highways england

A303 Sparkford to Ilchester Dualling Scheme TR010036

9.16 Biodiversity Offsetting Metric

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Biodiversity Offsetting Metric

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Table of Contents

1 Introduction

1.1.1 The aim of this biodiversity offsetting metric is to present additional information to allow the competent authorities to determine the likely effect of the A303 Sparkford to Ilchester Dualling Scheme (the 'scheme') on biodiversity within the footprint on the scheme. The report sets out the pre-construction baseline of biodiversity units and the anticipated 'post construction' scenario, so that these values can be compared to demonstrate the likely change in biodiversity value resulting from the scheme.

2 Methodology

2.1 Baseline Survey Data

2.1.1 Calculations for the metric have included information from the Extended Phase 1 Habitat survey for which the results are documented within Appendix 8.2 National Vegetation Classification Technical Report (APP-075), and Appendix 8.3 Hedgerow Technical Report (APP-076), as explained below, within the scheme red line boundary (APP-100). Ecologists undertook an Extended Phase 1 Habitat survey between February and March 2016. Broad habitat types were identified and mapped in compliance with the Joint Nature Conservation Committee Handbook for Phase 1 Habitat Survey[1]. National Vegetation Classification (NVC) surveys were completed in April and July 2017, and hedgerow surveys in September and November 2017. It should be noted that this data was used to inform the original Environmental Statement submitted as part of the Development Consent Order (DCO) application in July 2018, and this report simply interprets this existing data in a different way.

2.2 Biodiversity Offsetting Metric

2.2.1 The metric used was created by Highways England[2] and adapted from Defra's biodiversity metric[3], a government-issued metric to measure losses and gains in biodiversity resulting from a development.

2.2.2 The aim of the metric is to assess the losses and gains of each habitat type recorded within the scheme red line boundary (APP-100), using biodiversity units. A biodiversity unit is a nominal figure that represents the distinctiveness, condition and size of a habitat. It should be noted that biodiversity units are not a value but are used to help assess whether a project will result in a loss or gain of biodiversity.

2.2.3 A habitat's distinctiveness is described as a collective measure of biodiversity including parameters such as species richness, diversity, rarity and the degree to which a habitat supports species rarely found in other habitats. A habitat can be designated a distinctiveness of high, medium, or low as per Table 2.1.

Table 2.1: Distinctiveness scores

Distinctiveness	Score
High	6
Medium	4
Low	2

[1] JNCC. 2010. Handbook for Phase 1 habitat survey: a technique for environmental audit.
[2] Highways England. 2018. Chief Highway Engineer Memorandum 422/18: Supporting Transparency around our Biodiversity Performance
[3] Department for Environment, Food and Rural Affairs (Defra). 2012a Technical Paper: the metric for the biodiversity offsetting pilot in England.
Defra. 2012. Biodiversity Offsetting: Guidance for Developers. Guidance for Offset Providers

2.2.4 Habitat condition is based on the quality of a habitat which can either be good, moderate or poor; based on the Farm Environment Plan (FEP) Manual[4], as per Table 2.2 below.

Table 2.2: Condition scores

Number of condition criteria matched	Condition	Score
3	Good	3
2	Moderate	2
1	Poor	1
0	Poor	1

2.2.5 To obtain the baseline biodiversity units for a habitat, the total area (or the habitat type) is multiplied by the distinctiveness and condition scores. The post-construction biodiversity units follow the same methodology, with the addition of risk factors to take into account the main risks associated with delivering biodiversity net gains. Three risk factors are taken into account: difficulty to create or enhance a habitat (delivery risk), time required for the habitat to reach its target condition (temporal risk) and distance from the scheme/ habitat loss (spatial risk). These three factors are assigned scores as per Table 2.3 below. The location for all post-construction habitat types is considered to be within the local ecological network, as no offsite mitigation is proposed that is not connected to the areas of habitat loss.

Table 2.3: Post-construction risk factors

Location	Location Risk Factor	Years to target condition	Temporal Risk factor	Difficulty to create	Delivery Risk Factor
Habitat being created or enhanced is within 500m of the area of loss or in the same ecological network identified in a local (county or equivalent) biodiversity, green infrastructure or offsetting strategy.	1	5	0.84	Very High	0.10
Habitat type being created or enhanced contributes to and is in a location identified within a local (county or equivalent) biodiversity, green infrastructure or offsetting strategy.	0.5	10	0.71	High	0.33
Habitat being created or enhanced is not making a contribution to local (county or equivalent) biodiversity, green infrastructure or offsetting strategy.	0.33	15	0.59	Medium	0.66
		20	0.50	Low	1
		25	0.42		
		30	0.36		
		>30	0.33		

2.2.6 Each habitat identified during the Extended Phase 1 Habitat survey (APP-075) is listed in the below metric. A distinctiveness level, condition, and the area in hectares is required for each habitat type to calculate the biodiversity

[4] Natural England. 2010. Farm Environment Plan (FEP) Manual. Third Edition

unit. A distinctiveness score was automatically applied for each habitat by the Highways England metric, based on Defra guidance.

2.2.7 The results of distinctiveness and condition scores applied to each habitat type identified during the Extended Phase 1 Habitat survey for which the results are documented within Appendix 8.2 National Vegetation Classification Technical Report (APP-075), and Appendix 8.3 Hedgerow Technical Report (APP-076), are shown in Table 3.1 in Chapter 3 of this report. The distinctiveness, condition and risk factors for each habitat type post-construction are shown in Table 3.2 in Chapter 3.

2.2.8 An Extended Phase 1 Habitat map was created in ArcGIS and CAD to indicate the location and extent of each existing habitat type and is shown in Figure 8.1 Phase 1 Habitat Map (APP-126). The Environmental Masterplan for the scheme has been used to produce the post-construction habitat types, and is shown in Figure 2.8 of the Environmental Statement (APP-107).

2.3 Tree unit calculation

2.3.1 The methodology below outlines the process followed for calculating the biodiversity units for individual trees. As there is currently no specific method for calculating the biodiversity value of trees in terms of biodiversity units, individual lines trees were given an area based on the estimated root protection area (RPA). All trees are awarded a medium distinctiveness score as per the toolkit guidance for ecologists[5]. Unless there is evidence to suggest a tree is in poor or good ecological condition, all trees should be given a moderate condition[6].

2.3.2 Individual trees were assigned a tree maturity level ranging from 'sapling' to 'veteran'. Following Annex D of BS:5387:2012 guidance, tree maturity levels were each assigned an average RPA as shown below in Table 2.4. The environmental masterplan for the scheme (APP-107) proposes 51 new trees; the target condition for these has been taken as 'semi-mature' trees, to allow a proportional (not too large) RPA to be used. The RPA is then used as the habitat area for individual trees.

Table 2.4: Root Protection Areas of tree maturity levels

Maturity Level	Single stem diameter (mm)	Radius of nominal circle (m)	RPA (m^2)	RPA (ha)
Sapling	125	1.5	7	0.0007
Semi-mature	350	4.2	55	0.006
Mature	650	7.8	191	0.019
Veteran	1250+	15	707	0.071

[5] Department for Environment, Food and Rural Affairs (Defra). 2012a Technical Paper: the metric for the biodiversity offsetting pilot in England.
Defra. 2012. Biodiversity Offsetting: Guidance for Developers. Guidance for Offset Providers.

[6] Department for Environment, Food and Rural Affairs (Defra). 2012a Technical Paper: the metric for the biodiversity offsetting pilot in England.
Defra. 2012. Biodiversity Offsetting: Guidance for Developers. Guidance for Offset Providers.

2.4 Constraints and limitations

2.4.1 Using the direct observations and photographs of the Extended Phase 1 Habitat survey for which the results are documented within Appendix 8.2 National Vegetation Classification Technical Report (APP-075), and hedgerow surveys documents in Appendix 8.3 Hedgerow Technical Report (APP-076) the condition for each habitat type was assessed. Where multiple areas of habitat type are present within the scheme red line boundary (APP-100), an average of their perceived condition has been taken; if different conditions were observed a precautionary measure of the higher habitat condition has been given. Where previous survey information may not be sufficient to fully support a condition assessment, a precautionary measure of moderate habitat condition is given. This is the recommended approach based on best practice.

2.4.2 To give a habitat area for hedgerows, a width of 2 metres has been assumed for both existing and created hedgerows. This is considered to be accurate for both the existing baseline hedgerows and those proposed within the Environmental Masterplan (APP-107).

2.4.3 The RPA given to the different tree maturity levels were based on best practice guidance and provide an approximate value only. However, it is assumed that the values given for each maturity level are suitable for this metric.

2.4.4 When assigning distinctiveness scores to post-construction habitats shown within the Environmental Masterplan, the closest Phase 1 habitat type, or types, has been assigned. Where the proposed habitat may cross two Phase 1 habitat types the lowest scoring distinctiveness and condition have been applied. This is considered to be an appropriate approach, ensuring net gains are not overestimated.

3 Results

3.1 Pre-construction

3.1.1 Results of the biodiversity metric calculations for the pre-construction baseline showing habitat type, area, distinctiveness and condition are presented in Table 3.1. The habitats identified within the scheme red line boundary (APP-100) are detailed below. Habitats were found to be predominantly in moderate condition and distinctiveness scores are predetermined by Highways England.

Table 3.1: Pre-construction existing baseline biodiversity units

Existing habitats baseline	Units	Linear metres (m)	Area (m^2)	Habitat area (ha)	Existing habitat distinctiveness		Existing habitat condition		Biodiversity Units
					Distinctiveness	Score	Condition	Score	
J1 Cultivated/disturbed land (amenity grassland)				1.1	Low	2	Mod	1	2.2
B3.2 Calcareous Grassland – Semi-Improved				0.06	Med	4	Mod	2	0.48
B4 Improved Grassland				22.86	Low	2	Mod	2	91.44
B6 Poor Semi-Improved Grassland				22.42	Med	4	Mod	2	179.36
J1 Cultivated/ Disturbed Land (arable)				40.4	Low	2	Poor	1	80.8
Grassland total									**354.28**
A1.1.1 Broadleaved woodland – semi-natural				1.63	High	6	Good	3	29.34
A1.1.2 Broadleaved woodland - plantation				0.85	Med	4	Mod	2	6.8
A3.1 Broadleaved parkland scattered trees				0.8	High	6	Mod	2	9.6
A2.1 Scrub – dense/ continuous				0.99	Med	4	Poor	1	3.96
Woodland total									**49.70**
J2.1 Boundaries – hedges - intact: Important hedge		2,185.43	4370.86	0.44	High	6	Good	3	7.87
J2.1 Boundaries – hedges - intact: Species rich hedge		1,883.76	3767.52	0.38	High	6	Good	3	6.78
J2.1 Boundaries – hedges - intact: Species poor hedge		2,212.05	4424.1	0.44	High	6	Mod	2	5.31
J2.2 Boundaries – hedges - defunct		454.23	908.46	0.09	High	6	Poor	1	0.55

Existing habitats baseline	Units	Linear metres (m)	Area (m^2)	Habitat area (ha)	Existing habitat distinctiveness		Existing habitat condition		Biodiversity Units
					Distinctiveness	Score	Condition	Score	
J2.3 Boundaries – hedges – with trees: Important hedge		2,380	4760	0.48	High	6	Good	3	8.57
J2.3 Boundaries – hedges – with trees: species rich hedge		659.2	1318.4	0.13	High	6	Good	3	2.37
J2.3 Boundaries – hedges – with trees: species poor hedge		576.1	1152.2	0.12	High	6	Mod	2	1.38
Hedgerow total									**32.83**
		Individual tree RPA (m^2)	**Total area of RPAs (m)**	**Total area of RPAs (ha)**					
Individual trees	2	707	1414	0.14	High	6	Good	3	2.55
Total pre-construction units									**439.35**

3.2 Post-construction

3.2.1 Results of the biodiversity metric calculations for the post-construction habitat creation showing habitat type, area, distinctiveness and condition, along with associated risk factors are presented in Table 3.2 below. Distinctiveness scores are predetermined by Highways England.

Table 3.2: Post-construction Biodiversity Units

Post-completion habitats	Units	Linear metres (m)	Area (m^2)	Habitat area (ha)	Existing habitat distinctiveness		Existing habitat condition		Initial Biodiversity Units	Difficulty factor		Temporal factor		Spatial risk		Biodiversity Units
					Distinctiveness	Score	Condition	Score		Difficulty	Score	Time	Score	Location	Score	
Wildflower and Species Rich Grassland (B2.1 Neutral grassland-unimproved)				7.68	High	6	Good	3	138.24	Med	0.66	5	0.84	Local	1	76.640256
Nutrient Poor Managed Species Rich Grassland (B2.2 Neutral semi-improved grassland)				20.45	Med	4	Good	3	245.4	Med	0.66	5	0.84	Local	1	136.04976
Wet grassland (B5 Marshy grassland, B2.1 Neutral grassland-unimproved)				1.72	High	6	Good	3	30.96	Med	0.66	5	0.84	Local	1	17.164224
Marginal Planting (E3 Fen, B5 Marshy grassland)				0.18	High	6	Mod	2	2.16	Low	1	5	0.84	Local	1	1.8144
J1 Cultivated/ Disturbed Land (arable) (reinstated)				22.39	Low	2	Poor	1	44.78	Low	1	5	0.84	Local	1	37.6152
Grassland total																**269.28384**
A1.1.1 Broadleaved woodland – semi-natural				4.68	High	6	Good	3	84.24	Med	0.66	30	0.36	Local	1	20.015424
Linear Belt of Trees and Shrubs (A1.3.1 Woodland mixed semi-natural, A2.2 Scrub dense/continuous)				20.25	Med	4	Good	3	243	Low	1	10	0.71	Local	1	172.53
Woodland total																**192.54542**
J2.1 Boundaries – hedges - intact: Species rich hedge		5,562.81	11125.62	1.112562	High	6	Good	3	20.02612	Low	1	5	0.84	Local	1	16.821937
J2.3 Boundaries – hedges – with trees: Species rich hedge		4896.05	9792.1	0.97921	High	6	Good	3	17.62578	Low	1	10	0.71	Local	1	12.514304
Hedgerow total																**29.336241**
Balancing pond (permanent water)				1.2	High	6	Poor	1	7.2	Low	1	5	0.84	Local	1	6.048
Wildlife pond				0.03	High	6	Good	3	0.54	Low	1	5	0.84	Local	1	0.4536
Waterbody total																**6.50**
		Individual tree RPA (m^2)	**Total area of RPAs (m)**	**Total area of RPAs (ha)**												
Individual trees	51	191	9741	0.9741	Med	4	Good	3	11.6892	Low	1	20	0.5	Local	1	5.8446
Total post units									**834.17**							**503.51**

3.3 Results Summary

3.3.1 The results displayed in Sections 3.1 and 3.2 of this report show the biodiversity units for the pre-construction existing baseline and the post-construction mitigation planting for the scheme.

3.3.2 The existing baseline has a total of 439.35 biodiversity units, comprising grassland, woodland and hedgerow habitat types, along with two veteran trees that are assumed to be lost due to the scheme. Grasslands are the predominant habitat types present within the existing baseline, totalling 354.28 units.

3.3.3 The post-construction mitigation planting achieves a total of 503.51 biodiversity units, comprising grassland, woodland, hedgerow and waterbodies. Again, grassland is the predominant habitat type, totalling 269.28 units. It is noted that fewer biodiversity units for grassland are being created than are being lost; however, woodland habitats are being increased and ponds are being created as a result of the scheme, therefore increasing the diversity of the habitat mosaics within the scheme red line boundary (APP-100) and local area. In addition, the grassland habitats created are of a greater value than those existing.

4 Conclusion

4.1.1 The results displayed in Chapter 3 of this report present the biodiversity units for the existing baseline and the post-construction of the A303 Sparkford to Ilchester Dualling. As a result of the Environmental Masterplan (APP-107), the post-construction biodiversity units total a greater amount than the existing baseline, with a positive difference of 64.16 biodiversity units upon completion of the scheme. This is due to the landscape design of the scheme and mitigation measures incorporated within that design.

4.1.2 A change in 64.16 biodiversity units is a percentage increase of 14.6% from the existing baseline.

4.1.3 It can therefore be concluded that the scheme will result in a biodiversity net gain.