSSI (Middleton Plantation, East of A4226)	39.65	23.4	29.4	6.0	20.0%	Large	Moderate Adverse	Moderate adverse impacts at worst but no exceedence of objective; Impacts fall to negligible significance at 10m and greater from roadside
Barry Woodlands SSSI (Middleton Plantation, West of A4226)	30.4	18.5	24.2	5.8	19.3%	Large	Slight Adverse	Slight adverse impacts at worst but no exceedence of objective; Impacts fall to negligible significance at 10m and greater from roadside
Barry Woodlands SSSI (Lidmore Wood)	21.2	13.4	13.8	0.4	1.4%	Small	Negligible	Impacts are of small magnitude at worst but negligible significance everywhere
Barry Woodlands SSSI (Pencoetre Wood, South of A4050)	72.1	40.1	34.7	-5.3	-17.8%	Large	Large Beneficial	Large beneficial with reduction in distance from road with exceedence of objective from 6m to 2m; Impacts fall to negligible at 15m from A4050
Barry Woodlands SSSI (Pencoetre Wood, East of A4231)	55.0	26.1	25.8	-0.4	-1.2%	Small	Negligible	Impacts are of negligible significance across site, with no exceedence of objective whether or not Scheme is operating
Cwm Talwg LNR (South of A4050)	26.2	16.0	15.3	-0.7	-2.3%	Small	Negligible	Impacts are small in magnitude and beneficial across the entire site, but no exceedence of objective; Impacts are of negligible significance everywhere

Ecological Receptor	Impact At Nearest Point to Road						Significance	Comment
	Baseline 2013 ( $\mu\text{g}/\text{m}^3$ )	2032 DM ( $\mu\text{g}/\text{m}^3$ )	2032 DS ( $\mu\text{g}/\text{m}^3$ )	Change in concentration ( $\mu\text{g}/\text{m}^3$ )	% Change in concentration	Magnitude of Change		
Walters Farm SSSI (East of Waycock Road)	36.6	21.8	28.4	6.7	22.2%	Large	Moderate Adverse	Moderate adverse impacts at worst but no exceedence of objective; Impacts fall to negligible significance at 10m and greater from roadside
Walters Farm SSSI (North of A4226)	47.9	27.4	23.8	-3.6	-12.2%	Large	Slight Beneficial	Slight beneficial impacts at roadside with no exceedence of objective; Impacts fall to negligible significance at 5m and greater from roadside

**Table 6.16b: Summary of Nitrogen Deposition at Barry Woodlands SSSI (minimum critical load = 10kgN/ha/yr for all sites) & Walter's Farm SSSI (minimum critical load = 20kgN/ha/yr for all sites)**

Ecological Receptor	Impact At Nearest Point to Road					Magnitude of Change	Significance	Comment
	Baseline 2013 kgN/ha/yr	2017 DM kgN/ha/yr	2017 DS kgN/ha/yr	Change in deposition kgN/ha/yr	% Change in Deposition			
<b>2017</b>								
Barry Woodlands SSSI (Middleton Plantation, East of A4226)	30.18	29.90	31.64	1.74	17.4%	Large	Large Adverse	Slight adverse impacts at >26m from roadside
Barry Woodlands SSSI (Middleton Plantation, West of A4226)	28.80	28.66	30.31	1.65	16.5%	Large	Large Adverse	Slight adverse impacts at >15m from roadside
Barry Woodlands SSSI (Lidmore Wood)	27.35	27.32	27.45	0.13	1.3%	Small	Slight Adverse	Slight adverse impacts falling to imperceptible at distances > 230m from road
Barry Woodlands SSSI (Pencoetre Wood, South of A4050)	34.52	33.64	32.45	-1.19	-11.9%	Large	Large Beneficial	Slight beneficial impacts at >16m from roadside
Barry Woodlands SSSI (Pencoetre Wood, East of A4231)	32.32	30.95	30.90	-0.05	-0.5%	Imperceptible	Negligible	Negligible impact everywhere
Cwm Talwg LNR (South of A4050)	28.14	27.97	27.81	-0.16	-1.6%	Small	Slight Beneficial	Slight beneficial everywhere
Walters Farm SSSI (East of Waycock Road)	29.77	29.5	31.5	1.94	9.7%	Medium	Moderate Adverse	Slight adverse impacts at >10m from roadside, falling to negligible at <75m.
Walters Farm SSSI (North of A4226)	31.42	30.7	29.9	-0.80	-4.0%	Small	Slight Beneficial	Negligible impacts at >30m.
<b>2032</b>								
Barry Woodlands SSSI (Middleton Plantation, East of A4226)	30.18	28.77	29.64	0.87	8.7%	Medium	Moderate Adverse	Slight adverse impacts at >12m from roadside
Barry Woodlands SSSI (Middleton Plantation, West of A4226)	28.80	28.03	28.89	0.86	8.6%	Medium	Moderate Adverse	Slight adverse impacts at >10m from roadside
Barry Woodlands SSSI (Lidmore Wood)	27.35	27.26	27.32	0.06	0.6%	Imperceptible	Negligible	Negligible impact everywhere
Barry Woodlands SSSI (Pencoetre Wood, South of A4050)	34.52	31.09	30.37	-0.72	-7.2%	Medium	Moderate Beneficial	Slight beneficial impacts at >9m from roadside

Ecological Receptor	Impact At Nearest Point to Road					Magnitude of Change	Significance	Comment
	Baseline 2013 kgN/ha/yr	2017 DM kgN/ha/yr	2017 DS kgN/ha/yr	Change in deposition kgN/ha/yr	% Change in Deposition			
Barry Woodlands SSSI (Pencoetre Wood, East of A4231)	32.32	29.16	29.11	-0.05	-0.5%	Imperceptible	Negligible	Negligible impact everywhere
Cwm Talwg LNR (South of A4050)	28.14	27.65	27.55	-0.10	-1.0%	Small	Slight Beneficial	Impact becomes negligible at 65m from roadside
Walters Farm SSSI (East of Waycock Road)	29.77	28.55	29.54	0.99	4.9%	Small	Slight Adverse	Negligible impacts at >30m.
Walters Farm SSSI (North of A4226)	31.42	29.40	28.86	-0.54	-2.7%	Small	Slight Beneficial	Negligible impacts at >20m.

### 3.5 SUMMARY

The assessment has been reviewed with amended criteria for the critical load of nitrogen dioxide for Barry Woodlands SSSI and a modelled assessment of the impacts of the Scheme was carried out on the Walter's Farm SSSI, following the same methodology outlined within the published ES.

The critical load recommended by NRW for Barry woodlands SSSI was less stringent than the critical load assessed in the published ES. The revision had no impact on modelled concentrations within Barry Woodlands SSSI and no material impact on the outcome of the assessment. The change in deposition (expressed as a percentage of the critical load) reduced with the new critical load, and, as a result, the descriptor of the magnitude of the change, and the description of the severity of the impact changed at some distance from the roadside. This had the effect of decreasing the distance from the road at which impacts become negligible.

Overall the impacts predicted at ecological receptors as a result of nitrogen deposition is the similar to that reported in the published ES.

Adverse impacts are predicted at ecological receptors immediately adjacent to the Scheme. Nitrogen deposition without the Scheme in place is already in exceedence of the critical load against which depositions are assessed, and a large increase was modelled at the roadside on Five Mile Lane as a result of the Scheme. This is primarily due to the proximity of the Middleton Plantation section of the Barry Woodlands SSSI and Walter's Farm SSSI to the Scheme.

Similarly, nitrogen oxides concentrations are predicted to exceed the air quality objective at the roadside and, along Five Mile Lane, concentrations increase with the Scheme. In contrast, on Port Road, the Pencoetre Wood section of the Barry Woodlands SSSI and Walter's Farm SSSI (north of A4226) is expected to experience beneficial impacts of a corresponding magnitude.

# 4 LANDSCAPE

## 4.1 INTRODUCTION

Landscape was considered in Chapter 8 of Volume 1 of the published Environmental Statement (ES).

## 4.2 ADDITIONAL INFORMATION REQUESTED

In response to the planning application submitted by the Vale of Glamorgan, further information has been requested to supplement that contained in the published ES.

The additional information required comprises:

- An additional viewpoint – Key view 10 from a Public Right of Way between the Scheme and Moulton to the west
- Clarification with regards to the visual impact on Listed Buildings located within the Zone of Visual Influence (ZVI), and
- The provision of photomontages from six representative viewpoints

## 4.3 EXISTING CONTENT AND / OR ASSESSMENT WITHIN THE PUBLISHED ES

### KEY VIEW 10: VIEW FROM FOOTPATH (L5 -25-1) NEAR MOULTON LOOKING NORTH EAST

Nine key views (Key views 1 to 9) were selected as representative of typical or important views within the study area in the published ES. An additional viewpoint (Key view 10) has been requested from a Public Right of Way (L5 -25-1) between the Scheme and Moulton to the west.

The Visual Baseline Assessment and Sensitivity of the nine key views is considered in paragraphs 8.4.48 to 8.4.75 of the published ES. The Predicted Effects (without and with Mitigation) of the nine key views is considered in paragraphs 8.5.32 to 8.5.53 and in Appendix 8.2 of the published ES. These paragraphs have not been reproduced below as they contain no baseline or assessments for Key view 10.

### LISTED BUILDINGS

With reference to listed buildings Paragraph 8.4.4 of the published ES states:

*Within or immediately bordering the study area there are a number of statutory and non-statutory designated sites. The following designations are located within or adjacent to the study area and are shown on Figure 8.1:*

- **Scheduled Monuments and Listed Buildings** lie within the vicinity of the Scheme. These lie outside of the ZVI and whilst they would not be directly affected by the Scheme, there would be indirect impacts.

### PHOTOMONTAGES

The published ES did not include any photomontages.



## 4.4 NEW CONTENT AND / OR ASSESSMENT AS A RESULT OF THE ADDITIONAL INFORMATION

### KEY VIEW 10: VIEW FROM FOOTPATH (L5 -25-1) NEAR MOULTON LOOKING NORTH EAST

#### BASELINE

Key View 10 has been selected as the most representative and linear view from the public footpath leading south from Moulton which crosses an area within the ZVI that has a potential view of the scheme.

The Zone of Visual Influence (ZVI) has been updated to include Key View 10 and this is shown on Figure 8.5: Supplementary Information ZVI and Key Views in Appendix A-1.

Views from the footpath are very limited due to existing vegetation and landform. Key View 10 was selected as a location where there may be some views towards the proposed Northcliff junction (refer to Figure 8.10 in Appendix A-2).

The view from this location looks out to the northeast across an agricultural field bounded by hedgerows. Views out from the field are limited by a mature hedgerow with a number of significant mature trees. The existing Five Mile Lane is for the most part hidden from view behind existing hedgerows. However intermittent views through the hedge to farm buildings at Grovelands Farm and higher landform around Northcliff junction are possible.

Based on the methodology included in Tables 8.7 to 8.11 of the published ES, this view has a Moderate Sensitivity to Change and a Moderate Visual Quality. Receptors include walkers and therefore it has a High Visual Sensitivity.

#### PREDICTED EFFECTS

The existing road is screened from this view by mature vegetation. Some intermittent views may be possible especially in the winter months. The construction of the Scheme may be visible through gaps in the hedgerow. However, these views will be minor due to the distance of the scheme from the viewpoint.

Due to the distance from the Scheme and the existing mature vegetation there will be only minimal views of the Scheme during construction.

The Magnitude of Visual Effect and Significance of Visual Impact during each phase of the Scheme are shown in Tables 8.28 and 8.29 below. These have been assessed using criteria contained in Tables 8.8 and 8.10 of the published ES.

**Table 8.28: Key view 10: From Footpath FP - L5-25-1 near Moulton looking Northeast – Magnitude of Visual Effect and Impact Significance**

Phase	Magnitude of Visual Effect	Significance of Visual Impact
Construction	Minor Adverse	Moderate Adverse
Year 1	No change	None
Year 15 (Winter)	No change	None
Year 15 (Summer)	No change	None

## LISTED BUILDINGS

There are seven listed buildings within St Nicolas. Two of these listed buildings are on the South side of the A48 and within the ZVI. These will be unaffected by the Scheme as they are situated on the edge of the ZVI and all views to the Scheme are screened by existing vegetation:

- 13463 St Nicholas Church Hall is a Grade II listed building (Easting 309027, Northing 174259) Located on the south side of the Cardiff Road (A48), opposite Smiths Row.
- 16326 Church Hall House (next to St Nicolas Church Hall) grade II listed building (Easting 309015, Northing 174256) Located on the S side of the Cardiff Road (A48), opposite Smiths Row.

There is a further listed building located at Lidmore, this is again on the periphery of the ZVI. This will be unaffected by the Scheme as all views to the Scheme are screened by existing vegetation:

- 26995 Lidmore Farmhouse is a Grade II listed building (Easting 309220, Northing 170320) Part of a small group of buildings S of Dyffryn, E of Northcliff, including the former Lidmore Mill.

## PHOTOMONTAGES

In liaison with the Vale of Glamorgan Council, photomontages have been prepared for the following viewpoint locations at both year 1 and year 15, which were considered to be representative viewpoints (refer to Figure 8.11a to 8.11f in Appendix A-3):

- Key View 2 – View from Coed y Cwm Scheduled Ancient Monument
- Key View 3 – View from footpath L5-20-1 Amelia Trust Farm
- Key View 4 – View from unnamed road west of Equestrian Centre
- Key View 5 – View from unnamed road by Northcliffe Cottage
- Key View 7 – View from Millennium Heritage Trail
- Key View 9 – View from Welsh Hawking Centre

It should be noted that the photographs used to prepare the photomontages were taken in Summer (July 2016) and therefore the year 1 views are also related to the summer view rather than the winter view. Computer generated images have been included, where appropriate, the entire model except for any existing or proposed vegetation. This should be viewed in association with the year 1 views to indicate the potential visibility of the Scheme in year 1 winter.

All photographs used in the preparation of the photomontages were taken using a fixed 35mm lens and a tripod, the tripod was set at a level of 1.5m about ground level.

The photo locations are logged in a OS grid reference. The ground model or digital terrain is produced from the highway design software (Bentleys MX) to produce a mesh to which the proposals are merged into. This is then imported into the 3d modelling software where the proposed vegetation, fences, cars etc. are added, this is where cameras are created using the grid coordinated and ground level plus 1.5m.using 3dStudio Max.

The photos are stitched together using Photoshop. The renders and the photos are then overlaid and “cut into” again using Photoshop.

**Table 8.29: Visual Effects Schedule (presented in Appendix 8.2 of the published ES with Key view 10 added)**

RECEPTORS	ASSESSMENT	MITIGATION	MAGNITUDE OF EFFECTS			
			Construction	Year 1	Year 15 winter	Year 15 summer
<b>Key View 10:- Footpath FP - L5-25-1 near Moulton looking North east</b>						
<p>This view is taken from the footpath south of Moulton looking towards the existing A4226. The existing road is screened by hedgerows and mature trees. Some intermittent views are possible through the existing hedgerow to farm buildings at Grovelands Farm.</p> <p><b>Receptors - Walkers High sensitivity</b></p> <p><b>Direction of view – North east</b></p> <p><b>Angle of view – approx. 100 degrees direct and partially screened</b></p> <p><b>Distance to CL - 563m</b></p> <p><b>Existing Visual Quality - Moderate</b></p>	<p><b>CONSTRUCTION:</b> During construction there may be some intermittent views to the Scheme at the location of Northcliff Junction. These views will be limited by the mature vegetation to winter months.</p>	<p>Proposed hedgerow planting along western side of the Scheme will help integrate the Scheme into the current woodland within the local landscape and provide improved landscape integration.</p>	<p><b>Minor Adverse</b></p>	<p><b>No change</b></p>	<p><b>No change</b></p>	<p><b>No change</b></p>
	<p><b>OPERATION: Year 1</b> Once the Scheme is completed views to the road will be unchanged. The Scheme will be predominantly constructed in cutting to the south of Northcliff junction, and no views will be visible.</p>					
	<p><b>OPERATION: Year 15</b> Once mitigation hedgerow planting is fully established the Scheme will not be visible.</p>					
		<p><b>LIGHTING:</b> There will be no impact from street lighting. Car headlights may be visible through the hedgerows mainly in winter. However, headlights on the current road will be greatly reduced.</p>		<p><b>No change</b></p>	<p><b>No change</b></p>	<p><b>No change</b></p>

## 4.5 SUMMARY

This ESA provides the following additional information to that reported in the published ES:

- An additional viewpoint – Key view 10 from a Public Right of Way between the Scheme and Moulton to the west
- Clarification with regards to the visual impact on Listed Buildings located within the Zone of Visual Influence (ZVI), and
- The provision of photomontages from six representative viewpoints

The additional information does not change the assessment made within the published ES on the potential impact of the Scheme on Landscape. Therefore the assessments undertaken and conclusions of the published ES remain.

# 5

## NATURE CONSERVATION

### 5.1 INTRODUCTION

Nature Conservation was considered in Chapter 9 of Volume 1 of the published Environmental Statement.

### 5.2 ADDITIONAL INFORMATION REQUESTED

#### DORMOUSE AND BAT MITIGATION

In response to the planning application, Natural Resources Wales (NRW) issued a letter outlining their concerns in relation to the Scheme and requirements which would have to be met for the development.

Requirement 6 of NRW's letter requested that a condition is secured to any permission granted to ensure a dormouse mitigation scheme is implemented.

Requirement 7 of NRW's letter requested that a condition is secured to any permission granted to ensure a bat mitigation scheme is implemented.

#### BREEDING BIRD SURVEY 2016

A series of ecological surveys was carried out in 2014 in order to inform this assessment, but due to time constraints, a breeding bird survey was not carried out at that time. In order to adequately assess the impacts of the Scheme on breeding birds, the Vale of Glamorgan Council Biodiversity Team requested a breeding bird survey be undertaken at the appropriate time of the year in 2016.

### 5.3 EXISTING CONTENT AND / OR ASSESSMENT WITHIN THE PUBLISHED ES

#### DORMOUSE MITIGATION

Mitigation for the potential impacts of the Scheme on dormice is considered in Paragraphs 9.6.36 to 9.6.41 of the published ES and is repeated below:

*The proposed works affecting dormice comprise vegetation clearance at the initial stage of construction works on site. At present, the date for commencement of site clearance works is unknown. If site clearance is to begin in winter/spring 2016 it is proposed that vegetation clearance will be carried out using a 'two stage' method – i.e. above ground vegetation will be coppiced between November and March inclusive, to avoid both the bird nesting season and the period when dormice are most likely to be found above ground, with coppiced areas dug up at a later stage. Coppiced areas should not be dug up any earlier than May (the time when dormice emerge from hibernation). This strategy avoids disturbance to nesting birds, while also avoiding impacts to hibernating dormice (and also to hibernating reptiles).*

*If site clearance is to be carried out later than spring 2016, a different approach to dormouse mitigation will be required. Summer vegetation clearance may be carried out, by taking out small patches of vegetation on successive days, when animals are active and do not have dependent young. Such clearance will be carried out by hand, with an ecologist carrying out a thorough search for nests prior to clearance. After early June, female dormice are likely to have young in their nests, and so any clearance in areas with high dormouse potential (i.e. those classified as optimal or suitable; see details in Appendix 9.3) should be prioritised for clearance prior to June*

2016. If this is not possible, thorough searches will have to be carried out by an ecologist prior to clearance (see below).

*All hedgerows and planting will be inspected by an ecologist prior to vegetation clearance, in order to identify occupied dormouse nests. Where possible, these will be checked to confirm the absence of dependant young, with particular care to be taken in the period June to October, when dormouse are likely to have young. Any nests containing active or torpid dormice that can be removed will be translocated into retained habitat close to the Scheme. In the unlikely event of a dormouse being found, all works would cease and advice would be sought from the on-site ecologist and NRW and the requirement for a mitigation licence ascertained.*

*In general, vegetation clearance will commence at or close to the western edge of the Scheme footprint, so that dormice, if present, are displaced primarily from the existing road eastwards into the green-field areas that the Scheme bisects. The area to the east of the existing road contains an extensive network of retained habitat suitable for dormouse.*

*Up to 20m of each hedgerow will be cleared per day, so that dormice are progressively displaced into retained habitat, rather than being immediately removed from their home ranges.*

*The creation of new habitats, such as hedgerow, scrub and woodland (as described above), will also provide new foraging/commuting areas for dormouse.*

## BAT MITIGATION

Mitigation for the potential impacts of the Scheme on roosting, commuting and foraging bats is considered in Paragraphs 9.6.27 to 9.6.32 of the published ES and is repeated below:

### **Roosting Bats**

*Although no bat roosts were found in the seven trees examined along the line of the Scheme, a bat-licensed ecologist will carry out an aerial re-inspection of those trees categorised as Category 1, and those trees that were inaccessible in the original surveys, immediately prior to works commencing and be on site during any works to those trees. A toolbox talk regarding bats will be given to the tree work contractors by the ecologist. If bats are discovered during works, work will stop and not resume until advice has been given by the onsite ecologist. The ecologist will have the necessary equipment to care for any discovered bat(s) and a method statement regarding actions on discovering bats will be in place prior to works commencing. Bright lighting will not be directed to towards the trees identified as having potential of category 1 and 2.*

### **Commuting and Foraging Bats**

*The most appropriate method to mitigate the impact on the severed mature hedgerow (Survey location 3 in Appendix 9.4), along which there is a known Brown long-eared (*Plecotus auritus*) roost, would be to provide an underpass. However, this is not possible as the ground levels at this location do not allow it. Recent studies have suggested limited success of bat bridges / bat gantries in mitigating severance of flightlines by roads (Berthinussen & Altringham, 2012; Halcrow Group & Green, 2011). Therefore this method is not considered appropriate.*

*Recent studies also suggest limited success in the use of 'hop overs' (the planting of vegetation either side of the road to encourage bats to cross at canopy height) in maintaining local bat populations (Berthinussen & Altringham, 2012, Russell et al., 2009; Halcrow Group & Green, 2011). However, some success has been demonstrated by these studies. In this situation a 'hop over' solution is considered to be the best option to mitigate the severance of this flightline, as other options are limited.*

As Brown long-eared bats are a species which are low flying and will fly through the canopy, hop over planting will be used in conjunction with 4 to 5m high wooden / screen mesh (as suggested by Limpens et al., 2005 reported in Halcrow and Green, 2011). This will be supplemented with planting to guide bats to this safe crossing point.

In conjunction with the above, three Schweglar 2F bat boxes will be provided on the eastern side of the new carriageway, providing roosting opportunity for bats to the east of the carriageway without them having to cross the road. These will be located in existing mature trees along the hedgerow. This particular bat boxes have been specified as they are marketed as being particularly successful for *Plecotus auritus*.

Woodland, scrub and hedgerow planting (described above) will mitigate the loss of foraging habitat.

## BREEDING BIRD SURVEY

### BASELINE

As part of Baseline Conditions, birds are considered in Paragraphs 9.4.82 to 9.4.91, Table 9.10 and Table 9.11 of the published ES.

#### **Birds**

The bird species recorded within the study area during the 2008 breeding bird surveys conducted by Soltys-Brewster and other surveys carried out for the Scheme are listed in Table 9.7. The conservation status of each species is also presented (including BOCC Status, EU Birds Directive Annex 1, WCA Schedule 1, UK BAP, NERC Section 42 and VoG BAP). Bird species of conservation concern (i.e. those that are Red-listed and/or are listed under Annex I of EU Birds Directive / Schedule I of the WCA / priority species of UK BAP/Section 42/VoG) are highlighted in bold and discussed below.

Incidental records of several of the species listed in Table 9.7 were noted during the 2014 surveys conducted by TACP, including the red-listed species yellowhammer and skylark.

#### **Bird Species of Conservation Concern**

Skylark has been recorded in several areas within the survey corridor, mainly in the large arable fields in the mid to northern section of the route, though the presence of this species was noted in one pasture field. This species has suffered a decline in recent years, mainly due to changes in farming practices, such as increased pesticide use, the loss of arable land to grazing, and a shift from spring to autumn sown cereal crops, which reduces the number of available nesting and feeding sites (RSPB website, [www.rspb.org.uk](http://www.rspb.org.uk), accessed August 2014).

Similarly, the seed-eating species Yellowhammer and Linnet have all suffered declines in recent years due to changing farming practices, and are now red-listed. The occurrence of these species within the survey corridor also coincides with arable fields, which provide valuable feeding habitat. Hedgerows and scrub are important nesting habitats for these species.

Song Thrush has also suffered a decline in the UK in recent years. The reasons behind the decline of song thrush are unclear, but this is probably also partly due to the switch from arable to pasture land and autumn-sown cereal crops (RSPB website, [www.rspb.org.uk](http://www.rspb.org.uk), accessed August 2014). Other factors which may be involved in the decline of this species are hedgerow destruction, and the increased use of pesticides, which leads to a reduction in prey availability and may result in indirect poisoning.

Table 9.7: Bird Species Recorded within the survey corridor and their Conservation/Protection Status

Species	BOCC Status	EU Birds Directive Annex I	WCA Schedule I	UK BAP Species	Section 42 Species	VoG Priority Species
<i>Blackbird (Turdus merula)</i>	Green	No	No	No	No	No
<i>Blue tit (Cyanistes caeruleus)</i>	Green	No	No	No	No	No
<i>Buzzard (Buteo buteo)</i>	Green	No	No	No	No	No
<i>Carrion crow (Corvus corone)</i>	Green	No	No	No	No	No
<i>Chiffchaff (Phylloscopus collybita)</i>	Green	No	No	No	No	No
<i>Collared dove (Streptopelia decaocto)</i>	Green	No	No	No	No	No
<i>Coal tit (Periparus ater)</i>	Green	No	No	No	No	No
<i>Dunnock (Prunella modularis)</i>	Amber	No	No	Yes	Yes	No
<i>Goldfinch (Carduelis carduelis)</i>	Green	No	No	No	No	No
<i>Great tit (Parus major)</i>	Green	No	No	No	No	No
<i>Herring gull (Larus argentatus)</i>	Red	No	No	Yes	Yes	No
<i>House sparrow (Passer domesticus)</i>	Red	No	No	Yes	Yes	No
<i>Jackdaw (Corvus monedula)</i>	Green	No	No	No	No	No
<i>Kingfisher (Alcedo atthis)</i>	Amber	Yes	Yes	No	No	No
<i>Linnet (Carduelis cannabina)</i>	Red	No	No	Yes	Yes	No
<i>Nuthatch (Sitta europaea)</i>	Green	No	No	No	No	No
<i>Meadow pipit (Anthus pratensis)</i>	Amber	No	No	No	No	No
<i>Pheasant (Phasianus colchicus)</i>	N/A	No	No	No	No	No
<i>Robin (Erithacus rubecula)</i>	Green	No	No	No	No	No
<i>Skylark (Alauda arvensis)</i>	Red	No	No	Yes	Yes	Yes
<i>Song thrush (Turdus philomelos)</i>	Red	No	No	Yes	Yes	Yes
<i>Starling (Sturnus vulgaris)</i>	Red	No	No	Yes	Yes	No
<i>Swallow (Hirundo rustica)</i>	Amber	No	No	No	No	No
<i>Swift (Apus apus)</i>	Amber	No	No	No	No	No
<i>Tawny owl (Strix aluco)</i>	Green	No	No	No	No	No
<i>Wood pigeon (Columba palumbus)</i>	Green	No	No	No	No	No
<i>Whitethroat (Sylvia communis)</i>	Amber	No	No	No	No	No



<i>Species</i>	<i>BOCC Status</i>	<i>EU Birds Directive Annex I</i>	<i>WCA Schedule I</i>	<i>UK BAP Species</i>	<i>Section 42 Species</i>	<i>VoG Priority Species</i>
<i>Yellowhammer (Emberiza citrinella)</i>	<i>Red</i>	<i>No</i>	<i>No</i>	<i>Yes</i>	<i>No</i>	<i>No</i>

Reasons behind the decline of Starling and House Sparrow are relatively unknown, but may also be associated with changing farming practices. Within the Scheme study area, these species were recorded in pasture land in the vicinity of Moulton.

Herring Gull are generally considered to be a coastal species, but have increasingly begun to utilise more inland areas, particularly urban areas and landfill sites, which provide a valuable food source. Herring gull populations suffered a massive decline between the 1960s and the 1980s, thought to have been caused by an outbreak of botulism (Madden and Newton, 2004). A decline in the availability of food from fisheries discards and landfill sites has resulted in a shift of populations from remote coastal sites to urban areas in recent years (Furness et al., 1992).

Kingfisher, a species listed under Annex I of the EU Birds Directive and a WCA Schedule 1 species, was recorded by Soltys-Brewster during surveys of the River Waycock corridor conducted in 2008. As a slow-moving, shallow river with abundant small fish, the River Waycock is an ideal habitat for this species. Kingfishers are top predators in the food chain, and so are highly vulnerable to the build-up of chemicals. Long-term population declines in this species since the 1970s are generally attributed to river pollution, though human disturbance of nesting birds is also a serious problem (RSPB website, [www.rspb.org.uk](http://www.rspb.org.uk), accessed August 2014).

Dunnock was recorded in the vicinity of Whitton Rosser Farm by Soltys-Brewster in 2008. This species inhabits well vegetated areas with scrub, brambles and hedges. Abundance of Dunnock fell significantly between the mid-1970s and mid-1980s. The cause of this decline is unknown, but may be associated with changing forestry practices.

Barn Owl (*Tyto alba*), a WCA Schedule 1 species, was recorded as present in 2008 by Soltys-Brewster (the location was not shown on their Figure 6.7). SEWBRc hold 7 post-2000 records of Barn Owl with 2km of the scheme, two of which relate to breeding adults in 2002 over 900 m from the Scheme. During Phase 1 ecology surveys conducted by TACP in 2014, any trees or structures potentially affected by the Scheme likely to host barn owl were checked for the presence of, or any signs of breeding barn owl (for example during the bat survey work), but none were found. Barn owls are probably periodically present at low density.

**Table 9.10: List of UK BAP, Section 42 and VoG Priority Species Recorded within the Study Area**

	Species	UK BAP	Section 42	VoG Priority Species
Birds	Dunnock ( <i>Prunella modularis</i> )	Yes	Yes	No
	Herring gull ( <i>Larus argentatus</i> )	Yes	Yes	No
	House sparrow ( <i>Passer domesticus</i> )	Yes	Yes	No
	Linnet ( <i>Carduelis cannabina</i> )	Yes	Yes	No
	Skylark ( <i>Alauda arvensis</i> )	Yes	Yes	Yes
	Starling ( <i>Sturnus vulgaris</i> )	Yes	Yes	No
	Song thrush ( <i>Turdus philomelos</i> )	Yes	Yes	Yes
	Yellowhammer ( <i>Emberiza citrinella</i> )	Yes	Yes	No

**Table 9.11: Ecological Receptors within the Study Area, Evaluation, and Selection as Key Ecological Receptors**

<b>Ecological Receptor</b>	<b>Valuation of Receptor</b>	<b>Selection as Key Ecological Receptor Y/N</b>
Skylark	<i>Skylark is a Priority species under the Vale of Glamorgan BAP. As skylark regularly occur within the study area in large numbers, the population within the study area is considered to be of County importance.</i>	Yes
Song thrush	<i>This species was also noted within the study area and is a Vale of Glamorgan BAP Priority species. As no information is available on the numbers of song thrush within the study area, a precautionary approach is taken in assigning it a value of County importance.</i>	Yes
Yellowhammer	<i>Yellowhammer is a red-listed species which is also listed as a Priority species under the UK BAP. This species was recorded on a number of occasions during surveys conducted for the Scheme, and so is considered to have a local stronghold in the area. This population is therefore considered to be of County importance.</i>	Yes
Kingfisher	<i>Kingfisher is listed on Schedule 1 of the WCA and is also an EU Birds Directive Annex I species. Given its conservation and legal status, the presence of even one individual within the Scheme corridor is considered to be of County importance.</i>	Yes
Other breeding birds	<i>Other breeding birds recorded within the study area are either common or widespread species in the UK, or occur in low numbers within the study area. They area therefore considered to be of Local importance.</i>	Yes

#### PREDICTED EFFECTS (WITHOUT MITIGATION)

As part of Predicted Effects (without Mitigation), birds are considered in Tables 9.13 and 9.14 of the published ES.

**Table 9.13: Impacts on Key Ecological Receptors during Construction of the Scheme**

<b>Key Ecological Receptor</b>	<b>Nature Conservation Value</b>	<b>Description of Impact</b>	<b>Magnitude of Impact</b>	<b>Significance of Impact</b>
Skylark	County Importance	Damage or destruction of active nests/eggs/dependant young during site clearance/construction works within arable fields/field margins.	Medium adverse	Moderate adverse
		Some small areas of arable fields will be lost under the footprint of the Scheme. Arable fields and their associated field margins represent important feeding and breeding habitat for this species. <i>NOTE: The surrounding area contains abundant arable fields suitable for this species, and this has been taken into account in determining the severity of this impact.</i>	Low adverse	Slight adverse
Song thrush	County Importance	Damage or destruction of active nests/eggs/dependant young during site clearance works in areas with thick vegetation.	Medium adverse	Moderate adverse
		Loss of breeding habitat (hedgerows, woodland and scrub) during site clearance works, including foraging habitat within territories for breeding pairs. <i>NOTE: Only very small areas of suitable breeding bird habitat will be lost under the footprint of the road, and this has been taken into account in determining the severity of this impact.</i>	Low adverse	Slight adverse
Yellowhammer	County Importance	Damage or destruction of active nests/eggs/dependant young during site clearance works in areas with thick vegetation.	Medium adverse	Moderate adverse
		Loss of breeding habitat (hedgerows) during site clearance works, including foraging habitat within territories for breeding pairs. <i>NOTE: Only very small areas of suitable breeding bird habitat will be lost under the footprint of the road, and this has been taken into account in determining the severity of this impact.</i>	Low adverse	Slight adverse
		Some small areas of arable fields will be lost under the footprint of the Scheme. Arable fields and their associated field margins represent important feeding habitat for this species. <i>NOTE: The surrounding area contains abundant arable fields suitable for this species, and this has been taken into account in determining the severity of this impact.</i>	Low adverse	Slight adverse
Kingfisher	County Importance	Pollution of the River Waycock may result in indirect impacts through fish kills which would reduce the food resource for kingfisher.	Low adverse	Slight adverse

Key Ecological Receptor	Nature Conservation Value	Description of Impact	Magnitude of Impact	Significance of Impact
		Construction works in the vicinity of the River Waycock may cause disturbance to kingfisher.	Low adverse	Slight adverse
Other breeding birds	Local Importance	Damage or destruction of active nests/eggs/dependant young during site clearance works.	Low adverse	Slight adverse
		Loss of breeding bird habitat during site clearance works, including foraging habitat within territories for breeding pairs.	Low adverse	Slight adverse
		Disturbance of birds during construction works will deter birds from nesting near the site. However, there is abundant suitable habitat (in the form of hedgerows, woodland and scrub) in the surrounding area.	Low adverse	Slight adverse

**Table 9.14: Impacts on Key Ecological Receptors during Operation of the Scheme**

Key Ecological Receptor	Nature Conservation Value	Description of Impact	Magnitude of Impact	Significance of Impact
Skylark	County Importance	Slight reduction in area of arable field habitat available for feeding. NOTE: The surrounding area contains abundant arable fields suitable for this species, and this has been taken into account in determining the severity of this impact.	Low Adverse	Slight Adverse
Song thrush	County Importance	Planting scheme will result in a net increase in the total lengths of hedgerows (an important feeding and breeding habitat for this species) within the study area.	Low Beneficial	Slight Beneficial
Yellowhammer	County Importance	Slight reduction in area of arable field habitat available for feeding. NOTE: The surrounding area contains abundant arable fields suitable for this species, and this has been taken into account in determining the severity of this impact.	Low Adverse	Slight Adverse
		Planting scheme will result in a net increase in the total lengths of hedgerows (an important breeding habitat for this species) within the study area.	Low Beneficial	Slight Beneficial
Kingfisher	County Importance	N/A	N/A	N/A
Other breeding birds	Local Importance	Planting scheme will result in a net increase in the total lengths	Low Beneficial	Slight Beneficial

<i>Key Ecological Receptor</i>	<i>Nature Conservation Value</i>	<i>Description of Impact</i>	<i>Magnitude of Impact</i>	<i>Significance of Impact</i>
		<i>of hedgerows (an important breeding habitat for breeding birds) within the study area.</i>		

## MITIGATION

Construction mitigation for birds is considered in paragraphs 9.6.25 to 9.6.26 of the published ES.

### **Skylark (and other ground nesting birds)**

*Where possible, works will be timed so as to avoid impacts to ground-nesting birds, particularly skylark and meadow pipit, which were recorded within the arable fields in the north of the study area. Works carried out prior to April 2015 would avoid the nesting season of skylark and meadow pipit. If works in arable fields are to commence in the period April to early August, an ecologist will conduct a thorough search of the affected areas in order to determine the presence of ground-nesting birds. If nests are found, a 10m buffer zone of vegetation will be left around the nests, and such areas will be left undisturbed until such time as the chicks have fledged. In order to avoid accidental damage, such areas will be clearly demarcated and all site staff will be given a 'toolbox talk' to inform them of the concerns regarding nesting birds.*

### **Song Thrush, Yellowhammer and Other Breeding Birds**

*The best way to avoid impacts to breeding birds is through the appropriate timing of works, to avoid vegetation clearance during the bird nesting season (generally March to August inclusive but varies according to weather conditions and species). If vegetation clearance is unavoidable within the period March to August, all works will be supervised by a suitably qualified ecologist, who will carry out a thorough search for active birds' nests prior to clearance. If any active nests are found, a 10m buffer zone of vegetation will be left around the nests, and such areas will be left undisturbed until such time as the chicks have fledged. In order to avoid accidental damage, such areas will be clearly demarcated and all site staff will be given a 'toolbox talk' to inform them of the concerns regarding nesting birds.*

Operation mitigation for birds is considered in paragraphs 9.6.46 of the published ES.

### **Breeding Birds**

*Birds breeding close to the Scheme will potentially be at risk of road mortality; although the causes of road mortality vary between bird species, factors increasing risks are the provision of high quality foraging habitat very close to road carriageways, and planting discontinuous blocks of shrub planting which screen birds' views of on-coming traffic. Landscaping of the Scheme will therefore avoid provision of species-rich grasslands within 2 m of the carriageway, and shrub planting will be designed to maintain visibility along the Scheme for birds flying over the verges, as far as is practical.*

## RESIDUAL EFFECTS (WITH MITIGATION)

Residual Effects (with Mitigation) for birds during both construction and operational phases is considered in Table 9.16 of the published ES.

Table 9.16: Summary of Nature Conservation Impacts

Potential Impacts	Nature of Impact	Significance (without Mitigation)	Mitigation Measures	Residual Impact
<b>Construction</b>				
Skylark	Damage or destruction of active nests/eggs/dependant young during site clearance/construction works within arable fields/field margins.	Moderate adverse	Where possible, vegetation clearance will take place outside the nesting season for skylark. If vegetation clearance is to commence in the period April to August, all areas of suitable skylark habitat will be thoroughly searched for the presence of nests prior to clearance. If nests are found, these will be marked off and prevented from harm until chicks have fledged.	Neutral
Song thrush	Damage or destruction of active nests/eggs/dependant young during site clearance works in areas with thick vegetation.	Moderate adverse	Where possible, vegetation clearance will take place outside the nesting season for song thrush. If vegetation clearance is to commence in the period April to August, all areas of suitable skylark habitat will be thoroughly searched for the presence of nests prior to clearance. If nests are found, these will be marked off and prevented from harm until chicks have fledged.	Neutral
	Loss of breeding habitat (hedgerows, woodland and scrub) during site clearance works, including foraging habitat within territories for breeding pairs.	Slight adverse	Additional hedges and woodland will be planted which may provide suitable habitat	Slight beneficial
Yellowhammer	Damage or destruction of active nests/eggs/dependant young during site clearance works in areas with thick vegetation.	Moderate adverse	Where possible, vegetation clearance will take place outside the bird nesting season. If vegetation clearance is to commence in the period April to August, all areas of suitable skylark habitat will be thoroughly searched for the presence of nests prior to clearance. If nests are found, these will be marked off and prevented from harm until chicks have fledged.	Neutral
	Loss of breeding habitat (hedgerows) during site clearance works, including foraging habitat within territories for breeding pairs.	Slight adverse	More hedgerow will be planted, giving more potential nesting habitat	Slight beneficial
Kingfisher	Pollution of the River Waycock may result in	Slight adverse	Attenuation ponds help prevent pollutants	Slight beneficial



Potential Impacts	Nature of Impact	Significance (without Mitigation)	Mitigation Measures	Residual Impact
	<i>indirect impacts through fish kills which would reduce the food resource for kingfisher.</i>		<i>entering water courses</i>	
	<i>Construction works in the vicinity of the River Waycock may cause disturbance to kingfisher.</i>	<i>Slight adverse</i>	<i>None proposed</i>	<i>Slight adverse</i>
<i>Other breeding birds</i>	<i>Damage or destruction of active nests/eggs/dependant young during site clearance works.</i>	<i>Slight adverse</i>	<i>Where possible, vegetation clearance will take place outside the bird nesting season. If vegetation clearance is to commence in the period April to August, all areas of suitable skylark habitat will be thoroughly searched for the presence of nests prior to clearance. If nests are found, these will be marked off and prevented from harm until chicks have fledged.</i>	<i>Neutral</i>
	<i>Loss of breeding bird habitat during site clearance works, including foraging habitat within territories for breeding pairs.</i>	<i>Slight adverse</i>	<i>Some new habitat is being created which might provide suitable nesting sites</i>	<i>Slight beneficial</i>
	<i>Disturbance of birds during construction works will deter birds from nesting near the site.</i>	<i>Slight adverse</i>	<i>None proposed. However, there is abundant suitable habitat (in the form of hedgerows, woodland and scrub) in the surrounding area.</i>	<i>Slight adverse</i>
<b>Operation</b>				
<i>Skylark</i>	<i>Loss of arable habitat</i>	<i>Slight adverse</i>	<i>None proposed, as there is abundant habitat in the surrounding area.</i>	<i>Slight adverse</i>
<i>Song thrush</i>	<i>Net increase in habitat through planting scheme</i>	<i>Slight beneficial</i>	<i>N/A</i>	<i>Slight beneficial</i>
<i>Yellowhammer</i>	<i>Net increase in habitat through planting scheme</i>	<i>Slight beneficial</i>	<i>N/A</i>	<i>Slight beneficial</i>
<i>Kingfisher</i>	<i>N/A</i>	<i>N/A</i>	<i>N/A</i>	<i>N/A</i>
<i>Other breeding birds</i>	<i>Planting scheme will result in a net increase in the total lengths of hedgerows (an important breeding habitat for breeding birds) within the study area.</i>	<i>Slight beneficial</i>	<i>N/A</i>	<i>Slight beneficial</i>

## CUMULATIVE EFFECTS

The cumulative effect for birds is considered in paragraph 9.8.4 of the published ES.

*There are three approved solar farm proposals (2014/00798/FUL Whitton Mawr; 2014/00081/FUL Land off Waycock Cross, Waycock Road, Barry; 2015/00365/SC1 Derwen Farm). These solar farm proposals are generally in farmland with improved pasture or arable fields and hedges and together combined with the existing Sutton Farm solar farm development (2014/01103/NMA and 2015/00362/NMA) will result in a significant loss of arable skylark habitat replaced with diverse permanent grasslands under the solar panels. The combined cumulative effect on skylark of these solar farms combined with the relatively very small area lost to the Scheme is estimated to be up to 10% of its arable habitat in the study area which could reduce the skylark population. Similarly, loss of pasture and reduced edge habitat for other bird such as song thrush could also occur.*

## 5.4 NEW CONTENT AND / OR ASSESSMENT AS A RESULT OF THE ADDITIONAL INFORMATION

### DORMOUSE MITIGATION

In response to Requirement 6 of NRW's letter a Draft Dormice Mitigation Strategy has been produced which is included as Appendix B-1 to this ESA.

Mitigation for the potential impacts of the Scheme on dormice which is considered in Paragraphs 9.6.36 to 9.6.41 of the published ES has been supplemented with the following information:

### VEGETATION CLEARANCE

The proposed works affecting dormice comprise vegetation clearance at the initial stage of construction works on site. At present, the date for commencement of site clearance works is unknown.

The clearance methods used will depend on the time of year, the suitability of habitat being cleared and the requirements of the Scheme, for example the need to clear areas for haul routes.

Due to the fact that no evidence of dormouse was found during the surveys conducted for the Scheme, the works are not licensable. However, if dormouse are found at any stage during the works, works in the area will be suspended and a licence will have to be obtained from NRW.

### WINTER CLEARANCE

If site clearance is to begin in winter/spring it is proposed that vegetation clearance will be carried out using a 'two stage' method – i.e. above ground vegetation will be coppiced between November and March inclusive, to avoid both the bird nesting season and the period when dormice are most likely to be found above ground, with coppiced areas dug up at a later stage. Coppiced areas should not be dug up any earlier than May (the time when dormice emerge from hibernation). This strategy avoids disturbance to nesting birds, while also avoiding impacts to hibernating dormice (and also to hibernating reptiles). In areas of 'Optimal' and 'Suitable' habitat, coppicing will be carried out using hand held tools such as chainsaws and brush cutters; these works will be carried out under an ecological watching brief. In areas of 'Sub-optimal' or lower habitat value, coppicing may be carried out using tractor-mounted flail.

In the event that roots need to be dug up prior to May, for example where haul route access is required, these areas will be finger-tip searched by ecologists prior to excavation. If hibernating

dormouse are found during finger-tip searches, works will be suspended immediately and a licence will be obtained from NRW. Once a licence has been granted, hibernating dormouse will be taken out carefully in their nests and translocated to adjacent retained habitat. The sites to which the nests will be relocated will be chosen to match as much as possible the conditions of the original nest sites; for example, a dormouse nest found in the base of a coppiced stool will be placed in another coppiced stool in an area of retained habitat.

## SUMMER CLEARANCE

If site clearance is to be carried out later than spring, a different approach to dormouse mitigation will be required. Summer vegetation clearance may be carried out, by taking out small patches of vegetation on successive days, when animals are active and do not have dependent young. Between June and August, female dormouse are likely to have young in their nests, and so any clearance in areas with high dormouse potential (i.e. those classified as optimal or suitable) should be prioritised for clearance prior in April/May, bearing in mind that dormouse may still be in hibernation in April and so the roots will have to be left in place until May, or finger-tip searched prior to excavation.

All hedgerows and planting will be inspected by an ecologist prior to vegetation clearance, in order to identify occupied dormouse nests. If occupied dormouse nests are found, works will be suspended immediately and a licence will be obtained from NRW. Once a licence has been granted, nests will be checked to confirm the absence of dependant young, with particular care to be taken in the period June to October, when dormouse are likely to have young. Any nests containing active or torpid dormice that can be removed will be translocated into retained habitat close to the Scheme, matching as much as possible the conditions of the original nest site. In the event that dependant young are found, vegetation clearance on that hedgerow will be delayed until such time as the young are mobile enough to be translocated.

In general, vegetation clearance will commence at or close to the western edge of the Scheme footprint, so that dormice, if present, are displaced primarily from the existing road eastwards into the green-field areas that the Scheme bisects. The area to the east of the existing road contains an extensive network of retained habitat, such as hedgerow and woodland, suitable for dormouse.

Up to 20m of each hedgerow will be cleared per day, so that dormice are progressively displaced into retained habitat, rather than being immediately removed from their home ranges.

## HABITAT CREATION

As stated above, the landscaping proposals for the Scheme include for the creation of new habitats, such as hedgerow and woodland. Hedgerow planting has been designed to re-connect the severed ends of existing hedgerows which will be bisected by the Scheme, in order to maintain and enhance dispersal corridors for dormouse. Once it has become established, this new planting will also result in an improved foraging resource for dormouse, as the Scheme will result in a net increase of 4,615 lm of hedgerow. Similarly, the Scheme planting will result in a net increase of 5.5ha of broadleaved woodland which, once established, will provide suitable habitat for dormouse. Planting will comprise native species which are common in the local area and which are of value for dormice, such as hazel (*Corylus avellana*), hawthorn (*Crataegus monogyna*), field maple (*Acer campestre*) elder (*Sambucus nigra*) and honeysuckle (*Lonicera periclymenum*), and will be of local provenance.

Where possible, coppiced stools will be translocated from where they are dug up on the Scheme to planting areas; coppiced stools tend to establish quite quickly, and so these should be prioritised for re-planting in areas of maximum benefit, for example where areas of optimal or suitable habitat are severed.

In addition to the planting proposals, dormouse boxes will be installed in areas of retained habitats under the control of the Scheme, or in areas of new planting (this may require the

erection of posts to support the boxes). The number and locations of dormouse boxes will be agreed in consultation with the Vale of Glamorgan County Ecologist and NRW.

## BAT MITIGATION

In response to Requirement 7 of NRW's letter a Draft Bat Mitigation Strategy has been produced which is included as Appendix B-2 to this ESA.

Mitigation for the potential impacts of the Scheme on bats which is considered in Paragraphs 9.6.27 to 9.6.32 of the published ES has been supplemented with the following information:

### CONSTRUCTION PHASE MITIGATION

Although no bat roosts were found in the seven trees examined along the line of the Scheme, a bat-licensed ecologist will carry out an aerial re-inspection of Category 1 trees (medium potential to support roosting bats), and those trees that were inaccessible in the original surveys, prior to works commencing. Category 2 trees (low potential to support roosting bats) will be felled taking 'reasonable avoidance measures' such as climbing inspections by a bat licenced ecologist prior to felling or felled using soft felling techniques.

If following a thorough re-inspection of Category 1 trees no bats are found, exclusion devices will be fitted into potential roost features to prevent bats accessing them prior to felling. If bats are discovered during the re-inspection, then a European Protected Species Licence will need to be obtained from NRW prior to felling.

Immediately prior to felling Category 1 trees will be checked from ground level by the bat licenced ecologist, to ensure exclusion devices are still in place. If there are any potential roost features where it was not possible to fit exclusion devices (e.g. not possible to inspect all of the feature or feature was too extensive) further climbing inspections may be carried out immediately prior to felling or soft felling techniques employed as appropriate. Soft felled trees should be left on the ground for 48 hours before being removed, giving any bats the opportunity to fly off under the cover of darkness.

A toolbox talk regarding bats will be given to the tree work contractors by the ecologist. If bats are discovered during works, work will stop and the ecologist will inform NRW at the earliest opportunity. Work will not resume until advice has been sought from NRW and way to proceed has been agreed.

The bat licenced ecologist will have the necessary equipment to care for any discovered bat(s) and a method statement regarding tree felling and actions on discovering bats will be in place prior to works commencing. Bright lighting will not be directed towards the trees identified as having potential of category 1 and 2.

### OPERATION PHASE MITIGATION

The most appropriate method to mitigate the impact on the severed mature hedgerows, along which there is a known brown long-eared (*Plecotus auritus*) roost, would be to provide an underpass. However, this is not possible as the ground levels at this location do not allow it. Recent studies have suggested limited success of bat bridges / bat gantries in mitigating severance of flightlines by roads (Berthinussen & Altringham, 2012; Halcrow Group & Green, 2011). Therefore, this method is not considered appropriate.

Another method used to reduce bat mortality on road schemes is the use of 'hop overs': using planting or manipulation of existing features to encourage bats to fly at canopy height over the road. The effectiveness of this method has been shown to have some success in guiding bats to safe crossing points (Halcrow Group & Green, 2011), and may be most effective on smaller roads

(Berthinussen & Altringham, 2012). In this situation a 'hop over' solution is considered to be the best option to mitigate the severance of this flightline, as other options are limited, and the existing boundary feature provides good opportunity for manipulation in this regard.

The existing treeline at this location has good structural diversity, with a canopy of mature trees (approximately 20m in height) and a dense understorey of shrubby vegetation. Therefore, no extra planting will be required for the hop-over. Brown long eared bats are a species that fly low in clutter and so will follow vegetation, and so in order to guide brown long eared bats across the road at a safe height, a 4 to 5m high wooden / screen mesh will be installed within the vegetation on either side of the road, in order to force bats upwards (as suggested by Limpens et al., 2005 reported in Halcrow and Green, 2011). The design of the bat hop-over will be developed at the detailed design stage, in consultation with NRW and the Vale of Glamorgan county ecologist.

In conjunction with the above, three Schwegler 2F bat boxes will be provided on the eastern side of the new carriageway, providing roosting opportunity for bats to the east of the carriageway without them having to cross the road. These will be located in existing mature trees along the hedgerow. This particular bat box design has been specified as they are marketed as being particularly successful for brown long-eared bats. These bat boxes will be installed at the earliest stage possible, to give the bats using the existing shed the opportunity to colonise them prior to the Scheme opening to traffic.

Woodland, scrub and hedgerow planting will mitigate the loss of foraging habitat lost to the Scheme. It is proposed to plant a total of 6.7ha of new woodland throughout the Scheme, including an area 2.8ha of new woodland between Middleton Plantation and Sutton Wood to compensate for the permanent loss of 0.431ha and the temporary loss of 0.469ha of woodland in the Barry Woodlands SSSI. Additionally, whilst 1,693 linear metres (lm) of existing hedgerow will be lost to the Scheme, it is proposed to plant 6,308lm of new hedgerow. Additionally, the landscaping proposals involve the creation of 4.7ha of wildflower meadow habitat, which would provide good bat foraging habitat.

## BREEDING BIRD SURVEY 2016

A Breeding Bird Survey was undertaken between April and June 2016 and a modified version of the 'Common Bird Census' methodology (Bibby et al, 2000) was employed.

Full details of the results of the 2016 breeding bird surveys are provided in Appendix B-3 and are summarised below where it provides new content and / or assessment.

## BASELINE

A total of 44 bird species were identified during the course of the survey. On the basis of observations made, 19 species were confirmed to be breeding within the study area, with an additional 14 species probably breeding (but where breeding could not be confirmed), and a further 8 species were seen exhibiting behaviours suggesting possible breeding. Whilst the majority of the bird species using the site for breeding are common and widespread in the local area, some were of notable conservation significance.

Maps showing the locations of key species exhibiting breeding behaviour and an approximate indication of the areas likely to be used for breeding are provided in Appendix B-3.

### **Schedule 1 Birds**

Birds on Schedule 1 of the Wildlife and Countryside Act require special attention as they are afforded a greater degree of attention than other bird species, and there is a greater burden of proof required to prove that any reckless disturbance of nesting individuals could not have been reasonably avoided.

No Schedule 1 birds were noted during the breeding bird survey.

### ***Red Listed Birds***

Birds on the UK Red List include species that are globally threatened and / or where there has been a long term historical population decline or range contraction within the UK. See Eaton et al (2009) for full background and definitions in respect of avian Red Listing criteria.

Ten Red Listed species were recorded during the survey: Grey Wagtail, Herring Gull, House Sparrow, Starling, Linnet, Northern Lapwing, Skylark, Song Thrush, Spotted Flycatcher, and Yellowhammer. Of these, Northern Lapwing, Skylark, Song Thrush and Yellowhammer were confirmed to be breeding within the study area. Linnet is probably breeding in the northern part of the study area, potentially within the footprint of the Scheme. Starling is probably breeding in at least one location (Blackland Farm) and probably other locations within the study area too. Starlings are most likely to be nesting within buildings and, therefore, outside the footprint of the scheme.

Most of the species recorded in the 2016 surveys had previously been recorded within the study area in 2008 surveys conducted by Soltys Brewster. Red listed species not recorded in the 2008 surveys but recorded in 2016 were Northern Lapwing, Grey Wagtail and Spotted Flycatcher.

### ***Amber Listed Birds***

Birds on the UK Amber List include species that have an unfavourable conservation status in Europe, and / or where there has been a long term historical population decline, which is now recovering. Other criteria for inclusion on the Amber List include a moderate decline in UK population size, or range contraction, or where the UK breeding or non-breeding population is significant at a European scale. See Eaton et al (2009) for full background and definitions in respect of avian Amber Listing criteria.

Nine Amber Listed species were recorded during the survey: Barn Swallow, Dunnock, House Martin, Lesser Black-Backed Gull, Mallard, Meadow Pipit, Common Swift, Whitethroat and Willow Warbler. Of these, Dunnock, Whitethroat and Willow Warbler were confirmed to be breeding both within the study area and within hedgerows within the footprint of the Scheme. Barn Swallow is probably breeding within the study area, most likely in buildings outside the footprint of the Scheme. Meadow Pipit is probably breeding within the footprint of the scheme within grassland and arable crop areas.

Of the Amber listed species recorded during the 2016 survey, four species had not been previously recorded within the study area: House Martin, Lesser Black-Backed Gull, Mallard and Willow Warbler.

### ***Section 42 Species***

The following breeding birds listed, as species of principal species of importance for conservation of biological diversity in Wales, were found within the study area; Dunnock, House Sparrow, Northern Lapwing, Skylark, Song Thrush, and Yellow Hammer with Linnet and Starling also listed, and probably breeding.

### ***Main Areas of Avian Activity***

Although most parts of the site appeared to be used by foraging birds, and many parts by breeding birds, there were areas that appeared to be used more frequently than others. The most frequently used habitats by breeding birds were the woodland areas either side of the existing road at the south part of the site, hedgerows throughout the site, and agricultural fields and grass leys on either side of the existing road, north of Sutton Fach Farm.

To address the request for additional information on ground-nesting birds and Yellowhammer from the Local Planning Authority Ecologist, four maps have been provided within the 2016 Breeding Bird Survey Report (Appendix B-3) showing the general areas or territories where Lapwing, Skylark and Yellowhammer were seen exhibiting territorial behaviour.

### **Valuation of bird Population within the Study Area**

Bird species recorded within the Study Area during the 2008 surveys were given a geographical valuation, based in CIEEM guidance (refer to Table 9.11 of the published ES and in Section 6.3 of this ESA). The valuations of these species have not changed due to the 2016 survey results.

The valuation of bird species recorded in the 2016 and not recorded in 2008 is provided in Table 9.11b.

**Table 9.11b: Additional Bird Species Recorded within the Study Area in 2016 Surveys, Evaluation, and Selection as Key Ecological Receptors**

Ecological Receptor	Valuation of Receptor	Selection as Key Ecological Receptor Y/N
Northern Lapwing	This species is a Priority species under the Vale of Glamorgan BAP and is red-listed in Wales. Lapwing were recorded displaying breeding behaviour in a field approximately 200m from the Scheme. There are also historical records of large wintering populations within a 1km radius of the Scheme. This species is therefore considered to be of County Importance for both breeding and wintering populations.	Yes
Grey Wagtail	Grey wagtail is red-listed in Wales but is not a UK BAP, Section 42 or Schedule 1 species. This species is therefore considered to be of Local Importance.	Yes
Spotted Flycatcher	The spotted flycatcher is red-listed in Wales but is not a UK BAP, Section 42 or Schedule 1 species. This species is therefore considered to be of Local Importance.	Yes
Amber-listed birds	House Martin, Lesser Black-Backed Gull, Mallard and Willow Warbler were all recorded within the study area. These species are all amber-listed in Wales but are not UK BAP, Section 42 or Schedule 1 species. These species are therefore considered to be of Local Importance.	Yes

### **PREDICTED EFFECTS (WITHOUT MITIGATION)**

Tables 9.13 and 9.14 from the published ES has been updated following the results of the 2016 Breeding Bird Survey and are labelled as Table 9.13b and 9.14b respectively. Changes to the tables as a result of the 2016 surveys are highlighted in red.

**Table 9.13b: Impacts on Key Ecological Receptors during Construction of the Scheme (updated with 2016 Breeding Bird Survey results)**

Key Ecological Receptor	Nature Conservation Value	Description of Impact	Magnitude of Impact	Significance of Impact
Skylark	County Importance	Damage or destruction of active nests/eggs/dependant young during site clearance/construction works within arable fields/field margins.	Medium Adverse	Moderate Adverse
		Some areas of arable fields (6.8ha in total) will be lost under the footprint of the Scheme. Arable fields and their associated field margins represent important feeding and breeding habitat for this species. Areas most affected are as follows: <u>Whitton Mawr</u> : a field of 20 ha in total, with an average of 5 skylark recorded per visit (0.25/ha). The Scheme passes through the middle of this field, so this whole area will effectively be lost as a breeding site due to disturbance impact. <u>Coed Garw</u> : Field of 10ha, with an average of 6 skylark recorded per visit (0.6/ha). Scheme passes through the middle of this field, so this whole area will effectively be lost due to disturbance impact.	Medium Adverse	Moderate Adverse
Northern Lapwing	County Importance	Damage or destruction of active nests/eggs/dependant young during site clearance/construction works within arable fields.	Medium Adverse	Moderate Adverse
		Disturbance to wintering lapwing; though no wintering birds survey has been carried out, there are historical records of large populations of wintering lapwing within a 1km radius of the Scheme. In the absence of further survey information, this impact is moderate adverse.	Medium Adverse	Moderate Adverse
		Some small areas of arable fields will be lost under the footprint of the Scheme. Arable fields and their associated field margins represent important feeding and breeding habitat for this species.	Medium Adverse	Moderate Adverse
Song thrush	County Importance	Damage or destruction of active nests/eggs/dependant young during site clearance works in areas with thick vegetation.	Medium Adverse	Moderate Adverse
		Loss of breeding habitat (hedgerows, woodland and scrub) during site clearance works, including foraging habitat within territories for breeding pairs. NOTE: Only very small areas of suitable breeding bird habitat will be lost under the footprint of the road, and this has been taken into account in determining the severity of this impact.	Low Adverse	Slight Adverse
Yellowhammer	County Importance	Damage or destruction of active nests/eggs/dependant young during site clearance works in areas with thick vegetation.	Medium Adverse	Moderate Adverse
		Loss of breeding habitat (hedgerows) during site clearance works, including foraging habitat within territories for breeding pairs. NOTE:	Low Adverse	Slight Adverse



Key Ecological Receptor	Nature Conservation Value	Description of Impact	Magnitude of Impact	Significance of Impact
		Only very small areas of suitable breeding bird habitat will be lost under the footprint of the road, and this has been taken into account in determining the severity of this impact.		
		Some small areas of arable fields will be lost under the footprint of the Scheme. Arable fields and their associated field margins represent important feeding habitat for this species. NOTE: The surrounding area contains abundant arable fields suitable for this species, and this has been taken into account in determining the severity of this impact.	Low Adverse	Slight Adverse
Kingfisher	County Importance	Pollution of the River Waycock may result in indirect impacts through fish kills which would reduce the food resource for kingfisher.	Low Adverse	Slight Adverse
		Construction works in the vicinity of the River Waycock may cause disturbance to kingfisher.	Low Adverse	Slight Adverse
Other breeding birds	Local Importance	Damage or destruction of active nests/eggs/dependant young during site clearance works.	Low Adverse	Slight Adverse
		Loss of breeding bird habitat during site clearance works, including foraging habitat within territories for breeding pairs.	Low Adverse	Slight Adverse
		Disturbance of birds during construction works will deter birds from nesting near the site. However, there is abundant suitable habitat (in the form of hedgerows, woodland and scrub) in the surrounding area.	Low Adverse	Slight Adverse

**Table 9.14b: Impacts on Key Ecological Receptors during Operation of the Scheme (updated with 2016 Breeding Bird Survey results)**

Key Ecological Receptor	Nature Conservation Value	Description of Impact	Magnitude of Impact	Significance of Impact
Skylark	County Importance	Reduction in area of arable field habitat available for feeding and breeding, particularly at the following locations: <u>Whitton Mawr</u> : a field of 20 ha in total, with an average of 5 skylark recorded per visit (0.25/ha). The Scheme <b>passes</b> through the middle of this field, so this whole area will effectively be lost as a breeding site due to disturbance impact. <u>Coed Garw</u> : Field of 10ha, with an average of 6 skylark recorded per visit (0.6/ha). Scheme <b>passes</b> through the middle of this field, so this whole area will effectively be lost due to disturbance impact.	Medium Adverse	Moderate Adverse
Northern Lapwing	County Importance	Slight reduction in area of arable field habitat available for feeding. No areas directly affected by the Scheme were found to	Low Adverse	Slight Adverse

Key Ecological Receptor	Nature Conservation Value	Description of Impact	Magnitude of Impact	Significance of Impact
		have breeding lapwing; the nearest sighting of lapwing was approximately 200m from the Scheme.		
		Increase in noise as a result of the Scheme may deter birds from nesting in the area.	Low Adverse	Slight Adverse
Song thrush	County Importance	Planting scheme will result in a net increase in the total lengths of hedgerows (an important feeding and breeding habitat for this species) within the study area.	Low Beneficial	Slight Beneficial
Yellowhammer	County Importance	Slight reduction in area of arable field habitat available for feeding. NOTE: The surrounding area contains abundant arable fields suitable for this species, and this has been taken into account in determining the severity of this impact.	Low Adverse	Slight Adverse
		Planting scheme will result in a net increase in the total lengths of hedgerows (an important breeding habitat for this species) within the study area.	Low Beneficial	Slight Beneficial
Kingfisher	County Importance	N/A	N/A	N/A
Other breeding birds	Local Importance	Planting scheme will result in a net increase in the total lengths of hedgerows (an important breeding habitat for breeding birds) within the study area.	Low Beneficial	Slight Beneficial

## MITIGATION

Mitigation measures were designed for the Scheme based on survey information from the original breeding bird surveys conducted by Soltys Brewster in 2008. The mitigation measures already designed for the Scheme are considered to be generally suitable for most species, but following further discussions with the County Ecologist in October 2016, it was agreed that extra mitigation should be provided for skylark, as the 2016 surveys showed a high level of activity for this species within areas affected by the Scheme.

Additional mitigation measures proposed for skylark and other ground-nesting birds is presented below.

### ***Site Clearance Strategy***

Where possible, vegetation clearance will take place outside the nesting season for skylark. If vegetation clearance is to commence in the period April to August, a suitably qualified ornithologist with experience in skylark ecology will search all areas of suitable skylark, lapwing and other ground-nesting bird habitat for the presence of nests prior to clearance. If nests are found, these will be marked off and prevented from harm until chicks have fledged. Fencing will be used to mark off these areas to prevent accidental harm, and this will be installed under the supervision of the ornithologist, to ensure that there is adequate 'chick rearing' area available.

Skylark chicks will leave the nest, unable to fly, at 8-10 days, and are moved into 'chick-rearing areas' of suitable habitat until chicks have fully fledged (at 18-20 days after hatching). Similarly, lapwing chicks are covered in down when they hatch and are able to walk within a few hours; the parents then move them to a separate 'chick-rearing area'. Therefore, the buffer zones around these nests will have to allow a sufficient area around the nest with suitable habitat for chick rearing; buffer zones will be defined by the site ornithologist. These buffer zones should be maintained until such time as the chicks are able to fly (approximately 18-20 days after hatching for skylark and 5-6 weeks after hatching for lapwing).

### ***Compensation for Loss of Skylark Breeding/Feeding Areas***

The effective loss of two fields used by breeding lapwing requires compensation, however it will not be possible to provide compensatory habitat within the land obtained for the Scheme under the Compulsory Purchase Order. As an alternative, an agreement will be made with a local landowner to carry out land management for skylark in order to enhance the value of the area for breeding lapwing. It is of note that most of the arable lands in the area currently consist of winter-sown crops, which hinders skylark breeding success. Therefore, switching to spring-sown crops or creating 'skylark plots' would be particularly beneficial.

Also, leaving areas of weedy stubble throughout the winter would be good for winter-feeding, or as an alternative, supplementary feeding could be provided (see <https://www.gov.uk/countryside-stewardship-grants/supplementary-winter-feeding-for-farmland-birds-ab12>).

Land which would be particularly suitable for skylark management is shown in Figure 2 of the 2016 Breeding Bird Assessment report in Appendix B-3, and are discussed below.

Potential Mitigation Area 1 at Walterston/Trewallter: Existing skylark territory, of area 17.7 ha in total, with an average of 7.6 skylark recorded per visit (which works out to a density of 0.43/ha). This is a winter-sown field, so breeding success may be hindered here currently. This area is particularly recommended for skylark/lapwing enhancement.

There is another field of 11.2ha directly to the south of this field (Potential Mitigation Area 1a), which may also be suitable for enhancement. An average of 4.3 skylark recorded per visit (density

of 0.38/ha), and lapwing were also noted in this area; land management for skylark as described above would also benefit lapwing.

Potential Mitigation Area 2 - Land to the east of Whitton Mawr: 7.2ha. It is currently unknown whether skylark occur here, as this field was not within the survey area, but this is just south of the area to be used for skylark enhancement for solar farm development. During the meeting, with the County Ecologist in October 2016, the possibility of removing a hedgerow to combine this land with the field to the west was discussed. However, there is currently no hedgerow here (just a fence). These two fields together would give a total of 18.2ha.

## RESIDUAL EFFECTS (WITH MITIGATION)

Table 9.16 from the published ES has been updated following the results of the 2016 Breeding Bird Survey and the additional mitigation measures proposed and is labelled as Table 9.16b. Changes to the table are highlighted in red.

## MONITORING STRATEGY

In addition to the monitoring proposed in Section 9.9 of the published ES the following additional pre-development and post-development monitoring is proposed for breeding birds.

### ***Pre-development monitoring***

In order to establish a good baseline dataset, further breeding bird surveys will be carried out in spring 2017. The survey area and methods will be the same as those used in the 2016 surveys.

In addition, surveys should be conducted in winter 2016/2017, in order to establish a baseline dataset, to inform the design of detailed mitigation and to determine the need for further winter monitoring.

### ***Post-development monitoring***

In order to assess the effectiveness of mitigation measures, monitoring of breeding birds will be carried out on a biennial basis for ten years' post-construction. Monitoring methods will be based on previous survey methods - the 'Common Bird Census' methodology (Bibby et al, 2000) - with three surveys carried out within the breeding bird season. The study area for these surveys will include the area surveyed in the 2016 surveys, and the new skylark mitigation areas.

Bird monitoring reports will be prepared and issued to the Vale of Glamorgan County Ecologist. These reports will detail the results of bird surveys and will assess the effectiveness of mitigation measures. If the results of monitoring indicate that mitigation measures are insufficient, adjustments to the mitigation strategy will be discussed with the VoG County Ecologist.

Table 9.16b: Summary of Nature Conservation Impacts (updated with 2016 Breeding Bird Survey results)

Potential Impacts	Nature of Impact	Significance (without Mitigation)	Mitigation Measures	Residual Impact
<b>Construction</b>				
Skylark	Damage or destruction of active nests/eggs/dependant young during site clearance/construction works within arable fields/field margins.	Moderate adverse	Where possible, vegetation clearance will take place outside the nesting season for skylark. If vegetation clearance is to commence in the period April to August, a suitably qualified ornithologist with experience in skylark ecology will search all areas of suitable skylark habitat for the presence of nests prior to clearance. If nests are found, these will be marked off and prevented from harm until chicks have fledged. Skylark chicks will leave the nest, unable to fly, at 8-10 days. Therefore, the buffer zones around these nests will have to allow a sufficient area around the nest with suitable habitat for chick rearing; buffer zones will be defined by the site ornithologist. These buffer zones should be maintained until such time as the chicks are able to fly (approximately 18-20 days after hatching).	Neutral
Northern lapwing	Damage or destruction of active nests/eggs/dependant young during site clearance/construction works within arable fields/field margins.	Moderate Adverse	Where possible, vegetation clearance will take place outside the nesting season for lapwing. If vegetation clearance is to commence in the period April to August, a suitably qualified ornithologist will search all areas of suitable lapwing habitat for the presence of nests prior to clearance. If nests are found, these will be marked off and prevented from harm until chicks have fledged. An appropriate buffer zone will be kept around nesting areas in order to prevent disturbance. Once lapwing chicks have hatched, the parents move them to a separate 'chick-rearing area'. Therefore, the buffer zones around these nests will have to allow a sufficient area around the nest with	Neutral

Potential Impacts	Nature of Impact	Significance (without Mitigation)	Mitigation Measures	Residual Impact
			suitable habitat for chick rearing; buffer zones will be defined by the site ornithologist. These buffer zones will be maintained until such time as the chicks are able to fly (approximately 18-20 days after hatching for skylark and 5-6 weeks after hatching for lapwing).	
	Disturbance to wintering Lapwing during Construction phase.	Moderate Adverse	Pre-construction surveys will be carried out to determine the presence of lapwing within or near the Scheme boundary prior to the commencement of works and the Environmental Clerk of Works will carry out regular checks. If populations of wintering lapwing are discovered near the Scheme, appropriate buffer zones will be put around such areas until such time as lapwings have left their wintering grounds.	Neutral
Song thrush	Damage or destruction of active nests/eggs/dependant young during site clearance works in areas with thick vegetation.	Moderate adverse	Where possible, vegetation clearance will take place outside the nesting season for song thrush. If vegetation clearance is to commence in the period April to August, all areas of suitable skylark habitat will be thoroughly searched for the presence of nests prior to clearance. If nests are found, these will be marked off and prevented from harm until chicks have fledged.	Neutral
	Loss of breeding habitat (hedgerows, woodland and scrub) during site clearance works, including foraging habitat within territories for breeding pairs.	Slight adverse	Additional hedges and woodland will be planted which may provide suitable habitat	Slight beneficial
Yellowhammer	Damage or destruction of active nests/eggs/dependant young during site clearance works in areas with thick vegetation.	Moderate adverse	Where possible, vegetation clearance will take place outside the bird nesting season. If vegetation clearance is to commence in the period April to August, all areas of suitable skylark habitat will be thoroughly searched for the presence of nests prior to clearance. If nests are found, these will be marked off and prevented from harm until chicks have fledged.	Neutral

Potential Impacts	Nature of Impact	Significance (without Mitigation)	Mitigation Measures	Residual Impact
	Loss of breeding habitat (hedgerows) during site clearance works, including foraging habitat within territories for breeding pairs.	Slight adverse	More hedgerow will be planted, giving more potential nesting habitat	Slight beneficial
Kingfisher and Grey Wagtail	Pollution of the River Waycock may result in indirect impacts through fish kills which would reduce the food resource for kingfisher and Grey Wagtail.	Slight adverse	Attenuation ponds help prevent pollutants entering water courses	Slight beneficial
	Construction works in the vicinity of the River Waycock may cause disturbance to kingfisher and Grey Wagtail.	Slight adverse	None proposed	Slight adverse
Other breeding birds	Damage or destruction of active nests/eggs/dependant young during site clearance works.	Slight adverse	Where possible, vegetation clearance will take place outside the bird nesting season. If vegetation clearance is to commence in the period April to August, all areas of suitable skylark habitat will be thoroughly searched for the presence of nests prior to clearance. If nests are found, these will be marked off and prevented from harm until chicks have fledged.	Neutral
	Loss of breeding bird habitat during site clearance works, including foraging habitat within territories for breeding pairs.	Slight adverse	Some new habitat is being created which might provide suitable nesting sites	Slight beneficial
	Disturbance of birds during construction works will deter birds from nesting near the site.	Slight adverse	None proposed. However, there is abundant suitable habitat (in the form of hedgerows, woodland and scrub) in the surrounding area.	Slight adverse
<b>Operation</b>				
Skylark	Loss of skylark breeding and feeding habitat.	Moderate Adverse	Management of land in the local area to enhance its value for skylark, as described in the Mitigation section above.	Slight adverse
Northern lapwing	Noise disturbance during Operation phase	Low Adverse	Noise reduction measures have been designed for the Scheme; provided these measures are properly implemented, it is not expected that noise levels in the area will be increased.	Neutral
	Some small areas of arable fields will be lost (6.8ha in total), an important feeding and breeding habitat, though lapwing were not recorded breeding within any of the areas	Slight Adverse	It is proposed to create 4.7ha of wildflower meadow as part of the Scheme. This habitat will provide alternative foraging habitat for lapwing and will be managed to encourage	Neutral

Potential Impacts	Nature of Impact	Significance (without Mitigation)	Mitigation Measures	Residual Impact
	affected by the Scheme during the 2016 breeding bird surveys.		lapwing. It is likely that, over time, this habitat may be used by lapwing for foraging but due to the proximity to the road it is unlikely that it would be used for breeding; however, areas to be managed for skylark as described in the Mitigation section above will also be suitable for breeding lapwing.	
Song thrush	Net increase in habitat through planting scheme	Slight beneficial	N/A	Slight beneficial
Yellowhammer	Net increase in habitat through planting scheme	Slight beneficial	N/A	Slight beneficial
Kingfisher	N/A	N/A	N/A	N/A
Other breeding birds	Planting scheme will result in a net increase in the total lengths of hedgerows (an important breeding habitat for breeding birds) within the study area.	Slight beneficial	N/A	Slight beneficial



## 5.5 SUMMARY

### DORMOUSE MITIGATION

In response to Requirement 6 of NRW's letter a Draft Dormice Mitigation Strategy has been produced which is included as Appendix B-1 to this ESA. This information supplements and is complementary to the mitigation for the potential impacts of the Scheme on dormice which is considered in Paragraphs 9.6.36 to 9.6.41 of the published ES.

The strategy does not change the assessment made within the published ES on the potential impact of the Scheme on Dormice.

### BAT MITIGATION

In response to Requirement 7 of NRW's letter a Draft Bat Mitigation Strategy has been produced which is included as Appendix B-2 to this ESA. This information supplements and is complementary to the mitigation for the potential impacts of the Scheme on dormice which is considered in paragraphs 9.6.27 to 9.6.32 of the published ES.

The strategy does not change the assessment made within the published ES on the potential impact of the Scheme on Bats.

### BREEDING BIRD SURVEY 2016

The 2016 breeding birds survey recorded many of the same species recorded in the 2008 surveys, but there were several notable new species recorded, the most significant of which is Northern Lapwing, a Section 42 and Vale of Glamorgan Priority Species.

The impacts of the Scheme on newly-recorded species have been assessed. Residual impacts on species already recorded within the study area have not changed from the assessment made within the published ES.

The mitigation measures already designed for the Scheme are generally appropriate for all newly-recorded species, but some additional measures are proposed in order to mitigate for impacts, particularly for Northern Lapwing.

Provided the mitigation measures proposed for the Scheme are properly implemented, the residual impacts of the Scheme on breeding birds would be no greater than Slight Adverse for any species which is no change from that reported in the published ES.

# 6

## SUMMARY

### 6.1

#### INTRODUCTION

The additional information and the new content / or assessments presented in this ESA are summarised in Table 6.1.

**Table 6.1: Summary additional information and new content / assessment**

Additional information requested	New content and / or assessment	Changes between the existing and new content and / or assessments
<b>Air Quality</b>		
<p>Re-assessment of a nitrogen critical load of 10kgN/ha/yr on Barry Woodland SSSI is required.</p> <p>Subsequent to the preparation of the ES, NRW notified the Fferm Walters/Walters Farm SSSI. An assessment of a nitrogen critical load of 20kgN/ha/yr on Walter's Farm SSSI is required.</p>	<p>The critical load recommended by NRW for Barry woodlands SSSI was less stringent than the critical load assessed in the published ES. The revision had no impact on modelled concentrations within Barry Woodlands SSSI and no material impact on the outcome of the assessment. The change in deposition (expressed as a percentage of the critical load) reduced with the new critical load, and, as a result, the descriptor of the magnitude of the change, and the description of the severity of the impact changed at some distance from the roadside. This had the effect of decreasing the distance from the road at which impacts become negligible.</p>	<p>Overall the impacts predicted at ecological receptors as a result of nitrogen deposition is the similar to that reported in the published ES.</p>
<b>Landscape</b>		
<p>An additional viewpoint – Key view 10 from a Public Right of Way between the Scheme and Moulton to the west.</p>	<p>Baseline information on Key view 10 has been provided in the ESA including an update to Figures 8.5 and 8.10 from the published ES. The Scheme was predicted to have a Moderate Adverse visual effect during construction and no visual effect during operation on Key view 10.</p>	<p>Key view 10 was not included in the published ES. The additional information does not change the assessment made within the published ES on the potential visual effects of the Scheme on Key views.</p>
<p>Clarification with regards to the visual impact on Listed Buildings located within the Zone of Visual Influence (ZVI).</p>	<p>Two listed buildings are on the South side of the A48 in St Nicholas and within the ZVI and a further listed building is located at Lidmore, on the periphery of the ZVI. These will be unaffected by the Scheme as they are situated on the edge of the ZVI and all views to the Scheme are screened by existing vegetation.</p>	<p>The additional information does not change the assessment and conclusions made within the published ES.</p>

Additional information requested	New content and / or assessment	Changes between the existing and new content and / or assessments
The provision of photomontages from six representative viewpoints.	<p>Photomontages have been prepared for the following viewpoint locations at both year 1 and year 15, which were considered to be representative viewpoints:</p> <ul style="list-style-type: none"> <li>→ Key View 2 – View from Coed y Cwm Scheduled Ancient Monument</li> <li>→ Key View 3 – View from footpath L5-20-1 Amelia Trust Farm</li> <li>→ Key View 4 – View from unnamed road west of Equestrian Centre</li> <li>→ Key View 5 – View from unnamed road by Northcliffe Cottage</li> <li>→ Key View 7 – View from Millennium Heritage Trail</li> <li>→ Key View 9 – View from Welsh Hawking Centre</li> </ul>	The published ES did not include any photomontages. The additional information (photomontages) does not change the assessment made within the published ES on the potential impact of the Scheme on Landscape. Therefore the assessments undertaken and conclusions of the published ES remain.
<b>Nature Conservation</b>		
A condition is secured to any permission granted to ensure a dormouse mitigation scheme is implemented.	A Draft Dormice Mitigation Strategy has been produced which is included as Appendix B-1 to this ESA. The mitigation for the potential impacts of the Scheme on dormice which is considered in the published ES has been supplemented with additional mitigation in the ESA.	The information provided in the ESA supplements and is complementary to the mitigation for the potential impacts of the Scheme on dormice in the published ES. This information does not change the assessment made within the published ES on the potential impact of the Scheme on dormice.
A condition is secured to any permission granted to ensure a bat mitigation scheme is implemented.	A Draft Bat Mitigation Strategy has been produced which is included as Appendix B-2 to this ESA. The mitigation for the potential impacts of the Scheme on bats which is considered in the published ES has been supplemented with additional mitigation in the ESA.	The information provided in the ESA supplements and is complementary to the mitigation for the potential impacts of the Scheme on bats in the published ES. This information does not change the assessment made within the published ES on the potential impact of the Scheme on bats.
A breeding bird survey be undertaken at the appropriate time of the year in 2016.	The 2016 breeding bird survey recorded many of the same species recorded in the 2008 surveys, but there were several notable new species recorded, the most significant of which is Northern Lapwing, a Section 42 and Vale of Glamorgan Priority Species. The impacts of the Scheme on newly-recorded species have been assessed. Residual impacts on species already	Provided the mitigation measures proposed for the Scheme are properly implemented, the residual impacts of the Scheme on breeding birds would be no greater than Slight Adverse for all species which is no change from that reported in the published ES.

Additional information requested	New content and / or assessment	Changes between the existing and new content and / or assessments
	<p>recorded within the study area have not changed from the assessment made within the published ES.</p> <p>The mitigation measures already designed for the Scheme are generally appropriate for all newly-recorded species, but some additional measures are proposed in the ESA in order to mitigate for impacts, particularly for Northern Lapwing.</p>	

## 6.2 CONCLUSION

An Environmental Statement (ES) was published in February 2016 and submitted to the Vale of Glamorgan Council as part of a planning application for the Scheme. The Vale of Glamorgan Council subsequently consulted with a range of statutory and non-statutory consultees on the planning application and additional information has been requested to supplement that contained in the published ES.

The published ES was reviewed to consider whether the additional information would change the content and / or assessments made within each topic area. This concluded that the content and / or assessments made within Chapter 6: Air Quality, Chapter 8: Landscape and Chapter 9: Nature Conservation of the published ES would change.

This ESA updates the published ES with the additional information requested by consultees.

Comments on air quality required a re-assessment of a nitrogen critical load on Barry Woodland SSSI and an assessment undertaken on the nitrogen critical load on Fferm Walters/Walters Farm SSSI which was recently notified by NRW. The assessment concluded that the impacts predicted at ecological receptors as a result of nitrogen deposition is the similar to that reported in the published ES.

Comments on landscape required:

- An additional viewpoint – Key view 10 from a Public Right of Way between the Scheme and Moulton to the west.
- Clarification with regards to the visual impact on Listed Buildings located within the Zone of Visual Influence (ZVI).
- The provision of photomontages from six representative viewpoints.

It was concluded that the additional information did not change the assessment made within the published ES on the potential impact of the Scheme on Landscape. Therefore the assessments undertaken and conclusions of the published ES remain.

Comments on Nature Conservation required that a condition is secured to any permission granted to ensure a dormouse and bat mitigation scheme is implemented. Also a breeding bird survey is undertaken at the appropriate time of the year in 2016.

The information provided in the ESA supplements and is complementary to the mitigation for the potential impacts of the Scheme on dormice and bats in the published ES. This information does not change the assessment made within the published ES on the potential impact of the Scheme on dormice and bats.

Provided the mitigation measures for breeding birds proposed for the Scheme are properly implemented, the residual impacts of the Scheme on breeding birds would be no greater than Slight Adverse for all species which is no change from that reported in the published ES.

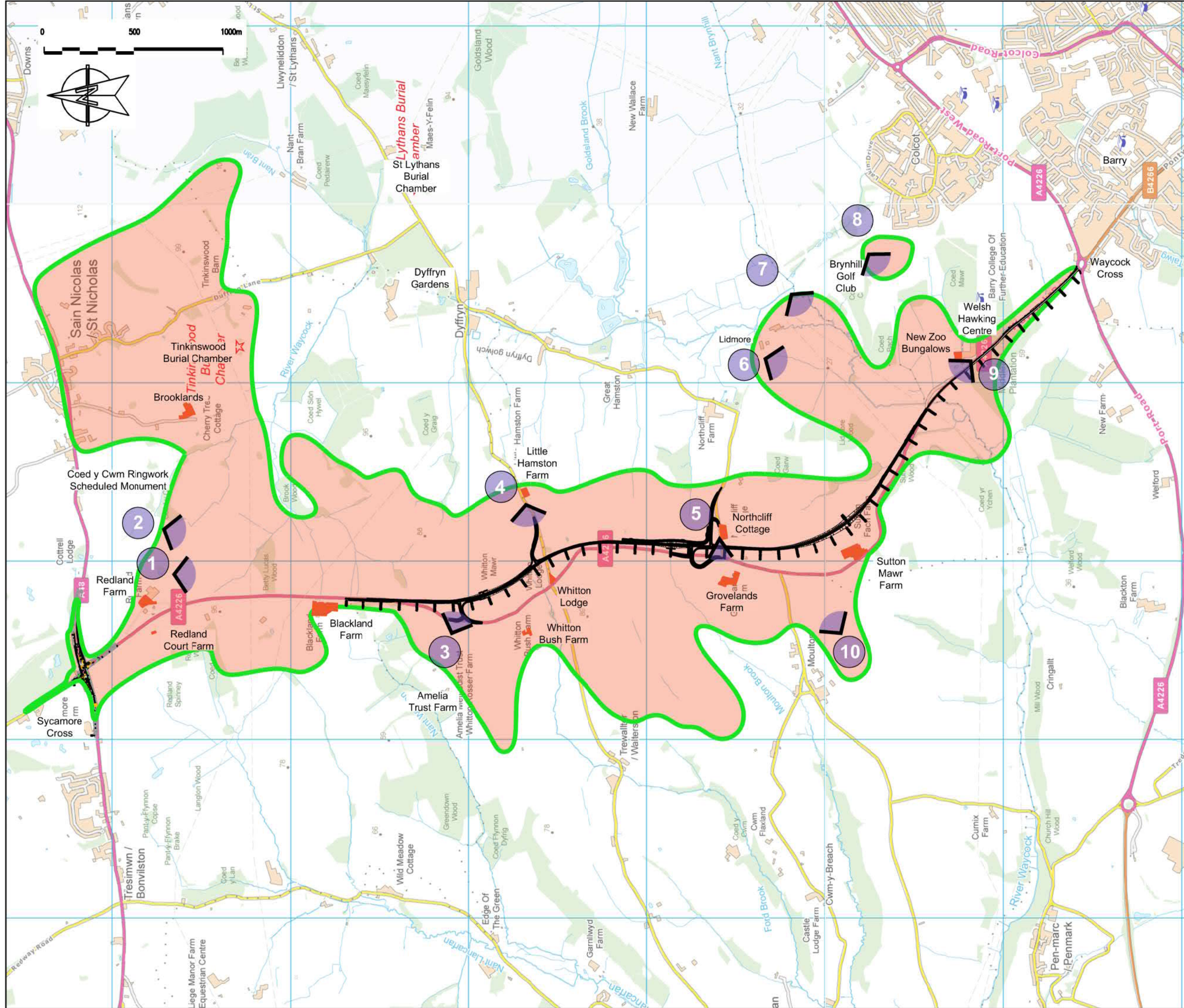
# Appendix A

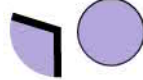
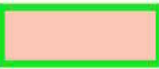


**LANDSCAPE SUPPLEMENTARY INFORMATION**

APPENDIX A-1

**FIGURE 8.5: SUPPLEMENTARY INFORMATION ZVI  
AND KEY VIEWS**

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-  Key View
-  Indicative Zone of Visual Influence
-  Proposed Scheme
-  Residential Properties

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**NOTE:**  
 ADDITIONAL INFORMATION  
 KEY VIEW 10 ADDED 06/07/16

2	06-07-16	KEY VIEW 10 ADDED	EMK	JW	JW
1	16-02-16	KEY VIEW LOCATIONS UPDATED	EMK	JW	JW

Rev	Date	Description	By	Chk	App
-----	------	-------------	----	-----	-----

**PARSONS BRINCKERHOFF**  
 Kings Orchard  
 1 Queen Street, Bristol  
 BS2 0HQ  
 Tel: 44-(0)117-930-6200

Site/Project:  
**FIVE MILE LANE IMPROVEMENTS**

Title:  
**SUPPLEMENTARY INFORMATION ZVI AND KEY VIEWS**

Drawn: SF	Checked: JW
Designed: EMK	Approved: JW
Date: 06/07/16	Scale: 1:20,000 A3 Sheet: 1_OF_1
Project Number: 60654	Drawing Number: 60654/8.5
	Revision: 2



APPENDIX A-2

**FIGURE 8.10: KEY VIEW 10**

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Key view 10  
 Distance from scheme centreline: 563m  
 Orientation: North-east  
 Angle of View: approx. 100 °

Rev	Date	Description	By	Chk	App
-----	------	-------------	----	-----	-----

**PARSONS  
BRINCKERHOFF**  
 Kings Orchard  
 1 Queen Street, Bristol  
 BS2 0HQ

Tel: 44-(0)117-930-6200

Client:

Site/Project:

**FIVE MILE LANE  
IMPROVEMENTS**

Title:

**SUPPLEMENTARY INFORMATION  
KEY VIEW 10**

Drawn: EMK      Checked: JW

Designed: EMK      Approved: JW

Date: 15/08/2016      Scale: NTS      A3      Sheet: 3\_OF\_6

Project Number:      Drawing Number:      Revision:

60654      60654/8.10

APPENDIX A-3

**FIGURES 8.11A TO 8.11F: PHOTOMONTAGES**



View 2: Year 1



View 2: Year 1 showing no existing or proposed vegetation.



View 2: Year 15

Rev	Date	Description	By	Chk	App
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Site/Project:

FIVE MILE LANE  
IMPROVEMENTS

Title:

SUPPLEMENTARY INFORMATION  
PHOTOMONTAGES  
VIEW 2 YR 1 & 15

Drawn: EMK Checked: JW

Designed: EMK Approved: JW

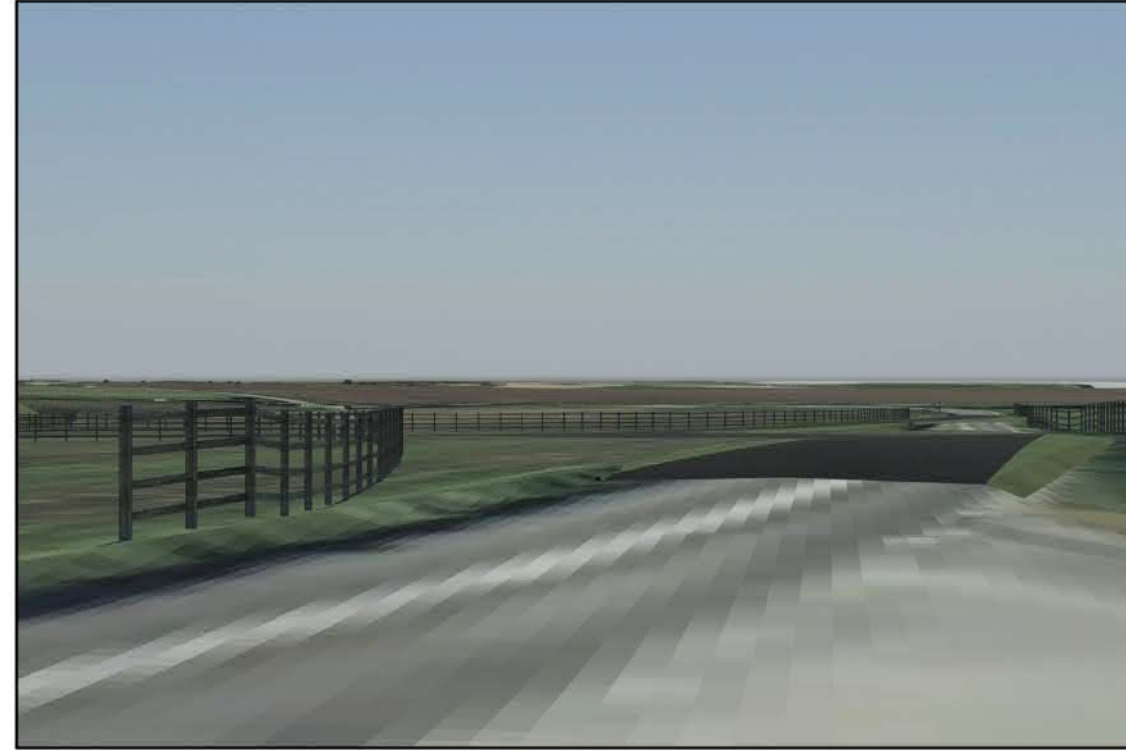
Date: 16/08/2016 Scale: NTS A3 Sheet: 1\_OF\_6

Project Number: Drawing Number: Revision:

60654 60654/8.11A



View 3: Year 1



View 3: Year 1 showing no existing or proposed vegetation



View 3: Year 15

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Client:

Site/Project:  
**FIVE MILE LANE  
IMPROVEMENTS**

Title:  
**SUPPLEMENTARY INFORMATION  
PHOTOMONTAGES  
VIEW 3 YR 1 & 15**

Drawn: EMK Checked: JW

Designed: EMK Approved: JW

Date: 16/08/2016 Scale: NTS A3 Sheet: 2\_OF\_6

Project Number: Drawing Number: Revision:

60654 60654/8.11B



View 4: Year 1



View 4: Year 1 showing no existing or proposed vegetation



View 4: Year 15

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Site/Project:

FIVE MILE LANE  
IMPROVEMENTS

Title:

SUPPLEMENTARY INFORMATION  
PHOTOMONTAGES  
VIEW 4 YR 1 & 15

Drawn: EMK Checked: JW

Designed: EMK Approved: JW

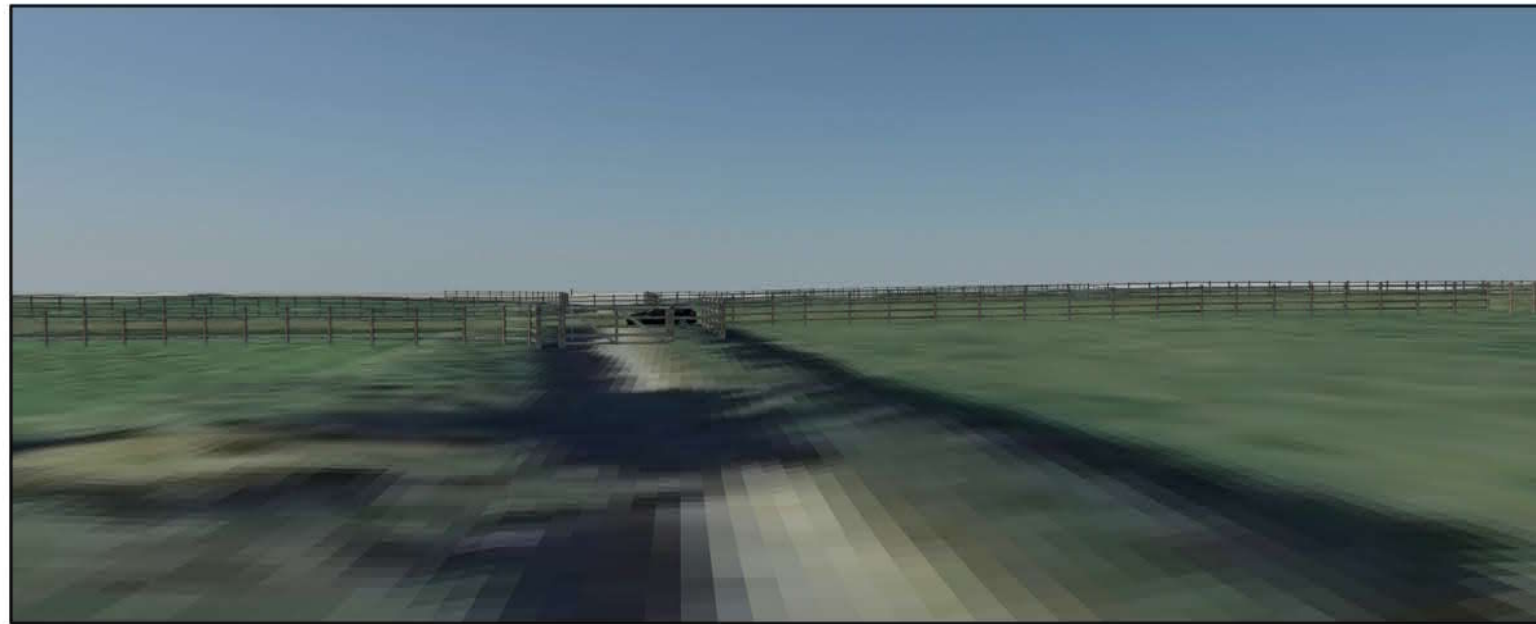
Date: 16/08/2016 Scale: NTS A3 Sheet: 3\_OF\_6

Project Number: Drawing Number: Revision:

60654 60654/8.11C



View 5: Year 1



View 5: Year 1 showing no existing or proposed vegetation



View 5: Year 15

Rev	Date	Description	By	Chk	App
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Site/Project:

FIVE MILE LANE  
IMPROVEMENTS

Title:

SUPPLEMENTARY INFORMATION  
PHOTOMONTAGES  
VIEW 5 YR 1 & 15

Drawn: EMK Checked: JW

Designed: EMK Approved: JW

Date: 16/08/2016 Scale: NTS A3 Sheet: 4 OF 6

Project Number: Drawing Number: Revision:

60654 60654/8.11D



View 7: Year 1



View 7: Year 1 showing no existing or proposed vegetation



View 7: Year 15

Rev	Date	Description	By	Chk	App

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Client:

Site/Project:

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IMPROVEMENTS

Title:

SUPPLEMENTARY INFORMATION  
PHOTOMONTAGES  
VIEW 7 YR 1 & 15

Drawn: EMK Checked: JW

Designed: EMK Approved: JW

Date: 16/08/2016 Scale: NTS A3 Sheet: 5 OF 6

Project Number: Drawing Number: Revision:

60654 60654/8.11E





View 9: Year 1



View 9: Year 1 showing no existing or proposed vegetation



View 9: Year 15

Rev	Date	Description	By	Chk	App

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IMPROVEMENTS

Title:

SUPPLEMENTARY INFORMATION  
PHOTOMONTAGES  
VIEW 9 YR 1 & 15

Drawn: EMK Checked: JW

Designed: EMK Approved: JW

Date: 16/08/2016 Scale: NTS A3 Sheet: 6 OF 6

Project Number: Drawing Number: Revision:

60654 60654/8.11F

# Appendix B

**ECOLOGY SUPPLEMENTARY REPORTS**

APPENDIX B-1

**DORMOUSE MITIGATION STRATEGY**

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# FIVE MILE LANE IMPROVEMENTS

DORMOUSE MITIGATION STRATEGY

CONFIDENTIAL

OCTOBER 2016

**FIVE MILE LANE  
IMPROVEMENTS**  
DORMOUSE MITIGATION STRATEGY  
**Vale of Glamorgan**

**Type of document (version)**  
**Confidential**

Project no: 70021703  
Date: October 2016

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# QUALITY MANAGEMENT

ISSUE/REVISION	FIRST ISSUE	REVISION 1	REVISION 2	REVISION 3
Remarks	Draft for issue to NRW	Revised Draft for issue to NRW following comments from VoG		
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Prepared by	Jean Hamilton (TACP)	Jean Hamilton (TACP)		
Signature				
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Signature				
Authorised by	Marc Thomas	Marc Thomas		
Signature				
Project number	70021703	70021703		
Report number				
File reference				

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2	SURVEY AND SITE ASSESSMENT .....	2
3	POTENTIAL IMPACTS OF THE PROPOSED DEVELOPMENT ON DORMOUSE .....	4
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## APPENDICES

### **A P P E N D I X A DORMOUSE SURVEY REPORT**

APPENDIX A-1 DORMOUSE SURVEY REPORT

### **A P P E N D I X B FIGURE 1**

# 1 INTRODUCTION

## 1.1 BACKGROUND AND PURPOSE OF THIS REPORT

The Vale of Glamorgan submitted a planning application for improvements at Five Mile Lane, Barry (Planning Ref 2016/00305/RG3). In response to this planning application, Natural Resources Wales (NRW) issued a letter outlining their concerns in relation to the proposed development, and requirements which would have to be met for the development.

This document has been prepared to satisfy Requirement 6: European Protected Species: A condition is secured to any permission granted to ensure a dormouse mitigation scheme is implemented.



# 2 SURVEY AND SITE ASSESSMENT

## 2.1 EXISTING INFORMATION ON DORMOUSE IN THE AREA

A desktop study was carried out to search for existing information on dormouse in the vicinity of the proposed works. The South East Wales Biodiversity Records Centre (SEWBRc) was contacted and protected species records obtained to identify any existing information on dormouse within the study area (a 1km radius of the works). Consultation was also carried out with the Vale of Glamorgan (VoG) County Ecologist and Natural Resources Wales (NRW).

There were no records for dormouse in the data received from SEWBRc, although this does not mean they are absent from the area; dormouse is a species which is difficult to detect, unless specific surveys are being undertaken. Therefore, a dormouse nest tube survey was conducted between May and September 2014, and a search for characteristically chewed nuts was carried out in July 2014. Additionally, all hedges and areas of woodland and scrub were assessed for their potential to support dormouse during a scoping study conducted in March/April 2014 and an Extended Phase 1 survey conducted in June 2014.

## 2.2 SITE SURVEYS

The results of dormouse surveys conducted for the Scheme are summarised below. Full details of the methods used in these surveys are provided in the dormouse survey report included as Appendix A to this report.

### NEST TUBE SURVEYS

No evidence of dormice was found during the nest tube survey conducted for the Scheme (although some tubes were found to be occupied by wood mouse). However, the absence of dormice may not be assumed in this case, as dormice are a species hard to find and detect, especially so if present in low densities. However, the results of surveys indicate that, if dormice are present, they are present in low densities.

### NUT SEARCHES

No evidence of dormice was recorded during nut searches carried out at Betty Lucas Wood and at Sutton Wood. Characteristically-chewed hazelnuts confirmed the presence of wood mice at both locations.

### HABITAT SUITABILITY ASSESSMENT

A total of 61 hedgerows and woodlands on the route of the Scheme were assessed for their potential to support dormice (see Figure 1 in Appendix B). Roughly half of these features were considered to be suitable for dormice, and six features were considered optimal:

- 6 features were considered optimal for dormice (Category A)
- 28 features were considered suitable for dormice (Category B)
- 24 features were considered sub-optimal for dormice (Category C)
- 3 features were considered suitable only as dispersal corridors (Category D)
- No features were considered unsuitable for dormice (Category E).

Assessment of habitat suitability of features within the Scheme indicates that if dormice are present, they are most likely to occur in the woodland blocks located at either end of the Scheme. A network of hedgerows and treelines provides linkage between these woodlands, and many of the hedgerows (28 in total) were considered suitable for dormice (Category B). Therefore, dormice may be present throughout the route corridor.

# 3 POTENTIAL IMPACTS OF THE PROPOSED DEVELOPMENT ON DORMOUSE

Dormice were not found during any of the surveys conducted for the Scheme, and so a licence is not required from NRW for the works. However, as a precautionary approach, presence of dormouse in low densities in areas of suitable habitat along the Scheme is being assumed. The potential impacts of the Scheme on dormouse, identified as part of the Environmental Impact Assessment of the Scheme, are outlined below.

## 3.1 CONSTRUCTION PHASE

The following potential impacts on dormouse have been identified for the Construction phase of the Scheme:

- Mortality of dormice during site clearance activities. The magnitude of this impact has been identified as *Medium Adverse* and the significance of this impact has been identified as *Slight Adverse*.
- Disturbance of dormice in nearby retained habitats through construction site noise, lighting or vibration. The magnitude of this impact has been identified as *Low Adverse* and the significance of this impact has been identified as *Slight Adverse*.
- Loss of small areas of suitable habitat (hedgerows and treelines, some woodland). The magnitude of this impact has been identified as *Low Adverse* and the significance of this impact has been identified as *Slight Adverse*.

## 3.2 OPERATION PHASE

The following potential impacts have been identified for the Operation Phase of the Scheme:

- Risk of mortality to dormice crossing the Scheme carriageway between hedges and blocks of woodland; recent research has shown that dormice can cross road carriageways during seasonal dispersal movements, and therefore could theoretically be at some risk of road traffic mortality. However, it is likely that such dispersal movements are so rare that the risk of dormouse road mortality is negligible. Similarly, as dormice have been shown to nest in habitat very close to active carriageways, including those with lighting columns, no disturbance effects on dormice are predicted. Therefore, the magnitude of this impact is considered to be *Low Adverse* and the significance *Slight Adverse*.
- Whilst the development will result in the loss of approximately 1.2ha of woodland, 1,693 linear metres (lm) of hedgerow and some small patches of scrub habitats which are suitable for dormouse, the landscaping proposals for the Scheme involve extensive planting which would more than compensate for this loss. It is proposed to plant a total of 6.7ha of new woodland throughout the Scheme, including an area 2.8ha of new woodland between Middleton Plantation and Sutton Wood to compensate for the permanent loss of 0.431ha and the temporary loss of 0.469ha of woodland in the Barry Woodlands SSSI. Additionally, whilst 1,693 lm of existing hedgerow will be lost to the Scheme, it is proposed to plant 6,308 lm of new hedgerow. This would represent an improvement in the foraging resource available to dormice along the verges of the Scheme, within areas of woodland and hedgerow creation, as these will be less intensively managed than the existing grazed pastures. The net impact of habitat creation in relation to habitat loss is considered to be *Low Beneficial* in magnitude and the significance of this impact is considered to be *Slight Beneficial*. It is of note, however,

that new planting will take several years to establish to a level that would be beneficial for dormouse, and that the value of these habitats is dependent on appropriate management.

# 4 MITIGATION STRATEGY FOR DORMOUSE

## 4.1 VEGETATION CLEARANCE

The proposed works affecting dormice comprise vegetation clearance at the initial stage of construction works on site. At present, the date for commencement of site clearance works is unknown.

The clearance methods used will depend on the time of year, the suitability of habitat being cleared (see Figure 1 in Appendix B) and the requirements of the Scheme, for example the need to clear areas for haul routes.

Due to the fact that no evidence of dormouse was found during the surveys conducted for the Scheme, the works are not licensable. However, if dormouse are found at any stage during the works, works in the area will be suspended and a licence will have to be obtained from NRW.

### WINTER CLEARANCE

If site clearance is to begin in winter/spring it is proposed that vegetation clearance will be carried out using a 'two stage' method – i.e. above ground vegetation will be coppiced between November and March inclusive, to avoid both the bird nesting season and the period when dormice are most likely to be found above ground, with coppiced areas dug up at a later stage. Coppiced areas should not be dug up any earlier than May (the time when dormice emerge from hibernation). This strategy avoids disturbance to nesting birds, while also avoiding impacts to hibernating dormice (and also to hibernating reptiles). In areas of 'Optimal' and 'Suitable' habitat (as indicated on Figure 1), coppicing will be carried out using hand held tools such as chainsaws and brush cutters; these works will be carried out under an ecological watching brief. In areas of 'Sub-optimal' or lower habitat value, coppicing may be carried out using tractor-mounted flail.

In the event that roots need to be dug up prior to May, for example where haul route access is required, these areas will be finger-tip searched by ecologists prior to excavation. If hibernating dormouse are found during finger-tip searches, works will be suspended immediately and a licence will be obtained from NRW. Once a licence has been granted, hibernating dormouse will be taken out carefully in their nests and translocated to adjacent retained habitat. The sites to which the nests will be relocated will be chosen to match as much as possible the conditions of the original nest sites; for example, a dormouse nest found in the base of a coppiced stool will be placed in another coppiced stool in an area of retained habitat.

### SUMMER CLEARANCE

If site clearance is to be carried out later than spring, a different approach to dormouse mitigation will be required. Summer vegetation clearance may be carried out, by taking out small patches of vegetation on successive days, when animals are active and do not have dependent young. Between June and August, female dormouse are likely to have young in their nests, and so any clearance in areas with high dormouse potential (i.e. those classified as optimal or suitable; see Figure 1 in Appendix B) should be prioritised for clearance prior in April/May, bearing in mind that dormouse may still be in hibernation in April and so the roots will have to be left in place until May, or finger-tip searched prior to excavation.

All hedgerows and planting will be inspected by an ecologist prior to vegetation clearance, in order to identify occupied dormouse nests. If occupied dormouse nests are found, works will be

suspended immediately and a licence will be obtained from NRW. Once a licence has been granted, nests will be checked to confirm the absence of dependant young, with particular care to be taken in the period June to October, when dormouse are likely to have young. Any nests containing active or torpid dormice that can be removed will be translocated into retained habitat close to the Scheme, matching as much as possible the conditions of the original nest site. In the event that dependant young are found, vegetation clearance on that hedgerow will be delayed until such time as the young are mobile enough to be translocated.

In general, vegetation clearance will commence at or close to the western edge of the Scheme footprint, so that dormice, if present, are displaced primarily from the existing road eastwards into the green-field areas that the Scheme bisects. The area to the east of the existing road contains an extensive network of retained habitat, such as hedgerow and woodland, suitable for dormouse.

Up to 20m of each hedgerow will be cleared per day, so that dormice are progressively displaced into retained habitat, rather than being immediately removed from their home ranges.

## 4.2 HABITAT CREATION

As stated in Section 3.3 above, the landscaping proposals for the Scheme include for the creation of new habitats, such as hedgerow and woodland. Hedgerow planting has been designed to re-connect the severed ends of existing hedgerows which will be bisected by the Scheme, in order to maintain and enhance dispersal corridors for dormouse. Once it has become established, this new planting will also result in an improved foraging resource for dormouse, as the Scheme will result in a net increase of 4,615 lm of hedgerow. Similarly, the Scheme planting will result in a net increase of 5.5ha of broadleaved woodland which, once established, will provide suitable habitat for dormouse. Planting will comprise native species which are common in the local area and which are of value for dormice, such as hazel (*Corylus avellana*), hawthorn (*Crataegus monogyna*), field maple (*Acer campestre*) elder (*Sambucus nigra*) and honeysuckle (*Lonicera periclymenum*), and will be of local provenance.

Where possible, coppiced stools will be translocated from where they are dug up on the Scheme to planting areas; coppiced stools tend to establish quite quickly, and so these should be prioritised for re-planting in areas of maximum benefit, for example where areas of optimal or suitable habitat are severed.

In addition to the planting proposals, dormouse boxes will be installed in areas of retained habitats under the control of the Scheme, or in areas of new planting (this may require the erection of posts to support the boxes). The number and locations of dormouse boxes will be agreed in consultation with the Vale of Glamorgan County Ecologist and NRW.

# Appendix A

**DORMOUSE SURVEY REPORT**

APPENDIX A-1

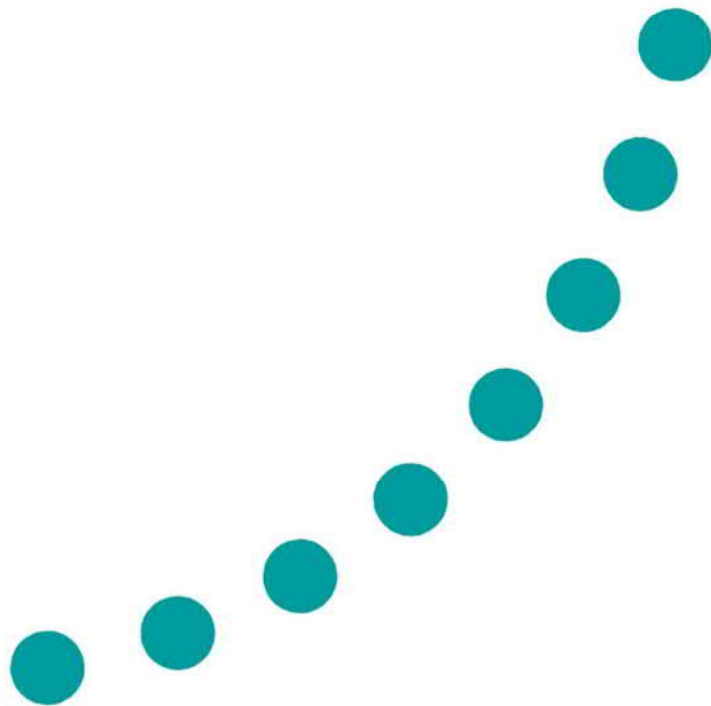
**DORMOUSE SURVEY REPORT**

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60654

TACP



*FIVE MILE LANE IMPROVEMENTS  
DORMOUSE SURVEY REPORT*

*PARSONS BRINCKERHOFF*

*OCTOBER 2015*



Parsons Brinckerhoff

*October 2015*

**TACP  
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Project Number: **60654**

Revision: **Rev 2**

Revision No.	Date of Revision	Written by	Date	Approved by	Date
<b>0</b>	<b>01/06/2014</b>	<b>JH</b>	<b>01/06/2014</b>	<b>TR</b>	<b>01/06/2014</b>
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<b>2</b>	<b>20/10/2015</b>	<b>JH</b>	<b>20/10/2015</b>	<b>TR</b>	<b>20/10/2015</b>

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**LIST OF ABBREVIATIONS**

NRW	Natural Resources Wales
SEWBRcC	South East Wales Biological Records Centre
SSSI	Site of Special Scientific Interest
VoG	Vale of Glamorgan

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**EXECUTIVE SUMMARY**

<p>This report presents the findings of Dormouse surveys undertaken as part of the Baseline Conditions surveys for the proposed Five Mile Land Improvements (the Scheme).</p>	

There are no historical records for Dormouse within 2km of the proposed route alignment, but as Dormouse is a cryptic and hard to find species this may not necessarily mean that they are absent from the area.

During a Scoping Survey for the Scheme, all hedgerows, treelines and woodland/scrub blocks were assessed for their suitability as dormouse habitat. Six locations with high potential for dormouse were then chosen for the deployment of nest tubes, which were left in place for five months and checked for signs of dormouse in July and September. Additionally, searches were carried out for characteristically-chewed hazelnuts at one of the survey locations.

No signs of dormouse were found at any of the survey locations, from either the nest-tube or nut search methods of survey. However, the presence of dormouse cannot be ruled out, as this it is very difficult to obtain evidence of dormouse presence, especially if they are present at low densities. The survey results indicate that dormouse, if present within the study area at all, are present at low densities. As a precautionary measure, habitats assessed as having the most potential to support dormice should be considered in the assessment of potential impacts and the design of mitigation measures for the Scheme.

## 1 INTRODUCTION

- 1.1.1 This report presents the findings of a study of hazel dormouse (*Muscardinus avellanarius*) activity undertaken as part of the Five Mile Lane Improvements, undertaken by TACP, on behalf of Parsons Brinkerhoff. The Scheme is located in the Vale of Glamorgan (VoG). The aims of the study were to assess the level of dormouse activity within the study area and to assess the likely effects of the Scheme on this protected mammal species. The level of dormouse activity within the study area was assessed by means of a desktop study, a site walkover, and a nest tube survey conducted between May and October 2014.

## 2 DORMOUSE ECOLOGY AND LEGISLATION

### 2.1 Dormouse Ecology

- 2.1.1 The hazel dormouse is a nocturnal rodent that lives mainly in deciduous woodland and scrub, feeding on fruits, flowers, seeds and invertebrates. Unlike other small mammals present in the UK, dormice hibernate during the winter months (usually October – April), due to the seasonality of their main dietary components. Hibernation takes place in closed nests woven from leaves, which they build just under the surface of the ground, within deep leaf litter, under log piles or at the base of tree stumps. Dormice are almost entirely arboreal during the summer months, living in the shrub and scrub layer of forests and hedgerows, rarely crossing open ground, perhaps due to the threat of predation. Therefore, dormice are highly vulnerable to habitat fragmentation.
- 2.1.2 In autumn, berries and nuts provide an abundant food source for dormice, and in the early summer dormice move from one species of tree to another, feeding on flowers as they bloom. In the mid- to late-summer, there is a period of potential food shortage, after flowering is over but before berries and nuts have ripened. Therefore, a high level of diversity in tree and shrub species is required in order to maintain a population of dormouse through the summer months. Certain species of tree and shrub are particularly important food sources, notably hazel (as the name suggests), which provides nuts, which are the main dietary component used by dormouse to fatten up prior to hibernation, and insects, which may be important dietary components in mid-summer.
- 2.1.3 Dormice breed during summer and autumn, building nests and typically producing litters of four or five young. During breeding, they may weave their own nests in shrubs and bushes, but prefer to use other, more robust structures such as hollow tree branches, old bird nests or squirrel dreys. They will also use artificial nest tubes or nest boxes as alternative sites for creating summer nests.
- 2.1.4 Dormice live at low densities for a small mammal; the National Dormouse Monitoring Programme indicates an average of between 1.75 and 2.5 adults per hectare. The best habitat for dormice are ancient semi-natural woodland, especially where there is a high degree of structural diversity. However, dormice also occur in other habitats, including conifer plantations, roadside plantations and scrub, particularly where these habitats are connected to more typical habitat areas for the species. Hedgerows, especially those with high species richness, can also support dormouse throughout the year. Hedgerows are also important dispersal routes, and if they are unshaded can be a vital food source for dormice.

## 2.2 Dormouse Legislation

2.2.1 The hazel dormouse is a European Protected Species listed under Annex IV of the Habitats Directive (Council Directive 92/43/EEC), which is transposed into UK law by the Conservation of Habitats and Species Regulations 2010 (as amended). The hazel dormouse also receives limited protection under the Wildlife and Countryside Act 1981 (as amended) and is a Species of Principal Importance for nature conservation under Section 42 of the Natural Environment and Rural Communities (NERC) Act 2006. It is also a VoG Local BAP priority species.

## 3 METHODS

### 3.1 Desk Study

3.1.1 The South East Wales Biodiversity Records Centre (SEWBReC) was contacted and protected species records were obtained to identify any existing information on dormouse within the study area. There has also been consultation with the VoG County Ecologist and Natural Resources Wales (NRW) on 30<sup>th</sup> April 2014 and the 12<sup>th</sup> May, respectively.

### 3.2 Field Survey

#### Scoping Study – Identification of Suitable Habitats

3.2.1 A scoping study was undertaken on 20<sup>th</sup> March and 22<sup>nd</sup> April 2014. These surveys comprised a walkover of the scheme footprint and review of habitat conditions within 250 m of the proposed alignment. Additionally, an extended Phase 1 habitat survey was carried out on the 9<sup>th</sup> and 10<sup>th</sup> of June. During these surveys, notes were made of any habitats suitable for dormouse within the study area. Signs of dormouse activity, such as chewed nuts or nests, were also noted.

3.2.2 During the scoping survey, all hedgerows, woodlands and patches of scrub affected by the Scheme were assessed for their potential to support dormice. These surveys were undertaken during the Scoping Study field visit and during the Extended Phase 1 Habitat Survey. Categories were assigned to habitats, based on several factors, including diversity of food plant species, connectivity to other habitats, structure and management, as described below:

- A – optimal habitat for dormice, with a high diversity of food plants, sympathetic management, good structural complexity for creation of nest sites and links to other suitable habitats;
- B – suitable habitat for dormice, but with a lower diversity, poorer structure, less sympathetic (but not entirely adverse) management, or more isolated;
- C – sub-optimal habitat for dormice, lacking one or more of the optimal characteristics described above;
- D – suitable only for dispersal by dormice, due to low diversity or unsympathetic management, these features may be used by dormice dispersing from adjacent habitats but are unlikely to support resident dormice;
- E – unsuitable for dormice, comprising fences or ditches rather than hedgerow field boundaries.



- 3.2.3 The approximate extent of potential dormouse habitat affected by the proposed Scheme was also recorded. A total of 61 features were surveyed for their suitability to support dormouse (see Figure 1).

#### Nest Tube Study

- 3.2.4 As several areas within or near the Scheme footprint were identified as good dormouse habitat, it was considered necessary to carry out targeted dormouse surveys using nest tubes. A total of 268 nest tubes were installed at 6 different locations. Generally, 50 tubes were used at each location, but where there was insufficient space, less were used. Figure 2 shows the nest tube survey locations and indicates how many tubes were used at each location.

- 3.2.5 Nest tubes were deployed at the beginning of May 2014, and checked on the 17<sup>th</sup>/18<sup>th</sup> July and again on the 29<sup>th</sup>/30<sup>th</sup> September. Nest tubes were collected during the September check. The survey was conducted following guidelines provided in Bright *et al* (2006) and Chanin & Woods (2003). Using the 'points' system outlined in Bright *et al* (2006), and further clarified in Natural England (2011), each of the survey sites, except the hedgerow by Northcliffe Cottage (survey location 4), would achieve 20 points (the minimum required for reliable presence/absence surveys in normal circumstances). The hedgerow by Northcliffe Cottage would score 6.5 points. The survey aimed to confirm presence of dormice by identifying dormouse nests.

#### Nut Searches

- 3.2.6 During the July 2014 nest tube check, a nut search was carried out at one of the survey sites, Betty Lucas Wood (Survey Area 1), which was considered the most likely to contain dormice, due to the suitability of habitat. This search comprised five 20 minute searches of 10m by 10m areas below heavily fruiting hazels.

## **4 RESULTS**

### **4.1 Desk Study**

- 4.1.1 There were no records for dormouse in the data received from SEWBRc, though this does not mean they are absent from the area; dormouse are a cryptic species and thus detection is difficult, unless specific surveys are being undertaken. Hence, a specific dormouse survey was conducted.

### **4.2 Field Study**

#### Habitat Suitability Assessment

- 4.2.1 A total of 61 hedgerows and woodlands along the route of the Scheme were assessed for their potential to support dormice (see Figure 1).

- 4.2.2 Roughly half of these features were considered to be suitable for dormice, and six features were considered optimal:

- 6 features were considered optimal for dormice (Category A or A/B);
- 28 features were considered suitable for dormice (Category B);
- 24 features were considered sub-optimal for dormice (Category C);
- 3 features were considered suitable only as dispersal corridors (Category D);

- No features were considered unsuitable for dormice (Category E).

4.2.3 A table showing details of the scoring of features for dormouse suitability is included as Appendix A.

#### Nest Tube Survey

4.2.4 Nest tube surveys did not record any evidence of dormice (neither presence of dormouse individuals nor nesting material) at any of the survey location. Several woodmouse nests, some occupied by woodmouse, were recorded in the woodlands to the south of Blacklands Farm.

#### Nut Searches

4.2.5 No evidence of dormouse was recorded during nut searches carried out at Betty Lucas Wood. Characteristically-chewed hazelnuts confirmed the presence of wood mouse at both locations.

## **5 ASSESSMENT AND CONCLUSIONS**

### **5.1 Presence/absence surveys**

5.1.1 No evidence of dormouse was found during the surveys conducted for the Scheme. However, the absence of dormouse may not be assumed in this case, as dormouse are a cryptic species and hard to detect, especially so if present in low densities. However, the results of surveys do indicate that, if dormouse are present, they are present in low densities.

### **5.2 Habitat assessment**

5.2.1 Of the 61 hedgerows and woodlands which were assessed for habitat suitability within the Scheme boundary, roughly half were considered to be suitable for dormouse, with six features considered optimal habitat.

5.2.2 The results of the habitat assessment can be used in order to infer where on the proposed Scheme dormice are likely to be present. Although there is no conclusive data on how far dormice may disperse through sub-optimal habitats, it is considered unlikely that they would travel more than 500m (Bright *et al*, 2006) through sub-optimal habitat to reach other areas. Consequently, suitable or sub-optimal habitats within 500m (as a linear distance along hedgerows) of identified dormouse populations are considered likely to support dormice.

### **5.3 Likely distribution of dormice on the proposed Scheme**

5.3.1 The results of presence/absence surveys indicate that dormouse, if present at all, occur at very low densities within the Scheme boundary. As a precautionary measure, habitats assessed as having the most potential to support dormice should be considered in the assessment of potential impacts and the design of mitigation measures for the Scheme.

5.3.2 Figure 1 displays the suitability of all woodland/hedgerow/scrub features within the Study Area for dormouse. If dormouse are present within the Scheme boundary, they are most likely to occur in the woodland blocks located at either end of the Scheme, which have been classified as Optimal/Suitable for dormouse. A network of hedgerows and treelines provides linkage between these woodlands, and many of the

hedgerows (28 in total) were considered suitable for dormouse (Category B). Therefore, it may be possible to encounter dormouse throughout the route corridor.

## **6 REFERENCES**

Bright, P. Morris, P. & Mitchell-Jones, A. (2006). *The Dormouse Conservation Handbook*. 2nd Edition, English Nature.

Chanin, P. & Woods, M. (2003) *Surveying dormice using nest tubes: Results and experiences from the South West Dormouse Project*. English Nature Research Report 524.

Natural England (2011) *Dormouse surveys for mitigation licensing – best practice and common misconceptions*. Interim Natural England Advice Note.

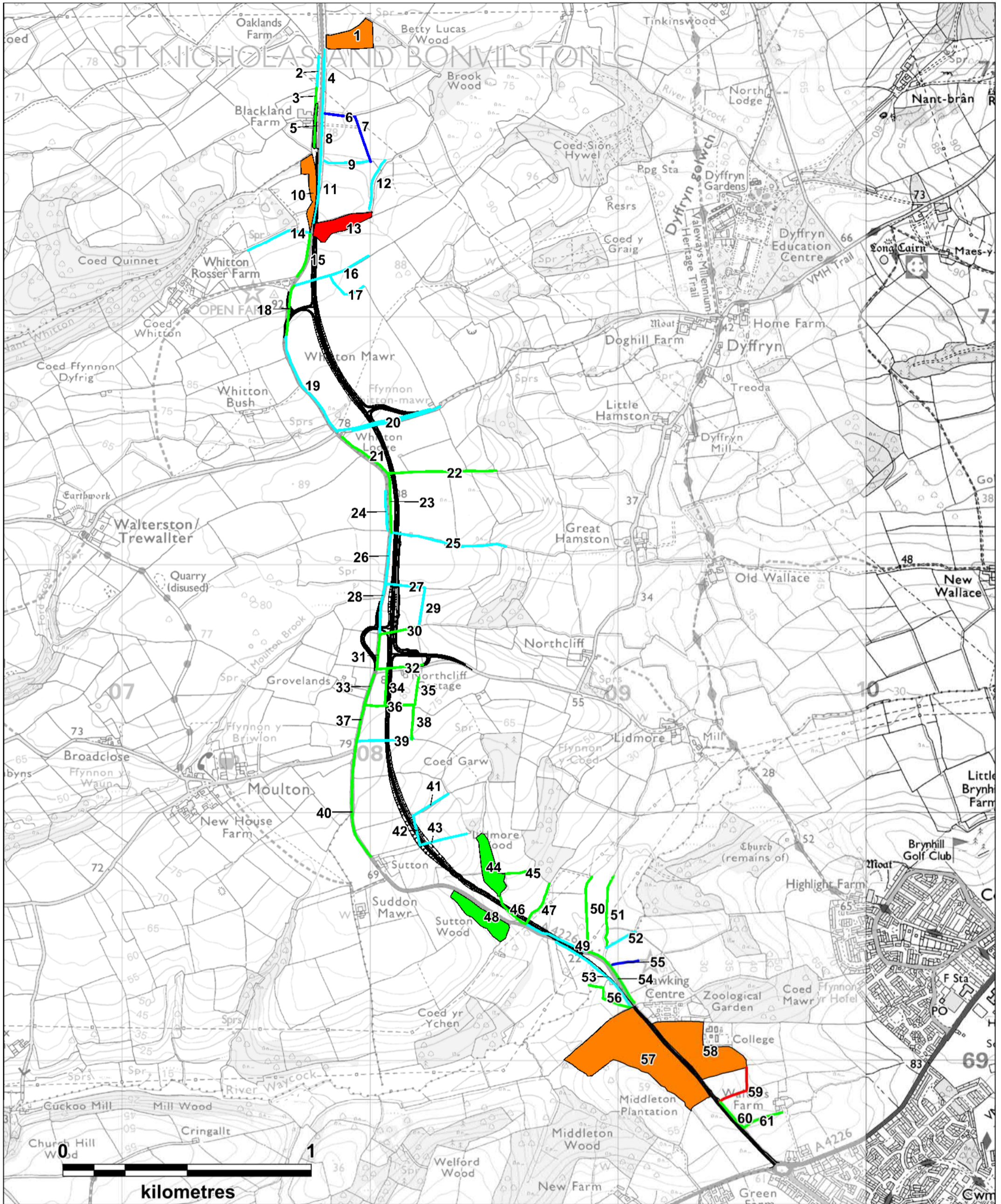
## **7 FIGURES**

**Figure 1:** Habitat Suitability Assessment

**Figure 2:** Nest Tube Survey Locations

## **8 APPENDICES**

**Appendix A:** Dormouse Habitat Suitability Results



**Legend**

- Dormouse Habitat Suitability**
- A (Optimal)
  - A/B (Optimal/Suitable)
  - B (Suitable)
  - C (Sub-optimal)
  - D (Dispersal corridors only)
  - Scheme Layout

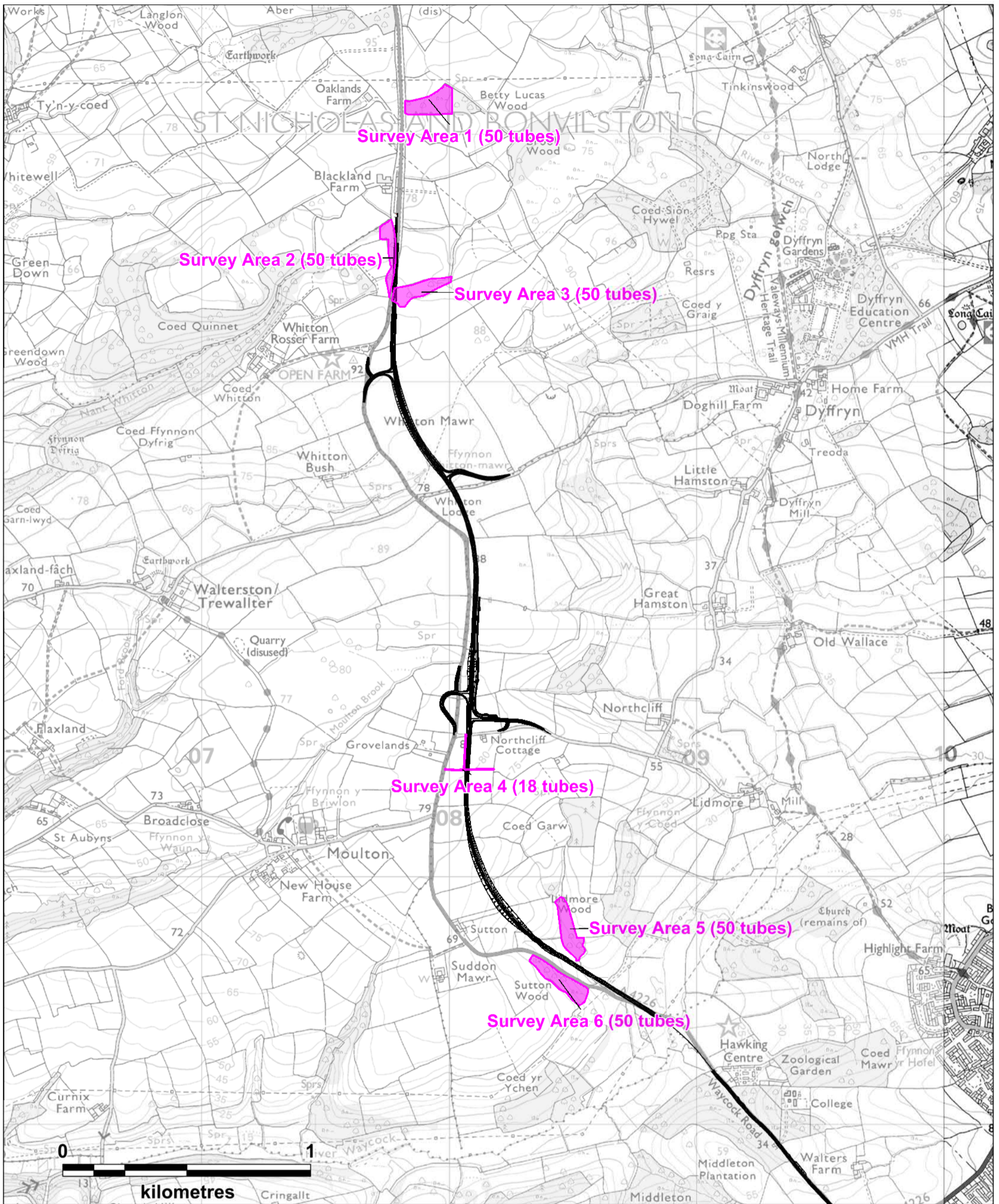
- Environmental Consultants
- Landscape Architects
- Urban Designers
- Planners
- Landscape Managers
- Ecologists

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**Welsh Government**  
**5 Mile Lane**  
**Dormouse Report Figure 1: Habitat Suitability Assessment**




• Drawn JH • Checked TR • Scale NTS • Date October 2015 • Dwg No Fig 60654/3.1

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**Legend**

**Nest Tube Survey Areas**

-  Hedgerow
-  Woodland Block
-  Scheme Layout

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**Dormouse Report Figure 2: Nest Tube Survey Locations**

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# **Appendix A: Dormouse Habitat Suitability Results**

**Table 1: Dormouse habitat suitability assessment for all hedgerows/woodlands within or close to the Scheme alignment, colour-coded by suitability; red – A (Optimal), orange – A/B (Optimal/Suitable), green – B (Suitable), turquoise – C (Sub-optimal), blue – D (Dispersal corridors only)**

No.	Feature Type	Category	Description
1	Broadleaved woodland block	A/B	Woodland comprising Hazel, Ash and Willow
2	Hedgerow	C	Sub-optimal, flailed annually
3	Treeline/hedgerow	B	
4	hedgerow	C	Flailed annually
5	Patch of scrub	B	Dense patch of bramble
6	Hedgerow	D	Species-poor hedgerow
7	Hedgerow	D	Species-poor hedgerow
8	Hedgerow	C	Flailed annually
9	Hedgerow	C	
10	Strip of woodland/scrub.	A/B	Oak, hazel, ash, hawthorn, blackthorn woodland/scrub. Extremely tangled with dense bramble scrub in understorey. Within 2 m of the carriageway.
11	Hedgerow	C	Hawthorn hedgerow, sub-optimal. Flailed annually.
12	Hedge and trees	C	Hedge and trees species-poor
13	Hedgerow/treeline Woodland corridor/block	A	Dense woodland with Japanese knotweed infestation.
14	Hedgerow	C	Species-poor hedgerow
15	Hedgerow	B	Species-rich hedgerow
16	Hedgerow	C	
17	Hedgerow	C	Species-poor hedgerow
18	Hedgerow	B	Species-rich hedgerow
19	Hedgerow	C	Species-poor hedgerow
20	Hedgerow	C	Sub-optimal hedgerow. Flailed annually.

No.	Feature Type	Category	Description
21	Hedgerow	B	Intact hedge, approx. 2m high, 1.5m wide. Woody species: hawthorn, ash, holly, elder and hazel.
22	Hedgerow	B	Intact hedge bisecting arable land; very dense; approx. 1.8 m high, 1.5 m wide; species-rich.
23	Hedgerow	B	Intact hedge, approx. 2m high, 1.5m wide. Woody species: hawthorn, ash, holly, elder and hazel.
24	Hedge	C	Species-rich hedgerow
25	Hedgerow	C	Species-poor hedgerow
26	Hedgerow	C	
27	Hedgerow	C	
28	Hedgerow	C	Intensively flailed, 4m wide??
29	Hedgerow	C	Species-poor hedgerow
30	Hedgerow	B	Intact hedge; uniform height 2m; approx. 1.5-2m wide.
31	Hedgerow	B	Intact hedge; uniform height 2m; approx. 1.5-2m wide.
32	Hedgerow	B	Intact hedge; uniform height 2m; approx. 1.5-2m wide.
33	Hedgerow	B	Intact hedge; uniform height 2m; approx. 1.5-2m wide.
34	Hedgerow	B	Sub-optimal hedgerow
35	Hedgerow with trees	B	Hedge and trees species-rich
36	Hedgerow with trees	B	Intact hedge with trees; approx. 8-10 m high; 3 m wide. The canopy species: oak, field maple and ash.
37	Hedgerow	B	Intact hedge; uniform height 2m; approx. 1.5-2m wide.
38	Hedgerow	B	Species-rich hedgerow
39	Hedgerow with trees	C	Hedgerow with trees
40	Hedgerow	B	Sub-optimal hedgerow.



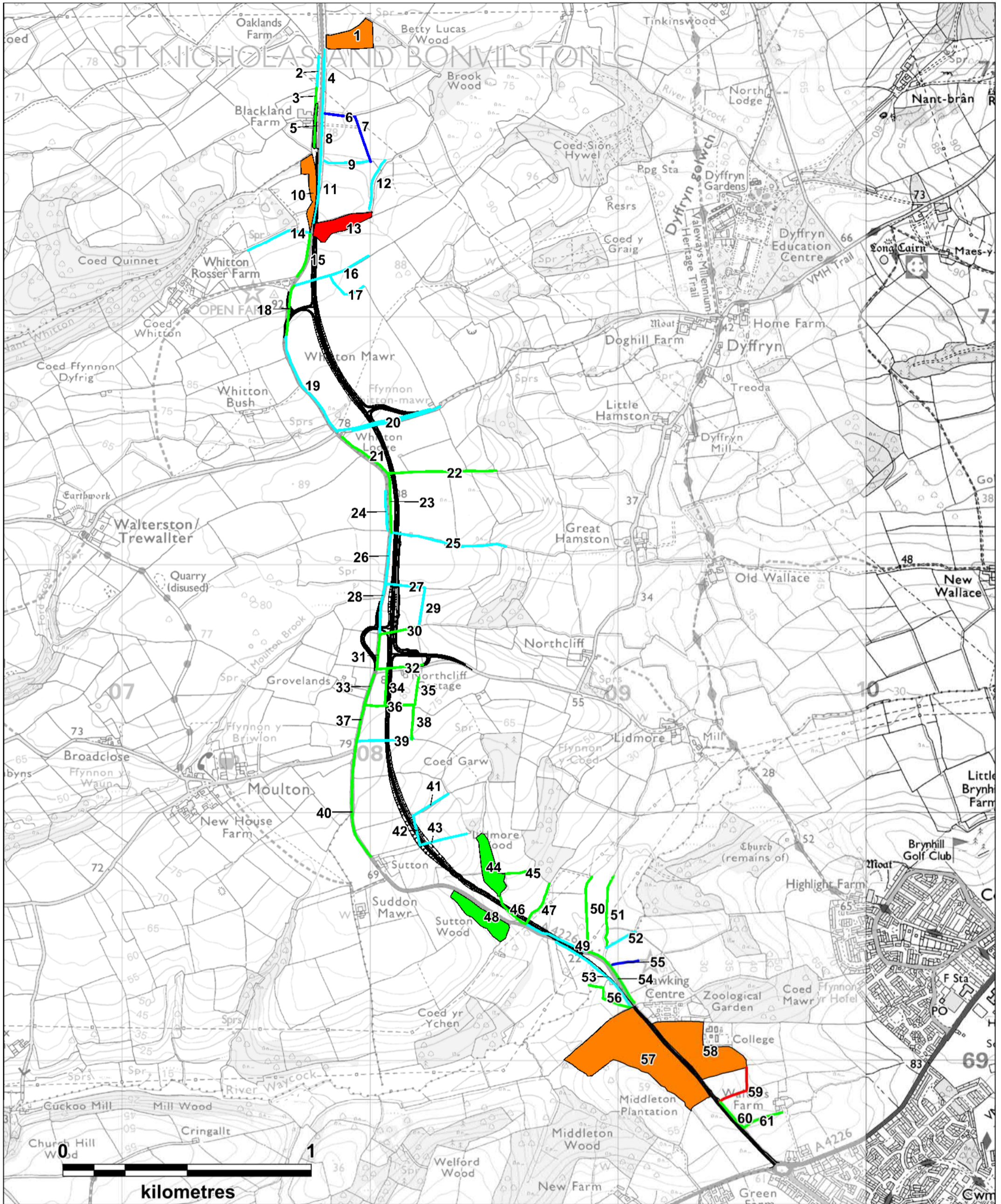
No.	Feature Type	Category	Description
41	Hedgerow	C	
42	Hedgerow	C	
43	Hedgerow	C	Species-poor hedgerow
44	Woodland block	B	Lidmore Wood: mixed woodland; semi-natural. Canopy dominated by pedunculate oak, with some ash and field maple. Planted with conifers including <i>Thuja plicata</i> and <i>Pinus sylvestris</i> .
45	Hedgerow	B	Species-poor hedgerow
46	Hedgerow	B	Intact hedgerow with trees. Good structural and species diversity, and linked to woodland block. Species include blackthorn, holly, hazel, hawthorn, field maple, elder, dog rose and grey willow.
47	Hedgerow	B	Species-rich hedgerow
48	Woodland	B	Sutton Wood: semi-natural broadleaved woodland.
49	Hedgerow	C	Intact, species-rich hedgerow. Dominated by field maple, hazel and ash. Also frequent blackthorn and spindle. Low structural diversity, however; appears to be regularly flailed.
50	Scrub; scattered	B	Extended area of scattered scrub with blackthorn, ash, goat willow, field maple and hawthorn.
51	Hedge and trees	B	Hedge and trees species-rich
52	Hedgerow	C	Species-poor hedgerow
53	Hedgerow	C	Sub-optimal hedgerow (species-poor)
54	Treeline	B	
55	Defunct hedge	D	Defunct hedge
56	Treeline	B	Treeline with oak and ash connected to woodland
57	Woodland	A/B	Woodland block SSSI
58	Woodland	A/B	Woodland block SSSI
59	Hedge and trees	A	L-shaped Hedge and trees, species rich

---

No.	Feature Type	Category	Description
60	Hedge	B	Species-poor hedge
61	Hedge	B	Species-poor hedge

# Appendix B

**FIGURE 1**



**Legend**

- Dormouse Habitat Suitability**
- A (Optimal)
  - A/B (Optimal/Suitable)
  - B (Suitable)
  - C (Sub-optimal)
  - D (Dispersal corridors only)
  - Scheme Layout

- Environmental Consultants
- Landscape Architects
- Urban Designers
- Planners
- Landscape Managers
- Ecologists

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**Dormouse Report Figure 1: Habitat Suitability Assessment**

• Drawn JH • Checked TR • Scale NTS • Date October 2015 • Dwg No Fig 60654/3.1

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APPENDIX B-2

**BAT MITIGATION STRATEGY**

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# FIVE MILE LANE IMPROVEMENTS

COMMUTING AND FORAGING BATS MITIGATION  
STRATEGY

CONFIDENTIAL

AUGUST 2016

# FIVE MILE LANE IMPROVEMENTS

## COMMUTING AND FORAGING BATS MITIGATION STRATEGY

**Vale of Glamorgan**

**Type of document (version)**  
**Confidential**

Project no: 70021703

Date: August 2016

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# QUALITY MANAGEMENT

ISSUE/REVISION	FIRST ISSUE	REVISION 1	REVISION 2	REVISION 3
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Report number				
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2	SURVEY AND SITE ASSESSMENT .....	2
3	POTENTIAL IMPACTS OF THE PROPOSED DEVELOPMENT ON COMMUTING AND FORAGING BATS .....	4
4	MITIGATION STRATEGY FOR COMMUTING AND FORAGING BATS .....	5

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## APPENDICES

### **APPENDIX A      BAT SURVEY REPORTS**

APPENDIX A-1 BAT ACTIVITY SURVEY REPORT

APPENDIX A-2 BAT TREE SURVEY REPORT

### **APPENDIX B      FIGURE 1**

# 1 INTRODUCTION

## 1.1 BACKGROUND AND PURPOSE OF THIS REPORT

The Vale of Glamorgan submitted a planning application for improvements at Five Mile Lane, Barry (Planning Ref 2016/00305/RG3). In response to this planning application, Natural Resources Wales (NRW) issued a letter dated 24<sup>th</sup> April 2016 outlining their concerns in relation to the proposed development, and requirements which would have to be met for the development.

This document has been prepared to satisfy Requirement 6: European Protected Species: A condition is secured to any permission granted to ensure a bat mitigation scheme is implemented.

# 2 SURVEY AND SITE ASSESSMENT

## 2.1 EXISTING INFORMATION ON BATS IN THE AREA

A desktop study was carried out to search for existing information on bats in the vicinity of the proposed works. The South East Wales Biodiversity Records Centre (SEWBRc) was contacted and protected species records obtained to identify any existing information on dormouse within the study area (a 5km radius of the works). Consultation was also carried out with the Vale of Glamorgan (VoG) County Ecologist and Natural Resources Wales (NRW).

The SEWBRc data search identified the following species within a 5km radius of the site:

- Common pipistrelle (*Pipistrellus pipistrellus*)
- Soprano pipistrelle (*Pipistrellus pygmaeus*)
- Unspecified Pipistrelle species ((*Pipistrellus* sp.)
- Noctule (*Nyctalus noctula*)
- Leisler's (*Nyctalus leisleri*)
- Brown long-eared (*Plecotus auritus*)
- Serotine (*Eptesicus serotinus*)
- Whiskered bat (*Myotis mystacinus*)
- Natterer's bat (*Myotis nattereri*)
- Daubenton's bat (*Myotis daubentonii*)
- Lesser horseshoe (*Rhinolophus hipposideros*)
- Greater horseshoe (*Rhinolophus ferrumequinum*)
- Unspecified bat

Further information on bat activity in the area was taken from the Interim Scheme Assessment Report prepared by Soltys Brewster Consulting in 2011.

## 2.2 SITE SURVEYS

The results of bat surveys conducted for the Scheme are summarised below. Full details of the methods used in these surveys are provided in the bat survey reports included as Appendix A to this report.

Five locations were surveyed during May, July and September 2014 (refer to Figure 1 in Appendix B). Four of the locations were surveyed by two personnel using Pettersson D240x time expansion bat detectors with Roland recording devices or AnaBat II frequency division detectors. Wherever possible, behaviour of bats observed was recorded in order to identify possible commuting routes. The remaining one location (Location 5) along the Waycock River was surveyed using static AnaBat II frequency division detectors on the same three occasions in May, July and September 2014.

Ten species of bat were recorded in total across all the locations surveyed. Species most commonly recorded were common and soprano pipistrelles (*Pipistrellus pipistrellus* and *P. pygmaeus*). Bats were regularly observed foraging close to and commuting across the existing A4226 close to where the Scheme is to be on-line (Locations 1, 2 and 4).

A Lesser horseshoe bat was recorded at Location 1 on one occasion. This is a species of higher conservation concern and more vulnerable to traffic collisions.

At Location 3, mainly common and soprano pipistrelles along with a number of brown long-eared bats (*Plecotus auritus*) were observed commuting and foraging along a mature section of hedgerow. A roost of at least two brown long-eared bats (thought to be a day / feeding roost) was identified in a small agricultural shed at Location 3. Previous surveys (Soltys Brewster Consulting, 2011) also identified a roost (thought to be *Pipistrellus* spp.) within a bat box on the opposite (northern side) of the mature hedgerow at Location 3.

At Location 5 results indicate that the northern side of the River Waycock is used for foraging by Daubenton's bats (*Myotis daubentonii*) along with mainly Common and Soprano pipistrelles.

# 3 POTENTIAL IMPACTS OF THE PROPOSED DEVELOPMENT ON COMMUTING AND FORAGING BATS

## 3.1 CONSTRUCTION PHASE

The following potential impacts on bats have been identified for the Construction phase of the Scheme:

- Loss of foraging habitat due to site clearance works. The magnitude of this impact has been identified as *Low Adverse* and the significance of this impact has been identified as *Medium Adverse*.
- Disruption of commuting routes due to removal of linear vegetation features or construction site lighting. The magnitude of this impact has been identified as *Low Adverse* and the significance of this impact has been identified as *Medium Adverse*.
- No bat roosts were found in trees on the line of the Scheme, but two category 1 trees which potentially provide very good roost habitat would be lost. The bat roost identified in the shed adjacent to the Scheme would not be lost as a result of the Scheme. This impact has been classified as being *Low Adverse* in magnitude and *Slight Adverse* significance.

## 3.2 OPERATION PHASE

The following potential impacts have been identified for the Operation Phase of the Scheme:

- In locations where the Scheme is close to being on-line, it is considered that the dangers posed to bats by road traffic is unlikely to change significantly from the current situation. Tree felling either side of the carriageway may cause bats to fly lower between the hedges and possibly increase the risk from traffic collision. The magnitude of this impact is considered to be *Neutral* and the significance *Neutral*.
- Where the Scheme is further off-line, such as at Grovelands Farm where a brown long-eared bat roost has been identified (Location 3 on Figure 1), severance of known roosts from the network of hedgerows and woodland areas to the east may occur. Bats attempting to access roosting features and foraging habitat on the western side of the Scheme would be vulnerable to road traffic, particularly brown long-eared bats, which are low flying and more susceptible to traffic collision. The magnitude of this impact has been identified as *Low Adverse* and the significance of this impact has been identified as *Slight Adverse*.
- The River Waycock provided a safe road crossing opportunity for bats. As the Scheme is on line at this location it is unlikely to have any adverse effects on commuting and foraging bats. The magnitude of this impact is considered to be *Neutral* and the significance *Neutral*.
- Loss of commuting/foraging habitat (hedgerows and treelines). The magnitude of this impact has been identified as *Low Adverse* and the significance of this impact has been identified as *Slight Adverse*.

# 4 MITIGATION STRATEGY FOR COMMUTING AND FORAGING BATS

## 4.1 CONSTRUCTION PHASE MITIGATION

Although no bat roosts were found in the seven trees examined along the line of the Scheme, a bat-licensed ecologist will carry out an aerial re-inspection of Category 1 trees (medium potential to support roosting bats), and those trees that were inaccessible in the original surveys, prior to works commencing. Category 2 trees (low potential to support roosting bats) will be felled taking 'reasonable avoidance measures' such as climbing inspections by a bat licenced ecologist prior to felling or felled using soft felling techniques.

If following a thorough re-inspection of Category 1 trees no bats are found, exclusion devices will be fitted into potential roost features (PRF) to prevent bats accessing them prior to felling. If bats are discovered during the re-inspection, then a European Protected Species Licence will need to be obtained from NRW prior to felling.

Immediately prior to felling Category 1 trees will be checked from ground level by the bat licenced ecologist, to insure exclusion devices are still in place. If there are PRF where it was not possible to fit exclusion devices (e.g. not possible to inspect all of the feature or feature was too extensive) further climbing inspections may be carried out immediately prior to felling or soft felling techniques employed as appropriate. Soft felled trees should be left on the ground for 48 hours before being removed, giving any bats the opportunity to fly off under the cover of darkness. A toolbox talk regarding bats will be given to the tree work contractors by the ecologist. If bats are discovered during works, work will stop and the ecologist will inform NRW at the earliest opportunity. Work will not resume until advice has been sought from NRW and way to proceed has been agreed.

The bat licenced ecologist will have the necessary equipment to care for any discovered bat(s) and a method statement regarding tree felling and actions on discovering bats will be in place prior to works commencing. Bright lighting will not be directed towards the trees identified as having potential of category 1 and 2.

## 4.2 OPERATION PHASE MITIGATION

The most appropriate method to mitigate the impact on the severed mature hedgerow (Survey location 3 on Figure 1), along which there is a known brown long-eared (*Plecotus auritus*) roost, would be to provide an underpass. However, this is not possible as the ground levels at this location do not allow it. Recent studies have suggested limited success of bat bridges / bat gantries in mitigating severance of flightlines by roads (Berthinussen & Altringham, 2012; Halcrow Group & Green, 2011). Therefore, this method is not considered appropriate.

Another method used to reduce bat mortality on road schemes is the use of 'hop overs': using planting or manipulation of existing features to encourage bats to fly at canopy height over the road. The effectiveness of this method has been shown to have some success in guiding bats to safe crossing points (Halcrow Group & Green, 2011), and may be most effective on smaller roads (Berthinussen & Altringham, 2012). In this situation a 'hop over' solution is considered to be the best option to mitigate the severance of this flightline, as other options are limited, and the existing boundary feature provides good opportunity for manipulation in this regard.

The existing treeline at this location has good structural diversity, with a canopy of mature trees (approximately 20m in height) and a dense understorey of shrubby vegetation. Therefore, no

extra planting will be required for the hop-over. Brown long eared bats are a species that fly low in clutter and so will follow vegetation, and so in order to guide brown long eared bats across the road at a safe height, a 4 to 5m high wooden / screen mesh will be installed within the vegetation on either side of the road, in order to force bats upwards (as suggested by Limpens *et al.*, 2005 reported in Halcrow and Green, 2011). The design of the bat hop-over will be developed at the detailed design stage, in consultation with NRW and the Vale of Glamorgan county ecologist.

In conjunction with the above, three Schwegler 2F bat boxes will be provided on the eastern side of the new carriageway, providing roosting opportunity for bats to the east of the carriageway without them having to cross the road. These will be located in existing mature trees along the hedgerow. This particular bat box design has been specified as they are marketed as being particularly successful for brown long-eared bats. These bat boxes will be installed at the earliest stage possible, to give the bats using the existing shed the opportunity to colonise them prior to the Scheme opening to traffic.

Woodland, scrub and hedgerow planting will mitigate the loss of foraging habitat lost to the Scheme. It is proposed to plant a total of 6.7ha of new woodland throughout the Scheme, including an area 2.8ha of new woodland between Middleton Plantation and Sutton Wood to compensate for the permanent loss of 0.431ha and the temporary loss of 0.469ha of woodland in the Barry Woodlands SSSI. Additionally, whilst 1,693 linear metres (lm) of existing hedgerow will be lost to the Scheme, it is proposed to plant 6,308lm of new hedgerow. Additionally, the landscaping proposals involve the creation of 4.7ha of wildflower meadow habitat, which would provide good bat foraging habitat.

# Appendix A

**BAT SURVEY REPORTS**



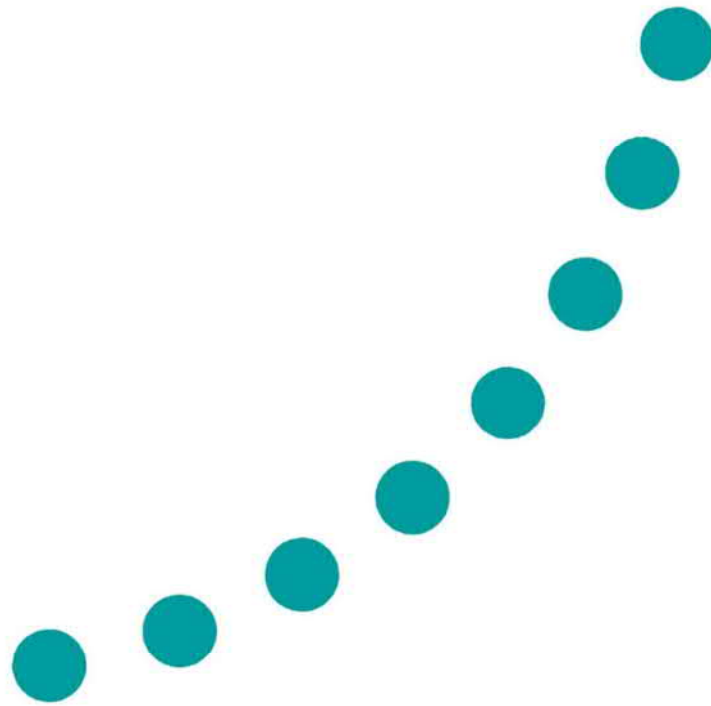
APPENDIX A-1

**BAT ACTIVITY SURVEY REPORT**

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60654

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*FIVE MILE LANE IMPROVEMENTS  
BAT ACTIVITY SURVEY REPORT  
PARSONS BRINCKERHOFF  
OCTOBER 2015*



*FIVE MILE LANE IMPROVEMENTS – BAT ACTIVITY SURVEY REPORT*

*October 2015*

**TACP  
10 PARK GROVE  
CARDIFF  
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Project Number: **60654**

Revision: **Rev 1** (minor edits from Revision 0)

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<b>0</b>	<b>Nov' 14</b>	<b>MB</b>	<b>Nov '14</b>	<b>TR</b>	<b>Nov '14</b>
<b>1</b>	<b>12/10/15</b>	<b>JB</b>	<b>12/10/15</b>	<b>TR</b>	<b>12/10/15</b>

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1. Location of survey sites.

**Appendices**

**A:** Bat Surveys of Stables at Grovelands Farm, Five Mile Lane, Moulton (AVA Ecology 2014).

**B:** A4226 Five Mile Lane. Proposed road safety improvement scheme. Interim scheme assessment report (Soltys Brewster Consulting, January 2011).

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**LIST OF ABBREVIATIONS**

LBAP	Local Biodiversity Action Plan
NBMP	National Bat Monitoring Programme
NERC	Natural Environment and Rural Communities Act 2006:
NRW	Natural Resources Wales
SAC	Special Area of Conservation
SEWBRcC	South East Wales Biological Records Centre
SSSI	Site of Special Scientific Interest
VoG	Vale of Glamorgan



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## EXECUTIVE SUMMARY

This report presents the findings of bat activity surveys undertaken as part of the Five Mile Lane Improvements, by TACP, on behalf of Parsons Brinkerhoff. The information will be used to inform the Environmental Impact Assessment (EIA) in relation to the Scheme.

The aim of the surveys was to identify commuting routes used by bats (regular flight paths usually along linear features within the landscape) which may be affected by the Scheme. Bats are vulnerable to being hit by moving traffic therefore new road developments, which sever bat commuting routes, have the potential to negatively affect these animals by causing injury and mortality.

Five locations were surveyed during May, July and September 2014. Four of the locations were surveyed by two personnel using Pettersson D240x time expansion bat detectors with Roland recording devices or AnaBat II frequency division detectors. Wherever possible, behaviour of bats observed was recorded in order to identify possible commuting routes. The remaining one location, (Location 5) along the Waycock River, was surveyed using static AnaBat II frequency division detectors on the same three occasions in May, July and September.

Ten species of bat were recorded in total across all the locations surveyed. Species most commonly recorded were Common and Soprano pipistrelles (*Pipistrellus pipistrellus* and *P. pygmaeus*). Bats were regularly observed foraging close to and commuting across the existing A4226 close to where the Scheme is to be on-line (Locations 1, 2 and 4). In these locations it is considered that the dangers posed to bats by road traffic is unlikely to change significantly from the current situation. Although tree felling either side of the carriageway may cause bats to fly lower between the vegetation and possibly increase the risk of traffic collision.

A Lesser horseshoe bat was recorded at Location 1 on one occasion. This is a species of higher conservation concern and more vulnerable to traffic collisions. However, it is not considered that the Scheme will have a significant impact on the integrity of the wider population.

At Location 3 mainly Common and Soprano pipistrelles along with a number of Brown long-eared bats (*Plecotus auritus*) were observed commuting and foraging along a mature section of hedgerow. A roost of at least two Brown long-eared bats (thought to be a day / feeding roost) was identified in a small agricultural shed at Location 3. Previous surveys (Soltys Brewster Consulting, 2011) also identified a roost (thought to be *Pipistrellus spp.*) within a bat box on the opposite (northern side) of the mature hedgerow at Location 3.

The Scheme will sever the hedgerow to the east of the known roosts which would isolate these from the network of hedgerows and woodland areas to the east. Bats attempting to access roosting features and foraging habitat on the western side of the Scheme would be vulnerable to road traffic, particularly the Brown long-eared bats, which are low flying and more susceptible to traffic collision.

At Location 5 results indicate that the northern side of the River Waycock is used for foraging by Daubenton's bats (*Myotis daubentonii*) along with mainly Common and Soprano pipistrelles. This location also provides a safe road crossing opportunity for bats. As the Scheme is on line at this location it is unlikely to have any adverse effects on commuting and foraging bats.



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## 1 INTRODUCTION

1.1.1 This report presents the findings of bat activity surveys undertaken as part of the Five Mile Lane Improvements, by TACP, on behalf of Parsons Brinkerhoff.

### 1.2 Location and purpose of the proposed scheme

1.2.1 The Scheme is located in the Vale of Glamorgan (VoG) and aims to upgrade a section of the A4226 known as Five Mile Lane between a point approximately 1.4km south of the Sycamore Cross Junction to the Waycock Cross Roundabout. Minor intersection upgrade works are also proposed at the Sycamore Cross Junction.

1.2.2 The route currently fails to meet appropriate highway standards and therefore a number of improvements are required to upgrade it, including the straightening and widening of bends, to create a safer route.

### 1.3 Aim of the survey

1.3.1 The aim of the survey was to identify commuting routes used by bats (regular flight paths usually along linear features within the landscape) which may be affected by the Scheme. Bats are vulnerable to being hit by moving traffic, therefore new road developments, which sever bat commuting routes, have the potential to negatively affect these animals by causing injury and mortality.

1.3.2 This report will inform the environmental impact assessment for the Scheme and will form part of the technical appendices of the Environmental Statement (ES) for the Scheme.

1.3.3 A separate survey for bat roosts within trees was undertaken for the Scheme and is reported in the Bat 'Survey of Trees' Report (AVA Ecology, 2014; Appendix 8.5).

### 1.4 Bat Ecology

1.4.1 Bats are the only mammals that use powered flight. They belong to the Order of mammals (*Chiroptera*), which is the second largest Order following Rodents. The UK has 17 resident species of bat which belong to two families: *Rhinolophidae* (horseshoe bats) and *Vespertilionide* (vesper bats).

1.4.2 All UK species are nocturnal and use ultrasound to locate prey and find their way in their environment. They do this by emitting pulses of high frequency sound through their mouth, or noses (in the case of horseshoe bats), and listen for the returning sound which bounces back off objects in their surroundings. Bats use features within their environment to find their way around. These are often linear features, such as hedgerow, ditches and streams.

1.4.3 UK bats feed on a range of invertebrate, with different species preferring different prey items and using different techniques in order to hunt. For example, Pipistrelle species (*Pipistrellus* spp.), hunt small insects, such as midges by areal hawking (catching them in the air), whereas the Brown long-eared (*Plecotus auritus*) preys on larger insects such as moths and butterflies by gleaning (picking stationary insects off vegetation).

1.4.4 When they are not active, bats require a roost in which to shelter and rest. There are a number of different types of roost, including day roosts (where bats shelter during the day), maternity roosts (where bats give birth and raise their young), hibernation

roosts (where bats spend the winter in hibernation and torpor) and transitional roosts (where bats may stay between their summer and winter roosts).

- 1.4.5 Different species have different roosting requirements and prefer different locations in which to roost. For example, Noctules (*Nyctalus noctula*) roost almost exclusively in trees, whereas Horseshoe bats (*Rhinolophus* spp.) roost almost exclusively in buildings during the summer where they require a free space in which to hang and an entrance wide enough for them to fly through. During the winter all UK bats require a hibernation roost, which must have a stable temperature and a high humidity.

## 1.5 Bat Legislation and Policy

- 1.5.1 All UK bat species are protected by European legislation and are listed under Annex IV of the Habitats Directive (Council Directive 92/43/EEC), which is transposed into UK law by the Conservation (Natural Habitats &c.) Regulations 2010 (and 2011/2012 amendment regulations). Under regulation 41(1): 'a person who:

- *Deliberately captures, injures or kills any wild animal of a European Protected Species,*
- *Deliberately disturbs wild animal of any such species,*
- *Deliberately takes or destroys the eggs of such an animal, or*
- *Damages, destroys a breeding site, or resting place of such an animal.*

- 1.5.2 *Is guilty of an offence'*

- 1.5.3 However, under Regulation 53 (1 & 2), 'the relevant licencing body may grant a licence for the purposes specified' below:

- *Scientific or educational purposes;*
- *Ringing or marking, or examining any ring or mark on, wild animals;*
- *Conserving wild animals or wild plants or introducing them to particular areas;*
- *Protecting any zoological or botanical collection;*
- *Preserving public health or public safety or other imperative reasons of overriding public interest including those of a social or economic nature and beneficial consequences of primary importance for the environment;*
- *Preventing the spread of disease; or*
- *Preventing serious damage to livestock, foodstuffs for livestock, crops, vegetables, fruit, growing timber or any other form of property to fisheries'.*

- 1.5.4 Under Regulation 53(9) 'the relevant licensing body must not grant a licence under this regulation unless they are satisfied:

- *That there is no satisfactory alternative; and*
- *That the action authorised will not be detrimental to the maintenance of the population of the species concerned at a favourable conservation status in their natural range'.*

- 1.5.5 The following four UK bat species are also listed on Annex II of Council Directive 92/43/EEC, and are therefore species for which Special Areas of Conservation can be designated:

- 
- Great horseshoe (*Rhinolophus ferrumequinum*)
  - Lesser horseshoe (*Rhinolophus hipposideros*)
  - Bechstein's bat (*Myotis bechsteinii*)
  - Barbastelle (*Barbastella barbastellus*)
- 1.5.6 Bats are also protected under the Wildlife and Countryside Act 1981 (as amended). This legislation is less significant since the implementation of the Conservation (Natural Habitats &c.) Regulations 2010 (and 2011/2012 amendment regulations).
- 1.5.7 The Environmental Damage (Prevention and Remediation) Regulations 2009 (as amended) apply in relation to prevention and remediation of environmental damage to protected species, natural habitats, SSSIs, surface and ground water and land. In the case of damage to species and habitats the regulations have the power to make the operators of activities which have caused damage carry out:
- Primary remediation (clean up)
  - Complementary remediation (cleaning up an alternative site if the damaged site cannot be fully restored), and
  - Compensatory remediation (carry out other measures to provide alternative natural resources to compensate for the time during which the damaged site remains in its damaged state)
- 1.5.8 The following seven bats are listed as Species of Principal Importance for Nature Conservation under Section 42 of the Natural Environment and Rural Communities (NERC) Act 2006:
- Soprano pipistrelle (*Pipistrellus pygmaeus*)
  - Great horseshoe (*Rhinolophus ferrumequinum*)
  - Lesser horseshoe (*Rhinolophus hipposideros*)
  - Bechstein's bat (*Myotis bechsteinii*)
  - Barbastelle (*Barbastella barbastellus*)
  - Noctule (*Nyctalus noctula*)
  - Brown long-eared (*Plecotus auritus*)
- 1.5.9 The following eight bats are listed as species of nature conservation importance within the Vale of Glamorgan Local Biodiversity Action Plan (LBAP):
- Lesser horseshoe (*Rhinolophus hipposideros*)
  - Noctule (*Nyctalus noctula*)
  - Whiskered (*Myotis mystacinus*)
  - Brandt's (*Myotis brandtii*)
  - Natterer's (*Myotis nattereri*)
  - Daubenton's (*Myotis daubentonii*)
  - Pipistrelle (*Pipistrellus sp.*)
  - Brown long-eared (*Plecotus auritus*)

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## **2 METHODS**

### **2.1 Desk Study**

2.1.1 The South East Wales Biodiversity Records Centre (SEWBReC) was contacted and protected species records were obtained to identify any existing information on bats within a 5km buffer of the study area. There was also consultation with the Vale of Glamorgan (VoG) County Ecologist and Natural Resources Wales (NRW) on 30<sup>th</sup> April 2014 and 12<sup>th</sup> May, respectively.

2.1.2 Results from bat surveys undertaken in 2008 and 2009 to inform the A4226 Five Mile Lane Interim Scheme Assessment Report (Soltys Brewster Consulting, 2011) have also been reviewed.

### **2.2 Preliminary Walkover and Phase 1 Habitat Survey**

2.2.1 General ecological walkover surveys were undertaken on 20<sup>th</sup> March and 22<sup>nd</sup> April 2014. These surveys comprised a walkover of the Scheme footprint and review of habitat conditions within 250 m of the proposed alignment. Additionally, an extended Phase 1 habitat survey was carried out on the 9<sup>th</sup> and 10<sup>th</sup> of June 2014. During these surveys, notes were made of any habitats suitable for bats within the study area.

### **2.3 Bat Activity Surveys**

2.3.1 Surveys aimed to identify commuting routes of all species of bats across the Scheme. Features suitable to support bat commuting routes were identified through review of aerial photographs and the preliminary walk over surveys / Phase 1 habitat surveys. Five survey locations were selected along the Scheme which were considered to have good potential for use by commuting bats:

- Location 1 – Online section of the Scheme, between woodland block on western side of existing A4226 and a mature hedgerow on the eastern side.
- Location 2 – where the Scheme comes off line, between woodland block on the eastern side of the Scheme and a mature hedgerow on the western side connecting to a larger woodland block further west.
- Location 3 – Off-line section of the Scheme, along a mature hedgerow, next to a small agricultural shed
- Location 4 – Along a mature hedgerow, which links two woodland blocks either side of the existing A4226, near to where the Scheme comes back on-line.
- Location 5 – Online section of the Scheme, either side of the culverted River Waycock, which is a vegetated water course that links into further mature hedgerows and woodland blocks north and south of the existing A4226.

2.3.2 The selection of the survey locations was made in agreement with NRW and the VoG County Ecologist. Locations are shown on Figures 1a-1c.

2.3.3 Survey methods and timing drew on the best practice guidance given in Hunt (2012). All locations were surveyed on three occasions during the active period for bats in May, July and September 2014. Surveys took place on the following dates:

- 28<sup>th</sup> (Location 1 & 2) and 29<sup>th</sup> (Location 3, 4 & 5) May 2014

- 15<sup>th</sup> (Location 1, 2 & 5) and 16<sup>th</sup> (Location 3 & 4) July 2014
- 15<sup>th</sup>, 16<sup>th</sup> (Location 1 & 2) 17<sup>th</sup> & 18<sup>th</sup> (Location 3, 4 & 5) September 2014

## 2.3.4

Surveys commenced approximately 15 minutes before sunset and continued for 2 hours thereafter. In September an additional dusk survey was also carried out, which commenced approximately 2 hours before sunrise and ended approximately 15 minutes after sunrise. Weather conditions during the surveys are shown in the table below:

Survey date	Weather conditions at start of survey
28 <sup>th</sup> May (dusk)	Cloud 100%, Temperature 14°C, wind 1-5mph, rain 0.
29 <sup>th</sup> May (dusk)	Cloud 100%, Temperature 17°C start, 16°C , wind 0, rain – drizzle.
15 <sup>th</sup> July (dusk)	Cloud 10%, Temperature 16°C, wind 0mph, rain 0.
16 <sup>th</sup> July (dusk)	Cloud 100%, Temperature 17°C, wind 0-1mph, rain showers and drizzle during survey.
15 <sup>th</sup> Sept (dusk)	Cloud 40%, Temperature 16°C, wind 0, rain 0
16 <sup>th</sup> Sept (dawn)	Cloud 0%, Temperature 13°C, wind 0-1mph, rain 0
17 <sup>th</sup> Sept (dusk)	Cloud 80%, Temperature 19°C, wind 5-10mph, rain 0
18 <sup>th</sup> Sept (dawn)	Cloud 90%, Temperature 17°C, wind 5-10mph, rain 0

## 2.3.5

Locations 1 – 4 were surveyed by two personnel using Pettersson D240x time expansion bat detectors with Roland recording devices or AnaBat II frequency division detectors. Wherever possible, behaviour of bats observed was recorded in order to identify possible commuting routes. Bat calls recorded in the field were later analysed using Bat Sound or AnalookW software and species identification made with reference to Russ (2012).

## 2.3.6

Due to health and safety issues (steep embankments close to running water), Location 5 was surveyed using two automated AnaBat II frequency division detectors. These were placed at either end of the culvert on three occasions during May, July and September. The detectors were placed out just prior to and retrieved just after the other dusk activity surveys finished in May and July (approximately 3 hours on each occasion). The detectors were placed out just prior to the dusk surveys and retrieved at the end of the dawn surveys during September (i.e. out over the entire night – approximately 11.5 hours). The data recorded was analysed using AnalookW software and species identification made with reference to Russ (2012).

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## 2.4 Personnel used

2.4.1 Surveys were undertaken by:

- Steve Wadley (ACIEEM, NRW Bat Licence No. 42680:OTH:CSAB:2012)
- Joanna Wadley (Trainee bat worker)
- Rhianna Bill (MSc)
- Fearn Simms BSc, MLA, ACIEEM, CMLI
- James Bilham BSc (Hons), MSc, ACIEEM
- Dr Tim Rich BSc, PhD
- Jean Hamilton BSc, MSc, MCIEEM
- Marta Gaworek-Michalczenia BSc, MSc, GCIEEM
- Kiri Jones BSc, MSc, GCIEEM

## 2.5 Constraints, limitations and assumptions

- 2.5.1 There was some drizzle and rain showers during some of the surveys (29<sup>th</sup> May & 16<sup>th</sup> July). As temperatures were warm and good numbers of bats were recorded during these surveys, it is not considered this was a significant constraint.
- 2.5.2 It was not always possible to observe all bat's behaviour in the field due to poor light conditions. Therefore it was not possible to say whether all bats recorded were foraging or commuting to a feeding area.
- 2.5.3 As automated detectors were used at Location 5, there is no observed bat behaviour information at this location. However it does provide data on bat species present and the level of activity.
- 2.5.4 Time expansion detectors need to stop and play back the time expanded call in order to be recorded. During this short space of time when the call is being recorded other bats may be missed, which is a minor constraint.
- 2.5.5 Surveys which rely on species identification from interpretation of bat calls have a number of limitations. Species with quiet calls, such as a Brown long-eared (*Plecotus auritus*) are often underrepresented as their calls are not always picked up by bat detectors. Conversely, bats with louder calls, such as Noctules (*Nyctalus noctula*) can be detected at a much longer distance, so may be over-represented.
- 2.5.6 There are also often difficulties in identifying bats to species level from interpretation of their calls using sound analysis software; this is particularly true of the '*Myotis*' genus. Identification to species level has been made through examination of call parameters with reference to Russ (2012) and using professional judgement and experience. In many cases it has not been possible to identify to species level with reasonable surety and in these cases, just the genus has been recorded.
- 2.5.7 *Plecotus* species recorded and observed during the surveys were presumed to be *Plecotus auritus* (the Brown long-eared bat) as the very rare Grey long-eared (*Plecotus austriacus*) is not known in the area.

### 3 RESULTS

#### 3.1 Desk Study

3.1.1 The SEWBRc data search identified the following species:

- Common pipistrelle (*Pipistrellus pipistrellus*)
- Soprano pipistrelle (*Pipistrellus pygmaeus*)
- Unspecified Pipistrelle species (*Pipistrellus sp.*)
- Noctule (*Nyctalus noctula*)
- Leisler's (*Nyctalus leisleri*)
- Brown long-eared (*Plecotus auritus*)
- Serotine (*Eptesicus serotinus*)
- Whiskered bat (*Myotis mystacinus*)
- Natterer's bat (*Myotis nattereri*)
- Daubenton's bat (*Myotis daubentonii*)
- Lesser horseshoe (*Rhinolophus hipposideros*)
- Greater horseshoe (*Rhinolophus ferrumequinum*)
- Unspecified bat

3.1.2 The data search and consultation with the Vale of Glamorgan species officer also identified the following significant roost sites:

- Maternity roost of Serotine within a church located approximately 3km to the north of the Scheme. The pre-parturition size of the roost is approximately 50 individuals, with the roost being monitored annually as part of the National Bat Monitoring Programme (NBMP). Other roosting bats recorded at the site include Common pipistrelle, Soprano pipistrelle, Brown long-eared and Natterer's bat.
- Maternity roost of Lesser horseshoe bats within a 13<sup>th</sup> Century Castle approximately 4.5km to the south-west of the Scheme. The pre-parturition size of the roost is approximately 100 individuals. Also identified as a maternity roost for Natterer's (approximately 30). Records of low numbers of Brown long-eared, Common pipistrelle, Soprano pipistrelle, Daubenton's and Serotine also roosting at this location.
- Maternity roost of Lesser horseshoe bats within a barn approximately 5.5km from the Scheme. The pre-parturition size of the roost is approximately 30 individuals
- Maternity roost of Lesser horseshoe bats within a Castle approximately 6.8km to the west of the Scheme. The pre-parturition size of the roost is approximately 20 individuals. Records also of a single roosting Greater horseshoe.

3.1.3 There were several other roost sites of small numbers and individual bats that were unidentified or of common species (mainly pipistrelle spp. or Brown long-eared).

3.1.4 The following species of bats were identified in the surveys undertaken in 2008 and 2009 (Soltys Brewster Consulting, 2011):

- Common pipistrelle (*Pipistrellus pipistrellus*)

- Soprano pipistrelle (*Pipistrellus pygmaeus*)
- Noctule (*Nyctalus noctula*)
- *Myotis* species – highly likely, but unconfirmed Whiskered / Brandt's (*Myotis mystacinus* / *M. Brandtii*) and Natterer's (*M. Nattereri*).
- *Plecotus* species

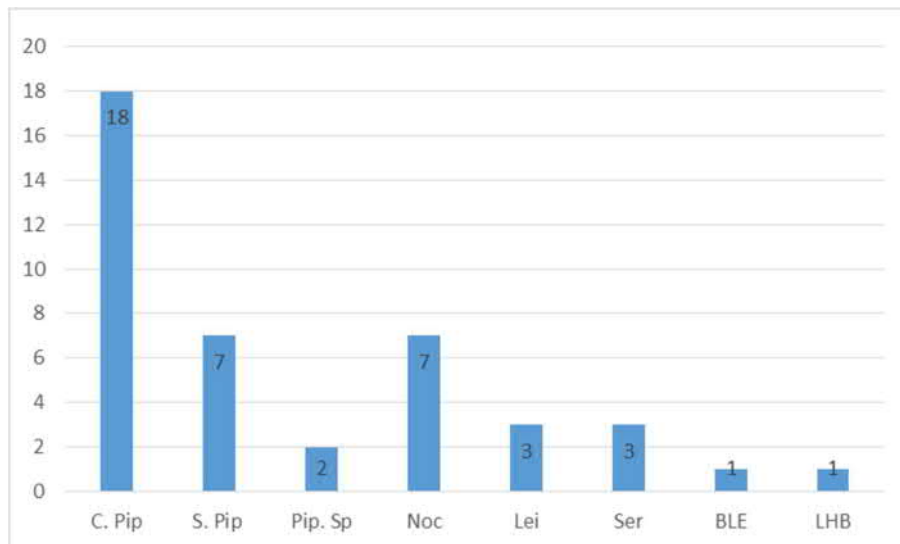
3.1.5 The majority of activity-type observations and recordings were made by both commuting and foraging bats. Bats were also observed crossing the A4226 in a number of places, including: Grovelands Farm / Northcliff Cottage, Sutton Wood and the River Waycock in a west to east direction.

3.1.6 The surveys also revealed the presence of roosting bats in a purposefully installed bat box on a stable block to the south of Northcliff Cottage (Grid ref: ST07959 70512). The type of box observed, coupled with the presence and type of droppings was indicative of use by *Pipistrellus* species.

3.1.7 During 2009, dusk emergence / dawn re-entry surveys were carried out on a group of mature Oak and Ash trees within the southern part of the study corridor. No bats were observed emerging or returning to the trees surveyed. However, the results did indicate that a roost of Soprano pipistrelles (*Pipistrellus pygmaeus*) was located nearby in close proximity to Sutton Wood.

### 3.2 Bat Activity Surveys – Location 1

3.2.1 The graph below shows the species and frequency of records at Location 1 during May, July and September. Seven species were recorded along with two unidentified *Pipistrellus* species.



**\*Key to species abbreviations:** C.Pip = Common pipistrelle (*Pipistrellus pipistrellus*), S.Pip = Soprano pipistrelle (*Pipistrellus pygmaeus*), Pip Sp = unidentified *Pipistrellus* species, Noc = Noctule (*Nyctalus noctula*), Leisler's (*Nyctalus leisleri*), Ser = Serotine (*Eptesicus serotinus*), BLE = Brown long-eared (*Plecotus auritus*), LHB = Lesser horseshoe (*Rhinolophus hipposideros*)

3.2.2 The majority of bats recorded at Location 1 were not seen, due to poor light levels. A number of observations were made of Noctule bats foraging high over-head



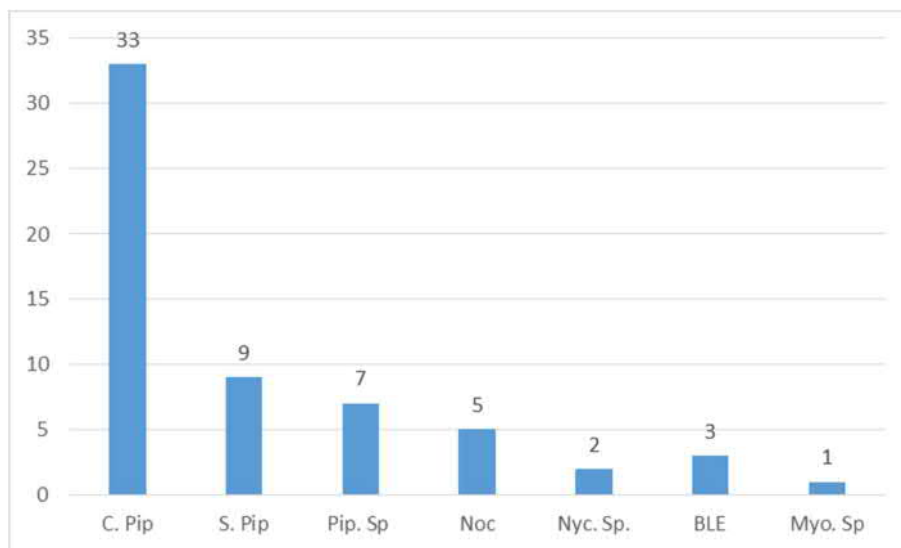
(approximately 25–30m), and over trees to the west of the existing road. Noctules were also commuting from the west towards the north.

3.2.3 There were observations made of Common pipistrelles crossing the existing A4226 in a west to east direction and foraging along the road and then heading south. A Serotine was also observed foraging back and forth (west, east and east, west) along the hedgerow on the western side of the road.

3.2.4 One Lesser horseshoe bat was recorded during the dawn survey in September on the western side of the road, but no observations were made.

### 3.3 Bat Activity Surveys – Location 2

3.3.1 The Graph below shows the species and frequency of records at Location 2 during May, July and September. Five species were recorded (including an unidentified *Myotis* species) along with seven unidentified *Pipistrellus* species and two unidentified *Nyctalus* species.

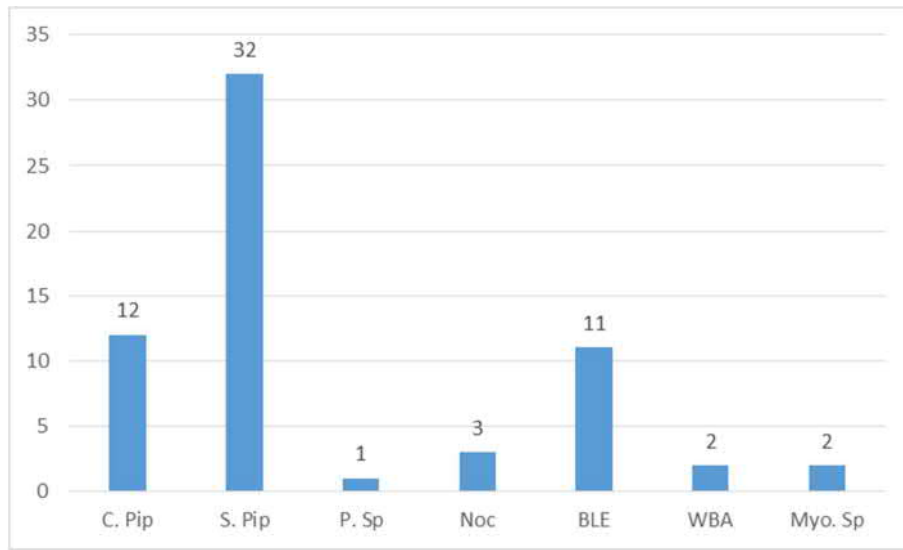


**\*Key to species abbreviations:** C.Pip = Common pipistrelle (*Pipistrellus pipistrellus*), S.Pip = Soprano pipistrelle (*Pipistrellus pygmaeus*), Pip Sp = unidentified *Pipistrellus* species, Noc = Noctule (*Nyctalus noctula*), Nyc. Sp = unidentified *Nyctalus* species, BLE = Brown long-eared (*Plecotus auritus*), Myo. Sp = unidentified *Myotis* species.

3.3.2 The majority of bats observed at this location (mainly Common pipistrelle) appeared to be foraging above or alongside the existing A4226, flying in a north to south / south to north direction at heights of between 8 – 30m. There was also good levels of foraging activity recorded within the trees on the western side of the road with bats crossing over the road from east to west after spending time foraging alongside the road.

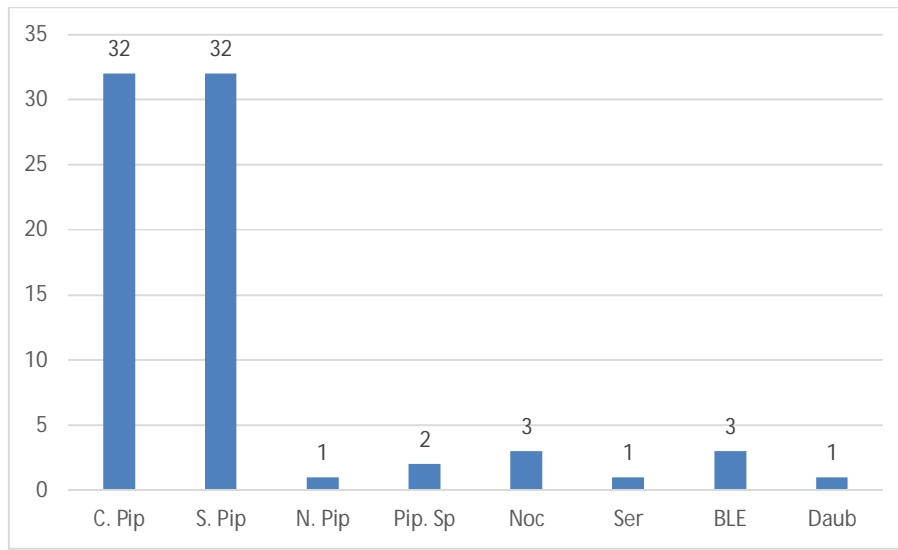
### 3.4 Bat Activity Surveys – Location 3

3.4.1 The Graph below shows the species and frequency of records at Location 3 during May, July and September: Five species were recorded along with one unidentified *Pipistrellus* and two unidentified *Myotis* species.



**\*Key to species abbreviations:** C.Pip = Common pipistrelle (*Pipistrellus pipistrellus*), S.Pip = Soprano pipistrelle (*Pipistrellus pygmaeus*), Pip Sp = unidentified *Pipistrellus* species, Noc = Noctule (*Nyctalus noctula*), BLE = Brown long-eared (*Plecotus auritus*), WBA = Whiskered, Brandt's or Alcathoe (*Myotis mystacinus*, *M. brandtii*, *M. alcathoe*), Myo. Sp = unidentified *Myotis* species.

- 3.4.2 Not all bats recorded were observed due to poor light levels. The majority of bats observed at this location appeared to be foraging back and forth along the hedgerow. There were records of Soprano pipistrelles also foraging around an Ash tree within the hedge. A Soprano pipistrelle seems to have emerged from the Ash tree at the start of the survey in May. During the July survey, a Soprano pipistrelle was also observed flying to up to a hole on an east facing branch of the tree, but not entering. No evidence of roosting bats was recorded at this tree during the bat tree roost inspection survey (AVA Ecology, 2014). It was however, given a 'category 1\*' valuation (the highest valuation) for roosting bats in accordance with the 'protocol for visual inspection of trees due to be affected by arboricultural works, as described in Hunt (2012).
- 3.4.3 Up to two Brown long-eared bats were observed using the small agricultural shed located along the hedgerow. During the May survey, a Brown long-eared was observed within the shed at the southern end above a ridge beam, prior to foraging activity being recorded outside. In July a Brown long-eared was observed emerging from the shed at 22:06 and then flying east. Later (22:25) two animals were again observed within the shed along with some feeding remains (moth wings). No Brown long-eared bats were observed or recorded during the September survey.
- 3.5 Bat Activity Surveys – Location 4**
- 3.5.1 The graph below shows the species and frequency of records at Location 4 during May, July and September; seven species were recorded along with two unidentified *Pipistrellus* species.



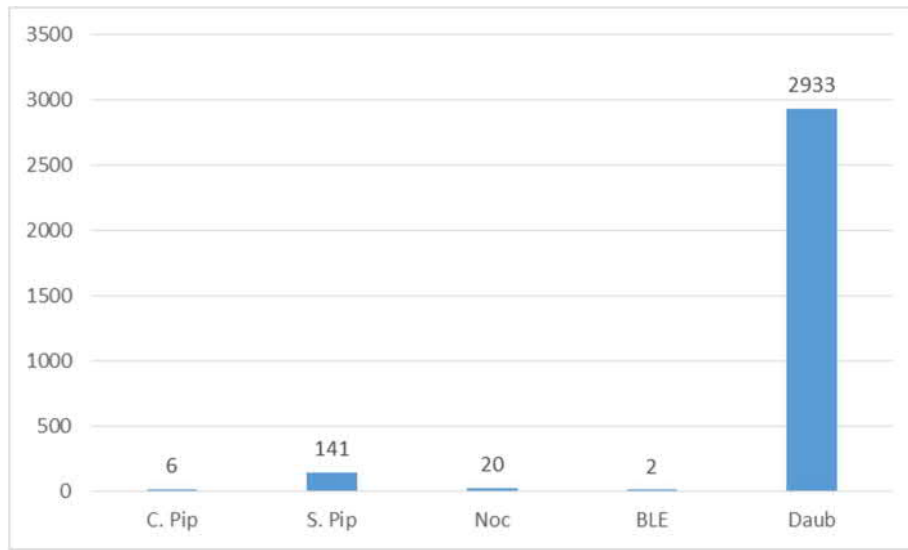
**\*Key to species abbreviations:** C.Pip = Common pipistrelle (*Pipistrellus pipistrellus*), S.Pip = Soprano pipistrelle (*Pipistrellus pygmaeus*), N.Pip = Nathusius pipistrelle (*Pipistrellus nathusii*), Pip Sp = unidentified *Pipistrellus* species, Noc = Noctule (*Nyctalus noctula*), Ser = Serotine (*Eptesicus serotinus*), BLE = Brown long-eared (*Plecotus auritus*), Daub = Daubenton's (*Myotis Daubentonii*).

3.5.2 Not all bats recorded were observed due to poor light levels.

3.5.3 Eight records were made of Common and Soprano pipistrelles flying across the road at this location at heights of between 2 and 20m, but typically at heights of 3-4m. Good levels of foraging activity were recorded over the hedgerows and trees on the north-eastern side of the road and also on the south-western side. A Noctule was also recorded flying in a southerly direction, from the woodland block in the north-east.

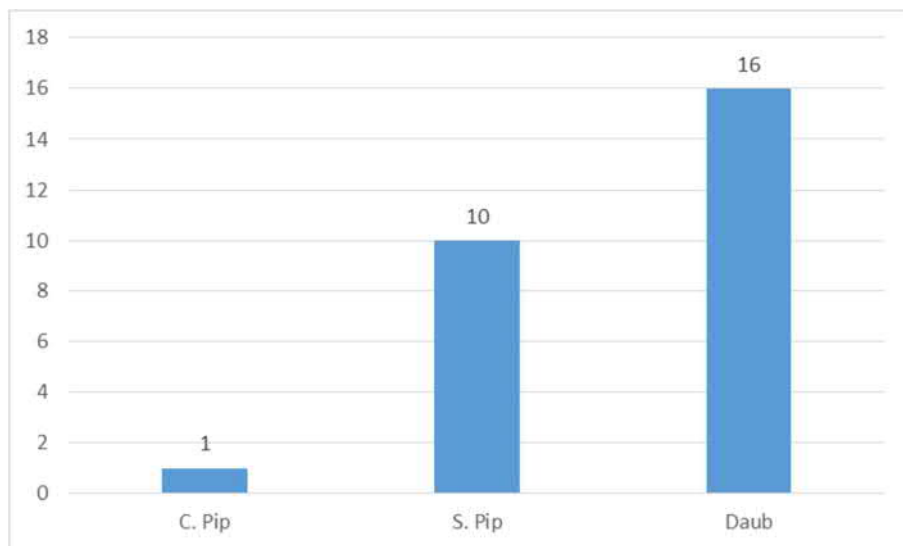
### 3.6 AnaBat Survey – Location 5

3.6.1 The Graph below shows the species and frequency of records at Location 5 recorded on the ANABAT on the northern side of the road, facing south, during May, July and September. Note that the frequencies given in the graphs represent the number of times the detector is triggered, rather than numbers of bats present. Five species of bats were recorded.



**\*Key to species abbreviations:** C.Pip = Common pipistrelle (*Pipistrellus pipistrellus*), S.Pip = Soprano pipistrelle (*Pipistrellus pygmaeus*), Noc = Noctule (*Nyctalus noctula*), BLE = Brown long-eared (*Plecotus auritus*), Daub = Daubenton's (*Myotis Daubentonii*),

3.6.2 The Graph below shows the species and frequency of records at Location 5 recorded on the ANABAT on the southern side of the road, facing north, during May, July and September. Three species of bat were recorded.



**\*Key to species abbreviations:** C.Pip = Common pipistrelle (*Pipistrellus pipistrellus*), S.Pip = Soprano pipistrelle (*Pipistrellus pygmaeus*), Daub = Daubenton's (*Myotis Daubentonii*),

3.6.3 No observations of behaviour were available as surveys were undertaken with automated detectors. By far the highest levels of activity were recorded on the ANABAT on the northern side of the road, facing south, on the River Waycock. The vast majority of calls recorded on this detector were that of a *Myotis* species. Give the location (next to water) and examination of the sonograms it is consider that the

species was Daubenton's bat (*Myotis Daubentonii*). The majority of the recordings were made during the September survey, where there was near constant records throughout the entire night. This probably represents a high level of foraging activity over the river, close to the detector. It is unknown how many bats were responsible for the recordings and may only be a few individuals.

## **4 ASSESSMENT AND CONCLUSIONS**

### **4.1 Species identified and commuting routes**

- 4.1.1 A total of 10 species of bats were identified during the surveys. By far the most abundant were Common and Soprano pipistrelles, which are species generally considered to be at low to medium risk of collisions with road traffic due to the height at which they fly. There were far fewer species recorded that are considered to be of high-risk of traffic collisions; these tend to be species that hunt in cluttered environments, and fly close to the ground, such as Lesser horseshoes, Brown long-eared and *Myotis* species.
- 4.1.2 Common and Soprano pipistrelles and Noctule bats were observed foraging alongside and crossing the existing road at Locations 1 and 2. A Lesser horseshoe bat was also recorded at Location 1, which is a species of higher conservation concern and more vulnerable to traffic collisions. The Scheme is mainly on line at these locations (coming off line near Location 2) and so the dangers posed by road traffic is unlikely to change significantly from the current situation. However if the scheme requires tree felling either side of the carriageway it would produce a wider gap between vegetation that bats would have to cross. This may cause bats to fly lower between the vegetation and possibly increase the risk from traffic collision.
- 4.1.3 Extensive foraging activity was recorded along the hedgerow at Location 3, mainly of Common and Soprano pipistrelles. There were also several records of Brown long-eared bats and at least two were found to be roosting within a small agricultural shed (see below). A roost is also known within a bat box at a larger stable on the opposite (north) side of the hedgerow (Soltys Brewster Consulting, 2011). The hedgerow is therefore not only used by bats for foraging but also a commuting route to gain access to and from roosting sites. The Scheme will sever the hedgerow to the east of the stable and shed which would isolate these roost sites from the network of hedgerows and woodland areas to the east. Bats attempting to access roosting features and foraging habitat on the western side of the scheme would be vulnerable to road traffic, particularly the Brown long-eared bats, which are low flying and more susceptible to traffic collision.
- 4.1.4 High levels of Common and Soprano pipistrelle activity was recorded at Location 4, close to where the Scheme comes back on line. Bats were observed foraging along the hedgerows leading up to the existing A4226 on the eastern side and within trees on the western side of the road. Bats were also observed crossing the road at this location and also foraging above the existing road. As the scheme is coming back online, the dangers posed by road traffic is unlikely to change significantly from the current situation, for bats foraging and commuting across the road. Although if tree felling is required either side of the road, it may increase the gap between vegetation that bats would have to cross, possibly causing them to fly lower and being at increased risk from road traffic.
- 4.1.5 At Location 5 results indicate that the northern side of the River Waycock is used for foraging by Daubenton's bats along with mainly Common and Soprano pipistrelles. This location also provided a safe road crossing opportunity for bats. As the Scheme

is on line at this location it is unlikely to have any adverse effects on commuting and foraging bats at this location.

- 4.1.6 It is considered unlikely that the Scheme would have a significant impact on the local Lesser horseshoe bat population. The surveys did not indicate that there were any significant commuting routes for this species affected by the Scheme. One Lesser horseshoe was recorded at one location on one occasion and the closest known maternity roost from the data search records is approximately 4.5km to the southwest.

## 4.2 Bat roost identified

- 4.2.1 Brown long-eared bats were observed emerging and entering the small agricultural shed during two of the three surveys undertaken at Location 3.
- 4.2.2 Survey observations suggest this structure is used as a day roost and a night / feeding roost for at least two Brown long-eared bats. This is based on a Brown long-eared observed emerging at 22:08 during the July survey, feeding remains on the shed floor and bats observed within the shed later in the evening in May and July after Brown long-eared bats being recorded outside.
- 4.2.3 A bat roost was also identified during the 2009 surveys within a bat box at a stable on the north side of the hedgerow at Location 3. The roost was considered to be that of a *Pipistrellus* species (Soltys Brewster Consulting, 2011). A further inspection of the bat boxes was undertaken outside the bat active period, in November 2014, which found no evidence of roosting bats (AVA Ecology<sup>2</sup>, 2014). Internal and external inspections were also carried out within the main barn. No evidence of roosting bats was observed and the structure was considered to have low potential to support roosting bats, principally because of air flow, light ingress and suitable roosting features (AVA Ecology<sup>2</sup>, 2014).
- 4.2.4 These roosts are protected under regulation 41(1) of the Conservation (Natural Habitats &c.) Regulations 2010 (and 2011/2012 amendment regulations) – refer to Section 2.2. The Scheme will not directly affect them, but as indicated in Section 5.1, the bats which occupy them (particularly the Brown long-eared bats) are vulnerable to being hit by road traffic along the scheme.

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AVA Ecology (2014). Bat Survey of Trees at 5 Mile Lane, St. Athan, Cardiff.

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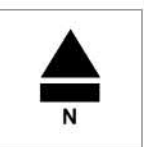
**6**            **FIGURES**

6.1            Figure 1.0 A-C Bat Activity Survey Crossing Points



**Legend**

- Transect Locations
- Proposed Scheme



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NOTES

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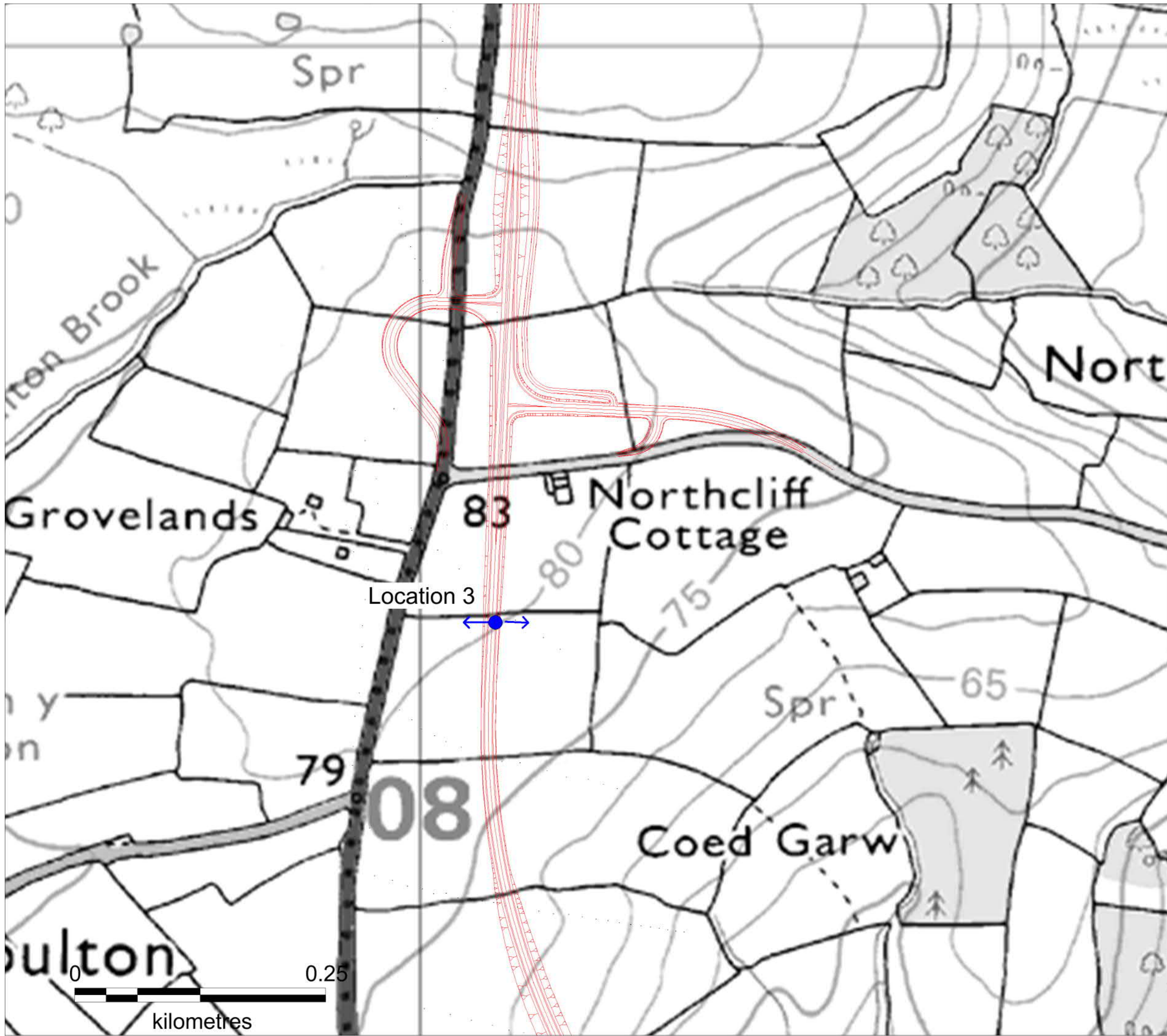
**Vale of Glamorgan  
A4226 Five Mile Lane Improvements  
Bat Activity Surveys**



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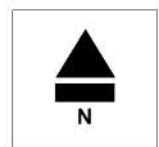
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**Legend**  
 Transect Locations  
 Proposed Scheme



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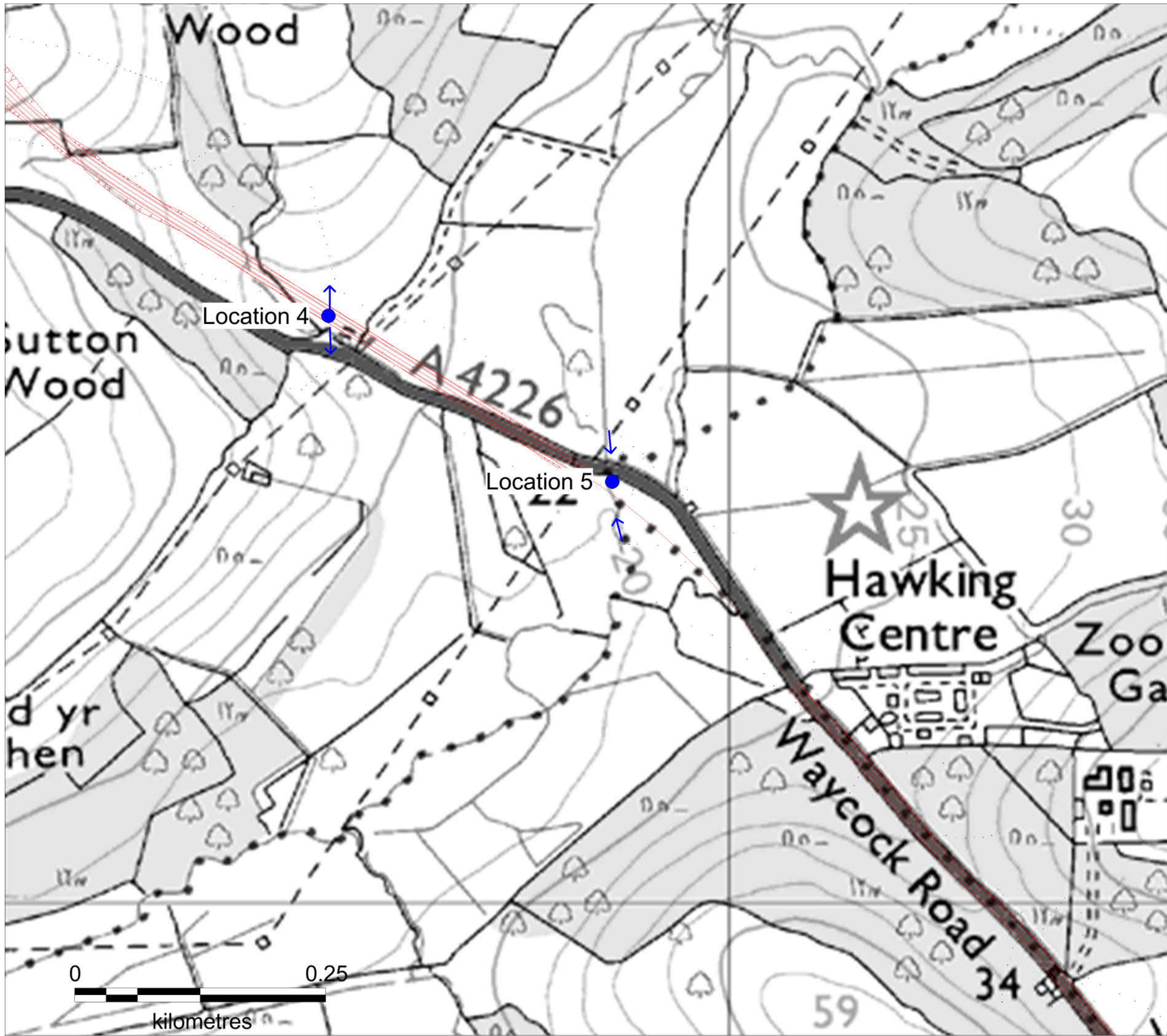
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 Bat Activity Surveys**

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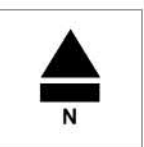
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**Legend**

- Transect Locations
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FIGURE / DRAWING NO. 60654_BA01c	REV 0
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**7 APPENDICES**

**Appendix A:** Bat Surveys of Stables at Grovelands Farm, Five Mile Lane, Moulton (AVA Ecology 2014).

**Appendix B:** A4226 Five Mile Lane. Proposed road safety improvement scheme. Interim scheme assessment report (Soltys Brewster Consulting, January 2011).



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Bat Surveys of Stables  
At  
Grovelands Farm  
Five Mile lane  
Moulton

Date: 01/12/2014



Client	TACP Ltd
Site / job	Grovelands stables 5 mile lane bat box checks
Report title	Bat survey of stables at Grovelands
report ref	ava/tacp/grovelands/5 mile lane
Local Authority	Vale of Glamorgan

version	status	changes	author	position	Date
1	draft		S Wadley	Director	01/12/2014
2	1 <sup>st</sup> Final	amendments	S Wadley	Director	09/12/2014
3					

Name	Position	Date
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Reviewed by	J Wadley	Secretary	
Approved for issue	S Wadley	Director	
Issued by	S Wadley	Director	09/12/2014

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The evidence we have prepared and provided is true and follows guidance from the Chartered Institute for Ecology and Environmental Management (CIEEM). We confirm that our opinions are professional and true bona fide opinions. Data recorded during surveys will be submitted to the local biodiversity records centre.

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## Author

This survey and report was carried out by Mr Steve Wadley of AVA Ecology Ltd. Mr Wadley has 3 years experience of bat conservation and survey work. He holds a Natural England (NE) class 2 bat survey license (Number 20123667) and VBRV licence as well as a NRW bat licence (number CCW42680:OTH:CSAB:2012). Mr Wadley specialises in woodlands and tree dwelling bats and is a qualifying member of the Chartered Institute of Ecology and Environmental Management (CIEEM), and committee member of Gloucestershire bat group.

## Executive summary

This bat survey and report was commissioned by TACP Ltd and concerns stables located 150m east of Grovelands farm, five mile lane (A4226). The stables and small shed are within 75m of the proposed new route for the A4226 road enhancement scheme.

Bat activity surveys during summer 2014 at potential crossing points were carried out which identified a long eared bat day roost (2 bats) within a small shed near the stables and a potential Pipistrelle bat roost (single bat) located in a Ash tree on the east side of the shed. The shed is located around 70m to the east of the current A4226.

A previous survey report carried out by Soltys Brewster in January 2011 identified bat droppings (consistent with Pipistrelle bats) discovered beneath a bat box located on the stables opposite the small wooden shed. (See appended report).

This bat scoping survey by AVA ecology Ltd was carried out on 26<sup>th</sup> November 2014 outside the bat activity season so the results are not conclusive but are merely to provide a likelihood or potential of use of the boxes and stables by bat species.

The daytime survey identified 2 x bat boxes, one on the east elevation apex and one on the north elevation apex. The boxes are of wooden construction and do not have an inspection hatch, however inspection is possible from ground level using a strong torch and endoscope. The box at the east elevation was full of spider's webs and a dead bird skeleton which would suggest the box has not been used by animals for at least 12 months, the box at the north elevation appeared to be clear of spider's webs and looked clean and potentially may have been used by bats during the summer of 2014. No evidence of bat activity was discovered at either bat box but this may have been affected by recent heavy rainfall although no bat droppings were discovered inside the boxes.

An external daytime inspection of the rest of stables was carried out which identified a low potential for bats due to gaps between the roofing panels, open stable doors and windows. The stables is connected to woodlands to the south east (Coed garw, Ffynon y Coed and Lidmore wood) via hedgerows, further extending south east to the River Waycock, Coed Bach and Coed y Caple. These features make the surrounding habitat of good potential for bats.

The internal daytime inspection identified a low potential for bats due to darker areas above roof beams and between roofing panels.

However, the stables are open and as such have a high level of air flow and light ingress making it unlikely that bats would use the building as anything other than a transitional day roost or feeding perch.

A further survey of the small wooden shed identified a few insect wing remains inside the south end of the shed but no other evidence of bat activity internally or externally. The construction of the shed and associated high air flow and light levels suggest the shed is not likely to be suitable for bats other than a transitional roost or feeding perch.

In the absence of mitigation the impact of the road scheme on the bat roost in the small shed would be low but the severance of the hedgerow to the east of the stables to accommodate the new road construction may have a medium impact on foraging or commuting bats.

Any works to the small shed will require a European protected Species licence from NRW.

Further survey is required on the bat boxes at the stables during the bat activity period May – September to assess the potential level of use of the bat boxes and transect survey of the hedgerow should be carried out to assess usage by foraging or commuting bats.

## 1: Introduction

### 1.1 Site description

The site is located at grid reference ST: 080704 and comprises a wooden stables and small shed set in improved pasture and arable fields some 70m east of the hedge lined A4226 at Grovelands farm. The “L shaped” stables are north facing and have traditional stable door entrances. A concrete platform is located at the front of the stables with a tall hedgerow running behind the stables in an east to west direction. This hedgerow has some semi mature trees one of which, an Ash tree, has potential for roosting bats. (See Tree Report by AVA Ecology Ltd 2014)



fig 1.

### 1.2 Proposed development

It is proposed to enhance the current route of the A4226 which will include re-locating the road some 150m to the east of its current position at Grovelands farm. (See fig 3). This will involve dissecting the tall hedgerow at grid reference ST: 081704 and could potentially cause disturbance to any bat roosts present as well as sever foraging or commuting routes.

### 1.3 Aims of study

The objective of this study is to identify evidence of any use of the stables (and bat boxes) by bat species. The report aims to assess the level of usage, classification of roost present, and requirement for development license. It will also provide mitigation proposals to be carried out prior to, during and after the works.

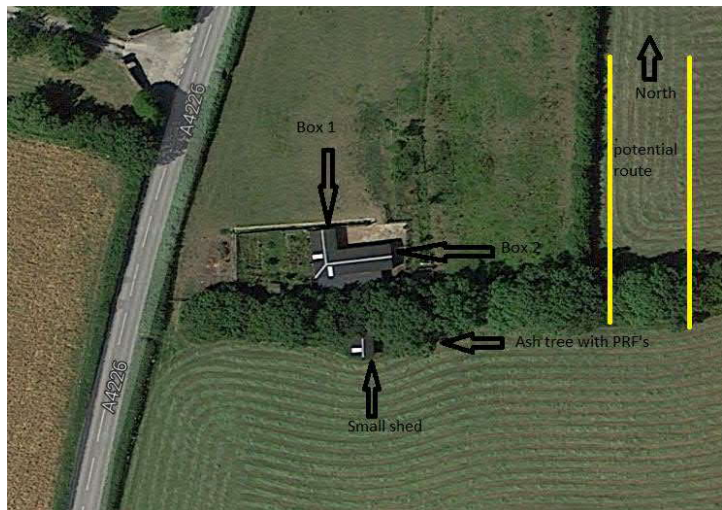


fig 2.

## 2: Methodology

### 2.1 Desk study

A desk study was not carried out specifically for this survey but was carried out as part of the ongoing crossing point surveys (see main survey).



## 2.2 Field surveys

The methods used were appropriate to achieve the aims of the survey following *Bat Surveys - Good Practice Guidelines* (2<sup>nd</sup> Ed; Bat Conservation Trust 2012) and BS 42020:2013 Biodiversity. (Code of practice for planning and development).

Date	26 <sup>th</sup> November 2014	Notes
Weather	Light Rain	
Cloud cover	100%	
Temperature	10°C	
Wind speed	5mph	
<b>Name</b>	<b>Bat Licence</b>	<b>Experience</b>
Steve Wadley	CCW42680:OTH:CSAB:2012	Experienced and licensed bat specialist.

The stables and bat boxes were inspected externally and internally using binoculars, endoscope and a high powered torch. Photographs of any evidence of bat activity and potential exit or entry points identified in the stables were taken and noted for the report.

## 3: Results

### 3.1 Field survey

#### 3.1.1 Habitat description

The habitat surrounding the site at Grovelands stables is mostly arable and improved pasture fields with small woodlands to the north east and south east connected by hedgerows and tree lines. There are some minor roads which are also tree lined leading further to woodlands and farm buildings dotted around the area (see fig 3). The small River Waycock runs generally North east to South West and is around 1.5km to the south east.

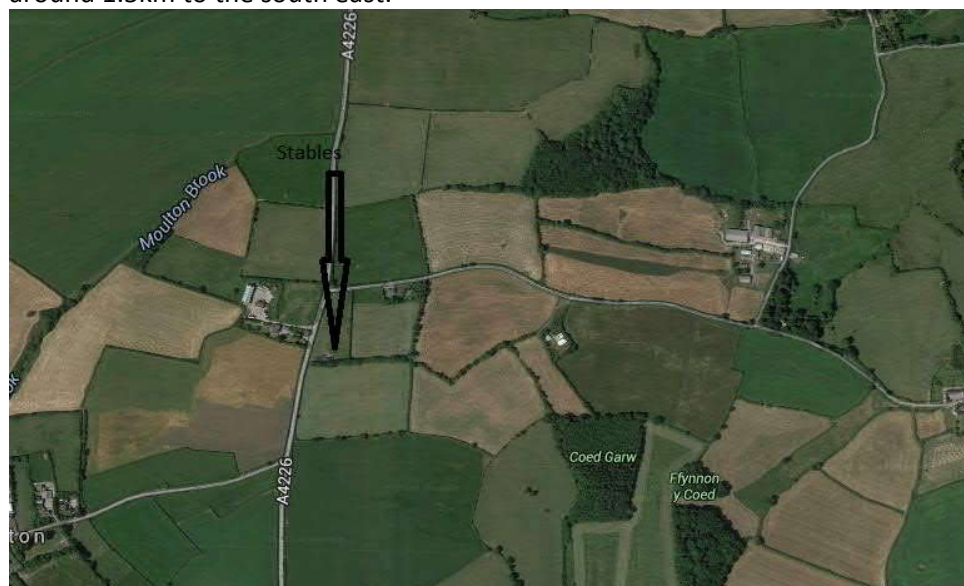


fig 3.

#### 3.1.2 External survey

The external survey identified a modern, north facing wooden built stables with composite material roofing panels. There is a tall mixed species hedgerow immediately south of the building running from east to west which contains several semi mature Ash and Oak trees. The stables have traditional doors allowing air and light into the building therefore producing high levels of air flow and natural light. There are a few areas of low potential for bats throughout the building including gaps between the rafters and roofing panels at the eaves and gaps at overlapping panels. There are also gaps beneath the barge boards at the gables. No evidence of bat activity was discovered externally and the potential for bat roosting was considered to be low.

#### 3.1.3 Internal Survey

The internal survey identified several areas of low potential including gaps between exposed rafters and roofing materials, and gaps at woodwork unions (internal corners of the roof). Two of the stable doors were locked and inaccessible making inspection impossible and horses occupied two of the stables making inspection difficult. No evidence of bat activity was discovered and it was noted during the

inspection that it was very unlikely that bats would use the stables for roosting other than as a transitional roost or feeding perch due to high air flow and natural light levels.

## 4: Assessment

### 4.1 Survey constraints (Inc. equipment)

The presence of horses in the stables made internal inspection difficult and evidence may have been missed due to safety issues.

Two of the stables were locked and inaccessible making inspection of those internal areas impossible.

### 4.2 Potential impacts

#### 4.2.1 Bat roosts

In the absence of mitigation the proposed development would have a low potential impact on the bat roost in the small shed and a potentially low impact on any bats using the bat boxes attached to the stables. This impact would be caused by factors such as increased noise, security lighting, vibration and dust from construction traffic during the road improvement works.

The severance of the hedgerow to the east of the stables may have a potential impact on the bat roost in the small shed through loss of foraging or commuting habitat.

#### 4.2.2 Bat foraging and commuting habitat

In the absence of mitigation the proposed development would have potential medium impact on bat foraging and commuting routes. This is due to the potential severance of a flight path (hedgerow) to accommodate the new road route to the east of the stables.

(2 brown long eared bats and a Pipistrelle bat were observed during surveys using the hedgerow for foraging during bat activity surveys).

## 5: Legislation and policy guidance

This legislation must be considered at all stages of development.

All bat species occurring in the UK are fully protected by European and UK law.

### **Under The Conservation (Natural Habitats &c) Regulations 2010 (and 2011/2012 amendment regulations) Regulation 41, (1) A person who—**

- (a) Deliberately captures, injures or kills any wild animal of a European protected species,
- (b) Deliberately disturbs wild animals of any such species,
- (c) Deliberately takes or destroys the eggs of such an animal, or
- (d) Damages or destroys a breeding site or resting place of such an animal, is guilty of an offence.

### **Under the Wildlife and Countryside Act 1981 (as amended) it is an offence to:**

- Intentionally or recklessly damage, destroy or obstruct access to any structure or place used by bats for shelter or protection.
- Intentionally or recklessly disturb bats whilst in their place of rest or shelter
- Sell or advertise for sale or transport bats (including their derivatives)

### **The Countryside and Rights of Way Act 2000 (CroW)**

The Act places a duty on Government Departments and the National Assembly for Wales to have regard for the conservation of biodiversity and maintain lists of species and habitats for which conservation steps should be taken or promoted, in accordance with the Convention on Biological Diversity.

Schedule 9 of the Act amends SSSI provisions of the Wildlife and Countryside Act 1981, including provisions to change SSSIs and providing increased powers for their protection and management. The provisions extend powers for entering into management agreements; place a duty on public bodies to further the conservation and enhancement of SSSIs; increases penalties on conviction where the provisions are breached; and introduce a new offence whereby third parties can be convicted for damaging SSSIs. To ensure compliance with the Human Rights Act 1998, appeal processes are introduced with regards to the notification, management and protection of SSSIs.

Schedule 12 of the Act amends the species provisions of the Wildlife and Countryside Act 1981,

strengthening the legal protection for threatened species. The provisions make certain offences 'arrestable', create a new offence of reckless disturbance, confer greater powers to police and wildlife inspectors for entering premises and obtaining wildlife tissue samples for DNA analysis, and enable heavier penalties on conviction of wildlife offences.

### Planning Policy Advice

#### Planning Policy Wales Chapter 5 “Conserving and Improving Natural Heritage and the Coast”

The Welsh Government’s objectives for the conservation and improvement of the natural heritage are to:

- promote the conservation of landscape and biodiversity, in particular the conservation of native wildlife and habitats;
- ensure that action in Wales contributes to meeting international responsibilities and obligations for the natural environment;
- ensure that statutorily designated sites are properly protected and managed;
- safeguard protected species, and to
- promote the functions and benefits of soils, and in particular their function as a carbon store.

#### The UK Biodiversity Action Plan (UKBAP) includes objectives to conserve, and, where practicable, enhance:

- The quality and range of wildlife habitats and ecosystems;
- The overall populations and natural ranges of native species;
- Internationally important and threatened species, habitats and ecosystems;
- Species, habitats and natural and managed ecosystems characteristic of local areas
- Biodiversity of natural and semi-natural habitats where this has been diminished over recent decades.

The Welsh Government is committed to promoting Habitat and Species Action Plans relevant to Wales prepared under the UKBAP in fulfilment of its obligations under the Countryside and Rights of Way Act.

### Protected species

The presence of a species protected under European or UK legislation is a material consideration when a local planning authority is considering a development proposal which, if carried out, would be likely to result in disturbance or harm to the species or its habitat. Local planning authorities should advise anyone submitting a planning application that they must conform to any statutory species protection provisions affecting the site concerned, and should consult Natural Resources Wales before granting permission. An ecological survey to confirm whether a protected species is present and an assessment of the likely impact of the development on a protected species may be required in order to inform the planning decision.

Developments are always subject to the legislation covering European protected species regardless of whether or not they are within a designated site. New developments for which development works would contravene the protection afforded to European protected species require derogations from the provisions of the Habitats Directive.

**Derogations may only be authorised if there is no satisfactory alternative and if the action authorised will not be detrimental to the maintenance of the population of the species concerned at a favourable conservation status in its natural range. The development works to be authorised must be for the purposes of preserving ‘public health or safety, or for other imperative reasons of overriding public interest, including those of a social or economic nature and beneficial consequences of primary importance for the environment.**

Derogations are granted by a licence issued by the Welsh Government. Local planning authorities are under a duty to have regard to the requirements of the Habitats Directive in exercising their functions. To avoid developments with planning permission subsequently not being granted derogations in relation to European protected species, planning authorities should take the above three requirements for derogation into account when considering development proposals where a European protected species is present.

## 6: Recommendations and Mitigation Measures

### 6.1 Mitigation proposals

The mitigation proposals for the development are as follows:

- a) No works to the stables or small shed including alterations or removal will take place as part of the road enhancement scheme. If works to the stables or shed is planned then further survey should take place beforehand including bat activity surveys and bat box checks during the summer months May - September 2015 to assess usage of the bat boxes.
- c) Any severance of the hedgerows to accommodate the new road route must be mitigated by planting mixed species hedgerows each side of the road to minimise the risk of bat impact with vehicles.
- d) The newly planted hedgerows must connect with other existing hedgerows to the west of the new route.
- e) Any removal of the hedgerow must be done between September and April to avoid the bat activity season.

### 6.2 Further survey

The stables have a low potential for roosting bats but as the stables will not be directly impacted by the road scheme further survey of the buildings was not deemed necessary. However, transect surveys of the nearby hedgerows should be carried out to assess flight paths and foraging routes to inform an assessment of the potential impacts of the new road route and hedgerow severance.

### 6.3 Requirement for licence.

The stables and small shed will not be altered or removed as part of the road scheme and will not be directly impacted. Mitigation can be put into place which will reduce the impacts to a negligible level therefore a European protected species licence was not deemed necessary as the proposed development would not result in an offence being committed under the Conservation of Habitats and Species Regulations 2010 (as amended).

## 7: Conclusion

It is possible that one of the bat boxes attached to the stables is being used by bat species. Although no physical evidence such as droppings or urine staining was discovered, the bat box at the north gable was free of the spider’s webs and debris which was evident in the bat box on the east gable. This may of course be due to birds using the north box but as brown long eared bats and a pipistrelle bat have been observed foraging near the stables there is a possibility that they may be using the box. The previous report by soltys Brewster confirms pipistrelle droppings beneath a bat box at the stables.

As droppings can be washed away with rain and are eaten by ants and other insects, only inspection of the box during the summer months May – September would confirm presence or absence. Bats are also known to use bat boxes for hibernation so it may be beneficial to regularly inspect the boxes over the winter period September to May.

The severance of the hedgerow to accommodate the new road route may have an impact on the foraging or commuting routes of the bats using the small shed so transect surveys must be carried out to assess the usage of the hedgerows.

An EPS licence is not deemed necessary but the mitigation must be followed to ensure bats are not impacted by the proposed development.

## 8: Photographs



1 South elevation



2 East elevation bat box



3 North elevation bat box



4 North elevations

## 10: References

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Tan 5 Planning Policy in Wales



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**A4226 FIVE MILE LANE**  
**PROPOSED ROAD SAFETY IMPROVEMENT SCHEME**  
**INTERIM SCHEME ASSESSMENT REPORT**

January 2011

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**PROPOSED ROAD SAFETY IMPROVEMENT SCHEME  
A4226 FIVE MILE LANE  
VALE OF GLAMORGAN**

**INTERIM SCHEME ASSESSMENT REPORT**

**January 2011**

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Approved by:

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Position:

Director

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Date:

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# 1 Introduction

1.1.1 Soltys Brewster Consulting were commissioned by the Engineering Design and Procurement Section of the Vale of Glamorgan Council to coordinate the Environmental Assessment for the proposed highways improvements to a section of the A4226, between Sycamore Cross and Waycock Cross, locally known as Five Mile Lane.

1.1.2 The A4226 (Five Mile Lane) route currently fails to meet modern highway standards; The Welsh Assembly Government has awarded a principal road transport grant to the Vale of Glamorgan Council for safety improvements to Five Mile Lane. The Interim Scheme Assessment report (ISAR) follows on from a Stage 1 Environmental Impact Assessment, May 2008. The assessment concluded that the route corridor under appraisal and shown in [Figure 1.1](#), is preferred to take forward for further refinement and route option appraisal.

## 1.2 Studies Completed to Date

1.2.1 Between 1997 and 2005 wider studies examined the possibilities of improving safety and access to Cardiff International Airport (now simply known as Cardiff Airport). Phase One proposals published in 1998 looked at construction of a new road for traffic using the A4050 corridor to link the A4232 at Culverhouse Cross with the Barry Docks Link Road, south of Wenvoe. This route corridor was safeguarded in the Vale of Glamorgan Unitary Development Plan (UDP), but has since been shelved. Environmental Statements produced in support of these earlier proposals included:

- *Full Scheme Environmental Statement - Airport Access Road Phase 1* (June 1998) Chris Blandford Associates
- *Interchange Environmental Statement - Airport Access Road Phase 1* (June 1998) Chris Blandford Associates

1.2.2 A later study in 2005 looked to establish the scope of environmental assessment needed to promote an alternative route further to the west, broadly following the alignment of the A4226 between the A48 and the A4050 to the west of Barry, locally known as Five Mile Lane. A scoping report was produced in 2005 in collaboration with the Statutory Consultees:-

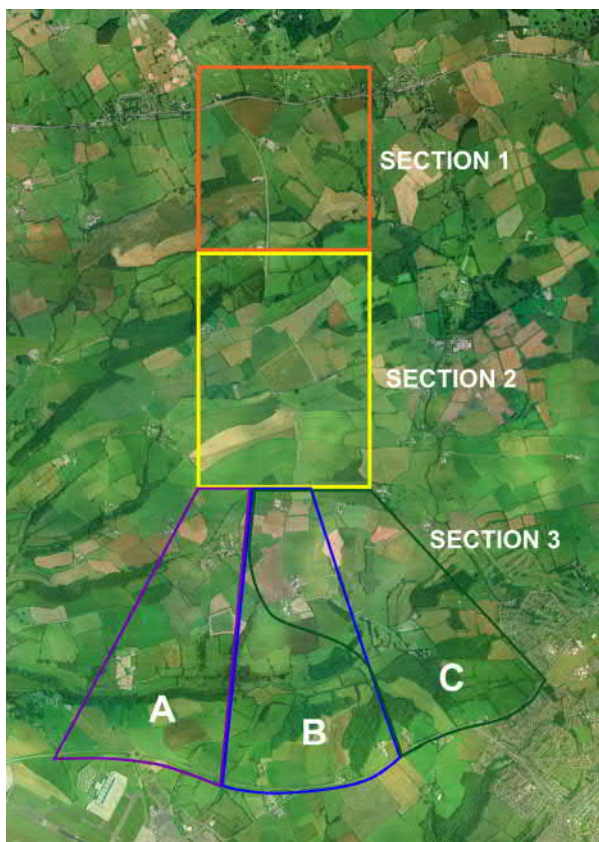
- *Cardiff Airport Access Road, Environmental Assessment Scoping Report (August 2005) Soltys Brewster Consulting.*

1.2.3 Subsequently, further scoping and Stage 1 Assessment was undertaken for a scheme to specifically upgrade the A4226 (Five Mile Lane) between the A48 and the northwestern edge of Barry at Waycock Cross to address its current poor safety record and improve links into the southern Vale including Barry, Cardiff Airport and settlements further west along the B4265. Supporting documents produced included:-

- *A4226 Five Mile Lane Improvements, Environmental Assessment Scoping Report (January 2008) Soltys Brewster Consulting.*
- *Five Mile Lane Stage 1 Environmental Assessment (May 2008) Soltys Brewster Consulting.*

### **Stage One Environmental Assessment**

1.2.4 The Stage 1 assessment considered the main opportunities and constraints within a wider study area and broad route corridors for new route corridors to take forward to the ISAR stage of the process.



- 1.2.5 Section 3 A and B were discounted as feasible broad corridor options as they did not satisfy the planning objective of improving the safety of Five Mile Lane, and adverse environmental impacts were considered to be greater than for Section 3 C.

### **Scheme Engineering Design**

- 1.2.6 Studies leading to the proposed alignments have considered a range of improvements to the existing road including:
- measures confined to the existing alignment (on-line improvements);
  - improvements separate from the existing alignment (off-line improvements); and
  - a combination of the two.
- 1.2.7 The selection of the appropriate proposed standards and route alignments is a iterative process. Wide ranging options have been studied and several rejected in the early stages of the study – predominately because the options did not satisfy the main ethos of safety improvements. Rejected options include:
- dual carriageway;
  - “wide single two carriageway plus one” standard; and
  - alignments that involve much severance, land take, earthworks and potentially high construction costs.
- 1.2.8 At start of the scheme preparation process the Vale of Glamorgan Council designers had the benefit of some previous feasibility work undertaken by Cardiff Council acting as Trunk Road Agents for the Welsh Assembly Government. These were initially referred to as Options 1, 2, 5, 7, 8, 9 and the Link Road. Only Options 7, 8 and 9 have been retained for present consideration. Options 1, 2 and 5 were not taken forward because the required quantity of earthworks was considered excessive for the appropriate standard of highway.
- 1.2.9 The routes presented herein are still in the early stages of development for broadly comparative studies. Recommendations are provided towards adoption of the best route option in this iterative process.

## 1.3 Purpose of the Interim Scheme Assessment Report

- 1.3.1 The Interim Scheme Assessment Report lies between the Stage 1 environmental assessment, as guided by Volume 11 of the Design Manual for Roads and Bridges (DMRB), and Stage 2 assessment. During the intervening period new guidelines for transport schemes and strategies specific to Wales have emerged; The Welsh Assembly Government Transport Appraisal Guidance (WelTAG)<sup>1</sup>.
- 1.3.2 The ISAR is a vehicle to collate all studies and surveys, analysis and appraisal collected and compiled during and since the Stage 1 EIA and align the results with reporting requirements set out in WelTAG. The approach aims to streamline progress in selecting an appropriate route between Sycamore Cross (the junction with the A48 in the north) and Waycock Cross (the junction with the A4226 to the south).
- 1.3.3 WelTAG's guidelines promote appraisal requirements that are of a scale that is appropriate to the value to the scheme, that focus on areas of most concern and on impacts that differentiate options.<sup>2</sup> Appraisal against Transport Planning Objectives aims to achieve a "fit for purpose" resulting scheme, and the required outcomes and strategic priorities of the Wales Transport Strategy, such as the National Transport Plan and its component plans.
- 1.3.4 Appraisal is the process of assessing the worth of a course of action and provides decision-makers with all the information they require to make a reasoned and auditable decision. The ISAR presents environmental baseline information and knowledge gathered to date in considering potential route options. It provides a concise assessment document with which to consult with Statutory Environmental Bodies and encouraging debate and discussion on feasible, acceptable, objective focused and environmentally acceptable options that will form the basis of Stage 2 assessment, Public Consultation and ultimately the selection of a preferred scheme for detailed Stage 3 assessment.

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<sup>1</sup> WelTAG v7.1 2008 The Welsh Assembly Government Transport Appraisal Guidance

<sup>2</sup> WelTAG v7.1 2008:1.4 Purpose of WelTAG



1.3.5 The ISAR will be circulated to the following statutory consultees in February 2009 followed by a discussion workshop in March 2009:

- **Cadw**
- **Countryside Council for Wales (CCW)**
- **Environment Agency Wales**
- **Glamorgan Gwent Archaeological Trust (GGAT)**
- **Vale of Glamorgan Council, Countryside and Environmental Projects**
- **Vale of Glamorgan Council, Development Control**
- **Vale of Glamorgan Council, Rights of Way Officer**
- **Vale of Glamorgan Council, Environmental Health**

1.3.6 Following the workshop a consultation responses and recommendations report will be compiled in liaison with the SEB's which, along with the ISAR and Risk Register, will inform the following stages of the scheme design and assessment.

## 1.4 Approach and Methodology

1.4.1 The ISAR appraises the route alignment options against Traffic Planning Objectives (TPO's) and Welsh Impact Areas thus ensuring deliverable, implementable and feasible (technical and operational) options are taken forward. The scheme is subject to The Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations 1999<sup>3</sup>.

1.4.2 Within WelTAG there is a formal and standardised two stage appraisal process. Undertaking appraisal in two stages enables best use of appraisal resources, as the first stage narrows the list

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<sup>3</sup> Schedule 2 and The Highways (Assessment of Environmental Effects) Regulations 1999. A 'Screening Opinion' was requested from the Planning Department of the Vale of Glamorgan Council, and on September 13<sup>th</sup> 2007 a reply confirmed that, "An Environmental Statement as defined by the Town & Country Planning (Environmental Impact Assessment) (England & Wales) Regulations 1999, is required to support a planning application for the Five Mile Lane road improvement, as described in the documents and plans received on 20<sup>th</sup> August 2007."

of proposals down to the leading options - or option - with only the best options then being subjected to a full and detailed appraisal.

- 1.4.3 The assessment is in accordance with WeITAG and DMRB, between Stage 1 and 2:
- Stage 1 - The qualitative and sometimes quantitative approach for the appraisal against each criterion.
  - Stage 2 - The (ordinarily more detailed) qualitative and quantitative approach for the appraisal against each criterion.
- 1.4.4 Please see individual topic chapters for detailed methodologies.

**Impact Distribution**

- 1.4.5 Where appropriate to the criterion being appraised the geographic and social distribution of effects is considered; does the scheme affect a particular group of society such as those that are mobility impaired, elderly, on low incomes or unemployed, women or deprived groups? Distribution impacts are explicitly stated and quantified wherever feasible to ensure that the proposal promotes social inclusion and that certain groups are not disproportionately adversely affected.

**Impact Significance**

- 1.4.6 Qualitative and quantitative measures for each appraisal criterion are assessed on their own merits. The results of the assessment of the impact significance will be summarised using a seven-point scale, like for other UK guidance, as follows:

Large beneficial	+++
Moderate beneficial	++
Slight beneficial	+
Neutral	0
Slight adverse	-
Moderate adverse	--
Severe adverse	---

1.4.7 Assessment of significance aims to differentiate the impact levels across options and is not considered in isolation from the overall appraisal results.

### **Mitigation**

1.4.8 Avoidance represents the first stage in the mitigation hierarchy. Measures which avoid impacts are considered ‘certain’ and so considered in advance of measures designed simply to minimise impacts due to their inherent residual level of uncertainty with regard to implementation and success<sup>4</sup>.

1.4.9 Iterative design and assessment of the proposed routes aims to overcome the following effects:

- intrusion of the road into undisturbed, high-quality landscapes
- large earthworks which intrude into views from nearby property and public places
- intrusive embankments crossing valleys and low-lying land
- cuttings which create notches on the skyline or scars on hillsides and sidelong ground
- unsympathetic junctions between new and existing landscapes
- landtake required for large earthworks affecting heritage and nature conservation sites
- changes to drainage regimes.

1.4.10 Mitigation principles are put forward for consideration by the overseeing organisation and Statutory Environmental Bodies; mitigation measures have not been iteratively prioritised against other assessment topics. The conclusions and recommendations report will recommend specific mitigation measures which are to be agreed with the overseeing organisation during Stage 2.

1.4.11 Mitigation measures assume ideal geotechnical conditions of grading out embankments and returning to agriculture and in sections where steep cuttings are preferred, that bedrock is suitable.

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<sup>4</sup> DMRB Volume 11 Section 4 Part 1 HD 44/09 3.14

## **Double counting**

- 1.4.12 There is scope for double counting and overlap between criteria, which may lead to a distortion of the importance of certain elements in the appraisal process. While as far as possible this has been netted out within the appraisal, it is recognised that this can be taken only so far - transport by its nature has direct and indirect consequences which feed through in different ways to a range of economic, environmental and social impacts. In order to minimise double-counting, impacts have been assessed in the chapters according to where the impacts experienced are considered most relevant.

## **1.5 Assessment Structure**

- 1.5.1 Whilst assessing effects of the scheme in accordance with WelTAG only becomes necessary at the next formal stage it is important to begin to consider aspects at this stage against broader option alignments and the baseline information collated thus far.
- 1.5.2 The ISAR begins to align the scheme assessment to the guidelines in WelTAG required for forthcoming EIA stages. Over and above undertaking an initial evaluation of performance of the scheme against the Transport Planning Objectives aiming to address local problems effectively, the contextually appropriate derivation of wider transport strategies.

### **Social Impacts**

- 1.5.3 Social impacts have been progressed towards WelTAG's criterion of "Transport Safety, Personal Security, Permeability, Physical Fitness and Social Inclusion" from DMRB's "Pedestrians, Cyclists and Community Effects"

### **Geology, Soils, Land Use and Agriculture**

- 1.5.4 Because land use within the study area is primarily agriculture which is inherently linked with geology and soils these four topics have been combined under one heading of Land Use. Soils and geology will be fully assessed in forthcoming stages with the benefit of detailed baseline and scheme design information.

### Vehicle Travellers included in association with Landscape Effects

- 1.5.5 Assessment of effects on vehicle travellers has been combined with the landscape assessment:
- both topics are assessed against the same baseline landscape character
  - to avoid double counting
  - when considering potential mitigation measures the effect of views from and along the road have been taken into account alongside effects on visual amenity in views towards the road as well as effects on landscape character due to the scheme.
- 1.5.6 The ISAR report assesses the effects of the proposed route alignment on environmental and social effects within the following criterion:
- 3.0 TRAFFIC NOISE AND VIBRATION** – noise and vibration effects on local community caused by traffic.
- 4.0 LOCAL AIR QUALITY** - local air quality and greenhouse gasses effects on the local community.
- 5.0 LANDSCAPE AND VEHICLE TRAVELLERS** – effects on landscape character and quality, visual amenity (from dwellings, footpaths and places of work and leisure) and vehicle travellers (views from the road and driver stress). Includes assessment of effects on landscape designations, settings to heritage features and road lighting.
- 6.0 BIODIVERSITY** – effects on nature conservation and biodiversity resource (SSSI's, loss, disturbance and fragmentation of habitat, resting place, breeding site or feeding/foraging area), severance of traditional dispersal routes and effects on protected species (reptiles, birds, bats, aquatic invertebrates and the riverine habitats of the River Waycock) and incidence of wildlife/vehicle collision.
- 7.0 LAND USE** – effects on land use, soil quality and landholdings (loss of resource and severance) and effects on geology and contaminate land.
- 8.0 HERITAGE** – effects on cultural heritage assets including archaeological remains, historic buildings and historic landscapes.
- 9.0 WATER ENVIRONMENT** – risk of pollution, effects on surface water quality, hydrological effects, and physical changes to watercourses, loss of floodplain storage, accidental spillage, reduction in and derogation of groundwater recharge and effects on abstraction.

- 10.0 SOCIAL IMPACTS** – impacts on pedestrians/public footpaths users, cyclists, bridleways and riding routes and on the use of community facilities.
- 11.0 DISRUPTION DUE TO CONSTRUCTION** - potential construction effects.
- 12.0 POLICIES AND PLANS** – assessment of local, regional and national policy that may be affected by the broad route corridor.

1.5.7 The reporting for each criterion covers the methodology used, the baseline conditions against which the assessment is undertaken, and the assessment of effects and potential mitigation measures. Comparative assessments between route options are detailed in Volume 3 - Option Appraisal Tables, summarised within the main report and tabulated in summary within the Appraisal Summary Tables allowing comparison of alignments in the context of appraisal criterion.

### **Receptor Numbering and Cross Referencing**

1.5.8 Receptors have been assigned unique reference numbers that can be cross referenced between tables, maps and report text, in the following format:

**Topic abbreviation - sector number – receptor number**

For example LC–5–7 is referencing Landscape Character Topic– Sector 5 – Receptor number 7.

## 2 Baseline

### 2.1 Geographical Context

2.1.1 Figure 1.1 Context of the Proposal can be found in Volume 2. The Five Mile Lane section of the A4226 is primarily oriented in a north-south direction. Sycamore Cross junction forms the northern point which may be accessed from the east via the A48, A4232 (Ely Link) and the M4 (Junction 33) and from the west via the A48 from Cowbridge, Bridgend and Swansea. The Waycock Cross roundabout is located at the southern point of the route which is accessed from the east via the A4050 running along the northern edge of Barry and from the west via continuation of the A4226 from the direction of Cardiff Airport.

### 2.2 Historical Context

2.2.1 Map based and field surveys reveal an historic alignment of Five Mile Lane. in the old road can be noted in a few places along its length as ‘dog-legs’ and local accesses whose sharp bends have been realigned resulting in the existing road. There are two significant lengths where this has occurred. The first is at the crossing of the Waycock River where the road was realigned and a new river bridge was constructed in 1969. The other is the 1200 metre length south of Sycamore Cross which was realigned in the 1970’s.

### 2.3 Planning Context

#### Transport Planning Objectives (TPO’s)

2.3.1 Assessment against TPO’s aims to address local problems effectively. Five Mile Lane has been a notorious location for road accidents over the years in a fairly even distribution along its length. There have been 65 accidents between the years 1994 to 2007, of which 11 were fatal. In the same period there have been 16 accidents at the Sycamore Cross junction and three slight accidents at Waycock Cross.

- 2.3.2 During the last seven years the Vale of Glamorgan Council has endeavoured to improve safety on the road through the introduction of speed limits, which the Safety Camera Partnership enforce with a static camera, re-surfacing, improved signage, lighting, and solar powered LED cats eyes. However the road still contains a number of sharp bends, has substandard forward visibility and is too narrow in places for two large vehicles such as farm traffic, lorries or buses to pass. Along most of its length the speed limit is 40 miles per hour and overtaking is not allowed.
- 2.3.3 Pedestrians, cyclists and equestrians are not catered for in the main. Those who do use the route are effectively doing so at considerable risk to themselves and others.
- 2.3.4 The Transport Planning Objective is therefore to reduce accidents through minimal improvements to the horizontal and vertical alignment of the existing road. The proposals aim to improve safety for vehicular, cyclists and pedestrian users. A secondary aim is to improve access to the airport and to the north and west of Barry.

## **2.4 Baseline Traffic Forecast**

- 2.4.1 For the following traffic forecasts developments taken into consideration for high growth conditions (with a projected increase in the region of 12-16%) are the major developments of St Athan and Wales International Business Park.
- 2.4.2 Recent studies show that the current traffic flow of 7,000 vehicles per day (VPD) would increase by approximately 9-13% by the baseline year of 2014 under central growth conditions.
- 2.4.3 For the assessment year fifteen (2029) projected increase in traffic along Five Mile Lane for the Do-Minimum scenario may be in region of 21-26%. Improvements to Five Mile Lane may increase this to 38-48% on the baseline year.



## 2.5 Do Minimum Scenario

- 2.5.1 Assessment against a 'Do-Minimum' scenario has been undertaken to represent the most realistic view of transport conditions without improvements to the A4226. Comparisons can then be drawn between the Do-Something scenarios described below and a baseline scenario.
- 2.5.2 Assessment against the 15 year Do Something has been undertaken to appraise the likely effects of the preferred option, constructed and in use, 15 years after the scheme has opened.

## 2.6 Scheme Options Descriptions

- 2.6.1 Figure 1.1 Route Alignment Options and Figure 2.1 Longitudinal Sections can be found in Volume 2.
- 2.6.2 For the purposes of assessment the routes have been divided into seven sectors. This strategy allows comparisons to be drawn between each alignment within each sector with the potential to explore 'joining' up different coloured sectors, to avoid the most significant effects as explored in the forthcoming results and recommendations report.
- 2.6.3 All elevation references are approximate, being derived from a five metre vertical interval topographical survey and are expressed in metres above ordnance datum (AOD).

### **Route Alignment Comparison**

- 2.6.4 The primary differences and similarities between the route options are:
- All alignments would commence and end with modifications to the existing junctions at Sycamore Cross, A48 and Waycross Cross, A4226;
  - None of the alignments are considering improvement works to a 1200 metre section between Blackland Farm and southern reaches Sycamore Cross proposed junction;
  - Two options are designed to a 80km/h standard due to the minimum curvature and numerous junctions and accesses along the highway; the Purple and the Red, mainly on-line, alignment with new T-junctions (or improved vision splays as a minimum requirement) and a roundabout onto the existing carriageway;

- The other three options are designed to a 100km/h standard utilising roundabouts to access the existing road / proposed local collector road and in the case of the Blue an overbridge in place of the Orange and Green roundabout in the vicinity of Grovelands/Northcliff Cottages;
- Road Cross Sections are comprised of a 7.3 metre carriageway with 1 metre hardstanding and a 2.5-3 metre soft verge with climbing lanes through the steeper parts of the Waycock Valley.
- All alignments, other from the Purple option, include climbing lanes through the relatively steep section of the Waycock Valley.
- The Red and Purple options would inevitably lead to major service diversions and delays to the travelling public during the construction phase. Further, any provision for pedestrians and cyclists would have to be included adjacent to the carriageway.
- The Orange, Green and Blue allow for the improvements to be constructed in separate phases but would still lead to major delays to the travelling public during the construction phase. Once constructed pedestrians and cyclists would be better provided for than the Red option, with access along the existing road and potentially with provisions made for them adjacent to the carriageway where the proposed and existing routes are co-incident.
- The Green alignment offers the potential for a reduction in the area of potential fragmented farmland when compared with the Orange Route with a reduction in earthwork quantities and hence a cost saving.
- The Blue option has been designed with the benefit of the feasibility work already undertaken on the Red, Orange and Green routes maximising offline potential to afford better access to adjacent properties and fields, to afford use in relative safety for the enjoyment of walkers, cyclists and equestrians and to ease technical issues and interference to the travelling public during the construction phase. The Blue option proposes an overbridge at the Northcliff/Moulton junction in place of the roundabouts proposed along other alignments. The alignment also proposes a new bridge crossing across the River Waycock.
- In order to consider the river crossing within this assessment, prior to design progression, some broad assumptions have been made; all bridges would be designed with similar clearances (with a soffit level at least one metre above the 1:100 storm flood level (taking into account climate change impact)) and spans; the Blue option requires a brand new

bridge downstream from the existing; Red and Purple routes would require widening the existing bridge; Orange and Green would require widening of both the bridge and culvert for the side roads.

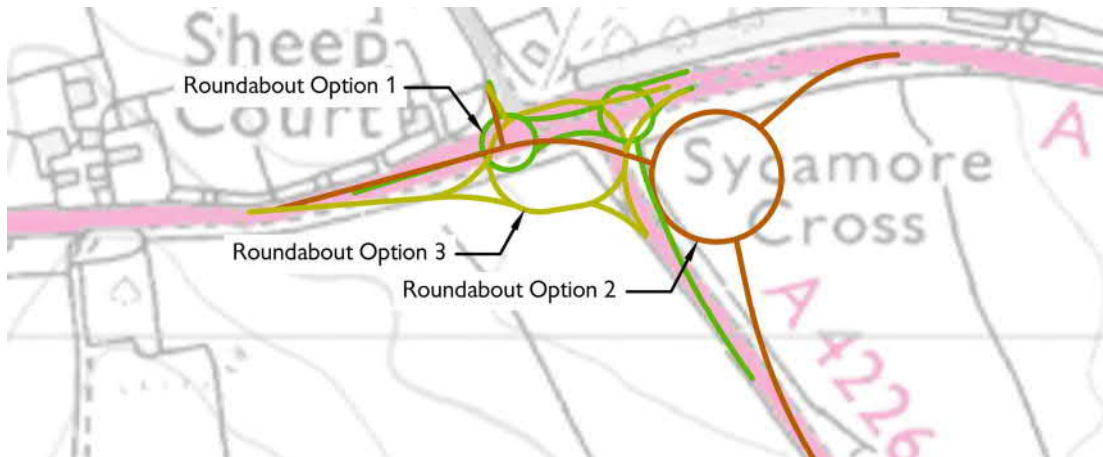
- The Purple route is a feasibility design produced by Arup under a separate commission from the Welsh Assembly Government and totally independently from other studies progressed by Cardiff County and the Vale of Glamorgan Council. In connection with access to Cardiff Airport the Purple route assessed within the ISAR is the “On-line”, minimum cost upgrading of the existing road. The discarded “Off-line” route was a “Wide Single 2 + 1” standard of carriageway cross section and derived mainly as part of a solution for a road link crossing the Waycock Valley to the west of the A4226 directly to the existing Welford Roundabout thereby avoiding the Waycock Cross Roundabout.

Approximate lengths of ‘on and off line’ sections for each alignment are:

	<b>Red (Cardiff Option 7)</b>	<b>Orange (Cardiff Option 8)</b>	<b>Green (Cardiff Option 9)</b>	<b>Blue (VoGC Option)</b>	<b>Purple (Arup Online Option)</b>
<b>Close to &amp; Online (metres)</b>	3550	1750	2250	140	2450
<b>Offline (metres)</b>	1200	2900	2450	4480	2300

## **Sector One**

- 2.6.5 This section of the proposed routes encompasses the Sycamore Cross junction at the north end of the Five Mile Lane. Once modelled and assessed preferred junction option will be selected at the next EIA stage.



- 2.6.6 Sector one is exposed to the south on the Limestone Ridge (approximately 105 metres), that gives the landscape character area its name, The Ridgeline. The A48 Roman Road travels east-west along the ridge supporting Bonvilston and St Nicholas settlements approximately 440 metres and 700 metres to the west and east respectively from the extents of the junction. To the north of the A48 junction are a number of dwellings and farmsteads and a belt of woodland that effectively screens much of the junction to the north. Settlement and farmsteads are softened by mature standard trees and shelterbelts. To the south, the pastoral farmland is defined by trimmed hedgerows that permit wide views both to and from this character area.
- 2.6.7 The existing staggered dedicated right turn junctions are proposed to be replaced by roundabout/s. The first option proposes two roundabouts which involves the least landtake. A second option utilises one roundabout to the south east of the existing Five Mile Lane/A48 junction, requiring a T junction between the Pendoylan road and the A48. The third option proposes a large roundabout that provides access to all roads.
- 2.6.8 The junction would require earthworks to grade into controlling levels on the A48 and grade out embankments to the south. All options require removal of lengths of hedgerow with the small double roundabout (option 1) removing the least (approximately 260 metres), and the large roundabout serving all roads requiring removal of approximately 400 metres (option 2) while the large roundabout that accommodates Five Mile Lane and the A48 requiring removal of 470 metres (option 3).

## **Sector Two**

- 2.6.9 From Sycamore Cross Five Mile Lane travels south along a stretch which has been improved through widening and horizontal realignment. There are no works proposed to this section and tying in should be permissible with the existing fenceline.

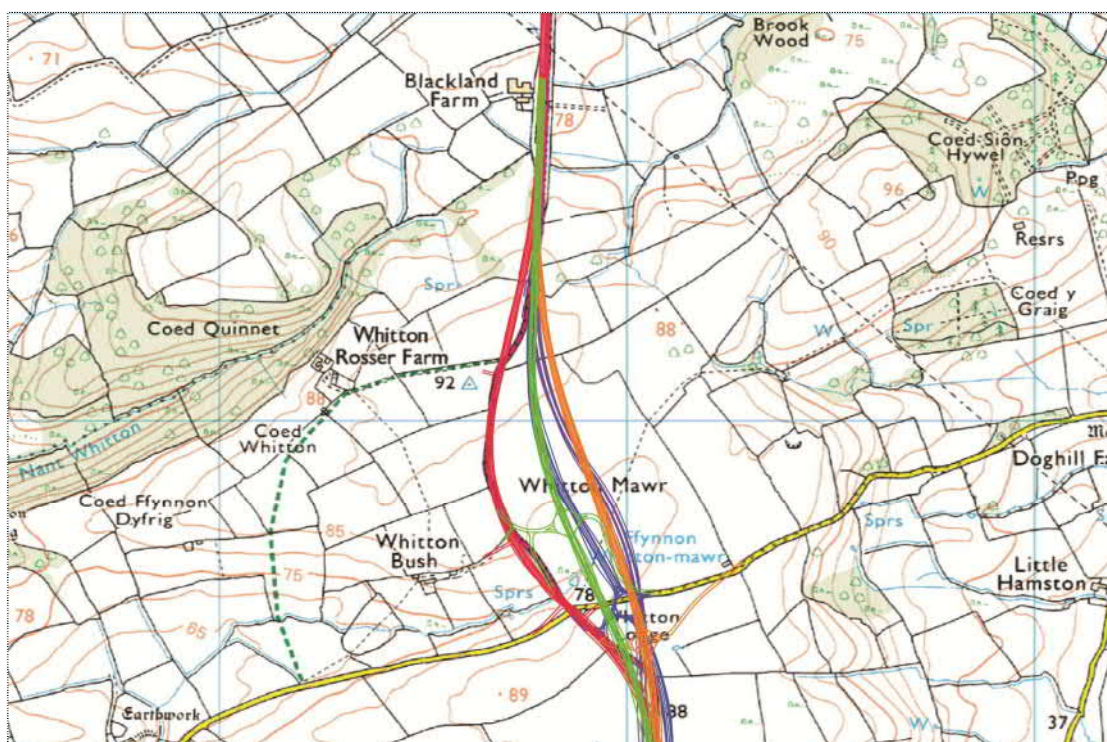


- 2.6.10 The topography begins to drop from the high point with the junction at Sycamore Cross down to low point of 78 metres at the southern point of this sector. Redlands Farmstead and adjacent dwellings straddle the pre-1970's alignment to the east of the current road and a new dwelling has been erected to the west. South of Redlands Farm the landscape character changes to The Rolling Ridge Slopes where woodland blocks, including a proportion of ancient woodland, are introduced as a landscape element. The road passes a large barn, then Oaklands Farm and finishes just to the north of Blackland Farm.

## **Sector Three**

- 2.6.11 To the south of Blackland Farm the potential routes begin to diverge, gradually diverging between the improved online option to the west and the mainly offline routes running a more direct route to the east of Five Mile Lane. The sector gently rises from 78 metres to a high point of 92 metres at the junction with Whitton Rosser Farm where the landscape is characterised by The Plateau character type. All offline options travel through a large arable field dropping towards the Ffynnon Whitton-mawr spring at 78 metres and rises again to a high

point where all routes broadly realign to the southeast of Whitton Lodge, the southern end of sector 3.



### **Red Alignment**

2.6.12 The Red, mainly online alignment cuts through woodland (approximately 2500 square metres) and grassland on Amelia Trust land, in cutting of approximately three quarters of a metre. This option would require the removal of either or both of the roadside hedgerows depending on refined horizontal and vertical alignment. It is approximated that half of the Five Mile Lane roadside hedgerow would be lost in this sector. The route broadly follows the vertical alignment of the existing road until the topography drops away to the south of Amelia Trust junction where it is in cutting of up to 2 metres. The road is then on an embankment of 2 metres across the Ffynnon Whitton-mawr spring and a 2-3 metre cutting once again as it ascends towards the high point at the south of the sector.

### **Green, Blue, Orange and Purple Alignments**

2.6.13 These route option alignments take a more direct route towards the end of the sector but are similarly on embankment as they travel south towards the Ffynnon Whitton-mawr spring and in

cutting through the high point plateau towards the end of the sector. The westerly of these, the Green alignment, is approximately 140 metres to the east of the existing route at the greatest point. The most easterly of the routes, the Orange and Purple, are approximately 240 metre east of the existing road. The routes would cause less loss to the woodland than the Red with the Green Option requiring the least removal (990 square metres) followed by the Blue and Purple routes (1100 square metres), and the Orange requiring in excess of 1800 square metres to be removed.

- 2.6.14 The Green route is on embankment (up to 1.5 metres) as it descends towards a roundabout that forms the junction to the Walterston/Dyffryn minor roads. The embankment reforms to a maximum height of 3.5 metres over the Ffynnon Whitton-mawr spring. The vertical alignment remains similar as it travels south from the spring, cutting through the high point of the open plateau by over 4 metres.
- 2.6.15 The Blue route is on similar height embankments similar to the Green as it descends and ascends to cross the Ffynnon Whitton-mawr spring. The roundabout forming the junction between the improved Five Mile Lane and the Walterston/Dyffryn roads is located between an Oak copse and Whitton Lodge on the Dyffryn road. The road in cutting through the plateau high point at the end of the sector is however much shallower at less than a metre.
- 2.6.16 Similarly the Orange route is on embankment across the Ffynnon Whitton-mawr spring field, on average between 1 and 1.5 metres above ground level to cross the Walterston/Dyffryn road at grade. The roundabout junction to join this road is however approximately 70 metres to the south of the current road crossing.
- 2.6.17 The Purple route option appears to follow the existing ground level more closely than the other options with an approximate maximum embankment through the Ffynnon Whitton-mawr spring field of 1.6 metres. Improved sight lines would likely be proposed at the junction with the Walterston/Dyffryn road. The cutting through the plateau high point is approximately 1.3 metres deep.

## Sector Four

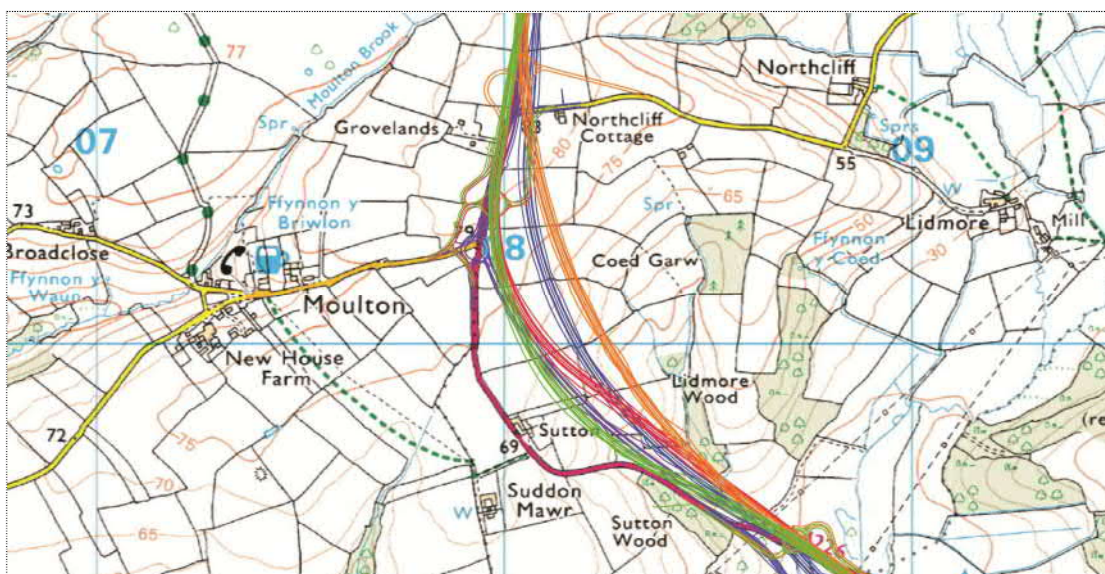


2.6.18 Sector four is a relatively short section between two high points of 88 metres and 83 metres in the vicinity of Grovelands, Grovelands Farm and Northcliff Cottage. The topography dips between these two high points at the head of Moulton Brook (approximately 78 metres). All proposed route options follow similar alignments within this section with an approximate maximum distance of 100 metres apart. All alignments are in cutting on the higher ground and on embankment on the lower ground adjacent to Moulton Brook. The most dramatic earthworks would be required for the Green, Orange and Red routes that travel on an embankment and then cutting, 3.7 metres and 4.3 metres, 3.8 metres and 3.8 metres, and 4.8 metres and 2.4 metres respectively. The Blue and Purple routes follow the topography more closely being on embankment at 1.8 metres and cutting 1.4 metres and 1.1 metres and 1.7 metres respectively.

2.6.19 The Purple route could require the removal of one of the existing roadside hedges along most of this sector whereas the Red, Green and Orange routes could require the removal of the majority of existing roadside hedge as they are online. The Blue route runs in parallel with the existing road requiring minimal removal of existing roadside hedgerow.



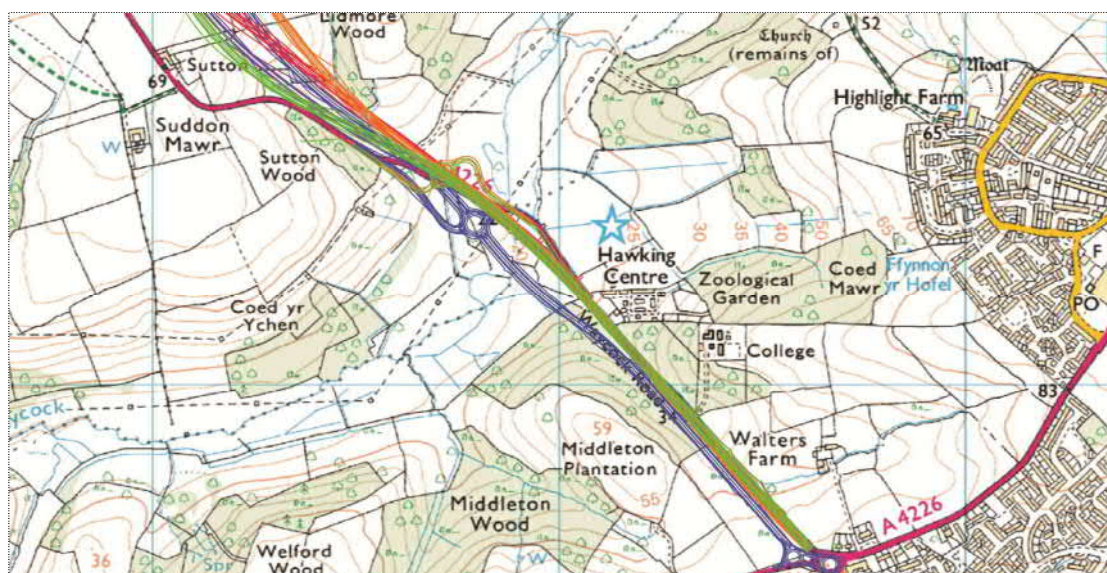
## Sector Five



- 2.6.20 This sector encompasses the route sections from the open Plateau (83 metres AOD) down the Wooded Valley Sides (32 metres AOD) towards the existing River Waycock crossing on the Valley Floor. It begins near Grovelands, Grovelands Farm and Northcliff Cottage where the routes are in cutting and the Blue passes under an overbridge serving Northcliff Farm and beyond to Lidmore and Lidmore Mill. The other options are served by roundabouts. From a horse paddock and stables between the dwellings, the routes diverge, turning south east offline cutting into the south east facing valley side through pastoral fields and Sutton Farm. The Red option becomes offline at this point due to the restriction of the existing sharp curves and to tie in with the existing culvert at the River Waycock. The routes are in cutting down the valley side flattening out to embankments across the valley floor. Maximum cuttings and embankments are approximately Blue – 5.5 and 8 metres, Purple – 6 and 5 metres, Red – 5 and 6 metres, Orange – 5 and 7.5 metres and Green – 6 and 5 metres respectively.
- 2.6.21 The proposed road options begin to converge again between two woodland groups where the vertical alignments emerge onto embankments. These woodlands would be potential screening for receptors on Barry's residential edge, which being on high ground reduces visible depth from the road corridor. The Orange and Red routes cut through between approximately 15-20 metres of the south eastern boundary of the woodland to the north, through an

approximate 6 metre cutting. The Blue route, in tying into the existing route cuts through the north east edge of Sutton Wood. The valley and valley slope supports a number of important trees in the form of standard Oaks and those growing along a field drain connecting the two woodland blocks.

## **Sector Six**



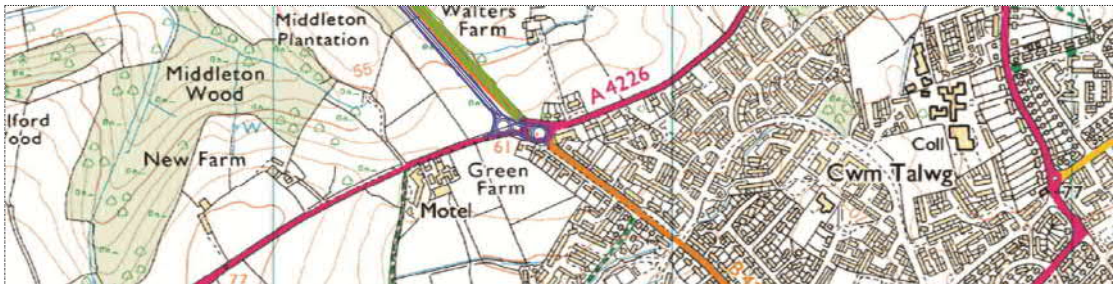
2.6.22 On the valley floor (23 metres) and up the southern side of Waycock Valley the routes follow similar horizontal alignments. The Blue option, being offline, permits road users from The Welsh Hawking Centre, adjacent residents, and the Barry College Buildings to access the new alignment via the existing road and the proposed roundabout. All other options along this stretch are online, requiring a short parallel collector road between these buildings and the old road dog-leg that currently serves the sewage works and used as a layby. Access to the Barry College buildings is not defined for any except the Blue option.

2.6.23 All the alignments are on embankments across the valley floor and all but the Blue Route tend to follow the existing horizontal road alignment. The Blue option runs further west avoiding the online corridor. Roundabouts and minor access roads are proposed to connect the new alignments and Five Mile Lane (on the valley floor between two powerline runs) for the Green, Orange and Blue Routes. The Purple and Red options propose T-junctions.

2.6.24 Every option involves partial removal of woodland for the road landtake required to satisfy standard horizontal and vertical alignments up the steep north west facing valley.

2.6.25 Parallel to Five Mile Lane a culverted stream runs down the majority of the north facing Waycock Valley until it joins the Waycock River. In all but the Blue options, refined alignment would involve consideration of impacts between the stream and the woodland.

### **Sector Seven**



2.6.26 The Blue route and existing road are roughly parallel approaching the junction with the A4226 and require a double roundabout to serve all three routes. All other options are online as they approach the junction and are not proposing a collector road for Barry college buildings, so a single roundabout is proposed in the existing location.

# Assessment of Effects

## 3 Traffic Noise and Vibration

### 3.1 Introduction / Impact Description

- 3.1.1 The World Health Organisation defines noise annoyance as the “feeling of displeasure evoked by noise” (WelTAG p105). WelTAG guidance states: “Noise nuisance from transport sources can adversely affect the quality of living of local communities. Vibration is a similar effect, but instead of being transmitted by air, it is transmitted by the earth. Noise is normally considered as an approximate indicator for both noise and vibration, since its effects are normally felt more strongly” (WelTAG p105-6). This chapter aims to draw conclusions on which of the five proposed new routes for the A4226 Five Mile Lane would cause the least noise annoyance for the local community.
- 3.1.2 The existing traffic noise and vibration varies and will depend on a number of factors including: vehicle operation (i.e. average speed, variation in speed and road geometry), vehicle type (i.e. car, lorry or motorbike).

### 3.2 Appraisal Methodology

- 3.2.1 The methodology used to assess the Traffic Noise and Vibration impacts (TNV) of the proposed road scheme on the A4226 Five Mile Lane follows current ‘best practice’ WelTAG and DMRB guidance published by the Welsh Assembly Government and the Highway Agency respectively.
- 3.2.2 The process adopts the standard approach using baseline desktop studies to identify potential sensitive receptors likely to be significantly affected by the proposed scheme and the potential effects brought about by the proposed development. The chapter will then judge the magnitude of effects and undertake a qualitative assessment of their significance following implementation with a quantitative assessment being undertaken at Stage 2. Impacts have been assessed against the baseline (Year 1 Do Minimum), Year 15 Do Minimum (worst case scenario) and Year 15

Do Something for each receptor and road alignment option. A description of the practicable mitigation techniques available will also be provided.

### **Double Counting**

- 3.2.3 In order to avoid double-counting of impacts, where possible, receptors have been assessed in the chapters according to where the impacts experienced would be most significant. Receptors such as SSSIs or SPAs, for example, would be more sensitive to ecological than TNV effects.

### **Cumulative Effects**

- 3.2.4 At this stage, there haven't been any potential cumulative TNV effects predicted or assessed as a result of completing this scheme.

## **3.3 Study Area / Sensitivity of Receptors**

- 3.3.1 The study area for this chapter was “restricted to within a 300m buffer of each of the five potential routes, since significant impacts are not likely to occur beyond that” (WeITAG p107). Please see [figures 3.1-3.5](#).
- 3.3.2 All potential receptors within the 300m zones were mapped and their building function recorded. Private dwellings and business premises have been identified as highly sensitive TNV receptors. Only residents whose dwellings create the frontage to the proposed route are considered to be high sensitivity receptors, potential receptors beyond the buildings fronting directly onto the existing road have not been assessed at this stage as they are unlikely to experience a change in TNV. Domestic dwellings within the 300m zone that were considered unlikely to experience a noticeable change in TNV levels were discounted from further assessment at this point in the process. Preliminary receptors with low noise sensitivity such as barns, silos and storage facilities were also discounted from further assessment, as they are unlikely to experience significant effects in TNV levels. Buildings of similar location, aspect, function and sensitivity were grouped and appraised in unison as the potential impacts would be similar at each address.

3.3.3 The main focus of the study has been placed on TNV sensitive receptors, which could potentially experience significant levels of effect as a result of the implementation of the scheme.

3.3.4 The TNV sensitive receptors that have been assessed are: private dwellings and business premises which are located within 300m study area. Any receptors outside of this study area boundary have not been assessed, as it is assumed that they are unlikely to be significantly affected by the proposals in terms of TNV.

### **Discounted Dwellings and Premises**

#### **Redlands Cottage, Redlands House and Ash Tree Cottage**

3.3.5 There would not be any construction works in the direct vicinity of Redlands Cottage, Redlands House and Ash Tree Cottage and the domestic dwelling on the opposite side of the carriageway, any temporary nuisance caused by passing works traffic would not be significant. On completion the TNV levels at the properties would be comparable to baseline.

#### **Welsh Hawking Centre**

3.3.6 The Welsh Hawking Centre is not considered to be a sensitive TNV receptor despite being located off the existing road within the 300m potential impact zone created by each of the five route options as the likely impacts created by the alternative alignments would be comparable to that created by the existing Five Mile Lane.

3.3.7 Opting for the Blue alignment would potentially create a slight positive effect as the main carriageway carrying the bulk of the fast moving traffic would be moved further from the Centre beyond a screen of mature deciduous trees. This impact may be beneficial but it would not be significant.

3.3.8 The alternative options would involve improving the existing road, potentially increasing traffic speed and volume and therefore TNV level but not to such an extent as to be significant.

### **Barry College of Further Education**

- 3.3.9 Barry College of Further Education is also not considered to be a sensitive TNV receptor. The site is set back approximately 120m from the existing A4226 and is separated from the road by dense deciduous woodland. None of the route alignments would move the carriageway closer to the buildings or significantly remove any of the mature vegetation used as screening.

## **3.4 Baseline Conditions**

- 3.4.1 The current traffic noise and vibration level experienced on the existing road network varies depending on time of day and year and it is likely the trends found in national traffic data would be relevant and applicable on these sections of roads.
- 3.4.2 Generally, it is predicted the national increase in motorist numbers would increase TNV levels on existing A4226 with or without a scheme implementation. This increase would have the greatest effect at the northern Sycamore Cross junction and at the southern Waycock Cross roundabout as motorists not intending to use Five Mile Lane will use the improved junctions.
- 3.4.3 The following paragraphs outline the existing road, features and sensitive receptor types that are located for each sector along the existing A4226 – Five Mile Lane carriageway.

### **Sector 1 Baseline:**

- 3.4.4 Sector 1 features an east-west aligned section of the existing A48 and Sycamore Cross junction. The road runs adjacent to farmland, private gardens, and Cottrell Park Golf Club. It is a busy section of road used by a wide spectrum of motorists including commuters, haulage operators and holiday travellers.
- 3.4.5 The road surface is in good condition and the carriageway itself is relatively straight and has good visibility; the road widens at Sycamore Cross junction integrating dedicated turning lanes. Combined, these factors allow motorists to easily achieve the designated 40mph speed limit, creating high levels of TNV.



- 3.4.6 Receptors are distributed evenly along the road, positioned at the same topographical level as the road and are generally to the north of the carriageway. Domestic dwellings are the main sensitive receptors within the Sector.

### **Sector 2 Baseline:**

- 3.4.7 The existing A4226 runs in a general north-south alignment within Sector 2, it lies adjacent to farms, domestic dwellings and farmland and in the vicinity of Redland Wood.
- 3.4.8 In Sector 2 there is one sweeping bend and overtaking is permitted in both directions, as a result traffic is able to move freely and quickly therefore TNV levels are likely to be at average or above average levels. However, there are a number of farm tracks and field accesses along the carriageway which may also help to reduce TNV levels as drivers may reduce speed in anticipation of emerging farm traffic.
- 3.4.9 There are no planned works or TNV sensitive receptors within Sector 2.

### **Sector 3 Baseline:**

- 3.4.10 Blackland Farm (TNV-3-1) is situated to the north of Sector 3, where the road remains wide and overtaking is allowed. Approximately 200m south of Blackland Farm, the road narrows and overtaking is prohibited, the bends within this section of the sector are often tight and visibility is poor. Traffic speeds and therefore TNV are often reduced as appropriate to the conditions. Infrequent field accesses may also help to reduce traffic speed and noise as drivers may reduce speed in anticipation of emerging farm traffic. However if traffic is forced to slow rapidly and unexpectedly as a result of this emerging farm traffic brief yet large increases in TNV could be caused. Tall hedges and hedgebanks along the road verges may help attenuate against actual and perceived traffic noise.
- 3.4.11 Whitton Lodge (TNV-3-2) is situated on Five Mile Lane at a cross roads leading to Llancarfan in the west and Dyffryn in the east. Traffic along these routes would create high baseline TNV levels.

### **Sector 4 Baseline:**

3.4.12 Sector 4 is a relatively narrow and straight section of the road running north-south with tall hedges on the adjacent verges.

3.4.13 There are no TNV sensitive receptors within this Sector.

### **Sector 5 Baseline:**

3.4.14 In the northern section of Sector 5, the carriageway slightly widens and overtaking is permitted. Traffic speeds are likely to be high as they pass the sensitive receptors (TNV-5-1 and TNV-5-2). TNV levels are likely to be average given that cars can travel at a steady speed, however the acceleration from overtaking vehicles may result in an increase in levels. The road then narrows slightly within into the southern section; where overtaking is prohibited past the entrance tracks to Sutton Fach Farm (TNV-5-3) and through a complex of tight blind bends where forward visibility is poor, as a result traffic speeds and TNV levels are reduced. Tall hedges on the road verges may help attenuate against actual and perceived traffic noise.

### **Sector 6 Baseline:**

3.4.15 The existing Five Mile Lane is predominately positioned in a north-west to south-east alignment within Sector 6. The road passes through a section of Barry Woodlands, where the tree canopies that enclose the carriageway result in reduced light levels and potentially visibility problems. However, the road is generally straight and wide which could allow for high speed traffic and therefore high TNV levels.

3.4.16 Adjacent to the road are blocks of deciduous dense woodland and fields with generally tall hedge boundaries, these may help to attenuate the traffic noise and reduce the perceived noise.

3.4.17 There are no TNV sensitive receptors within Sector 6.

### **Sector 7 Baseline:**

- 3.4.18 Traffic will have to slow and may become stationary when approaching the existing junction where Five Mile Lane meets the Waycock Cross roundabout with Port Road, Port Road West and Pontypridd Road, this may result in lower than average TNV level within this locality.
- 3.4.19 The road has similar characteristics to the Sycamore Cross Junction at the northern extent of Five Mile Lane and is used by a wide range of motorists using the route.
- 3.4.20 The buildings front directly onto the existing A4226 Waycock Road, Waycock Cross roundabout, Port Road West, Port Road and Pontypridd Road creating highly sensitive receptors.

## **3.5 Potential mitigation principles**

- 3.5.1 The permanent mitigation techniques as noted in the DMRB (Volume 11 Section 3, Part 7, HA 213/08, Chapter 5/1) suitable for use on this scheme include:
- 3.5.2 **Environmental barriers** – These can be in the form of earth mounding or acoustic fencing of various types or a combination of the two. Conventional environmental barriers are not effective in reducing ground borne vibration and may be only partially effective against airborne vibration. The use of reflective and absorptive barriers could also be considered.
- 3.5.3 **Low-noise surfaces** – The principal benefit of low-noise surfaces is the reduction in mid and higher frequencies of noise generated by tyres. They are less effective in addressing low frequency noise generated by heavy vehicles that may be perceived as airborne vibration. These also create a relatively smooth running surface that in some cases can help to reduce ground borne vibration.
- 3.5.4 **Speed restrictions** – The effect of the speed of vehicles on noise level is one of the most fundamental in the noise prediction process. Above 40 km/h, noise level increases with the

speed of the vehicle and a reduction in speed would normally cause a reduction in noise level. In a similar way, the volume of traffic has a direct influence on the noise level.

- 3.5.5 TNV attenuation may also be achieved by adjusting the horizontal and vertical alignments of the proposed roads. Moving the road away from sensitive receptors or placing the road within a cutting would reduce potential TNV impacts. The proposed routes utilizing these techniques would generally create lower significance impacts.
- 3.5.6 During the construction phase temporary mitigation techniques should include controlling working hours and noise levels from sites with contractual restraints; erecting temporary environmental barriers around the construction site where land is available should also be considered. Compensating homeowners for the disruption and annoyance cause may also be necessary. Temporary re-housing whilst the works are completed and installing additional insulation and glazing should also be considered.
- 3.5.7 The merits of any mitigation technique intended to attenuate TNV should be assessed against any conflicts it may cause; for example an environmental “barrier may introduce an unacceptable visual intrusion or safety implication” (DMRB Volume 11 Section 3, Part 7, HA 213/08, Chapter 5/2) or it may be uneconomically viable to construct or compensate against.

## **3.6 Construction Impacts**

- 3.6.1 The impacts caused during the construction phase could include constant above average noise and vibration from the works heavy plant and frequent sharp increases in levels caused by sudden impacts such as piling. Construction impacts are temporary and generally more localised than other impacts.

### **Construction Impact Mitigation**

- 3.6.2 In order to mitigate against the temporary construction related impacts, a number of techniques should be considered, these include: proposing contract conditions to limit noise levels from the construction site and to restrict working hours. Erecting temporary measures such as

environmental barriers around the construction site where land is available installing additional insulation and glazing and temporary re-housing could also be considered.

### 3.7 Significance

3.7.1 Generally, as the road geometry, horizontal and vertical alignment and junction pattern is similar for all of the route options, the results of the assessment do not vary greatly. Overall, each route will have a neutral or a beneficial effect on the sensitive receptors and it is unlikely any route will cause a greater annoyance to the local community than what is already experienced. Please see Volume 3 for full appraisal Tables.

**Table 3.1 : SUMMARY OF RESIDUAL EFFECTS**

RECEPTORS	ROUTE ALIGNMENT										
	BLUE		PURPLE		RED		ORANGE		GREEN		
Sector 1	Yr 1 D.M	Yr15 D.S	Yr 1 D.M	Yr15 D.S	Yr 1 D.M	Yr15 D.S	Yr 1 D.M	Yr15 D.S	Yr 1 D.M	Yr15 D.S	
TNV-1-1	-	+	-	+	-	+	-	+	-	+	
<b>Sector 2</b>	<b>No Works Proposed</b>										
<b>Sector 3</b>	<b>No Sensitive Receptors</b>										
TNV-3-1	-	-	-	-	-	-	-	-	-	-	
TNV-3-2	-	0	-	0	-	0	-	0	-	-	
			Preferred Option								
<b>Sector 4</b>	<b>No Sensitive Receptors</b>										
<b>Sector 5</b>	<b>No Sensitive Receptors</b>										
TNV-5-1	-	+	-	-	-	-	-	+	-	-	
TNV-5-2	-	-	-	0	-	0	-	-	-	0	
TNV-5-3	-	++	-	+	-	++	-	+++	-	+	
TNV-5-4	N/A		N/A		N/A		N/A		-	+++	
							Preferred Option				
<b>Sector 6</b>	<b>No Sensitive Receptors</b>										
<b>Sector 7</b>	<b>No Sensitive Receptors</b>										
TNV-7-1	-	-	-	0	-	0	-	0	-	0	
			Preferred Options								

**Sector 1 Preferred Route:**

- 3.7.2 Each potential route requires the same scope of junction improvements; each of the five routes would ultimately create a beneficial, but not significant effect on the sensitive TNV receptors. In Sector 1 there is not a preferred route option.

**Sector 2 Preferred Route:**

- 3.7.3 There are no planned works in Sector 2. The construction noise emitted from works in Sectors 1 and 3 would not cause any significant impacts to dwellings within Sector 2.

**Sector 3 Preferred Route:**

- 3.7.4 All of the routes follow similar online horizontal alignments when passing Receptor TNV-3-1 (Blackland Farm and Tynant) and would all create the same permanent adverse, but not significant effect. At this point one route cannot be distinguished from the others.

- 3.7.5 The Red Route would require the demolition of the domestic dwelling Whitton Lodge (TNV-3-2); therefore the proposed route would not cause any TNV impacts on the receptor. However, the other factors involved in relocating the residents such as the economic and social would have significant impacts. Opting for the Red route and relocating the residents would not be a preferred option.

- 3.7.6 The Purple Route may result in slight beneficial impact to Whitton Lodge (TNV-3-2) as the proposed carriageway would be constructed approximately 140m east of the existing carriageway, to which the property currently abuts. Other routes (ie. Blue, Orange and Green) may also have slight beneficial impacts on other the receptors but not to the same extent as the Purple Route. In Sector 3 the Purple Route is the preferred route option.

**Sector 4 Preferred Route:**

- 3.7.7 There are no TNV sensitive receptors within Sector 4; therefore the alignment of the route would cause no effects. In Sector 4 there is not a preferred route option.

**Sector 5 Preferred Route:**

- 3.7.8 The impacts created by each route vary quite dramatically where the route horizontal alignments are at their most different. Following the implementation of mitigation measures, the Blue and Orange Route may have a beneficial impact on Grovelands Farm (TNV-5-1) and as the route will be further away from the existing carriageway. The other routes may cause adverse impacts as additional junctions in close proximity to the dwellings and improved carriageway designs may increase levels of TNV. Beneficial impacts at Grovelands Farm as a result of the Routes Blue and Orange will be offset by the adverse impacts caused at Northcliff Cottage (TNV-5-2) as the carriageway is moved closer to the dwelling. All routes, but in particular the Orange Route, provide beneficial effects for TNV-5-3 (Sutton Fach Farm).
- 3.7.9 The Green Route will provide a significant benefit for the residents of Sutton Mawr (TNV-5-4) as the main carriageway would be relocated approximately 300m away from their dwelling. This receptor has not been assessed for the Blue, Purple, Red and Orange Routes as the buildings are beyond the 300m study area.
- 3.7.10 Overall the Orange Route is the preferred option in Sector 5 as it creates greater significant beneficial impacts than the other routes.

**Sector 6 Preferred Route:**

- 3.7.11 There are no TNV sensitive receptors within Sector 6; therefore the route realignments would not cause any effects. In Sector 6 there is not a preferred route option.

**Sector 7 Preferred Route:**

- 3.7.12 Traffic will have to slow on the approach to a junction regardless whether it is a single or a double arrangement, this should therefore reduce local TNV levels. The double roundabout incorporated into the Blue Route may have a higher traffic capacity than the single roundabout options present in the other routes; this higher capacity may result in increased amounts of queuing and stationary traffic adjacent to the sensitive dwellings. This may cause an increase in TNV annoyance compared to the single roundabout options. Therefore the Purple, Red, Orange or Green Route is the preferred route option in Sector 7.

## **3.8 Overall Significance**

3.8.1 Overall, the Orange Route is the preferred route option when assessed under Traffic Noise and Vibration impact criteria. Following the installation of appropriate mitigation the route could offer a significant positive benefit on one occasion and it does not produce a significant adverse effect to receptors along its whole length. The Orange Route would cause the least noise annoyance to the local community.

## **3.9 Limitations, Assumptions and Further Work**

3.9.1 It has been assumed that junctions and roundabouts on the constructed roads would slow traffic and reduce TNV levels at that point, whereas wide, straight sections of the road would allow fast moving traffic and therefore the highest levels of TNV.

3.9.2 Other assumptions include: the predicted increase in traffic volume (from 7000 VPD up 9-13% by the baseline year under central growth conditions or up 12-16% under high growth conditions. For assessment year 15 (2029) the Do-Minimum increase may be 21-26%. Improvements to Five Mile Lane may increase this to 38-48% on the baseline year causing an increase in the baseline TNV level. The assessment assumes that within the next fifteen years significant steps will not be made to only use hybrid or electric cars which emit an extremely low level of noise and vibration.

3.9.3 Generalised TNV criteria have been established for the purposes of this assessment - traffic moving at a constant high speed would emit more noise and vibration than traffic decelerating on the approach to a junction or roundabout than accelerating on completing the manoeuvre.

3.9.4 The main limitation of this study was the sole use of desk-based assessment as without the use of complex measuring and data modelling equipment the actual impacts cannot be measured.

3.9.5 Further work should involve completing the Stage 2 WeITAG and the DMRB methodology of assessment as described in the documents.



## 4 Local Air Quality

### 4.1 Introduction / Impact Description

- 4.1.1 The WeITAG guidance states “Exhaust emissions from transport sources disperse in the air, affecting its quality. A deterioration in local air quality can cause damage to human health while certain pollutants can affect the world’s climate (contributing to global warming through greenhouse gas emissions).” The two main local pollutants that affect local air quality are particles (PM<sup>10</sup>) and nitrogen dioxide (NO<sup>2</sup>). This chapter aims to draw conclusions on which of the five proposed new routes for the A4226 Five Mile Lane would cause least impacts with regards to local air quality and greenhouse gasses for the local community.
- 4.1.2 The existing air quality varies and will depend on a number of factors including: vehicle operation (i.e. average speed, variation in speed, road geometry and engine temperature), vehicle type and fuel type (i.e. petrol or diesel).

### 4.2 Appraisal Methodology

- 4.2.1 The methodology used to assess the impacts on Local Air Quality and Greenhouse Gas Emissions as a result of the proposed road scheme on the A4226 Five Mile Lane follows current ‘best practice’ WeITAG and DMRB guidance published by the Welsh Assembly Government and the Highway Agency respectively.
- 4.2.2 The process adopts the standard approach using baseline desktop studies to identify potential sensitive receptors likely to be significantly affected by the proposed scheme and the potential effects brought about by the proposed development. The chapter will then judge the magnitude of effects and undertake a qualitative assessment of their significance following implementation with a quantitative assessment being undertaken at Stage 2. Impacts have been assessed against the baseline (Do Minimum), 1<sup>st</sup> Year Do Something (worst case scenario) and 15 Year Do

Something for each receptor and road alignment option. A description of the practical mitigation techniques available is also provided.

### **Double Counting**

- 4.2.3 In order to avoid double-counting of impacts, where possible, receptors have been assessed in the chapters according to where the impacts experienced will be most significant.

### **Cumulative Effects**

- 4.2.4 At this stage, there haven't been any potential cumulative air quality effects predicted or assessed as a result of completing this scheme.

## **4.3 Study Area / Sensitivity of Receptors**

- 4.3.1 The investigation was restricted to within a 200m buffer of each of the five potential routes, since "local air quality impacts are likely to be highly localised in the vicinity of the polluting sources" (WeITAG p112). Please refer to [figures 4.1-4.5](#).
- 4.3.2 All potential receptors within the 200m zones were mapped and their building function recorded.
- 4.3.3 Residents whose dwellings create the frontage to the proposed route were considered to be high sensitivity receptors. Domestic dwellings within the 200m zone that were considered unlikely to experience a noticeable change in air quality levels were discounted from further assessment at this point in the process. Preliminary receptors with low sensitivity such as barns, silos and storage facilities were also discounted from further assessment. Buildings of similar location, aspect, function and sensitivity were grouped and appraised in unison, as the potential impacts would be equal at each address.
- 4.3.4 The main focus of the study has been placed on air quality sensitive receptors, which could potentially experience significant levels of effect as a result of the implementation of the scheme.

- 4.3.5 The air quality sensitive receptors that have been assessed are: private dwellings and business premises and all designated sites (SAC's, SPAs and SSSIs), which are located with 200m study area. Any receptors outside of this study area boundary have not been assessed, as it is assumed that they are unlikely to be significantly affected by the proposals in terms of air quality.

### **Discounted Dwellings and Premises**

#### **Redlands Cottage, Redlands House and Ash Tree Cottage**

- 4.3.6 There will not be any construction works in the immediate vicinity of Redlands Cottage, Redlands House and Ash Tree Cottage and the domestic dwelling on the opposite side of the carriageway, any temporary nuisance caused by passing works traffic would not be significant, once mitigation measures have been put in place. On completion the air quality levels at the properties will be comparable to baseline.

#### **Welsh Hawking Centre**

- 4.3.7 The Welsh Hawking Centre is not considered to be a sensitive AQ receptor despite being located off the existing road within the 200m potential impact zone created by each of the five route options as the likely impacts on air quality arising from the alternative route alignments would be comparable to those arising from traffic using the existing Five Mile Lane.
- 4.3.8 The Blue Route alignment would potentially create a slight positive effect, as the main carriageway carrying the bulk of the fast moving traffic would be moved further from the Hawking Centre beyond a screen of mature deciduous trees. This impact may be beneficial but it would not be significant.
- 4.3.9 The alternative options would involve improving the existing road, following the same alignment. However it is predicted that existing mature vegetation would be capable of ameliorating though confinement any rises in air pollution, therefore levels would remain comparable to those of the baseline.

### **Barry College of Further Education**

4.3.10 Barry College of Further Education is currently not in use as an educational facility and therefore not considered to be a sensitive receptor. The site is also set back approximately 120m from the existing A4226 and is separated from the road by dense deciduous woodland, which is likely to mitigate any deterioration in air quality levels. None of the five route alignments would move the carriageway closer to the buildings and therefore no deterioration in air quality would occur.

## **4.4 Baseline Conditions**

4.4.1 The following paragraphs outline the existing road, features and sensitive receptor types that are located for each sector along the existing A4226 – Five Mile Lane carriageway.

### **Sector 1 Baseline:**

4.4.2 Sector 1 features an east-west aligned section of the existing A48 and Sycamore Cross junction. The road runs adjacent to farmland, private gardens, and Cottrell Park Golf Club. It is a busy section of road used by a wide spectrum of motorists including commuters, local residents, haulage operators and visitors.

4.4.3 The road surface is in good condition and the carriageway itself is relatively straight and has good visibility; the road widens at Sycamore Cross junction integrating dedicating turning lanes. The slow moving or stationary traffic at the junction may locally cause higher than average levels of pollutants within the air.

4.4.4 Domestic dwellings are the main sensitive receptors within the sector and are predominately located to the northwest of the existing carriageway.

### **Sector 2 Baseline:**

4.4.5 The existing A4226 runs in a general north-south alignment within Sector 2, it lies adjacent to farms, domestic dwellings and farmland and in the vicinity of Redland Wood.

4.4.6 Within the sector, three sensitive domestic dwelling receptors have been identified. These receptors are distributed to the sector northern and southern extents at the same approximate topographical level at the road.

4.4.7 In Sector 2 there is one sweeping bend and overtaking is permitted in both directions, as a result traffic is able to move freely and quickly therefore air quality is likely to be at average or above average levels. However, there are a number of farm tracks, field access and other informal junctions along the section of road, which could cause traffic to slow rapidly and unexpectedly. This may cause deterioration in local air quality levels.

### **Sector 3 Baseline:**

4.4.8 Blackland Farm (TNV-3-1) is situated to the north of Sector 3, where the road remains wide and overtaking is allowed. Approximately 200m south of Blackland Farm, the road narrows and overtaking is prohibited, the bends within this section of the sector are often tight and visibility is poor. Traffic speeds and therefore reduced as appropriate to the conditions, resulting in slower moving traffic within this area. Infrequent field access and informal junctions may also help to reduce traffic speed. As a result local air quality within this Sector may be lower than average.

4.4.9 There are two sensitive receptors within Sector 3, Blackland Farm (Receptor AQ-3-1) and Whitton Lodge (Receptor AQ-3-2). The former is situated to the northern boundary of the Sector, while Whitton Lodge is situated on Five Mile Lane at a cross roads leading to Llancarfan in the west and Duffryn in the east. Traffic within this sector generally moves freely, therefore air quality levels would be expected to be typical for the volume of traffic that passes along it. However levels may deteriorate close to the crossroads near Whitton Lodge.

### **Sector 4 Baseline:**

4.4.10 Sector 4 is a relatively narrow and straight section of the road running north-south with tall hedges on the adjacent verges.

4.4.11 There are no sensitive receptors within this sector.

### **Sector 5 Baseline:**

4.4.12 In the northern section Five Mile Lane is relatively wide and overtaking is permitted and traffic speeds are likely to be high at they pass the sensitive receptors. Air quality is likely to be average given that cars can travel at a steady speed, however the acceleration from overtaking vehicles may result in deterioration in air quality. The road then narrows into the southern section, where overtaking is prohibited past the entrance tracks to Sutton Fach Farm and Sutton Mawr through a complex of tight blind bends, as a result traffic speeds are reduced, therefore local air quality may be lower than expected within this section of the Sector.

### **Sector 6 Baseline:**

4.4.13 The existing Five Mile Lane is predominately positioned in a north-west to south-east alignment within Sector 6. The road is generally straight and wide which could allow for traffic to travel at steady speeds.

4.4.14 Adjacent to either side of the road are blocks of deciduous dense woodland and fields with hedge boundaries. The woodland forms part of the larger Barry Woodlands SSSI and is considered to be a sensitive receptor.

### **Sector 7 Baseline:**

4.4.15 Traffic will have to slow and may become stationary when approaching the existing junction where Five Mile Lane meets the Waycock Cross roundabout with Port Road, Port Road West and Pontypridd Road, this may result in lower than average air quality within this locality.

4.4.16 The road at Waycock Cross has similar characteristics to the Sycamore Cross Junction at the northern extent of Five Mile Lane and is used by a wide range of motorists using the route.

4.4.17 The buildings front directly onto the existing A4226 Waycock Road, Waycock Cross roundabout, Port Road West, Port Road and Pontypridd Road creating highly sensitive receptors.

## 4.5 Construction Impacts

4.5.1 During the construction phase of the works air quality is likely to temporarily reduce for receptors within close proximity of the works, due to associated traffic and construction dust. Mitigation measures such as wheel and body washing, sheeting of lorries prior to leaving site, spraying of roads, and provision of visual barriers, would be carried out to minimise the effects of dust during the construction period.

## 4.6 Potential mitigation principles

4.6.1 The permanent mitigation techniques as noted in the DMRB (Volume 11 Section 3, Part 1, HA 207/07, Chapter 3/6) suitable for use on this scheme include:

- Increasing the distance between the road and the sensitive location. Realignment by only a few tens of metres may provide significant benefits.
- Orientation of the road relative to locally prevailing winds. If a route can be chosen so that a sensitive location tends to be upwind of the road, average concentrations at that location will be lower than if the sensitive locations tend to be downwind.
- Junctions and intersections would be sited to minimize the impact on air quality at sensitive locations. Slow traffic negotiating intersections generally produces greater amounts of pollution than freely flowing traffic.
- Placing the road in a cutting or on an embankment can increase the distance between a roadside receptor and the vehicles thus allowing more time for dispersion and reducing concentrations at the receptor.

## 4.7 Overall Significance

**Table 4.1: SUMMARY OF RESIDUAL EFFECTS**

RECEPTORS	ROUTE ALIGNMENT									
	BLUE ROUTE		PURPLE ROUTE		RED ROUTE		ORANGE ROUTE		GREEN ROUTE	
Sector 1	WC	RE	WC	RE	WC	RE	WC	RE	WC	RE
AQ-1-1	--	++	--	++	--	++	--	++	--	++
Sector 2	No Works Proposed									
Sector 3										
AQ-3-1	-	++	-	++	-	++	-	++	-	++
AQ-3-2	--	+	-	++	0	0	-	+	-	+
	Preferred Option									
Sector 4	No Sensitive Receptors									
Sector 5										
AQ-5-1	-	++	--	-	---	-	--	-	---	-
AQ-5-2	---	-	0	0	---	--	---	--	---	--
AQ-5-3	N/A		-	++	-	++	N/A		-	++
	Preferred Option									
Sector 6										
AQ-6-1	0	0	0	0	0	0	0	0	0	0
	Preferred Options									
Sector 7										
AQ-7-1	---	-	--	0	--	0	--	0	--	0

**Note**

WC = Worst Case (i.e. 1<sup>st</sup> Year Do Something)

RE = Residual (i.e. After mitigation measures have been put in place)

**Sector 1 Preferred Route:**

4.7.1 Each potential route requires the same scope of junction improvements; each of the five routes will ultimately create a beneficial, effect on the sensitive air quality receptors.

**1 there is not a preferred Do Something option.**

**Sector 2 Preferred Route:**

4.7.2 There are no planned works in Sector 2.



**Sector 3 Preferred Route:**

- 4.7.3 All of the routes follow the same online position when passing Receptor AQ-3-1 (Blackland Farm and Tynant) and would all create, once mitigation measures have been put in place, significant beneficial effects. At this point one route cannot be distinguished from the others.
- 4.7.4 The Purple Route may result in significant beneficial impacts to Whitton Lodge (AQ-3-2) as the proposed carriageway would be constructed approximately 140m east of the existing carriageway, to which the property currently abuts. Other routes (ie. Blue, Orange and Green) may also have beneficial impacts on other receptors within the sector, as the proposed road would be constructed at a greater distance than the existing road, however these impacts are unlikely to be significant.
- 4.7.5 The Red Route would require the demolition of the domestic dwelling Whitton Lodge; therefore the proposed route would not cause any air quality impacts on the receptor. However, the other factors involved in relocating the residents such as the economic and social would have significant impacts. Opting for the Red route and relocating the residents would not be a preferred option.

**In Sector 3 the Purple Route is the preferred Do Something option**

**Sector 4 Preferred Route:**

- 4.7.6 There are no air quality sensitive receptors within Sector 4; therefore the alignment of the route would cause no effects.

**In Sector 4 there is not a preferred Do Something option.**

**Sector 5 Preferred Route:**

- 4.7.7 The Blue Route may have some beneficial impacts, on Grovelands Farm (AQ-5-1) once mitigation measures have been put in place, as the route will be further away from the existing carriageway. For other routes, impacts are likely to be adverse due to the effects of the adjacent roundabout, as the accelerating/decelerating traffic causes deterioration in air quality

within this locality. Impacts from all routes on receptor AQ-5-2 (Northcliff Cottage) are likely to be neutral to adverse. Adverse impacts are likely to be greatest if the Red, Orange or Green Route is selected as the feeder road for the roundabout passes within a few metres of the property.

- 4.7.8 The Purple, Red and Green Routes may result in benefits to receptor AQ-5-3 (Sutton Farm), as the proposed route will be at a greater distance from the farm than the existing carriageway. The Blue and Orange Routes do not impact on the receptor and as they are outside of the 200m-study area, they have not been assessed.

**In Sector 5 the Blue Route is the preferred Do Something option.**

**Sector 6 Preferred Route:**

- 4.7.9 All of the routes follow the same online position when passing Receptor AQ-6-1 (Barry Woodland SSSI) and are unlikely to impact on air quality, as the existing woodland may potentially absorb any changes in air quality. At this point one route cannot be distinguished from the others.

**In Sector 6 there is not a preferred Do Something option.**

**Sector 7 Preferred Route:**

- 4.7.10 The Blue Route, which will incorporate a double roundabout, may result in slower moving traffic for a longer period of time compared to a single roundabout, especially at peak hours. Therefore it may result in greater effects on air quality than the other routes. Routes 2-5 will incorporate the existing roundabout, therefore depending on the volume of traffic, vehicles may be able to move away from the sensitive receptors more quickly, resulting in less pollutants being emitted into the atmosphere.

**In Sector 7 the Purple, Red, Orange or Green Route is the preferred Do Something options.**

## **4.8 Overall Result**

- 4.8.1 Overall, the Purple Route is the preferred Do Something option when assessed in terms of Air Quality impact criteria alone.

## **4.9 Limitations, Assumptions and Further Work**

- 4.9.1 It has been assumed that junctions and roundabouts on the constructed roads will slow traffic and therefore reduce existing air quality levels at that point, whereas straight sections of the road will allow for traffic to move at a steady speed and therefore emissions may be lower.
- 4.9.2 Other assumptions include: vehicle emission standards will be tightened approximately every five years, resulting in a decrease in emissions of particles and nitrogen oxide. It is also assumed that the predicted national increase in traffic volume (amount) will happen causing an increase in the emissions of potentially harmful pollutants.
- 4.9.3 The main limitation of this study was the sole use of desk-based assessment as without the use of complex measuring and data modelling equipment the actual impacts cannot be measured.
- 4.9.4 Further work would involve completing the Stage 2 WeITAG and the DMRB methodology of assessment as described in the documents.

## 5 Landscape and Vehicle Travellers Effects

### 5.1 Introduction

- 5.1.1 This chapter describes the potential effects of the scheme on the landscape of the area surrounding the proposed road alignments. It assesses three specific sub-topics: landscape character, visual amenity and vehicle travellers.
- 5.1.2 This chapter provides a summary of the baseline conditions established by the desk-based studies and field surveys, and assesses the likely effects of the scheme on landscape resources during construction and in the short term as a worst-case scenario. Mitigation measures to integrate the scheme into the landscape and minimise adverse effects are considered and the residual effect on the landscape resource assessed. In conclusion recommendations are put forward to further minimise adverse effects towards adoption of best route option.
- 5.1.3 Field surveys and desk-based studies conducted since the completion of the Stage 1 Assessment report (SBC 2008) include landscape features surveys, appraisal of landscape character, landscape quality, visual envelope and receptor mapping, and review of CCW's LANDMAP data.

### 5.2 Landscape Effects Appraisal Methodology

- 5.2.1 The assessment has been undertaken in accordance with the guidance set out under the appraisal of impacts on landscape as set within the WelTAG framework; in turn referring to the guidance set out in detail in DMRB as well as by the Landscape Institute and Institute of Environmental Management and Assessment guidelines:
- “WelTAG” v7.1 June 2008
  - “DMRB volume 11, section 3, part 5 Landscape Effects” August 2008
  - “Guidelines for Landscape and Visual Impact Assessment” Landscape Institute/ Institute of Environmental Management & Assessment 2002
  - Countryside Council for Wales LANDMAP methodology

5.2.2 The function of this section of the ISAR is to collate baseline surveys completed following the Stage 1 Assessment report (SBC 2008) and assess the potential effects of progressed route alignment options, focusing on significant effects as well as those that differentiate between route alignment options. LANDMAP data supplemented the analysis and categorisation of landscape character, visual amenity and light levels at night.

### **Assessment of Significance on Landscape Character**

5.2.3 Landscape effects would be derived from physical changes to the landscape that may cause changes in character and how the landscape is experienced and valued. The landscape classification and evaluation is the baseline against which the effect of the proposed scheme is assessed.

5.2.4 Assessment of the significance of effects on landscape character is the result of a combination of magnitude of change and the capacity of the landscape to accommodate or accept the change that is predicted to occur.

5.2.5 In applying the criteria, the potential beneficial as well as adverse effects of the scheme have been taken into account. Assessment of magnitude is based on factors including geographical extent, prominence, degree of alteration/intrusion and perceived change, reversibility, duration and potential mitigation. In assessing how the alignments would affect the existing landscape the following factors are considered:

- The extent to which the road would be visible in the landscape;
- The character of the landscape and its capacity to accept changes of the type and scale proposed;
- The extent to which effects can be mitigated and the road can be integrated into the landscape.

5.2.6 The following criteria have been used to define magnitude:

- **High Magnitude:** The scheme or specific effect will result in substantial loss or major alteration to key elements of the landscape resource to the extent that there is a fundamental change to landscape character.

- **Medium Magnitude:** The scheme or specific effect will result in loss or alteration to key elements of the landscape resource to the extent that there is a partial change to landscape character.
- **Low Magnitude:** The scheme or specific effect will result in minor loss or alteration to key elements of the landscape resource to the extent that there may be some slight perception of change to landscape character.
- **Negligible Magnitude:** The scheme or specific effect will result in very minor loss or alteration to key elements of the landscape resource and there would be no fundamental change to landscape character.

5.2.7 Landscape capacity refers to the degree to which a particular landscape character area (LCA) or type is able to accommodate change of a specific type without significant effects in its character, or overall change of landscape character type.

5.2.8 Consequently, capacity is based on the type of development proposed, a consideration of sensitivity, landscape value (quality, situation and rarity) attached to the landscape and visibility from within the LCA. For the purposes of this landscape character assessment the following criteria have been adopted for assessing capacity.

- **Low Capacity:** A landscape of high value, sensitive to this form of development, or where views of the road scheme may be visible from a large proportion of the character area. As a consequence significant effects on landscape character or quality are likely.
- **Moderate Capacity:** A landscape that has medium sensitivity to the type and form of development proposed and any change caused by the proposed development would be unlikely to have a significant effect on landscape character or quality that could not be mitigated against.
- **High Capacity:** A landscape of low value, not sensitive to this type of development, unlikely to be within a designated landscape and contain few other constraints imposed by landscape character elements. Or where dominant views from within the LCA of the proposed road scheme are unlikely. As a result development of the type proposed is very unlikely to have a significant effect on landscape character or quality.

5.2.9 As stated above, the relationship and combinations of magnitude and capacity determine the significance of landscape effects. Significance increases in line with the capacity of the landscape character area (LCA) and the magnitude of effect. Differentiation is made between the sensitivity of particular receptors based upon their value within the landscape. A greater landscape capacity or a smaller magnitude of landscape effect moderates and/or lessens the significance of effect. The table below sets out the derivation of significance for effects on landscape character.

**Table 5.1 Significance of Effect on Landscape Character**

Magnitude of Effect on Landscape Character	Landscape Capacity		
	Low	Moderate	High
High	Substantial*	High-Moderate*	Moderate
Medium	High-Moderate*	Moderate	Slight
Low	Moderate	Slight	Slight-Neutral
Negligible	Slight	Slight-Neutral	Slight-Neutral

**Note:** Substantial and High-Moderate is considered significant in terms of the EIA Regulations and as such has been asterisked.

### **Assessment of Significance on Visual Amenity**

5.2.10 Effects on visual amenity relate to changes in the composition of views and people’s responses to these changes which have been assessed at locations frequented by members of the public such as dwellings and public rights of way. Relevant considerations for the visual effect analysis included:

- The magnitude of the change to the visual quality that would be caused by the proposed road alignments including length of road visible, the roads potential prominence, the distance between road and receptor, and the context of the view;
- The receptor location, number of people within each potential receptor group and the nature of these receptor groups and their sensitivities (e.g. will people view the site during work or leisure activities, whilst in transit, etc.); and
- The existing visual character and quality of the view (including whether it is subject to landscape designations, the presence of positive or negative visual detractors, etc.).

5.2.11 The level of significance of effect upon visual amenity is determined by correlating the magnitude of effect with the sensitivity of receptors. When considering the potential visibility of the scheme, the following features are taken into account:

- the level of the road relative to the existing ground level (including mounds, bunds, cuttings, false cuttings);
- the main carriageway, side roads, junctions, lighting and structures;
- traffic on the road (screened traffic is by a barrier (for example a cutting or woodland) of over 4 metre deep/tall, whereas ‘not fully screened’ refers to the fact that larger vehicles would be visible but smaller cars are not); and
- loss of landscape elements.

5.2.12 The magnitude of effect on visual amenity is based upon the following criteria:

- **High Magnitude:** Where the scheme will result in a significant or dominant and immediately apparent feature of the view that affects and changes the overall character of the view and to which other features become subordinate.
- **Medium Magnitude:** Where the scheme forms a visible and recognisable new element within the overall view and is readily noticed by the viewer without changing the overall nature of the view.
- **Low Magnitude:** The scheme will constitute a minor component of the wider view, which might be missed by the casual observer. Awareness of the development will not have a marked effect on the overall quality of the view.
- **Negligible Magnitude:** The presence of the proposed road scheme has no effect on the perception of the landscape.

5.2.13 Receptor type is a key factor in determining sensitivity, although other factors listed can influence the sensitivity of the given receptor to visual change.

- **High Sensitivity:** Residents with views towards the route alignments or people undertaking recreation where the landscape within which the road is seen is the primary reason for attraction (e.g. walkers, hikers, riders, scenic route users). Receptors are more likely to be within a recognised designated landscape and could be attracted to visit more frequently, or stay for longer by virtue of the view.



- **Medium Sensitivity:** Outdoor workers (farm workers etc.) and people undertaking recreational pursuits where the landscape within which the scheme is seen is not the primary reason for attraction (e.g. golfers, water based activities, theme and adventure parks, historic sites, parks and gardens, minor road users). This category normally includes residents with indirect views towards the development but for the purposes of this study the worst-case scenario is recorded i.e. all residents are high sensitivity. Receptors are less likely to be within a recognised designated landscape and could be attracted to visit more frequently, or stay for longer by virtue of the facilities and features of the particular attraction.
- **Low Sensitivity:** People travelling through the landscape (by car, train, bus etc.). Users of indoor workplaces and indoor community facilities. Receptors are unlikely to be within a recognised designated landscape and are most likely to be present at a given viewpoint by virtue of some other need or necessity unrelated to the landscape.

5.2.14 For brevity of reporting receptor groups have been established where the effects on a group of adjacent receptors would be similar. Where these groups include both residents and outdoor workers, the effect on residents' visual amenity has been recorded as the worst-case scenario.

5.2.15 Receptors assessed in detail are those that are both likely to be significantly affected by the road scheme and fall within the Visual Envelope as shown on the Visual Envelope Map.

### **Visual Envelope Map (VEM)**

5.2.16 The maximum potential extent of the proposed road's visibility has been determined using computer generated data to create a Visual Envelope Map ([figure 5.2 VEM](#)). The computer visibility analysis does have a number of limitations. VEMs prepared solely on the basis of the digital terrain model do not take into account the screening effects of surface features such as woodland, hedges and hedgebanks, walls, buildings and other local landscape features and local topographic variations. The VEM was generated to where vehicles 4 metres tall and less would be visible but only from 11 points along the roads length. Consequently, the VEM diagram should be considered as the worst-case and be used as a tool in determining general theoretical visibility rather than absolute visibility prior to being verified in the field which was done at seven points along the existing road and across the alignment corridor.

5.2.17 Private dwellings, public buildings and public footpaths that fall within the field verified Visual Envelope or any that fall out with it due to the location in comparison to the verification point are included within the visual impact assessment.

5.2.18 The table below, based on Landscape Institute Guidelines, sets out the derivation of significance for effects on visual amenity:

**Table 5.2 Significance of Effect on Visual Amenity**

Magnitude of Visual Effect	Sensitivity of Receptor		
	High	Medium	Low
High	Substantial*	High-Moderate*	Moderate
Medium	High-Moderate*	Moderate	Slight
Low	Moderate	Slight	Slight-Neutral
Negligible	Slight	Slight-Neutral	Slight-Neutral

**Note:** Substantial and High-Moderate is considered significant in terms of the EIA Regulations and as such has been asterisked.

5.2.19 The above derivations of significance can be translated into WelTAG’s seven point scale used in the comparison between options and environmental assessment topics:

**Table 5.3 Definition of the '7-Point Scale' For Use in Appraisals**

Significance Category	WelTAG Scale	Symbol	SEA Definition	Example (Landscape effects)
Substantial	Large Positive Benefit	+++	Significant beneficial effect	Very few proposals will merit this score.
High-Moderate	Moderate Positive Benefit	++	Significant beneficial effect	Proposals enhance landscape because they: <ul style="list-style-type: none"> <li>• fit in very well;</li> <li>• have potential to restore characteristic features;</li> <li>• enable a sense of place and scale;</li> <li>• enable a sense of quality; and</li> <li>• further government objectives.</li> </ul>
Moderate				
Slight	Slight Positive Benefit	+	Beneficial effect, but not significant	The proposals: <ul style="list-style-type: none"> <li>• fit in well;</li> <li>• incorporate mitigation;</li> <li>• enable a sense of place and scale maintain or enhance existing character outside protected areas; and</li> <li>• avoid conflict with government policies.</li> </ul>

Slight-Neutral	No effect or neutral effect	0	No effect	The proposals: <ul style="list-style-type: none"> <li>• complement the landscape;</li> <li>• incorporate mitigation;</li> <li>• avoid being visually intrusive and don't affect tranquility;</li> <li>• maintain existing landscape character outside protected areas; and</li> <li>• avoid conflict with Government policies.</li> </ul>
Slight	Slight Adverse Effect	-	Adverse effect, but not significant	The proposals: <ul style="list-style-type: none"> <li>• do not quite fit the landscape/ townscape;</li> <li>• impact on certain views;</li> <li>• cannot be completely mitigated;</li> <li>• affect an area of recognised landscape quality; and</li> <li>• conflict with local authority policies.</li> </ul>
Moderate	Moderate Adverse Effect	--	Significant Adverse effect	The proposals: <ul style="list-style-type: none"> <li>• are out of scale with the landscape/ townscape;</li> <li>• are visually intrusive;</li> <li>• cannot be fully mitigated;</li> <li>• will have an adverse impact on a landscape/townscape of recognised quality; and</li> <li>• conflict with local and national policies.</li> </ul>
High-Moderate				
Substantial	Severe Adverse Effect	---	Significant adverse effect	Proposals are: <ul style="list-style-type: none"> <li>• at complete variance with the landscape;</li> <li>• highly visual and intrusive;</li> <li>• damaging to characteristic features;</li> <li>• elements of change in very high quality or highly vulnerable landscapes;</li> <li>• not capable of being mitigated for; and</li> <li>• not reconcilable with Government policy.</li> </ul>

Source: WelTAG appendices pg E.9

### **Assessment of Road Lighting and Signage**

5.2.20 The assessment does not consider the effects of signage or gantries. This would be undertaken at the next stage of the EIA process once signage design has been progressed.

5.2.21 The effects of lighting have been included within the visual amenity assessment but with consideration also for landscape character. At this stage the assessment uses LANDMAP's night time pollution analysis as the baseline against which to assess the unmitigated effects of proposed road lighting proposed around junctions.

### **Vehicle Travellers Effects Appraisal Methodology**

5.2.22 The appraisal of effects on Vehicle Travellers follows methodology set out in DMRB; there is no equivalent under WelTAG. The objective is to undertake sufficient assessment to identify the

factors and effects concerning vehicle travellers to be taken into account by the Design Organisation in developing and refining route options in agreement with the Overseeing Department's Project Manager.

5.2.23 The DMRB Volume 11, Section 3, Part 9 was used to provide guidance on the assessment. The effects on vehicle travellers of the proposed scheme were assessed using the following criteria:

- View from the road; and
- Driver Stress.

5.2.24 Assessment of effects on vehicle travellers has been combined with the landscape assessment:

- as both topics are assessed against the same baseline landscape character;
- to avoid double counting; and
- when considering potential mitigation measures the effect of views from and along the road have been taken into account alongside effects on visual amenity in views towards the road as well as effects on landscape character due to the scheme.

### **View from the Road**

5.2.25 This criterion determines whether the new alignments provide opportunities for views to the landscape for road users and the quality of those views. Views from the road are assessed taking into account wide differences between route options, landscape character and quality, extent of exposure to scenery and any especially good or bad potential views along the route.

5.2.26 Four categories are used in assessing travellers' ability to see the surrounding landscape:

- **No view:** road in deep cutting or contained by earth bunds, environmental barriers or adjacent structures.
- **Restricted view:** frequent cuttings or structures blocking the view.
- **Intermittent view:** road generally at ground level but with shallow cuttings or existing barriers at intervals (such as hedgerows).
- **Open view:** appropriating DMRB's guidelines to the study area an open view has been defined for this study as a view extending to the landscape – i.e. are on embankment or level with landform.

5.2.27 Hedgerows have not been considered as screening elements within the assessment of views from the road for two primary reasons:

- As an important landscape element hedgerows would be a likely mitigation measure to minimise adverse effects on landscape character and visual amenity, but mitigation principles are yet to be agreed; and
- Views from the road are a secondary consideration with consideration first for integrating the road in the landscape, and other potential significant effects, so the potential views described would be sought along lengths where not prohibited by mitigation measures.

### **Driver Stress**

5.2.28 Driver stress is defined for the purposes of environmental assessment as the adverse mental and physiological effects experienced by a driver traversing a road network. The aim of reducing driver stress is to maintain driving standards, reduce risk taking, reduce chances of driver fatigue and maintain concentration.

5.2.29 Driver stress has three main components: frustration, fear of potential accidents, and uncertainty relating to the route being followed. An initial evaluation of these factors is qualitatively described in comparison to the do minimum baseline.

### **Double Counting**

5.2.30 Where applicable overlap between criteria and double counting has been identified and then assessed under one criterion as far as practicable at this stage to avoid distortion of the importance of certain elements in the appraisal process:

- Heritage – includes assessment of historical landscapes, Scheduled Ancient Monuments and registered parks and gardens as applicable
- Biodiversity – includes assessment of effects on biodiversity due to changes to the vegetative resource and assessment of lighting effects on bats
- Social Impacts – includes assessment of pedestrian routes, cycle routes, bridleways and community facilities.

- Land Use – includes assessment impacts of Red option of Whitton Lodge which is not included under visual amenity here as it would be demolished if the Red option was taken forward in its current form.

### **Cumulative Effects**

5.2.31 Cumulative landscape effects will be assessed during upcoming stages if applicable.

## **5.3 Baseline Conditions**

### **Wider Landscape Context**

- 5.3.1 The Vale of Glamorgan is an attractive and productive lowland landscape on the north coast of the Severn estuary and Bristol Channel. The county is bordered by the large urban centres of Cardiff to the east, Bridgend to the west and by the M4 to the north and coast to the south. It covers an area of approximately 335 square kilometres of which about 70% is agricultural land<sup>5</sup>.
- 5.3.2 There are three broad character types within the Vale in visual terms. The Rural Vale, The South East Developed Vale and The Coast; The Rural Vale is further divided into the North Rural Vale and the South Rural Vale divided by the A48 Roman Road.
- 5.3.3 Five Mile Lane forms a broad boundary between two variations of the South Rural Vale connecting to Barry within The South East Developed Vale. The underlying Carboniferous and Liassic Limestone is the basis to the characteristics of fertile well drained soils and hence cultivation and settlement since Roman times. Lowland plateaux with a gently undulating surface dips into shallow or steep wooded valleys; the landscape is dissected by picturesque valleys to the west and a more complex hill and basin system to the east of Five Mile Lane. Barry (the Vale's largest settlement) and large-scale detractors influence rural perception within the managed farmland from high ground.

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5 White Consultants 1999 'Landscapes Working for the Vale of Glamorgan'

5.3.4 Prevalent in the South Rural Vale is a Norman nucleated settlement pattern based on manor and church. Today the South East Vale is the most developed with Barry at its heart. The modern settlement of Barry is effectively a conurbation of a number of villages that have built up since the 19th century as a result of industrial activity at Barry docks. The western edge of the study area touches on the Llancarfan Historic Landscape as listed on the Register of Landscapes of Outstanding Historic Importance in Wales<sup>6</sup>. For further details see chapter 8 Heritage.

### **Study Area**

5.3.5 Progressing from Stage One the study area has become focused on the existing road and proposed route option corridors, stretching from the limestone ridge and associated Roman A48 Road in the north down a broad southerly extending ridge finger, a remnant of limestone plateau and the watershed between the Waycock and Llancarfan valleys. The high ground gives way to the Lower Waycock Valley before rising again through woodland to meet the coastal plateau between Cardiff Airport in the West and Barry in the East.

### **Landscape Evaluation**

5.3.7 Please refer to [Figure 5.3](#) depicting results of landscape features surveys and Landscape Character Areas. Although the landscape has been classified into broadly homogenous units, or LCA's, the landscape displays common characteristics across the study area:

- Land cover and landscape pattern are closely related to elevation and topography.
- Main land use is pastoral agriculture.
- Landscape trends relate to changing agricultural practices (removal of hedgerows to create larger fields or to replace with fences) and small scale infilling (new dwellings around existing farmsteads).

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<sup>6</sup> "Part 2.1 Register of Landscapes of Outstanding Historic Interest in Wales", Cadw; Welsh Historic Monuments Cardiff 1998

5.3.8 The classification and evaluation of the baseline landscape is derived from LANDMAP (bracketed and numbered LCA's), but refined during the course of the study to align the wider analysis to the local study area. The current and proposed alignments travel through the six following character areas:

### **The Ridgeline and Ridgeline Slopes**

5.3.9 Along the northern reaches of the Llanarf and Waycock catchments a limestone ridge runs east-west, along which linear historic settlements and an historic Roman Road run. The landscape character is evidently susceptible to change. Mature trees along the road and around settlements filter and screen expansive views in parts. Redlands Farm and neighbouring houses, including new builds, along northern reaches of Five Mile Lane are exposed to view.

5.3.10 Running south from the Ridgeline is a southerly extending ridge finger or remnant limestone plateau and the watershed between the Waycock and Llanarf Valleys. In the north the landscape is characteristic of rolling ridge slopes and to the south is a plateau landscape.

### **The Plateau**

5.3.11 At the south end of ridge finger this landscape type is characterised by exposed high ground (88 metres AOD) and expansive views. Field sizes are larger with a greater proportion of arable farming, bound often by short trimmed hedgerows. Farmsteads are often found within this character type.

### **The Rolling Ridge Slopes**

5.3.12 The north section of the ridge finger is influenced by The Wooded Valley Sides character type which clothes the broad south facing lower slopes of the valleys. Farmsteads are often found within this character type.

### **The Wooded Valley Sides**

5.3.13 At lower AOD's the valley sides are steeper and clothed in woodland on the less productive steeper topography. The majority of hamlets in the area are found within this character type.



### The Valley Floor

5.3.14 Traced by trees the River Waycock meanders through smaller pastoral fields bound by ditches and outgrown hedgerows reducing the scale of this relatively flat LCA. Generally attractive views tend to more intimate but can be detracted by overhead power lines and areas of lower quality landscape.

### Barry

5.3.15 The north western edge of Barry, on the Rhoose plateau, falls within the Study Area. The urban situation is in contrast with other LCA's. Value is poorer than for other character areas and capacity is higher.

5.3.16 In the landscape evaluation summary table below Quality is categorised according to DMRB's five point scale of highest quality, very attractive, good landscape, ordinary landscape, and poor landscape.

**Table 5.4: Landscape Evaluation Summary Table**

Landscape Character	Landscape Value	Landscape Capacity
<b>1 - RIDGELINE AND RIDGE SLOPES</b> <b>(ST NICHOLAS AND BONVILSTON RIDGE CREST - VLFGLVS271)</b>		
<p><b>Moderate</b> Prominent broad backed limestone ridge crest (extensive views both to and from) forming the rough boundary between the South Vale and the North Vale.</p> <p>Small to medium sized irregular field pattern of improved pastoral farmland defined by trimmed hedgerows over a gently rolling/undulating topography.</p> <p>Linear settlements of St Nicholas and Bonvilston address the A48 Roman Road.</p> <p>Adjacent character types exert an influence as the landform dips away on the boundary of this LCA; hedgerows are less frequently managed or</p>	<p><b>High Value</b> <b>Very Attractive quality</b> <b>High Rarity</b> <b>Declining Condition</b></p> <p>Falls within an SLA and encompasses an historical route. High intrinsic value Long views are unusual in other aspect areas in the Vale - high rarity. Moderate integrity.</p> <p>The A48 can be heard through much of the area. Inappropriate suburban detailing and development along A48, and Cottrell golf course modifies the landscape character.</p> <p>Generally well managed farmland enhancing views.</p> <p>Detractive features in the area include two TV</p>	<p><b>Moderate</b> Although Bonvilston and St Nicholas are conserved positive elements, the rural and settlement character is eroded by roadside development, quarrying, masts, signage and other urban detailing.</p> <p>Visibility of character area reduces capacity to absorb development.</p> <p>Mature trees along the A48 largely screen views to golf course.</p> <p>Moderate night time</p>

Landscape Character	Landscape Value	Landscape Capacity
outgrown especially along watercourses; field sizes become smaller; woodland becomes more frequent.	masts at St Lythans Down and Pantylladron, power lines and the quarry at Pant y Ffynnon.	pollution.
<b>2 - THE ROLLING RIDGE SLOPES</b> <b>(CENTRAL VALE RIDGES AND SLOPES - VLFGLVS146)</b>		
<b>Moderate</b> Rolling lowland of similar landcover to the ridge; small to medium sized field pattern of pastoral farmland defined by trimmed hedgerows. Woodland blocks introduced - an influence of Wooded Valley Sides LCA. Of medium scale. Farmsteads and new build house are potential receptors within the LCA.	<b>Moderate Value</b> <b>Very Attractive/Good Landscape Quality</b> <b>Fair/declining condition</b>  Common landscape within Vale.  Pleasant views within the character area.  Tranquil away from the road.	<b>Moderate</b> The landform, tall hedgerows and woodland blocks reduce visibility.  Farmsteads common within this character type.  Night time pollution is slight (sparsely settled)
<b>3 - THE PLATEAU</b> <b>(CENTRAL VALE RIDGES AND SLOPES - VLFGLVS146)</b>		
<b>Weak - Moderate</b> Further south along the ridge finger from LCA 2. Larger field sizes bound by trimmed hedgerows, a greater proportion of arable (constraint to slope treatment). Whilst the area does not have a strong intrinsic character being typical of well-maintained Vale plateau, it is enhanced by long views to the sea/Bristol Channel, (and BAA hanger) and its open exposed qualities. Farmsteads are often found within this character type. Tall vegetation clustered around buildings.	<b>Moderate Value</b> <b>Moderate/Good Landscape Quality</b> <b>Fair Condition/declining trend</b>  Integrity affected by loss of hedgerows  Not rare landscape  Tranquillity and attractive views affected by the airport and Aberthaw Power Station and Five Mile Lane.  Hedges being substituted by fences.	<b>Moderate/Low</b> Long views, gentle landform and fewer trees increase the visibility of this aspect area and reduce the capacity to absorb development.  Night time pollution is slight (sparsely settled)
<b>4 - THE VALLEY FLOOR and WOODED VALLEY SIDES</b> <b>(LLANCARFAN AND WAYCOCK VALLEYS - VLFGLVS453 and UPPER WAYCOCK VALLEY/DYFFRYN AREA - VLFGLVS608)</b>		
<b>Moderate - Strong</b> Valley sides and spurs are clothed in woodland closely following the less productive, steeper topography. Along the valley floor watercourses are traced by trees, and smaller pastoral fields bound by outgrown hedgerows and sometimes trimmed.	<b>High Value</b> <b>Very Attractive Quality</b> <b>Good Condition/ Constant Trend</b> <b>Moderate to high rarity</b>  Unspoilt character (high integrity) Moderate to high scenic quality	<b>Low</b> High character integrity – landscape is not able to absorb inappropriate development.  Constant trend

Landscape Character	Landscape Value	Landscape Capacity
<p>The scale of the landscape is small where short distance views are attractive but simultaneously dominated by two runs of overhead power lines.</p> <p>Valleys are broader towards the upper reaches and trimmed hedgerows with hedgerow trees become more frequent.</p> <p>The scale of the landscape becomes medium.</p> <p>The majority of hamlets in the area are found within this character type, often attractive consisting of well integrated dwellings of stone.</p> <p>The area is a steep sided narrow and enclosed lowland valley, which contains a tranquil landscape of streams, woodlands and small farms.</p>	<p>Moderate to high rarity due to the enclosed valleys.</p> <p>Tranquil</p> <p>Includes Dyffryn Gardens, a Grade I listed Edwardian garden.</p>	<p>Night time pollution is slight (sparsely settled)</p>
<p><b>5 - BARRY</b> <b>(BARRY - VLFLVLS219)</b></p>		
<p><b>Moderate</b></p> <p>The north western edge of Barry is situated on the slopes facing the study area, between 60 and 88 metres AOD.</p> <p>Perceived overall as a noisy, unattractive and settled area with a moderate sense of place overall due to different characters. Seen from the Waycock Valley the elevated edges of Barry are abrupt without integration into the rural landscape structure or landform. This housing area has more sense of place than some aprts of Barry.</p>	<p><b>Ordinary Quality</b> <b>Moderate Value</b> <b>Fair condition/Constant trend</b> <b>Moderate Rarity</b></p> <p>Scenic quality and integrity are evaluated as low overall; rarity and character as moderate (LANDMAP)</p> <p>The local character is classified higher than for LANDMAP's assessment of the whole of Barry.</p>	<p><b>High</b></p> <p>Urban character means the landscape has a higher capacity to absorb development.</p> <p>Night time pollution is substantial (urban).</p>

## Landscape Designations

5.3.17 The landscape within the Vale of Glamorgan is considered to be unique within the South East Wales Region so large areas have been classified as Special Landscape Areas (SLAs) - a local landscape designation. The route of the current Five Mile lane forms the boundary between two SLAs, Dyffryn Basin & Ridge Slopes and Nant Llancarfan. The Special Landscape Area designations contribute to the evaluation of landscape value which in turn informs landscape capacity and as such have been assessed alongside effects on landscape character.

5.3.18 The Green Wedge designation between Cardiff Airport and Barry is not effected by the route options.

5.3.19 No significant effect is likely to occur to the settings of above ground heritage features or the Llancarfan historic landscape area (medium value – please see heritage Chapter for more information) or to Dyffryn Gardens, a Grade I listed park and garden.

## **5.4 Impact Distribution**

5.4.1 Landscape and visual effects can be experienced over wide areas, depending on the scale of the proposal, visibility due to topography and landscape structures and the sensitivity of the landscape. Visual effects of the proposed alignments would potentially impact across a 2-4 kilometre study area. However due to the nature of the landscape topography and features, and the scale of the scheme it is considered that effects beyond an approximate 500 metres would not significant and as such are not covered within this study.

5.4.2 Those whose visual amenity would be most affected by the proposals, both adversely and beneficially, are those that reside and work in the farms and dwellings alongside the existing Five Mile Lane, and people travelling through the landscape along the route. Others potential receptors include walkers, equestrians, and golfers. Effects on landscape character are generally confined to a similar study area for the purposes of this interim assessment.

5.4.3 Effects on Vehicle Travellers are most beneficial to local residents and workers and those who regularly visit community facilities for example the Amelia Trust Farm. Please see Social Impacts Chapter for more detail.

## **5.5 Potential mitigation principles**

5.5.1 Within this section a summary of mitigation principles are described. Specific mitigation measures are considered within the option appraisal tables. It should be noted that:

- mitigation is yet to be agreed with the overseeing organisation;

- measures do not take account of mitigation required for other significant effects (where conflicts may occur) and as such are idealistic pertaining to landscape effects only; and
- not every measure would be required.

5.5.2 The choice of route options avoiding potential adverse effects and with good fit in the landscape is fundamental to reduction in adverse effects. Good fit is achieved through:

- The design of the horizontal and vertical alignment for the main line, side roads and junctions:
  - to get the best fit with the contours
  - to retain and make the best use of existing vegetation
  - to optimise protection for nearby houses through the use of cuttings, existing features or range
  - to avoid loss or damage to landscape features e.g. hedges, water features or field systems
- The use of specific landscape mitigation measures:
  - on and offsite planting
  - mounding
  - earth shaping
  - new water features
  - careful consideration of the form and finish of structures
  - the alignment and appearance of roadside ditches and fences
  - the appearance of other features such as street signs and gantries

### **Mitigation Design Objectives**

5.5.3 At this stage a number of mitigation principles are being considered specific to the routes alignments proposed and site context.

- To choose the route least damaging to the landscape; the alignment that respects existing landform best and avoids disruption of major topographical features; that uses the existing landform to good effect and that which minimises the scale of earthworks.
- To design profiles which reflect existing natural slopes.
- To retain the least highway land, by the return of land to its former use where this does not conflict with the need to provide mitigation by planting.

- To use existing landform to minimise visual intrusion: for example, placing a road in a cutting or behind rising ground to screen dwellings/settlement.
- To develop new landforms, including mounds and false cuttings, to screen the road from dwellings/settlement.
- To utilise landscape elements that define landscape character to protect and enhance the sense of place.
- To continue landscape elements across and not along the road to provide good integration and to not emphasise its linearity.
- To utilise local native species and local hard materials and styles where practicable.

## 5.6 Landscape Effects Assessment

5.6.1 For assessment of effects on landscape character receptors and effects on visual amenity please refer to:

Alignment Assessment Tables within Volume 3;

Figures 5.5-5.14 Alignment Assessments; and

Assessment Summary towards the end of this chapter.

## 5.7 Vehicle Travellers Assessment

5.7.1 The following effects on vehicle travellers for the proposed scheme were assessed using the following criteria:

- View from the road; and
- Driver Stress.

### **Construction**

5.7.2 Effects on vehicle travellers predicted during construction may include delays and local diversions but these would be of a short term nature. To reduce driver frustration and uncertainty relating to the route being followed appropriate signage would be installed informing vehicle travellers of the proposed scheme, diversions and that delays due to works would be probable.

### **Views from the Road**

- 5.7.3 The narrow carriageway contained within roadside hedgerows restricts views to the landscape despite the fact it passes over the Plateau where views can be expansive. Views tend to be of landscape adjacent to the road where vertical alignments and topography allow. Enhancement to the baseline condition is sought to allow views across the Special Landscape Areas where this measure does not degrade landscape character and screening of the road is not required to minimise effects on visual amenity.
- 5.7.4 Please refer to the Figure 5.15 for the analysis of Views from the Road.

### **The Route Alignments**

- 5.7.5 Mitigation measures are not considered in the following descriptions of potential views from the alignments, which instead describe where there is potential for views from the road, to be considered when agreeing the environmental design during forthcoming stages.
- 5.7.6 Generally the vertical alignments are in cutting on higher ground restricting potential expansive views, and on embankment on lower ground where views currently tend to be more intimate. The proposed alignments do however provide opportunities to expose road users to the scenery being passed through.

### **Sectors one and two**

- 5.7.7 The roundabouts proposed at Sycamore Cross would likely be at grade along the A48 and in minor cutting at southern extents limiting views. As the new alignment joins the existing improved section of Five Mile Lane views from the carriageway would be as existing, restricted by roadside hedgerows. Nothing differentiates the options within these sectors.

### **Sectors three and four**

- 5.7.8 As the alignments approach Blackland Farm the online widening works would begin to impact upon the existing roadside hedgerows which could open up views to The Rolling Ridge Slopes LCA.

- 5.7.9 The proposed alignments begin to diverge at Amelia Trust Farm Oak woodland which helps define the character of the existing road at this point. The Red option removes the majority of the edge of this woodland and some grassland on The Amelia Trusts land and would degrade the view. Other options remove the shorter edge of woodland along the east side.
- 5.7.10 Emerging south from the woodland the vertical alignments provide opportunities for views over The Plateau. Both the Orange and Red then maintain a vertical alignment that is similar to existing topography, potentially permitting views depending on roadside treatment.
- 5.7.11 As the route options travel south across The Plateau landscape character area the vertical alignments are generally in cutting over high ground and on embankment across shallow dips in topography associated with small watercourses. Across a minor shallow valley associated with the Ffynnon Whitton-mawr/Ford Brook between two high points, the vertical alignments changes from cutting to embankment and back to deep cutting. The result reduces potential long distance views gained from the high ground of The Plateau. The route option that takes best advantage of the open views is the Blue being on the shallowest cutting of approximately 0.5-0.75 metres at the high point near the site of Roman Settlement and Villa. The cutting along the Red alignment becomes quite shallow at points also.
- 5.7.12 In sector three the Red option is least favourable as it causes loss of Amelia Trust Farm Oak woodland which defines the character of the existing road at this point. Depending on mitigation, enhancement planting and slope treatments, the embankments on lower ground within Whitton-mawr field and near Moulton Brook may provide opportunities for views from any alignment.
- 5.7.13 In sector four the Blue and Red options are in the shallowest cutting through the high point near the sites of the Settlements and Roman Villa, where expansive views could be attainable, so being preferable options.

### **Sector five**

- 5.7.14 The Blue Option, in deep cutting, passes under the side road overbridge, adjacent to Grovelands, providing a landmark to aid driver orientation and with the potential to reduce the



effect of the cutting through the skyline. All options, apart from the Red, are in deep cutting restricting views out. From the drivers' point of view the Red is therefore preferable at this point followed by the Blue.

5.7.15 The alignments are generally in cutting as they descend south into the Waycock Valley, on embankment across the valley floor and cutting (west shoulder) and embankment (east shoulder) up the valley side to Waycock Cross. As the routes descend into deep, 1:2 gradient cuttings only forward views would be possible. The landform and landscape treatment of the banks could enhance the sense of place for road users. The Orange route is preferable as it is located furthest east where local landform changes allow both embankments and cuttings providing variety in viewing distances. The Blue option is more consistent in the depth of the cuttings which could provide the opportunity to consider a single treatment along the length of the cuttings so providing a sense of place that can be enjoyed at the design speeds.

5.7.16 As the cuttings taper off onto high embankments, views would include the two woodlands between which the routes travel, towards the valley bottom where intimate pleasant views along the valley are restricted by the taller hedgerows and trees along The River Waycock. No option is markedly different from the others within this sector as far as the unmitigated schemes go but measures would be different for each option so altering the drivers' views and appreciation of place. During early operation years the Blue option takes best advantage of landscape character due to the horizontal alignment travelling between taller vegetation rather than causing loss of hedgerows as other alignments do.

5.7.17 The Red option is preferable route down into the Waycock Valley followed by the Blue and Orange.

### **Sector six**

5.7.18 All routes are on embankment across the valley, potential for views is dependent on mitigation planting. The journey between valley bottom and Sycamore Cross is different for the Blue option compared to the others, as the route retains the existing road as a side access road with the main carriageway proposed to the west, generally on higher ground so resulting in the

removal of more woodland. Other options would be more enclosed and hence faithful to the existing atmosphere within the woodland.

5.7.19 Blue would provide the most interesting views for road users along the valley floor until mitigation planting establishes. Through the SSSI Middleton woodlands the Blue option is least favourable.

### **Sector seven**

5.7.20 Views from the vertically adjusted on-line alignments are preferable than those from the Blue. Blue is the least favourable option.

### **Driver Stress**

5.7.21 Influencing the three main components of driver stress (frustration, fear of potential accidents, and uncertainty relating to the route being followed) are factors such as road layout and geometry, surface riding characteristics, junction frequency, and speed and flow per lane. Taken together, these factors can induce in drivers the feelings of discomfort, annoyance, frustration or fear culminating in physical and emotional tension that detracts from the value and safety of a journey.

5.7.22 The baseline against which new alignments are assessed is the existing road which may be considered to induce driver stress:

- Poor forward visibility and inadequate sight distances, due to the rapidly changing horizontal and vertical alignment within roadside hedgerows of the narrow road;
- The occurrence of road traffic incidents; and
- Use of the road by agricultural vehicles; speed differential between slower vehicles and those who want to travel faster but have difficulties in overtaking.

5.7.23 The improved scheme may increase driver fear to some extent because it will increase traffic speeds and, by diverting traffic from a number of existing roads, may also increase flows. However, this increased perception of danger is likely to be more than offset in most cases by the superior design standards to which a new scheme is built.

5.7.24 The proposed alignments are all designed to improved design standards. The Blue, Orange and Green routes are designed to 100km/h with roundabout junctions serving:

- Whitton Lodge and the Amelia Trust Farm and the existing road northwards;
- the Northcliff turn off, Grovelands and the existing road southwards towards the Moulton turn off (Orange and Green only); and
- the Welsh Hawking Centre and the existing road northwards towards Sutton Farm.

In place of the central roundabout an overbridge is proposed on the Blue option to serve the Northcliff turn off from the existing road in the vicinity of Grovelands.

5.7.25 The proposed design speed for the Red and Purple routes is reduced to 80 kilometres per hour (km/h) due to the minimum curvature and numerous junctions and accesses along the highway. The Red alignment closely follows the existing road and apart from a new roundabout junction between the Moulton and “Northcliff” turn offs, which also serves Grovelands and Sutton Farm, the existing remaining junctions will in the main require improved vision splays as a minimum requirement.

5.7.26 All routes propose climbing lanes through the steep section of the Waycock Valley and improvements are likely at the terminal junctions for all in the north in joining the A48 and the Blue option at Waycock Cross.

5.7.27 Whilst the routes will be fully categorised in forthcoming EIA stages, when all components of driver stress can be measured, on initial evaluation the new alignments would reduce driver stress through reducing frustration, reducing fear of potential accidents and reducing uncertainty relating to the route being followed.

### **Reduction in frustration**

5.7.28 Frustration may be caused by a driver’s inability to travel at a constant speed due to the volume of traffic and slow moving vehicles, which in turn leads to unreliable journey times which further increases stress. Proposed routes would reduce frustration through:

- Use of existing route for local traffic including farm machinery (the mainly online Red route options, and to an extent Purple, would not perform so well).

- Good forward visibility, provision of climbing lanes through the Waycock Valley and consistent road standard to design speeds allowing traffic to generally drive at more consistent speeds.

### **Reduction in fear of potential accidents**

5.7.29 Reduced fear of potential accidents would be due to improved road standards such as:

- increased sight distances due to improved horizontal and vertical alignments;
- widened carriageway including hardstrip and climbing lanes; and
- controlled access onto main carriageway.

The Red and Purple route options would not perform as well as the Blue, Orange and Green.

### **Uncertainty relating to the route being followed**

5.7.30 Route uncertainty is caused primarily by signing that is inadequate for the individual's purposes.

It is not possible to assess the size of this factor as a consensus has not appeared on the adequacy of existing signing practice along the route. Good design and layout of signs will be assessed in following EIA stages with recommendations put forward towards eliminating this cause of stress from new road schemes. However as the new alignments are broadly similar to the existing, orientation views are being considered, and forward visibility and signage would be improved, it is considered that this component of driver stress would likely also decrease in the long term.

5.7.31 Available research evidence has not established reliable correlations between physical factors and driver stress. However, the following DMRB tables give guidance on the appropriate category of stress for use in environmental assessments:

Average peak hourly flow per lane, in flow Units/1 hour	Average Journey Speed Km/hr		
	Under 50	50-70	Over 70
Under 600	High	Moderate	Low
600-800	High	Moderate	Moderate
Over 800	High	High	High

**Note:** Table for use with single-carriageway roads. A car or light van equals one flow unit whereas a commercial vehicle over 1½ tons unladen weight or a public service vehicle equals 3 flow units. However commercial vehicle data is not available at this stage so it has been assumed that all vehicles are equal to one flow unit.

5.7.32 Using this method the results would be the same for the baseline (existing road) and the worst year for the proposed alignments, being graded as Low. The figures given in the table are for guidance only so the assessment of specific routes is made in the light of full knowledge of local conditions which suggest that driver stress between Waycock Cross and the improved northerly section of Five Mile Lane could be described as being higher than Low, such as Moderate/High.

5.7.33 The proposed road would result in a significant improvement with regards to journey ambience, as road conditions would be significantly improved, with associated reduction in stress and potential reduced journey times.

## 5.8 Overall Significance

**Table 5.5: Summary of Worst Case and Residual Effects on Landscape Character**

RECEP-TORS	ROUTE ALIGNMENT									
	BLUE		RED		ORANGE		GREEN		PURPLE	
	WC	RE	WC	RE	WC	RE	WC	RE	WC	RE
Sector 1										
LC-all-1-1	--	-	--	-	--	-	--	-	--	-
<b>Sector 2 No Works Proposed</b>										
Sector 3										
LC-all-3-1	--	-	---	--	--	-	--	-	--	-
LC-all-3-2	--	-	---	-	--	-	--	-	--	-
Sector 4										
LC-all-4-1	-	+	--	0	---	*	-	0	--	0
Sector 5										
LC-all-5-1	--	0	---	--	---	--	---	--	--	0
LC-all-5-2	--	0	---	--	---	--	--	-	--	-
Sector 6										
LC-all-6-1	---	-	--	0	---	0	---	-	--	0
LC-all-6-2	---	--	--	-	--	-	--	-	-	0
Sector 7										
LC-all-7-1	--	+	-	+	-	+	-	+	-	+

Table 5.6: Summary of Worst Case and Residual Effects on Visual Amenity

RECEPTORS	ROUTE ALIGNMENT									
	BLUE		RED		ORANGE		GREEN		PURPLE	
	WC	RE	WC	RE	WC	RE	WC	RE	WC	RE
Sector 1										
LV-all-1-1	--	-	--	-	--	-	--	-	--	-
LV-all-1-2	-	0	-	0	-	0	-	0	-	0
Sector 2 No Works Proposed										
Sector 3										
LV-all-3-2	--	0	--	0	--	0	--	0	--	0
LV-all-3-4	-	0	--	-	-	0	-	0	-	0
LV-all-3-5	--	+	****	-	--	+	--	0	--	+
LV-all-3-6	---	+	N/A	N/A	--	++	--	+	--	++
Sector 4										
LV-all-4-1	-	0	N/A	N/A	-	0	-	0	-	0
LV-all-4-2	-	0	-	0	-	0	-	0	-	0
LV-all-4-3	-	0	-	0	-	0	-	0	-	0
Sector 5										
LV-all-5-1	--	++	---	-	--	+	---	-	--	+
LV-all-5-2	--	0	--	-	*****	--	--	-	--	0
LV-all-5-3	---	0	---	-	---	-	---	-	---	-
LV-all-5-4	0	++	0	++	0	++	0	++	0	++
Sector 6										
LV-all-6-1	-	+	--	-	--	-	--	-	--	-
LV-all-6-2	0	0	--	-	--	-	--	-	--	-
LV-all-6-3	-	0	-	0	-	0	-	0	-	0
LV-all-6-4	--	-	--	-	--	-	--	-	--	-
LV-all-6-5	-	0	--	0	--	0	--	0	--	0
Sector 7										
LV-all-7-1	---	+	--	0	--	0	--	0	--	0

**NOTE:** \* Assessment of significance would be less if assessed in isolation but is recorded as higher to aid in differentiating options

\*\* Preliminary visual assessment – Garden Vegetation may effectively screen dwelling from route options

## Significance of Landscape Effects

5.8.1 The interim assessment of route alignments has identified a number of landscape receptors that would be affected by the improvement works. These include local residents and the character of the landscape which would experience some degree of adverse effect as a result of scheme construction although, with appropriate mitigation, these effects could be effectively minimised and, in the long term could lead to an overall benefit for certain receptors.

5.8.2 The worst-case scenario assessment, whether that would occur on a winters day in year one of operation or during construction, predicts that the Purple option is the most favourable, followed by Blue and Green and then Orange and Red. The Purple would cause the least adverse effect in the short term primarily due to the lower design speeds and exclusion of roundabouts and associated side roads. The best improvement through mitigation, from Moderate Adverse to Neutral/Slight adverse, is the Blue option. The Orange and Red options would have a significance adverse effect on landscape character in the short term.

5.8.3 Effects on Landscape Character - Worst Case

<b>Purple route</b>	-	--	<b>Slight/Moderate Adverse</b>
<b>Blue route</b>		--	<b>Moderate Adverse Effect</b>
<b>Green route</b>		--	<b>Moderate Adverse Effect</b>
<b>Orange route</b>	--	---	<b>Moderate/Severe Adverse Effect</b>
<b>Red route</b>	--	---	<b>Moderate/Severe Adverse Effect</b>

5.8.4 Residual Effects on Landscape Character

<b>Purple route</b>	0	-	<b>Neutral/Slight Adverse</b>
<b>Blue route</b>	0	-	<b>Neutral/Slight Adverse</b>
<b>Green route</b>		-	<b>Slight Adverse Effect</b>
<b>Orange route</b>		-	<b>Slight Adverse Effect</b>
<b>Red route</b>		-	<b>Slight Adverse Effect</b>

5.8.5 Significance adverse effects on visual amenity would result from all options in the short term until mitigation establishes. Once again the Blue option shows the most improvement through time and would be likely to improve upon the baseline condition in the long term.

5.8.6 Effects on Visual Amenity - Worst Case

<b>Purple route</b>	-	--	<b>Slight/Moderate Adverse</b>
<b>Blue route</b>	-	--	<b>Slight/Moderate Adverse</b>
<b>Green route</b>	-	--	<b>Slight/Moderate Adverse</b>
<b>Orange route</b>	-	--	<b>Slight/Moderate Adverse</b>
<b>Red route</b>	-	--	<b>Slight/Moderate Adverse</b>

5.8.7 Residual Effects on Visual Amenity

<b>Purple route</b>	<b>0</b>	<b>Neutral</b>
<b>Blue route</b>	<b>0 -</b>	<b>Neutral/Slight Adverse</b>
<b>Green route</b>	<b>0 -</b>	<b>Neutral/Slight Adverse</b>
<b>Orange route</b>	<b>0</b>	<b>Neutral</b>
<b>Red route</b>	<b>0 -</b>	<b>Neutral/Slight Adverse</b>

5.8.8 For both landscape character and visual amenity Option 1 roundabout at Sycamore Cross is preferred.

**Significance of Landscape Effects on Vehicle Travellers**

5.8.9 The proposed alignments provide an opportunity to improve the experience of driving, cycling or walking between Sycamore Cross and Waycock Cross.

5.8.10 Effects on Vehicle Travellers

<b>Purple route</b>	<b>+</b>	<b>Slight Beneficial</b>
<b>Blue route</b>	<b>++</b>	<b>Moderate / Large Beneficial</b>
<b>Green route</b>	<b>+</b>	<b>Slight / Moderate Beneficial</b>
<b>Orange route</b>	<b>+</b>	<b>Slight / Moderate Beneficial</b>
<b>Red route</b>	<b>+</b>	<b>Slight Beneficial</b>

5.8.11 The Blue option is the most favourable, followed by Red and Orange with regard to effects on views from the road. It should be noted that both Blue and Red options impact both positively and negatively upon views from the road. The Purple and Green alignments are the least favourable but do improve upon the baseline with Slight Beneficial significance.

5.8.12 Blue would also be the preferred option to reduce driver stress as it accommodates climbing lanes as well as local traffic access via the Existing Five Mile Lane connecting to the main carriageway via roundabouts. The Red and Purple options are considered the least favourable as they do not tend to include roundabouts, with the main carriageway accessed by T-junctions which may be perceived as more dangerous. It should be noted that all options are an



improvement on the baseline road and that perception of danger would be reduced by the increased viewing distances.

### **Re-alignment Potential/Recommendations**

5.8.13 The following section provides an outline of how adverse effects could be further reduced and beneficial effects could be maximised through horizontal and vertical alignment adjustments, reducing landtake or loss of landscape resource which feed into the iterative design process in forthcoming stages.

- Maintain a close relationship between vertical alignment, landform and topography where this does not conflict with visual amenity issues.
- Minimise loss of High Category woodland and then follow an offline alignment retaining as many hedgerows as practicable in sector three.
- To reduce adverse in sector five it is important to reduce junction landtake and avoid loss of High Category standard Oaks and deciduous woodland. Deep cuttings in combination with roadside hedgerows to west of carriageway would effectively reduce adverse effect on visual amenity. Explore opportunity to grade out cuttings to east side of carriageway to open up views to vehicle travellers and minimise effect on landscape character. Steep embankments between the woodlands would have an adverse effect on visual amenity but could be mitigated through woodland planting in the long term.
- Across the valley floor in sector six the embankments have an adverse effect on landscape character but allow the vehicle traveller to see down the valley to the east (Blue route restricts these views, set between tall hedgerows in parts). Landtake required for roundabouts also have an adverse effect through more extensive loss of landscape resource.
- Minimising effect on the SSSI woodland on the north facing valley side would improve the performance of any option. It is recognised that the Blue option would have the most

adverse effect at this point as it is the only option that provides a separate carriageway to the access road and climbing lanes.

## 6 Biodiversity

### 6.1 Introduction

- 6.1.1 This section of the ISAR describes the assessment of the route alignment options relating to nature conservation and biodiversity. The function of the ISAR has been set out in previous sections (see introductory section) and in terms of nature conservation, the report represents a single point of reference at this stage of the assessment process, drawing together the various ecological surveys undertaken in 2008 and 2009 following completion of the Stage 1 Assessment report (SBC 2008).
- 6.1.2 Any new construction, improvement or maintenance project may have an impact on biodiversity in addition to impacts from traffic using the road. Construction of roads, road improvements and road maintenance and management can directly and indirectly affect biodiversity in a number of ways including:
- Direct habitat loss within the scheme footprint;
  - Increased incidence of wildlife/vehicle collision;
  - Fragmentation of habitats;
  - Damage or destruction of a resting place, breeding site or feeding area;
  - Severance of traditional dispersal routes;
  - Disturbance and changes to environmental conditions making habitats for resting, breeding and foraging un-suitable;
- 6.1.3 Planning Policy Wales (2002) Section 8.5.7 states that *‘Great care must be taken to minimise the adverse impacts of new transport infrastructure, or improvements to existing infrastructure, on the natural, historic and built environment and on local communities...’*. Relating to the natural environment, Section 5.5.2 of the same document states that *‘When considering any development proposal... local planning authorities should consider environmental impact, so as to avoid, wherever possible, adverse effects on the environment. Where other material considerations outweigh the potential adverse environmental effects, authorities should seek to minimise those effects and should, where possible, retain and, where practicable, enhance features of conservation importance.’*

- 6.1.4 A Stage 1 Environmental Assessment based on Design Manual for Roads and Bridges (DMRB) guidance was undertaken in late 2007/early 2008 (SBC 2008) and identified actual or potential presence of protected and priority habitats and species (e.g. ancient woodland, amphibians, reptiles, birds and bats) in close proximity to the existing A4226 corridor. In terms of ecological considerations, the Stage 1 assessment concluded that *‘adopting an alignment which broadly follows the existing A4226 alignment could reduce the potential for ecological impacts.’*
- 6.1.5 Subsequent to the Stage 1 Assessment, and in consideration of seasonal constraints, a number of surveys, equivalent in scope to those required to inform a Stage 2 DMRB assessment were undertaken over the course of 2008 and 2009 (see Baseline Conditions). The Stage 2 Environmental Assessment is likely to be progressed over 2010, subsequent to consultation on the ISAR with the statutory environmental bodies (e.g. Countryside Council for Wales, Environment Agency Wales, Vale of Glamorgan Ecologist etc).
- 6.1.6 This Interim Scheme Assessment Report (ISAR) aims to provide a link between Stages 1 and 2 relating to the ecological constraints and opportunities associated with each of the five route alignment options under consideration and to inform the process towards identification of a Preferred Route.

## 6.2 Appraisal Methodology

- 6.2.1 The Stage 1 Assessment of the proposed scheme on nature conservation and biodiversity features was undertaken in accordance with the guidance set out in the Design Manual for Roads and Bridges (DMRB) Volume 11, section 3, part 4 and Welsh Transport Planning and Appraisal Guidance (WelTAG). Consistent with the requirements of a DMRB Stage 1 Assessment, the aim at this stage in the evolution of the scheme was to:
- Identify the nature conservation advantages, disadvantages, opportunities and constraints within the broad route corridors associated with the proposed improvement of the A4226 including a possible south-western option.

- 6.2.2 The Stage 1 assessment was based on a desk study consultation and site familiarisation visit and the findings were carried forward to advise the requirement and scope of additional survey work that would be used to inform the Interim Assessment (i.e. the current report) and the Stage 2 assessment. The aim of the Stage 2 Assessment (yet to be undertaken), (as stated in DMRB, is to:
- Undertake sufficient assessment to identify the magnitude and potential importance of nature conservation features when developing and defining the route options. If nature conservation constraints are a significant factor in route selection, an appraisal comparing the merits of each route option will be produced.
- 6.2.3 Typically, the Stage 2 assessment is informed by a number of field surveys, including an Extended Phase I Habitat survey of the route alignment options under consideration in addition to targeted surveys for species (and/or habitats) likely to be present within the scheme footprint and which could be subject to development impacts. As indicated in the preceding text and described further under the Baseline Conditions, although the Stage 2 Assessment has yet to be undertaken, the surveys undertaken in 2008/2009 were comparable in scope and function to those typically undertaken at Stage 2. Surveys were based on a broad survey corridor that included the existing A4226 alignment and the adjoining areas, where the current route alignment options are proposed.
- 6.2.4 For the purposes of the Stage 1 assessment and the current ISAR the DMRB guidance set out in Volume 11, Section 3, Part 4 was followed in parallel with the recommended approach described by WelTAG. The guidance within DMRB for assessing the likely impact and significance on ecological receptors (Volume 11, Section 2, Part 5) is based on the correlation between the ecological value of the receptor (for example a hedgerow or population of reptiles) and the magnitude of the impact on a 5-point scale from Major to No Change.
- 6.2.5 No further assessment methodologies were considered at this stage. However, as part of the consultation exercise following issue of the ISAR, the use of additional guidance could be discussed. For example, use of the Guidelines for Ecological Impact Assessment described by

The Institute of Ecology and Environmental Management (IEEM; 2006) is generally viewed as industry best practice for a range of development projects.

## **6.3 Baseline Conditions**

### **Study Area - Overview**

6.3.1 The study area, as a whole, is set within an agricultural landscape comprising mostly of improved, sheep-grazed pasture and arable land separated by native hedgerows and scattered trees. There are many broad-leaved woodland blocks across the site, particularly in the southern and western parts of the study area, which link up with the hedgerow network. Areas of grassland verge are mainly associated with the northern part of the existing A4226 corridor. Localised standing and open water habitats also occur within the study area. The southern part of the study area, between the River Waycock and Waycock Cross supports several woodland blocks which fall within the Barry Woodlands SSSI – the existing A4226 alignment bisects two such blocks.

### **Ecological surveys 2008 - 2009**

6.3.2 Based on the desk-based consultation and data search exercise undertaken to inform the Stage 1 Assessment, a range of additional habitat and species surveys were indicated to inform further assessment of the route corridor. The following surveys were undertaken:

- Extended Phase I Habitat survey - March 09;
- Amphibian survey (including Great Crested Newts) – March to May 2008;
- Dormouse nest tube survey – June to November 2008;
- Dormouse Nut Search – September/October 2009;
- Bat activity surveys – June/July 2008 & July to September 2009;
- Woodland survey (southern blocks only) - June 2008;
- Reptile survey (northern section) - May to July 2008;
- Reptile survey (southern section) – August/September 2009;
- Bird survey – June/July 2008;

- River Corridor survey (River Waycock) – September 2009;
- Aquatic Invertebrate survey (River Waycock) – September 2009;

6.3.3 A summary of the survey findings is provided below for the purposes of the ISAR report. Further detail is contained within the individual survey reports (see SBE 2008; SBE 2009a-c), copies of which have been provided to the Vale of Glamorgan Council and could be passed on to consultees as required.

### **Extended Phase I Habitat Survey**

6.3.4 Fieldwork was undertaken throughout March 2009 and followed standard Phase 1 Habitat Survey protocol (JNCC 1990) as amended by the Institute of Environmental Assessment (1995). All habitats within a corridor extending approximately 250m east and 150m west of the existing A4226 alignment were classified and mapped as accurately as possible. The habitat plan and accompanying target notes are included in Appendix 6.1 of the ISAR.

6.3.5 The main habitat types comprised improved grassland or arable fields, with boundary features including hedgerows and fences. Other significant (in terms of area coverage) and localised habitat types included semi-improved neutral grassland, semi-natural broadleaved woodland, scattered trees, running water and marshy grassland. During the course of the survey, some limited evidence of use by Badgers *Meles meles* was recorded (suspected road casualty – i.e. carcass found within 5m of carriageway edge in the southern woodland block close to Barry College) together with several sightings of Brown Hare *Lepus europaeus*. Small amounts of Japanese Knotweed *Fallopia japonica* were also noted within the surveyed area (for the complete report see SBE 2009b).

### **Amphibian Survey**

6.3.6 Following a site walk-over in March 2008 to verify the presence/potential suitability of waterbodies identified from desk study, a total of six ponds were subject to further survey work between March and May 2008 (see SBE 2008). Surveys were based on techniques described by English Nature (2001) and involved a series of evening surveys to establish likely presence/absence of Great Crested Newts *Triturus cristatus* (and other amphibians).

- 6.3.7 Three of the surveyed ponds, all located within the grounds of Whitton Rosser Farm (Amelia Trust Farm) supported one or more amphibian species. The Dew Ponds at Amelia Trust Farm supported a small population of Great Crested Newts and Palmate newts *T. helveticus* with the latter species also recorded from two other ponds at the Farm with Common Frog *Rana temporaria* and Common Toad *Bufo bufo*.
- 6.3.8 All ponds supporting amphibians (including Great Crested Newts) are located to the west of the existing A4226 alignment and no loss of ponds or adjacent terrestrial habitat (Dew ponds are approximately 400m west of existing A4226) would arise from any of the route alignment options under consideration.

### **Dormouse surveys**

- 6.3.9 The Stage 1 assessment identified potentially suitable habitat for Common Dormouse *Muscardinus avellanarius* within the scheme corridor comprising of woodland blocks and hedgerows. A nest tube survey based on the survey protocol described by Bright et. al. (2006) was undertaken between June and November 2008 and involved the deployment and subsequent checking of artificial nest tubes. A total of 100 artificial nest tubes were deployed between the scrub/hedgerow east of the Amelia Trust Farm and Waycock Cross ([Figure 6.1](#)) and checked monthly between July and November. No evidence of use by Dormice was recorded over the course of the surveys (SBE 2009a) although a small number of nest tubes did indicate use by Woodmouse *Apodemus sylvaticus*.
- 6.3.10 Supplementary survey, involving searches for characteristically opened Hazel *Corylus avellana* nuts were undertaken within the southern woodland blocks as part of the nest tube survey and as a separate exercise in September and October 2009 (SBE 2009c). No evidence of Dormice was recorded with most of the fallen nuts examined opened by Grey Squirrel *Sciurus carolinensis*.

### **Bat surveys**

- 6.3.11 A series of bat activity and emergence/re-entry survey were undertaken over the summer of 2008 (see SBE 2009a) and summer/autumn 2009 (see SBE 2009c).

### **2008 survey**



- 6.3.12 The surveys comprised a series of three evening (dusk) activity surveys on 23 June, 16 and 28 July by a team of three experienced surveyors walking transects in close proximity to the eastern roadside hedgerow to establish general levels of bat commuting and foraging activity and identify actual or potential roosts.
- 6.3.13 Field surveys and sonogram analysis confirmed the presence of at least four species of bat actively using the hedgerows and associated margins alongside; Common Pipistrelle *Pipistrellus pipistrellus*, Soprano pipistrelle *P. pygmaeus* and Noctule *Nyctalus noctula*. However, the presence of Myotis *Myotis spp.* were also frequently observed using the hedgerow network and agricultural buildings. From flight behaviour, time of encounter and sonogram analysis it is highly likely, although un-confirmed, that these Myotis bats were Whiskered/Brandt's *Myotis mystacinus/brandtii* and Natterer's *M. nattereri*.
- 6.3.14 The presence of a bat roost in a purposefully installed bat box on a stable block to the south east of Northcliff Cottage on the eastern side of the A4226 (Grid ref: ST07959 70512) during the course of the survey was observed and confirmed. The type of box observed, coupled with the presence and type of droppings (approximately 10, newly deposited, small, black faeces) on and below the bat box, is indicative of use by Pipistrelle *Pipistrellus spp.* bats.
- 6.3.15 The majority of activity-type observations and recordings were made by both commuting and foraging bats and were observed to extensively utilise the hedgerow network with bats also observed crossing over the A4226 in a number of places (e.g. Grovelands Farm/Northcliff Cottage, Sutton Wood and the River Waycock), in a west-to-east direction (see [Figure 6.2](#)).

### **2009 Surveys**

- 6.3.16 A series of three evening (dusk) activity surveys were undertaken on 23 July, 11 August and 09 September by a team of three experienced surveyors walking three separate transects interspersed with stops (spot checks) to establish general levels of bat commuting and foraging activity and identify actual or potential roosts. The direction of the three separate transects were reversed alternatively throughout the field season to reduce the amount of bias between early or late emerging bat species.

- 6.3.17 In addition to the transect surveys, two ecological surveyors undertook a dusk emergence and dawn re-entry survey on 03 & 05 August of a group of mature Oak *Quercus robur* and Ash *Fraxinus excelsior* trees within the southern part of the study corridor (north of the River Waycock).
- 6.3.18 The transect surveys and sonogram analysis confirmed the presence of at least five species of bat actively using the hedgerows and associated margins alongside; Common Pipistrelle, Soprano pipistrelle, Noctule, Myotis *Myotis spp.* and Long-eared *Plecotus spp.* bats. As noted during the 2008 surveys, bats were observed to extensively utilise the hedgerow network and were also observed crossing over the A4226 in a number of places, particularly in the southern survey area between Sutton Farm and the Waycock Bridge ([Figure 6.3a – c](#)).
- 6.3.19 Emergence surveys did not confirm the presence of roosting bats within any of the trees although the results indicated that a roost of Soprano Pipistrelle was located in close proximity (around Sutton Wood). Common Pipistrelle, Soprano pipistrelle, Noctule and Myotis bats were encountered foraging or commuting within the area of the trees surveyed ([Figure 6.4](#)).

### **Woodland survey**

- 6.3.20 Within the southern part of the survey corridor, between Waycock Cross and the River Waycock, route alignment options would involve some loss of existing woodland (part of Barry woodlands SSSI) alongside north and south-bound carriageways (Wood 1 and Wood 2 respectively). Dependent on the route alignment selected, impacts to smaller, undesignated woodland at Sutton Wood (Wood 4) and Lidmore Wood (Wood 3) could also occur. Woodland location and numbering is illustrated on [Figure 6.5](#).
- 6.3.21 In order to assign these woodland blocks to a recognised vegetation type and to provide an indication of their existing condition, an evaluation of vegetation quality within these four woodland blocks was undertaken in June 2008 (see SBE 2009a) and each woodland subjectively assigned a botanical value from Negligible to Very High.

### **Wood 1 & Wood 2**

6.3.22 These woodlands are separated by the existing A4226 and share very similar floristic and structural characteristics and in NVC terms appeared to be closest to W8 *Fraxinus excelsior-Acer campestre-Mercurialis perennis* (Ash-Field Maple-Dog's Mercury) woodland. Ash was the most abundant canopy tree, followed by Pedunculate Oak and occasional Silver Birch *Betula pendula*. Fallen dead trees and branches were relatively frequent throughout the woodland, with the shrub understorey supporting outgrown Hazel *Corylus avellana* coppice and other shrubs such as Wych Elm *Ulmus glabra*, Hawthorn *Crataegus monogyna* and Field Maple *Acer campestre*. Holly *Ilex aquifolium* and Field-rose *Rosa arvensis* were locally common understorey species in Wood 2 (alongside the southbound carriageway). Bramble *Rubus* aggregate was a common low-understorey species, increasing in frequency close to the road. Carpets of Ivy *Hedera helix* dominated much of the ground flora throughout both woodlands, along with Enchanter's-nightshade *Circaea lutetiana* and False Brome *Brachypodium sylvaticum*.

6.3.23 Neither woodland showed any signs of recent management and the canopy was mostly closed with only low light levels reaching the woodland floor. As a consequence, Ivy dominated the ground flora although a number of the characteristic woodland flora species listed in the SSSI Citation were seen in low numbers. These included small colonies of Greater Butterfly-orchid, Herb Paris, Sanicle, Dog's Mercury *Mercurialis perennis* and Goldilocks Buttercup *Ranunculus auricomus*. There were more of these woodland floor species in the surveyed part of Wood 1 (i.e. alongside the northbound carriageway) than Wood 2 and the woodlands were valued (botanically) as Moderate-High and Moderate respectively.

### **Wood 3 (Lidmore Wood)**

6.3.24 This woodland showed evidence of historical management similar to Woods 1 & 2 (i.e. coppice with standards), but at some point semi-natural woodland had been cleared and much of the woodland interior had been replanted with Western Red Cedar *Thuja plicata*. A narrow margin of semi-natural broad-leaved woodland remained intact along the western (lower) edge of the wood and supported the same canopy and shrub understorey species as Woods 1 & 2, and was considered to most closely match the W8d *Fraxinus-Acer-Mercurialis* woodland type. The ground flora was dominated by Ivy although species characteristic of old woodland persisted in low numbers throughout and especially close to the woodland bank at the southern end where

a colony of Greater Butterfly-orchid was present. With the exception of this southern area, the woodland was considered of Low botanical value.

#### **Wood 4 (Sutton Wood)**

6.3.25 Like Lidmore Wood, Sutton Wood had been extensively replanted over an area of what appeared to be older semi-natural broadleaved woodland, and remnants of the original woodland remained close to the existing A4226. The interior of the wood had been cleared of some trees and replanted with Hybrid Black-poplar *Populus x canadensis sensu lato*. Fragments of older woodland conformed to the W8d *Fraxinus-Acer-Mercurialis* woodland type. The number of woodland herbs and grasses present in the part of the wood near the road was greater than in any of the other three woodlands, and species not seen (including Giant Fescue *Festuca gigantea* and Bugle *Ajuga reptans*) in those were present, albeit in low numbers. Conversely, the wood did not seem to have some of the other species present in the other woods such as Primrose and Greater Butterfly-orchid – the woodland was considered of Low botanical value.

#### **Reptile Surveys**

6.3.26 Habitat with the potential to support common reptiles was associated with the existing A4226 road verges in the northern and southern areas of the scheme corridor ([Figure 6.6](#)). Much of the adjoining land comprising grazed pasture, arable fields and woodland was considered generally unsuitable.

6.3.27 Surveys in the northern section between May and July 2008 confirmed that small numbers of Slow worm *Anguis fragilis* (max count of 4) and Grass Snake *Natrix natrix* (max count of 2) were present within the road verges alongside the north and southbound carriageways (SBE 2009a). No reptiles were recorded from road-verge and scrub habitats in the southern part of the scheme following survey in August/September 09 (SBE 2009c).

#### **Bird surveys**

6.3.28 All of the proposed route alignment options would result in the loss of native hedgerows and displacement of field edge habitat to varying degrees, with these features of value to a range of bird species. In order to broadly identify the level and range of birdlife associated with these

habitats, a series of two survey visits were conducted in June and July 2008 along selected stretches of the existing A4226 road corridor from north of the Amelia Trust Farm to Waycock Cross (see SBE 2009a).

- 6.3.29 The survey protocol was based on Breeding Bird Survey (BBS) methodology (adapted field method (Bibby et al, 1992, BBS. BTO, 1995, Gibbons et al., 1996)) with birds identified both visually (using x8 binoculars) and by vocalisations. Each survey visit commenced at 06:00 and finished at 09:00 and involved transects running parallel along both sides of the road corridor. The direction of the routes was reversed on the second survey visit to avoid disturbance biases.
- 6.3.30 A total of 27 species were recorded during the course of the surveys ([Figure 6.7](#)) which were associated with the roadside hedgerows, within the fields, perching on telegraph wires or within the roadside woodland areas. Of the species recorded, nine are highlighted as being of some conservation importance<sup>7</sup> - Yellowhammer *Emberiza citrinella*, Dunnock *Prunella modularis*, Song Thrush *Turdus philomelos*, Linnet *Carduelis cannabina*, House Sparrow *Passer domesticus*, Skylark *Alauda arvensis*, European Starling *Sturnus vulgaris*, Herring Gull *Larus argentatus* and Barn Owl *Tyto Alba*.
- 6.3.31 During the bat emergence surveys in August 2009, a Tawny owl *Strix aluco* was seen and heard within the canopy of an Oak tree adjacent to the A4226 and could be nesting within a large cavity in the main trunk.

### **River Corridor Survey**

- 6.3.32 A survey of the River Waycock based on standard River Corridor Survey (RCS) methodology (NRA 1992) was undertaken in September 2009. The survey incorporated two 500m survey sections of the River Waycock, one upstream and one downstream of the A4226 at Waycock Bridge. For the purposes of fieldwork and detailed mapping of channel and bank features, each section was further divided into 100m sub-sections - Nos. 1-5 upstream and Nos. 1-5

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<sup>7</sup> Listed on one or more of the following: the UK Biodiversity Action Plan (BAP); Vale of Glamorgan LBAP, Section 42 List of Species of Principal Importance for Conservation of Biological Diversity in Wales, RSPB Red/Amber List (Gregory et al 2002), or on Schedule 1 of the Wildlife & Countryside Act 1981 (as amended).

downstream ([Figure 6.8](#)). The survey was undertaken from both banks and much of the river channel and photographs were taken to highlight certain features (see SBE 2009c).

- 6.3.33 The river channel had been modified (culverted) near the A4226 and possibly straightened for approximately 200 m north of Waycock Bridge. Downstream of the bridge the river bore little evidence of significant modification and had several associated hydrological features including inflow streams and an impounded backwater. The river channel was generally steep-sided and 3-5m wide with water flow moderately fast and shallow. In the upstream section water quality appeared to be good and the water was clear; a sewage outfall just above Waycock Bridge pumped treated effluent from a nearby sewage treatment works into the river and below this point the water was more turbid. The substrate in the channel was a mixture of fluviially-rounded limestone cobbles, bedrock and shallow silt; the latter only found in pools and impounded sections.
- 6.3.34 The predominant adjacent land use was improved grassland with old and neglected hedges; at the time of survey sheep, cattle and ponies were grazing the pastures. The transition between pasture and channel was abrupt, given the vertical nature of the banks and consequently there was little marginal vegetation. Outgrown hedges heavily shaded a significant proportion of the channel and trees and open water was quite scarce. There were very few aquatic macrophytes in the channel and the only frequent emergent plants were communities of mosses on cobbles in the riffles.
- 6.3.35 Brown Trout *Salmo trutta* were seen in deeper parts of the river and the Bullhead *Cottus gobio* was noted to be a frequent inhabitant of riffles and runs. A single Kingfisher *Alcedo atthis* was seen flying along the river in the downstream section.

### **Aquatic Invertebrate Survey**

- 6.3.36 A survey of the River Waycock for aquatic invertebrates was undertaken on the 26 September 2009 (SBE 2009c). A total of four sites, two upstream and two downstream of the A4266 bridge were selected ([Figure 6.9](#)), each supporting aquatic habitats representative of that stretch of the river. Semi-quantitative samples were taken in accordance with Environment Agency guidelines (Environment Agency, 1997) where River Invertebrate Prediction and

Classification System (RIVPACS) sampling methodology was used to collect samples. The river was sampled by a combination of three-minute kick and sweep netting marginal vegetation. Detailed site descriptions, including standard RIVPACS physical habitat variables, were recorded at each site.

- 6.3.37 In addition to the field survey, and to provide comparative data, information for macroinvertebrate families was also obtained from the Environment Agency Wales sampling site at Curnix Bridge, approximately 2.5 km downstream of the A4226 Waycock bridge (ST 06554 68822).
- 6.3.38 Macroinvertebrate samples from the field surveys were identified to the highest taxonomic level practical, with the exception of the Chironomidae (Non-biting Midges) and Oligochaeta (Segmented Worms) these were identified no further than Family or Order. Where invertebrates were present as incomplete specimens, only the portions, which had a head and a thorax or a thorax and abdomen, were included in the relative abundances (Environment Agency, 1997).
- 6.3.39 Macroinvertebrate abundance data were investigated in terms of tolerance to organic pollution (biological water quality), conservation assessment and taxonomic diversity using appropriate indices including the Biological Monitoring Working Party Score (BMWPS); River Invertebrate Prediction and Classification System (RIVPACS); Community Conservation Index (CCI) (Chadd and Extence, 2004) and the Shannon and Berger-Parker indices.
- 6.3.40 On the basis of the CCI index the river can be classified as being between Moderate and Fairly High/High conservation value (categories as described in Chadd and Extence, 2004). RIVPACS indicated the tolerance to organic enrichment to be low throughout the study stretch i.e. the biological water quality to be high; observed values meeting or exceeding those predicted. This quality is similarly reflected farther downstream at Curnix Bridge (Environment Agency data). The predominance of species favouring clean gravelly habitats indicates a general sensitivity to any decline in water quality or clarity.

## 6.4 Potential Receptors

### Overview

- 6.4.1 All proposed route options under consideration would result in the loss of improved grassland and arable habitats of limited ecological interest although breaching/removal of hedgerow networks and some loss of woodland habitat (within the Barry Woodlands SSSI) at the southern end of the scheme would also arise. Selection and design of the Preferred Route should therefore seek to avoid (where possible) or minimise the amount of hedgerow/woodland displaced or removed with appropriate mitigation provided where possible (see Mitigation section).
- 6.4.2 For protected species, the route alignment options could potentially affect reptiles, birds, bats, aquatic invertebrates and the riverine habitats of the River Waycock. The likely absence of Dormice from the scheme corridor has been demonstrated and no specific consideration of this species has been included. Similarly, only limited evidence of use by Badgers was reported (road casualty at the southern end of the scheme near Barry College) and consideration of effects on this species was limited to the woodland areas in the southern part of the scheme.
- 6.4.3 The following section provides a summary of the potential receptors that could be impacted by each of the five route alignments during the construction phase. For each of the alignment options, potential impacts are described in relation to Sectors as illustrated on Figure 1.1. Further detail relating to the significance of potential impacts during construction and operation as well as an indication of mitigation measures are provided in the Alignment Assessment Tables in Volume 3.

### Construction

- 6.4.4 For all route alignment options, the greatest ecological impact would be associated with the loss of established habitats necessary to accommodate the scheme. Effectively this would reduce the available habitat for any species retained, potentially leading to local loss, degradation or fragmentation of populations of flora and fauna. In addition, these species would be subject to increased disturbance from construction vehicles as well as associated increases in noise, lighting



and pollution risk due to site activities. A summary of the ecological receptors potentially affected by each route alignment is provided in Table 6.1 with an assessment of the associated impacts on these receptors in the Alignment Assessment Tables in Volume 3. For some sections – for example Sectors 1 & 7 at Sycamore Cross and Waycock Cross respectively, the impacts are common to all of the alignment options. No development works, other than those required within the existing carriageway (e.g. re-surfacing works etc), are proposed within Sector 2.

- 6.4.5 Differentiation between the potential impacts of the route alignment options effectively equates to selecting an alignment that minimises impacts on ecological features between Sector 3 and Sector 6 and even on this basis, potential impacts are similar for one or more alignments. For example, at Sector 4, the Red, Orange and Green alignments would all result in very similar impacts to ecological receptors.
- 6.4.6 Breaching of hedgerows and the associated loss of resources for nesting birds and foraging/commuting bats would occur to varying degrees for all of the route alignments. However, the alignments that incorporate substantial areas of ‘on-line’ improvement (e.g. Purple, Orange and Red) would effectively remove large sections of the existing roadside hedgerows, particularly within Sector 3 and Sector 4. Although these hedgerows were not particularly diverse throughout, they are used by foraging/commuting bats and are likely to support nesting birds and other species (e.g. small mammals, invertebrates) and contribute to maintaining habitat connectivity within a predominantly agricultural landscape.
- 6.4.7 In addition to conserving road-side hedgerows in Sectors 3 & 4, minimising potential impacts through Sectors 5 & 6 is a key consideration for route selection. Within Sector 5, all the route alignments would result in hedgerow breaches east of the existing A4226 with the Blue Route also requiring removal of a species-rich hedgerow south of Northcliff cottage and affecting a number of mature Oaks to the west of Lidmore Wood. These trees, in addition to the western edge of Lidmore Wood could also be impacted by the Orange and Red alignments and, although Purple and Green alignments would avoid these trees and the woodland, they would likely impact upon the mature Oak and Ash immediately adjacent to the A4226.

6.4.8 Sector 6 incorporates the new crossing of the River Waycock and the improvements through part of the Barry Woodlands SSSI, with four of the alignments crossing the river at a similar location (Purple, Red, Orange and Green). The Blue Route crossing is further to the west (downstream) and this alignment would also necessitate removal of a swathe of SSSI woodland away from the existing A4226 corridor. The remaining route options would require comparatively less removal of woodland habitat and within a corridor already affected by the existing alignment.

### **Operation**

6.4.9 The ecological receptors that could potentially be affected by the operational phase of the scheme are generally common to all route alignments with potential impacts principally related to the extent of habitat loss and/or degradation during construction. On this basis, the operational impacts offer little additional information to differentiate between the alignment options and consequently have not been incorporated into Table 6.1. The operational impacts are however addressed in the Alignment Assessment Tables in Volume 3.

6.4.10 During scheme operation, foraging bats and nesting birds would be impacted by the loss of hedgerows and, in the short term at least, mitigation for these impacts would not be possible. On-line route alignments, particularly through Sectors 3 & 4 would remove a substantial length of hedgerow habitat with the potential to result in habitat fragmentation or interruption of flight/feeding areas for bats and a loss of nesting/foraging resources for birds. In addition, where hedgerows have been removed this would exacerbate the disturbance effect of the road due to a reduction in the amount of available habitat – this is less of a consideration where hedgerows are breached (for example Blue route through Sectors 3 & 4) as some of the resource is retained.

6.4.11 Lighting provision at junctions could also impact on bat foraging/feeding behaviour, particularly for those species such as Myotis and Brown Long-eared, which are known to be sensitive to artificial light (e.g. Rydell & Racey 1995).

6.4.12 A key operational receptor is the River Waycock, with four of the five alignments crossing the river at a similar point and the Blue route, further to the west (downstream). Indirect impacts

arising from a reduction in water quality (from e.g. highway run-off) would be a key consideration for drainage and crossing design for all alignments.

**Table 6.1 Summary of ecological receptors impacted by scheme construction.**

Route Sector	Route alignment and potential impact on ecological receptors				
	Blue	Purple	Red	Orange	Green
<b>Construction</b>					
<b>Sector 1</b>	<p>Loss of Semi-improved neutral grassland, scrub and species-poor road-side hedgerows to accommodate new junction</p> <p>Partial loss of species-rich hedgerow at southern limit of section on eastern side</p> <p>Common reptiles recorded in existing verges (loss of habitat)</p> <p>Nesting birds likely to utilise scrub &amp; hedgerows (loss of habitat and increased disturbance of adjoining areas)</p>				
<b>Sector 2</b>	<p>No works proposed</p> <p>Retention of existing semi-improved grassland along verges and species-poor native hedgerows</p>				
<b>Sector 3</b>	<p>Loss of existing road-side hedgerows, grassland and woodland to west for on-line works (northern part of Sector)</p> <p>Loss of scrub linked to small woodland block (east of existing A4226)</p> <p>Breaching of 3no. species-poor hedgerows and 1 no. species-rich hedge at southern end of sector</p> <p>Loss of habitat for nesting birds and reptiles</p> <p>Increased disturbance to farmland birds in existing arable field including Skylark, Meadow Pipit and Goldfinch</p> <p>Interruption of bat feeding areas along hedgerows, potential for</p>	<p>As described for Blue Route with slight reduction in loss of existing road-side hedgerows (northern part of Sector).</p> <p>Loss of Oak trees along lane east of Whitton Lodge</p> <p>Breach of species-rich hedge east of A4226 and impacts to road-side neutral grassland west of A4226 in southern part of Sector.</p>	<p>On-line works resulting in loss of existing road-side hedgerows (ca.3km length), woodland (west of route) and grassland</p> <p>Loss of habitat for nesting birds and reptiles</p> <p>Increased disturbance to farmland birds in arable field</p> <p>Loss of bat feeding areas (road-side hedgerows) and interruption of flight routes</p>	<p>As described for Blue Route with reduced risk to Oak trees east of Whitton Lodge</p> <p>Additional breach of road-side hedge to south and east of Whitton Lodge to accommodate slip roads</p> <p>Breach of species-rich hedge at southern end of sector</p>	<p>As described for Blue Route with additional loss of road-side hedge at southern end of sector and to allow for slip roads</p> <p>Increased disturbance to birds north of Whitton Lodge to accommodate junction</p> <p>Breach of species-rich hedge east of A4226 and impacts to road-side neutral grassland west of A4226 in southern part of Sector.</p> <p>Reduced risk to Oak trees east of Whitton Lodge</p>

Route Sector	Route alignment and potential impact on ecological receptors				
	Blue	Purple	Red	Orange	Green
	<p>increased disturbance (lighting) to retained hedgerows</p> <p>Loss of mature Oak trees to allow for new roundabout at Whitton Lodge</p>				
<b>Sector 4</b>	<p>Breach of 3no. species-poor hedgerows</p> <p>Loss of bird nesting habitat</p> <p>Interruption of bat feeding areas along hedgerows</p> <p>Disturbance of retained features (noise, light)</p>	<p>Loss of existing road-side hedgerows on western side. Total hedgerow loss ca. 800 m</p> <p>Breach of 3no hedgerows west of A4226 including 1 species-rich hedge</p> <p>Loss of habitat for nesting birds and foraging/commuting bats</p>	<p>Loss of existing road-side hedgerows, including species-rich sections. Total hedgerow loss ca. 1.2km</p> <p>Loss of habitat for nesting birds and foraging/commuting bats</p>		
<b>Sector 5</b>	<p>Breach of 2no species poor hedgerows along Northcliff lane and loss of species-rich hedgerow (ca 100m in length) to south of lane</p> <p>Breach of 5no. hedgerows including 2 which are species-rich</p> <p>Loss of up to 3no. mature Oak trees with potential for roosting bats</p> <p>Disturbance of roosting bats in stable block south west of Northcliff Cottage</p> <p>Loss of bird nesting</p>	<p>Loss of road-side hedgerows, including species-rich areas in northern section to Moulton Junction. Total loss of up to 1km</p> <p>South of Moulton junction, breach of 3no. species-rich hedgerows to accommodate roundabout and slip roads and further breach (2no hedgerows) east of Sutton Farm</p> <p>Loss of mature Oak and Ash with possible bat roost and./or Tawny Owl nest.</p>	<p>As described for Blue Route with additional loss of road-side hedgerow in northern section (up to Moulton Junction) to accommodate roundabout and slip roads</p> <p>Potential for loss along western edge of Lidmore Wood</p>	<p>As described for Blue Route with additional loss of road-side hedgerow in northern section to accommodate roundabout and slip roads north of Northcliff lane</p> <p>Potential for loss along western edge of Lidmore Wood</p>	<p>As described for Red Route but with no risk of potential effects on Lidmore Wood</p> <p>Loss of mature Oak and Ash with possible bat roost and./or Tawny Owl nest.</p>

Route Sector	Route alignment and potential impact on ecological receptors				
	Blue	Purple	Red	Orange	Green
	<p>habitat</p> <p>Interruption of bat feeding areas along hedgerows</p> <p>Disturbance of retained features (noise, light)</p>	<p>Disturbance of roosting bats in stable block south west of Northcliff Cottage</p> <p>Loss of bird nesting habitat</p> <p>Interruption of bat feeding areas along hedgerows</p> <p>Disturbance of retained features (noise, light)</p>			
<b>Sector 6</b>	<p>Loss of existing road-side hedge up to 500m in northern section</p> <p>Loss of small woodland block/copse and breach of linear woodland north of River Waycock</p> <p>Potential for impact on 2no mature Oak trees in field corner in northern section</p> <p>New bridge crossing of River Waycock (effects on aquatic invertebrates and riverine habitat)</p> <p>Breach of 2no species-rich hedgerows south of the River</p> <p>Loss of woodland swathe (ca. 25m width) within SSSI west of existing A4226 over length of ca. 500m</p>	<p>Loss of existing road-side hedge up to River Waycock. Total length ca. 800m.</p> <p>Loss of 2no Mature Oak in northern section</p> <p>New bridge crossing of River Waycock at or immediately downstream of existing (reduced effects on aquatic invertebrates and riverine habitat)</p> <p>Some loss of SSSI woodland alongside existing alignment over length of ca. 500m</p> <p>Loss of habitat for nesting birds and interruption of bat feeding areas along road-side hedgerows (in northern section only)</p>	<p>Loss of road-side hedge north of River Waycock. Total length ca. 300m</p> <p>Breach of 2no hedgerows north of the River</p> <p>As described for Purple Route from the River Waycock to end of sector.</p> <p>Loss of habitat for nesting birds and interruption of bat feeding areas along road-side hedgerows (in northern section only)</p>	<p>As described for Red Route</p> <p>Junction arrangement allows slip road to use existing crossing of River Waycock</p> <p>Breach of species-rich hedgerow and linear woodland west of existing A4226 to accommodate junction and slip to Sutton Farm</p>	<p>As described for Red Route</p> <p>Junction arrangement allows slip road to use existing crossing of River Waycock</p> <p>Breach of species-rich hedgerow and linear woodland west of existing A4226 to accommodate junction and slip to Sutton Farm</p>

Route Sector	Route alignment and potential impact on ecological receptors				
	Blue	Purple	Red	Orange	Green
	Loss of habitat for nesting birds and interruption of bat feeding areas along road-side hedgerows				
<b>Sector 7</b>	<p>Loss of scrub, plantation woodland and ruderal vegetation to either side of carriageway. Blue Route would result in relatively greater loss compared to other alignments</p> <p>Nesting birds likely to use this area. Snipe flushed from area west of A4226 during Phase I survey (loss of habitat and increased disturbance of adjoining areas.</p>				

## 6.5 Mitigation

6.5.1 In many cases, the mitigation will be determined by the legislative protection or planning policy relating to habitats or species/groups such as woodland, hedgerows, breeding birds, bats and reptiles. For example, any scrub or vegetation clearance would be undertaken outside the bird-breeding season, which typically runs from March-August inclusive. The following section sets out the mitigation measures considered appropriate to each of the route alignment Options within different Sectors – these measures, along with an assessment of impacts are summarised in Volume 3.

6.5.2 In determining the requirement and scale of mitigation considered for each alignment, the following key principles have been applied:

- Avoidance of the most sensitive areas through identification and adoption of best route option;
- Minimising the development footprint as far as practicable where avoidance of impacts is not possible;
- Timing of construction works to avoid or reduce disturbance to wildlife (e.g. maintenance and vegetation control activities outside nesting periods);
- On-site habitat enhancement within the scheme corridor or adjacent land;
- Sympathetic design and installation of hard structures, such as bridges and tunnels, and increase permeability through installation of nest/roost sites for wildlife;
- Appropriate Management of retained habitats/features;

### **Sector 1 – Sycamore Cross**

6.5.3 All route alignments within this section would have similar impacts resulting from the construction and operation of a new junction and roundabout at the A48/A4226 interface. Ecological features potentially affected include semi-improved neutral grassland, hedgerows, nesting birds and common reptiles.

6.5.4 Prior to any construction works a strategy for minimising risks to common reptiles (Slow worm and Grass Snake) would be required. This is likely to involve some degree of reptile capture/transfer (translocation exercise) to move animals out of the development footprint to retained areas of verge – for example within Sector 2 where no development works are proposed. Transfer of animals to retained verges is likely to require some local enhancements



(e.g. log-pile provision) to increase carrying capacity. The reptile translocation exercise could be undertaken at any time between April and October when reptiles are active but should aim to be completed in September prior to colder temperatures in autumn. Other timing considerations for construction work would involve the removal of scrub/hedgerows outside the bird breeding season.

- 6.5.5 Mitigation measures appropriate to the operational phase of the scheme (post construction) would involve re-planting of hedgerows to re-establish habitat connectivity, sowing of new road-side verges with a wildflower/grassland mix to complement the existing grassland character and appropriate design of junction lighting to limit any increase in illumination of adjacent hedgerows and woodland (north of A48) over the existing level – this is in consideration of the likely use by foraging bats. Where hedgerow planting is undertaken, this should make use of native species known to occur locally (i.e. in retained hedgerows) such as Hawthorn *Crataegus monogyna*, Blackthorn *Prunus spinosa*, Elder *Sambucus nigra*, Hazel *Corylus avellana*, Field Maple *Acer campestre* and Holly *Ilex aquifolium*.

## **Sector 2**

- 6.5.6 No development activities are proposed in this section for any of the route alignment options. Some works within the existing carriageway (e.g. re-surfacing) are likely to be required and such works should avoid any storage or stockpiling of materials within the adjacent road-side verges.

## **Sector 3**

- 6.5.6 Four of the route alignment options (Blue, Purple, Orange and Green) would result in similar impacts in this section with some loss of road-side hedgerows and scrub in the northern part and loss/breach of hedgerows either side of the lane at Whitton Lodge. Much of the alignment for these options would cross the large arable field east of the A4226 corridor potentially impacting on farmland birds including ground-nesting species such as Skylark *Alauda arvensis*. The Red route follows the existing A4226 alignment, resulting in the loss of road-side hedgerows over the entire section. Bat activity alongside these hedgerows recorded up to four species foraging/commuting ([Figure 6.3a](#)).

- 6.5.7 Mitigation measures within this section would involve replacement planting for any road-side hedgerows as described for Sector 1. For the four off-line options, new hedgerow planting through the arable habitat represents an opportunity to increase the hedgerow resource in the

long term and provide a positive overall impact for the hedgerow and grassland resource. Avoiding/minimising impacts associated with the junction arrangement through route selection is also a consideration for this section. For example, the Blue Route junction would result in removal of a substantial area of hedgerow along Whitton lane and could affect a number of semi-mature Oaks to the east, whereas selection of either the Green or Orange route would limit loss of hedgerow with habitat loss associated with junctions on these alignments relating to arable land or improved grassland, both of which are of less ecological interest than the hedgerows.

- 6.5.8 Other mitigation measures considered as part of the assessment (see Volume 3) include avoidance of the bird breeding season for vegetation clearance works and appropriate design of lighting at new junctions to maintain bat flight corridors along hedgerows.

#### **Sector 4**

- 6.5.9 With the exception of the northern and southern junction sections (Sectors 1 & 7 respectively) Sector 4 is the shortest section of the route with the existing habitats comprising arable or pasture fields intersected by hedgerows. Bat activity levels within this section recorded three species utilising the hedgerow network north of the lane at Northcliff Cottage.
- 6.5.10 Only the Blue Route follows an off-line alignment within this section with the remaining four routes all resulting in substantial loss of road-side hedgerows over the length of the section. As described for Sector 3, avoiding and minimising impacts is a consideration for Sector 4 with the off-line solution, involving breaching/partial loss of hedgerows preferable to the complete loss required for on-line works. Other considerations for this section are as described for Sector 3 relating to replacement hedgerow provision, nesting birds and lighting design (bat foraging/commuting areas).

#### **Sector 5**

- 6.5.11 All of the route options in Sector 5 eventually follow an off-line alignment although the Purple, Red and Green routes remain on-line over the northern part of the section. Ecological features within Sector 5 include both species-poor and species rich hedgerows, improved grazing pasture and a number of mature Oak and Ash trees at selected locations. The hedgerow network within this section was also used by up to four species of bat (Figure 6.3b) with a confirmed roost (Pipistrelle species) within the stable south west of Northcliff cottage.

- 6.5.12 Mitigation considerations are comparable to Sector 4 with the off-line routes (Blue and Orange) demonstrating the principle of avoiding/minimising impacts to hedgerows in particular. However, the junction arrangement for the Orange Route, with a new roundabout and slip roads north of Northcliff lane would affect existing road-side hedgerows, including species-rich sections.
- 6.5.13 All of the route alignments could potentially affect the mature trees towards the centre of the section although the Blue, Orange and Red Routes offer the potential to minimise loss to a single tree. However, both the latter alignments (Red and Orange) could result in impacts along the western edge of Lidmore Wood and this should be avoided where possible.
- 6.5.14 Both the Green and Purple routes would likely result in the loss of a mature Ash and Oak immediately east of the existing A4226. As noted for Sector 3, all routes within Sector 5 offer an opportunity for Neutral/beneficial impacts in the long term (for the off-line sections at least) through increasing the amount of hedgerow and diverse grassland, with these features incorporated as part of the cutting/embankment design. However, the potential for a positive impact is reduced for those alignments involving substantial loss of existing road-side hedgerows (e.g. Purple, & Green) and the risk of impacts to existing woodland (Red and Orange Routes). In these instances, replacement planting would be viewed more as mitigation (for features lost) rather than an enhancement/beneficial effect on the existing biodiversity resource.

## **Sector 6**

- 6.5.15 In contrast to the other Sectors, mitigation involving avoiding/minimising impacts in Sector 6 could be best achieved through on-line improvements, particularly through the southern part of the section which incorporates the Barry Woodland SSSI. All route alignments would affect ecological features to the east and west of the A4226 to varying degrees although the Blue Route would be particularly unfavourable resulting in the loss of at least one small woodland area north of the River Waycock and a swathe of woodland through the SSSI.
- 6.5.16 Within this section, a new crossing of the River Waycock would be required with four of the alignments (Purple, Red, Orange and Green) crossing at a comparable location at or immediately downstream of the existing bridge. Protection of the river from indirect impacts on water quality – from e.g. silt discharge, accidental spillage and highways run-off - would be a key consideration during construction and operation of the scheme with an Environmental Protection Plan (or similar) likely to be required as part of construction works. Drainage design

of the built scheme should also incorporate appropriate pollution control units to minimise the risks to water quality from highways run-off.

- 6.5.17 The Blue Route crossing of the River Waycock would be approximately 100m downstream of the existing crossing and would impact habitats adjacent to the river corridor (woodland, grassland and hedgerow) as well as the riverine habitats themselves. Minimising impacts through avoidance – in this case adopting a more on-line option that uses the existing bridge crossing – should be considered. However, the practicalities and feasibility (in engineering terms) of using the existing bridge crossing would require further investigation and design work.
- 6.5.18 All route alignments would also involve a degree of habitat loss within the Barry Woodlands SSSI, although minimising this impact through adoption of the more on-line solutions would be preferable. As identified within the woodland survey (see SBE 2009a), the quality of the woodland alongside the carriageway was broadly comparable within 50m of the carriageway although ground flora within Woodland 1 was marginally more diverse than in Woodland 2 (Figure 6.5). Mitigation for loss of woodland habitat could involve adoption of a woodland management plan (duration to be agreed) for the retained areas with the aim of restoring effective management through selective coppicing.
- 6.5.19 Other mitigation considerations for Sector 6 include avoidance of the bird breeding season for vegetation clearance, new hedgerow planting and appropriate lighting design along retained/newly created linear features.

## **Sector 7**

- 6.5.20 All route alignments at the southern end of the scheme would result in similar impacts involving provision of a new roundabout/junction. The Blue Route would result in a comparatively greater loss of hedgerow and scrub to the west of the existing A4226 with the remaining route options all associated with loss of similar habitats adjacent to the carriageway.
- 6.5.21 Timing of vegetation clearance (nesting birds), replacement hedgerow planting and appropriate lighting design are all relevant mitigation measures for this section.

## 6.6 Residual Impact

- 6.6.1 The following section and the table in Volume 3 describe the residual impact of the five route options assuming that the mitigation measures described above are effectively implemented. Even with adoption of the mitigation measures, all route options would inevitably have some adverse impact during construction and in the short term post-construction (Year 1 of operation) due to the loss of existing habitats to accommodate the scheme. With the exception of the Blue Route in Sector 6, typically the ecological impact for the route alignments within each Sector was considered to be Slight Adverse (in the short term), moving towards Neutral and Slight Beneficial in some cases as mitigation/enhancement planting matures in the long term (Year 15 and beyond).
- 6.6.2 In general, those route alignments involving mainly on-line improvements would have the greatest adverse effects due to loss of existing road-side hedgerows. For example, within Sector 4, only the Blue Route adopts an off-line solution with the residual impact (long term) considered to be Slight Beneficial as there would be a net increase in hedgerow and grassland resource. In contrast, the remaining routes would result in a Moderate Adverse impact in the short term in Sector 4, reducing, at best, to Neutral in the long term as mitigation would effectively aim to replace the hedgerow resource.

## 6.7 Conclusions

- 6.7.1 The interim assessment of route alignment options has identified a number of ecological receptors that would be affected by the improvement works. This includes hedgerow, grassland (road verge), woodland and aquatic habitats (River Waycock) in addition to nesting birds, foraging/commuting bats and common reptiles. All of these features would inevitably experience some degree of adverse effect as a result of scheme construction although, with appropriate mitigation, these effects could be effectively controlled and, in the long term could lead to an overall benefit for certain features.
- 6.7.2 As described in previous sections and summarised within Volume 3, differentiation of the ecological impacts associated with the five routes under consideration effectively relates to an assessment between Sectors 3 and 6. For all route options, potential impacts would be comparable at Sector 1 (Sycamore Cross) and Sector 7 (Waycock Cross) with no development works proposed in Sector 2.

6.7.3 Based on consideration of the likely impacts, no single route alignment would be particularly favourable and the Preferred Route taken forward to the next stage of the assessment is likely to comprise a combination of different options, each of which minimises ecological impacts within a particular Sector. In terms of ecology and nature conservation, this route could adopt the following arrangement:

- Sector 3: Blue Route with Junction arrangement as for Orange Route;
- Sector 4: Blue Route;
- Sector 5: Blue Route;
- Sector 6: Red or Orange Routes

6.7.4 Dependent of the route taken forward as the Preferred Route, following consideration of all the environmental impacts (air quality, noise, landscape/visual etc.) further targeted survey work may be required to inform mitigation design, particularly at junctions and the new River Waycock crossing, and any licensing requirements if European Protected Species (bats in this instance) could be effected. For example, the bat roost identified within the stable at Northcliff Cottage and one or more mature Oaks within Sector 5, (presence of a roost considered likely) could be impacted by the route and this could require a licence from the Welsh Assembly Government (WAG).

## 7 Land Use

### 7.1 Introduction

7.1.1 The dominant land use in the study area is agriculture which in turn is influenced by geology and soils. The study area extends from Sycamore Cross at the north of the scheme to Waycock Cross at the south of the scheme. The assessment of effects on landholdings is based upon the section of the holding that is within 1km of and bordering against Five Mile Lane.

**NOTE:** All distances and areas given have been measured from a CAD plan and are approximate.

### 7.2 Appraisal Methodology

7.2.1 The methodology followed is based on that required for both a Stage 1 and Stage 2 assessment as set out in the HA Design Manual for Roads and Bridges Volume 11, Part 6.

7.2.2 This report has been prepared to provide the necessary information for a full Stage 2 assessment:

- Information on the agricultural land classification of the land that may be affected;
- Outline information on the agricultural holdings that may be affected;
- Information on any potentially substantive severance issues;
- Land uses and potential impact including contaminated land;
- Baseline geology and soils and potential impacts; and
- Mitigation options for adverse impacts.

7.2.3 The WeITAG '7 Point Scale' has been used to assess the significance of effects on Land Use, Geology and Soils. Please refer to the Approach and Methodology section in the introduction for more information.

7.2.4 Landholding boundaries in the vicinity of Five Mile Lane were identified, along with principal farm access routes. Consideration has been given to the main uses of the land potentially affected, together with an investigation of the potential impacts of the new carriageways'

construction upon each affected unit. Opportunities for possible mitigation of impacts are reported in this document.

- 7.2.5 Landholding information was obtained in 2008, confirming the holding limits, owners, lessees and description of land use. This was supplemented by field surveys during the period February to November 2009.

### **Double Counting**

- 7.2.6 In order to avoid double-counting of impacts, where possible, receptors have been assessed in the chapters according to where the impacts experienced may be most significant. In this chapter, the landholdings that may experience impacts have been described. Community Facilities has been assessed fully under Social Impacts.

### **Cumulative Effects**

- 7.2.7 At this stage, there haven't been any potential cumulative land use effects predicted or assessed as a result of completing this scheme.

## **7.3 Baseline Conditions**

### **Woodland**

- 7.3.1 Small woodlands are included within the study corridor, frequently occupying valley sides. Most woodlands are privately owned rather than commercial and there are also a good distribution of copses and hedgerow trees. A significant proportion of the woodland is designated as Ancient Woodland or SSSI. Impacts on the SSSIs are discussed under Biodiversity in Chapter 6.

### **Agriculture and Soils**

- 7.3.2 Mixed farming is the dominant land use within the study corridor due to the good climate, good soils and gentle topography. [Figure 7.3](#) illustrates land use while [Figure 7.5](#) illustrates the distribution of agricultural land quality in the study area.
- 7.3.3 Where the underlying bedrock is carboniferous limestone these are overlain by well-drained alkaline soils. Other areas of the Vale are underlain by old red sandstone that produces acidic



well-drained soils. There are areas of high quality agricultural land - Agricultural Land Classification (ALC) Grades 2 and 3a within the study corridor.

### **Land Quality**

- 7.3.4 The National Assembly for Wales Agriculture Department classify agricultural land by grades according to the extent to which its physical or chemical characteristics impose long term limitations on agricultural use for food production. There are 5 grades of land numbered 1 to 5, with grade 3 divided into two sub-grades. The best and most versatile land falls into grades 1, 2 and sub-grade 3a and is the most flexible, productive and efficient in response to inputs.
- 7.3.5 The agricultural land quality information was obtained from the Welsh Assembly Government in March 2008. The majority of land within the study corridor is Grade 3 although a sub – class of ‘a’ or ‘b’ is not given in the GIS data.
- 7.3.6 At the start of the improvement scheme, the land quality is grade 2. The route then passes through an area of grade 4, before entering a zone of grade 3 that continues to the end of the improvement scheme at Waycock Cross.

### **Geology**

- 7.3.7 The dominant bedrock (solid geology) of the Vale is composed of sedimentary glacial and fluvial deposits (drift geology). A band of carboniferous limestone extends through the middle of the Vale. The study corridor is predominantly composed of Lower Jurassic (Blue Lias) with limited drift geology. Please refer to Figures 7.1 and 7.2.
- 7.3.8 The Vale of Glamorgan is geologically interesting as it is the only place in Wales where Jurassic strata can be seen on land; however there are no geological SSSIs, RIGS<sup>8</sup> or quarries within the study corridor.

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<sup>8</sup> South Wales RIGS study awaiting publication. There is no active RIGS group in the area and therefore it is unlikely that there are any RIGS within the study corridor.

### **Community Facilities**

- 7.3.9 The Amelia Trust Farm (Whitton Rosser Farm) is located to the west of the existing road. The Farm is open to the public with no admission charge. The volunteer charity supports adults with learning difficulties and disadvantaged young people.
- 7.3.10 The Welsh Hawking Centre, is a popular visitor attraction located close to the existing road and adjacent to the Barry woodland SSSI.
- 7.3.11 Community facilities are assessed under Social Impacts, please see Chapter 10.

### **Urban areas and settlements**

- 7.3.12 The north west corner of Barry also falls within the study area although most of the study corridor is generally sparsely populated with isolated farms and houses. There is a small settlement at Moulton.

### **Contaminated Land**

- 7.3.13 This is a fairly minor issue in this predominantly rural area although the Environment Agency has provided indicative evidence of one former landfill site within the study corridor:
- Blacklands Farm: Licensed Dec 1990 to Dec 1991 the type of waste buried here is 'Inert' which means waste that remains largely unaltered once buried such as glass, concrete, bricks, tiles, soil and stones.

## **7.4 Potential Receptors and Impacts**

### **Landholdings**

- 7.4.1 In total twenty-five identified landholdings border the existing Five Mile Lane and may be affected by either loss of land, or access, or both. The new route is intended to be wider and have a higher design speed than the existing making it unsafe to cross, or make sharp turnings. With mitigation in the form of feeder lanes, underpasses and overbridges, this significant adverse effect may be greatly reduced, although this also needs to be balanced against the likely impact of greater land take and permanent loss of agricultural land.

7.4.2 Where the new route is off-line, small pockets of land may be created between the existing Five Mile Lane and the new highway. These may be too small to be agriculturally viable and compensation may be required in places.

7.4.3 To maintain confidentiality, receptors and farm holdings have been given reference numbers, which aid cross referencing between figures, tables and the report and place names have been given to holdings for ease of reference. Owners and lessees names are not given.

**NOTE:** Only significant impacts are covered within the main body of the text. Please see Appendix 7.1 for the remaining landholdings assessments.

**References similar to 'LU-3-1a + b'** can be cross referenced with figures and tables.

### **Sector 1**

7.4.4 No significant effects.

### **Sector 2**

7.4.5 No significant effects.

### **Sector 3**

7.4.6 In Sector 3, four of the five options under consideration deviate significantly from the existing route.

7.4.7 Whichever option is chosen all landholdings bordering the edges of the new route are likely to experience impingement onto their boundaries.

### **Blackland Farm (LU-3-1a + b)**

7.4.8 These two land parcels are located on the western and eastern sides of Five Mile Lane. Effects on this landholding can be summarised as follows:

- All routes: loss of farm access and connectivity.
- Red (on-line): minimal loss of 0.4Ha land area as a result of road widening
- Orange: Loss of 2.1Ha corner of field (b)
- Green: Loss of 0.9Ha corner of field (b)
- Blue: Loss 0.9Ha of corner of field (b)
- Purple: Loss of 1.1Ha corner of field (b)

7.4.9 The effect on the land parcel can be defined as **slight adverse**, as a corner may be affected, however, the effects on the landholding could be **severe adverse** without mitigation. Provision of access via a bridge or underpass may reduce this effect to **slight adverse**.

#### ***'Doghill Farm' (LU-3-3)***

7.4.10 Located on the east of Five Mile Lane, this agricultural holding is at a point where a bend in the existing road needs to be straightened. Route options i.e. Purple or Orange, that leave a wider strip of land between the existing Five Mile Lane and the new route may be preferred to those that leave a narrower strip.

7.4.11 Effects on this landholding can be summarised as follows:

- Red route: minimal loss as a result of road widening (on-line)
- Orange or Purple: 11.8Ha of land between old and new road
- Green route: 8Ha of land between old and new road and a roundabout causing further fragmentation.
- Blue route: 6.2Ha of land between old and new road

The effects on the landholding could be defined as **moderate adverse**, although with provision of access to the land parcel that may be on the west of the new route, this could be reduced to **slight adverse**.

#### ***Whitton Lodge (LU-3-5)***

7.4.12 The private dwelling of Whitton Lodge is located immediately to the east of Five Mile Lane. The red alignment would have a direct severe adverse effect on this property and it would need to be demolished. The other routes propose adding a new alignment on the other side of the dwelling, to the east. The Blue route includes a roundabout junction that may be placed behind the house, about 75 m away, whereas the Orange roundabout is approximately 130 m away and the Green roundabout 200 m away. The Purple route, designed for an 80 km/h speed, as opposed to 100 km/h, utilises a simple crossroad junction.

7.4.13 Effects on this dwelling can be summarised as follows:

- Red route: direct severe adverse impact and demolition
- Orange or Purple route: new route alignment 120m from house
- Green route: new route alignment 50m from house
- Blue route: new route alignment 100m from house

7.4.14 Due to the close proximity of the dwelling to the proposed route the impact is **severe adverse**. For the Red route this may not be possible to mitigate, although compensatory measures may need to be agreed. The other routes may provide more opportunities for mitigation over and above that of avoidance. Please refer to landscape chapter for further detail.

#### **Little Hamston Farm (LU-3-6)**

7.4.15 This agricultural holding is located to the east of the existing Five Mile Lane. The red on-line route may have a minimal effect on a small part of the holding boundary. The other routes would all slice off a corner of the holding. The Orange and Blue routes have a roundabout located mainly within the holding. The severed land may be too small to remain commercially viable.

7.4.16 Effects on this landholding can be summarised as follows:

- Red route: minimal loss as a result of road widening (on-line)
- Green route: 0.6Ha loss of corner of land between old and new road
- Orange, Blue and Purple routes: loss of up to 1.5 ha segment of land between old and new route with additional fragmentation caused by junction.

The effect on the holding from the Orange, Blue and Purple routes is **moderate adverse** due to a loss of up to 1.5 hectares.

### **Sector 4**

#### **Highfield (LU-4-2)**

7.4.17 This holding, on the western side of Five Mile lane, also straddles Sectors 4 and 5. This particular land parcel is made up of three fields. The Red or Green routes may impinge on the boundaries, removing up to 0.1Ha. For the Orange route, part of the proposed roundabout would be within the holding.

7.4.18 The Blue or Purple routes may not affect the holding. These alignments are further eastwards of the existing road. The Blue route essentially leaves the existing Five Mile Lane in place and creates a parallel off line route at this point.

7.4.19 The Red or Green routes may have a **slight adverse effect** on this landholding. The potential fragmentation from the Orange route could increase the impact to **moderate adverse**.

## Sector 5

### **Northcliff Cottage (LU-5-1)**

- 7.4.20 This private dwelling is over 100m east of the existing Five Mile Lane and may be affected by any of the route options.
- 7.4.21 For the Red and Green options, an approach road for the new roundabout would be within 50m of the house. The main part of the Orange route may be 58m away from the house and the alignment for the Blue route may be 48m away with additional impacts from a junction improvements. The Purple route is most favourable.
- 7.4.22 The effects of either the Red or Green routes would be **slight adverse**. The predicted effect on this small landholding, particularly from the Orange or Blue routes, is **moderate adverse**.

### **Groveland Farm (LU-5-2)**

- 7.4.23 This holding is on the western side of Five Mile lane. The Red and Green routes may have the greatest impingement on the boundaries, removing up to 0.1Ha. For the Orange option, part of the approach to a roundabout junction may affect a field corner.
- 7.4.24 The Blue or Purple routes may not affect the holding. These alignments are further eastwards of the existing road. The Blue route essentially leaves the existing Five Mile Lane in place and creates a parallel off line route at this point.
- 7.4.25 The Red, Orange or Green routes may have a **slight adverse effect** on this landholding. This could increase to **moderate adverse**, in consideration of the relatively small size of the holding.

### **Groveland House (LU-5-3a + 3b)**

- 7.4.26 This is a private dwelling on the western side of Five Mile Lane, with attached land on the eastern side of Five Mile Lane. This small landholding is at a pivotal location where sharp bends are to be removed and as such it is affected by all options.
- 7.4.27 The Red, Orange and Green options include roundabouts and access roads in proximity to Groveland House. Local access to the dwellings would reduce the distance between receptor and road by approximately 12 metres for the Red and Green alignments. The increase in road network would have a severance effect on the associated fields to the eastern side of the road.

7.4.28 The main carriageway for the Orange and Blue routes is further to the east when compared to the others and as such would retain a greater proportion of paddock. The Purple route would retain approximately 3.3Ha, the Orange 2.5Ha and the Blue 1.8Ha.

7.4.29 The effects on this landholding are **severe adverse** as all options may lead to a significant loss of land, severance or impact on the quality of the dwelling. The Orange or Blue routes would provide more opportunities for mitigation.

#### **Highmeade (LU-5-4)**

7.4.30 This holding may be affected by the junction options for the Red and Green routes that would place an approach road through the edge of this holding. The Orange and Blue routes would not affect the holding, as these alignments are further east. The Purple route may have greatest effect, as half of the indicated roundabout junction may be located within the field that is next to Five Mile Lane.

7.4.31 The assessment of effects for the Red, Green and Purple routes is **moderate adverse**. The Orange and Blue routes would be preferred.

#### **Sutton Fach Farm (LU-5-5)**

7.4.32 This holding may be affected by all the options. The full extent of the holding beyond 1 km distance of Five Mile Lane is not known at this point. However, any of the options seem likely to leave the house and barns isolated from a substantial part of the eastern land area. The provision of access in the form of an overbridge or underpass needs serious consideration.

7.4.33 For each option, the approximate size of the workable land parcel left between the existing and proposed route may be: Red-10.5Ha, Orange-18.9Ha, Green-5.5Ha, Blue-13.3Ha, and Purple - 7.3Ha.

7.4.34 The Orange route may be preferable, leaving as it potentially leave the greatest workable area between the old road and the new alignment. There is also the benefit that the new route is located at a greater distance from the house and barns than either the present route, or any of the other options.

7.4.35 The worst-case effects for the holding may be **severe adverse**, due to land disturbance and severance. This effect could be reduced to **moderate adverse** with mitigation and could be reduced further to **slight adverse** if it was established that this land section is part of much larger landholding.

***‘Llancarfan’ holding***

7.4.36 This extensive landholding has been previously described above. The Blue option would potentially affect an area of woodland which is assessed below and in the appendices under ‘woodland’.

**Sector 6**

7.4.37 In Sector 6, the severance effect described above for Sutton Fach Farm continues for approximately 240m until a point where all options again begin to follow the existing route. The Blue route may have the greatest impact in this section, as it leaves the existing route in place to use as a feeder and a new alignment is constructed alongside it. For the Orange and Green routes there may be additional effects and loss of 0.3 Ha due to a feeder lane and roundabout.

**Woodland**

7.4.38 The proposed routes may affect a number of areas of woodland. The biodiversity section of the report has assigned reference numbers and these are used below:

***Wood 1 Middleton plantation & Wood 2 Vale & Barry College***

7.4.39 These woodlands are separated by the existing A4226 and are part of the Barry woodlands SSSI (See Chapter 6 Biodiversity).

7.4.40 Within the southern part of the survey corridor, between Waycock Cross and the River Waycock, all route alignment options are on-line (except for the Blue route). There could be a shift of up to 8m westwards or eastwards due to the additional width of the new road.

7.4.41 All route alignments may have a marginal effect on woodland to the east and west of the A4226 to varying degrees although the Blue Route may be particularly unfavourable resulting in the loss of at least one small woodland area north of the River Waycock and a swathe of woodland – up to 60m from the existing road – may be affected.

7.4.42 The effect of the Blue option is **severe adverse** for wood 1 with no effect on wood 2.



### **'Waycock' holding (LU-6-1)**

7.4.43 The holding contains small blocks of woodland, and the Blue route may directly affect these. The other routes - Red, Orange, Green and Purple are all on line although the increased width may lead to an impingement against the landholding boundary. For the Red and Green options, feeder lanes to a proposed roundabout may affect the edge of the holding. The Blue route has the greatest effect, leading to an approximate loss of 1.1ha.

7.4.44 The assessment of effects for the Blue route is **moderate adverse**, for the Orange or Green routes it is **slight adverse**.

### **New Farm (LU-6-2)**

7.4.45 The Blue route may directly affect this landholding. The other routes are all on line although the increased width may lead to an impingement against the landholding boundary. The Red or Green routes would lead to the loss of a corner due to the roundabout slip roads.

7.4.46 The assessment of effects for the Orange or Green routes are **slight adverse**, and the predicted effect of the Blue route is **moderate adverse**.

### **Sector 7**

7.4.47 No significant effects.

### **Land Quality**

7.4.48 The predicted effects on agricultural land quality may be very similar for all route options.

### **Sector 1**

7.4.49 In the worst - case scenario, 1.1 Ha may be permanently removed from Redland Farm. If a large roundabout is constructed on the Redland Court Farm landholding, the plans at this stage indicate that the land take may be 0.3Ha.

7.4.50 The land has an Agricultural Land Quality of Grade 2. The Environment Planning and Countryside section of the Welsh Assembly Government should be consulted regarding the options available

7.4.51 Due to the agricultural land quality of Grade 2, the predicted impact is **moderate adverse effect**.

### **Sector 2**

7.4.52 There is mainly Grade 4 agricultural land and any proposed highway improvements would be on line, therefore there would be no impact on agricultural land quality.

### **Sector 3**

7.4.53 In this section there is an area of Grade 4 agricultural land and then the rest of the section is Grade 3.

7.4.54 The Red route may lead to a loss off 0.7 ha of Grade 4 agricultural land, and an overall loss (Grade 3 & 4) of 0.23 ha.

7.4.55 All other routes have a similar effect to each other, leading to a loss approximately 0.4 ha of Grade 4 agricultural land. The Orange and Purple routes lead to a slightly lower loss of Grade 3 & Grade 4 land than the Green and Blue routes. For all options the amount lost is approximately 2.7 ha to 3.1ha.

7.4.56 The agricultural land quality affected is mainly Grade 3 with some Grade 4, this is given a **slight adverse** effect.

### **Sectors 4 to 7**

7.4.57 In sector 4 the Red, Orange, Green and Purple options are all mainly online resulting in an overall loss of Grade 3 agricultural land of less than 1ha. The Blue option is aligned to the east of the existing road and may lead to greater land take of more than 1 hectare.

7.4.58 In sector 5, the Red option may lead to the least land take, preliminary measurements indicate that this may be in the region of 2.7ha. Due to differing curvatures of the options, the Orange and Green options have a slightly higher land take of up to 3ha. The highest land take is likely to occur for the Blue option, which may be almost 4ha. The indicative loss for the Purple route is approximately 3.5ha. In sector 5, the order of preference may be 1 Red, 2, Orange, 3 Green, 4 Purple, and then 5 Blue.

- 7.4.59 In sector 6, the Red, Orange, Green and Purple options are all mainly on-line. Widening of the existing road and the addition of roundabout may lead to an overall loss of between 1ha to 1.5ha. The additional land take of the Blue route leads to a loss in the region of 3.6ha.
- 7.4.60 In sector 7, the proposed roundabout may lead to an overall loss of 0.3 hectares from the Middleton plantation.
- 7.4.61 For sectors 4 to 7, the agricultural land quality is Grade 3 and the predicted impact of the Red, Orange, Green and Purple routes is slight adverse. The Blue option has the greatest land take, and preliminary measurement indicate that this is approximately 12ha (including Sycamore and Waycock junctions.)

### **Geology**

- 7.4.62 The geological rock type through which the scheme passes is predominantly limestone with inter-bedded mudstone. The river valleys are overlain by deposits clay, silt, sand and gravel. Further geo-technical investigation may be necessary in order to assess the full impact on geology. The impact is likely to be similar for any of the options.

### **Urban areas and settlements**

- 7.4.63 Junction improvements are proposed at the northern end of the scheme, near Bonvilston and St Nicholas, and the southern end of the scheme, on the urban fringe of Barry.
- 7.4.64 The proposed junction improvements would be unlikely to have a direct impact on these settlements. The indicative junction layouts are entirely on existing highway or agricultural land.

### **Contaminated Land**

- 7.4.65 The former landfill site at Blackland farm is unlikely to be disturbed by any of the proposed route options.

## **7.5 Potential Mitigation Principles**

- 7.5.1 In many cases, the mitigation may be determined by the legislation, planning policy or standard practice for highway schemes.

7.5.2 In determining the requirement and scale of mitigation considered for each alignment, the following key principles should be applied:

- Avoidance of the most sensitive landholdings through adoption of best route option;
- Minimising the development footprint as far as practicable where avoidance of impacts is not possible;
- Timing of construction works to avoid or reduce disturbance to working farms, and impacts on soil.
- Installation of hard structures, such as overbridges or underpasses, to limit impact on severance and loss of access.

7.5.3 In general, mitigation is likely to be more practical to apply to off line options, as these leave sections of the existing road in place, to use as a feeder road, and also, there is improved build-ability for underpasses and overbridges in a new alignment.

7.5.4 The assessment above has identified receptors where impacts could be reduced by mitigation. These are:

- **Blackland Farm** - As the holding straddles the existing Five Mile Lane, the scheme should include provision of safe access to the western and eastern sides
- **Doghill Farm** - The Orange, Green, Blue and Purple options may all lead to severance of a large field next to Five Mile Lane. The Orange and purple routes are likely to provide the more preferable options for mitigation.
- **Whitton Lodge** - The Red route would lead to demolition of the property. The preferable options for providing mitigation to the dwelling would be Orange or Purple.
- **Groveland House** – The Orange or Blue routes may provide more opportunities for mitigation.
- **Sutton Fach Farm** – all options would require mitigation in the form of provisions of access between the house and barns and fields.

7.5.5 In some cases, mitigation may not be possible and other compensatory measures may need agreement. The Orange, Blue or Purple options may have a greater impact on Little Hamston Farm than the Red or Green options.

7.5.6 Some of the smaller landholdings may be affected by particular options:

- The junction associated with the Orange route may particularly affect Highfield and Groveland Farm.

- The junction feeder lanes associated with the red or green options may particularly affect Northcliff Cottage, Groveland House and Highmeade.
- The junction in the Purple option may particularly affect Highmeade.

## **7.6 Limitations, Assumptions and Further Work**

### **Landholdings**

- 7.6.1 This assessment has predicted effects based on likely impacts to the agricultural areas that may be physically affected by the proposals. At the next stage of assessment, the full extent of the agricultural landholdings should be established, and interviews should be held with the landowners and tenants.

### **Land Quality**

- 7.6.2 The information obtained from the Welsh assembly Government should be verified in the field. The Grade 3 land may include sub-grades 'a' and 'b', or there may be local variations in land quality that become evident when a detailed local survey is carried out.

### **Geology**

- 7.6.3 A full geo-technical investigation would be undertaken, providing site specific detail to information obtained from the British Geological Survey.

### **Community Facilities**

- 7.6.4 As the scheme progresses, representatives from the Amelia Trust, Welsh Hawking Centre and Barry College should be consulted regarding safe access arrangements and signage.

### **Urban areas and settlements**

- 7.6.5 The urban areas of Barry, and village of Bonvilston and St Nicholas are not directly affected by the scheme but would likely be consulted as neighbours during Stage 2 as part of the public consultation process. The main effects are likely to arise from the proposed roundabout junctions at both ends of the scheme.

### Contaminated Land

- 7.6.6 The area of possible contaminated land is not likely to be affected by the proposals and no further work is likely to be required.

## 7.7 Overall Assessment of Significance

### Landholdings

- 7.7.1 The affected landholdings are of varying sizes and this has an influence on the level of impact and opportunities for mitigation. Prior to consultation with landowners, there is some difficulty in recommending a preferred option. Alignments that leave apparently viably sized fields between the existing Five Mile Lane and the new route may be preferred, provided that access throughout the holding can be maintained.
- 7.7.2 At this stage of the assessment, the main alignment for the Orange route seems to provide the most opportunities for mitigation; however, the junctions associated with the option have slight adverse effects at a number of receptors.
- 7.7.3 For all options, the overall predicted impact on landholdings is slight adverse.

### Land Quality

- 7.7.4 The overall effect on land quality is **slight adverse**, as the majority of land affected is Grade 3. It is not possible to mitigate the impacts except through reducing landtake and severance, so respectively the Blue and Orange appear preferable.

## 8 Heritage

### 8.1 Introduction

8.1.1 This section of the report sets out the results of the cultural heritage assessment of the various route options. Cultural Heritage assets include Archaeological Remains, Historic Buildings and Historic Landscapes, as defined in the DMRB Vol 11, Section 3, Part 2, Chapter 2. The assessment has been based on a ‘simple’ assessment, but makes recommendations for further, more detailed assessment. There are no cumulative effects identified.

#### **Appraisal Methodology**

8.1.2 The appraisal methodology follows guidance contained in DMRB and has incorporated data from the following sources:

- The Glamorgan Gwent Archaeological Trust Ltd Historic Environment Record (HER)
- The National Monuments Record (NMR), including aerial photographs, maintained by the Royal Commission on the Ancient and Historical Monuments of Wales(RCAHMW)
- A site walkover in December 2009.

#### **Study Area**

8.1.3 The study area comprises the various route options plus a zone of up to c. 500m either side to provide context.

#### **Impact Distribution**

8.1.4 Those assets likely to be affected by the road improvements will comprise buried archaeological remains. The anticipated impacts on the cultural heritage assets within the study area will occur during the construction phase of road improvement. These impacts are likely to be of short duration (e.g. trial pit excavation, topsoil stripping, general excavation and plant movement etc) but their effects will be permanent (loss of physical fabric). There are no heritage assets, whose setting is currently affected by the existing road, for which the proposed improvements would have a positive, beneficial, effect. Similarly, there are no assets currently identified where the constructed and operational road would have an adverse effect on their setting.

## 8.2 Baseline Conditions

8.2.1 A total of 19 cultural heritage assets have been identified in the study area. A summary of all recorded sites is set out in Table 8.1; a depiction of aerial photographic data in [Figure 8.1](#), and locations of all assets on [Figures 8.2 – 8.6](#) in relation to the route options.

### Recorded archaeological and cultural heritage assets

#### Archaeological remains

##### *Prehistoric*

8.2.2 One site (3) is a standing stone of presumed prehistoric date. It is considered to be of High value and is a Grade II listed building.

8.2.3 No other sites are known to date to this period although a fallen monolith (standing stone) at Site 4 may be of this period; cropmarks recorded at Site 16 (see below) may also date to this period.

8.2.4 It is likely that the potential for prehistoric remains within the study area is understated by the currently available data.

**Table 8.1: Summary of cultural heritage features within study area**

Site No.	HER	NMR	NGR	Form/Type	Description	Period	Status	Assessment of Value
<b>(Figure 8.2)</b>								
1		19956	ST 0714 7409	Building	Sheepcourt Cottage	?Post - medieval	-	Low
2	00373s	-	ST 0778 7418	Findspot	A valuable collection of coins was unearthed between Bonvilston and St Nicholas. Most of the coins are C17	Post - medieval	-	Negligible
3	00372s	307723 16327	ST 0804 7412	Site/ Structure	Cottrell Park Standing Stone. Bronze Age. An erect weathered slab removed from a previous location opposite the entrance to Cottrell Park	Prehistoric	Grade II	High
4	00370s	307721	ST 0781 7382	Site	Stone, Redland Farm. A fallen monolith, 2m x 1m x 0.5m. Reported in 1937 as erect but leaning. The stone stood on a parish boundary.	Undated	-	Medium
5	03870s	-	ST 0776 7382	Building	A barn , partly converted, with end external stair to hayloft	Post- medieval	-	Low
6	03039s	-	ST 081 721	Findspot	Single sherd of Roman pottery found	Roman	-	Low



Site No.	HER	NMR	NGR	Form/Type	Description	Period	Status	Assessment of Value
<b>(Figure 8.2)</b>								
7	03040s	-	ST 0800 7190	Findspot	Roman silver coin and human bone found	Roman	-	Low/Medium
8	00380s	-	ST 0800 7177	Findspot	Inhumation. Dimensions and description not known	Undated	-	Medium
9	02625s	-	ST 0770 7180	Cartographic	Thaw Valley Survey; OS1 58 lime kiln sheet 46.11	Post-medieval	-	Low
10	02624s	-	ST 0770 7170	Cartographic	Thaw Valley Survey; OS1 57 lime kiln sheet 46.11	Post-medieval	-	Low
11	00381s	-	ST 0805 7135	Findspot	Inhumation. Dimensions and description not known	Undated	-	Medium
12	00382s	227673	ST 0812 7131	Site of	Whitton Lodge Roman Villa. Discovered in 1956. Excavation has shown that there were ten phases of occupation between the later 1st century AD and c340AD, and that the site developed from a roundhouse settlement into a villa. Air photographs show further possible enclosures and features within the immediate vicinity	Roman	-	High
13	02626s	-	ST 0810 7130	Cartographic	Thaw Valley Survey; OS1 59 lime kiln sheet 46.11	Post-medieval	-	Low
14	03051s	-	ST 0831 7129	Cartographic	Lime kiln seen on 1762-3 estate map	Post-medieval	-	Low
15	03125s	-	ST 0775 7009	Aerial Photograph	Enclosures seen on Air photos	Undated	-	Unknown
16		309455 309456	ST 0782 7004	Cropmark	Cropmark enclosure SE of Moulton. A sub-rectangular ditched enclosure. Traces of further features/enclosures to the west.	Undated	-	Medium
17	03951s	-	ST 095 686	Cartographic	Lime kiln identified from the 1 <sup>st</sup> edition OS maps	Post-medieval	-	Low
18	03952s	-	ST 0972 6872	Cartographic	Quarry identified from the 1 <sup>st</sup> edition OS maps	Post-medieval	-	Low
19	HLCA 010	-	-	Historic Landscape Designation	Bonvilston Amalgamated Fieldscape (Historic Character area 010). A landscape characterised by the post-medieval agricultural landscape of large fields formed by the merging of smaller medieval and earlier post-medieval field systems. An additional characteristic of this landscape are small areas of broadleaf woodland forming field boundaries and small copses	Post-medieval	Historic Landscape Character Area	Medium

### **Romano-British**

8.2.5 Of the three archaeological sites recorded, one (Site 12) is a complex site that is recorded over an extensive area. This includes a Roman Villa and extensive cropmark enclosures believed to be broadly contemporaneous. This site is considered to be of High value.

- 8.2.6 Several inhumation burials have been discovered in the Whitton Lodge area (Sites 8 & 11); these may be of Romano-British date and are considered to be of Medium value as they may indicate the location of more extensive cemetery sites.
- 8.2.7 Two further sites north of Whitton Lodge record the location of finds of Romano-British coins or pottery (Sites 6 and 7); the latter also includes human remains. These are of low/medium value.
- 8.2.8 The body of archaeological evidence for Romano-British sites within the southern portion of Sector 3 indicates that there is considerable potential for the presence of high value assets within the area.

### ***Medieval***

- 8.2.9 There are no sites of Medieval date recorded within the study area.

### ***Post-Medieval***

- 8.2.10 There are seven archaeological sites recorded from this period. Five are limekilns (Sites 9, 10, 13, 14, 17) and one is a quarry (Site 18); these are known from historical maps and are considered to be of low value. A further site comprises the location of a hoard of 17th century coins. This site is of uncertain or negligible value.

### ***Undated***

- 8.2.11 Five sites are recorded as undated. One (Site 4) is a fallen standing stone of probable prehistoric date; two record the presence of human inhumation (Sites 8 & 11), and two (Sites 15 & 16) record the presence of cropmark sites. More detail on Site 16 is set out below. Undated sites are considered to be of low or medium value.

### ***Historic Buildings***

- 8.2.12 Two historic buildings are recorded in the study area (Sites 1 and 5). Both are of post-Medieval date and lie to the north of the scheme area. Neither is listed and is considered to be of low value.

### ***Historic Landscape***

- 8.2.13 One historic landscape area has been identified in the study area, the east extent of the Llancarfan Character Area. This area comprises the historic landscape area of Bonvilston amalgamated fieldscape, designated by CADW and the Countryside Council for Wales. It

represents an area of land that is largely a post-Medieval agricultural landscape, with some agri-industrial features (limekilns etc), located within the historic parish of Bonvilston. Roads bound the character area to the east, where the A4226 runs north to south from the A48, and to the west, where a more minor road runs north to southwest from the A48 down to the junction at Pancross.

## **Aerial photographs**

### **Methodology**

- 8.2.14 A total of 118 RCHAMW oblique prints and 130 vertical air photographs were examined at the National Monuments Record of RCHAMW at Aberystwyth. The oblique cover dates between 1988 and 2003; the vertical cover comprises RAF photography taken from 1945 to 1962 and Ordnance Survey cover dated 1975 to 2001. A further 21 CUCAP prints held by RCHAMW were also reviewed. The Aerofilms collection was also examined. All vertical photographs were examined using a stereoscopic viewer and the oblique images with an x5 magnification hand lens.
- 8.2.15 All features of archaeological significance were hand plotted using the network method at a scale of 1:5000.

### **Results**

- 8.2.16 Two blocks of archaeological features were noted and are presented on [Figure 8.1](#). The largest area observed archaeology is centred on ST083713, southeast of Whitton Lodge and covers an area of at least 9 hectares on a plateau immediately to the east of the A4226 (Site 12). At ST081714 is a sub-rectangular ditched enclosure with an east facing entrance. Within the enclosure excavation between 1965 and 1970 recorded a series of timber roundhouses succeeded by a small stone built villa and ancillary buildings of Romano-British date (Jarrett and Wrathmell 1981). The excavated buildings appear on the photographs examined; the enclosure ditch and roundhouses have been plotted from the published excavation plan ([Figure 8.1](#), Site 12 A). Some 150 metres to the east of point A, a further complex of unexcavated ditched enclosures and related linear features were recorded. A trapezoidal enclosure at B measures approximately 80m by 60m with a ditched internal sub-division. 30m to the south are traces of two further sub-rectangular enclosures (C and D); the easternmost (D) measures 50m by 60m and has traces of a north-south ditched sub-division. D is separated from C by probable track or drove over 10m wide.

- 8.2.17 Although undated, enclosures C, D and E appear to be laid out either side of a broad track or drove approaching the eastern entrance of enclosure A and are likely to be contemporaneous with it.
- 8.2.18 To the south of A and between the eastern enclosures, a series of roughly parallel ditches may represent remnants of a field system associated with the Roman settlement. This possible system extends under the A4226 and traces can be seen for at least 500m to the west of the modern road.
- 8.2.19 One kilometre to the south of the Roman complex at Whitton Lodge, centred on ST 078700, are cropmarks of a small ditched enclosure and linear features ([Figure 8.1 Site 16](#)). The cropmarks show an incomplete plan of a three-sided enclosure measuring approximately 30-35m across, showing indications of a circular structure, c.10m in diameter, within its SW angle (point A). The morphology of the features would suggest a probable prehistoric or Romano-British date. Immediately to the east a short length of linear ditch is visible. A further length of ditch 50m to the south (B) shares a partial alignment with the present parish boundary.

## Site walkover

8.2.20 The walkover of the route was undertaken on December 17<sup>th</sup> 2009. Weather conditions were good with sunshine and light broken cloud. A note of the current land use adjacent to the route at the time of the walkover is held in archive, along with photographs of field conditions. The following present a record of those assets closest to the route proposals.

### 8.2.21 **Site 1: Sheepcourt Cottage**

The thatched roofed cottage is sited on the north side of the A48 and the building is only five metres back from the A48 north kerb.



**Plate 1: Sheepcourt Cottage. View from the west**

### 8.2.22 **Site 8: Undated inhumation burial**

The site of the inhumation is within a field under winter crop and the land slopes gently to the north. No surface features are visible; see Plate 2.



**Plate 2: View to north-west of the area of site 8**

8.2.23 **Sites 9 and 10; Limekilns**

These two sites comprise Lime kilns shown on the 1st edition OS map. Site 9 is within the same field as site 8 and there are no surface features visible. Site 10 is within a field currently under pasture at the crest of a gentle south facing slope. There are no surface remains; see Plate 3.



**Plate 3: View north to area of site 10**

8.2.24 **Sites 11 & 13; Lime Kiln shown on 1st edition OS map; site of undated human inhumation**

Sites 11 and 13 lie on the west side of the A4226 and the current land-use is arable. No surface features were noted; see Plate 4.



**Plate 4: View to west of Sites 11 & 13**

8.2.25 **Whitton Lodge Romano-British villa and associated features**

Sites 12 (Romano-British Villa), 13 and 14 (Lime Kilns) are all in an arable field and no surface remains were noted. The sites occupy a plateau with commanding views to the north, south, east and west; see Plate 5.



**Plate 5: View east over site of Whitton Lodge Romano-British villa (Site 12, foreground) and lime kiln (Site 14, middle distance)**

8.2.26 To the north of the villa site the land use is pasture and as a consequence there are no cropmark or soilmark features visible on the available air photograph cover. The proximity of the area to the Romano-British site would indicate a high archaeological potential and therefore suitable for geophysical prospection; see Plate 6.



**Plate 6: Pasture to the north of Whitton Lodge Romano-British villa. View to east**

8.2.27 **Sites 15 & 16: Undated cropmark enclosures**

Sites 15 and 16 are under arable cultivation and there are no surface remains; see Plate 7.



**Plate 7: View to west of Sites 15 and 16. The sites are located in the middle distance adjacent to the distant hedge line**

8.2.28 **Site 17: Lime kiln shown on 1st edition OS map**

The site is under permanent pasture and there are no surface remains visible.

## 8.3 Option Assessment Tables

8.3.1 The assessment of value of cultural heritage assets, the anticipated impacts, proposed mitigation and assessment of overall significance have been considered in accordance with guidance set out in DMRB. Assessment option tables are set out in Volume 2.

## 8.4 Potential mitigation principles

- 8.4.1 The route options may provide opportunities for preservation in situ, particularly where the road will be on an embankment. Further detailed assessment (by Field Survey) is required to more fully define the extent and importance of the buried archaeological assets. Once such data exists then informed mitigation options can be considered.
- 8.4.2 We would recommend the adoption of the following mitigation principles:
- The area through which the road improvements will be constructed is of high archaeological potential, but detailed assessment of the (buried) archaeological assets within the scheme area will be required to inform mitigation decisions;
  - Where assets of high importance, or groups of assets of lower importance, are located these should be preserved in situ wherever possible during construction, or route alignments changed to avoid such sites;
  - Where preservation in situ is not desirable, or where preservation is not cost-beneficial then preservation by record (i.e. by archaeological excavation) is an acceptable second choice.

## 8.5 Limitations, Assumptions and Further Work

- 8.5.1 This study has been based on a 'simple assessment', as defined by DMRB. There are inherent weaknesses in relying on such data that are based entirely on results from previous, selective, investigations. The study area has not been the subject of detailed archaeological survey in the past and many of the assets are known either as isolated finds or historical documentary references. Such data can only be considered to provide a broad insight into the true cultural heritage potential of the area and should be treated with caution when being used to compare scheme options.
- 8.5.2 It should be assumed that further archaeological remains will exist in the vicinity of the existing road and which will require consideration at a higher level of survey.
- 8.5.3 We would recommend:
- Broad, non-intrusive, area surveys (initially by geophysical survey) in those areas presently considered to be of high archaeological potential (sector 3/4), to incorporate all route options;



- Broad, non-intrusive, area surveys (initially by geophysical survey) of other areas where multiple options exist (sector 5/6);
- More localised non-intrusive, survey of areas where route options are limited;
- Subject to the results of the non-intrusive surveys, further intrusive investigations may be required (e.g. by trial trenching) to resolve uncertainties about the location, character, extent, survival or value of buried archaeological remains.

## 8.6 Overall Significance

8.5.4 The overall assessment of Cultural Heritage significance for each option is as follows:

Blue:	Potential Moderate Adverse Overall Effect
Purple:	Potential Moderate Adverse Overall Effect
Red:	Potential Slight/Moderate Adverse Overall
Orange:	Potential Moderate/Slight Adverse Overall Effect
Green:	Potential Moderate Adverse Overall Effect

## 9 Water Environment

### 9.1 Introduction

9.1.1 The External Relations and Planning Liaison sections of the Environment Agency Wales office at Cardiff were consulted during the production of this baseline report. The original Scoping Report dated January 2008 defined the scope for this assessment.

#### **Appraisal Methodology**

9.1.2 The information presented is based on the general scope of work outlined in DMRB Volume 11 Part 10 and WeITAG. It follows the particular requirements described in the Scoping Report produced for the scheme in January 2008.

The baseline data for the assessment of baseline conditions of watercourses were obtained from<sup>9</sup>:

- Environment Agency Wales (EAW)
- Vale of Glamorgan Council
- Ordnance Survey
- The British Geological Survey

9.1.3 Assessment of effects is not against a drainage strategy, to be designed in forthcoming stages; residual effects would likely lead to betterment of the baseline situation with the aim of not increasing the risk of flooding elsewhere.

#### **Double Counting**

9.1.4 In order to avoid double-counting of impacts, where possible receptors have been assessed in the chapters according to where the impacts experienced may be most significant. The biodiversity chapter also covers aquatic invertebrates' survey and river corridor survey.

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<sup>9</sup> The Environment Agency (Wales) provided all information on licensed abstractions and consented discharges. The Environmental Health Department of the Vale of Glamorgan Council provided available information on private domestic water supplies

### **Cumulative Effects**

- 9.1.5 At this stage, there haven't been any potential effects predicted or assessed as a result of completing this scheme.

## **9.2 Baseline Conditions**

- 9.2.1 Please refer to Figures 9.1-9.5.

### **Regional Drainage**

- 9.2.2 The existing Five Mile Lane is located along the watersheds of the Llancarfan and Waycock Rivers, which are both tributaries of the Thaw catchment.
- 9.2.3 The upper tributaries of the Waycock are within 100m of the existing road in Sector 3. The Waycock catchment is complex with some sections culverted and fed by Nant Bran, Goldsland Brook and Nant Brynhill and other smaller tributaries and drains. The waters have been used to form ornamental ponds at Dyffryn house.
- 9.2.4 Moulton Brook rises from a spring that is less than 50m from the existing road that flows westwards towards the Nant Llancarfan. Ford Brook rises from Ffynnon - Whitton Mawr on the eastern side of the existing Five Mile Lane, which flows under the road and then westwards towards the Nant Llancarfan.

### **River Crossings**

- 9.2.5 The current A4226 crosses the Waycock Valley upstream of Cuckoo Mill, where there is a restricted runoff rate of 8 litres/sec/hectare on the River Waycock for all sites upstream of the bridge at Cuckoo Mill (NGR ST 0658 6882). The existing road also crosses a continuous channel of water that flows from Ffynnon Whitton Mawr and into Ford Brook. New crossings across the River Waycock would be designed with a soffit level at least one metre above the 1:100 storm flood level (taking into account climate change impact).

### **Flood Risk**

- 9.2.6 The existing road extends across the Waycock Valley and its associated flood risk areas. These are defined as Zones B and C2 on the development advice maps associated with TAN 15,

Development and Flood Risk, issued by the Welsh Assembly Government in July 2004. The extents of the flood risk areas affected are illustrated in [Figures 9.1-9.5](#).

### **Surface Water Quality**

- 9.2.7 The water quality of River Waycock is monitored by the Environment Agency at Curnix Bridge ST 06600 68820. Full details of the records for the last five years are included in [Appendix 9.1](#).
- 9.2.8 Information on the Environment Agency website includes the Biology, Chemistry, Nitrate and Phosphate levels for Nant Llancarfan and River Waycock. This is summarised below:

	Llancarfan	Waycock
	Grade	Grade
<b>Chemistry</b>		
Biochemical Oxygen Demand (mg/l)	B	B
Ammonia	A	A
Dissolved Oxygen (percentage saturation)	B	A
<b>Biology</b>	A	A
<b>Nitrates (mg/l)</b>	3	3
<b>Phosphates (mg/l)</b>	4	4

**Notes: Grade A (very good)** - These rivers have natural ecosystems and make very good salmonid and cyprinid fisheries. They may be used for any type of water abstraction including potable supply.

**Grade F (bad)** - These rivers have severely restricted ecosystems and are very polluted.

- 9.2.9 The draft River Basin Management Plan for the Waycock indicated that it is included within the river basin District of Western Wales, in the Ogmore to Tawe management catchment. The typology description is 'low, small, calcareous'. The current ecological quality is 'moderate, and the predicted ecological quality for 2015 is 'moderate'. Probable pollution risks include: phosphorous from agriculture and combined source nutrients.

### **Consented Discharges**

- 9.2.10 The Environment Agency provided information on Consented Discharges and there are a number within 1km of the route options corridors, they are summarised in the table below. Full details are included in [Appendix 9.1](#).

**Table 9.1 Consented Discharges**

Name	Grid Ref	Type
Blackland Farm	ST0771472720	Domestic Property (Single)
Bonvilston East STW	ST0720073700	Sewage Disposal Works - water company
Redlands Court farm	ST0750073700	Domestic Property (Single)
Waycock Cross STW Barry	ST0887069430	Sewage Disposal Works - water company
St Nicholas STW	ST0879073090	Sewage Disposal Works - water company
New Farm	ST0904268420	Septic tank Livestock Prod. Food Prod.
Welsh Hawking Centre	ST0910069200	Recreational and Cultural
Waycock Cross STW Five Mile Lane	ST0908069500	Sewage Disposal Works - water company
Waycock Cross Annex	ST0930069100	Education
Great hamston farm	ST0906871092	Domestic Property (Single)

## **Geology**

9.2.11 The dominant bedrock of the Vale is composed of sedimentary glacial and fluvial deposits. A band of carboniferous limestone extends through the middle of the Vale. The study corridor is predominantly composed of Lower Jurassic (Blue Lias) with limited drift geology.

9.2.12 The Vale of Glamorgan is geologically interesting as it is the only place in Wales where Jurassic strata can be seen on land. There are no geological SSSIs, RIGS<sup>10</sup> or quarries within the study corridor.

9.2.13 The geological rock type through which the scheme passes is predominantly limestone with inter-bedded mudstone. The river valleys are overlain by deposits clay, silt, sand and gravel.

## **Hydrogeology**

9.2.14 The aquifer classification under the Groundwater Protection: Policy and Practice (EA 2008) or GP3 is defined a minor aquifer with areas of non-aquifer and an area of major aquifer to the north of the study area by Bonvilston. The majority of groundwater abstractions in the Thaw catchment area are from Carboniferous Limestone, although other aquifers supporting abstraction include Triassic Mudstones and Lower Lias.

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<sup>10</sup> South Wales RIGS study is awaiting publication. There is no active RIGS group in the area and therefore it is unlikely that there are any RIGS within the study corridor.

9.2.15 Limestone has poor long-term storage properties, providing little baseflow to the rivers leading to low river flows during prolonged dry periods.

### **Groundwater Resources**

9.2.16 The Environment Agency has indicated that there are a number of licensed abstractions in the area at distances ranging from 950 metres (m) to 1300m from the existing road. They are illustrated in Figures 9.1-9.5.

9.2.17 Current Vale of Glamorgan Council records indicate that there are up to thirty licensed private water supplies, on either dairy farms or domestic properties, within the county and it is likely that there are further abstractions that are not registered with the Council. The topographic map indicates that a large number of the farms in the vicinity of Five Mile Lane have wells although these may be historic.

9.2.18 One known private supply is within 500m of the proposed route; this is an agricultural supply at the Amelia Trust Farm at 420m from the existing road. Private supplies are also known to exist at Walterston (1300m away, dairy only), Tyn-y-Coed (1500m), and Holme Farm (1700m).

9.2.19 There is a groundwater quality network monitoring borehole about 1.2km west of the A4226, at Walterston Farm (306757, 171185). The bedrock at this site is Porthkerry Member Limestone and Interbedded Mudstone, which under the Water Framework Directive is classified as a Secondary A aquifer. The groundwater vulnerability varies within the study area as shown on Figures 9.1-9.5. The majority of the Study Area covers minor aquifers from Low through Intermediate to High. Beneath the Limestone Ridge along the A48 is an intermediate major aquifer.

9.2.20 Most of the abstracted water in the area is used for potable water supply and for industrial and commercial purposes. The majority of licensed abstractions in the Thaw catchment area are for agricultural purposes.

## 9.3 Potential Receptors and Impacts

### **Risk of Pollution during construction**

- 9.3.1 Construction works can potentially lead to contamination of surface waters and groundwater from pollution incidents. The construction process can generate polluted run-off to watercourses and groundwater. It may have high levels of particulates, hydrocarbons, and heavy metals or be strongly alkaline. This has a potential impact on groundwater supplies and water quality. Please see Chapter 11 'Disruption due to Construction'.

### **Risk of Pollution during operation**

- 9.3.2 During the operational phase, pollutants deposited on the road surfaces by vehicles may be washed by rainfall into road drainage systems and water bodies. Possible pollutants include: particulates, salts, heavy metals and hydrocarbons from fuel combustion, vehicle wear and road maintenance.
- 9.3.3 The potential impact would depend on the volume of traffic using the road, interception mitigation measures in place, and the quality and sensitivity of the receiving watercourse or aquifer.

### **Surface Water Quality**

- 9.3.4 The potential long-term effects of the proposed scheme on water quality are from material deposited on the road being washed off during rainfall events. Potential pollutants include: suspended solids; metals such as zinc, copper, lead and cadmium; organics such as oil, bitumen and rubber; salt and other de-icing agents; herbicides and pesticides from roadside verge maintenance.
- 9.3.5 The highest concentration of pollutants is likely to enter a watercourse during an intense storm immediately following a dry period. The significance depends on many factors, such as the size and length of road drained, the drainage flows and the dilution available within the receiving watercourse.

## Hydrological Effects

9.3.6 The initial drainage strategy will follow the principles of Sustainable Urban Drainage Systems (SUDS), which aims to minimise the adverse effects of drainage schemes and can also be used in conjunction with landscaping to provide environmental benefits.

## Physical change to watercourses

9.3.7 New structures in watercourses such as culverts and stream diversions can cause physical changes to a watercourse affecting their capacity and flood storage. The main receptors are identified below. The presence of small water bodies was confirmed during field surveys undertaken in 2008.

**Table 9.2: Water Environment Receptors**

SECTOR	REF NO	RECEPTOR NAME
1		0
2	WE-2 - 1 WE-2 - 2	'Redland' Pond 'Oakland' Pond
3	WE-3 - 1 WE-3 - 2 WE-3 - 3 a + b WE-3 - 4 WE-3 - 5 WE-3 - 6	Source of River Waycock Nant Whitton Pond Amelia Trust ponds Ffynnon Whitton Mawr - source of Ford Brook Ford Brook spring 'Little Hamston' pond
4	WE-4 - 1 a + b WE-4 - 2	'Moulton north' water bodies Source of Moulton Brook
5	WE-5 - 1 WE-5 - 2 WE-5 - 3	'Moulton south' Pond Sutton Fach Pond Waycock Tributary a
6	WE-6 - 1 WE-6 - 2	River Waycock Crossing Waycock Tributary b
7		0

9.3.8 The highway improvements in Sector 2 would involve a minimal change to the existing route and no direct adverse effect on a surface water body is predicted.

9.3.9 In Sector 3 it is likely that none of the route options would have a direct impact on any of the ponds at the Amelia Trust Farm, including Nant Whitton pond. The source of the River Waycock and Ford Brook would potentially be affected.



- 9.3.10 The Red mainly on-line route would be likely to have the least physical effect on these water bodies. Any of the remaining routes – Orange, Green, Purple or Blue – would have the effect of re-aligning the highway within 60m of a source tributary for the River Waycock. This has the potential to be a sensitive point for the catchment, as any effect on water quality at this location would have a far-reaching impact throughout the Waycock, and ultimately Thaw catchments.
- 9.3.11 Fynnon Whitton Mawr is located on the eastern side of the current highway. The alignment of the Orange, Green, Blue or Purple options would leave the pond on the western side of the new highway. Any of these alignments are likely to require a cutting at this location. The Orange and Purple routes potentially provide the greatest buffer, being approximately 100m east of the pond. The alignment of the Blue route is approximately 20 metres away from the pond. The Green route would have a direct impact on the Fynnon Whitton Mawr. As it is the source of Ford Brook, that runs into Nant Llancarfan and subsequently into the River Thaw, the potential impact from the Green route could be **severe adverse**.
- 9.3.12 A further pond in Sector 3 is located at Little Hamston Farm. None of the route alignment options would have a direct impact on the pond, although the Orange, Blue or Purple options would all be closer to the pond than the existing road.
- 9.3.13 Moulton Brook is immediately to the west of the existing highway and while the Red, Orange and Green routes are all on-line at this point, the construction process and widening of the existing road could potentially have adverse effects on the brook and the two small water bodies to the north. The Blue route would be located to the east of the existing alignment and would therefore be unlikely to have an effect on these receptors. The Purple alignment would be closest to Moulton Brook and the smaller water bodies and likely to have the greatest effect on them.
- 9.3.14 The pond to the south of Moulton would not be directly affected by any of the proposals. The pond at Sutton Fach is on the eastern side of the current road and all of the route alignment options would leave the pond on the western side of the new route although it would not be directly affected. The effects of this alignment on the landholding are discussed in Chapter 7 All route options could potentially affect a tributary of the River Waycock.

9.3.15 In Sector 6, it seems likely that the route options would potentially have an impact on the River Waycock and its tributaries. Protection of the river from indirect impacts on water quality – from e.g. silt discharge, accidental spillage and highways run-off - would be a key consideration during construction and operation of the scheme with an Environmental Protection Plan (or similar) likely to be required as part of construction works. Drainage design of the built scheme should also incorporate appropriate pollution control units to minimise the risks to water quality from highways run-off.

### **Loss of Floodplain Storage**

9.3.16 The increase in hard surface area and the construction of active drainage systems draining to surface waters would increase the volume of water that drains to receiving water-bodies. Without mitigation to restrict the discharge of surface water, particularly during storm conditions, there may be an increased risk of flooding downstream. The floodplains of the Ely, Cadoxton and Thaw are vulnerable to flooding (in 1999 EAW carried out a 1 in 100 year study).

9.3.17 A new crossing of the River Waycock would be required with most of the alignment options. The Red, Orange, Green and Purple routes are all on-line through the Waycock Valley. This minimises the impact on potential loss of permeable land surface but the existing bridge would be too narrow for the improved road. In addition the Orange and Green options include slip roads to a roundabout that would require additional bridges upstream.

9.3.18 The Blue option would require the construction of a new bridge downstream of the existing crossing, and would have the greatest impact in terms of loss of permeable surfaces.

### **Accidental Spillage**

9.3.19 The proposed highway improvements may mean that the route becomes more preferable for Heavy Goods Vehicles (HGVs). If involved in accidents, HGVs can cause serious pollution incidents, particularly when carrying a liquid cargo that can run into the highway drainage system, water bodies and groundwater.

9.3.20 Industrial cargoes could include fuel oil and chemicals; agricultural cargoes of slurry or food products such as milk may all potentially give rise to a significant pollution incident if they are spilt onto the surface of the road as a result of an accident.

### **Impact on groundwater and abstraction**

- 9.3.21 The improvement scheme is likely to lead to an increase in paved impermeable surfaces and therefore the risk of rainwater infiltrating groundwater via the road drainage system.
- 9.3.22 This would potentially result in a decrease in recharge to the limestone aquifer. In addition construction works, such as cuttings and dewatering operations can affect the direction and magnitude of groundwater flows can affect local drawdown of the water table. This may influence the ability of groundwater to support existing abstractions and river baseflows.
- 9.3.26 At this stage of the assessment, it is not possible to predict whether large-scale interception of groundwater by the proposed scheme would occur.

### **Reduction in Groundwater Recharge**

- 9.3.27 The reduction in infiltration caused by an increase in impermeable area would locally affect the limestone aquifer. On a regional scale the reduction would cause little effect on water resources, as the carriageway surface area is small compared to the outcrop area.

### **Derogation of Groundwater Quality**

- 9.3.28 Groundwater quality could potentially be adversely affected as a result of pollutants infiltrating groundwater bodies by seepage from watercourses, drains or lagoons. Direct spillage of contaminants onto the outcrop, by-passing the road drainage is also possible. The actual effects are dependent on many factors such as the permeability of the underlying material. Unlike surface water, however, groundwater is generally not considered to be at risk from sediments collected on the road surface, as this would be removed by natural filtration in the ground.
- 9.3.29 There are no Source Protection Zones within the study area. The nearest - Biglis Wells Source Protection Zone - is approximately 4 km from the current road alignment at the northeast of Barry.

## 9.4 Potential Mitigation Principles

### Hydrology

- 9.4.1. The primary strategy will follow the principles of Sustainable Urban Drainage Systems (SUDS). This may entail the use of balancing ponds, filtration ditches and storm cells at the lowest points prior to discharge. Other features that could be included in the final design are:
- Surface channels with carrier drains in the verge of embankments;
  - Surface channels with carrier drains and filter drainage in verges of cuttings;
  - Toe ditches or piped drains at the bottom of embankment slopes;
  - Interceptor ditches or piped drains at the top of cutting slopes on the up fill side.
- 9.4.2 Impacts on the water environment during construction should be avoided through adherence to a Construction Environment Management Plan (CEMP) and frequent liaison and consultation with the Environment Agency.

### Physical change to watercourses

- 9.4.3 In highway schemes it is usual practice for culverts and river crossings to be designed with sufficient capacity to convey flood flows to a return period of at least 100 years.

### Loss of Floodplain Storage

- 9.4.4 Provision of compensatory floodplain storage should be located within the landscaped corridor, where possible.

### Accidental Spillage

- 9.4.5 The potential effects from accidental spillage can be mitigated by the use of petrol-oil interceptors at currently un-attenuated highway outfalls.

## 9.5 Limitations, Assumptions and Further Work

- 9.5.1 An assessment of the expected accident frequency at each proposed outfall location should be undertaken in accordance with the methodology within DMRB Volume 11. This would indicate

the level of risk of major spill, with return periods. This assessment would indicate where the risk appears to be greatest with an indication of frequency.

9.5.2 A full geo-technical investigation and required surveys will be undertaken, in order to provide more details regarding geological structure, groundwater levels, and possible interception locations.

9.5.3 Prior to a planning application being submitted a Flood Consequence Assessment (in accordance with planning guidance) and Flood Defence Consent based on the specific details of the River Waycock crossing will be sought.

## 9.6 Overall Impact

Table 9.3 : Summary Of Residual Effects Water Environment

RECEPTORS	ROUTE ALIGNMENT									
	RED		ORANGE		GREEN		BLUE		PURPLE	
Sector 1	WC	RE	WC	RE	WC	RE	WC	RE	WC	RE
No Sensitive Receptors	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
<b>Sector 2</b>										
WE2 -1 'Redland' Pond	0	0	0	0	0	0	0	0	0	0
WE2 - 2 'Oakland' Pond	0	0	0	0	0	0	0	0	0	0
<b>Sector 3</b>										
WE3 - 1 Source of R. Waycock	-	0	-	0	-	0	-	0	-	0
WE3 - 2 Nant Whitton Pond	0	0	0	0	0	0	0	0	0	0
WE3 - 3 a + b Amelia Trust Ponds	0	0	0	0	0	0	0	0	0	0
WE3 - 4 Ffynnon Whitton Mawr	--	0	-	0	--	0	--	0	-	0
WE3 - 5 Ford Brook Spring	--	0	-	0	-	0	-	0	-	0
WE3 - 6 'Little Hamston' Pond	0	0	-	0	0	0	-	0	-	0
<b>Sector 4</b>										
WE4 -1 a+b 'Moulton North' Water bodies	-	0	-	0	-	0	-	0	--	0
WE4 - 2 Source of Moulton Brook	-	0	-	0	-	0	-	0	--	0
<b>Sector 5</b>										
WE5 - 1 'Moulton South' Pond	0	0	0	0	0	0	0	0	0	0
WE5 - 2 Sutton Fach Pond	0	0	0	0	0	0	0	0	0	0
WE5 - 3 Waycock Tributary a	---	-	---	-	---	-	---	-	---	-
<b>Sector 6</b>										
WE6 - 1 River Waycock Crossing	--	0	--	0	--	0	--	0	--	0
WE6-2 Waycock Tributary b	---	-	---	-	---	-	---	-	---	-
<b>Sector 7</b>										
No Sensitive Receptors	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
<b>Sector 1 - 7</b>										
WE Groundwater	-	0	-	0	-	0	-	0	-	0
WE Floodplain (Loss of storage)	--	-	--	-	--	-	--	-	--	-
WE Surface Water Quality	-	0	-	0	-	0	-	0	-	0

### Note 1

WC = Worst Case (i.e. 1<sup>st</sup> Year Do Something)

RE = Residual (i.e. After mitigation measures have been put in place)

**Note 2**

This is a preliminary qualitative assessment: as the scheme develops further information regarding geotechnical issues and construction methods will inform a fully detailed quantitative assessment.

- 9.6.1 The five route alignment options would be similar in their predicted effects on the water environment. The main potential impacts of the new highway are likely to be effects on the sources of the main rivers in the study area, including the Waycock, Ford Brook and Moulton Brook. While these effects are similar for all options, engineers may prefer the mitigation opportunities of some options to others. An impact on floodplain storage in Waycock Valley is another likely effect of any of the route alignments for the proposed scheme.
- 9.6.2 Ffynnon Whitton Mawr is at the source of Ford Brook, and the choice of preferred scheme needs to consider potential impacts on this important hydrological feature. All the options may require suitable mitigation to be engineered into the scheme.
- 9.6.3 The maps appear to indicate that the Green route crosses the source of the spring. The potential effect on interruption and contamination of water flows and aquifer levels requires further investigation in forthcoming assessment stages.
- 9.6.4 Associated mitigated impacts on groundwater are likely to be Neutral for other options.
- 9.6.5 The majority of potential impacts on the water environment can be mitigated by appropriate engineering design. The assessment of the scheme proposals on the water environment at this stage is considered to have the potential to be **moderate adverse**, although, with required mitigation, this would be reduced to **slight adverse**.

## 10 Social Impacts

### 10.1 Introduction / Impact Description

10.1.1 As stated within WelTAG Guidance (WelTAG page 137) “Social objectives, such as improving quality of life, health and welfare are central to policy in Wales...hence, it is essential that the appraisal process addresses the subjects which have been established as policy priorities in Wales and which are meaningful to most people, including concepts such as health and social inclusion”. Pedestrians, cyclists, equestrians and community facilities users are all key receptors in achieving the above, therefore the purpose of this chapter is to assess the effects that each of the five proposed route alignment options would have on these groups, in terms of personal security, permeability, physical fitness and social inclusion.

### 10.2 Appraisal Methodology

10.2.1 The methodology used to assess the social impacts of the proposed road scheme on the A4226 Five Mile Lane follows current ‘best practice’ WelTAG and DMRB guidance published by the Welsh Assembly Government and the Highways Agency respectively.

10.2.2 The process adopts the standard approach using baseline desktop studies to identify potential sensitive receptors likely to be significantly affected and the potential effects brought about by the proposed scheme. The chapter will then judge the magnitude of effects and undertake a qualitative assessment of their significance.

#### **Double Counting**

10.2.3 In order to avoid double-counting, impacts have been assessed in the chapters according to where the impacts experienced are considered most relevant. For example impacts on the visual landscape or impacts on motorised travellers are assessed within Landscape and Vehicles Travellers chapter of this report.

### **Cumulative Effects**

10.2.4 At this stage, there haven't been any potential cumulative pedestrian, equestrian, or community effects predicted or assessed as a result of completing this scheme.

## **10.3 Study Area / Sensitivity of Receptors**

10.3.1 A 1:25,000 OS Map of the area surrounding the existing A4226 – Five Mile Lane has been consulted to build up an understanding of the distribution and frequency of recreational and community facilities that could potentially be effected by the proposed carriageway. This included the mapping of schools/colleges, hospitals/doctors, public houses, shops, community halls, sport and recreation facilities, post offices, libraries, public rights of ways, bridleways and cycleways. The impacts of each of these receptor types were then assessed against each of the five route alignment options. Please refer to Figures 10.1-10.5.

## **10.4 Baseline Conditions**

10.4.1 The following paragraphs illustrate the existing provision of footpaths/pedestrian access, bridleways, cycle routes and community facilities that are located within the study area. For the purpose of this study, facilities have been identified within each sector.

### **Sector 1 Baseline:**

10.4.2 Sector 1 features an east-west aligned section of the existing A48 and Sycamore Cross junction. The road runs adjacent to farmland, private gardens, and Cottrell Park Golf Club. It is a busy section of road used by a wide spectrum of motorists including commuters, haulage operators and holiday travellers.

10.4.3 There are no pedestrian routes, designated cycle routes, bridleways or other community facilities within Sector 1; therefore there would be no effects.

### **Sector 2 Baseline:**

10.4.4 The existing A4226 runs in a general north-south alignment within Sector 2, it lies adjacent to farms, domestic dwellings and farmland and in the vicinity of Redland Wood. Within the sector there are five public footpaths. The closest of the five, connects with the existing A4226 Five Mile Lane (SI-2-1), approximately 170m south of the entrance to Ash Tree House. The



footpath runs in a northeast direction, connecting with the A48, to the west of the village of St. Nicholas. The remaining four public footpaths are between approximately 1.1km and 1.7km east of the existing and proposed routes and predominately run in a north-south direction, connecting with St. Nicholas in the north and other footpaths routes to the south. (SI-2-2 to SI-2-5). Footpath SI-2-3 forms part of the Valeways Millennium Heritage Trail, which is a National Trail. The section of the trail that runs through the study area starts in the village of Peterson Super Ely in the north, connecting with Barry in the south. There are no other existing public rights of way, cycle routes, bridleways, or community facilities within this sector.

### **Sector 3 Baseline:**

- 10.4.5 Adjacent to the existing carriageway to the northern edge of Sector 3 is Blackland Farm. Approximately 900m to the southwest of Blackland Farm is Amelia Methodist Trust/Whitton Rosser Farm (SI-3-1). The farm is a community facility that allows people, particularly those within learning disabilities and from disadvantaged groups to learn about conservation, animals and the countryside. A public footpath connects with the carriageway and runs through the farm before arching in southerly direction, terminating on a minor road (SI-3-2).
- 10.4.6 Approximately 2.1km east of Amelia Trust Farm is the popular visitor attraction of Dyffryn Gardens (SI-3-4), a Grade I listed park and garden, covering an area of just over 22 hectares. The gardens have recently been restored and included the construction of the Cory Education Centre, which is used for talks and other educational activities. To the western boundary of the gardens, running in a north-south direction is a public footpath (SI-3-3 – Valeways Millennium Heritage Trail) that connects with footpaths in Sector 2. A network of other public footpaths is located to the east of Dyffryn Gardens (SI-3-5), which eventually connect with the northeastern fringes of Barry.
- 10.4.7 To the southern boundary of Sector 3 is an additional footpath (SI-3-6 - Valeways Millennium Heritage Trail) that travels through Little Hamston, continuing south into Sector 4. There are no other pedestrian routes, cycle routes, bridleways or community facilities within this sector.

### **Sector 4 Baseline:**

- 10.4.8 Sector 4 is a relatively narrow and straight section of the road running north-south with tall hedges on the adjacent verges. There are two public footpaths within Sector 4, both

approximately 1.3km east of the existing A4226 Five Mile Lane carriageway. The first footpath (SI-4-2 - Valeways Millennium Heritage Trail) runs south from the boundary of Sector 3 to the boundary of Sector 5. The second footpath (SI-4-3) runs from the farms of New Wallace to Old Wallace, where it connects with the first footpath SI-4-2.

10.4.9 West of the existing carriageway is the northern section of a right of way (SI-4-1) that runs from the hamlet of Walterston, south for approximately 700m before crossing into Sector 5.

10.4.10 There are no bridleways or community facilities within this sector.

### **Sector 5 Baseline:**

10.4.11 The right of way (SI-5-1) that starts within the hamlet of Walterston (SI-4-1) continues south for approximately another 600m where it enters the small settlement of Moulton. The Three Horseshoes Public House (SI-5-2) is situated within Moulton, which attracts people from surrounding larger settlements.

10.4.12 To the south of the settlement a public footpath (SI-5-3) runs in a general south easterly direction for 850m before joining the A4226 Five Mile Lane near the farm of Suddon Mawr. The only additional public footpath, other rights of way, bridleways or community facility with Sector 5, is a public footpath approximately (SI-5-4) 1.5km northeast of Moulton. The footpath runs from Northcliff Farm in a south-easterly direction towards the farm at Lidmore.

### **Sector 6 Baseline:**

10.4.13 The existing Five Mile Lane is predominately positioned in a north-west to south-east alignment within Sector 6. Located within this sector is the Welsh Hawking Centre (SI-6-4) and also, though not currently in use, several buildings owned by Barry College of Further Education (SI-6-5). The Welsh Hawking Centre, which provides educational programmes for schools, is located adjacent to the existing carriageway and just under a kilometre from the urban fringe of Barry.

10.4.14 The Valeways Millennium Heritage Trail that passes through Old Wallace farm (SI-4-2 Sector 4) continues south, terminating at Highlight Farm, to the northern outskirts of Barry. Immediately adjacent to the footpath (SI-6-3) is Brynhill Golf Club, an 18-hole private course.

## **Sector 7 Baseline:**

10.4.15 This is a small sector of approximately 100m and is adjacent to the urban settlement of Barry, where the majority of community facilities, such as schools, doctors and shops are concentrated. There are no footpaths, bridleways or cycle routes within this sector.

## **10.5 Results**

10.5.1 Due to the limited number of pedestrian routes, cycle route, bridleways and community facilities that are within the vicinity of the A4226 – Five Mile Lane, social impacts are not considered to be significant along each of the five routes. Therefore no assessment tables have been produced for this section of the study, however the social impacts on user groups are illustrated in Figures 10.1-10.5 and summarised below.

### **Impacts of Pedestrians/Public Footpaths users**

10.5.2 The majority of existing footpaths are located at a significant distance away from the proposed route alignments and do not impinge on it; therefore there would be no impacts on these footpaths. Two existing footpaths are accessed from the carriageway (SI-2-1 and SI-3-2). There would be no impacts on footpath SI-2-1 as no changes to the road alignment are proposed within Sector 2.

10.5.3 Footpath SI-3-2 is the most frequently used footpath within the study area, and forms part of a route towards the village of Llancarfan. The Red Route would allow for the continuation of direct access on to the A4226 – Five Mile Lane from footpath SI-3-2 if this route is the preferred route option and therefore it would have no negative or beneficial impacts. If one of the other routes were selected, then the footpath would be accessed from a ‘Local Collector Road’. This may have a slight positive benefit to users of the footpath, as it may result in reduced levels of traffic volume and therefore the perception of safety may increase for pedestrians/walkers within this area. This may result in increased numbers of users and may have positive benefits in terms of physical fitness. Benefits of the ‘Local Collector Road’ may also extend to footpath SI-5-3 and is applicable to all route options.

10.5.4 There would be no impacts on the Valeways Millennium Heritage Trail regardless of which route alignment is selected.

10.5.5 No existing footpaths would be severed by any of the proposed route alignments therefore there would be no impacts on permeability.

10.5.6 Currently there is no provision for a footway adjacent to the five proposed routes which impacts to the greatest extent on the Red Route, as it follows the current route alignment. If a footway was to be provided for this route then additional land take would be required adjacent to the carriageway to incorporate any pedestrian footway. The off line routes (Orange, Green, Blue and Purple Routes) pose an opportunity to use the existing road (where they are not coincident) as a pedestrian route and therefore increasing the perception of safety for people on foot, as the separation between pedestrians and the potentially faster moving traffic becomes greater.

### **Impacts on Cyclists**

10.5.7 There are no dedicated cycling facilities within the study area, with cyclists restricted to the potentially dangerous route of the existing A4226. Sections of the existing carriageway that are used as a 'Local Collector Road' would become more cycle friendly as a result of the realignment of the road. If a designated cycle lane is incorporated into the design of each of the route options, where it follows the existing online alignment, then this would require additional land take adjacent to the carriageway in order that the cycle lane could be integrated into the scheme. These potential benefits are applicable for all route alignments, while routes Blue, Purple, Orange and Green provide the greatest opportunity for the use of cycling as a means of transport along the proposed 'Local Collector Road' and the 'Red Route' the least. An effect of this is that more people may be encouraged to cycle, which may bring positive benefits to physical fitness.

### **Impacts on Bridleways/Riding Routes**

10.5.8 Currently there are no bridleways or other types of riding routes within the study area and therefore there would be no direct impacts as a result of the proposed carriageway realignment, whichever is selected. However the use of existing routes as 'Local Collector Routes' may provide a quieter route for equestrians to use compared to the existing carriageway. As a result the perception of safety may increase for horse riders, encouraging greater participation and an increased level of physical fitness.

## **Impacts on Community Facilities**

10.5.9 There would be no impacts on local communities with regards to access to key facilities, such as doctor's surgeries, hospitals, shops, post offices, churches and parks/recreation areas etc. The journey lengths to these facilities, which are predominately situated within Barry, are likely to remain comparable and access to them on foot or cycle would not be severed by any of the proposed route alignments. In addition no existing groups would be socially excluded from the use of facilities by any of the selected routes.

10.5.10 The Red Route is likely to have slight adverse effects on the land to the eastern boundary of Amelia Trust Farm, where land would be lost through the realignment of the carriageway. This would be a permanent long-term impact, though mitigation planting to compensate loss in habitat may result in a reduction in impacts over time.

## **10.6 Potential mitigation principles**

10.6.1 As there are no significant adverse effects on pedestrians, equestrians, cyclists or community facility users/groups as a result of the five route alignments, no mitigation measures are considered necessary at this stage.

## **10.7 Limitations, Assumptions and Further Work**

10.7.1 When assessing impacts on community facilities it has been assumed that people would use the nearest facility to them. It has been assumed that average journey speeds are 5km/hr for people on foot, 10km/hr for equestrians and 20km/hr for cyclists.

10.7.2 The main limitation of this study was the sole use of desk-based assessment. No user flow counts of public footpaths, cyclist, equestrians or community facilities users were carried out at this stage of the assessment and no assessment has been made of the type of groups who use the facilities.

10.7.3 Further work would involve completing the Stage 2 WeITAG and the DMRB methodology of assessment.

## 10.8 Overall Significance

- 10.8.1 Whichever route is selected, the road realignment would have some positive benefit effects in terms of the perception of personal safety. This may be achieved through improvements in forward visibility or through the introduction of a hard shoulder, which would provide room for cyclists and for vehicles that may have broken down.
- 10.8.2 There would be no significant impacts on permeability of footpaths; cycle routes and bridleways would not be affected by the routes alignments as none are severed by any of the five proposed route options.
- 10.8.3 There would potentially be some positive benefits in terms of physical fitness to the local population if Route Blue, Purple, Green or Orange were selected. The use of a ‘Local Collector Road’ on these routes may result in a decrease in vehicle traffic along this route, leading to an increase in the perception of safety and therefore an increase in the numbers of pedestrian, cyclists and equestrians using it as a recreational route.
- 10.8.4 The only public transport link along the A4226 – Five Mile Lane, is the Barry to Cardiff bus (Route 322), with stops at Sycamore Cross, Amelia Trust Farm and Waycock Cross. The bus also serves the village of Moulton. It is intended that whichever route is selected that the bus route and existing bus stops would remain, therefore there would be no impacts on public transport as a result of the route realignment. However the incorporation of a hard shoulder and the use of a ‘Local Collector Road’ for cyclists (though limited for the Red Route) may encourage an increase in this form of transport and therefore beneficial impacts in terms of social inclusion, for some sections of the community, as the choice of transport options increases.
- 10.8.5 In conclusion, following the assessment of the five route options in terms of their social impacts, either the Blue Route, Purple Route, Orange Route or Green Route is the preferred route option.

## 11 Disruption due to Construction

### 11.1 Introduction

11.1.1 This chapter considers the potential construction effects arising from the proposed improvements to Five Mile Lane and their mitigation.

11.1.2 The chosen contractor would be required to prepare a Construction Environmental Management Plan (CEMP), with which the construction works will be required to comply.

11.1.3 Preparation for the CEMP should include surveys of ancillary areas such as temporary construction compounds, access routes and material stores (including temporary soil stores) which are likely to generate additional environmental effects. Some of these areas would be selected by the contractor and may require separate planning permission, in which case specific mitigation would be called for through the development control process.

### 11.2 Appraisal Methodology

11.2.1 As WelTAG does not give specific guidance for Disruption Due to Construction, the methodology has been followed according to the guidance in the Design Manual for Roads and Bridges (DMRB) Volume 11, section 3, Part 3.

### 11.3 Baseline Conditions

11.3.1 The baseline for the construction phase of any scheme is the same as the baseline for the operational phase, as reported in the preceding chapters.

### 11.4 Environmental Effects & Mitigation

#### Air Quality and Greenhouse Gases

11.4.1 The main effect on air quality during construction would be dust arising during dry weather and this would mainly affect receptors in the construction corridor. Along the majority of any of the

proposed routes, few properties are within 200m of the proposed alignment. For all of the proposed options, 25 sensitive receptors were identified.

11.4.2 The potential for dust nuisance depends on a wide range of factors including prevailing meteorological conditions, nature of materials and type and duration of the activities. Dust would be mitigated against by wetting the working area and in particular wetting of the tyres of construction traffic leaving the site. Requirements for these measures would be incorporated into the CEMP.

### **Traffic Noise and Vibration**

11.4.3 Receptors in the construction corridor would be most affected. A baseline monitoring noise survey would be carried out pre-construction to establish acceptable noise levels. The main detrimental effects of construction noise will be where construction is close to residential areas.

11.4.4 Along the majority of any of the proposed routes, few properties are within 300m of the proposed alignment. For the Red, Orange, Blue and Purple options, 25 sensitive receptors have been identified. For the Green option, 1 additional receptor has been identified; bringing the total to 26.

11.4.5 During the construction phase temporary mitigation techniques should include controlling working hours and noise levels from sites with contractual restraints; erecting temporary environmental barriers around the construction site where land is available should also be considered. Compensating homeowners for the disruption and annoyance caused may also be necessary. Temporary re-housing whilst the works are completed and installing additional insulation and glazing should also be considered, where necessary. The conditions would be incorporated into the CEMP, all subject to the agreement of the local Environmental Health Officer.

### **Cultural Heritage**

11.4.6 The anticipated impacts on the cultural heritage assets within the study area would occur during the construction phase of road improvement. The movement of heavy construction machinery could compact solid and subsoil, leading to adverse effects on buried archaeological deposits.



11.4.7 Those assets likely to be affected by the road improvements would comprise buried archaeological remains. These impacts are likely to be of short duration, for example, trial pit excavation, topsoil stripping, general excavation and plant movement, but their effects would be permanent and result in loss of physical fabric.

11.4.8 The area through which the road improvements would be constructed is of high archaeological potential, but detailed assessment of the buried archaeological assets within the scheme area would be required to inform mitigation decisions.

11.4.9 Archaeological assets of high importance, or groups of assets of lower importance, should be preserved in situ wherever possible during construction, or route alignments should be altered to avoid such sites.

### **Biodiversity**

11.4.10 Potential effects during construction works for the improvement of the A4226 Five Mile Lane relate principally to protected species issues and designated areas. The scheme design process will be influenced by the need to avoid nature conservation impacts wherever possible.

11.4.11 For all route alignment options, the greatest ecological impact would be associated with the loss of established habitats necessary to accommodate the scheme. This would reduce available habitat for any retained species potentially leading to adverse effects. There would also be increased disturbance from construction vehicles and associated increases in noise, lighting and pollution risk due to site activities.

11.4.12 Breaching of hedgerows would occur to varying degrees for all of the route alignments. In sectors 3 and 4 loss of hedgerow could be reduced if the Green or Blue options were followed.

11.4.13 Within Sector 5, all the route alignments would result in hedgerow breaches east of the existing A4226 although the Blue route may have the most adverse effects.

11.4.14 The Orange and Red alignments impact on a group of trees and while the Purple and Green alignments would avoid them, they would be likely impact upon the mature trees elsewhere.

11.4.15 In sector 6 the Red, Orange, Green or Purple route options would require comparatively less removal of woodland habitat than the Blue option.

11.4.16 The main principles of best practice for mitigation of effects on biodiversity during construction are:

- Avoidance of the most sensitive areas through identification and adoption of best route option;
- Minimising the development footprint as far as practicable where avoidance of impacts is not possible;
- Timing of construction works to avoid or reduce disturbance to wildlife (e.g. maintenance and vegetation control activities outside nesting periods);
- Reptile capture/transfer (translocation exercise) to move animals out of the development footprint;
- On-site habitat enhancement within the scheme corridor or adjacent land;
- Sympathetic design and installation of hard structures, such as bridges and tunnels, and increase permeability through installation of nest/roost sites for wildlife;
- Appropriate Management of retained habitats/features;
- The Construction Environmental Management Plan (CEMP) should seek to avoid further impacts from construction compounds, temporary haul routes and stores by considering sensitive areas and setting out a plan that avoids them.

### **Landscape Effects**

11.4.17 Due to exposed earthworks and the enlarged site area, including contractors' compounds and soil stores, the construction effects on Landscape Character and Visual Amenity are generally more adverse, but temporary, than effects during the operational phase.

11.4.18 Little can be done to mitigate these temporary additional effects, but as much existing vegetation would be retained as possible to optimise screening. Retained trees and hedgerows within and adjoining the site would be protected in accordance with BS 5837:2005.

11.4.19 During construction areas of townscape near Sycamore Cross and Waycock Cross and individual dwellings across the study area may be temporarily affected by adverse influences on

their views and settings. Any operational lighting to extend winter working hours would need to be positioned and shaded as necessary to avoid visual intrusion on residential properties.

### **Water Quality and Drainage**

11.4.20 The main temporary effects requiring control would arise from silt from construction operations. The construction of earthworks could cause silt contamination to be washed into watercourses from excavations and embankments by rainfall and site runoff; The Water Resources Act (1991) requires those carrying out construction activities to secure the complete protection of surface watercourses. This includes ensuring that no polluting discharge of solid or liquid is made to any watercourse and that work which is carried out in any watercourse is done in a manner that will not cause pollution or erosion.

11.4.21 The Environment Agency (EA) would set consent standards for discharges from the construction site. These would include the volumes and the concentration of suspended solids that it would be permissible to discharge to the receiving watercourses. Compliance with the discharge consent should mean that any effects on water quality would be slight.

11.4.22 In the CEMP, the contractor would need to draw up proposals for their compliance with the standards and obtain formal consent from the EA.

11.4.23 During the construction phase surface water run-off may be treated using any combination of installations or drainage management practices, including settlement lagoons, irrigation techniques, geo-textile fences and straw filters.

11.4.24 Spillage of fuel and chemicals could potentially cause contamination of the ground, groundwater and surface watercourses. The EA would specify conditions regarding the storage of all potentially contaminating materials and contaminating activities on site, particularly fuels.

11.4.25 The contractor would be required to produce detailed construction method statements to comply with the EA requirements. These would be incorporated into the CEMP, following EA approval. Compliance with the method statements would be verified by auditing and this should ensure that the impacts to the ground and groundwater would be negligible.

## **Land Use**

11.4.26 The effects on land use during construction would have potential to be very destructive. The construction footprint of the scheme would be larger than for the operational phase, potentially taking land out of production, causing disturbance to livestock and severance of farm activities.

11.4.27 This disruption may continue for a prolonged time until mitigation in the form of crossing points or new access roads could be completed. While physical mitigation may not be possible in all cases, communication, negotiation and compensation may be the best course of action. As in the case of biodiversity, the timing of the construction programme could minimise impacts.

11.4.28 The appointed contractor should be considerate of landowners and occupiers in their plan for the construction process, the location of compounds, access roads and stores. They should be consulted during the finalisation of the CEMP.

## **11.5 Potential Mitigation Principles**

11.5.1 There are standard means of mitigating the adverse effects of highway construction, examples include:

- Design development and re-alignment to avoid sensitive receptors
- Consultation with the Welsh Assembly Government, Countryside Council for Wales, Environment Agency and Local Authority Environmental Health Officer to devise and appropriate mitigation strategy
- Adherence to environmental law and guidance: e.g. The Water Resources Act (1991), UK Biodiversity Action Plan.
- Application of Best Practical Means (BPM).
- Reference to standard highway construction guidance, for example, Design Manual for Roads and Bridges Volume 10.
- Adherence to a Construction Environment Management Plan that would be agreed with statutory bodies- this covers pre-construction surveys, construction methodology, working hours, watching brief during construction, legislative and health and safety requirements
- Commitment to the provision of post-operational surveys, monitoring and revised mitigation.

## 11.6 Limitations, Assumptions and Further Work

11.6.1 A baseline monitoring noise survey would be carried out pre-construction to establish acceptable noise levels.

11.6.2 Detailed assessment of the (buried) archaeological assets within the scheme area would be required to inform mitigation decisions.

11.6.3 The chosen contractor would be required to prepare a Construction Environmental Management Plan (CEMP), with which the construction works will be required to comply.

## 11.7 Conclusion

11.7.1 In accordance with Best Practice the appointed contractor will consider the constraints and sensitive receptors that have been outlined in this Interim Scheme Assessment Report (ISAR). Appropriate mitigation measures would be included in the Construction Environment Management Plan.

## 12 Policies and Plans

### 12.1 Introduction

12.1.1 This section of the report assess the effects of the scheme options on planning policy, most notably that within the Adopted Unitary Development Plan 1996 – 2011. The Vale of Glamorgan Council is currently working towards Stage 4 of the Local Development Plan Deposit of Proposals.

#### Appraisal Methodology

12.1.2 This assessment follows the guidance set out in “DMRB Volume 11, section 3, part 12, Impact of Road Schemes on Policies and Plans” and WelTAG. At DMRB Stage 1 the objective is to undertake sufficient assessment of local, regional and national policy that may be affected by the broad route corridor.

12.1.3 The WelTAG guidance gives general advice relating to planning, rather than a particular methodology for assessment of effects on plans and policies.

### 12.2 Baseline Conditions

#### Welsh Policy Structure

12.2.1 In Wales, the planning policy structure and background are as follows:

##### **NATIONAL**

##### **Planning Policy WALES (2002)**

Sets out the land use planning policies of the Welsh Assembly Government and is supplemented by Technical Advice Notes (TANs). Procedural advice is given in circulars and together this provides the national planning policy that is given consideration when local planning authorities prepare their UDPs.

##### **Wales Spatial Plan in November 2004.**

Analysis and policy backdrop for all planning activities in Wales. Sets the context within which the Wales Transport Strategy has been developed

##### **Wales Transport Strategy**

With other Assembly policy documents supports the Wales Spatial Plan The aim of the strategy is “to provide a framework that connects national, regional and local policy to maximise the contribution that transport can make to achieving a sustainable future for

Wales, where actions for social, economic and environmental improvement work together to create positive change.”

**EA Welsh Office Circular 11/99**

Gives guidance on the Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations 1999.

**REGIONAL**

**Strategic Planning Guidance for South East Wales, January 2000**

- Provides a context for the preparation, consideration and revision of Unitary Development Plans (UDPs).
- Minimizes delays and conflicts between planning authorities at the public inquiry stage.
- Identifies areas of agreement on common issues.
- Identifies strategic spatial policy issues that may need resolution and identify the mechanisms for resolving them.
- Provides an opportunity for interested organisations to contribute to the Regional Planning process.

**LOCAL**

**The Adopted Vale of Glamorgan Unitary Development Plan 1996 – 2011** (finalised in 2005).

This is the development plan for the authority and supersedes all adopted / approved structure and local plans that were previously in force.

**Local Development Plan** (emerging)

**Emerging Plans**

12.2.2 The Welsh Assembly Government requires the Vale of Glamorgan Council to prepare a Local Development Plan (LDP) that will supersede the Unitary Development Plan (UDP) once adopted. The Council are currently preparing a LDP for the period 2011 to 2026 and the Delivery Agreement (Revised July 2009), sets out the timetable for its preparation.

12.2.3 The key stages of Plan preparation are:

- Stage 1 The Delivery Agreement (Feb'06 - July'06)
- Stage 2 Pre-Deposit Participation (Feb'06 - Oct'08)
- Stage 3 Pre-Deposit Consultation (Jan'07 - Oct'08)
- Stage 4 LDP Deposit of Proposals (May'10 - June'10)
- Stage 5 Submission of LDP to National Assembly (Dec'10 - Indicative) & Independent Examination (Apr'11 - Jun'11 - Indicative)
- Stage 6 Inspector's Report (Jan'12 - Indicative)
- Stage 7 Adoption (Apr'12 - May'12 - Indicative)

## 12.3 Potential Receptors and Impacts

12.3.1 The five potential route options under consideration, all travel through the same broad corridor, in which the main planning designations are Special Landscape Area and Green Wedge. The impact assessment applies to all of the options. The red route has an additional direct impact on a dwelling and this would cause it to be the least preferred from a planning perspective.

- Please refer to Table 12.1 Affected Planning Allocations and Policies: Main Allocations Affected
- Please refer to Table 12.2 Affected Planning Allocations and Policies: Other Policies Affected
- Please refer to Table 12.3 Planning Policy Schedule: full text of affected UDP policies

12.3.2 A large proportion of the study area is designated as Special Landscape Area's (SLA). Land to the west of Five Mile Lane is designated as the Nant Llancarfan SLA and Land to the east is Dyffryn Basin & Ridge Slopes SLA. [See Figure 12.1](#). Chapter 5 Landscape Effects gives further assessment of the impacts on the Special Landscape Areas.

12.3.3 To the south of the A4226 between Cardiff Airport and the edge of Barry there is an area covered by Policy ENV 3 – Green Wedge. The residential settlement boundary of Barry covered by UDP Policies HOUS 2 and 8 is at the southern end of the scheme, where the roundabout junction needs to be improved at Waycock Cross.

12.3.4 The full text of the Unitary Development Policies mentioned in this chapter can be found below in the appendices. Please also refer to [Figure 12.1](#) Planning Designations

**Table 12.1 Affected Planning Allocations and Policies: Main allocations affected**

UDP Policy		U	IMPACT			Description of impacts
			+	0	-	
<b>ENV4</b>	SPECIAL LANDSCAPE AREA				--	The proposed improvements would be likely to have an average of moderate adverse effect on this policy
<b>ENV3</b>	GREEN WEDGE				-	There may be a slight adverse effect (due to the junction improvements at



					Waycock Cross)
<b>HOUS2</b>	RESIDENTIAL SETTLEMENT BOUNDARY			<b>0</b>	Not affected
<b>HOUS 8</b>	RESIDENTIAL SETTLEMENT BOUNDARY			<b>0</b>	Not affected

**U = Unknown at present**

**- = Adverse**

**+ = Beneficial**

**0 = Neutral**

**Table 12.2 Affected Planning Allocations and Policies: Other policies affected**

UDP Policy		IMPACT			Description of impacts
		+	0	-	
<b>Env29</b>	Protection of Environmental Quality		<b>0</b>		The effects on this policy should be <b>neutral</b> with mitigation
<b>Env17</b>	Protection of Built and Historic Environment			<b>--</b>	Further specialist assessment is required to more fully define the extent and importance of the buried archaeological assets. This will inform the potential mitigation options. A <b>moderate adverse</b> impact is predicted.
<b>Env18</b>	Archaeological field investigation			<b>--</b>	
<b>Env19</b>	Preservation of Archaeological Remains			<b>--</b>	
<b>Env20</b>	Development in Conservation Areas		<b>0</b>		The conservation areas at Penmark, Bonvilston and St Nicholas are within 1 km of the study area. They will not be directly affected by the proposal
<b>Env13</b>	International areas of nature conservation importance		<b>0</b>		There are no internationally important sites within the study area.
<b>Env14</b>	National sites of nature conservation importance		<b>0</b>	<b>--</b>	There are a number of SSSIs within the study area, with mitigation there could be expected to be a <b>moderate adverse</b> impact on this policy, in year 1, reducing to a <b>neutral</b> impact as mitigation takes effect.
<b>Env15</b>	Local sites of nature conservation significance		<b>0</b>	<b>--</b>	
<b>Env16</b>	Protected species		<b>0</b>	<b>--</b>	
<b>Env11</b>	Protection of landscape features		<b>0</b>	<b>--</b>	<b>Moderate adverse</b> effect reducing to Neutral/Slight adverse on average in the long term
<b>Env10</b>	Conservation of the countryside		<b>0</b>	<b>--</b>	<b>Moderate adverse</b> effect reducing to Neutral/Slight adverse on average in the long term
<b>Env1</b>	Development in the countryside		<b>0</b>		As infrastructure in a rural location the proposal accords with this policy
<b>Env2</b>	Agricultural land			<b>- / --</b>	There is likely to be a <b>moderate adverse</b> effect on agricultural land in Sector 1, no effect in Sector 2, and <b>slight adverse</b> effects in Sectors 3 – 7.
<b>Env26</b>	Contaminated land and unstable land		<b>0</b>		The impact should be <b>neutral</b> after mitigation

UDP Policy		IMPACT			Description of impacts
		+	0	-	
<b>Comm5</b>	Retention of community facilities		0		With appropriate design and consultation adverse impact would be avoided
<b>Rec1</b>	Protection of existing recreational facilities		0		With appropriate design and consultation adverse impact would be avoided
<b>Env7</b>	Water resources			-	Interim assessment indicates that the impact is likely to be <b>slight adverse</b>

## 12.4 Indirect Effects on Other Plans and Policies

12.4.1 Improving access to Cardiff International Airport would be a secondary benefit of the scheme to improve the safety of the A4226 (Five Mile Lane).

12.4.2 There are a number of plans and policies that specifically mention an access route to the airport.

12.4.3 In the “**Strategic Planning Guidance for South East Wales, January 2000**”, the issue of access to Cardiff Airport is specifically addressed in recommendation T8. The supporting text also states that, “*Cardiff International Airport and the region’s ports are major regional economic assets*”.

12.4.4 The “**Adopted Vale of Glamorgan Unitary Development Plan (UDP) 2005**” has protected an area of land - to the east of Wenvoe as a potential route for the Cardiff Airport Access Road, and this was the subject of earlier environmental assessments. The broad alignment corridor currently under consideration lies outside this protected route. POLICY TRAN 1 – STRATEGIC HIGHWAYS) states: “*Land will be protected and provision made for the development of the strategic highway network, including: i) The airport access road and ii) The Barry waterfront to Cardiff link*”

12.4.5 This is supported by a reference to national policy guidance: “*Planning Guidance (Wales) “Planning Policy” (1996) refers to the need to consider the increasing economic role of Cardiff International Airport. The importance of establishing a high quality link road to the airport from the M4 and Cardiff is seen as a unique strategic objective. In providing a high quality fast link, the Airport Access Road will serve new development at the airport, Barry Waterfront and Pencoedtre. It will relieve the congested major interchange at Culverhouse Cross, remove through traffic, improve environmental and road safety problems at the existing residential area of Wenvoe and North Barry and relieve the existing road network to the benefit of public transport, cyclists and pedestrians. The*

*Council remains keen to encourage improved public transport links, both bus and rail, to Cardiff International Airport, as outlined in the text accompanying policy Tran 3.”*

- 12.4.6 The “**Vale of Glamorgan Local Transport Plan 2001/02 – 2005/06**”, has specific plans and policies in relation to Cardiff International Airport, these are quoted below:

**Policy 24**

*The continued use and development of Cardiff International Airport to cater for all types of traffic will be favoured*

*Paragraph 7.126 states that “the development strategy for the airport aims to develop facilities to cater for up to 3.6 million passengers per annum”.*

*Paragraph 7.127 states that:*

*“The continued use and development of Cardiff International Airport will benefit the region as a whole. However if the region is to maximise the potential of the airport it will be necessary to enhance the transport links between the airport and the wider region. It will be important to ensure convenient and appropriate access to/from the airport to attract continued growth of business travellers, leisure users, and to ensure future opportunities to further developed the freight potential of the airport.”*

**Policy 25**

*An airport transport forum will be established to develop a surface access strategy for the airport.*

## 12.5 Overall Impact

- 12.5.1 The majority of the study area for the Five Mile Lane improvements is designated as a Special Landscape Area (ENV4) in the adopted Vale of Glamorgan Unitary Development Plan (1996 – 2011). All of the route alignment options would have an adverse on this policy designation reducing through mitigation towards Neutral. Please refer to the Landscape Effects chapter for more information.

- 12.5.2 The landscape effects chapter has examined the options in detail. These can be broadly summarised as the Purple route would have a slight/moderate adverse effect, the Blue and Green would have moderate adverse effect and the Red and Orange routes would have a moderate/severe adverse impact. With mitigation these effects can reduced to a neutral/slight effect in the long term.

12.5.3 A slight adverse effect is initially predicted for the Green Wedge (ENV3) as a result of alterations to the roundabout at Waycock Cross. With mitigation these effects would be reduced to neutral after 15 years

12.5.4 For most other policies no effects are predicted.

12.5.5 The impacts on Plans and Policies are similar for all options. The most pronounced effects are moderate adverse (landscape, heritage, biodiversity) that can be reduced to neutral effects after mitigation. There is an overall slight adverse effect on land use that cannot be completely mitigated.

12.5.6 The overall effect on Plans and Policies is Neutral / Slight Adverse.

## 13 Appraisal Summary Tables

### 13.1 Blue Route Option Appraisal Summary Table

Criteria	Assessment	Distribution	Significance
<b>Traffic Noise and Vibration</b>	Following mitigation, impacts throughout the route are likely to vary from significant beneficial through to slight but not significant adverse.	Principal beneficial effects around Sycamore Cross (Sector 1), Blacklands Fram/Tynant and Sutton Fach Farm' (Sector 5)	<b>+</b> Slight Beneficial
<b>Local Air Quality</b>	Once mitigation measures have been put in place, long-term there are likely to be Slight Positive Benefit to Moderate Positive Benefit.	Principal beneficial effects around Sycamore Cross (Sector 1), Blacklands Fram/Tynant and Whitton Lodge (Sector 3)  Principal adverse effects around Northcliff Cottage (Sector 5) and Waycock Cross (Sector 7) due to the close proximity of receptors to the carriageway or potentially slow moving traffic at roundabouts.	<b>+ / + +</b> Slight to Moderate Beneficial
<b>Landscape</b>	Neutral/Slight Adverse effect on Landscape Character and Neutral/Slight Beneficial effect on Visual Amenity	N/A	<b>0</b> Neutral
<b>Vehicle Travellers</b>	Moderate beneficial effect on views from the road and Large Beneficial on driver stress	Most beneficial to regular users of the road, such as local residents and workers.	<b>+ + / + + +</b> Moderate / Large Beneficial
<b>Biodiversity</b>	Overall impact in the long term likely to be Neutral –	N/A	<b>-</b>

Criteria	Assessment	Distribution	Significance
	Slight beneficial for most Sectors with appropriate mitigation. Impact in Sector 6 would be Moderate Adverse due to loss of SSSI woodland.		Slight Adverse overall (due primarily to effects on SSSI) + Potential for Slight beneficial impact if SSSI impacts minimised
<b>Soils, Agriculture and Land Use</b>	Overall impact in the long term is likely to be slight adverse.	N/A	- Slight Adverse
<b>Heritage</b>	Overall impact may result in Moderate Adverse due to impact on known sites. High potential for further important remains in Sectors 3/4. Principal adverse effects around Whitton Lodge (Sectors 3/4) at current assessment level.	N/A	-- Moderate Adverse (current assessment level)
<b>Water Environment</b>	Overall impact in the long term is likely to be slight adverse.	N/A	- Slight Adverse
<b>Social Impacts</b>	Overall impacts in the long term are likely to be Slight beneficial for receptors in most Sectors, as there will be potential for improvements in personal safety, physical fitness and social inclusion and no existing recreational routes or services will be severed by the proposed route.	N/A	+ Slight Beneficial
<b>Planning Policy</b>	Neutral / Slight Adverse.	N/A	0 / - Neutral / Slight Adverse
<b>Transport Planning Objective</b>	Moderate Beneficial effect	Most beneficial to regular users of the road, such as local residents and workers.	++ Moderate Beneficial

## 13.2 Purple Route Option Appraisal Summary Table

Criteria	Assessment	Distribution	Significance
<b>Traffic Noise and Vibration</b>	Generally, the route creates neutral or slight positive impacts following the installation of appropriate mitigation.	Principal beneficial effects around Sycamore Cross (Sector 1), Blacklands Fram/Tynant and Sutton Fach Farm' (Sector 5)	<b>+</b> Slight Beneficial
<b>Local Air Quality</b>	Overall impact in the long term is likely to be Neutral to Moderate Positive Benefit.	Principal beneficial effects to Sycamore Cross (Sector 1), Blacklands Fram/Tynant and Whitton Lodge (Sector 3), plus Sutton Farm (Sector 5)  Principal adverse effects around Grovelands Farm in Sector 5 due to the adjacent roundabout and also proximity to the carriageway.	<b>++</b> Moderate Beneficial
<b>Landscape</b>	Neutral/Slight Adverse effect on Landscape Character and Neutral effect on Visual Amenity	N/A	<b>0</b> Neutral
<b>Vehicle Travellers</b>	Slight beneficial effect on driver stress and on views from the road.	Most beneficial to regular users of the road, such as local residents and workers.	<b>+</b> Slight Beneficial
<b>Biodiversity</b>	Overall impact in the long term likely to be Neutral for most Sectors with appropriate mitigation. Impact in Sector 6 would be Slight Adverse due to minimal loss of SSSI woodland.	N/A	<b>-</b> Slight Adverse
<b>Soils, Agriculture</b>	Overall impact in the long term is likely to be slight	N/A	<b>-</b>

Criteria	Assessment	Distribution	Significance
<b>and Land Use</b>	adverse.		Slight Adverse
<b>Heritage</b>	Overall impact may result in Moderate Adverse due to impact on known sites. High potential for further important remains in Sectors 3/4. Principal adverse effects around Whitton Lodge (Sectors 3/4) at current assessment level.	N/A	-- Moderate Adverse (current assessment level)
<b>Water Environment</b>	Overall impact in the long term is likely to be slight adverse.	N/A	- Slight Adverse
<b>Social Impacts</b>	Overall impacts in the long term are likely to be Slight beneficial for receptors in most Sectors, as there will be potential for improvements in personal safety, physical fitness and social inclusion and no existing recreational routes or services will be severed by the proposed route.	N/A	+ Slight Beneficial
<b>Planning Policy</b>	Neutral / Slight Adverse	N/A	0 / - Neutral / Slight Adverse
<b>Transport Planning Objective</b>	Slight Beneficial effect	Most beneficial to regular users of the road, such as local residents and workers.	+ Slight Beneficial



### 13.3 Red Route Option Appraisal Summary Table

Criteria	Assessment	Distribution	Significance
<b>Traffic Noise and Vibration</b>	Generally, the route creates neutral or slight positive impacts following the installation of appropriate mitigation.	Principal beneficial effects around Sycamore Cross (Sector 1), Blacklands Fram/Tynant and Sutton Fach Farm' (Sector 5)	<b>+</b> Slight Beneficial
<b>Local Air Quality</b>	Overall impacts are likely to be Neutral to Slight Benefit. There will be some Moderate Positive effects on receptors where the carriageway is constructed at a greater distance than the current roadway alignment. Slight to Moderate Adverse effects will occur in locations where the proposed carriageway is within close proximity to receptors.	Principal beneficial effects around receptor Sycamore Cross (Sector 1), Blackland Farm (Sector 3) and Sutton Farm (Sector 5).  Principal adverse effects around Grovelands Farm and Northcliff Cottage (Sector 5)	<b>0 / +</b> Neutral / Slight Beneficial
<b>Landscape</b>	Slight Adverse effect on Landscape Character and Neutral effect on Visual Amenity	N/A	<b>0</b> Neutral
<b>Vehicle Travellers</b>	A Slight/Moderate beneficial effect on views from the road and Slight Beneficial on driver stress	Most beneficial to regular users of the road, such as local residents and workers.	<b>+</b> Slight Beneficial
<b>Biodiversity</b>	Overall impact in the long term likely to be Neutral for most Sectors with appropriate mitigation. Large scale loss of road-side hedgerows in the short term Impact in Sector 6 would be Slight Adverse due to loss of SSSI woodland.	N/A	<b>-</b> Slight Adverse
<b>Soils, Agriculture and Land Use</b>	Overall impact in the long term is likely to be slight adverse.	N/A	<b>-</b> Slight Adverse

Criteria	Assessment	Distribution	Significance
<b>Heritage</b>	Overall impact may result in Slight/Moderate Adverse due to more limited land-take around Whitton Lodge. Low/Moderate potential for further important remains in Sectors 3/4. Principal adverse effects in Sector 3 at current assessment level.	N/A	- / -- Slight/Moderate Adverse (current assessment level)
<b>Water Environment</b>	Overall impact in the long term is likely to be slight adverse.	N/A	- Slight Adverse
<b>Social Impacts</b>	Impacts for this route are likely to be Neutral as pedestrian/cyclist/equestrians access along the route may not be provided for, resulting in no benefits to the community in terms of physical fitness, perception of safety and improvements in social inclusion	N/A	0 Neutral
<b>Planning Policy</b>	Neutral / Slight Adverse	N/A	0 / - Neutral / Slight Adverse
<b>Transport Planning Objective</b>	Slight Beneficial effect	Most beneficial to regular users of the road, such as local residents and workers.	+ Slight Beneficial

### 13.4 Orange Route Option Appraisal Summary Table

Criteria	Assessment	Distribution	Significance
<b>Traffic Noise and Vibration</b>	The route is likely to create neutral and positive effects throughout the route following the installation of appropriate mitigation. The route should not create any significant adverse effects.	Principal beneficial effects around Sycamore Cross (Sector 1), Blacklands Fram/Tynant and Sutton Fach Farm' (Sector 5)	<b>++</b> Significant Beneficial
<b>Local Air Quality</b>	Overall impacts are likely to be Neutral to Slight Benefit.	Principal beneficial effects on receptors Sycamore Cross (Sector 1) and Blackland Farm, Whitton Lodge (Sector 3) where the carriageway is constructed at a greater distance than the current roadway alignment.  Principal adverse effects in Sector 5 due to the close proximity of a roundabout and the proposed carriageway.	<b>0 / +</b> Neutral / Slight Beneficial
<b>Landscape</b>	Slight Adverse effect on Landscape Character and Neutral effect on Visual Amenity	N/A	<b>0</b> Neutral
<b>Vehicle Travellers</b>	A Slight Beneficial effect on views from the road and Moderate Beneficial effect on driver stress	Most beneficial to regular users of the road, such as local residents and workers.	<b>+ / ++</b> Slight / Moderate Beneficial
<b>Biodiversity</b>	Overall impact in the long term likely to be Neutral for most Sectors with appropriate mitigation.	N/A	<b>0</b> Neutral impact

Criteria	Assessment	Distribution	Significance
	Impact in Sector 6 would be Slight Adverse due to minimal loss of SSSI woodland.		
<b>Soils, Agriculture and Land Use</b>	Overall impact in the long term is likely to be slight adverse.	N/A	- Slight Adverse
<b>Heritage</b>	Overall impact may result in Moderate/Slight Adverse due to more limited land-take around Whitton Lodge. High potential for further important remains in Sector 3. Principal adverse effects in Sector 3 at current assessment level.	N/A	- / -- Moderate/Slight Adverse (current assessment level)
<b>Water Environment</b>	Overall impact in the long term is likely to be slight adverse.		- Slight Adverse
<b>Social Impacts</b>	Overall impacts in the long term are likely to be Slight beneficial for receptors in most Sectors, as there will be potential for improvements in personal safety, physical fitness and social inclusion and no existing recreational routes or services will be severed by the proposed route.	Most beneficial to regular users of the road, such as local residents and workers.	+ Slight Beneficial
<b>Planning Policy</b>	Neutral / Slight Adverse	N/A	0 / - Neutral / Slight Adverse
<b>Transport Planning Objective</b>	Slight / Moderate Beneficial effect	Most beneficial to regular users of the road, such as local residents and workers.	+ / ++ Slight / Moderate Beneficial

## 13.5 Green Route Option Appraisal Summary Table

Criteria	Assessment	Distribution	Significance
<b>Traffic Noise and Vibration</b>	Generally, the route creates neutral or slight positive impacts following the installation of appropriate mitigation.	Principal beneficial effects around Sycamore Cross (Sector 1), Blacklands Fram/Tynant and Sutton Mawr' (Sector 5)	<b>+</b> Slight Beneficial
<b>Local Air Quality</b>	Overall impacts are likely to be Neutral to Slight Benefit.	Principal beneficial effects on receptors Sycamore Cross (Sector 1) and Blackland Farm, Whitton Lodge (Sector 3) where the carriageway is constructed at a greater distance than the current roadway alignment.  Principal adverse effects in Sector 5 due to the close proximity of a roundabout and the proposed carriageway.	<b>0</b> Neutral
<b>Landscape</b>	Slight Adverse effect on landscape character and Neutral/Slight Adverse on visual amenity	N/A	<b>-</b> Slight Adverse
<b>Vehicle Travellers</b>	A Slight Beneficial effect on views from the road and Moderate Beneficial effect on driver stress	Most beneficial to regular users of the road, such as local residents and workers.	<b>+ / ++</b> Slight / Moderate Beneficial
<b>Biodiversity</b>	Overall impact in the long term likely to be Neutral for most Sectors with appropriate mitigation.	N/A	<b>0</b> Neutral impact

Criteria	Assessment	Distribution	Significance
	Impact in Sector 6 would be Slight Adverse due to minimal loss of SSSI woodland		
<b>Soils, Agriculture and Land Use</b>	Overall impact in the long term is likely to be slight adverse.	N/A	- Slight Adverse
<b>Heritage</b>	Overall impact may result in Moderate Adverse due to impact on known sites. High potential for further important remains in Sectors 3/4. Principal adverse effects around Whitton Lodge (Sectors 3/4) at current assessment level.	N/A	-- Moderate Adverse (current assessment level)
<b>Water Environment</b>	Overall impact in the long term is likely to be slight adverse.	N/A	- Slight Adverse
<b>Social Impacts</b>	Overall impacts in the long term are likely to be Slight beneficial for receptors in most Sectors, as there will be potential for improvements in personal safety, physical fitness and social inclusion and no existing recreational routes or services will be severed by the proposed route.	N/A	+ Slight Beneficial
<b>Planning Policy</b>	Neutral / Slight Adverse	N/A	0 / - Neutral / Slight Adverse
<b>Transport Planning Objective</b>	Slight Beneficial effect	Most beneficial to regular users of the road, such as local residents and workers.	+ Slight Beneficial

## 13.6 Summary of Appraisal of Different Options

Appraisal Criteria	Summary of Significance				
	Blue Option	Purple	Red	Orange	Green
Traffic Noise and Vibration	+	+	+	++	+
Local Air Quality	+ / ++	++	0 / +	0 / +	0
Landscape	0	0	0	0	-
Vehicle Travellers	++ / +++	+	+	+ / ++	+ / ++
Biodiversity	-	+	-	-	0
Soils, Agriculture and Land Use	-	-	-	-	-
Heritage	--	--	- / --	- / --	--
Water Environment	-	-	-	-	---
Social Impacts	+	+	0	+	+
Planning Policy	0 / -	0 / -	0 / -	0 / -	0 / -
Transport Planning Objective	++	+	+	+ / ++	+

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## 15 Glossary

<b>ALC</b>	Agricultural Land Classification
<b>AQMA</b>	Air Quality Management Area
<b>ARAD</b>	Agriculture and Rural Affairs Department
<b>AST</b>	Appraisal Summary Table
<b>Cadw</b>	Cadw is a Welsh word which means 'to keep'. Cadw is the Welsh Assembly Government's historic environment division.
<b>CCW</b>	Countryside Council for Wales is the Welsh Assembly Government's Government's statutory advisor on sustaining natural beauty, wildlife and the opportunity for outdoor enjoyment in Wales and its inshore waters.
<b>cSINC</b>	Candidate Site of Interest for Nature Conservation – local authority level of designation
<b>Development</b>	For the purposes of planning regulation development is defined in primary legislation and statutory instruments as the carrying out of building, engineering, mining or other operations or the making of any change in the use of any buildings or land.
<b>DMRB</b>	Design Manual for Roads and Bridges (Highways Agency 2000)
<b>EC directive</b>	A type of legislation issued by the European Community that is binding on Member States in terms of the results to be achieved but which leaves Member States the choice of methods.
<b>EIA</b>	Environmental Impact Assessment The formal procedure that requires applications for specified types of development to be accompanied by an environmental statement that the local planning authority must take in to account when determining an application.
<b>Environment Agency</b>	Part of the corporate Environment Agency for England and Wales, a statutory body The EA has wide responsibilities for managing the environment: i) Acting as a champion for the environment ii) Reducing pollution and enforcing pollution legislation iii) Overseeing the management of waste, water resources and freshwater fisheries iv) Reducing the harm caused by flooding v) Influencing others to achieve positive environmental outcomes by changing attitudes and behaviour
<b>ES</b>	Environmental Statement
<b>EU</b>	European Union

<b>GGAT</b>	Glamorgan Gwent Archaeological Trust is one of four Welsh Archaeological Trusts working closely with other national, regional and local bodies, to help protect, record and interpret all aspects of the historic environment for the whole of Wales.
<b>JNCC</b>	Joint Nature Conservation Committee.
<b>LDP</b>	Local Development Plan
<b>LNR</b>	Local Nature Reserve
<b>Listed Building</b>	Buildings of special historical or architectural interest registered on statutory lists and subject to stricter planning controls
<b>LTP</b>	Local Transport Plan
<b>LVIA</b>	Landscape and Visual Impact Assessment
<b>m</b>	Metres.
<b>OD</b>	Ordnance Datum
<b>PPG</b>	Planning Policy Guidance
<b>Ramsar</b>	Wetland of International Importance, designated by the Convention on Wetlands, signed in Ramsar, Iran, in 1971
<b>RIGs</b>	Regionally Important Geological and Geomorphological Sites.
<b>RPG</b>	Regional Planning Guidance
<b>SAM</b>	Scheduled Ancient Monument
<b>SMR</b>	Sites and Monuments Records
<b>SLA</b>	Special Landscape Area
<b>SPG</b>	Supplementary Planning Guidance
<b>SSSI</b>	Site of Special Scientific interest. An area notified under Section 28 of the Wildlife and Countryside Act 1981 (as amended) for its 'special interest by reason of any of its flora, fauna or geological or physiographic features'.
<b>TAN</b>	Technical Advice Note
<b>UDP</b>	Unitary Development Plan - The type of development plan prepared by Metropolitan District or Borough Councils incorporating aspects of both Structure Plans and Local Plans.
<b>VOGC</b>	Vale of Glamorgan Council
<b>WAG</b>	Welsh Assembly Government
<b>WeITAG</b>	Welsh Transport Analysis Guidance
<b>WebTAG</b>	Transport Analysis Guidance Website

# 16 Appendices

<b>Appendix 6.1</b>	<b>Biodiversity - Phase I Habitat survey plan and accompanying Target Notes</b>
<b>Appendix 7.1</b>	<b>Land Use - Landholdings assessment</b>
<b>Appendix 9.1</b>	<b>Water Environment - Water Quality of River Waycock</b>
<b>Appendix 12.1</b>	<b>Planning Policy Schedule</b>

## **Appendix 6.1    Biodiversity - Phase I Habitat survey plan and accompanying Target Notes**

- Key**
- Scattered Scrub
  - Parkland/scattered trees - Broad-leaved
  - Parkland/scattered trees - Coniferous
  - Improved Grassland
  - A** Cultivated/disturbed land - Arable
  - Scattered Scrub
  - Parkland/scattered trees - Broad-leaved
  - Running water
  - Boundaries - Intact hedge - Native species rich
  - Boundaries - Intact hedge - Species poor
  - Boundaries - Defunct hedge - Native species rich
  - Boundaries - Defunct hedge - Species poor
  - Boundaries - Hedge and trees - Native species rich
  - Boundaries - Hedge and trees - Species poor
  - Boundaries - Fence
  - Boundaries - Wall
  - Boundaries - Dry ditch
  - Boundaries - Boundary removed
  - Boundaries - Earth bank
  - Mammal Path
  - Change of use break line
  - Woodland - Broad-leaved - Semi natural
  - Woodland - Broad-leaved - Plantation
  - Woodland - Coniferous - Plantation
  - Scrub - Dense/continuous
  - Scrub - Scattered Scrub
  - Parklands/scattered trees - Broad-leaved
  - Parklands/scattered trees - Coniferous
  - Neutral grassland - Unimproved
  - Neutral grassland - Improved
  - Calcareous grassland - Unimproved
  - Poor semi-improved grassland
  - Other - Tall ruderal
  - Standing water
  - Running water
  - Artificial - Spoil
  - Cultivated/disturbed land - Amenity grassland
  - Cultivated/disturbed land - Ephemeral/short perennial
  - Built-up areas - Buildings
  - Bare ground
  - Other habitat

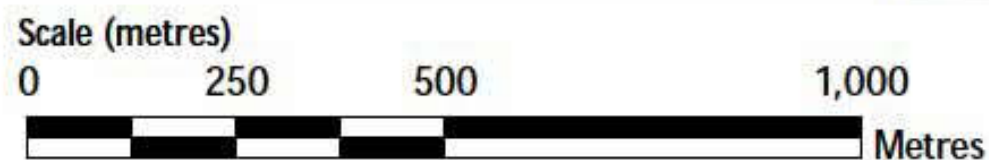
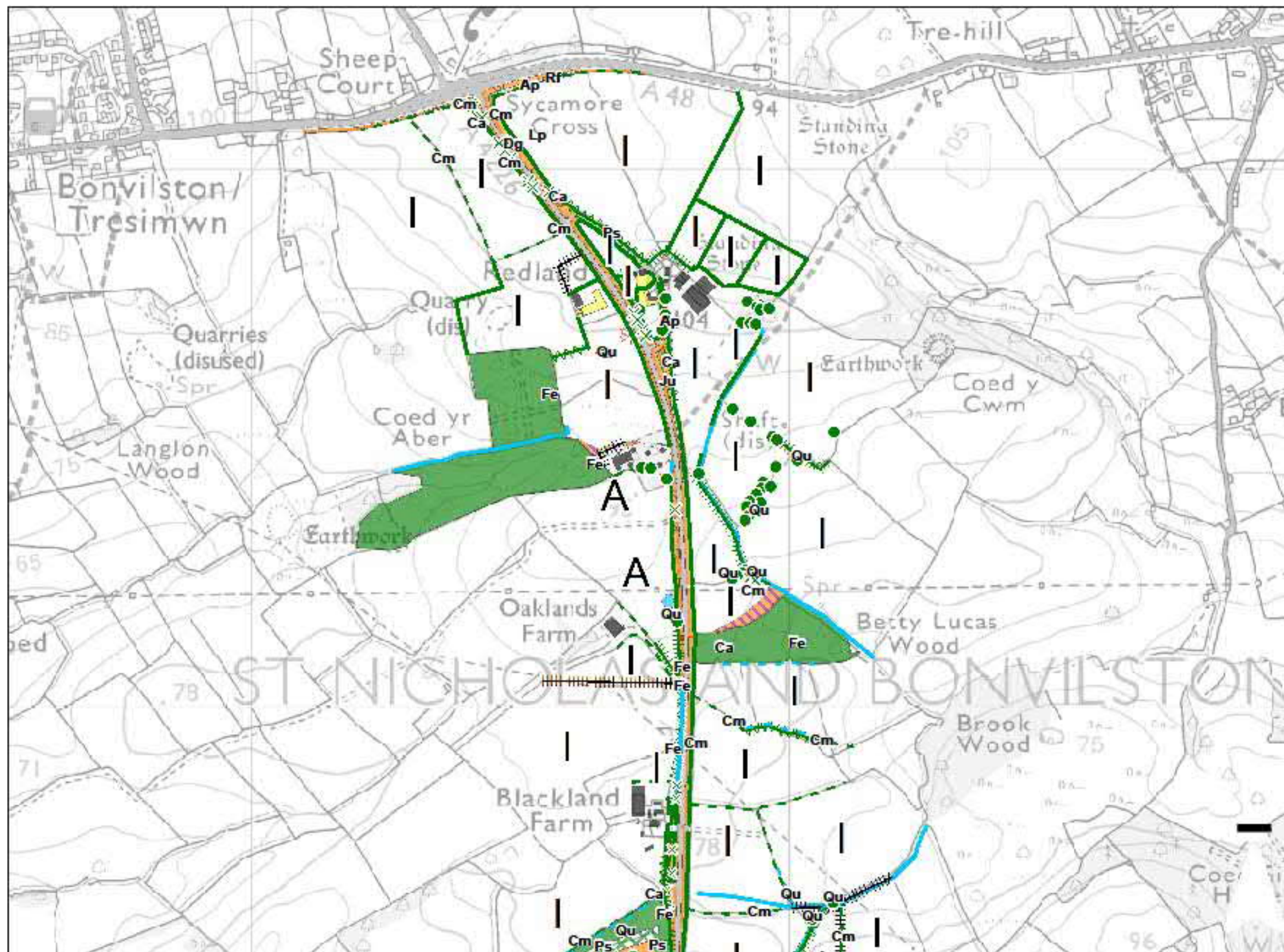


Figure 6.1a: Phase 1 Habitat Survey

- Key**
- Scattered Scrub
  - Parkland/scattered trees - Broad-leaved
  - Parkland/scattered trees - Coniferous
  - Improved Grassland
  - A** Cultivated/disturbed land - Arable
  - Scattered Scrub
  - Parkland/scattered trees - Broad-leaved
  - Running water
  - Boundaries - intact hedge - Native species rich
  - Boundaries - intact hedge - Species poor
  - Boundaries - Defunct hedge - Native species rich
  - Boundaries - Defunct hedge - Species poor
  - Boundaries - Hedge and trees - Native species rich
  - Boundaries - Hedge and trees - Species poor
  - Boundaries - Fence
  - Boundaries - Wall
  - Boundaries - Dry ditch
  - Boundaries - Boundary removed
  - Boundaries - Earth bank
  - Mammal Path
  - Change of use break line
  - Woodland - Broad-leaved - Semi natural
  - Woodland - Broad-leaved - Plantation
  - Woodland - Coniferous - Plantation
  - Scrub - Dense/continuous
  - Scrub - Scattered Scrub
  - Parklands/scattered trees - Broad-leaved
  - Parklands/scattered trees - Coniferous
  - Neutral grassland - Unimproved
  - Neutral grassland - Improved
  - Calcareous grassland - Unimproved
  - Poor semi-improved grassland
  - Other - Tall ruderal
  - Standing water
  - Running water
  - Artificial - Spill
  - Cultivated/disturbed land - Amenity grassland
  - Cultivated/disturbed land - Ephemeral/short perennial
  - Built-up areas - Buildings
  - Bare ground
  - Other habitat

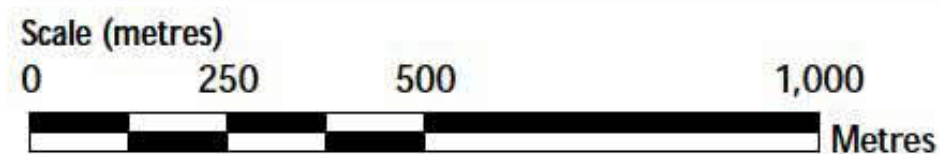
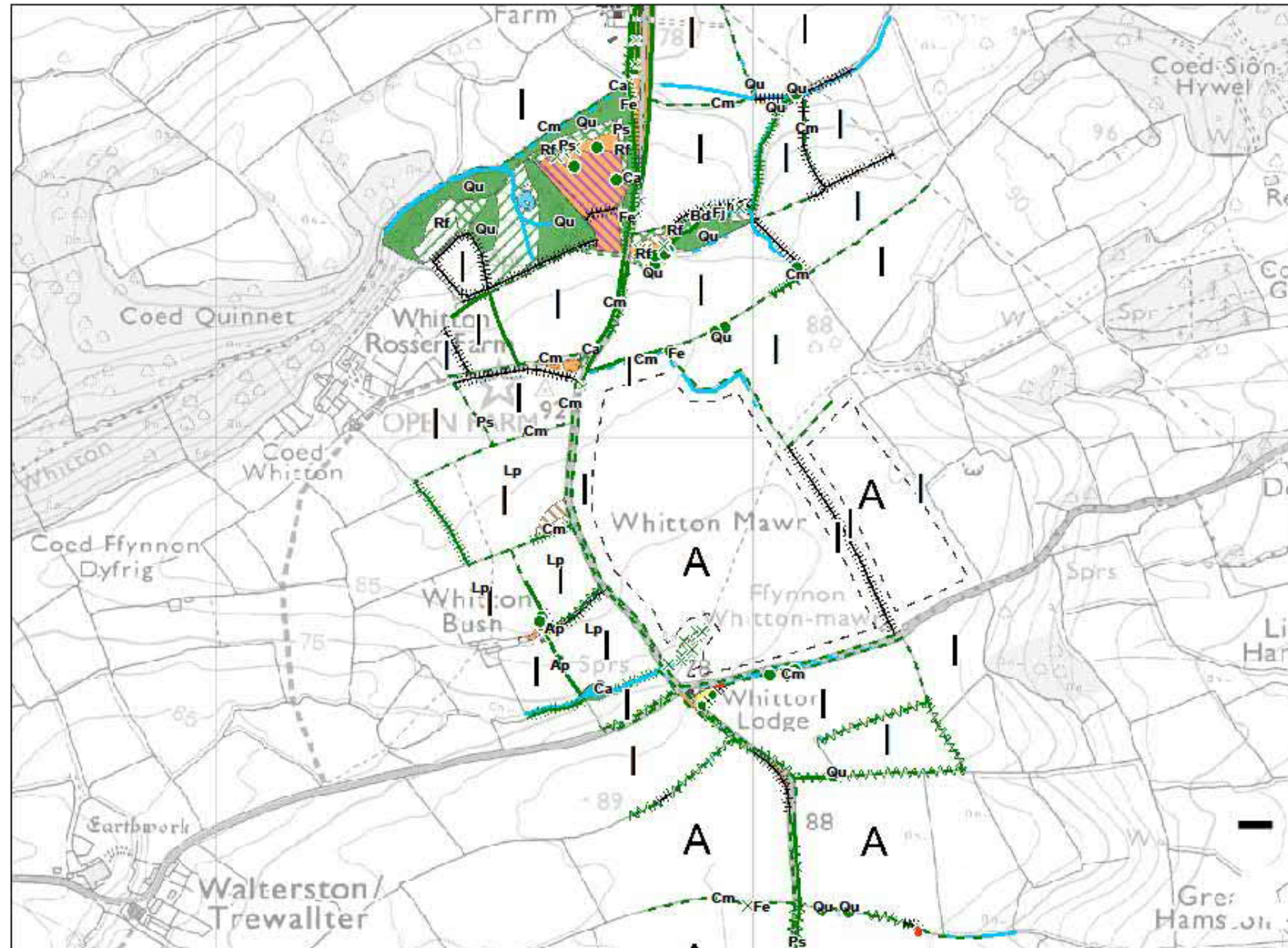


Figure 6.1b: Phase 1 Habitat Survey



- Key**
- Scattered Scrub
  - Parkland/scattered trees - Broad-leaved
  - Parkland/scattered trees - Coniferous
  - Improved Grassland
  - Cultivated/disturbed land - Arable
  - Scattered Scrub
  - Parkland/scattered trees - Broad-leaved
  - Running water
  - Boundaries - Intact hedge - Native species rich
  - Boundaries - Intact hedge - Species poor
  - Boundaries - Defunct hedge - Native species rich
  - Boundaries - Defunct hedge - Species poor
  - Boundaries - Hedge and trees - Native species rich
  - Boundaries - Hedge and trees - Species poor
  - Boundaries - Fence
  - Boundaries - Wall
  - Boundaries - Dry ditch
  - Boundaries - Boundary removed
  - Boundaries - Earth bank
  - Mammal Path
  - Change of use break line
  - Woodland - Broad-leaved - Semi natural
  - Woodland - Broad-leaved - Plantation
  - Woodland - Coniferous - Plantation
  - Scrub - Dense/continuous
  - Scrub - Scattered Scrub
  - Parkland/scattered trees - Broad-leaved
  - Parkland/scattered trees - Coniferous
  - Neutral grassland - Unimproved
  - Neutral grassland - Improved
  - Calcareous grassland - Unimproved
  - Poor semi-improved grassland
  - Other - Tall ruderal
  - Standing water
  - Running water
  - Artificial - Spoil
  - Cultivated/disturbed land - Amenity grassland
  - Cultivated/disturbed land - Ephemeral/short perennial
  - Built-up areas - Buildings
  - Bare ground
  - Other habitat

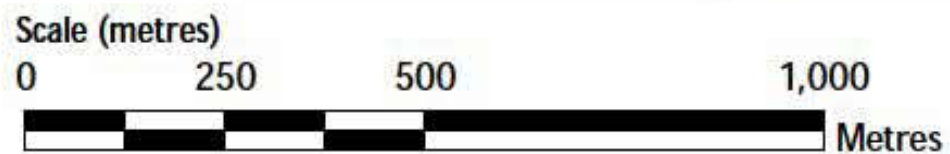
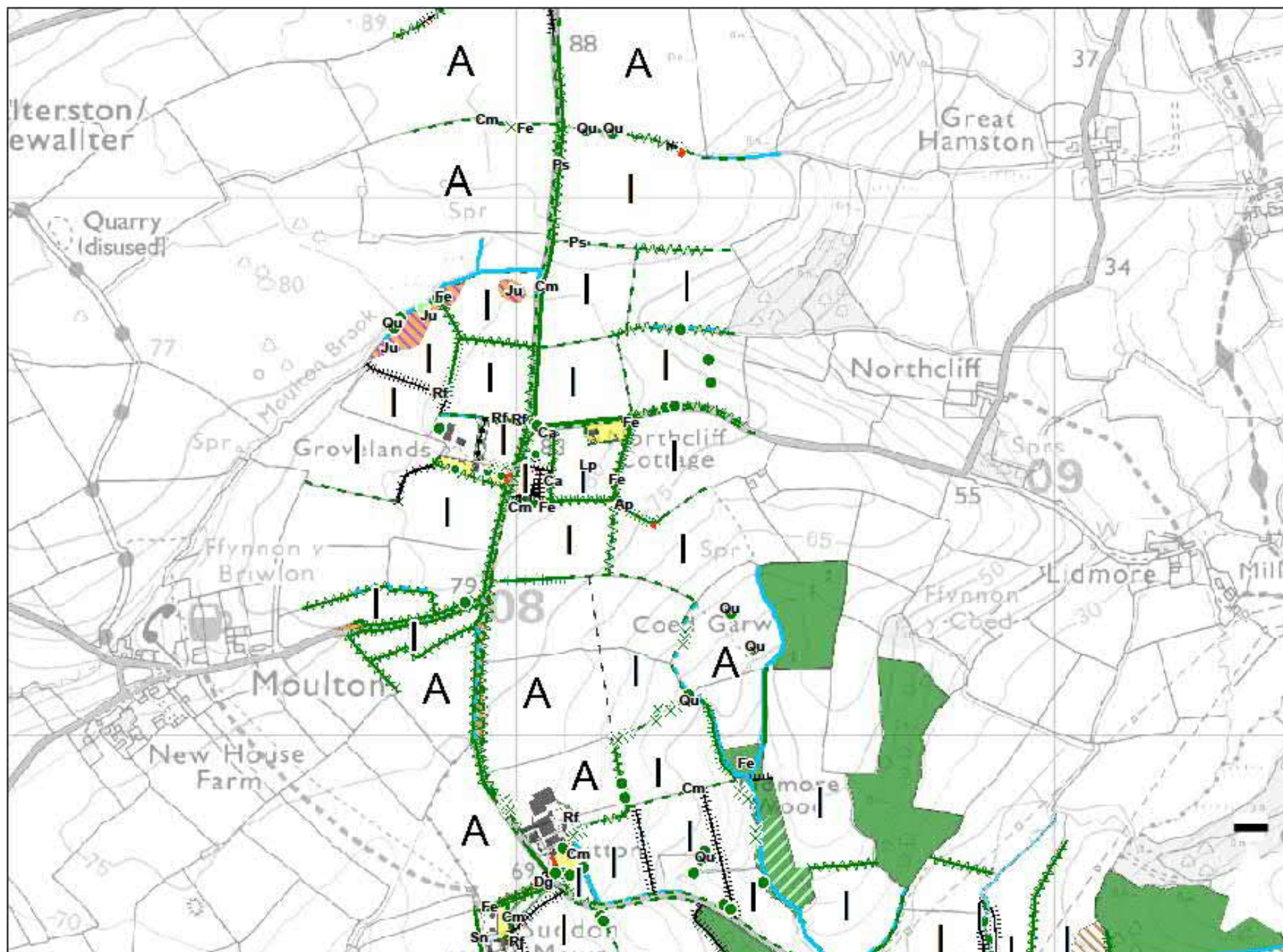


Figure 6.1c: Phase 1 Habitat Survey

- Key**
- Scattered Scrub
  - Parkland/scattered trees - Broad-leaved
  - Parkland/scattered trees - Coniferous
  - Improved Grassland
  - Cultivated/disturbed land - Arable
  - Scattered Scrub
  - Parkland/scattered trees - Broad-leaved
  - Running water
  - Boundaries - intact hedge - Native species rich
  - Boundaries - intact hedge - Species poor
  - Boundaries - Defunct hedge - Native species rich
  - Boundaries - Defunct hedge - Species poor
  - Boundaries - Hedge and trees - Native species rich
  - Boundaries - Hedge and trees - Species poor
  - Boundaries - Fence
  - Boundaries - Wall
  - Boundaries - Dry ditch
  - Boundaries - Boundary removed
  - Boundaries - Earth bank
  - Mammal Path
  - Change of use break line
  - Woodland - Broad-leaved - Semi natural
  - Woodland - Broad-leaved - Plantation
  - Woodland - Coniferous - Plantation
  - Scrub - Dense/continuous
  - Scrub - Scattered Scrub
  - Parklands/scattered trees - Broad-leaved
  - Parklands/scattered trees - Coniferous
  - Neutral grassland - Unimproved
  - Neutral grassland - Improved
  - Calcareous grassland - Unimproved
  - Poor semi-improved grassland
  - Other - Tall ruderal
  - Standing water
  - Running water
  - Artificial - Spoil
  - Cultivated/disturbed land - Amenity grassland
  - Cultivated/disturbed land - Ephemeral/short perennial
  - Built-up areas - Buildings
  - Bare ground
  - Other habitat

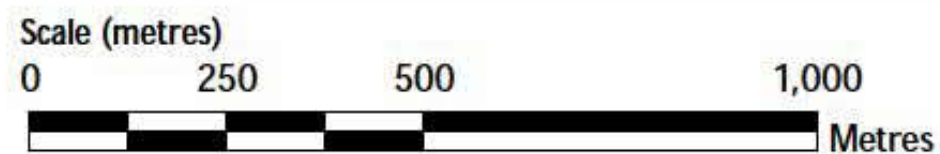
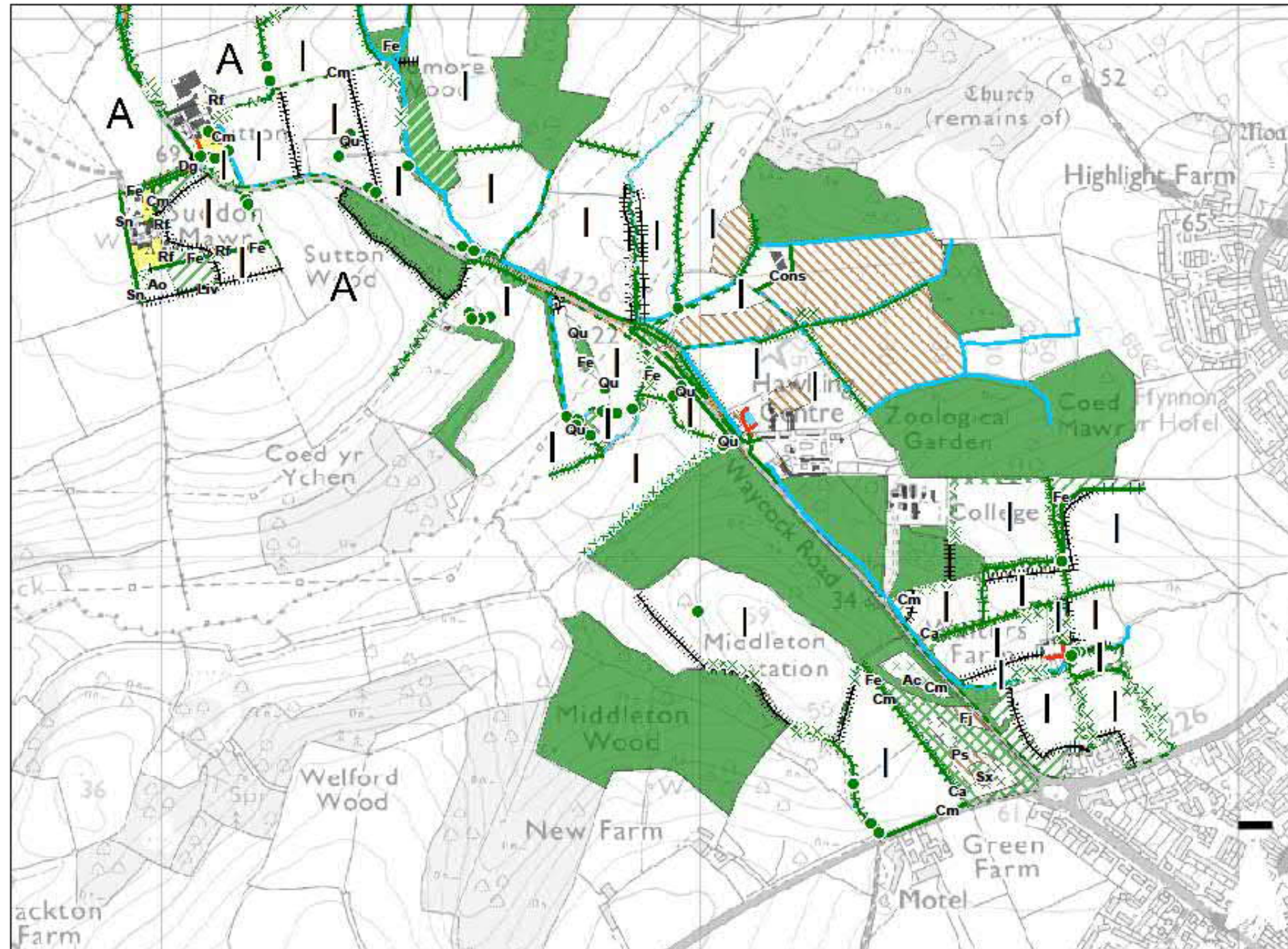


Figure 6.1d: Phase 1 Habitat Survey

## Appendix 7.1

## Land Use - Landholdings assessment

## Potential Receptors and Impacts

### Sector 1

#### **Redland Farm (LU-1-1) and Redland Court Farm (LU-1-2)**

In Sector 1, two land holdings – Redland Farm and Redland Court Farm - near Sycamore Cross, and to the south of the A48 are likely to be affected by changes to the junction. The current at-grade junction has been a focus of accidents and safety must be improved. The construction of either one large, or two small roundabouts is proposed.

In the worst-case scenario, 1.1 Ha may be permanently removed from Redland Farm. If a large roundabout is constructed on the Redland Court Farm landholding, the plans at this stage indicate that the land take may be 0.3Ha. The land holdings may lose field corners although this does not create significant problems such as fragmentation of the holding. However, in practical terms, the access to farm units requires detailed consideration; the agricultural land quality is Grade 2.

The effects on the land holdings are given **Slight Adverse Effect**. There is no preferred option.

### Sector 2

In this section the existing road is of sufficient width with good sight lines and no further improvements need to be made. While this has no direct impact on land holdings, the improved road is intended to have a higher design speed and this may create severance problems, as discussed below.

All land holdings bordering the edges of the route may experience impingement onto their boundaries – even when improvements are on-line, as the new route is likely to be slightly wider.

### Sector 3

In Sector 3, four of the five options under consideration deviate significantly from the existing route.

All land holdings bordering the edges of the new route – whichever option is chosen - are likely to experience impingement onto their boundaries – even when improvements are on-line, as the new route would be wider than the existing.

#### **Whitton Rosser Farm (LU-3-2) and Whitton Bush Farm (LU-3-4)**

Both located on the western side of Five Mile Lane, the Amelia Trust, which is a charitable organisation that mainly provides assistance to disadvantaged children and adults with social and emotional problems,

who utilise LU-3-2 as an open farm. Whitton Bush Farm is an agricultural holding. The red route curves inwards and shaves approximately 26m maximum from the fields bordering Five Mile Lane. This is a **slight adverse effect**. The orange, green, blue and purple routes all curve away from the holdings and have the additional advantage of leaving the existing Five Mile Lane in place, and providing safe access to the farms.

#### **'Llancarfan' holding (LU-3-7a + 7b)**

The ownership boundary includes four separate landholdings bordering Five Mile Lane. The landholding in Sector 2 is not affected, and the landholding in Sector 5 is affected by some of the route options.

The parts of the holding given the reference numbers LU-3 - 7 a and b) are on the west and east sides of Five Mile Lane, in Sector 3. Any of the options may potentially isolate the eastern field (12.5Ha). A telephone conversation with a land agent has confirmed that the entire holding is extensive, approximately 1214 hectares, so the adverse effects of the road may not be likely to make the holding unviable although the options would sever the eastern field. The full extents of other holdings are not known at this stage.

The Red route is mainly online but at this point it curves west of the existing road to lessen a sharp corner. This affects a large land parcel (numbered LU-3-7a) that straddles the join of Sectors 3 and 4. The route may effectively shave off the corner and may also impinge on the owner's other land area to the east of Five Mile Lane (numbered LU-3-7b). Purple and Green routes, with a maximum loss of 1.8Ha, may similarly affect the area.

The Blue route goes off line through the eastern field (numbered LU-3-7b) and may leave a narrow strip of land of 0.9 Ha between the old Five Mile Lane and the new route.

The overall impact on the land holding as a whole could be considered **slight adverse** although suitable compensatory measures may need to be agreed.

## **Sector 4**

### **Northcliff Farm (LU-4-1)**

This agricultural land holding is on the east of Five Mile Lane and straddles Sectors 4 and 5.

The Red route is aligned slightly to the east of the existing Five Mile Lane, so it may impinge on the field boundary and lead to a loss of 0.8Ha land. The Green route has a similar, further westwards, alignment to the red at this point.

The Orange route is mainly online at this point, it also curves westwards at Sector 5 and may skim off a field corner of 0.8Ha with further loss caused by the approaches to the proposed roundabout.

The Blue route is furthest to the east of the existing road and may lead to the greatest loss of land and the creation of an isolated narrow strip of 2.9Ha.

The Purple route is mainly located slightly to the west of the existing route, although it crosses to the east near the Sector 5 boundary, leading to a loss of 0.3Ha.

This agricultural land holding is on the east of Five Mile Lane and may receive **slight adverse effects** particularly from the Purple, Orange and Blue options. The Red and Green routes would have a minimal effect and are the preferred options for this holding. The order of preference of routes for this receptor is: 1 Green, 2 Red, 3 Purple, 4 Orange then 5 Blue.

### **Sector 5**

All landholdings significantly affected by scheme options – please see main body of the report.

### **Sector 6**

In Sector 6, the severance effect described above for Sutton Fach Farm continues for approximately 240m until a point where all options again begin to follow the existing route. The Blue route may have the greatest impact in this section, as it leaves the existing route in place to use as a feeder and a new alignment is constructed alongside it. For the Orange and Green routes there may be additional effects and loss of 0.3 Ha due to a feeder lane and roundabout.

## Woodland

The proposed routes may affect a number of areas of woodland. The biodiversity section of the report has assigned reference numbers and these are used below:

### Wood 3 Lidmore Wood

This woodland showed evidence of historical management. The Red and Orange routes impinge against the edges of the privately owned wood. The Red route may lead to a loss of approximately 0.8Ha while the Orange route may lead to a greater loss of up to 0.1Ha. The predicted effects of either the Red or Orange routes are **slight adverse**.

### Wood 4 Sutton Wood (Llancarfan holding)

This area of woodland falls within an area of privately owned land. The landowner's entire holding is extensive (more than 1000 hectares) of mixed agricultural land. This area of woodland may be slightly affected by Red, Green and Blue options leading to a loss of approximately 0.02Ha. The predicted effects of either the Orange, Green and Blue options is **slight adverse**.

### Welsh Hawking Centre (LU-6-3) & Vale of Glamorgan Council LU-6-4)

The proposed road improvements are on line at this point (except for the Blue route) and the Welsh Hawking Centre may not be directly affected although there could be a shift of up to 8m (maximum) westwards or eastwards due to the additional width of the new road. There should be an opportunity to provide an improved safer access to the facility with the new layout.

The effect of up to 8m-increased road width continues in the neighbouring area of woodland (Wood 2).

The effects from the Orange, Green or Blue routes could be **slight adverse**, although with appropriate mitigation and consultation, this could be reduced to **no effect**.

### Barry College (LU-6-5)

The entrance to the college may be affected by the change in road width and design speed that may not improve the safety of the turning. The Blue option removes through traffic from the existing road/proposed local collector road that serves the buildings. For all other options, provision of safer/alternative access needs consideration.

**'Llancarfan' Holding & Wood 4 LU-3-7 (see above and in main text)**

This is another section of the landholding described above. For the Red, Green or Blue options, about 0.1Ha may be affected. The Red and Green routes have roundabout junction feeder lanes at this location, while the Blue alignment is west of the existing route. The effects on this section of the holding would be mitigated or compensated with the effects already described above.

**'Walters Farm' Holding LU-6-6**

This agricultural land holding may be affected by the increase in road width that may impinge against the existing boundaries.

**Sector 7**

**Middleton plantation (Wood 1)**

The final sector includes the roundabout junction options for the improvement of Waycock Cross. The Middleton Plantation (Wood 1) may be most affected with a loss of approximately 0.3ha of woodland. This **slight adverse effect** is currently associated with the Blue route, although all route options may necessitate some form of junction improvement.

**Land Quality**

The predicted effects on agricultural land quality may be very similar for all route options.

**Sector 1**

In the worst - case scenario, 1.1 Ha may be permanently removed from Redland Farm. If a large roundabout is constructed on the Redland Court Farm landholding, the plans at this stage indicate that the land take may be 0.3Ha.

The land has an Agricultural Land Quality of Grade 2. The Environment Planning and Countryside section of the Welsh Assembly Government should be consulted regarding the options available

Due to the agricultural land quality of Grade 2, the predicted impact is **moderate adverse effect**.

**Sector 2**

There is mainly Grade 4 agricultural land and any proposed highway improvements would be on line, therefore there would be no impact on agricultural land quality.



### **Sector 3**

In this section there is an area of Grade 4 agricultural land and then the rest of the section is Grade 3.

The Red route may lead to a loss of 0.7 ha of Grade 4 agricultural land, and an overall loss (Grade 3 & 4) of 0.23 ha.

All other routes have a similar effect to each other, leading to a loss approximately 0.4 ha of Grade 4 agricultural land. The Orange and Purple routes lead to a slightly lower loss of Grade 3 & Grade 4 land than the Green and Blue routes. For all options the amount lost is approximately 2.7 ha to 3.1 ha.

The agricultural land quality affected is mainly Grade 3 with some Grade 4, this is given a **slight adverse** effect.

### **Sectors 4 to 7**

In sector 4 the Red, Orange, Green and Purple options are all mainly on-line resulting in an overall loss of Grade 3 agricultural land of less than 1 ha. The Blue option is aligned to the east of the existing road and may lead to greater land take of more than 1 hectare.

In sector 5, the Red option may lead to the least land take, preliminary measurements indicate that this may be in the region of 2.7 ha. Due to differing curvatures of the options, the Orange and Green options have a slightly higher land take of up to 3 ha. The highest land take is likely to occur for the Blue option, which may be almost 4 ha. The indicative loss for the Purple route is approximately 3.5 ha. In sector 5, the order of preference may be 1 Red, 2 Orange, 3 Green, 4 Purple, and then 5 Blue.

In sector 6, the Red, Orange, Green and Purple options are all mainly on-line. Widening of the existing road and the addition of roundabout may lead to an overall loss of between 1 ha to 1.5 ha. The additional land take of the Blue route leads to a loss in the region of 3.6 ha.

In sector 7, the proposed roundabout may lead to an overall loss of 0.3 hectares from the Middleton plantation.

For sectors 4 to 7, the agricultural land quality is Grade 3 and the predicted impact of the Red, Orange, Green and Purple routes is **slight adverse**. The Blue option has the greatest land take, and preliminary measurement indicate that this is approximately 12 ha (including Sycamore and Waycock junctions.)

## **Geology**

The geological rock type through which the scheme passes is predominantly limestone with inter-bedded mudstone. The river valleys are overlain by deposits clay, silt, sand and gravel. Further geo-technical investigation may be necessary in order to assess the full impact on geology. The impact is likely to be similar for any of the options.

## **Urban areas and settlements**

Junction improvements are proposed at the northern end of the scheme, near Bonvilston and St Nicholas, and the southern end of the scheme, on the urban fringe of Barry.

The proposed junction improvements would be unlikely to have a direct impact on these settlements. The indicative junction layouts are entirely on existing highway or agricultural land.

## **Contaminated Land**

The former landfill site at Blackland farm is unlikely to be disturbed by any of the proposed route options.

## Appendix 9.1                      Water Environment - Water Quality of River Waycock



Halipidae		1									2											1		
Dytiscidae				2					3		50		7						2	1				
Gyrinidae	1		2	2	7					1		6	3	2	4			9	2					
Hydrophilidae																			1	1				
Scirtidae				1							1													
Elmidae	80	60	200	90	300	3	1	2		3	1	2	9	120	1000	700	700	600	700	300	500	100	80	
Silidae				1																				
Sirynidae																						1		
Rhyacophilidae	35	10	8	1	1							2		2	1	1	1	5	8	30	20	30		
Glossosomatidae	9	20	50	7	50							10	5	2	10	20	80	200	2	20	1			
Hydrophilidae	80	50			1							4	130		50				40	7	5	15		
Psychomyiidae		2		1	1							1	3	1	1		1				1	5		
Polycntrropodidae	1			1	1							5						2			2	1		
Hydropterygidae	6	30	40	20	20							1	9	40	20	20	40	40	30	100	3	15		
Phryganeidae																								
Lepidostomatidae		1										40	3	1	2	50	5							
Limnephilidae	1		3	1	1	1		2		1	4	5	2		1	2	2	2		1				
Gosidae																								
Sericostomatidae	1	20	10	10	20						1				8	3	20	17	2	3	5	1		
Leptoceridae		3																		20	10	3	3	
Tipulidae	3	8	1	2	1		4	2		2	1	1	11			1	2			20	3			
Limoniidae																			1				3	
Psychodidae	5	3	3	1			4	2	4		3		2		1		1							
Diixidae													6				1							
Ceratopogonidae	60	2	30		30	15	3	2	1	7	2	16	1			8	10		30	1		4	2	
Ceratopogon														100										
Simuliidae	40	3	20	7	6	1		20	2	20	11	29	2000		70	7	1	50	21	20	200	1	2	
Chironomidae	60	100	9	80	9	40	500	1000	300	900	400	1400	400	30	8	30		60	14	1000	60	400	160	
Stratiomyidae	1			1							1													
Rhagionidae																								
Tabanidae																							1	
Empididae	30	5	40		30	9	7	1	1	4	6		9	90	10	4		70		6	2			
Muscidae		2		1							1	1	1									2		
Planariidae	18	30	6	6	10		40			2	4			8	1	1	6	6			3			
Dusocidae								40	9		12	1	3				1							
Dendrocoelidae																								
Phoxinus phoxinus													6										1	
Anguilla anguilla													1											
Nematomorpha				4											2		1							



## Appendix 12.1      Planning Policy Schedule

## Appendices 12.1 Planning Policy Schedule

<b>AIR QUALITY</b>	
<b>UDP ENV 29</b>	<p><b>Protection of environmental quality.</b></p> <p>Development will not be permitted if it would be liable to have an unacceptable effect on either people's health and safety or the environment: By releasing pollutants into water, soil or air, either on or off site; or From smoke, fumes, gases, dust, smell, noise, vibration, light or other polluting emissions</p>
<b>TRAFFIC NOISE AND VIBRATION</b>	
<b>TAN11 (1997)</b>	<p><b>Noise</b></p> <p>This note gives guidance on noise policies. When area specific noise policies are useful, the relevant boundaries should be illustrated on the proposals map although it would inappropriate for a proposals map to show detailed noise contours as noise emissions may change significantly over time.</p> <p>Plans should contain an indication of any general policies which the local planning authority proposes to apply in respect of conditions or planning obligations.</p>
<b>UDP ENV 29</b>	<p><b>Protection Of Environmental Quality</b> (as above)</p>

<b>ARCHAEOLOGY AND CULTURAL HERITAGE</b>	
<b>UDP ENV 17</b>	<p><b>Protection of built and historic environment,</b></p> <p>The environmental qualities of the built and historic environment will be protected. Development which has a detrimental effect on the special character appearance or setting of: A building or group of buildings, structure or site of architectural or historic interest, including listed buildings and conservation areas; Scheduled ancient monuments and sites of archaeological and / or historic interest; Designed landscapes, parks or gardens of historic, cultural or aesthetic importance Will not be permitted.</p>
<b>UDP 05 ENV 18</b>	<p><b>Archaeological field evaluation</b></p> <p>Where development is likely to affect a known or suspected site of archaeological significance, an archaeological evaluation should be carried out at the earliest opportunity and may be required before the proposal is determined. Detailed plans would need to reflect the conclusions of the evaluation.</p>



<b>ARCHAEOLOGY AND CULTURAL HERITAGE</b>	
<b>UDP 05 ENV 19</b>	<p><b>Preservation of archaeological remains</b></p> <p>Where development is permitted which affects a site of archaeological importance archaeological mitigation measures will be required to ensure preservation on site or adequate recording prior to disturbance</p>
<b>UDP 05 ENV 20</b>	<p><b>Development in conservation areas</b></p> <p>Proposals for new development or alterations to buildings or features within conservation areas will be permitted where they preserve or enhance the character of the conservation area. Such proposals will need to reflect:</p> <p>The scale, design, layout, character, materials and setting of those buildings which establish the character of the area;</p> <p>The patterns of use which establish the character of the area; Important open space within and adjoining conservation areas; Important trees and hedgerows; and Ponds and streams.</p>

<b>ECOLOGY, NATURE CONSERVATION &amp; BIODIVERSITY</b>	
<b>TAN 5 (1996)</b>	<p><b>Nature Conservation and Planning</b></p> <p>The advice note emphasises that the countryside Council for Wales should be consulted with regard to proposed development that would potentially harm ssis or their immediate surroundings. The Consultation area is defined as 500m although it can extend up to 2km. The TAN refers to supporting legislation and guidance.</p>
<b>TAN 10 (1997)</b>	<p><b>Tree preservation orders</b></p> <p>The principal effect of a TPO is to prohibit the cutting down, uprooting, topping, lopping, wilful damage or wilful destruction of a tree or trees without the consent of the local planning authority.</p>
<b>UDP ENV 13 -</b>	<p><b>International areas of nature conservation importance</b></p> <p>International sites which are designated or potential Ramsar sites, special protection areas or special areas of conservation will be protected. Development or land use changes likely to have an adverse effect on such sites will not be permitted unless there is no alternative and there are imperative reasons of</p>

<b>ECOLOGY, NATURE CONSERVATION &amp; BIODIVERSITY</b>	
	overriding public interest. Where such sites host a priority habitat or species (as listed in the EC Habitats Directive) developments will not be permitted unless required for reasons of human health or safety. If in exceptional circumstances development is permitted, appropriate conditions or agreed planning obligations will be used to secure adequate compensation or mitigation measures.
<b>UDP ENV 14</b>	<p><b>National sites of nature conservation importance</b></p> <p>Development likely to have an adverse effect, either directly or indirectly on the conservation value of a national nature reserve or a site of special scientific interest will not be permitted unless there is no alternative and it can be demonstrated that the benefits arising from the development clearly outweigh the special interest of the site. If development is permitted, appropriate conditions or agreed planning obligations will be used to secure adequate compensation or mitigation measures.</p>
<b>UDP ENV 15</b>	<p><b>Local sites of nature conservation significance</b></p> <p>Development and land use change likely to have an unacceptable effect on a local nature reserve, a regionally important geological / geomorphological site, or a site shown to be of importance for nature conservation will not be permitted unless the reasons for the proposal clearly outweigh the local importance of the site. If development is permitted, appropriate conditions or agreed planning obligations will be used to ensure the impact on nature conservation is minimised.</p>
<b>UDP ENV 16</b>	<p><b>Protected species</b></p> <p>Permission will only be given for development that would cause harm to or threaten the continued viability of a protected species if it can be clearly demonstrated that: There are exceptional circumstances that justify the proposals; There is no satisfactory alternative; and Effective mitigation measures are provided by the developer.</p>

<b>LAND USE/AGRICULTURE/SOILS</b>	
<b>TAN 6 (2000)</b>	<p><b>Agricultural and Rural Development</b></p> <ul style="list-style-type: none"> <li>This note mostly relates to issues such as agricultural buildings, farm diversification etc and does not specifically mention highway schemes. Paragraphs 3 to 6 discuss agricultural considerations in relation to development.</li> </ul>

	<ul style="list-style-type: none"> <li>• When planning applications, local planning authorities should consider the quality of agricultural land and other agricultural factors and seek to minimise any adverse effects on the environment.</li> <li>• Local planning authorities should bear in mind that, once land is built on, the restoration of semi-natural and natural habitats and landscape features is rarely possible and usually expensive, and archaeological and historic features cannot be replaced.</li> <li>• The National Assembly for Wales Agriculture Department classify agricultural land by grades according to the extent to which its physical or chemical characteristics impose long term limitations on agricultural use for food production. There are 5 grades of land numbered 1 to 5, with grade 3 divided into two sub-grades. The best and most versatile land falls into grades 1, 2 and sub-grade 3a and is the most flexible, productive and efficient in response to inputs.</li> <li>• The Agricultural Land Classification (ALC) map for Wales is published at a scale of 1:250,000 and provides a generalised indication of the distribution of land quality.</li> </ul>
<p><b>UDP Env 3</b></p>	<p><b>Green wedges</b></p> <p>Green wedges have been identified in order to prevent urban coalescence between and within settlements at the following locations:</p> <ol style="list-style-type: none"> <li>1. Dinas Powys and Penarth and to the south and west of Llandough;</li> <li>2. North west of sully;</li> <li>3. North and east of Wenvoe;</li> <li>4. South of Bridgend; and</li> <li><b>5. Barry, Rhoose and St Athan.</b></li> </ol> <p>Within these areas development which prejudices the open nature of the land will not be permitted.</p>
<p><b>UDP Env 1</b></p>	<p><b>Development in the countryside</b></p> <p>Within the delineated countryside permission will only be granted for:</p> <p>Development which is essential for agriculture, horticulture, forestry or other development including mineral extraction, waste management, utilities or infrastructure for which a rural location is essential; Appropriate recreational use; The re-use or adaptation of existing buildings particularly to assist the diversification of the rural economy; or Development which is approved under other policies of the plan.</p>

<b>UDP ENV 2</b>	<p><b>Agricultural land</b></p> <p>The best and most versatile agricultural land (grades 1, 2 and a) will be protected from irreversible development, save where overriding need can be demonstrated. Non-agricultural land or land of a lower quality should be used when development is proposed, unless such land has a statutory landscape, nature conservation, historic or archaeological designation which outweighs agricultural considerations.</p>
<b>UDP ENV 26</b>	<p><b>Contaminated land and unstable land</b></p> <p>Proposals for the redevelopment of contaminated land and unstable land will be permitted where the contamination and/or instability will be removed or reduced to a level where there is no unacceptable risk to the health and safety of those living or working on the site or nearby, to flora and fauna on the site or nearby, and to the quality of air and water on these sites or nearby.</p>

### PEDESTRIANS, CYCLISTS, EQUESTRIANS AND COMMUNITY EFFECTS

<b>UDP Comm 5</b>	<p><b>Retention of community facilities</b></p> <p>The retention of community facilities in rural settlements and villages will be favoured</p>
<b>UDP Rec 1</b>	<p><b>Protection of existing recreational facilities</b></p> <p>Development involving the loss of existing recreational facilities, whether in public or private ownership, will be permitted if:</p> <ul style="list-style-type: none"> <li>▪ Alternative provision of equivalent community benefit is made available or</li> <li>▪ There is an excess of such provision in the area and the facilities are not important to the character of a conservation area or the setting of the town or village.</li> </ul>
<b>UDP Rec 11</b>	<p><b>Informal public open space and country parks</b></p> <p>Land is allocated for informal public open space at:</p> <ul style="list-style-type: none"> <li>▪ Pencoedtre, Barry;</li> <li>▪ White farm, Merthyr Dyfan, Barry;</li> <li>▪ South of St. Illtyds Church, Llantwit major;</li> <li>▪ Plymouth park, Penarth; and</li> <li>▪ Rhoose point;</li> </ul>

<b>PEDESTRIANS, CYCLISTS, EQUESTRIANS AND COMMUNITY EFFECTS</b>	
	And for country park extensions at: Porthkerry, Barry; and Cosmeston, Penarth.
<b>UDP Rec 12</b>	<p><b>Public rights of way and recreational routes</b></p> <p>During the plan period, the council will maintain and improve the existing pattern of public rights of way (including bridleways). Land will be protected and provision made for the establishment of the following routes as a framework for a network of linkages for the enjoyment of the countryside.</p> <ul style="list-style-type: none"> <li>▪ Along the Odney Brook, Llantwit Major;</li> <li>▪ Along the Hoddnant, Llantwit Major;</li> <li>▪ Extension of the Penarth railway walk south west towards sully, including the provision of a cycle route;</li> <li>▪ Completion of a town trail in Barry;</li> <li>▪ Development of the disused railway line between Aberthaw / Cowbridge / Pontyclun including the provision of a cycle route;</li> <li>▪ Improvement of access to the coast at Lavernock Point, St Mary's Well Bay, Swanbridge, Sully, Rhoose Point, pleasant harbour and summerhouse point;</li> <li>▪ Development of a seascape trail linking existing footpaths to provide an unbroken right of way from the Ogmere river to Cardiff bay;</li> <li>▪ Creation of new access opportunities as part of development proposals;</li> <li>▪ Development of a footpath around Penarth head, including the provision of a cycle path; and</li> <li>▪ From the Cardiff bay barrage through Penarth haven and adjacent to the railway line, and also adjacent to the river ely.</li> </ul> <p>Where appropriate the council will favour the incorporation into these routes of bridleways, cycleways and facilities for users.</p>

## PEDESTRIANS, CYCLISTS, EQUESTRIANS AND COMMUNITY EFFECTS

<p><b>Hous 2</b></p>	<p><b>Additional residential development</b></p> <p>Housing infill, small-scale development and redevelopment which meets the criteria listed in POLICY HOUS 8 will be permitted within the settlement boundaries of the following: Urban settlements of: Barry (among a list of other settlements)</p> <p>And rural settlements of: Rhoose, St Nicholas, Bonvilston (among a list of other settlements)</p> <p>Favourable consideration will be given, other than within areas identified as green wedges, to small-scale development which constitutes the “rounding off” of the edge of settlement boundaries where it can be shown to be consistent with the provisions of POLICY HOUS 8 and particularly criterion (i).</p>
<p><b>Hous 8</b></p>	<p><b>Residential development criteria - POLICY HOUS 2 settlements</b></p> <p>Subject to the provisions of POLICY HOUS 2, development will be permitted which is within or closely related to the defined settlement boundaries provided that it meets all the following criteria:</p> <ul style="list-style-type: none"> <li>▪ The scale, form and character of the proposed development is sympathetic to the environs of the site;</li> <li>▪ The proposal has no unacceptable effect on the amenity and character of existing or neighbouring environments of noise, traffic congestion, exacerbation of parking problems or visual intrusion;</li> <li>▪ The proposal does not have an unacceptable impact on good quality agricultural land (grades 1, 2 and 3a), on areas of attractive landscape or high quality townscape or on areas of historical, archaeological or ecological importance;</li> <li>▪ When appropriate and feasible the provisions of POLICY REC 3 are met;</li> <li>▪ The provision of car parking and amenity space is in accordance with the council's approved guidelines;</li> </ul> <p>Adequate community and utility services exist, are reasonably accessible or can be readily and economically provided.</p>

## LANDSCAPE AND VISUAL IMPACT

<p><b>UDP ENV 4</b></p>	<p><b>Special landscape areas</b></p> <p>New development within or closely related to the following special landscape areas will be permitted where it can be demonstrated that it would not adversely affect landscape character, landscape features, or visual amenities for the special landscape area: 1.Ely Valley and ridge slopes 2.Lower Thaw valley 3.Upper</p>
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	Thaw valley 4. Nant Llancarfan 5. Cwrt yr Ala Basin 6. Duffryn Basin and ridge slopes 7. Castle upon Alun
<b>UDP ENV 11</b>	<p><b>Protection of landscape features</b></p> <p>Development will be permitted if it does not unacceptably affect features of importance to landscape or nature conservation including: trees, woodland, hedgerows, river corridors, ponds, stone walls and species rich grasslands.</p>
<b>UDP ENV 10</b>	<p><b>Conservation of the countryside</b></p> <p>Measures to maintain and improve the countryside, its features and resources will be favoured, particularly in the Glamorgan heritage coast, areas of high quality landscape, and areas subject to development pressure and/or conflict such as the urban fringe.</p>

<b>TRANSPORT</b>	
<b>TAN 18 (2007)</b>	<p><b>Transport</b></p> <p>This guidance note explains that local authorities must apply for planning permission for their own roads schemes and in some cases the Welsh Assembly Government should be notified. In para 3.10 and 3.11 there is specific advice for transport in rural areas. This acknowledges that transport schemes can promote social inclusion and reduce rural isolation. It advises that Development in rural locations should accords with the principles of sustainability and balance the need to support the rural economy.</p>
<b>The Transport Framework for Wales (Nov 2001)</b>	<p>Under section 6 “The Transport Strategy”, it is stated that the strategy will “help create the right conditions to enable the strategic potential of Cardiff International Airport (CIA) to reflect Wales’ business and leisure needs; and to improve access to other UK airports important to Wales.” It is also stated that, at the time of writing, the Welsh Development Agency were leading an aviation and economic opportunities group that was established by the Assembly to look at the economic potential of Cardiff International Airport (CIA). An Environment Strategy is also due to emerge from the Welsh Assembly Government.</p>
<b>Strategic Policy Guidance for SE Wales January 2000</b>	<p><b>RECOMMENDATION T2</b></p> <p>T2 where appropriate land will be allocated for the development of transportation schemes which promote the development of an integrated transport network within south east wales particularly those which:</p> <ul style="list-style-type: none"> <li>▪ Contribute to the development of the local economy;</li> </ul>

<b>TRANSPORT</b>	
	<ul style="list-style-type: none"> <li>▪ Alleviate local environmental and safety problems;</li> <li>▪ Assist regeneration strategies and initiatives.</li> </ul>
<b>Strategic Policy Guidance for SE Wales January 2000</b>	<b>RECOMMENDATION T9</b> T9 where appropriate land will be protected and provision made for the development of the strategic cycle network in south east wales. Local transport plans should include measures to increase the role of cycling and walking as a form of transport.
<b>UDP</b>	There are no policies that have particular relevance to the proposed scheme

<b>WATER ENVIRONMENT</b>	
<b>TAN 15 (2004)</b>	<b>Development and Flood Risk</b> The advice note aims to direct development away from areas that are at high risk of flooding. There is a development advice maps that classifies the degree of flood risk and there are definitions of vulnerable development and advice on permissive uses. The TAN is used for both forward planning and development control.
<b>UDP Env 7</b>	<b>Water resources</b> River, other inland waters and underground water resources will be safeguarded. Developments which improve the water environment or help to prevent flooding will be favoured. Development will be permitted where it would not: <ul style="list-style-type: none"> <li>have an unacceptable effect on the quality or quantity of water resources or on fisheries, nature or heritage conservation, recreation or other amenity interests related to such waters;</li> <li>Or Be potentially at risk from flooding, or increase the risk of flooding locally or elsewhere to an unacceptable level</li> </ul>
<b>UDP Env 29</b>	<b>Protection Of Environmental Quality</b> (as above )



GEOLOGY	
<b>TAN 5 (1996)</b>	<b>Nature Conservation and Planning</b> (as above) & The procedure for the protection of RIGS is defined.

<b>DESIGN</b>	
<b>TAN 12 (2002)</b>	<p><b>Design</b></p> <p>The advice note for design tends to be more concerned with urban design and use of space rather than road design.</p>
<b>DMRB</b>	<p><b>Design Manual for Roads and Bridges</b></p> <p>The “Design Manual for Roads and Bridges” (DMRB) was introduced in 1992 in England and Wales. It provides a comprehensive manual system which accommodating; all current standards, advice notes and other published documents relating to the design, assessment and operation of trunk roads (including motorways).</p> <p>Volume 10 of the DMRB “<i>Environmental Design</i>” provides detailed guidance on environmental mitigation for road schemes and will be used as the primary reference for environmental inputs to the scheme design.</p>
<b>UDP Env 27</b>	<p><b>Design of New Developments</b></p> <p>Proposals for new development must have full regard to the context of the local natural and built environment and its special features. New development will be permitted where it:</p> <ol style="list-style-type: none"> <li>1. Complements or enhances the local character of buildings and open spaces;</li> <li>2. Meets the council's approved standards of amenity and open space, access, car parking and servicing;</li> <li>3. Ensures adequacy or availability of utility services and adequate provision for waste management;</li> <li>4. Minimises any detrimental impact on adjacent areas;</li> <li>5. Ensures existing soft and hard landscaping features are protected and complemented by new planting, surface or boundary features;</li> <li>6. Ensures clear distinction between public and private spaces;</li> <li>7. Provides a high level of accessibility, particularly for public transport, cyclists, pedestrians and people with impaired mobility;</li> <li>8. Has regard to energy efficiency in design, layout, materials and technology; and</li> <li>9. Has regard to measures to reduce the risk and fear of crime.</li> </ol>

<b>DESIGN</b>		
<b>SPG</b>	<p>Design in the landscape contains the following guidelines:</p> <ul style="list-style-type: none"> <li>▪ DG1 SUSTAINABLE DEVELOPMENT</li> <li>▪ DG5 MITIGATION OF LARGE SCALE VISUAL DETRACTORS</li> <li>▪ DG7 ROADS - RURAL</li> <li>▪ DG11 RIVERS - MANAGEMENT AND INTEGRATION OF DEVELOPMENT</li> <li>▪ DG12 URBAN EDGE</li> <li>▪ DG13 RURAL SETTLEMENTS (1)</li> <li>▪ DG15 FARM ACCESS</li> <li>▪ DG16 WOODLANDS AND HEDGEROWS</li> <li>▪ DG17 DESIGN AND MANAGEMENT FOR NATURE CONSERVATION</li> <li>▪ DG20 PALETTE OF MATERIALS HARD - RURAL VALE</li> <li>▪ DG22 PALETTE OF MATERIALS: PLANTING - GENERAL GUIDANCE</li> <li>▪ DG23 PLANTING IN THE INLAND VALE</li> </ul>	<p><i>Other supplementary planning guidance on topics that are related to or may have an influence on design are:</i></p> <ul style="list-style-type: none"> <li>▪ Special landscape areas topic paper</li> <li>▪ Amenity standards</li> <li>▪ Supplementary planning guidance</li> <li>▪ Draft sustainable development</li> <li>▪ Supplementary planning guidance</li> <li>▪ Conservation area appraisals (various)#</li> <li>▪ Landscapes working for the vale of Glamorgan</li> </ul>

APPENDIX A-2

**BAT TREE SURVEY REPORT**

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# Bat Surveys of Trees

At

Five Mile Lane  
St Athan  
Cardiff

Version 2 (amendments)

Date: 12/10/2015

Client	TACP
Site / job	Five Mile Lane
Report title	Bat survey of trees at Five Mile Lane.
report ref	AVA/TACP/FiveMileLanetrees/2014
Local Authority	Vale of Glamorgan

version	status	changes	author	position	Date
1	draft		S Wadley	Director	18/08/2014
2	1 <sup>st</sup> final	Text & Format	S Wadley	Director	16/12/2014
3	2 <sup>nd</sup> final	Habitat map	S Wadley		12/10/2015

Name	Position	Date
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Reviewed by	J Wadley	Director	12/10/2015
Approved for issue	S Wadley	Secretary	12/10/2015
Issued by	S Wadley	Secretary	12/10/2015

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## Author

This survey and report was carried out by Mr Steve Wadley of AVA Ecology Ltd. Mr Wadley has 3 years experience of bat conservation, research and survey work. He holds a Natural England (NE) class 2 bat survey license (Number 20123667) and VBRV licence as well as a Natural Resources Wales (NRW) bat licence (58638:OTH:EPS:2014)

Mr Wadley is actively involved in woodland bat research in South East Wales (Wye Valley Bechstein's and Barbastelle bat Project) and provides educational presentations on bat conservation. He is also a qualifying member of the Chartered Institute of Ecology and Environmental Management (CIEEM) and Committee member of Gloucestershire bat group.

## Non Technical Summary

The trees inspected at five mile lane were identified as having potential for roosting bats as a result of a phase 1 extended habitat survey carried out by TACP. The categories of trees were assessed from ground level using Bat Conservation Trust (BCT) guidelines. Any trees categorised as Category 1, 1\* and 2 were then subject to an aerial survey carried out by Mr S Wadley of AVA Ecology Ltd and assisted by Mrs J Wadley (Assistant climber and trainee bat worker) Category 3 trees were not subject to aerial survey.

Generally the trees inspected by climbing offered varying potential for roosting bats but no evidence of bats was identified in any the trees during the inspection. (See results)  
However, tree 17 has high potential and is within 3m of a recorded long eared bat roost.

Although the trees have been subject to aerial inspection in August 2014, it must be remembered that tree dwelling bats can start to use trees at any time and have multiple roosting sites changing roost on average every 1.5 – 4 days. Evidence of roosting bats can be washed away by rain and wind and eaten by insects.

The trees which are given category 2, 1 or 1\* must be surveyed by climbing immediately prior to any works to ensure that bats are not present during any felling or remedial works.

## 1: Introduction

### 1.1 Site description

Five Mile Lane (A4226) runs in a general north to south direction. The road is bordered by mostly improved pasture but also some arable crop fields. Parts of the road are bordered by woodland including deciduous semi natural ancient woodland (See Phase 1 habitat survey appended).

There are several farm buildings along the road some being of older style and have good potential for bat species.

### 1.2 Proposed development

The development includes road improvements and widening of the road in some places which will necessitate the felling or pruning of some trees near to the proposed road / new route.

### 1.3 Aims of study

The objective of this study is to identify evidence of any use of the trees by bat species. The report aims to assess the level of usage, classification of roost present, and requirement for development license. It will also provide mitigation proposals to be carried out prior to, during and after the works.

## 2: Methodology

### 2.1 Desk study

A desk study was undertaken to identify any records of bats along the road and other bat roosts and activity within the route area. Records were obtained from South East Wales Biodiversity Centre (SEWBRc). The data search also included information on European and UK designated sites (e.g. Special Areas of Conservation (SACs) and Site of Special Scientific Interest (SSSIs). This information was provided by Natural Resources Wales.

### 2.2 Field surveys

The methods used were appropriate to achieve the aims of the survey following *Bat Surveys - Good Practice Guidelines* (2<sup>nd</sup> Ed; Bat Conservation Trust 2012) and BS 42020:2013 Biodiversity (Code of practice for planning and development).

The survey was carried out on the 4<sup>th</sup> August 2014 in clear weather and 19°C. Cloud cover was around 25%, wind speed 0-5mph.

The trees inspected are shown in Figures 1a-1d. The trees was inspected externally and internally (within potential roost features) using binoculars, endoscope and a high powered torch. Photographs of any evidence of bat activity and potential exit or entry points identified in the trees were taken and noted for the report.

Name	Bat Licence	Experience
Steve Wadley	51659:OTH:CSAB:2013	Experienced and licensed bat specialist.
Joanna Wadley		Experienced bat surveyor

## 3: Results

### 3.1 Desk study

The desk study resulted in the following information.

#### 3.1.1 Designated sites

Site of Special Scientific Interest

- Cliff Wood - Golden Stairs
- Coedydd Y Barri / Barry Woodlands
- East Aberthaw Coast
- Ely Valley

Local Nature Reserve

- Cliff Wood - Golden Stairs
- Cwm Talwg Woodlands



### 3.1.2 Protected species

The desk top survey identified the following bat records within the route area:

- Common Pipistrelle bat
- Noctule bat
- Nathusius bat
- Brown long eared bat
- Whiskered bat
- Serotine bat (maternity roost within 3km of trees surveyed)
- Lesser Horseshoe bat
- Greater horseshoe bat
- Whiskered / Brandts bat
- Natterers bat

### 3.2 Field survey

Tree Number	Grid Ref	Species	Category	Survey method	Notes
1	ST:08148 71376	Oak	3	Aerial	Mature tree, no potential or evidence of bats
5	ST: 08132 71133	Oak	3	Aerial	At 4m on west side of tree is a hole measuring 4cm quite shallow with no upward decay column. No evidence of bats.
17	ST:08030 70430 (metallic tag no. 1075)	Ash	1*	Aerial	At 6m on south side of tree is a west facing hole 7cm x 20cm key shaped, extends vertically to .5m, No evidence of bats but cat 1* potential.
18	ST:08034 70292	Mixed	3	Aerial	Hedgerow with several trees inc. Ash, Oak and Hawthorne. No bat potential in any of the trees.
22	(3 trees) a) ST: 08572 69588 b) ST: 08333 69742 c) ST: 08378 69700	Oaks	1 1 1	Aerial	a) Hollow tree with potential features but no evidence of bats. b) Potential features but no evidence of bats c) No evidence but good potential features.
23	ST: 08547 69576 ST: 08558 69575	Oak	1 & 3	Aerial	a) No evidence of bats, Hollow tree. Good potential Cat 1 b) No evidence of bats very limited potential Cat 3
26	ST: 08048 71562	Mixed	?	?	<b>No access allowed</b>
26a	ST: 08048 71562	Oak	?	?	<b>No access allowed</b>
32	ST: 07891 72626	Oak	3	Aerial	No evidence of bats and very limited potential.

## 4: Assessment

### 4.1 Survey constraints (Inc. equipment)

Trees 26 and 26a were not surveyed due to access issues. However from the nearby road it was possible to see the trees had a good potential for bat roosting.

### 4.2 Potential impacts

#### 4.2.1 Designated sites

In the absence of further survey and mitigation the proposed development would have a no potential impact on designated sites. This is because of the distance to the sites and no bat roosts being discovered during the survey.

#### 4.2 Bat roosts

In the absence of further survey and mitigation the proposed development would have a medium to high potential impact on bat roosts. This is due to the fact that bats may start to use the trees prior to works starting.

#### 4.2.3 Bat foraging and commuting habitat

In the absence of further survey or mitigation the proposed development would have a low potential impact on bat foraging and commuting routes. This is due to the possibility that bats may use the trees for foraging.

## 5: Legislation and policy guidance

This legislation must be considered at all stages of development.

All bat species occurring in the UK are fully protected by European and UK law.

### **Under regulation 41 of the Conservation of Habitats and Species Regulations 2010 (as amended)**

(1) A person who—

- (A) Deliberately captures, injures or kills any wild animal of a European protected species,
  - (b) Deliberately disturbs wild animals of any such species,
  - (c) Deliberately takes or destroys the eggs of such an animal, or
  - (d) Damages or destroys a breeding site or resting place of such an animal,
- is guilty of an offence.

### **Under the Wildlife and Countryside Act 1981 (as amended) it is an offence to:**

- Intentionally or recklessly damage, destroy or obstruct access to any structure or place used by bats for shelter or protection.
- Intentionally or recklessly disturb bats whilst in their place of rest or shelter.
- Sell or advertise for sale or transport bats (including their derivatives).

### **The Countryside and Rights of Way Act 2000 (CRoW)**

The Act places a duty on Government Departments and the National Assembly for Wales to have regard for the conservation of biodiversity and maintain lists of species and habitats for which conservation steps should be taken or promoted, in accordance with the Convention on Biological Diversity.

Schedule 9 of the Act amends SSSI provisions of the Wildlife and Countryside Act 1981 including provisions to change SSSIs and providing increased powers for their protection and management. The provisions extend powers for entering into management agreements; place a duty on public bodies to further the conservation and enhancement of SSSIs; increases penalties on conviction where the provisions are breached; and introduce a new offence whereby third parties can be convicted for damaging SSSIs. To ensure compliance with the Human Rights Act 1998, appeal processes are introduced with regards to the notification, management and protection of SSSIs.

Schedule 12 of the Act amends the species provisions of the Wildlife and Countryside Act 1981, strengthening the legal protection for threatened species. The provisions make certain offences 'arrestable', create a new offence of reckless disturbance, confer greater powers to police and wildlife inspectors for entering premises and obtaining wildlife tissue samples for DNA analysis, and enable heavier penalties on conviction of wildlife offences.

### **Planning Policy Advice**

#### **Planning Policy Wales Chapter 5 “Conserving and Improving Natural Heritage and the Coast”**

The Welsh Government’s objectives for the conservation and improvement of the natural heritage are to:

- promote the conservation of landscape and biodiversity, in particular the conservation of native wildlife and habitats;
- ensure that action in Wales contributes to meeting international responsibilities and obligations for the natural environment;
- ensure that statutorily designated sites are properly protected and managed;
- safeguard protected species, and to
- promote the functions and benefits of soils; and in particular their function as a carbon store.

#### **The UK Biodiversity Action Plan (UKBAP) includes objectives to conserve, and, where practicable, enhance:**

- The quality and range of wildlife habitats and ecosystems;
- The overall populations and natural ranges of native species;
- Internationally important and threatened species, habitats and ecosystems;
- Species, habitats and natural and managed ecosystems characteristic of local areas
- Biodiversity of natural and semi-natural habitats where this has been diminished over recent decades.

The Welsh Government is committed to promoting Habitat and Species Action Plans relevant to Wales prepared under the UKBAP in fulfilment of its obligations under the Countryside and Rights of Way Act.

#### **Protected species**

The presence of a species protected under European or UK legislation is a material consideration when a local planning authority is considering a development proposal which, if carried out, would be likely to result in disturbance or harm to the species or its habitat. Local planning authorities should advise anyone submitting a planning application that they must conform to any statutory species protection provisions affecting the site concerned, and should consult Natural Resources Wales before granting permission. An ecological survey to confirm whether a protected species is present and an assessment of the likely impact of the development on a protected species may be required in order to inform the planning decision.

Developments are always subject to the legislation covering European protected species regardless of whether or not they are within a designated site. New developments for which development works would contravene the protection afforded to European protected species require derogations from the provisions of the Habitats Directive.

Derogations may only be authorised if there is no satisfactory alternative and if the action authorised will not be detrimental to the maintenance of the population of the species concerned at a favourable conservation status in its natural range. The development works to be authorised must be for the purposes of preserving 'public health or safety, or for other imperative reasons of overriding public interest, including those of a social or economic nature and beneficial consequences of primary importance for the environment.

Derogations are granted by a licence issued by the Welsh Government Local planning authorities are under a duty to have regard to the requirements of the Habitats Directive in exercising their functions. To avoid developments with planning permission subsequently not being granted derogations in relation to European protected species, planning authorities should take the above three requirements for derogation into account when considering development proposals where a European protected species is present.

## **6: Recommendations and Mitigation Measures**

### **6.1 Mitigation proposals**

The mitigation proposals for the development are as follows:

- a) A bat licensed ecologist must carry out an aerial re-inspection of those trees categorised as Category 1 or 1\* immediately prior to works commencing and be employed to be on site during any tree works to category 1 trees.
- b) A toolbox talk regarding bats must be given to the tree work contractors by the onsite ecologist.
- c) The client must ensure that the contractors are aware that no trees must be subject to works until the ecologist has given the toolbox talk.
- d) If bats are discovered during works, NRW must be informed. Work must stop and not resume until advice has been given by the onsite ecologist. The ecologist must have the necessary equipment to care for any discovered bat(s) and a method statement regarding actions on discovering bats must be in place prior to works commencing.
- e) Bright lighting must not be directed to towards the trees identified as having potential for roosting bats.

### **6.2 Further survey**

Further survey was deemed to be necessary to ensure bats are not harmed as a result of the development. This should include the surveys detailed in 6.1.a.

### **6.3 Requirement for licence.**

A European protected species licence was deemed not necessary at this stage but if bats are discovered in the trees between the date of survey and start of works or during works, then a licence will be required.

If required, an EPS Licence will only be issued if the following 3 tests have been met:

- The purpose of the work is for preserving public health or public safety or other imperative reasons of over-riding public interest including those of a social or economic nature and beneficial consequences of primary importance for the environment
- There is no satisfactory alternative
- The action authorised will not be detrimental to the maintenance of the population of the species concerned at a favourable conservation status (FCS) in their natural range

## 7: Photographs



1) Tree 17 (category 1 tree)



2) Tree 17



3) Tree 32 and a shallow hole.



4) Tree 32



5) Tree 22a Hollow oak with high potential.

## **8: References**

Bat Surveys - Good Practice Guidelines 2012. Hundt, L. Bat Conservation Trust, London.

The bat workers' manual (3rd Edition). Joint Nature Conservation Committee  
Mitchell-Jones, A.J. & McLeish, A.P. (2004)

Bat mitigation guidelines. English Nature. Mitchell-Jones, A.J. (2004)

Bats and lighting. A. Fure (London Naturalist No. 85 2006)

South East Wales Biological Records Centre (SEWBReC) (bat records)

The Conservation of Habitats and Species Regulations 2010 (as amended)

The Wildlife and Countryside Act 1981 (as amended)

Tan 5 Planning Policy in Wales


Figures 1a-1d. Trees inspected for bats (see also the Table in Section 3.2).





**Legend**

- Locations of Bat trees surveyed
- Proposed Scheme



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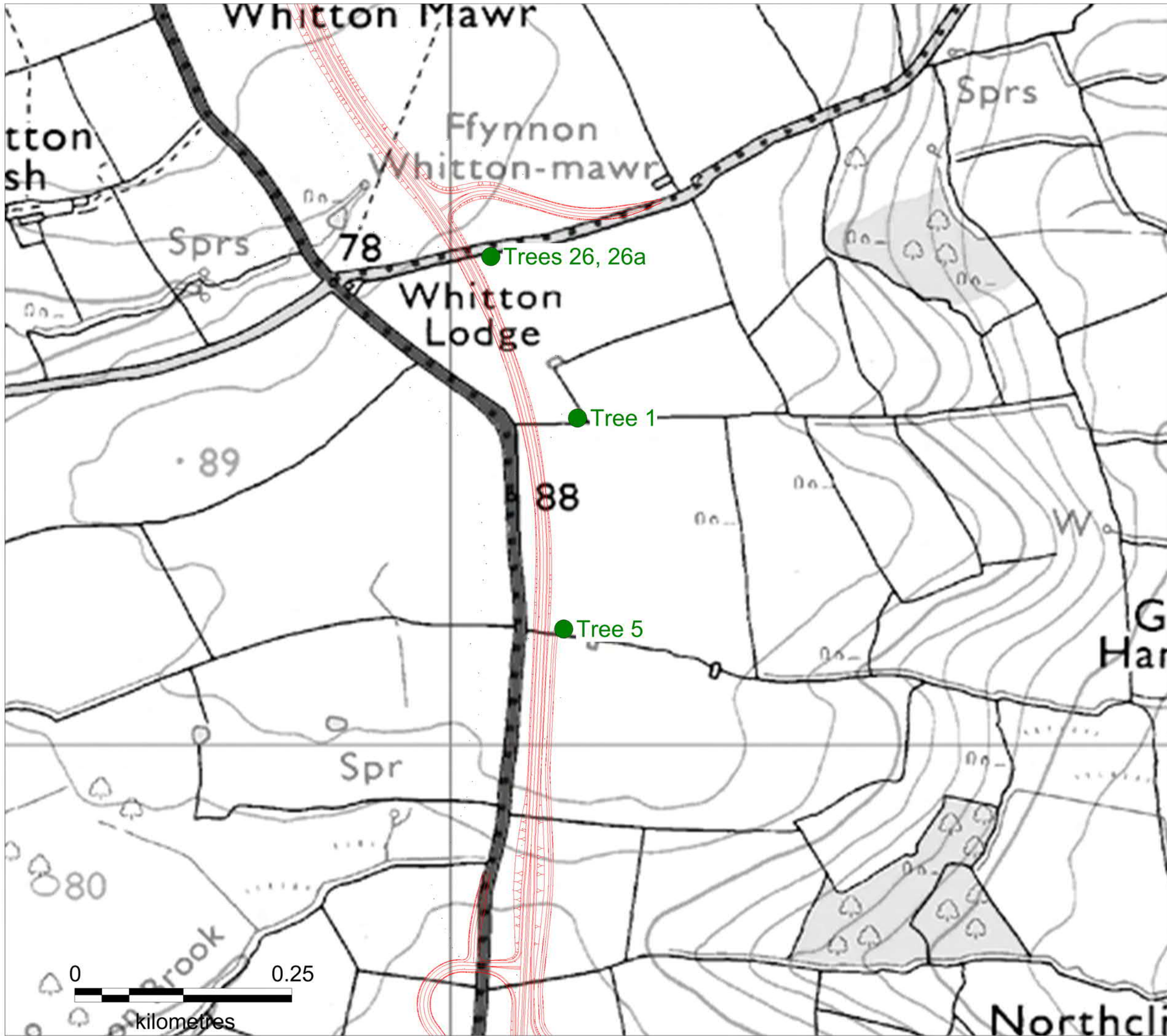
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**Vale of Glamorgan  
A4226 Five Mile Lane Improvements  
Bat Tree Survey**


○ DRAWN JB	○ CHECKED TR	○ OFFICE : CARDIFF
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<b>FIGURE / DRAWING NO.</b> 60654_BT001	<b>REV</b> 0
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- Legend**
- Locations of Bat trees surveyed
  - Proposed Scheme



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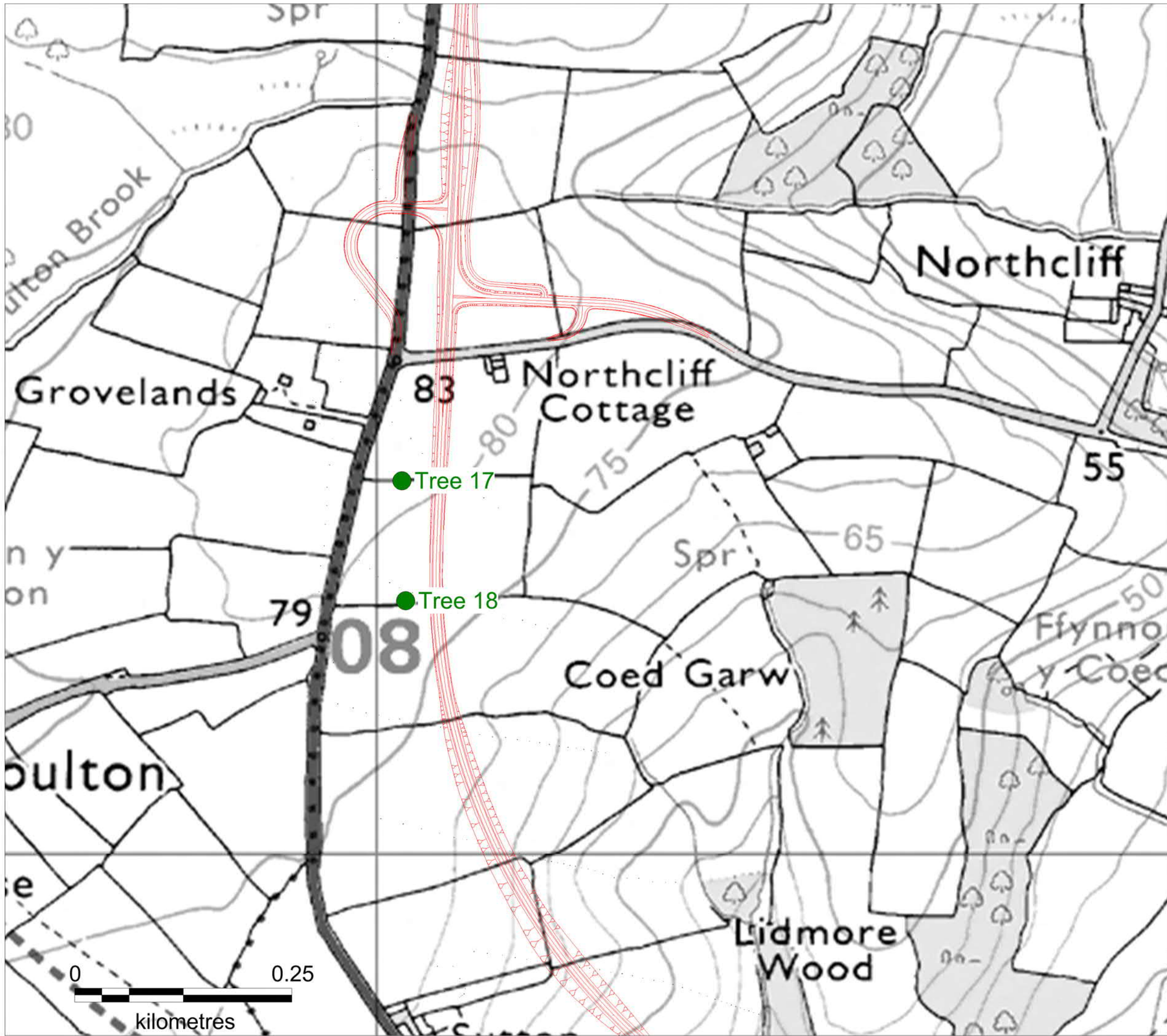
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- Legend**
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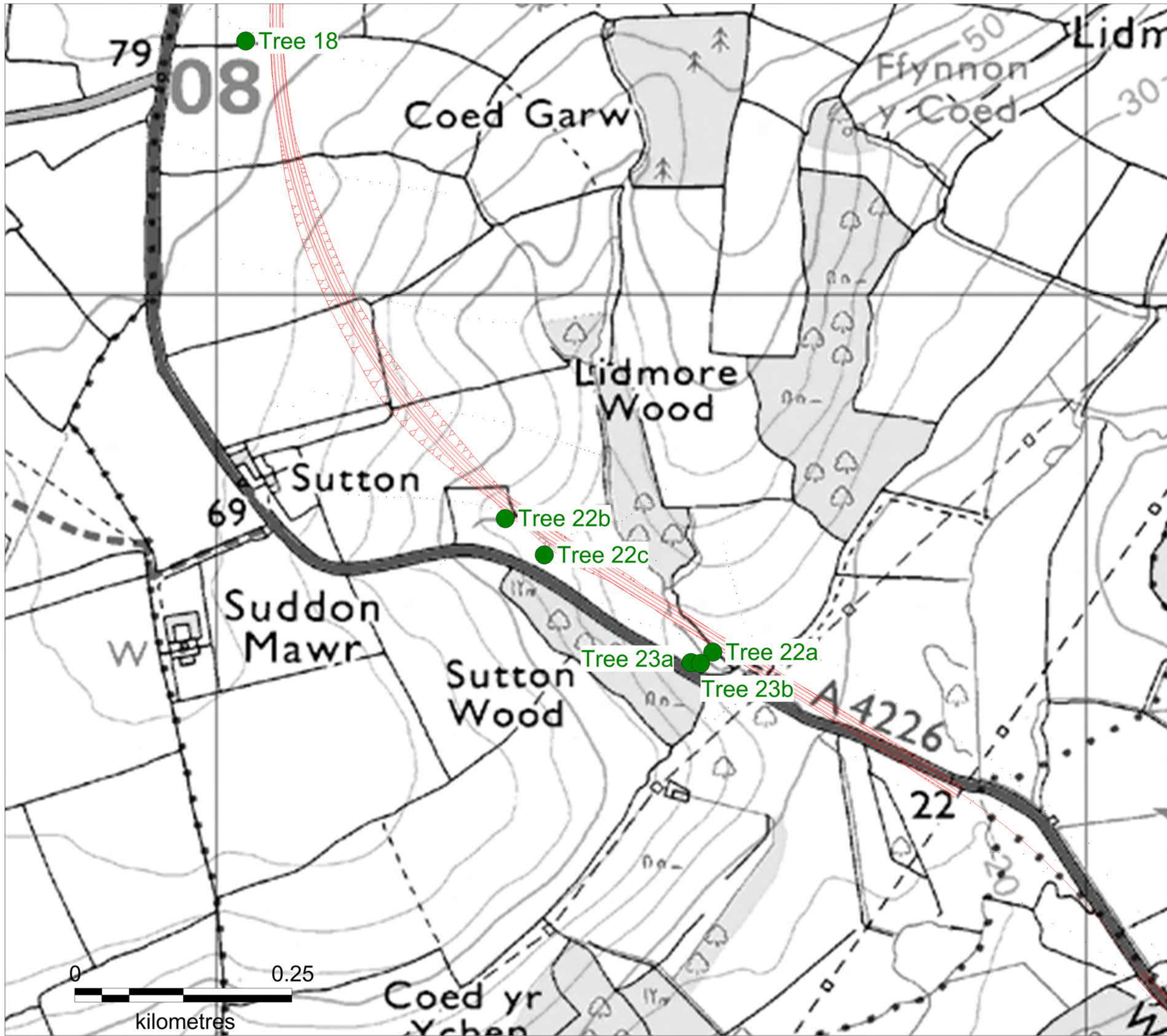
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**Legend**

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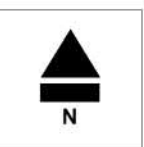
# Appendix B

**FIGURE 1**



**Legend**

- Transect Locations
- Proposed Scheme



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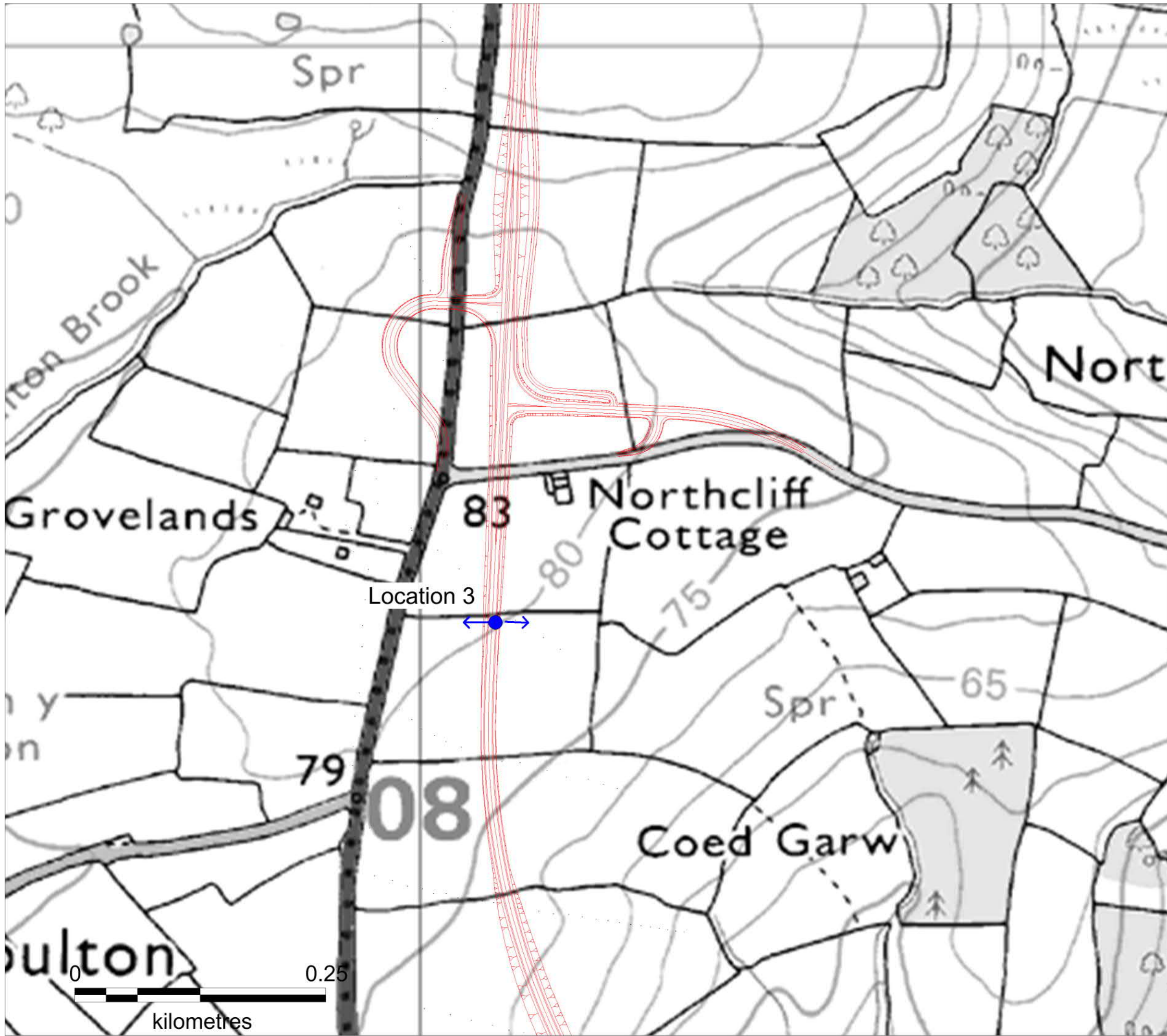
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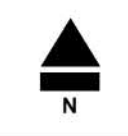
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**Legend**

- Transect Locations
- Proposed Scheme



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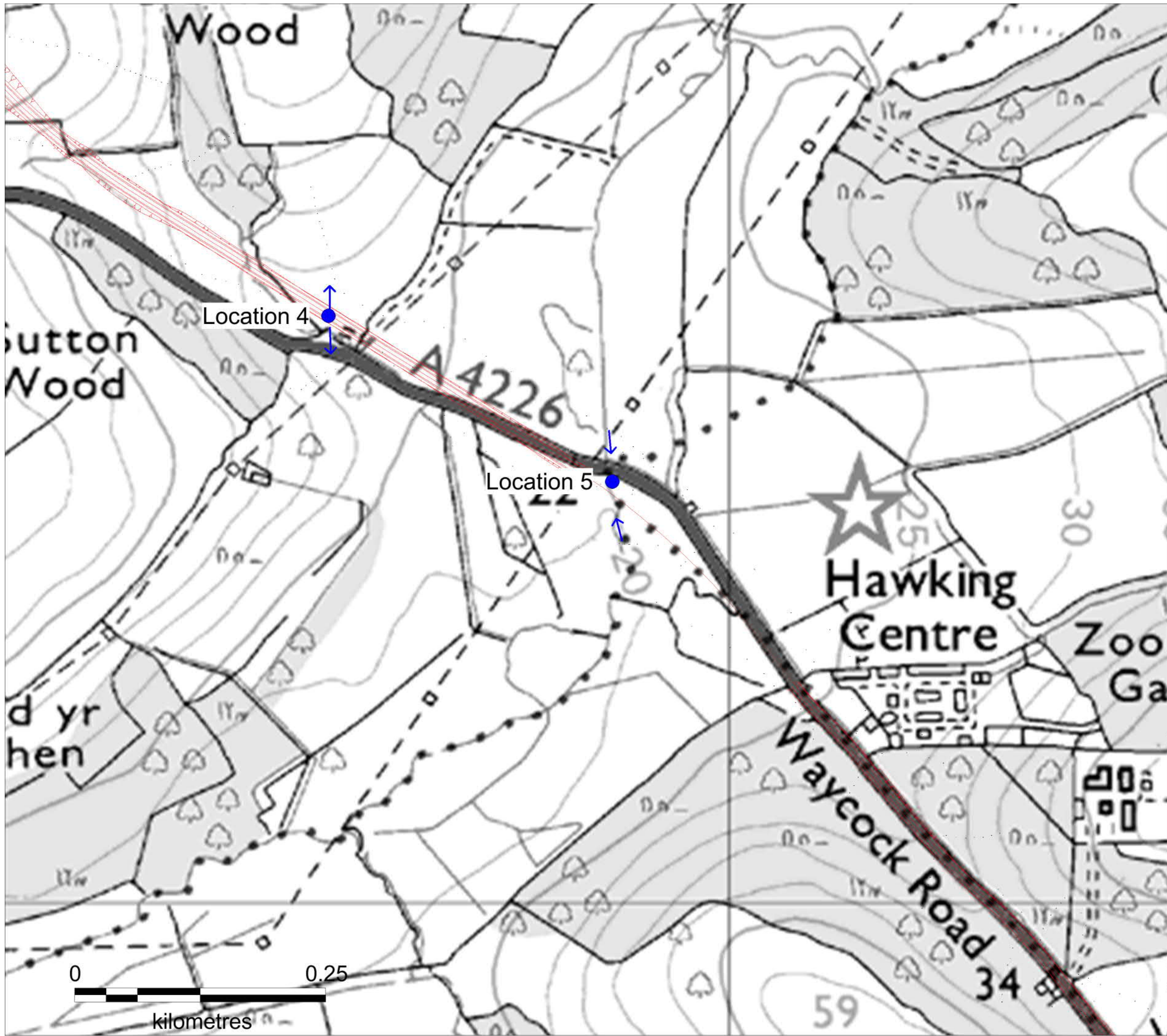
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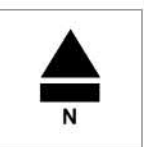
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**Legend**

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APPENDIX B-3

**BREEDING BIRD ASSESSMENT 2016**

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# FIVE MILE LANE IMPROVEMENTS

BREEDING BIRD ASSESSMENT 2016

CONFIDENTIAL

OCTOBER 2016

**FIVE MILE LANE  
IMPROVEMENTS**  
BREEDING BIRD ASSESSMENT  
**Vale of Glamorgan**

**Type of document (version)**  
**Confidential**

Project no: 70021703  
Date: October 2016

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# QUALITY MANAGEMENT

ISSUE/REVISION	FIRST ISSUE	REVISION 1	REVISION 2	REVISION 3
Remarks		Update following comments from VoG		
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Prepared by	Jean Hamilton (TACP)	Jean Hamilton (TACP)		
Signature				
Checked by	Marc Thomas	Marc Thomas		
Signature				
Authorised by	Marc Thomas	Marc Thomas		
Signature				
Project number	70021703	70021703		
Report number				
File reference				

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## APPENDICES

### **A P P E N D I X A BREEDING BIRD SURVEY REPORT**

APPENDIX A-1 BREEDING BIRD SURVEY REPORT

### **A P P E N D I X B FIGURES**

APPENDIX B-1 FIGURE 1 – LOCATIONS OF KEY SPECIES EXHIBITING BREEDING BEHAVIOUR

APPENDIX B-2 FIGURE 2 – POTENTIAL SKYLARK MITIGATION AREAS

# 1 INTRODUCTION

## 1.1 BACKGROUND AND PURPOSE OF THIS REPORT

The Vale of Glamorgan submitted a planning application for improvements at Five Mile Lane, Barry (Planning Ref 2016/00305/RG3), which included an Environmental Statement outlining the potential environmental impacts of the Scheme and the mitigation measures proposed to minimise such impacts. A series of ecological surveys was carried out in 2014 in order to inform this assessment, but due to time constraints, a breeding bird survey was not carried out at that time. In order to adequately assess the impacts of the Scheme on breeding birds, a breeding bird survey was carried out at the appropriate time of the year in 2014.

This report outlines the main findings of the survey, assesses the potential impacts of the Scheme on the bird species identified and the appropriateness of the mitigation already designed for breeding birds (as outlined in the ES). Additional mitigation is proposed for certain species.

# 2 PREVIOUS SURVEY INFORMATION

## SEWBREC DATA

The SEWBReC data search results supplied contained 962 avian records. Most were flight records of species of low conservation value which are both common and widespread in the local area. Notable records with potential relevance to the scheme included;

- Five records collected between 2009 and 2014 of Yellowhammer in a 1km square containing the village of Moulton;
- Four records collected between 2009 and 2014 of Skylark;
- A single record from 2014 of Northern Wheatear; and
- Nine records collected between 2009 and 2014 of Northern Lapwing in the general areas around Moulton, with five confirmed breeding records in the same period.

## BREEDING BIRD SURVEYS CONDUCTED BY SOLTYS BREWSTER IN 2008

The bird species recorded within the study area during the 2008 breeding bird surveys conducted by Soltys-Brewster and other surveys carried out for the Scheme are listed in Table 1. The conservation status of each species is also presented (including BOCC Status, EU Birds Directive Annex 1, WCA Schedule 1, UK BAP, NERC Section 42 and VoG BAP). Bird species of conservation concern (i.e. those that are Red-listed and/or are listed under Annex I of EU Birds Directive / Schedule I of the WCA / priority species of UK BAP/Section 42/VoG) are highlighted in bold and discussed below.

Incidental records of several of the species listed in Table 1 were noted during the 2014 surveys conducted by TACP, including the red-listed species yellowhammer and skylark.

**Table 1: Bird Species Recorded within the survey corridor in 2008 surveys and their Conservation/Protection Status**

Species	BOCC Status	EU Birds Directive Annex I	WCA Schedule I	UK BAP Species	Section 42 Species	VoG Priority Species
Blackbird ( <i>Turdus merula</i> )	Green	No	No	No	No	No
Blue tit ( <i>Cyanistes caeruleus</i> )	Green	No	No	No	No	No
Buzzard ( <i>Buteo buteo</i> )	Green	No	No	No	No	No
Carrion crow ( <i>Corvus corone</i> )	Green	No	No	No	No	No
Chiffchaff ( <i>Phylloscopus collybita</i> )	Green	No	No	No	No	No
Collared dove ( <i>Streptopelia decaocto</i> )	Green	No	No	No	No	No
Coal tit ( <i>Parus ater</i> )	Green	No	No	No	No	No
<b>Dunnock (<i>Prunella modularis</i>)</b>	<b>Amber</b>	<b>No</b>	<b>No</b>	<b>Yes</b>	<b>Yes</b>	<b>No</b>
Goldfinch ( <i>Carduelis carduelis</i> )	Green	No	No	<b>No</b>	No	No
Great tit ( <i>Parus major</i> )	Green	No	No	No	No	No
<b>Herring gull (<i>Larus argentatus</i>)</b>	<b>Red</b>	<b>No</b>	<b>No</b>	<b>Yes</b>	<b>Yes</b>	<b>No</b>
<b>House sparrow (<i>Passer domesticus</i>)</b>	<b>Red</b>	<b>No</b>	<b>No</b>	<b>Yes</b>	<b>Yes</b>	<b>No</b>
Jackdaw ( <i>Corvus monedula</i> )	Green	No	No	No	No	No
<b>Kingfisher (<i>Alcedo atthis</i>)</b>	<b>Amber</b>	<b>Yes</b>	<b>Yes</b>	<b>No</b>	<b>No</b>	<b>No</b>
<b>Linnet (<i>Carduelis cannabina</i>)</b>	<b>Red</b>	<b>No</b>	<b>No</b>	<b>Yes</b>	<b>Yes</b>	<b>No</b>
Nuthatch ( <i>Sitta europaea</i> )	Green	No	No	No	No	No
Meadow pipit ( <i>Anthus pratensis</i> )	Amber	No	No	No	No	No
Pheasant ( <i>Phasianus colchicus</i> )	N/A	No	No	No	No	No
Robin ( <i>Erithacus rubecula</i> )	Green	No	No	No	No	No
<b>Skylark (<i>Alda arvensis</i>)</b>	<b>Red</b>	<b>No</b>	<b>No</b>	<b>Yes</b>	<b>Yes</b>	<b>Yes</b>
<b>Song thrush (<i>Turdus philomelos</i>)</b>	<b>Red</b>	<b>No</b>	<b>No</b>	<b>Yes</b>	<b>Yes</b>	<b>Yes</b>
<b>Starling (<i>Sturnus vulgaris</i>)</b>	<b>Red</b>	<b>No</b>	<b>No</b>	<b>Yes</b>	<b>Yes</b>	<b>No</b>
Swallow ( <i>Hirundo rustica</i> )	Amber	No	No	No	No	No
Swift ( <i>Apus apus</i> )	Amber	No	No	No	No	No
Tawny owl ( <i>Strix aluco</i> )	Green	No	No	No	No	No
Wood pigeon ( <i>Columba palumbus</i> )	Green	No	No	No	No	No
Whitethroat ( <i>Sylvia communis</i> )	Amber	No	No	No	No	No
<b>Yellowhammer (<i>Emberiza citrinella</i>)</b>	<b>Red</b>	<b>No</b>	<b>No</b>	<b>Yes</b>	<b>No</b>	<b>No</b>

## 3 METHODS USED DURING 2016 SURVEYS

The Breeding Bird Survey was undertaken in 2016 and a modified version of the 'Common Bird Census' methodology (Bibby et al, 2000) was employed. This method was chosen as it records specific avian activity on site, from which the probability of birds breeding can be meaningfully assessed, and specific breeding territories for individual pairs can be estimated if required. This can assist considerably with identifying particularly sensitive areas of the site, and also enables more precise recommendations for management work to be made if appropriate.

A total of four site visits were conducted between April and June 2016, including a reconnaissance visit conducted in April.

Full details of the methods used in the surveys are provided in the Breeding Bird Survey Report, provided as Appendix A to this document.

## 4 SUMMARY OF THE RESULTS OF 2016 BREEDING BIRD SURVEYS

Full details of the results of the 2016 breeding bird surveys are provided in Appendix A and are summarised below.

A total of 44 bird species were identified during the course of the survey. On the basis of observations made, 19 species were confirmed to be breeding within the study area, with an additional 14 species probably breeding (but where breeding could not be confirmed), and a further 8 species were seen exhibiting behaviours suggesting possible breeding. Whilst the majority of the bird species using the site for breeding are common and widespread in the local area, some were of notable conservation significance.

Maps showing the locations of key species exhibiting breeding behaviour and an approximate indication of the areas likely to be used for breeding are provided in Figure 1 in Appendix B-1.

### 4.1 SCHEDULE 1 BIRDS

Birds on Schedule 1 of the Wildlife and Countryside Act require special attention as they are afforded a greater degree of attention than other bird species, and there is a greater burden of proof required to prove that any reckless disturbance of nesting individuals could not have been reasonably avoided.

No Schedule 1 birds were noted during the breeding bird survey.



## 4.2 RED LISTED BIRDS

Birds on the UK Red List include species that are globally threatened and / or where there has been a long term historical population decline or range contraction within the UK. See Eaton et al (2009) for full background and definitions in respect of avian Red Listing criteria.

Ten Red Listed species were recorded during the survey: Grey Wagtail, Herring Gull, House Sparrow, Starling, Linnet, Northern Lapwing, Skylark, Song Thrush, Spotted Flycatcher, and Yellowhammer. Of these, Northern Lapwing, Skylark, Song Thrush and Yellowhammer were confirmed to be breeding within the study area. Linnet is probably breeding in the northern part of the study area, potentially within the footprint of the Scheme. Starling is probably breeding in at least one location (Blackland Farm) and probably other locations within the study area too. Starlings are most likely to be nesting within buildings and, therefore, outside the footprint of the scheme.

Most of the species recorded in the 2016 surveys had previously been recorded within the study area in 2008 surveys conducted by Soltys Brewster. Red listed species not recorded in the 2008 surveys but recorded in 2016 were Northern Lapwing, Grey Wagtail and Spotted Flycatcher.

## 4.3 AMBER LISTED BIRDS

Birds on the UK Amber List include species that have an unfavourable conservation status in Europe, and / or where there has been a long term historical population decline, which is now recovering. Other criteria for inclusion on the Amber List include a moderate decline in UK population size, or range contraction, or where the UK breeding or non-breeding population is significant at a European scale. See Eaton et al (2009) for full background and definitions in respect of avian Amber Listing criteria.

Nine Amber Listed species were recorded during the survey: Barn Swallow, Dunnock, House Martin, Lesser Black-Backed Gull, Mallard, Meadow Pipit, Common Swift, Whitethroat and Willow Warbler. Of these, Dunnock, Whitethroat and Willow Warbler were confirmed to be breeding both within the study area and within hedgerows within the footprint of the Scheme. Barn Swallow is probably breeding within the study area, most likely in buildings outside the footprint of the Scheme. Meadow Pipit is probably breeding within the footprint of the scheme within grassland and arable crop areas.

Of the Amber listed species recorded during the 2016 survey, four species had not been previously recorded within the study area: House Martin, Lesser Black-Backed Gull, Mallard and Willow Warbler.

## 4.4 SECTION 42 SPECIES

The following breeding birds listed, as species of principal species of importance for conservation of biological diversity in Wales, were found within the study area; Dunnock, House Sparrow, Northern Lapwing, Skylark, Song Thrush, and Yellow Hammer with Linnet and Starling also listed, and probably breeding.

## 4.5 MAIN AREAS OF AVIAN ACTIVITY

Although most parts of the site appeared to be used by foraging birds, and many parts by breeding birds, there were areas that appeared to be used more frequently than others. The most frequently used habitats by breeding birds were the woodland areas either side of the existing road at the south part of the site, hedgerows throughout the site, and agricultural fields and grass leys on either side of the existing road, north of Sutton Fach Farm.

To address the request for additional information on ground-nesting birds and Yellowhammer from the Local Planning Authority Ecologist, four maps have been provided with this report showing the general areas where these species were seen exhibiting territorial behaviour (Lapwing Skylark and Yellowhammer territories in Figure 1 in Appendix B-1).

## 5 VALUATION OF BIRD POPULATION WITHIN THE STUDY AREA

Bird species recorded within the Study Area during the 2008 surveys were given a geographical valuation, based in CIEEM guidance (see Table 2). The valuations of these species has not changed due to the 2016 survey results.

The valuation of bird species recorded in the 2016 and not recorded in 2008 is provided in Table 3.

**Table 2: Birds Recorded within the Study Area in 2008 Surveys, Evaluation, and Selection as Key Ecological Receptors in Environmental Statement**

Ecological Receptor	Valuation of Receptor	Selection as Key Ecological Receptor Y/N
Skylark	Skylark is a Priority species under the Vale of Glamorgan BAP. As skylark regularly occur within the study area in large numbers, the population within the study area is considered to be of County importance.	Yes
Song thrush	This species was also noted within the study area and is a Vale of Glamorgan BAP Priority species. As no information is available on the numbers of song thrush within the study area, a precautionary approach is taken in assigning it a value of County importance.	Yes
Yellowhammer	Yellowhammer is a red-listed species which is also listed as a Priority species under the UK BAP. This species was recorded on a number of occasions during surveys conducted for the Scheme, and so is considered to have a local stronghold in the area. This population is therefore considered to be of County importance.	Yes
Kingfisher	Kingfisher is listed on Schedule 1 of the WCA and is also an EU Birds Directive Annex I species. Given its conservation and legal status, the presence of even one individual within the Scheme corridor is considered to be of County importance.	Yes
Other breeding birds	Other breeding birds recorded within the study area are either common and widespread species in the UK, or occur in low numbers within the study area. They are therefore considered to be of Local importance.	Yes

**Table 3: Additional Bird Species Recorded within the Study Area in 2016 Surveys, Evaluation, and Selection as Key Ecological Receptors**

Ecological Receptor	Valuation of Receptor	Selection as Key Ecological Receptor Y/N
Northern Lapwing	This species is a Priority species under the Vale of Glamorgan BAP and is red-listed in Wales. Lapwing were recorded displaying breeding behaviour in a field approximately 200m from the Scheme. There are also historical records of large wintering populations within a 1km radius of the Scheme. This species is therefore considered to be of County Importance for both breeding and wintering populations.	Yes
Grey Wagtail	Grey wagtail is red-listed in Wales but is not a UK BAP, Section 42 or Schedule 1 species. This species is therefore considered to be of Local Importance.	Yes
Spotted Flycatcher	The spotted flycatcher is red-listed in Wales but is not a UK BAP, Section 42 or Schedule 1 species. This species is therefore considered to be of Local Importance.	Yes
Amber-listed birds	House Martin, Lesser Black-Backed Gull, Mallard and Willow Warbler were all recorded within the study area. These species are all amber-listed in Wales but are not UK BAP, Section 42 or Schedule 1 species. These species are therefore considered to be of Local Importance.	Yes

# 6

## IMPACT CHARACTERISATION

The potential impacts of the Scheme on breeding birds are set out in Table 4 (Construction Phase impacts) and Table 5 (Operation Phase impacts). These tables are taken from the ES for the Scheme and any changes as a result of the 2016 surveys are highlighted in red.

**Table 4: Construction Phase Impacts on Breeding Birds**

Key Ecological Receptor	Nature Conservation Value	Description of Impact	Magnitude of Impact	Significance of Impact
Skylark	County Importance	Damage or destruction of active nests/eggs/dependant young during site clearance/construction works within arable fields/field margins.	Medium Adverse	Moderate Adverse
		<p>Some areas of arable fields (6.8ha in total) will be lost under the footprint of the Scheme. Arable fields and their associated field margins represent important feeding and breeding habitat for this species. Areas most affected are as follows:</p> <p><u>Whitton Mawr</u>: a field of 20 ha in total, with an average of 5 skylark recorded per visit (0.25/ha). The Scheme passes through the middle of this field, so this whole area will effectively be lost as a breeding site due to disturbance impact.</p> <p><u>Coed Garw</u>: Field of 10ha, with an average of 6 skylark recorded per visit (0.6/ha). Scheme passes through the middle of this field, so this whole area will effectively be lost due to disturbance impact.</p>	Medium Adverse	Moderate Adverse
Northern Lapwing	County Importance	Damage or destruction of active nests/eggs/dependant young during site clearance/construction works within arable fields.	Medium Adverse	Moderate Adverse
		Disturbance to wintering lapwing; though no wintering birds survey has been carried out, there are historical records of large populations of wintering lapwing within a 1km radius of the Scheme. In the absence of further survey information, this impact is moderate adverse.	Medium Adverse	Moderate Adverse
		Some small areas of arable fields will be lost under the footprint of the Scheme. Arable fields and their associated field margins represent important feeding and breeding habitat for this species.	Medium Adverse	Moderate Adverse
Song thrush	County Importance	Damage or destruction of active nests/eggs/dependant young during site clearance works in areas with thick vegetation.	Medium Adverse	Moderate Adverse
		Loss of breeding habitat (hedgerows, woodland and scrub) during site clearance works, including foraging habitat within territories for breeding pairs. NOTE: Only very small areas of suitable breeding bird habitat will be lost under the footprint of the road, and this has been taken into account in determining the severity of this impact.	Low Adverse	Slight Adverse

Key Ecological Receptor	Nature Conservation Value	Description of Impact	Magnitude of Impact	Significance of Impact
Yellowhammer	County Importance	Damage or destruction of active nests/eggs/dependant young during site clearance works in areas with thick vegetation.	Medium Adverse	Moderate Adverse
		Loss of breeding habitat (hedgerows) during site clearance works, including foraging habitat within territories for breeding pairs. NOTE: Only very small areas of suitable breeding bird habitat will be lost under the footprint of the road, and this has been taken into account in determining the severity of this impact.	Low Adverse	Slight Adverse
		Some small areas of arable fields will be lost under the footprint of the Scheme. Arable fields and their associated field margins represent important feeding habitat for this species. NOTE: The surrounding area contains abundant arable fields suitable for this species, and this has been taken into account in determining the severity of this impact.	Low Adverse	Slight Adverse
Kingfisher	County Importance	Pollution of the River Waycock may result in indirect impacts through fish kills which would reduce the food resource for kingfisher.	Low Adverse	Slight Adverse
		Construction works in the vicinity of the River Waycock may cause disturbance to kingfisher.	Low Adverse	Slight Adverse
Other breeding birds	Local Importance	Damage or destruction of active nests/eggs/dependant young during site clearance works.	Low Adverse	Slight Adverse
		Loss of breeding bird habitat during site clearance works, including foraging habitat within territories for breeding pairs.	Low Adverse	Slight Adverse
		Disturbance of birds during construction works will deter birds from nesting near the site. However, there is abundant suitable habitat (in the form of hedgerows, woodland and scrub) in the surrounding area.	Low Adverse	Slight Adverse

**Table 5: Operation Phase Impacts on Breeding Birds**

Key Ecological Receptor	Nature Conservation Value	Description of Impact	Magnitude of Impact	Significance of Impact
Skylark	County Importance	Reduction in area of arable field habitat available for feeding and breeding, particularly at the following locations: <u>Whitton Mawr</u> : a field of 20 ha in total, with an average of 5 skylark recorded per visit (0.25/ha). The Scheme passes through the middle of this field, so this whole area will effectively be lost as a breeding site due to disturbance impact. <u>Coed Garw</u> : Field of 10ha, with an average of 6 skylark recorded per visit (0.6/ha). Scheme passes through the middle of this field, so this whole area will effectively be lost due to disturbance impact.	Medium Adverse	Moderate Adverse
Northern Lapwing	County Importance	Slight reduction in area of arable field habitat available for feeding. No areas directly affected by the Scheme were found to have breeding lapwing; the nearest sighting of lapwing was approximately 200m from the Scheme.	Low Adverse	Slight Adverse
		Increase in noise as a result of the Scheme may deter birds from nesting in the area.	Low Adverse	Slight Adverse
Song thrush	County Importance	Planting scheme will result in a net increase in the total lengths of hedgerows (an important feeding and breeding habitat for this species) within the study area.	Low Beneficial	Slight Beneficial
Yellowhammer	County Importance	Slight reduction in area of arable field habitat available for feeding. NOTE: The surrounding area contains abundant arable fields suitable for this species, and this has been taken into account in determining the severity of this impact.	Low Adverse	Slight Adverse
		Planting scheme will result in a net increase in the total lengths of hedgerows (an important breeding habitat for this species) within the study area.	Low Beneficial	Slight Beneficial
Kingfisher	County Importance	N/A	N/A	N/A
Other breeding birds	Local Importance	Planting scheme will result in a net increase in the total lengths of hedgerows (an important breeding habitat for breeding birds) within the study area.	Low Beneficial	Slight Beneficial

# 7 MITIGATION

## 7.1 MITIGATION MEASURES OUTLINED IN THE ORIGINAL ES

Mitigation measures were designed for the Scheme based on survey information from the original breeding bird surveys conducted by Soltys Brewster in 2008. The mitigation measures already designed for the Scheme are considered to be generally suitable for most species, but following further discussions with the County Ecologist in October 2016, it was agreed that extra mitigation should be provided for skylark, as the 2016 surveys showed a high level of activity for this species within areas affected by the Scheme.

Mitigation measures for skylark and other ground nesting birds provided within the original ES are as follows:

*'Skylark (and other ground nesting birds)*

*Where possible, works will be timed so as to avoid impacts to ground-nesting birds, particularly skylark and meadow pipit, which were recorded within the arable fields in the north of the study area. Works carried out prior to April 2015 would avoid the nesting season of skylark and meadow pipit. If works in arable fields are to commence in the period April to early August, an ecologist will conduct a thorough search of the affected areas in order to determine the presence of ground-nesting birds. If nests are found, a 10m buffer zone of vegetation will be left around the nests, and such areas will be left undisturbed until such time as the chicks have fledged. In order to avoid accidental damage, such areas will be clearly demarcated and all site staff will be given a 'toolbox talk' to inform them of the concerns regarding nesting birds.'*

## 7.2 ADDITIONAL MITIGATION MEASURES PROPOSED FOR SKYLARK AND OTHER GROUND-NESTING BIRDS

### SITE CLEARANCE STRATEGY

Where possible, vegetation clearance will take place outside the nesting season for skylark. If vegetation clearance is to commence in the period April to August, a suitably qualified ornithologist with experience in skylark ecology will search all areas of suitable skylark, lapwing and other ground-nesting bird habitat for the presence of nests prior to clearance. If nests are found, these will be marked off and prevented from harm until chicks have fledged. Fencing will be used to mark off these areas to prevent accidental harm, and this will be installed under the supervision of the ornithologist, to ensure that there is adequate 'chick rearing' area available.

Skylark chicks will leave the nest, unable to fly, at 8-10 days, and are moved into 'chick-rearing areas' of suitable habitat until chicks have fully fledged (at 18-20 days after hatching). Similarly, lapwing chicks are covered in down when they hatch and are able to walk within a few hours; the parents then move them to a separate 'chick-rearing area'. Therefore, the buffer zones around these nests will have to allow a sufficient area around the nest with suitable habitat for chick rearing; buffer zones will be defined by the site ornithologist. These buffer zones should be maintained until such time as the chicks are able to fly (approximately 18-20 days after hatching for skylark and 5-6 weeks after hatching for lapwing).

### COMPENSATION FOR LOSS OF SKYLARK BREEDING/FEEDING AREAS

The effective loss of two fields used by breeding lapwing requires compensation, however it will not be possible to provide compensatory habitat within the land obtained for the Scheme under



the Compulsory Purchase Order. As an alternative, an agreement will be made with a local landowner to carry out land management for skylark in order to enhance the value of the area for breeding lapwing. It is of note that most of the arable lands in the area currently consist of winter-sown crops, which hinders skylark breeding success. Therefore, switching to spring-sown crops or creating 'skylark plots' would be particularly beneficial.

Also, leaving areas of weedy stubble throughout the winter would be good for winter-feeding, or as an alternative, supplementary feeding could be provided (see <https://www.gov.uk/countryside-stewardship-grants/supplementary-winter-feeding-for-farmland-birds-ab12>).

Land which would be particularly suitable for skylark management are shown in Figure 2 in Appendix B-2, and are discussed below.

Potential Mitigation Area 1 at Walterston/Trewallter: Existing skylark territory, of area 17.7 ha in total, with an average of 7.6 skylark recorded per visit (which works out to a density of 0.43/ha). This is a winter-sown field, so breeding success may be hindered here currently. This area is particularly recommended for skylark/lapwing enhancement.

There is another field of 11.2ha directly to the south of this field (Potential Mitigation Area 1a), which may also be suitable for enhancement. An average of 4.3 skylark recorded per visit (density of 0.38/ha), and lapwing were also noted in this area; land management for skylark as described above would also benefit lapwing.

Potential Mitigation Area 2 - Land to the east of Whitton Mawr: 7.2ha. It is currently unknown whether skylark occur here, as this field was not within the survey area, but this is just south of the area to be used for skylark enhancement for solar farm development. During the meeting, with the County Ecologist in October 2016, the possibility of removing a hedgerow to combine this land with the field to the west was discussed. However, there is currently no hedgerow here (just a fence). These two fields together would give a total of 18.2ha.

Table 6 outlines the general mitigation measures proposed for the Scheme in relation to breeding birds; any additional measures proposed for newly-recorded species such as Lapwing are highlighted in red. The predicted residual impact of the Scheme, after mitigation, is also provided.

**Table 6: Mitigation for Breeding Birds, and Residual Impacts**

Potential Impacts	Nature of Impact	Significance (Without Mitigation)	Mitigation Measures	Residual Impact
Skylark	Damage or destruction of active nests/eggs/dependant young during site clearance/construction works within arable fields/field margins.	Moderate Adverse	Where possible, vegetation clearance will take place outside the nesting season for skylark. If vegetation clearance is to commence in the period April to August, a suitably qualified ornithologist with experience in skylark ecology will search all areas of suitable skylark habitat for the presence of nests prior to clearance. If nests are found, these will be marked off and prevented from harm until chicks have fledged. Skylark chicks will leave the nest, unable to fly, at 8-10 days. Therefore, the buffer zones around these nests will have to allow a sufficient area around the nest with suitable habitat for chick rearing; buffer zones will be defined by the site ornithologist. These buffer zones should be maintained until such time as the chicks are able to fly (approximately 18-20 days after hatching).	Neutral
	Loss of skylark breeding and feeding habitat.	Moderate Adverse	Management of land in the local area to enhance its value for skylark, as described in Section 7.2.	Slight Adverse

Potential Impacts	Nature of Impact	Significance (Without Mitigation)	Mitigation Measures	Residual Impact
Northern lapwing	Damage or destruction of active nests/eggs/dependant young during site clearance/construction works within arable fields/field margins.	Moderate Adverse	Where possible, vegetation clearance will take place outside the nesting season for lapwing. If vegetation clearance is to commence in the period April to August, a suitably qualified ornithologist will search all areas of suitable lapwing habitat for the presence of nests prior to clearance. If nests are found, these will be marked off and prevented from harm until chicks have fledged. An appropriate buffer zone will be kept around nesting areas in order to prevent disturbance. Once lapwing chicks have hatched, the parents move them to a separate 'chick-rearing area'. Therefore, the buffer zones around these nests will have to allow a sufficient area around the nest with suitable habitat for chick rearing; buffer zones will be defined by the site ornithologist. These buffer zones will be maintained until such time as the chicks are able to fly (approximately 18-20 days after hatching for skylark and 5-6 weeks after hatching for lapwing).	Neutral
	Disturbance to wintering Lapwing during Construction phase.	Moderate Adverse	Pre-construction surveys will be carried out to determine the presence of lapwing within or near the Scheme boundary prior to the commencement of works, and the Environmental Clerk of Works will carry out regular checks. If populations of wintering lapwing are discovered near the Scheme, appropriate buffer zones will be put around such areas until such time as lapwing have left their wintering grounds.	Neutral

Potential Impacts	Nature of Impact	Significance (Without Mitigation)	Mitigation Measures	Residual Impact
	Noise disturbance during Operation phase	Low Adverse	Noise reduction measures have been designed for the Scheme; provided these measures are properly implemented, it is not expected that noise levels in the area will be increased.	Neutral
	Some small areas of arable fields will be lost (6.8ha in total), an important feeding and breeding habitat, though lapwing were not recorded breeding within any of the areas affected by the Scheme during the 2016 breeding bird surveys.	Slight Adverse	It is proposed to create 4.7ha of wildflower meadow as part of the Scheme. This habitat will provide alternative foraging habitat for lapwing and will be managed to encourage lapwing. It is likely that, over time, this habitat may be used by lapwing for foraging but due to the proximity to the road it is unlikely that it would be used for breeding; however, areas to be managed for skylark as described in Section 7.2 will also be suitable for breeding lapwing.	Neutral
Song thrush	Damage or destruction of active nests/eggs/dependant young during site clearance works in areas with thick vegetation.	Moderate Adverse	Where possible, vegetation clearance will take place outside the nesting season for song thrush. If vegetation clearance is to commence in the period April to August, all areas of suitable skylark habitat will be thoroughly searched for the presence of nests prior to clearance. If nests are found, these will be marked off and prevented from harm until chicks have fledged.	Neutral
	Loss of breeding habitat (hedgerows, woodland and scrub) during site clearance works, including foraging habitat within territories for breeding pairs.	Slight Adverse	Additional hedges and woodland will be planted which may provide suitable habitat	Slight Beneficial

Potential Impacts	Nature of Impact	Significance (Without Mitigation)	Mitigation Measures	Residual Impact
Yellowhammer	Damage or destruction of active nests/eggs/dependant young during site clearance works in areas with thick vegetation.	Moderate Adverse	Where possible, vegetation clearance will take place outside the bird nesting season. If vegetation clearance is to commence in the period April to August, all areas of suitable skylark habitat will be thoroughly searched for the presence of nests prior to clearance. If nests are found, these will be marked off and prevented from harm until chicks have fledged.	Neutral
	Loss of breeding habitat (hedgerows) during site clearance works, including foraging habitat within territories for breeding pairs.	Slight Adverse	More hedgerow will be planted, giving more potential nesting habitat	Slight Beneficial
	Some small areas of arable fields will be lost, an important feeding habitat.	Slight Adverse	None proposed	Slight Adverse
Kingfisher and Grey Wagtail	Pollution of the River Waycock may result in indirect impacts through fish kills which would reduce the food resource for kingfisher and Grey Wagtail.	Slight Adverse	Attenuation ponds help prevent pollutants entering water courses	Slight Beneficial
	Construction works in the vicinity of the River Waycock may cause disturbance to kingfisher and Grey Wagtail.	Slight Adverse	None proposed	Slight Adverse
Other breeding birds	Damage or destruction of active nests/eggs/dependant young during site clearance works.	Slight Adverse	Where possible, vegetation clearance will take place outside the bird nesting season. If vegetation clearance is to commence in the period April to August, all areas of suitable skylark habitat will be thoroughly searched for the presence of nests prior to clearance. If nests are found, these will be marked off and prevented from harm until chicks have fledged.	Neutral
	Loss of breeding bird habitat during site clearance works, including foraging habitat within territories for breeding pairs.	Slight Adverse	Some new habitat is being created which might provide suitable nesting sites	Slight Beneficial

Potential Impacts	Nature of Impact	Significance (Without Mitigation)	Mitigation Measures	Residual Impact
	Disturbance of birds during construction works will deter birds from nesting near the site.	Slight Adverse	None proposed. However, there is abundant suitable habitat (in the form of hedgerows, woodland and scrub) in the surrounding area.	Slight Adverse

# 8

## MONITORING STRATEGY

### 8.1 PRE-DEVELOPMENT MONITORING

In order to establish a good baseline dataset, further breeding bird surveys will be carried out in spring 2017. The survey area and methods will be the same as those used in the 2016 surveys.

In addition, surveys should be conducted in winter 2016/2017, in order to establish a baseline dataset, to inform the design of detailed mitigation and to determine the need for further winter monitoring.

### 8.2 POST-DEVELOPMENT MONITORING

In order to assess the effectiveness of mitigation measures, monitoring of breeding birds will be carried out on a biennial basis for ten years' post-construction. Monitoring methods will be based on previous survey methods - the 'Common Bird Census' methodology (Bibby et al, 2000) - with three surveys carried out within the breeding bird season. The study area for these surveys will include the area surveyed in the 2016 surveys, and the new skylark mitigation areas.

Bird monitoring reports will be prepared and issued to the Vale of Glamorgan County Ecologist. These reports will detail the results of bird surveys and will assess the effectiveness of mitigation measures. If the results of monitoring indicate that mitigation measures are insufficient, adjustments to the mitigation strategy will be discussed with the VoG County Ecologist.

# 9

## CONCLUSIONS

The 2016 breeding birds survey recorded many of the same species recorded in the 2008 surveys, but there were several notable new species recorded, the most significant of which is Northern Lapwing, a Section 42 and Vale of Glamorgan Priority Species.

The impacts of the Scheme on newly-recorded species have been assessed. Impacts on species already recorded within the study area have not changed since the writing of the Environmental Statement.

The mitigation measures already designed for the Scheme are generally appropriate for all newly-recorded species, but some additional measures are proposed in order to mitigate for impacts, particularly for Northern Lapwing.

Provided the mitigation measures proposed for the Scheme are properly implemented, the residual impacts of the Scheme on breeding birds would be no greater than Slight Adverse for any species.



# Appendix A

**BREEDING BIRD SURVEY REPORT**

APPENDIX A-1

**BREEDING BIRD SURVEY REPORT**

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Wyedean Ecology Ltd  
Modesgate  
Tidenham Chase  
Chepstow  
NP16 7LZ



# BREEDING BIRD SURVEY, FIVE MILE LANE, BARRY, VALE OF GLAMORGAN. ISSUE 3.0

<b>Client</b>	<b>TACP Ltd.</b>	
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Report Author(s)	Denis Jackson	
Report Date	12 <sup>th</sup> August 2016	
Checked By	Val Jackson BSc	Date: 12 <sup>th</sup> July 2016

## Editorial History

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Issue 1	12 <sup>th</sup> July 2016	Denis Jackson / Typographical corrections
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## **1 SUMMARY**

A breeding bird assessment was undertaken of a proposed road scheme along and either side of a section of Five Mile Lane, north of Barry, in the Vale of Glamorgan, to determine the bird species present, which species are (or may be) breeding, and to identify important areas and habitat types for birds on site. Subsequent to this evaluation, an assessment was made of the likely impact as a result of the Scheme.

Most avian species found to be using, or breeding on the site were common and widespread in the local area, but, within arable and grassland habitats, and within hedgerows throughout the site, several species of conservation concern, including Lapwing, Linnet, Yellowhammer and Whitethroat were all found to be breeding.

To avoid committing offences in respect of breeding birds, timing of certain works, in particular, vegetation removal, to avoid the breeding season will be required. Mitigation/compensation will be required for the loss of woodland, arable land, grass leys and hedgerows.

## **2 Introduction**

Wyedean Ecology was approached by Dr Tim Rich, on behalf of TACP Ltd., to undertake a 'standard survey for breeding birds' along a section of roadway and adjoining habitats, forming part of the Welsh Government's Five Mile Lane Improvement Scheme (hereafter, 'the Scheme').

This report details the findings of the survey undertaken, provides outline assessments of the potential impacts of the scheme implementation on breeding birds, and suggests potential mitigation options which could be explored in more detail as planning progresses.

## **3 ESSENTIAL AVIAN ECOLOGY**

Most British avian species breed during the spring and summer months, between April and August, although some, such as pigeons, and doves, will frequently breed at all times of year, as they are not dependent on small, soft-bodied invertebrates to provide food for their chicks. Some other species, such as Barn Owl have also been recorded breeding in the winter months, in years when winters have been mild, and small mammal prey plentiful, although such breeding attempts are unusual, with chicks frequently failing to fledge. The breeding season can be extended for most species if the weather is mild, and food plentiful.

Contrary to common belief, whilst some bird species, such as crows and rooks, nest high in trees, often more than 10m high, the majority of British breeding birds will nest within 2m of the ground (or on the ground) within dense scrub or within holes and other natural and manmade cavities in rocks and walls.

Most bird species take considerably less than 60 days from egg-laying to chick fledging, whilst others, such as Barn Owl, can take more than 90 days. Many, but not all, British species will make multiple breeding attempts if environmental conditions and food availability allow.

### **3.1 BREEDING BIRDS**

In Britain, all naturally occurring avian species are protected under Section 1 of the Wildlife and Countryside Act 1981 (as amended). The legislation protects all birds, their nests and eggs, and it is an offence to:

- Intentionally kill, injure or take a wild bird;
- Intentionally take, damage or destroy the nest of any wild bird whilst it is in use or being built; and
- Intentionally take or destroy the egg of any wild bird.

In addition, birds listed on Schedule 1 of the Act, such as the Red Kite (*Milvus milvus*), are afforded further protection, and it is an offence to:

- Intentionally or recklessly disturb the bird whilst nest building or while at (or near) a nest with eggs or young; and
- Disturb the dependant young of such a bird.

## **4 METHODOLOGY**

### **4.1 GENERAL**

All field survey work was undertaken by Mr Denis Jackson DipEnvSci MSc FRSB MCIEEM Mem.MBA. Mr Jackson has more than 20 years bird survey experience, with twelve years professional ecological practice. Mr Jackson is a licenced bird ringer/trainer and holds survey and/or disturbance licences for Bats, Dormouse, Great Crested Newt, White-Clawed Crayfish,

Barn Owl, Red Kite and Goshawk

## **4.2 DESK STUDY**

A data search had been previously undertaken by TACP, and the avian data was extracted and supplied to us. We were also provided with an extract from a Breeding Bird Survey undertaken by Soltys Brewster in 2008 and the proposed scheme mitigation plans, all of which were reviewed.

## **4.3 FIELD SURVEY – BREEDING BIRDS**

The Breeding Bird Survey was undertaken in 2016 and a modified version of the ‘Common Bird Census’ methodology (Bibby et al, 2000) was employed. This method was chosen as it records specific avian activity on site, from which the probability of birds breeding can be meaningfully assessed, and specific breeding territories for individual pairs can be estimated if required. This can assist considerably with identifying particularly sensitive areas of the site, and also enables more precise recommendations for management work to be made if appropriate.

This survey method was first developed as a conservation tool by the British Trust for Ornithology (BTO) in 1962 and is established as a reliable and accurate method for surveying birds. In the original survey method, at least 10 visits would be made during all months of the breeding season. The reason for the large number of survey visits was to enable detailed avian territory maps of the site under survey to be produced.

For development projects such as this, however, detailed territory mapping is generally not required, and it is sufficient to know what birds are breeding on site, to map those areas where breeding birds are concentrated (if applicable), and to identify potential areas of the site for mitigation, compensation or enhancement. To achieve these objectives, three survey visits between the beginning of April and the end of June are generally considered to be adequate.

For this project, approximate transect routes were agreed in advance with Dr Rich (Appendix 1). The first visit is used to assess the site, determine the route the surveyor will follow and gather data on suitable breeding and foraging habitats, in addition to recording birds seen during the visit. It did not prove necessary to deviate significantly from the transects agreed, but it proved possible to access some other areas and data from these are included in the results.

Subsequent survey visits are focused entirely on recording birds. Birds are identified by sight and sound. Surveys take place early in the morning when bird singing is at its peak, and carry on until mid-day. Every bird identified is recorded on a 1:10,000 scale map. With all bird survey methods that do not involve capture of birds, males are usually more readily detected than



females, and records of singing males may represent a breeding pair, or an attempt to establish or defend a breeding territory.

Survey visits take place on calm, dry days with wind-speeds less than Beaufort Force 4. No audio or other lures are used. During each survey visit, the surveyor walked the site following the route described in Appendix 1. On one of the three survey visits, the direction of the route was reversed, to reduce the potential for bias arising from surveyor fatigue to be introduced. The survey route chosen endeavoured to ensure that the surveyor passed within 50m of all features (e.g. hedgerows, trees and scrub) with potential to be of value to breeding birds and which were considered likely to be within the zone of impact of the Scheme.

A pair of Leica Ultravid 8x40 binoculars were used on all survey visits, and a 20-60 x 80mm telescope was occasionally used to search more distant areas.

#### **4.4 DETERMINATION OF BREEDING STATUS**

In evaluating the breeding status for each species within the site boundary, the criteria devised by the European Ornithological Atlas Committee (EOAC, 1979) have been applied. These criteria are defined as: -

##### **Possible breeding**

- Species observed in breeding season in possible nesting habitat; and/or
- Singing male(s) present (or breeding calls heard) in breeding season.

##### **Probable breeding**

- Pair observed in suitable nesting habitat in breeding season;
- Permanent territory presumed through registration of territorial behaviour (song, etc.), on at least two different days, a week or more apart at the same place;
- Courtship and display;
- Visiting a probable nest site;
- Agitated behaviour or anxiety calls from adults; and/or
- Nest building or excavating nest-holes.

## Confirmed breeding

- Distraction-display or injury feigning;
- Used nest or eggshells found (occupied or laid within period of survey);
- Recently fledged young or downy young;
- Adults entering or leaving nest-site in circumstances indicating occupied nest (including high nest or nest-holes, the contents of which cannot be seen), or adult seen incubating;
- Adult carrying fecal sac or food for young;
- Nest containing eggs; and/or
- Nest with young seen or heard.

## 4.5 SURVEY TIMINGS

Surveys were undertaken as per Tables 1

**Table 1. Field Survey details**

<b>Date</b>	<b>Time</b>	<b>Conditions (Wind: Beaufort, Temp: at start of survey)</b>	<b>Notes</b>
24/04/2016	06:00 – 13:40	Wind 1-2, Temp 8°C Cloud 7/8	Reconnaissance visit.
01/05/2016	05:40 – 13:30	Wind: 1-2, Temp: 5-14 °C, Cloud: 5/8	Good Survey Conditions
29/05/2016	05:00 – 13:30	Wind: 0-2, Temp: 10-18°C, Cloud:0/8	Perfect survey conditions
26/06/2016	05:00 – 13:30	Wind 1-2, Temp 12-17°C, Cloud 8/8	Perfect survey conditions

## **4.6 CONSTRAINTS**

There were no constraints to the survey.

## **5 RESULTS**

### **5.1 RESULTS – DESK STUDY**

The breeding bird survey undertaken in 2008 identified the presence of Skylark, Yellowhammer, Meadow Pipit, Kingfisher and other species on site – 27 species in total but, at least in the extract we were provided with, it did not indicate the probability of that any of these species were breeding or attempting to breed on the site. No search of historical data appears to have been undertaken. Fieldwork comprised two survey visits, undertaken in June and July 2008 which is too late in the season to detect territorial behaviour of species such as Lapwing.

The SEWBRc data search results supplied contained 962 avian records. Most were flight records of species of low conservation value which are both common and widespread in the local area. Notable records with potential relevance to the scheme included;

- Five records collected between 2009 and 2014 of Yellowhammer in a 1km square containing the village of Moulton;
- Four records collected between 2009 and 2014 of Skylark;
- A single record from 2014 of Northern Wheatear; and
- Nine records collected between 2009 and 2014 of Northern Lapwing in the general areas around Moulton, with five confirmed breeding records in the same period.

### **5.2 RESULTS – BREEDING BIRD SURVEY**

### **5.3 RESULTS – SUMMARY**

An assemblage of 44 bird species was recorded. No bird species listed on Schedule 1 of the Wildlife and Countryside Act (1981) (as amended) was identified as breeding within the study area, and no Nightjars were found to be present. A full list of all bird species recorded during the bird surveys, together with their conservation status and breeding status on site, is provided in Appendix 2.

## **5.4 RESULTS – BREEDING BIRDS**

A total of 44 bird species were identified during the course of the survey. On the basis of observations made, 19 species were confirmed to be breeding within the study area, with an additional 14 species probably breeding (but where breeding could not be confirmed), and a further 8 species were seen exhibiting behaviours suggesting possible breeding. Whilst the majority of the bird species using the site for breeding are common and widespread in the local area, some were of notable conservation significance.

Maps showing the locations of key species exhibiting breeding behaviour and an approximate indication of the areas likely to be used for breeding are provided in in attached files *Lapwing Skylark and Yellowhammer territories 1 - 4*.

### **5.4.1 SCHEDULE 1 BIRDS**

Birds on Schedule 1 of the Wildlife and Countryside Act require special attention as they are afforded a greater degree of attention than other bird species, and there is a greater burden of proof required to prove that any reckless disturbance of nesting individuals could not have been reasonably avoided.

No Schedule 1 birds were noted during the breeding bird survey.

### **5.4.2 RED LISTED SPECIES**

Birds on the UK Red List include species that are globally threatened and / or where there has been a long term historical population decline or range contraction within the UK. See Eaton *et al* (2009) for full background and definitions in respect of avian Red Listing criteria.

Ten Red Listed species were recorded during the survey: Grey Wagtail, Herring Gull, House Sparrow, Starling, Linnet, Northern Lapwing, Skylark, Song Thrush, Spotted Flycatcher, and Yellowhammer. Of these, Northern Lapwing, Skylark, Song Thrush and Yellowhammer were confirmed to be breeding within the study area. Linnet is probably breeding in the northern part of the study area, potentially within the footprint of the Scheme. Starling is probably breeding in at least one location (Blackland Farm) and probably other locations within the study area too. Starlings are most likely to be nesting within buildings and, therefore, outside the footprint of the scheme.

### **5.4.3 AMBER LISTED SPECIES**

Birds on the UK Amber List include species that have an unfavourable conservation status in Europe, and / or where there has been a long term historical population decline, which is now recovering. Other criteria for inclusion on the Amber List include a moderate decline in UK population size, or range contraction, or where the UK breeding or non-breeding population is significant at a European scale. See Eaton *et al* (2009) for full background and definitions in respect of avian Amber Listing criteria.

Nine Amber Listed species were recorded during the survey: Barn Swallow, Dunnock, House Martin, Lesser Black-Backed Gull, Mallard, Meadow Pipit, Common Swift, Whitethroat and Willow Warbler. Of these, Dunnock, Whitethroat and Willow Warbler were confirmed to be breeding both within the study area and within hedgerows within the footprint of the Scheme. Barn Swallow is probably breeding within the study area, most likely in buildings outside the footprint of the Scheme. Meadow Pipit is probably breeding within the footprint of the scheme within grassland and arable crop areas.

### **5.4.4 GREEN LISTED SPECIES**

Birds on the UK Green List are all those which occur and/or breed regularly in the UK and are considered to be generally both widespread and common, but which do not fulfil the criteria to warrant Red or Amber Listing.

### **5.4.5 SECTION 42 SPECIES**

The following breeding birds listed, as species of principal species of importance for conservation of biological diversity in Wales, were found within the study area; Dunnock, House Sparrow, Northern Lapwing, Skylark, Song Thrush, and Yellow Hammer with Linnet and Starling also listed, and probably breeding.

## **5.5 RESULTS – MAIN AREAS OF AVIAN ACTIVITY**

Although most parts of the site appeared to be used by foraging birds, and many parts by breeding birds, there were areas that appeared to be used more frequently than others. The most frequently used habitats by breeding birds were the woodland areas either side of the existing road at the south part of the site, hedgerows throughout the site, and agricultural fields and grass leys on either side of the existing road, north of Sutton Fach Farm.

Because the Local Planning Authority Ecologist had specifically requested additional information on ground-nesting birds & Yellowhammer, four maps have been provided with this report showing the general areas where these species were seen exhibiting territorial behaviour (*Lapwing Skylark and Yellowhammer territories 1 – 4*)

## 6 BREEDING BIRDS – EVALUATION & IMPACT CHARACTERISATION

Due to the specific species and abundance of breeding birds present within the study area, and the legislative protection afforded to them, breeding birds are considered be of importance at the County level.

The breeding bird survey undertaken in 2008 was wholly inadequate, having failed to take into account any recorded historical use of the area by birds, and with fieldwork largely undertaken outside of the principal breeding season for many avian species. Only 27 species were identified. Lapwing, an important breeding species on site was missed, and the significance of breeding Skylark significantly understated.

A summary of those species of conservation concern is provided in Table 2.

**Table 2. Potential impacts for avian species of conservation concern breeding or potentially breeding within the study area.**

Common Name	Conservation Status	Evaluation & likely impact of the Scheme
Barn Swallow	Amber	Occasionally seen foraging over open fields. Probably breeding in farm buildings. Unlikely to be adversely impacted.
Dunnock (Hedge Accentor)	Amber/Sect.42	Breeding in many hedgerows throughout the site. Breeding and foraging opportunities will reduce
Grey Wagtail	Red/Sect. 42	One individual was heard on the reconnaissance visit near Waycock Bridge. Not seen on subsequent visits. Breeding birds could be killed, injured or disturbed by works close to the river.
Herring Gull	Red/Sect. 42	Not breeding. Occasionally seen around the site. Impacts highly unlikely.
House Martin	Amber	Possibly nesting on farm or other buildings. Impacts unlikely.
House Sparrow	Red/Sect. 42	Confirmed nesting on farm buildings. Impacts highly unlikely.

Common Name	Conservation Status	Evaluation & likely impact of the Scheme
Lesser Black-Backed Gull	Amber	<p>More than 50 seen loafing on field centred on ST078703 immediately south of Grovelands Farm.</p> <p>Non-breeding. Impacts highly unlikely</p>
Linnet	Red/Sect. 42	<p>Individuals or small groups occasionally seen in the north part of the scheme.</p> <p>Probably breeding within the hedgerows in this area.</p> <p>Potential for individuals to be killed, injured or disturbed or nests to be damaged during construction. Likely to avoid area near new road sections road due to noise in the short-term post-construction but may adapt over time.</p>
Mallard	Amber	<p>Individuals seen over. Impacts highly unlikely.</p>
Meadow Pipit	Amber	<p>No historical records. Few seen around the northern part of the site and they are probably breeding in the larger areas holding Skylark.</p> <p>Potential for individuals to be killed, injured or disturbed or nests to be damaged during vegetation clearance and soil strip. Individuals likely to avoid area near new road sections road due to noise in the short-term post-construction but may adapt over time.</p> <p>Reduction in available nesting habitat and foraging opportunities.</p>
Northern Lapwing	Red/Sect. 42	<p>Historical records of breeding in the area around Moulton and three individuals exhibiting breeding behaviour seen at ST07839 707621 on the first survey visit only.</p> <p>Lapwing breed early and chicks may have fledged and this single-brooded species may have left the area before second survey visit undertaken.</p> <p>Potential for individuals to be killed, injured or disturbed or nests to be damaged during vegetation clearance and soil strip.</p> <p>This area is very close to the area of a proposed new junction. Individuals likely to avoid area near</p>

Common Name	Conservation Status	Evaluation & likely impact of the Scheme
		<p>new road sections road due to noise in the short-term post-construction but may adapt over time. However, if traffic and therefore noise levels increase significantly, breeding densities are likely to permanently reduce and birds may abandon the area altogether.</p> <p>Reduction in available nesting habitat and foraging opportunities.</p> <p>Note that nesting and foraging areas to be lost will include not only that directly lost to the Scheme, but also those areas from which birds are likely to be displaced as a consequence of any increase in disturbance from increased road noise.</p> <p>It is considered possible that Lapwing use the area during the winter. In the absence of a wintering bird survey then winter presence should be assumed and a suitably precautionary approach adopted.</p> <p>See file <i>Lapwing Skylark and Yellowhammer territories 2</i> (supplied to TACP separately) for approximate location of Lapwing territories.</p>
Skylark	Red/Sect. 42	<p>There were few records of Skylark within the study area, but many birds exhibiting territorial behaviour were seen on all survey visits. It is estimated that there are between 27 and 37 territories present, possibly more. Breeding success is likely to vary considerably from year to year with changes in agricultural crops and associated management regimes.</p> <p>Potential for individuals to be killed, injured or disturbed or nests to be damaged during vegetation clearance and soil strip.</p> <p>Reduction in available nesting habitat and foraging.</p> <p>It is considered possible that Skylark use the area during the winter. A winter bird survey to determine this and evaluate likely impacts is strongly recommended.</p> <p>Note that nesting and foraging areas to be lost will</p>



Common Name	Conservation Status	Evaluation & likely impact of the Scheme
		<p>include not only that directly consumed by the Scheme but also those areas from which birds are likely to be displaced as a consequence of any increase in disturbance from increased road noise</p> <p>See files <i>Lapwing Skylark and Yellowhammer territories 1 - 4</i> (supplied to TACP separately) for approximate location of Skylark territories.</p>
Song Thrush	Red/Sect. 42	<p>Some territories within woodland at the southern part of the site with others in small woodland stands elsewhere.</p> <p>Potential for killing, injuring, damage to nests or chicks during the breeding season. Potential loss of nesting and foraging opportunities.</p>
Spotted Flycatcher	Red/Sect. 42	<p>A single individual seen on one survey visit. Possible breeding but not confirmed. Potential impacts unknown.</p>
Starling	Red/Sect. 42	<p>Mostly seen around farm buildings where they are likely to be breeding.</p> <p>Unlikely to be any direct impacts. Loss of farmland and hedgerows will potentially result in reduced foraging opportunities but foraging may well be focused on areas in close proximity to livestock.</p>
Swift	Amber	<p>Mostly seen around farm buildings where they are likely to be breeding.</p> <p>Unlikely to be any direct impacts. Loss of farmland and hedgerows will potentially result in reduced foraging opportunities but foraging may well be focused on areas in close proximity to livestock.</p>
Whitethroat	Amber	<p>Territorial behaviour mostly observed in association with hedgerows but scrub also valuable for this species.</p> <p>Potential for individuals to be killed, injured or disturbed or nests to be damaged during vegetation clearance and construction. Likely to avoid area near new road sections road due to noise in the short-term. Post-construction, they may adapt over time.</p>

Common Name	Conservation Status	Evaluation & likely impact of the Scheme
Willow warbler	Amber	<p>Some territories within woodland at the southern part of the site with others in small woodland stands elsewhere.</p> <p>Potential for killing, injuring, damage to nests or chicks during the breeding season. Nests within scrub etc. on or very near to the ground. Potential loss of nesting and foraging opportunities.</p>
Yellowhammer	Red/Sect. 42	<p>It is estimated that approximately 16 – 22 Yellowhammer territories exist within the study area with most in the more central and northern parts. There were five recent historical records.</p> <p>Potential for individuals to be killed, injured or disturbed, or nests to be damaged during vegetation clearance and construction. Likely to avoid area near new road sections road due to noise in the short-term. Post-construction, they may adapt over time.</p> <p>See files Lapwing Skylark and Yellowhammer territories 1 - 4 (supplied to TACP separately) for approximate location of Yellowhammer territories</p>

## 7 CONCLUSIONS

The study area hosts a wide range of breeding birds. Most are species widespread and common within the local area, but others, such as Starling, Linnet, Lapwing, Skylark and Yellowhammer, are more restricted in their distribution and have undergone significant population declines over the last 30 years.

Because the scheme will result in removal of woodland, hedgerows, arable land and grass leys, it is likely to have direct and indirect significant impacts on all avian species recorded breeding along its course. In particular, the Scheme is most likely to have negative significant impacts on those avian species considered to be farmland and hedgerow specialists, because the majority of habitats lost to, or disturbed by the Scheme would be farmland and hedgerows.

There are historical records of Lapwing nesting in the area, but numbers now appear very low now and for ground-nesting species such as this, low numbers in breeding colonies tend to result in increased predation rates. Continued breeding may not be sustainable at this site

whether the Scheme progresses or not as the long-term survival of the species in this area is dependent on land management and agricultural practices in the wider area.

Skylark is present with a good number of territories, but breeding success will be significantly influenced by cropping regimes. In particular, the increased use of autumn and winter sown crops has been shown to be detrimental to the breeding success of this species. Whitethroat, Yellowhammer and Linnet will all nest within hedgerows and this is where most territorial behaviour was observed during the study area.

As well as breeding, it is likely that all of the species mentioned, with the exception of Whitethroat, could be present within the scheme area in the winter. It is possible that the habitats present could provide a significant winter food resource for those and other species. In the absence of a wintering bird survey, winter presence and significance should be assumed.

A mitigation programme for the scheme has been developed. We have reviewed these and can confirm that they include suitable provision for breeding birds, including 6.7ha of native woodland planting, with coppice stools re-located where possible, 6308m of native hedgerow planting, and 4.7ha of wildflower meadow planting. All these measures include appropriate aftercare and provision for long-term management.

Monitoring of the study area and any new areas nearby used for mitigation/compensation should be undertaken, with results evaluated against this baseline report. It is recommended that Breeding Bird Surveys are undertaken in Year 1, 3, 5 & 7 post-development.

## **8 LIMITATIONS**

This report has been prepared by Wydean Ecology Ltd, with all reasonable care, skill and attention to detail as set out within our standard terms and conditions.

The lack of evidence of a protected species does not mean they are not currently present, nor does it preclude their presence at some future date. The survey methods used and/or recommended are suitable to establish the presence of a populations of protected species, and, in accordance with published best practice methodologies, are considered to show adequate effort in determining that a species is likely to be absent, or at least present for such a limited period of time, or at such low population levels, that the habitats present on site are highly unlikely to be significant to that population.

Any ecological survey can only identify what was present on site when it was conducted. Habitat usage by species can change over time, and if development works do not begin within twenty four months of the date of this report, further survey work will be required to identify

any change of use of the site by protected species.

## **9 COPYRIGHT**

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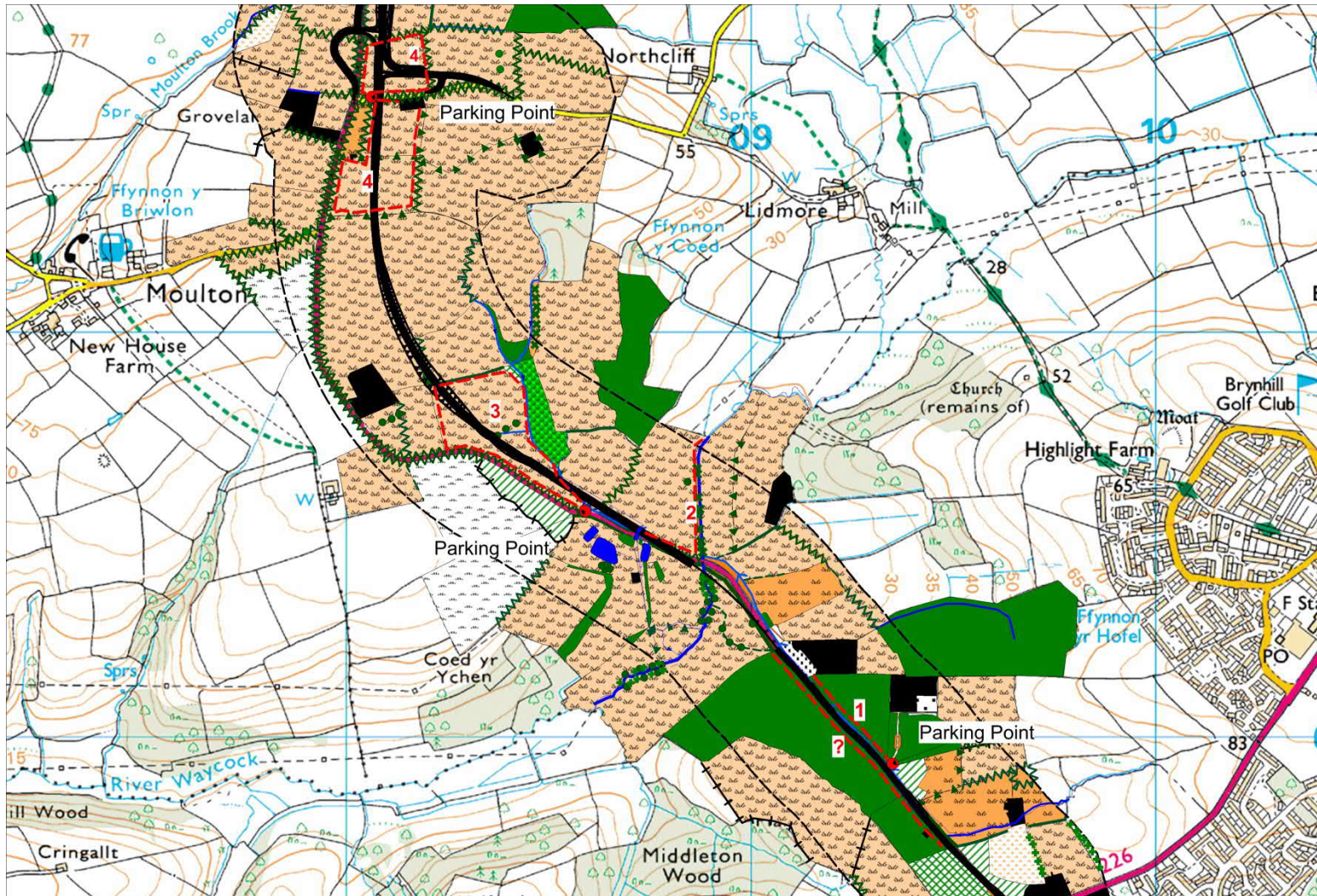
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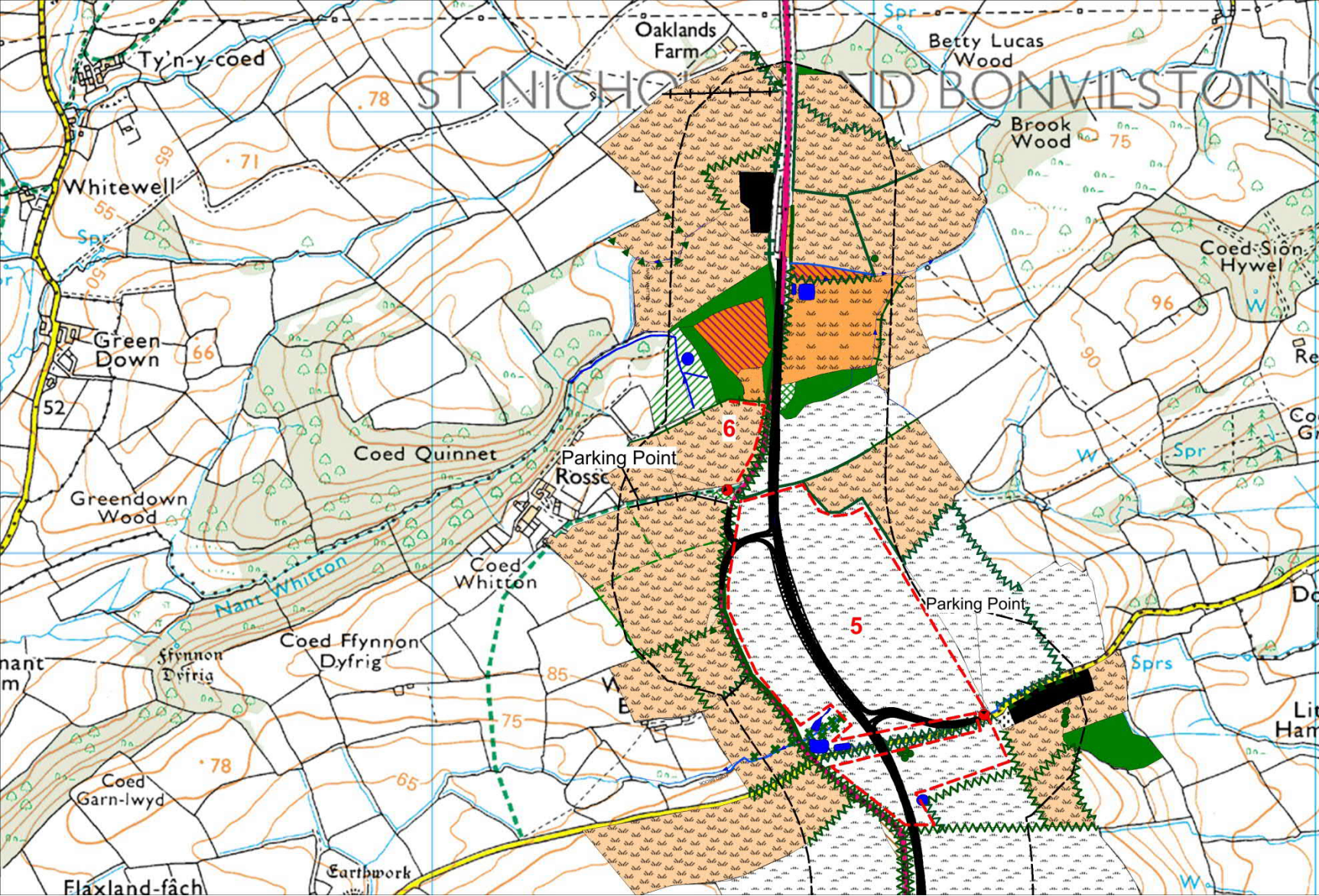
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# 11 APPENDIX 1. Bird Survey Transects (supplied by TACP)

## 11.1 SOUTHERN END



NORTHERN END



## 12 APPENDIX 2. FULL LIST OF BIRDS IDENTIFIED ON SITE.

Common Name	Scientific Name	BTO Survey Code	Indicative Breeding Status	WCA Schedule 1	Red Listed	Amber Listed	Section 42 Species
Barn Swallow	<i>Hirundo rustica</i>	SL	Probable			√	
Blackbird	<i>Turdus merula</i>	B.	Confirmed				
Blackcap	<i>Sylvia atricapilla</i>	BC	Confirmed				
Blue Tit	<i>Cyanistes caeruleus</i>	BT	Confirmed				
Buzzard	<i>Buteo buteo</i>	BZ	Confirmed				
Carrion Crow	<i>Corvus corone corone</i>	C.	Confirmed				
Chaffinch	<i>Fringilla coelebs</i>	CH	Probable				
Chiffchaff	<i>Phylloscopus collybita</i>	CC	Confirmed				
Collard Dove	<i>Streptopelia decaocto</i>	CD	Probable				
Dunnock (Hedge Accentor)	<i>Prunella modularis</i>	D.	Confirmed			√	√
Garden Warbler	<i>Sylvia borin</i>	GW	Confirmed				
Goldfinch	<i>Carduelis carduelis</i>	GO	Probable				
Great Spotted Woodpecker	<i>Dendrocopos major</i>	GS	Probable				

Common Name	Scientific Name	BTO Survey Code	Indicative Breeding Status	WCA Schedule 1	Red Listed	Amber Listed	Section 42 Species
Great Tit	<i>Parus major</i>	GT	Probable				
Green Woodpecker	<i>Picus viridis</i>	G.	Possible				
Grey Wagtail	<i>Motacilla cinerea</i>	GL	Possible		√		√
Herring Gull	<i>Larus argentatus</i>	HG			√		√
House Martin	<i>Delichon urbicum</i>	HM	Possible			√	
House Sparrow	<i>Passer domesticus</i>	HS	Confirmed		√		√
Jackdaw	<i>Corvus monedula</i>	JD	Probable		√		
Jay	<i>Garrulus glandarius</i>	J.	Possible				
Lesser Black-Backed Gull	<i>Larus fuscus</i>	LB				√	
Long-tailed tit	<i>Aegithalos caudatus</i>	LT	Probable				
Linnet	<i>Carduelis cannabina</i>	LI	Probable		√		√
Magpie	<i>Pica pica</i>	MG	Confirmed				
Mallard	<i>Anas platyrhynchos</i>	MA				√	
Meadow Pipit	<i>Anthus pratensis</i>	MP	Probable			√	
Northern Lapwing	<i>Vanellus vanellus</i>	L.	Confirmed		√		√
Nuthatch	<i>Sitta europaea</i>	NH	Probable				



Common Name	Scientific Name	BTO Survey Code	Indicative Breeding Status	WCA Schedule 1	Red Listed	Amber Listed	Section 42 Species
Pheasant	<i>Phasianus colchicus</i>	PH	Probable				
Pied Wagtail	<i>Motacilla alba</i>	PW	Probable				
Raven	<i>Corvus corax</i>	RN	Possible				
Robin	<i>Erithacus rubecula</i>	R.	Confirmed				
Rook	<i>Corvus frugilegus</i>	RO	Possible				
Skylark	<i>Alauda arvensis</i>	S.	Confirmed		√		√
Song Thrush	<i>Turdus philomelos</i>	ST	Confirmed		√		√
Spotted Flycatcher	<i>Muscicapa striata</i>	SF	Possible		√		√
Starling	<i>Sturnus vulgaris</i>	SG	Probable		√		√
Swift	<i>Apus apus</i>	SI	Possible			√	
Whitethroat	<i>Sylvia communis</i>	WH	Confirmed			√	
Willow warbler	<i>Phylloscopus trochilus</i>	WW	Confirmed			√	
Wood pigeon	<i>Columba palumbus</i>	WP	Confirmed				
Winter Wren	<i>Troglodytes troglodytes</i>	WR	Confirmed				
Yellowhammer	<i>Emberiza citrinella</i>	Y.	Confirmed		√		√

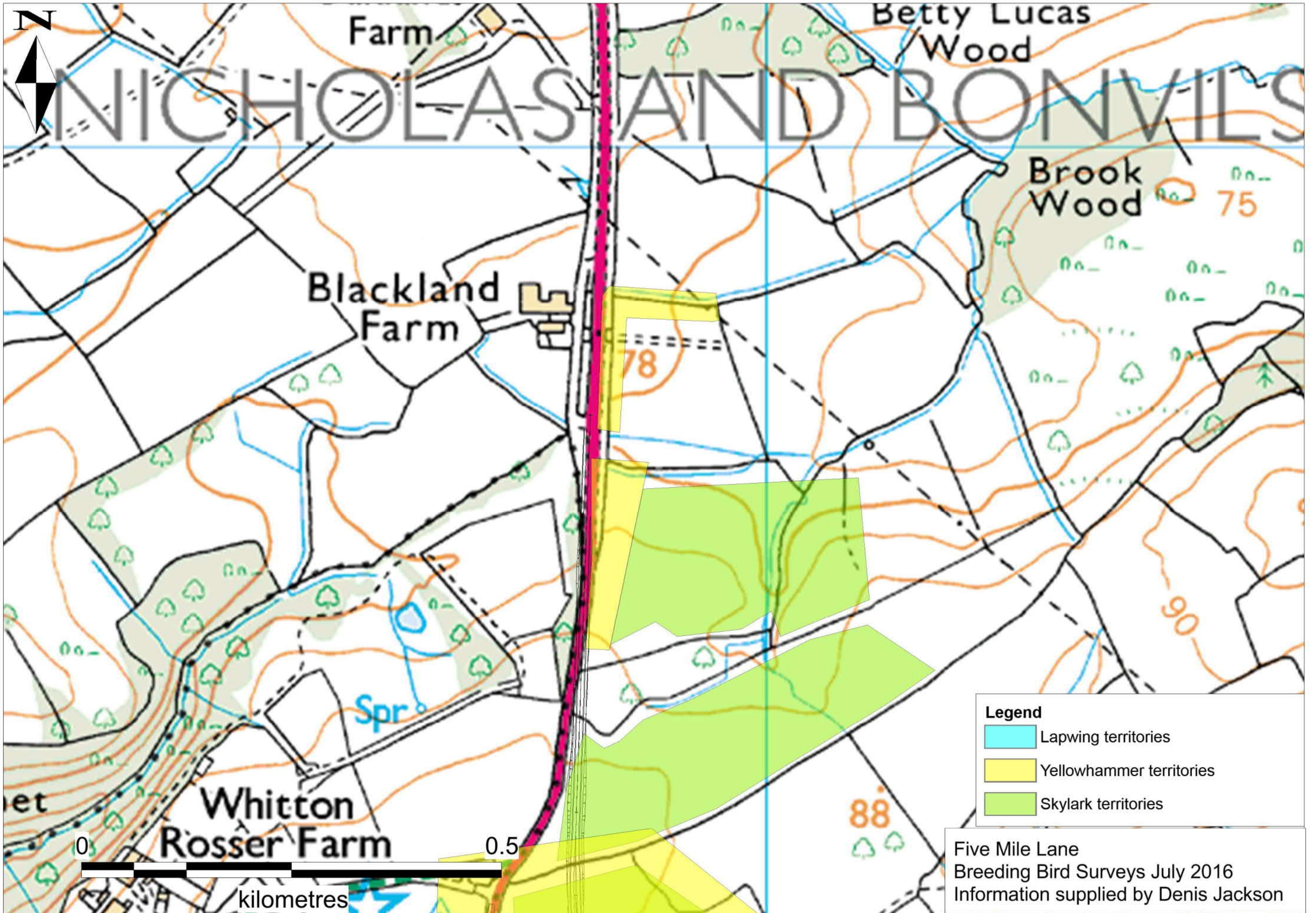
# Appendix B

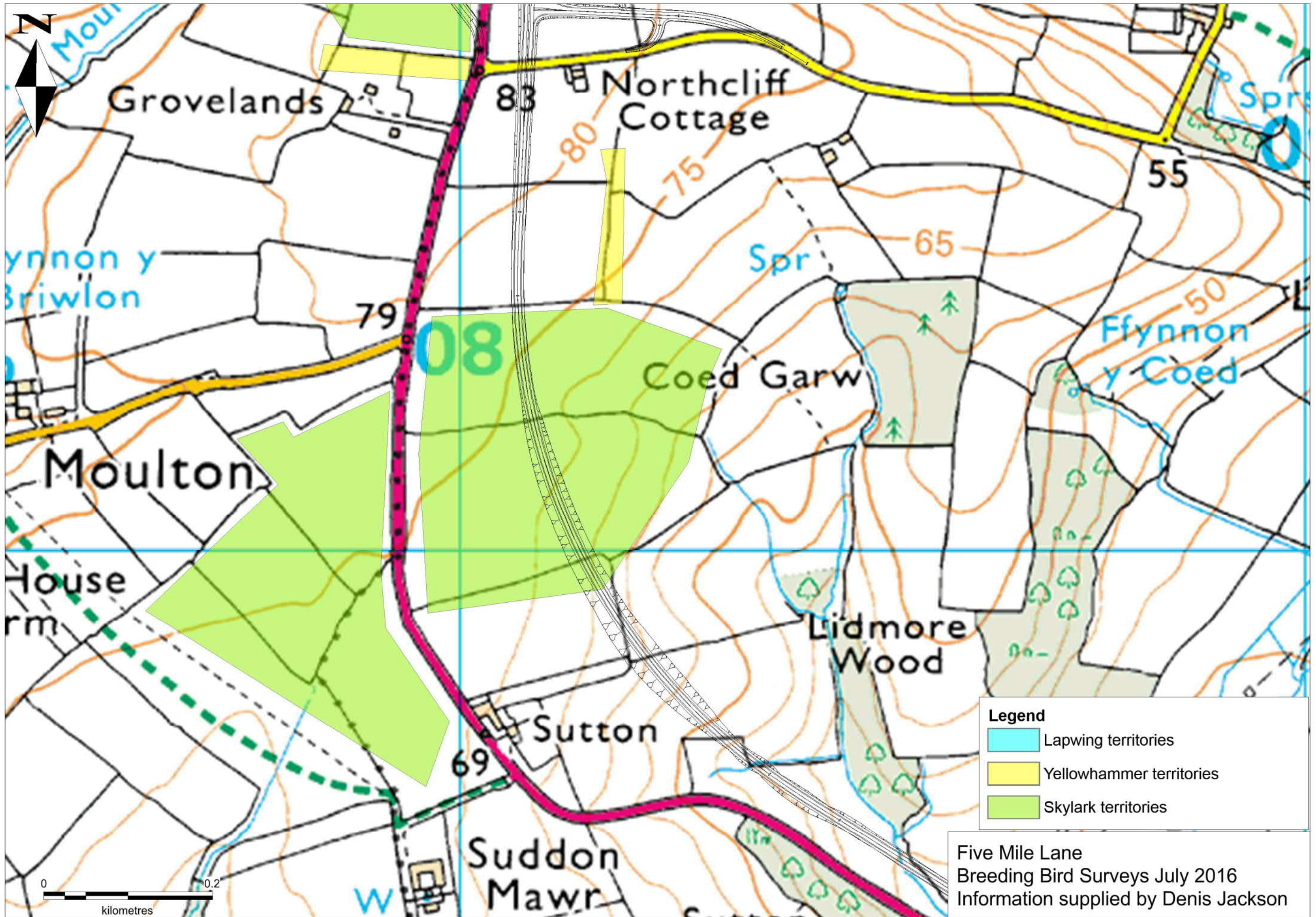
**FIGURES**

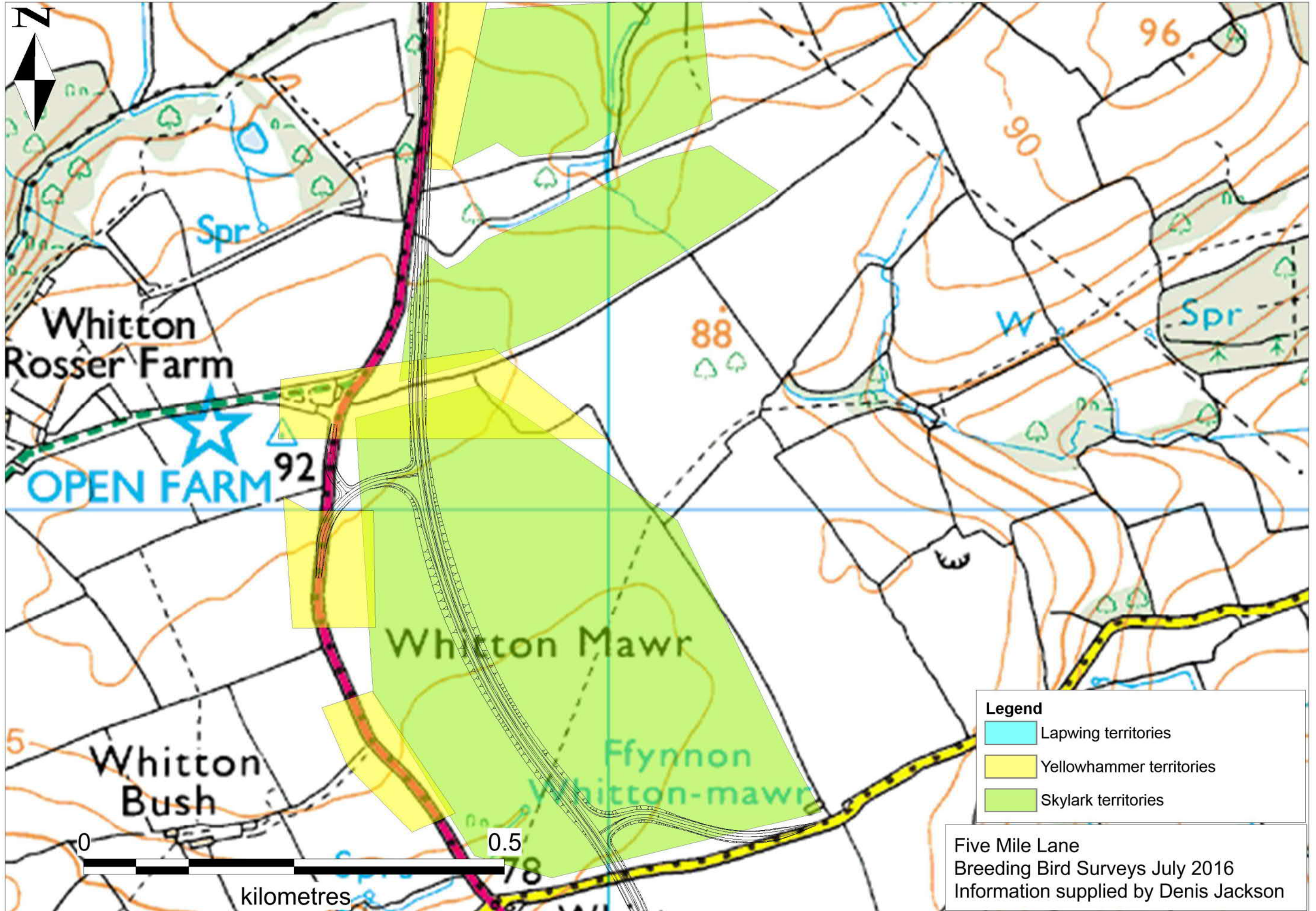
APPENDIX B-1

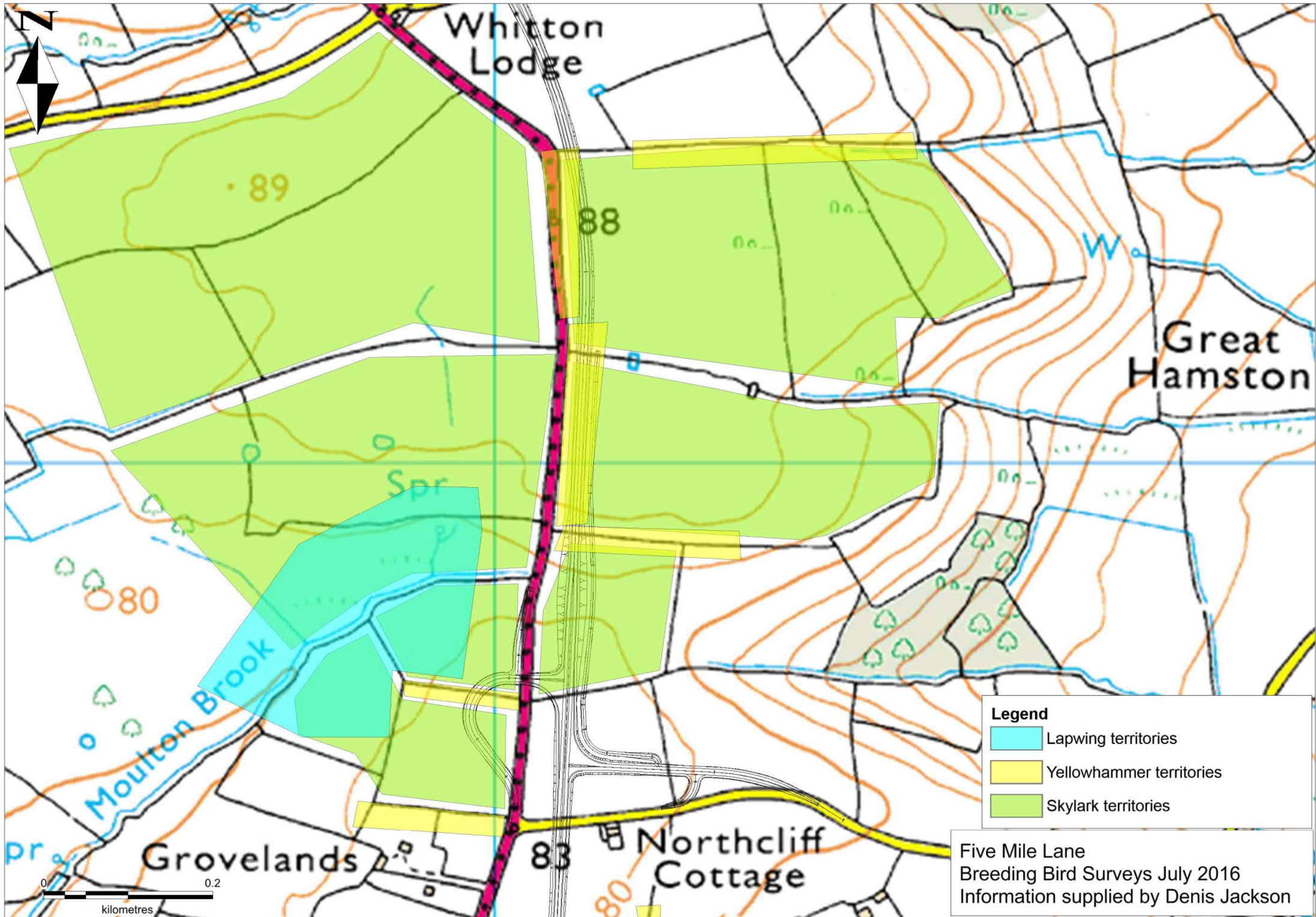
**FIGURE 1 – LOCATIONS OF KEY SPECIES  
EXHIBITING BREEDING BEHAVIOUR**

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**Legend**

- Lapwing territories
- Yellowhammer territories
- Skylark territories

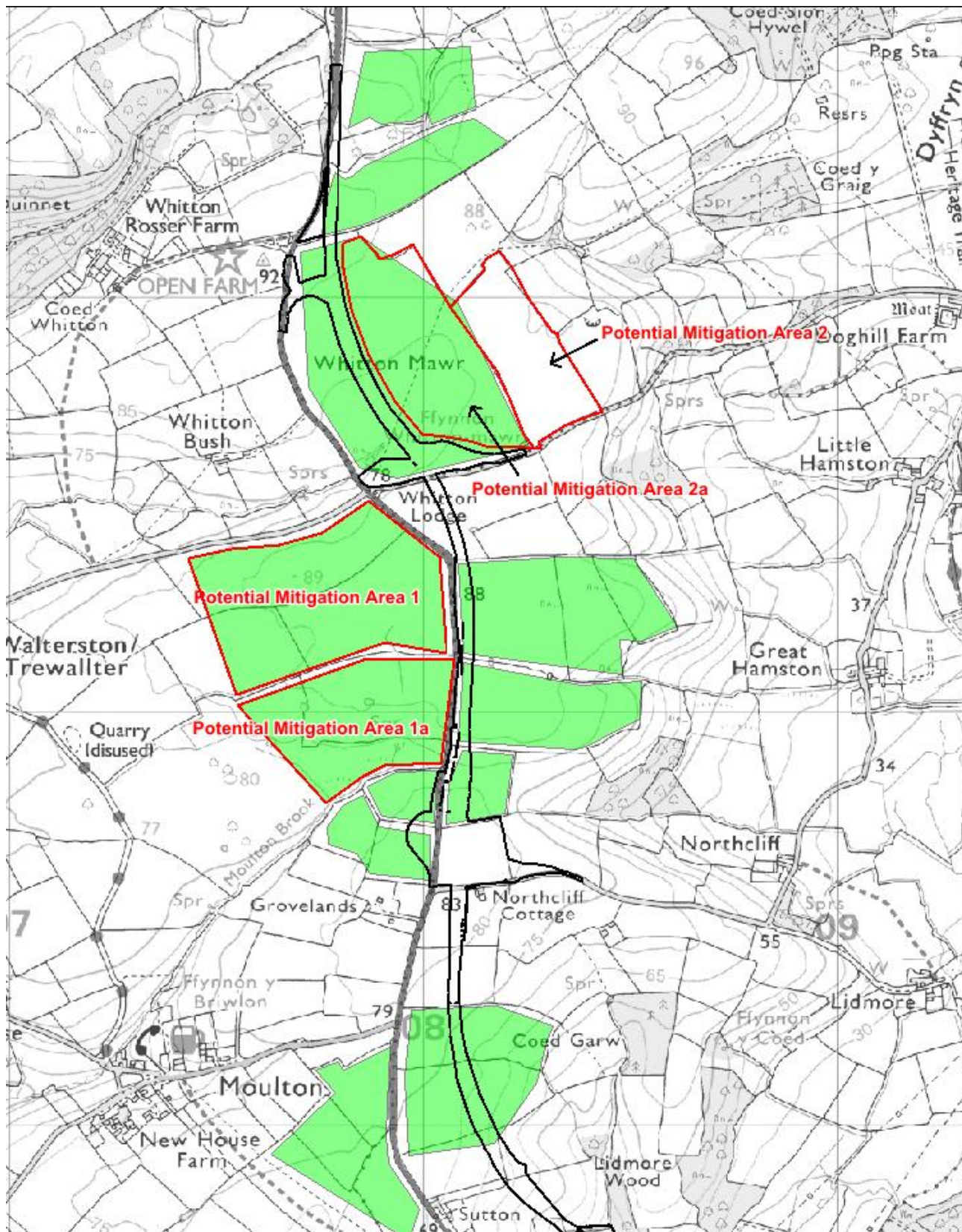
Five Mile Lane  
Breeding Bird Surveys July 2016  
Information supplied by Denis Jackson

APPENDIX B-2

**FIGURE 2 – POTENTIAL SKYLARK MITIGATION  
AREAS**

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Green areas denote lapwing territories recorded during the 2016 breeding bird surveys; areas outlined in red are considered the most suitable for lapwing enhancement.