

A417 Missing Link
TR010056

6.4 Environmental Statement
Appendix 8.2 Hedgerow Technical
Report

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APFP Regulation 5(2)(a)
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Procedure) Regulations 2009

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**The Infrastructure Planning
(Applications: Prescribed Forms
and Procedure) Regulations 2009**

A417 Missing Link

Development Consent Order 202[x]

**6.4 Environmental Statement
Appendix 8.2 Hedgerow Technical Report**

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Executive Summary

The proposed A417 Missing Link scheme (hereafter referred to as 'the scheme') aims to provide a dual carriageway to a stretch of single carriageway between the Cowley roundabout and Crickley Hill in Gloucestershire; the 5.5km section is the only remaining section of single carriageway. The scheme would increase capacity by creating a free-flowing link between the Brockworth Bypass and Cowley roundabout and remove the at-grade junction with the A436, resulting in a continuous flow between the M4 Junction 15 (Swindon) and the M5 Junction 11a (Gloucester/Cheltenham).

A total of 34 hedgerows were recorded within the survey area and were subject to further assessment due to likely impacts from the scheme. Twelve hedgerows were found to be species-rich, 10 species-poor intact, 9 were species-poor defunct and 3 hedgerows were not fully surveyed, due to access restrictions. Of the 31 hedgerows surveyed in this study, 13 were deemed to be important under the Hedgerow Regulations 1997.

Hedgerow composition was dominated by hawthorn throughout the survey area, abundant shrub species included blackthorn, field maple, rose species and hazel. Standard trees were largely ash and English oak.

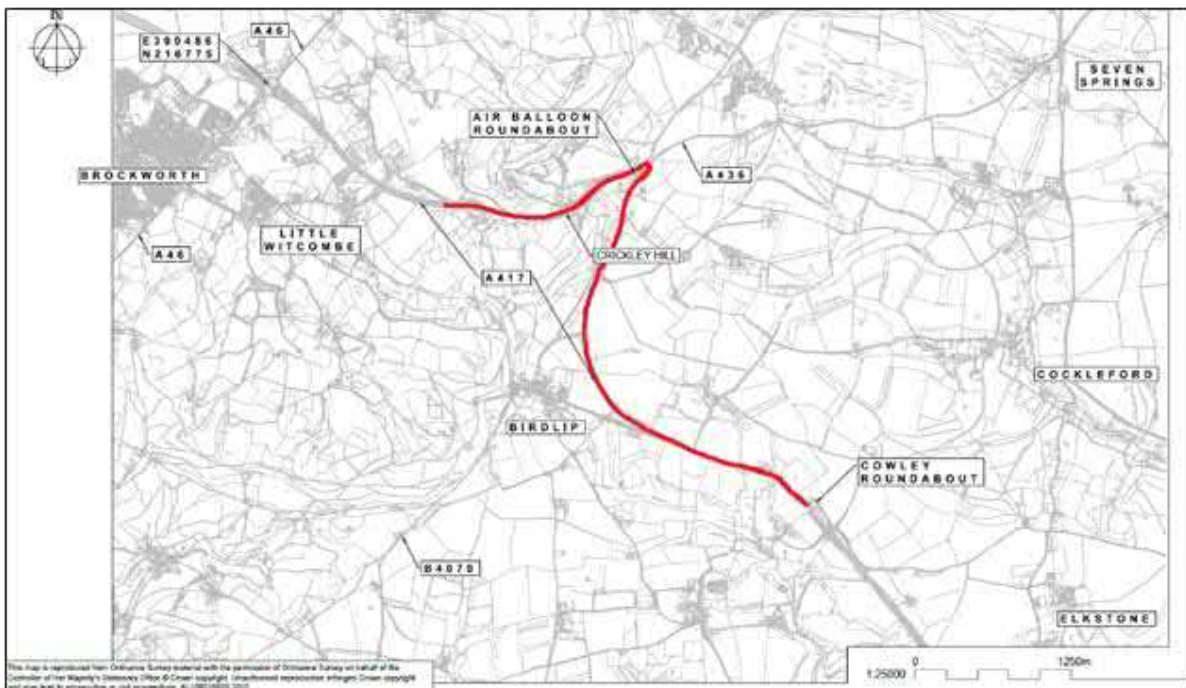
Hedgerows providing important linkages to streams and woodland were numerous throughout the survey area, suggesting that hedgerows within the study area are likely to contribute significantly to the landscape connectivity for wildlife movements and dispersal. Future impact assessment of these hedgerows should take into account this aspect of their distribution in relation to the scheme proposals.

1. Introduction

1.1. Background

- 1.1.1. The A417/A419 provides an important link between the Midlands/North and South of England, between Gloucester and Swindon, and as an alternative to the M5/M4 route via Bristol. The section of the A417 near Birdlip, known as the 'missing link', forms the only section of single carriageway along the route, with an at-grade junction located at the 'Air Balloon' public house. The single carriageway is located between the Cowley roundabout and the base of Crickley Hill, a 5.5km stretch shown on Figure 1.1 below.

Figure 1.1: A417 Missing Link Scheme Location Plan



Source: GiGi GIS Portal. Crown Copyright 2016 100030649

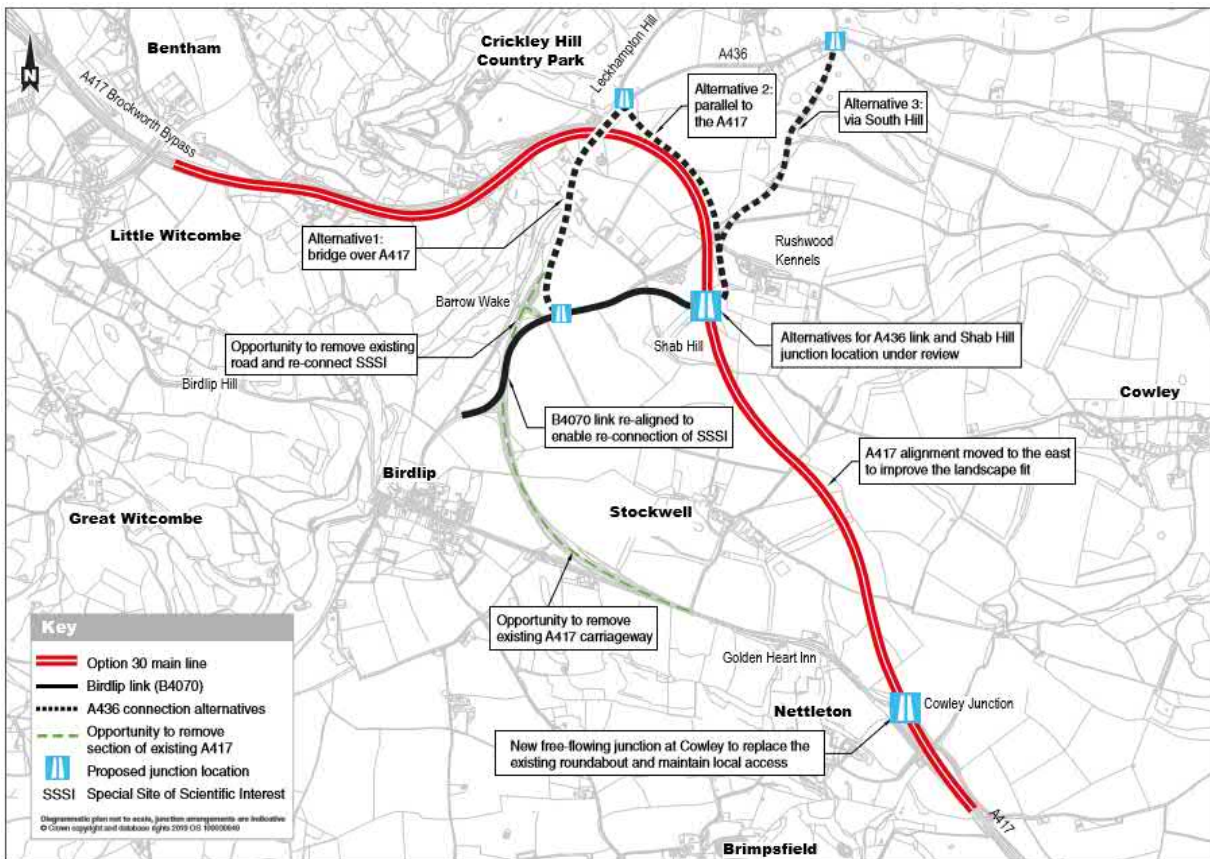
1.2. Scheme Proposal

- 1.2.1 The proposed scheme would provide a dual carriageway to improve the current Missing Link section of single carriageway of the A417 between Cowley roundabout and Crickley Hill.
- 1.2.2 Any proposed scheme would aim to increase capacity by creating a free-flowing link between the Brockworth Bypass and the Cowley roundabout and remove the at-grade junction with the A436 (Air Balloon roundabout). This Missing Link will provide a free-flowing journey between Swindon (M4 Junction 15) and Gloucester / Cheltenham (M5 Junction 11).

1.2.3 The preferred route for the Scheme was confirmed as Option 30 by the Secretary of State in March 2019 (see Figure 2.1 below). The Scheme comprises the construction of a new dual carriageway to replace the existing single carriageway section between Brockworth bypass and Cowley Roundabout. It is predominately an “offline” Scheme but approximately a third of the route follows the existing A417 route corridor at Crickley Hill.

1.2.4 A new link road would be built between the slip road junction at Shab Hill and the existing A417 to connect traffic to and from Birdlip and the A436 with the new A417. This new link road would end in a new roundabout near Barrow Wake.

Figure 1.2: A417 Preferred Route Announcement



1.2.5 Figure 1.2 above shows how there are three A436 link road alternative connections. Alternative 2, parallel to the A417, is the selected route proceeded with for assessment in the Environmental Statement.

1.3. Scope of Report

1.3.1. The objectives of the report are:

- to collect and review the Phase 1 habitat survey to identify potential species rich hedgerows, and those connected to other notable features, for example ponds, woodland, other hedgerows
- to present the methods, constraints and results of the hedgerow assessments, including the notable herb layer species for those hedgerows thought to be species rich
- to assess the importance of the hedgerows, specifically whether hedgerows are considered 'important' under the Hedgerow Regulations (1997) and whether they are species rich

1.4. Study Area

1.4.1. Guidance on ecological assessments recommends that all ecological features that occur within a zone of influence (Zoi) for a proposed scheme are investigated (CIEEM, 2016)¹. The potential Zoi includes:

- areas to be directly within the land take for the proposed scheme
- areas that would be temporarily affected during construction

1.5. Legislation

1.5.1. The Hedgerow Regulations 1997 protect important hedgerows from damage or destruction. The key principle of the hedgerow regulations is that those in the countryside are often ancient features that have been part of the landscape for many centuries. Their age, combined with the fact that they are valuable assets in ecological terms, means that important hedgerows merit a degree of protection.

1.5.2. The removal of countryside hedgerows (excluding garden hedges) is prohibited without first submitting a hedgerow removal notice to the local planning authority (LPA). In considering the removal notice, the LPA can order the retention of 'important' hedgerows. The regulations set out the criteria under which hedgerows are considered important.

1.5.3. A hedgerow is defined within the Hedgerow Survey Handbook² as 'any boundary line of trees or shrubs over 20 metres long and less than 5 metres wide at the base, provided that at 1 time the trees and shrubs were more or less continuous'. This includes shrubby hedgerows; lines of trees and very gappy

¹ Chartered Institute of Ecology and Environmental Management (2016) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal

² Defra (2007) *Hedgerow Survey Handbook: A standard procedure for local surveys in the UK*. Defra, London

hedgerows, where each section may be less than 20 metres long, but the gaps are less than 20 metres.

- 1.5.4. For the purposes of the Hedgerow Regulations 1997, a hedgerow is classified as 'important' if it, or the hedgerow of which it is a stretch:
- has existed for 30 years or more
 - satisfies at least 1 of the criteria listed in Part II of Schedule 1. This criterion is presented in Appendix A
- 1.5.5. All native hedgerows (including species-poor ones) are listed under Section 41 of the Natural Environment and Rural Communities (NERC) Act 2006 and are considered to be of high conservation value.
- 1.5.6. Species-rich hedgerows are defined as those containing an average of 5 or more native woody species (or at least 4 in northern and eastern England, upland Wales and Scotland) per 30 metres length.

1.6. Status of hedgerows at the national level

- 1.6.1. Historically, hedgerows were listed as a UK Biodiversity Action Plan (BAP) habitat and are now listed as a habitat of 'principal importance for the conservation of biodiversity in England' under Sections 41 and 42 of the NERC Act 2006.
- 1.6.2. Hedgerows over 20 metres in length that are composed of at least 80% of 1 or more UK native species are classed as a UK habitat of principal importance. Hedgerows fulfilling this criteria will also be less than 5 metres wide and have gaps of less than 20 metres between tree or scrub species³.

1.7. Status of hedgerows at the county level

- 1.7.1. Although the UK BAP has been superseded, BAPs are still widely used at county level to support Biodiversity 2020⁴. Species rich hedgerows and ancient hedgerows are listed as an "Action Plan Habitat" within the Biodiversity action plan for Gloucester as produced by the Gloucester Local Nature Partnership which describes BAP actions to halt the net loss of biodiversity⁵.

³ Bickmore, C.J. (2002) Hedgerow survey handbook: a standard procedure for local surveys in the UK. London, DEFRA.

⁴ Defra (2011) *Biodiversity 2020: A strategy for England's wildlife and ecosystem services* [online] available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/69446/pb13583-biodiversity-strategy-2020-111111.pdf

⁵ Biodiversity Plan for Gloucestershire. Gloucester Local Nature Partnership 2000.

2. Methodology

2.1. Desk study

2.1.1. The aims of the desk study with specific regard to hedgerows, was to identify all hedgerows directly impacted by the scheme. Therefore, all hedgerows within the present red line boundary were identified using the Phase 1 habitat maps, online databases and aerial images. The following databases were used to extract the required information outlined above:

- Google Maps⁵
- Multi-Agency Geographic Information for the Countryside (MAGIC) website⁶

2.1.2. All hedgerows were then individually numbered using a sequential numerical referencing system to identify them for surveying. Hedgerows less than 20 metres in length or with gaps of more than 20 metres in length, were not classed as hedgerows and were not highlighted for surveying. Appendix B displays the locations of all hedgerows.

2.1.3. The historic importance of hedgerows within 50 metres of the scheme was reviewed using maps indicating pre-1850s parish boundaries. Hedgerows which form historic field patterns are discussed in Section 3.1 of this report.

2.2. Hedgerow assessment

2.2.1. All hedgerows that fall or partly fall within the scheme and a surrounding 50 metre buffer from the red line scheme boundary were surveyed to comply with the requirements of the 'Wildlife and Landscape Criteria' in the Hedgerow Regulations 1997. Areas considered as 'within the scheme' are as follows:

- areas to be directly within the land take for the scheme and access
- areas that would be temporarily affected during construction
- areas likely to be impacted by hydrological disruption
- areas where there is a risk of pollution and noise disturbance during construction or operation

⁵ Biodiversity Plan for Gloucestershire. Gloucester Local Nature Partnership 2000. co.uk/" <https://maps.google.co.uk/> (last accessed April 2018)

⁶ Defra (2018) Multi-Agency Geographic Information for the Countryside [online] available at: <http://magic.defra.gov.uk/> (last accessed April 2018)

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- 2.2.2. Each survey was completed by 2 experienced ecologists with experience of undertaking botanical and hedgerow surveys. As part of this survey, the hedgerows were identified and mapped in accordance with the Hedgerow Regulations 1997. Species lists were compiled and any signs of fauna noted. An 8-digit grid reference was taken at the start and end points of each hedgerow using the British National Grid Ordnance System.
- 2.2.3. To ensure quantifiable lengths of hedgerow were surveyed; end points were defined as stated in the Hedgerow Survey Handbook. These were identified as where there was a connection to another feature (for example, hedge, road, wall or fence), a gap of 20 metres or more, or a link to woodland or other semi-natural habitat.
- 2.2.4. Hedgerow surveys were undertaken on each hedgerow within the area of the scheme and within a 50 metre buffer. Thirty-one hedgerows were surveyed in June 2019 to assess their quality and determine the importance of hedgerows present within the survey area. Optimal timing for hedgerow surveys is between May- July, when the woody vegetation is fully in leaf and woodland ground flora can be easily identified.
- 2.2.5. The hedgerows within the survey are shown in Appendix B.1. With results maps contained in Appendix B.2. Photographs of surveyed hedgerows are shown in Appendix C.
- 2.2.6. The primary and most important criteria for determining whether a hedgerow is covered by the regulations is the number of woody species within the surveyed section. Woody species are defined as those listed in Schedule 3 of the Hedgerow Regulations 1997 and are essentially those tree and shrub species that are indicative of an ancient hedgerow.
- 2.2.7. For the purposes of this assessment, each hedgerow was sampled in typical 30 metre sections in accordance with the guidance outlined within Schedule 1 Part II of the Hedgerow Regulations 2007:
- length of the hedgerow does not exceed 30 metres, whole hedgerow surveyed
 - hedgerow exceeds 30 metres, but not exceeding 100 metres, central stretch of 30 metres surveyed
 - hedgerow exceeding 100 metres, but not exceeding 200 metres, central 30 metres stretch within each half of the hedgerow surveyed
 - hedgerow exceeding 200 metres, central 30 metres stretch within each third of the hedgerow surveyed
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- 2.2.8. The woody species relevant to the Hedgerow Regulations 1997 present in each section were recorded, along with any additional woody species. This included both those not in any of the 30 metre sections but present in the rest of the length and additional woody species that are not relevant to the hedgerow regulations assessment, for example sycamore *Acer pseudoplatanus* and cherry laurel *Prunus laurocerasus*.
- 2.2.9. An estimation of individual woody species was assessed using the DAFOR scale (a simple qualitative plant abundance cover classification system) from, as follows:
- D: Dominant- comprises most of the community
 - A: Abundant -very frequent in the community but not dominant
 - F: Frequent- frequently seen in the community
 - O: Occasional- seen but not frequently occurring
 - R: Rare- hardly ever found
- 2.2.10. The secondary set of criteria that are assessed relate to the whole hedgerow, not just the 30 metre section surveyed. Ground flora within the whole hedge and within 1 metre of the outermost edges of the hedge was recorded. The number of woodland species relevant to the Hedgerow Regulations 1997 was counted as 3 or more constitute an associated feature. Woodland species are listed in Schedule 2 of the Hedgerow Regulations 1997, and are plant species that, because of the conditions that they grow in, indicate an ancient hedgerow. Additional features such as ditches, walls, banks, parallel hedges, connections and standard and rare trees were also recorded.

2.3. Survey Constraints

- 2.3.1. It was not possible to survey some areas within the survey extent; this is largely due to limited or irregular land access. This includes hedgerows 7,8 and 10 which were not surveyed due to denied land access. Hedgerow 9 was partially surveyed from accessible land and all other remaining hedgerows with granted land access have had surveys carried out.
- 2.3.2. Field surveys were restricted to locations where landowners granted permission, and therefore it was not possible in all instances to survey the hedgerows from both sides in accordance with best practice. In addition, in some areas, vegetation prevented surveyors from accessing both sides of a hedgerow. Nevertheless, it is considered that sufficient data has been collected for hedgerow evaluation and an accurate representation of the species was

obtained, and therefore this is unlikely to have detracted from the reliability of results.

- 2.3.3. This report is based on the scheme information obtained at the time of the appraisal. If the design is subject to significant change then an updated report with associated surveys may be required.

3. Results

3.1. Desk study

3.1.1. Multiple hedgerows within 50 metres of the scheme are recorded within historic mapping, dating back to 1882. This includes ancient hedgerows bordering fields, tracks, and roads. Hedgerows H28 and H30 border a historic parish boundary at the site of the route of the Roman Road. The route of the present day A417 is congruous with this historic settlement boundary, it is therefore likely that hedgerows lying adjacent to the A417 route will be historic in nature. Similarly, historic by-ways through the Shab Hill and Stockwell are well documented on historic mapping, indicating their long-established presence within the landscape, hedgerows H12, H16a, H16, H17, H21, H22, H23, H24 and H29 fall at these historic boundaries.

3.2. Field assessment

- 3.2.1. A total of 34 hedgerows were recorded within the survey area and were subject to further assessment. Twelve hedgerows were found to be species-rich, 10 species-poor intact, 9 were species-poor defunct and 3 hedgerows were not fully surveyed, due to access restrictions. Of the 31 hedgerows surveyed in this study, 13 were deemed to be important under the Hedgerow Regulations (Table 3.1).
- 3.2.2. To be classified as important, a hedgerow must be at least 30 years old and meet at least 1 of the 8 criteria set out in Schedule 1 of the Hedgerow Regulations 1997, summarised in appendix B.
- 3.2.3. Of the 12 species-rich hedgerows identified within the study area, 10 qualified as 'important' under the Hedgerow Regulations 1997 due to their wildlife and landscape value. An additional 3 hedgerows which were comprised of 4 woody species (species-poor intact) also qualified as important hedgerows due to their position adjacent to a "by-way open to all traffic" and additional features of biodiversity importance.
- 3.2.4. All hedgerows surveyed fall within the current design option, the hedgerow classifications and their locations regarding the current central route option are shown in Map 2 in Appendix B. All 'important' hedgerows and their reason for classification are detailed in Table 3.1 and the findings of all hedgerows surveyed are detailed in Table 3.2.

Table 3.1 Description of hedgerows qualifying as “important” under the Hedgerow Regulations 1997

Hedgerow Number	Land Parcel	Length	Species Rich	Important	Qualifying features
1	GR382246	136	Yes	Yes	At least 7 woody species listed through the length of the hedgerow, numerous woodland indicator flora
2	GR382246	220	Yes	Yes	Cross bill records within this hedgerow as identified
9	U00049	100	Yes	Yes	Hedge is older than 30 years, contains at least 6 woody species
12a	U00049	63	Yes	Yes	Hedge adjacent to a bridleway, foot path/road used by public, path/byway open to all traffic
17	GR159309	180	Yes	Yes	7 woody species and species rich woodland ground flora. Historic land boundary (pre1900). Hedge adjacent to a bridleway, foot path/road used by public, path/byway open to all traffic
17a	GR159309	100	No	Yes	Hedge adjacent to a bridleway, foot path/road used by public, path/byway open to all traffic + at least 4 woody species (from Schedule 3) + at least 2 of the features described in (a) to (g) above
22	GR159309	345	Yes	Yes	7 woody species present on a by-way open to all traffic
23	GR159309	225	Yes	Yes	6 woody species 3 features and Hedge adjacent to a bridleway, foot path/road used by public, path/byway open to all traffic
24	GR159309	675	No	Yes	4 species, 2 features and Hedge adjacent to a bridleway, foot path/road used by public, path/byway open to all traffic
27	U00120	130	Yes	Yes	Contains 6 woody species and 4 qualifying features
28	U00120	285	Yes	Yes	Demarks historic parish boundary, identified from 1882. 6 woody species with 3 features
29	GR159309	300	Yes	Yes	7 woody species but not technically a hedge as it forms part of the woodland
30	GR298558	308	Yes	Yes	7 woody Species

3.2.5. Of the 13 important hedgerows identified, 5 qualified as important due to their high species diversity (H1,H17,H22, H29 and H30) in which 7 woody species listed in Schedule 2 of the hedgerow regulations were present within the

hedgerow. A further hedgerow (H9) was identified due to its species richness in combination with landscape and wildlife features; particularly as the hedgerow contained a high proportion of standard trees and a diverse woodland ground flora.

- 3.2.6. Five of the important hedgerows were situated adjacent to a bridleway or by-way open to all traffic. Of these hedgerows, 3 (H17a, H24 and H23) would not have qualified as important hedgerows under additional criteria.
- 3.2.7. In addition, 1 hedgerow (H2) qualified as important due to records of common crossbill *Loxia curvirostra* at this location, all crossbill species are listed in Schedule 1 of the WCA 1981, fulfilling one criteria of an important hedgerow under the 1997 regulations. This hedgerow would not have qualified as important owing to any additional criteria.
- 3.2.8. Hedgerows form an important part of the character of a rural landscape. The landscape character within the study area is not homogenous and can roughly be categorised between the landscape to the west of the existing A417 route and those hedgerows lying to the east of the existing road. To the west and south of the existing road, remnants of ash dominated woodland are linked by relatively short hedgerows on steep foot slopes. Typically, the demarcation of these fields divide historic and presently used pastoral areas. To the east of the existing A417 the hedgerow configuration trends towards a more open landscape, set on more expansive fields at a markedly higher elevation to those in the west, with woodland linkages scant; traditional scrub hedgerows are often absent or defunct, replaced by ruderal banks, defunct stonewalls and post and wire fencing laced with bramble and hedge bindweed.
- 3.2.9. Mature standards trees (over 20 centimetres diameter at chest height) were heavily associated with the hedgerows to the west of the scheme, notably hedgerows H1, H2, H12a, H27, H28, H29 and H30. Mature and over-mature English oak *Quercus robur*, and ash *Fraxinus excelsior* standards were of bio-diversity value were present, the scrub bulk of these hedgerows tended to be hawthorn *Crataegus monogyna* dominant with abundant field maple *Acer campestre*, hazel *Corylus avellana* and blackthorn *Prunus spinosa*.
- 3.2.10. Hedgerows, which defined the boundary extents of Stockwell Farm tended to be distinct in character (H16a, 22 and 24), bearing the hallmark of historic agricultural boundaries. These hedgerows lacked a well-defined scrub layer and were dominated by standard tree planting; the species composition comprised mature and often well maintained standards of singular or few dominant species. In H16a, this comprised exclusively beech *Fagus sylvatica*, in H22 English Oak with ash and horse-chestnut *Aesculus hippocastanum* and at H24 mature poplar hybrids were planted alternately with semi-mature small leaved lime *Tilia*

cordata. Though the age and condition of the trees indicate their present arrangement and planting is likely to be post-war, historic maps dating from the 1880's indicate the presence of historic boundary demarking vegetation, increasing the cultural and aesthetic value of these hedgerows.

- 3.2.11. Among the traditional scrub dominated hedgerows present within the study area the dominant species were hawthorn and blackthorn. However, these species were rarely a monoculture and were frequently associated with stands of field maple, rose species *Rosa* sp. hazel, wild privet *Ligustrum vulgare* and crab apple *Malus sylvestris*. Guelder rose *Viburnum opulus*, dogwood *Cornus* sp., holly *Ilex aquifolium*, Swedish whitebeam *Sorbus intermedia* and wild service *Sorbus torminalis* were rare within the hedgerows themselves but well distributed throughout the study area. Within hedgerows which qualified as important due to particularly high species richness, hazel, rose species, field maple and dominant hawthorn or blackthorn were noted to be growing within the shrub layer at varying heights at one given location, resulting in a dense appearance to the hedgerow body, with layers of species contributing to a well-defined structure.
- 3.2.12. The ground flora present fell into 2 broad categories; hedgerow with woodland ground flora (often more frequent to the west of the existing road) and species poor grassland fragments adjacent to intense arable agriculture. Hedgerows H1, H2, H9, H17, H17a, H27 and H28 comprised well distributed woodland species; lords and ladies *Arum maculatum*, lesser stitchwort *Stellaria graminea*, wood avens *Geum urbanum*, hedgerow cranesbill *Geranium pyrenaicum*, enchanter's nightshade *Circaea lutetiana*, dog's mercury *Mercurialis perennis*, herb Robert *Geranium robertianum*, primrose *Primula vulgaris* and native bluebell *Hyacinthoides non-scripta* were noted. In areas of frequent water pooling within H1 and H2, pendulous sedge *Carex pendula* was locally abundant. Lining the other hedgerows, ground flora tended to be poor and indicative of an enriched sward; narrow grassland strips dominated by cocks-foot *Dactylus glomerata*, hedge bindweed *Calystegia sepium*, false oat grass *arrhenatherum elatius* with stands of common nettle *Urtica dioica* and common ragwort *Senecio jacobaea* were present. An exception was H12a and H18-20, where crested dog's tail *Cynosurus cristatus*, and sweet vernal grass *Anthoxanthum odoratum* dominated, denoting the base-rich nature of the underlying soils.
- 3.2.13. Hedgerows can form important connections to wildlife landscape features; for example, rivers, streams, ponds and woodland. Within the studied area 2 hedgerows (H1 and H2) bordered streams, no hedgerows within the study area were directly (or within 20 metres of) a pond or wetland. Ten hedgerows linked with woodland habitat; H1, H2, H3, H4, H12a, H22, H27, H28, H29 and H30.

3.2.14. During the hedgerow surveys observations of notable fauna or signs of fauna were noted by surveyors. A stoat *Mustela erminea* was observed on the roadside bank adjacent to Hedgerow 16. Bird species such as yellowhammer *Emberiza citrinella* and goldfinch *Carduelis carduelis* were observed within the hedgerow 17. Hedgerow 18 is congruous to a reptile survey site where adder *Vipera berus* presence has been confirmed during 2019 surveys.

Table 3.2 Surveyed Hedgerows

	Species Rich	Important	(a) A bank or wall which supports the hedgerow along at least half of its length	(b) Gaps which aggregate do not exceed 10% of length of hedgerow	(c) Where the length of the hedgerow does not exceed 50m, at least one standard tree	(d) Where the length of the hedgerow exceeds 50m but does not exceed 100m, at least 2 standard trees	(e) Where the length of the hedgerow exceeds 100m, such number of standard trees (within a part of its length) as would be averaged over its total length amount at least one for each 50m	(f) At least 3 woodland species (Schedule 2) within one metre, in any direction, of the outermost edges of the hedgerow	(g) A ditch along at least one half of the length of the hedgerow	(h) Connections scoring 4 points or more in accordance with sub-paragraph (5)	(i) A parallel hedge within 15m of the hedgerow	Hedge older than 30 years?	Does hedge currently support or have desk study records of spp protected in Schedules 1, 5 or 8 of the WACA, or red data book species for 2007 to date.	Does the hedge include at least 7 woody species (from Schedule 3)	Does the hedge include at least 6 woody species (from Schedule 3) + 3 features listed overleaf?	Does the hedge include at least 6 woody species (from Schedule 3), including native black poplar small or large lvd lime or service tree?	Does the hedge include at least 5 woody species (from Schedule 3) + four features listed overleaf?	Hedge adjacent to a bridleway, foot path/road used by public, path/byway open to all traffic + at least 4 woody species (from Schedule 3) + at least 2 of the features described in (a) to (g) above.
1	1	1					1	1	1	1		1		1			1	
2	1	1					1	1	1	1		1		1				
3			1		1					1	1		1					
4				1	1					1								
5			1				1	1										
6					1						1							
7																		
8																		
9	1	1		1		1			1			1			1			
10																		
11																		
12																		
12a	1	1		1			1					1						1
13							1					1						
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16a							1	1			1	1						
17	1	1						1			1	1		1				1
17a		1	1								1	1						1
18																		
19																		
20	1			1		1						1						
21	1		1	1	1													
22	1	1								1		1		1				
23		1		1						1	1	1						1
24		1					1				1	1						1
25																		
26																		
27	1	1			1				1	1		1			1			
28	1	1					1			1		1			1			
29	1	1		1							1	1		1				
30	1	1									1	1		1				
Total	12	13	5	7	5	2	8	5	3	8	8	20	1	5	4	0	1	5

4. Conclusion

- 4.1.1. Field surveys were undertaken in July 2019, 34 hedgerows were identified within 50m of the red line boundary of the scheme. Thirty-one of these hedgerows were subject to field survey at this time.
- 4.1.2. Hedgerows were assessed against their species diversity, and the criteria as set out within the Hedgerow regulations.
- 4.1.3. Of the 34 hedgerows identified 31 were surveyed in the field, 3 could not be assessed due to access permissions. It is recommended that future surveys are undertaken to complete these surveys, when access permission is granted.
- 4.1.4. Of the 31 hedgerows surveyed, 9 were found to be defunct, comprising either post-or wire fencing or fallen stonewalls which had been colonised by ruderal plants such as bramble, nettle and bindweed species.
- 4.1.5. The surveys identified 13 important hedgerows within the study area, 10 of these hedgerows qualified as important, predominantly due to their species-rich composition. A further 3 hedgerows qualified due to a moderate species richness combined with their prominent landscape position, adjacent to bridle ways and by-ways open to all traffic.
- 4.1.6. Species rich (containing over 5 species/30 metres) hedgerows were also mapped. A total of 12 species rich hedgerows were identified within the study area. Hedgerows providing important linkages to streams and woodland were numerous throughout the survey area, suggesting that hedgerows within the study area are likely to contribute significantly to the landscape connectivity for wildlife movements and dispersal. Future impact assessment of these hedgerows should take into account this aspect of their distribution in relation to the scheme proposals.
- 4.1.7. Hedgerow composition was dominated by hawthorn throughout the survey area, abundant shrub species included blackthorn, field maple, rose species and hazel. Standard trees were largely ash and English oak.
- 4.1.8. The survey area encompasses a historic rural landscape, with historic parish boundaries and agricultural estates evident on historic mapping resources. Hedgerows within the study area form part of these historic boundaries and would also be afforded protection as important hedgerows due to their cultural and aesthetic importance.

Appendix A: Criteria for Important Hedgerow

Accompanying notes for Hedgerows Regulations 1997 record sheet

A hedgerow may be classified as ‘important’ for archaeological/historical reasons, or according to Wildlife and Landscape criteria. To be classified as ‘important’ under the Wildlife and Landscape criteria, the hedgerow must be over 30 years old and should comprise 1 of the following:

- *at least 7 woody species/30m
- *at least 6 woody species/30m and at least 3 features
- *at least 6 woody spp/30m including any one of Pn/Sot/Tic/Tip (see below)
- *at least 5 woody species and at least 4 features
- or if adjacent to a bridleway/footpath, at least 4 woody species and at least 2 features

*If the hedgerow is situated wholly or partly in 1 of the counties listed in Criteria 7 sub-paragraph (2) of the Regulations, the number of woody species should be reduced by 1.

Note that a hedgerow may also be classified as ‘important’ due to the presence or recorded presence of particular animal and plant species (see Criteria 6 sub-paragraphs (1)-(4) of the Regulations for details).

Table A.1: The woody species ‘recognised’ by the Hedgerows Regulations 1997 are listed below, along with the species codes to be used on the record sheet

Spp	Scientific name	English name	Spp	Scientific name	English code
Ac	<i>Acer campestre</i>	Field Maple	Pa	<i>Prunus avium</i>	Wild Cherry
Ag	<i>Alnus glutinosa</i>	Alder	Pp	<i>Prunus padus</i>	Bird Cherry
Bpe	<i>Betula pendula</i>	Silver Birch	Ps	<i>Prunus spinosa</i>	Blackthorn
Bpu	<i>Betula pubescens</i>	Downy Birch	Pyc	<i>Pyrus communis</i>	Pear
Bxs	<i>Buxus sempervirens</i>	Box	Qp	<i>Quercus petraea</i>	Sessile Oak
Cb	<i>Carpinus betulus</i>	Hornbeam	Qr	<i>Quercus robur</i>	Pedunculate Oak
Cos	<i>Cornus sanguinea</i>	Dogwood	Rc	<i>Rhamnus cathartica</i>	Buckthorn
Ca	<i>Corylus avellana</i>	Hazel	Ruv	<i>Ribes uva-crispa</i>	Gooseberry
Cla	<i>Crataegus laevigata</i>	Midland Hawthorn	Ros	<i>Rosa sp(p)</i>	Rose
Cm	<i>Crataegus monogyna</i>	Hawthorn	Rac	<i>Ruscus aculeatus</i>	Butcher’s-broom
Cys	<i>Cytisus scoparius</i>	Broom	Sx	<i>Salix sp(p)</i>	Willow
Dl	<i>Daphne laureola</i>	Spurge-laurel	Sxv	<i>Salix viminalis</i>	Osier
Ee	<i>Euonymus europaeus</i>	Spindle	Sn	<i>Sambucus nigra</i>	Elder
Fs	<i>Fagus sylvatica</i>	Beech	Sac	<i>Sorbus aucuparia</i>	Rowan
Fa	<i>Frangula alnus</i>	Alder Buckthorn	Sor	<i>Sorbus sp(p)</i>	Whitebeam
Fe	<i>Fraxinus excelsior</i>	Ash	Sot	<i>Sorbus torminalis</i>	Wild Service-tree
Hr	<i>Hippophae rhamnoides</i>	Sea-buckthorn	Tb	<i>Taxus baccata</i>	Yew
la	<i>Ilex aquifolium</i>	Holly	Tic	<i>Tilia cordata</i>	Small-leaved Lime

Spp	Scientific name	English name	Spp	Scientific name	English code
Jr	<i>Juglans regia</i>	Walnut	Tip	<i>Tilia platyphyllos</i>	Large-leaved Lime
Jc	<i>Juniperus communis</i>	Common Juniper	Ue	<i>Ulex europaeus</i>	Gorse
Liv	<i>Ligustrum vulgare</i>	Wild Privet	Ug	<i>Ulex gallii</i>	Western Gorse
Ms	<i>Malus sylvestris</i>	Crab Apple	Umi	<i>Ulex minor</i>	Dwarf Gorse
Pal	<i>Populus alba</i>	White Poplar	Um	<i>Ulmus sp(p)</i>	Elm
Pn	<i>Populus nigra sub-species betulifolia</i>	Black-poplar	VI	<i>Viburnum lantana</i>	Wayfaring-tree
Pot	<i>Populus tremula</i>	Aspen	Vop	<i>Viburnum opulus</i>	Guelder Rose
Pcan	<i>Populus x canescens</i>	Grey Poplar			

Table A.2: Woody species recorded in hedgerows but not recognised as such by Hedgerows Regulations 1997

Spp code	Scientific name	English name
Ah	<i>Aesculus hippocastanum</i>	Horse-chestnut
Ap	<i>Acer pseudoplatanus</i>	Sycamore
Cs	<i>Castanea sativa</i>	Sweet Chestnut
Pd	<i>Prunus domestica</i>	Wild Plum
	<i>Prunus laurocerasus</i>	Cherry Laurel
Tie	<i>Tilia x europaea</i>	Lime

The presence of a number of features along a hedgerow influences the classification under the Regulations. The terms used on the record sheet are explained in Table A.3 below, and their presence is indicated by a '✓'.

Table A.3: Terms used on the record sheet

Term	Description
Bank/wall	The hedgerow is supported along at least half of its length by a bank/wall.
Intact	The hedgerow contains less than 10% gaps along its length.
Trees	The hedgerow supports at least 1 standard tree per 50m length (standard trees are defined as those which when measured at 1.3m above ground level have a diameter of at least 20 cm, or 15 cm for multi-stemmed trees).
3 flora spp	The hedgerow supports at least 3 of the valuable ground flora species defined by the Regulations. The hedgerow is considered to support a plant if it is rooted within 1m (in any direction) of the hedgerow.
Ditch	There is a ditch along at least half of the length of the hedgerow.
Connections ≥ 4 points	A hedgerow must score 4 or more 'connections points'. Connections with an adjoining hedgerow(s) score 1 point each and a connection with a pond or woodland (in which the majority of the trees are broad-leaved) scores 2 points each. A hedgerow is considered to be connected if it meets the feature or if it has a point within 10m of it and would meet it if the line of the hedgerow continued.
Parallel hedge	A parallel hedgerow is present within 15m.

An explanation of additional terms used on the Hedgerow Regulations record sheet are contained in Table A.4.

Table A.4: Additional terms used on the Hedgerow Regulations record sheet

Term	Description
Hedge No.	Hedgerow Number (within survey area/ site)
Important	Is the hedgerow classified as 'important' under the Hedgerows Regulations?
Bridleway/path	The hedgerow runs parallel to a designated bridleway/footpath.
Pn/Sot/Tic/Tip	The presence of these trees within the hedgerow influences the classification. An explanation of the species codes is shown above.
Woody species	A list of the woody species found along the hedgerow (this is likely to list more species than are present along 30 m length(s)).
Ground flora spp	Any dominant and/or notable ground flora species recorded along the hedgerow.

Table A.5: Valuable ground flora species with regard to the Hedgerows Regulations 1997

Spp code	Scientific name	English name
Amos	<i>Adoxa moschatellina</i>	Moschatel
Ajr*	<i>Ajuga reptans</i>	Bugle
Alu*	<i>Allium ursinum</i>	Ramsons
An*	<i>Anemone nemorosa</i>	Wood Anemone
Amac	<i>Arum maculatum</i>	Lord's-and-Ladies
Aff*	<i>Athyrium filix-femina</i>	Lady-fern
Bsp*	<i>Blechnum spicant</i>	Hard-fern
Bs*	<i>Brachypodium sylvaticum</i>	False Brome
Bram	<i>Bromopsis ramosa</i>	Hairy Brome
Clat	<i>Campanula latifolia</i>	Giant Bellflower
Ctra	<i>Campanula trachelium</i>	Nettle-leaved Bellflower
Cxsy	<i>Carex sylvatica</i>	Wood Sedge
Cl*	<i>Circaea lutetiana</i>	Enchanter's Nightshade
Cmaj	<i>Conopodium majus</i>	Pignut
Daff	<i>Dryopteris affinis</i>	Scaly Male-fern
Dcar	<i>Dryopteris carthusiana</i>	Narrow Buckler-fern
Dfm	<i>Dryopteris filix-mas</i>	Male-fern
Ehel	<i>Epipactis helleborine</i>	Broad-leaved Helleborine
Esyl	<i>Equisetum sylvaticum</i>	Wood Horsetail
Eamy	<i>Euphorbia amygdaloides</i>	Wood Spurge
Fgig	<i>Festuca gigantea</i>	Giant Fescue
Fv*	<i>Fragaria vesca</i>	Wild Strawberry
Godo	<i>Galium odoratum</i>	Woodruff
Gsx*	<i>Galium saxatile</i>	Heath Bedstraw
Gro*	<i>Geranium robertianum</i>	Herb-Robert
Gu*	<i>Geum urbanum</i>	Wood Avens
Hn*	<i>Hyacinthoides non-scripta</i>	Bluebell
Lgal	<i>Lamiastrum galeobdolon</i>	Yellow Archangel
Lsqu	<i>Lathraea squamaria</i>	Toothwort
Ls*	<i>Luzula sylvatica</i>	Greater Wood-rush
Lnem	<i>Lysimachia nemorum</i>	Yellow Pimpernel
Mpra	<i>Melampyrum pratense</i>	Common Cow-wheat
Msyl	<i>Melampyrum sylvaticum</i>	Small Cow-wheat
Muni	<i>Melica uniflora</i>	Wood Melick

Spp code	Scientific name	English name
Mp*	<i>Mercurialis perennis</i>	Dog's Mercury
Meff	<i>Milium effusum</i>	Wood Millet
Omas	<i>Orchis mascula</i>	Early –purple Orchid
Oxa*	<i>Oxalis acetosella</i>	Wood Sorrel
Pqua	<i>Paris quadrifolia</i>	Herb Paris
Psco	<i>Phyllitis scolopendrium</i>	Hart's-tongue
Pnem	<i>Poa nemoralis</i>	Wood Meadow-grass
Pvul	<i>Polypodium vulgare</i>	Polypody
Pacu	<i>Polystichum aculeatum</i>	Hard Shield-fern
Pset	<i>Polystichum setiferum</i>	Soft Shield-fern
Pere	<i>Potentilla erecta</i>	Tormentil
Pste	<i>Potentilla sterilis</i>	Barren Strawberry
Pela	<i>Primula elatior</i>	Oxlip
Pvul	<i>Primula vulgaris</i>	Primrose
Raur	<i>Ranunculus auricomus</i>	Goldilocks Buttercup
Sne*	<i>Sanicula europaea</i>	Sanicle
Tsn*	<i>Teucrium scorodonia</i>	Wood Sage
Vmon	<i>Veronica montana</i>	Wood Speedwell
Vodo	<i>Viola odorata</i>	Sweet Violet
Vrei	<i>Viola reichenbachiana</i>	Early Dog-violet
Vriv	<i>Viola riviniana</i>	Common Dog-violet

* Denotes code taken from Phase 1 handbook.

The remaining species have not been given a code under Phase 1. To make up a code, use the first letter of the genus and first 3 letters of the specific epithet (for sedges use 'Cx').

Below are species codes for other species often found in hedgerows, with their codes as stated in Phase 1 handbook. The table suggests some of the possible dominant species for the recording table above, but is not exclusive. If any Ancient Woodland Indicators (AWI) are encountered (some are included below and marked 'AWI') which are not dominant and not listed as valuable under the Hedgerow Regulations, they should be included in the 'notes' section, not in the 'notables' section.

Table A.6: Ground flora recorded in hedgerows but not recognised as such by Hedgerows Regulations 1997

Spp code	Scientific name	English name
`	<i>Arrhenatherum elatius</i>	False Oat-grass
Apet	<i>Alliaria petiolata</i>	Garlic Mustard
Aste	<i>Anisantha sterilis</i>	Barren Brome
Asy*	<i>Anthriscus sylvestris</i>	Cow Parsley
Car*	<i>Cirsium arvense</i>	Creeping Thistle
Cxrm AWI	<i>Carex remota</i>	Remote Sedge
Ddl*	<i>Dryopteris dilatata</i>	Broad Buckler-fern
Dp*	<i>Digitalis purpurea</i>	Foxglove
Fu*	<i>Filipendula ulmaria</i>	Meadowsweet
Gap*	<i>Galium aparine</i>	Cleavers
Gh*	<i>Glechoma hederacea</i>	Ground-ivy
Gmol	<i>Galium mollugo</i>	Hedge Bedstraw
Hh*	<i>Hedera helix</i>	Ivy
Hl*	<i>Holcus lanatus</i>	Yorkshire-fog
Hlup	<i>Humulus lupulus</i>	Hop

Spp code	Scientific name	English name
Ig*	<i>Impatiens glandulifera</i>	Indian Balsam
Lped	<i>Lotus pedunculatus</i>	Greater Bird's-foot-trefoil
Lpc*	<i>Lonicera periclymenum</i>	Honeysuckle
Ocro	<i>Oenanthe crocata</i>	Hemlock Water-dropwort
Cop* AWI	<i>Chrysosplenium oppositifolium</i>	Opposite-leaved Golden-saxifrage
Pt*	<i>Pteridium aquilinum</i>	Bracken
Pver	<i>Primula veris</i>	Cowslip
Rf*	<i>Rubus fruticosus agg.</i>	Bramble
Shol	<i>Stellaria holostea</i>	Greater Stitchwort
Ssyl	<i>Stachys sylvatica</i>	Hedge Woundwort
Hand AWI	<i>Hypericum androsaemum</i>	Tutsan
Ud*	<i>Urtica dioica</i>	Common Nettle
Vio	<i>Viola sp</i>	Violet species

Appendix B Survey Maps



Key to symbols

Legend

- Option 30 Scheme Extent (at time of survey)
- Hedgerow importance**
- Defunct
- No
- Unknown - couldn't be surveyed
- Yes

Rev	Date	Amendment Details	Drawn	Chk'd	App'd
P02	November 2019	Minor Revision of key	TJ	EA	SM
P01	July 2019	1st issue	TJ	EA	SM

Mott MacDonald Sweco



Client	highways england
Drawing Status	For Information
Suitability	S2


Project Title
A417 - Missing Link

Drawing Title
Hedgerow survey results 2019

Scale	Designed	Drawn	Checked	Approved	
Original Size A1	CD	TJ	EA	SM	
Date	JULY 2019	Date	JULY 2019	Date	JULY 2019

Drawing Number	Originator	Volume	Project Ref. No.
551505 - MMSJV	EBD	-	551505
000	DR	LB	00053
Location	Type	Role	Number
			P02

Appendix C Photographs


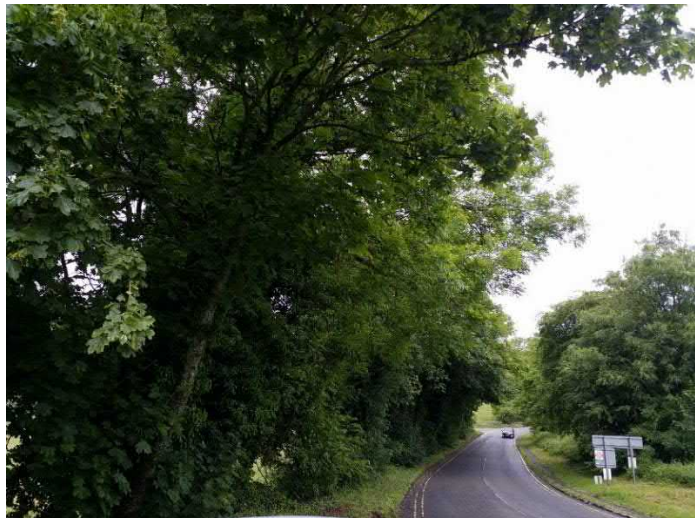

Hedgerow	Photograph
1	


2



3



4	 A photograph showing a grassy area with a large pile of dark mulch in the foreground. In the background, there are picnic tables and a wooden fence, surrounded by dense green trees and foliage.
5	 A photograph of a paved road winding through a dense forest. The trees are lush green, and the road curves to the right. A small sign is visible on the right side of the road.
6	 A photograph of a grassy field with a wooden fence in the foreground. The background is filled with dense green trees and foliage.




7	No access- survey not undertaken
8	No access- survey not undertaken
9	 <p>The first photograph shows a white flower with five petals and a yellow center, surrounded by lush green ferns and foliage. The second photograph shows a large, dense green bush with many leaves, some showing signs of insect damage or disease, set against a background of trees and a hillside.</p>
10	No access- survey not undertaken




11 and 12









12a








<p>13 Bund</p>	
<p>13</p>	
<p>14</p>	

<p>15</p>	
<p>16- Hedge not Present</p>	
<p>16- Windrow</p>	

17a	
17	
18	No photograph
19	

20	
21	 
22	No photograph

23	
24	
25	

26	
27	
28	No photographs

29	
30	No photographs