

M54 to M6 Link Road

TR010054

Volume 6

6.3 Environmental Statement

Appendices

**Appendix 8.2 Biodiversity Metric
Calculations**

Regulation 5(2)(a)

Planning Act 2008

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

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Infrastructure Planning

Planning Act 2008

**The Infrastructure Planning
(Applications: Prescribed Forms and
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**M54 to M6 Link Road
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**6.3 Environmental Statement Appendices
Appendix 8.2 Biodiversity Metric Calculations**

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1 Introduction

1.1 Purpose of the Report

1.1.1 This appendix provides the findings of the Biodiversity Metric Calculation undertaken to inform Highways England's proposed development of the M54 to M6 link road, herein referred to as 'the Scheme'.

1.1.2 The purpose of the report is to:

- calculate the Scheme's biodiversity units, in terms of baseline and predicted future baseline; and
- determine the change in biodiversity units as a result of the Scheme.

1.1.3 This appendix includes the following information:

- Introduction including purpose, overview and principals of biodiversity accounting.
- Methodology used to complete the calculation.
- Results of the calculation.
- Conclusions.
- References.

1.2 Biodiversity accounting

No net loss and biodiversity net gain

1.2.1 Biodiversity net gain is defined as "development that leaves biodiversity in a better state than before" and involves an approach where developers work with local governments, wildlife groups, land owners and other stakeholders in order to support their priorities for nature conservation (Ref 1).

1.2.2 Biodiversity net gain can be achieved through the creation of new habitats or through the improvement and management of existing habitats either on-site or off-site (or through a combination of on-site and off-site measures).

1.2.3 Biodiversity net gain is achieved when measurable improvements for biodiversity are delivered in association with a development. No net loss is achieved when the impacts of a development on biodiversity are balanced by equivalent gains resulting in no overall change to biodiversity.

1.2.4 It is important that any proposed biodiversity improvement measures have appropriate arrangements in place to secure their long-term management. Where new habitats are provided, they should aim to contribute to biodiversity restoration by helping to establish more resilient and coherent ecological networks in alignment with local nature conservation priorities and local landscape character objectives.

1.2.5 Biodiversity metrics provide a tool to assess whether a biodiversity net gain or no net loss outcome is expected to be achieved. A metric enables the calculation of losses and gains by assessing the habitats. The metric translates habitat distinctiveness, condition and extent into a score which is presented in biodiversity

units. It also uses multipliers to account for risks in delivering habitat creation or enhancement. The change in biodiversity units indicates either a net loss, net gain or biodiversity neutrality.

- 1.2.6 It is important that evidence and rationale used to inform the calculation is underpinned by appropriate ecological expertise and local wildlife knowledge.
- 1.2.7 The assessment is an iterative process and can be applied during the design-development process to guide the requirements for mitigation and compensation, in terms of the type and extent of habitats to be created or improved.

1.3 Principles of biodiversity no net loss and net gain

- 1.3.1 The assessment of the Scheme has been undertaken in accordance with best practice principles for calculating and assessing biodiversity net gain (Ref 1).
- 1.3.2 The application of the mitigation hierarchy is fundamental to the achievement of no net loss and net gain. This involves adopting an approach that seeks to avoid, mitigate and (as a last resort) compensate for impacts on biodiversity through all stages of project development.
- 1.3.3 Habitats of high distinctiveness are generally expected to be replaced on a 'like for like' basis (i.e. the mitigation and/or compensation should involve the same habitat that is being lost).
- 1.3.4 Ecological mitigation and compensation measures proposed as part of a development should therefore strive to result in an improvement in the extent or condition of the ecological network. To do this, the focus of the habitat restoration or creation should be on priority habitats of medium or preferably high distinctiveness. There should not be a 'trading down', for example by replacing a habitat of high distinctiveness with creation or restoration of a habitat of medium distinctiveness.
- 1.3.5 Planning policy encourages the avoidance of impacts on irreplaceable habitats that are either very rare or difficult or impossible to recreate (Ref 2, Ref 3). Where it is impossible to avoid impacts on these habitats, they should not be included in the metric calculation but dealt with separately in order to develop a bespoke compensation package to address the loss.
- 1.3.6 Decisions on the types of habitat creation or restoration that form part of the mitigation or compensation should be taken at a local level in line with local conservation priorities.
- 1.3.7 Multipliers are applied to correct for disparity or risk in delivery or uncertainty in the effectiveness of restoration or habitat creation and management techniques. These address the risk associated with the level of difficulty in restoration or creation for different habitats and the temporal risk associated with the time taken for the habitat to reach target condition.

2 Methodology

2.1 Study area and considerations

2.1.1 The area subject to the calculation comprised all land within the Scheme boundary (refer to Figure 2.8 [TR010054/APP/6.2]).

2.1.2 The following considerations have fed into the methodology:

- Only habitats within the Scheme boundary have been included within the calculation to establish the site's habitat biodiversity value.
- The habitats used in the calculation have been based on those illustrated in Appendix 8.4 [TR010054/APP/6.3], and have been re-categorised to a Phase 1 habitat code by an ecologist.
- Target conditions and timescales for newly created and restored habitats have been based upon professional judgement and best practice guidance on management practices (Ref 4).
- The following Target Notes (TNs) on the Phase 1 Habitat plan (see Appendix 8.4 [TR010054/APP/6.3] and Figure 8.3 [TR010054/APP/6.2]) denote areas of ancient woodland which will be impacted by the Scheme as follows:
 - TN97: Oxden Leasow (Whitgreaves wood) – no direct loss but incursion into 15 m buffer zone resulting in an assumed loss of 0.32 ha; and
 - TN43: Brookfields Farm Site of Biological Importance (SBI) – 0.0015 ha direct loss; 0.04ha assumed loss due to incursion into the 15 m buffer zone and a further 0.078 ha assumed lost as a result of the change in air quality.
- The 15 m buffer zone referred to above is considered a best practice minimum development offset for ancient woodland (Ref 5). As such, it has been determined through consultation with Natural England that the provision of 3.08 ha of broad-leaved plantation will be sufficient to compensate for the above cumulative losses of ancient woodland. This is set out in the Statement of Common Ground with Natural England [TR010054/APP/7.3]. Given that ancient woodland is not included in the metric as it is considered 'irreplaceable', this 3.08 ha of broad-leaved plantation has been subtracted from the creation figure in Table 3.9 below (marked by a '*').

2.1.3 The figure for created 'buildings and hardstanding' habitat included in the metric represents the area to be occupied by hard surfaces associated with the Scheme.

2.2 Calculation

2.2.1 Biodiversity units have been calculated using a modification of the method published by Defra in Biodiversity Offsetting Pilots Technical Paper: the metric for the biodiversity offsetting pilot in England (Ref 6), hereafter referred to as the 'Defra Paper'.

2.2.2 The metric calculation requires the calculation of Biodiversity Units based on five factors and is calculated pre and post implementation of the Scheme, as per the following:

$$\text{Before Works} = \text{Distinctiveness Score} \times \text{Condition Assessment} \times \text{Area}$$

$$\text{After Works} = ((\text{Distinctiveness Score} \times \text{Condition Score} \times \text{Area}) / \text{Time until Target Condition}) / \text{Difficulty of Creation/Restoration}$$

2.2.3 The five factors are determined as set out below:

- Distinctiveness Score – High, Medium or Low, based on Phase 1 habitat classifications (Ref 4, Ref 7).
- Condition Score – Good, Moderate or Poor, based on habitat condition assessment (Ref 4).
- Area – hectares (ha) of habitat type;
- Time until target condition – time period (in years) until the target condition will be achieved.
- Difficulty of creation/restoration – a score applied to account for risk associated with different types of habitat creation/restoration.

2.2.4 Linear habitats (namely hedgerows, ditches, treelines and watercourses) are addressed separately to non-linear habitats; additionally, as biodiversity units are calculated for conditions both before and after works, this results in four separate sets of results, as follows:

- non-linear – before works;
- non-linear – after works;
- linear – before works; and
- linear – after works.

Before works

2.2.5 Biodiversity units for ‘before works’ represent existing baseline conditions prior to construction. Habitat types for baseline conditions were derived during field surveys undertaken to inform the Scheme in line with the method described in the ‘Handbook for Phase 1 Habitat Survey – a technique for environment audit’ (Ref 7) (see Appendix 8.4 for full details [TR010054/APP/6.3]).

After works

2.2.6 Biodiversity units for ‘after works’ represent the predicted future conditions, post-construction. Phase 1 habitat types for the predicted future baseline are derived from the Environmental Masterplan prepared to inform the Scheme (Figure 2.1 to 2.7 [TR010054/APP/6.2]).

Distinctiveness score

2.2.7 The metric assigns each Phase 1 habitat type a level of distinctiveness (Low, Moderate or High) with a corresponding distinctiveness score as set out in Table 2.1.

Table 2.1: Distinctiveness Scores

Distinctiveness	Score
High	6
Medium	4

Distinctiveness	Score
Low	2

2.2.8 The distinctiveness score is independent of habitat condition and is a set value assigned to each habitat type.

Condition criteria

2.2.9 Each habitat type is assigned a set of condition criteria. These criteria set out specific parameters (e.g. Species diversity, vegetation cover, level of disturbance) against which each distinct habitat area can be assessed (Ref 4). The cumulative number of criteria against which each habitat area is matched is used to determine its condition and associated score. The cumulative number of criteria and associated condition scores are set out in Table 2.2.

Table 2.2: Condition scores

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

Area

2.2.10 Non-linear habitat areas are measured in hectares (ha). Linear habitat areas are measured in metres (m).

Time until target condition

2.2.11 Time until target condition for each habitat is categorised and assigned a multiplier as set out in Table 2.3.

Table 2.3: Time until Target Condition Multipliers

Years	Multiplier
5	1.2
10	1.4
15	1.7
20	2.0
25	2.4
30	2.8
32+	3

Difficulty of creation or restoration

2.2.12 The difficulty of creation or restoration proposals is assigned to one of four categories, each of which is assigned a multiplier. These are set out in Table 2.4.

Table 2.4: Difficulty of creation or restoration multipliers

Difficulty of creation or restoration	Multiplier
Very High	10
High	3
Medium	1.5
Low	1

2.3 Assumptions

2.3.1 The following assumptions have been made in relation to the pre- and post-development data when undertaking the calculations used in the assessment:

- For the purposes of the metric it is assumed no retained habitats will be enhanced.
- The proposed habitats illustrated in Figures 2.1 to 2.7 [TR010054/APP/6.2] would either be managed as part of Highways England's soft estate or by separate landowner agreement (where located on third party land), and would be managed over the projected timescales selected for the target conditions.

2.4 Limitations

2.4.1 The assessment has been based on the known permanent loss and any retained habitats. This assessment does not include any calculations relating to the temporary use of land, for example, those required for compounds or services.

3 Results

3.1.1 The following raw data tables are presented below:

- Table 3.1: Phase 1 Habitat (Non-linear): Before Works Conditions.
- Table 3.2: Phase 1 Habitat (Non-linear): Effects.
- Table 3.3: Phase 1 Habitat (Linear): Before Works Conditions.
- Table 3.4: Phase 1 Habitat (Linear): Effects.
- Table 3.5: Phase 1 Habitat (Non-linear): After Works Conditions.
- Table 3.6: Phase 1 Habitat (Non-linear): After Works Units.
- Table 3.7: Phase 1 Habitat (Linear): After Works Conditions.
- Table 3.8: Phase 1 Habitat (Linear): After Works Units.

Table 3.1: Phase 1 habitat (non-linear): Before works conditions

Phase 1 habitat category	Area (ha)	Distinctiveness		Condition		Biodiversity units
		Category	Score	Category	Score	
Broad-leaved semi-natural woodland	4.50	High	6	Good	3	80.91
Broad-leaved semi-natural woodland	0.47	High	6	Moderate	2	5.68
Broad-leaved plantation	4.85	High	6	Good	3	87.38
Broad-leaved plantation	53.78	High	6	Moderate	2	645.31
Broad-leaved plantation	2.44	High	6	Poor	1	14.64
Bare ground	0.01	Low	2	Poor	1	0.02
Mixed plantation	3.13	Medium	4	Moderate	2	25.04
Recently felled woodland	0.45	Low	2	Moderate	2	1.79
Improved grassland	35.03	Low	2	Poor	1	70.06
Poor semi-improved grassland	1.08	Medium	4	Moderate	2	8.67
Poor semi-improved grassland	7.10	Medium	4	Poor	1	28.40
Tall ruderal	0.16	Low	2	Moderate	2	0.63
Tall ruderal	0.20	Low	2	Poor	1	0.40
Standing water	1.29	High	6	Good	3	23.22
Standing water	1.02	High	6	Moderate	2	12.21
Standing water	0.005	High	6	Poor	1	0.01
Buildings or hardstanding	37.08	N/A	0	Poor	1	0.00

Phase 1 habitat category	Area (ha)	Distinctiveness		Condition		Biodiversity units
		Category	Score	Category	Score	
Arable	44.51	Low	2	Poor	1	89.02
Amenity grassland	0.94	Low	2	Poor	1	1.88

Table 3.2: Phase 1 habitat (non-linear): Effects

Phase 1 habitat category	Habitats to be retained with no change		Habitats to be lost	
	Area (ha)	Biodiversity units	Area (ha)	Biodiversity units
Broad-leaved semi-natural woodland	3.71	66.73	0.79	-14.18
Broad-leaved semi-natural woodland	0.08	0.97	0.39	-4.72
Broad-leaved plantation	2.96	53.22	1.90	-34.16
Broad-leaved plantation	39.63	475.56	14.14	-169.68
Broad-leaved plantation	1.84	11.02	0.60	-3.62
Bare ground	0.01	0.02	0.00	0.00
Mixed plantation	0.51	4.05	2.62	-20.98
Recently felled woodland	0.32	1.27	0.13	-0.52
Improved grassland	6.67	13.34	28.36	-56.72
Poor semi-improved grassland	0.34	2.72	0.74	-5.95
Poor semi-improved grassland	5.34	21.37	1.76	-7.03
Tall ruderal	0.04	0.15	0.12	-0.48
Tall ruderal	0.00	0.00	0.20	-0.40
Standing water	0.74	13.31	0.57	-10.26
Standing water	0.26	3.12	0.76	-9.12

Phase 1 habitat category	Habitats to be retained with no change		Habitats to be lost	
	Area (ha)	Biodiversity units	Area (ha)	Biodiversity units
Standing water	0.00	0.00	0.00	-0.01
Buildings or hardstanding	24.90	0.00	12.18	0.00
Arable	6.94	13.88	37.57	-75.14
Amenity grassland	0.47	0.95	0.47	-0.94

Table 3.3: Phase 1 habitat (linear): Before works conditions

Phase 1 habitat category	Length (m)	Distinctiveness		Condition		Biodiversity units
		Category	Score	Category	Score	
Hedges: linear trees	204	High	6	Moderate	2	2.45
Hedges: native species rich intact hedge	1896	High	6	Good	3	34.13
Hedges: native species rich intact hedge	660	High	6	Moderate	2	7.92
Hedges: intact hedge	1947	High	6	Moderate	2	23.36
Hedges: intact hedge	810	High	6	Poor	1	4.86
Hedges: defunct hedge	623	High	6	Good	3	11.21
Hedges: defunct hedge	1048	High	6	Moderate	2	12.57
Hedges: defunct hedge	35	High	6	Poor	1	0.21
Running water	1432	High	6	Good	3	25.77

Table 3.4: Phase 1 habitat (linear): Effects

Phase 1 habitat category	Habitats to be retained with no change		Habitats to be lost	
	Length (m)	Biodiversity units	Length (m)	Biodiversity units
Hedges: linear trees	204	2.45	0	0.00
Hedges: native species rich intact hedge	773	13.91	1124	-20.22
Hedges: native species rich intact hedge	381	4.57	279	-3.35
Hedges: intact hedge	1207	14.49	739	-8.87
Hedges: intact hedge	508	3.04	304	-1.82
Hedges: defunct hedge	262	4.72	361	-6.49
Hedges: defunct hedge	590	7.08	458	-5.49
Hedges: defunct hedge	35	0.21	0	0.00
Running water	1120	20.16	350	-6.3

Table 3.5: Phase 1 habitat (non-linear): Habitats to be created conditions

Phase 1 habitat category	Area (ha)	Distinctiveness		Target condition	
		Category	Score	Category	Score
Broad-leaved plantation	25.04	High	6	Moderate	2
Standing water	1.45	High	6	Good	3
Standing water	1.43	High	6	Moderate	2
Semi-improved grassland	42.43	Medium	4	Good	3
Marsh or marshy grassland	1.04	High	6	Good	3
Buildings or hardstanding	23.76	Low	2	Poor	1
Amenity grassland	5.27	Low	2	Poor	1

Table 3.6: Phase 1 habitat (non-linear): Habitats to be created units

Phase 1 habitat category	Time to target condition		Creation or restoration difficulty		Biodiversity units
	Years	Score	Category	Score	
Broad-leaved plantation	30	2.8	Medium	1.5	71.54
Standing water	5	1.2	Medium	1.5	14.5
Standing water	5	1.2	Medium	1.5	9.51
Semi-improved grassland	10	1.4	Medium	1.5	242.45
Marsh or marshy grassland	10	1.4	High	3.0	4.48
Buildings or hardstanding	5	1.2	Low	1.0	0.00
Amenity grassland	5	1.2	Low	1.0	8.79

Table 3.7: Phase 1 habitat (linear): Habitats to be created conditions

Phase 1 habitat category	Length (m)	Distinctiveness		Target condition	
		Category	Score	Category	Score
Native species-rich intact hedge	4616	High	6	Good	3
Running water	4450	High	6	Good	3

Table 3.8: Phase 1 habitat (linear): Habitats to be created units

Phase 1 habitat category	Time to target condition		Creation or restoration difficulty		Biodiversity units
	Years	Score	Category	Score	
Native species-rich intact hedge	15	1.7	Low	1.0	48.89
Running water	5	1.2	Medium	1.5	4.5

3.1.2 A summary of the area and linear measurements of each habitat before and after works are set out in Tables 3.9 and 3.10 below.

Table 3.9: Phase 1 habitat areas

Phase 1 habitat category	Area (ha)			Percentage change
	Before works	After works (Retained)	After works (Created)	
Broad-leaved semi-natural woodland	4.97	3.79	-	-23.74
Broad-leaved plantation	61.07	44.43	25.04*	+13.75
Bare ground	0.01	0.01	-	0
Mixed plantation	3.13	0.51	-	-83.71
Recently felled woodland	0.45	0.32	-	-28.89
Improved grassland	35.03	6.67	-	-80.99
Poor semi-improved grassland	8.18	5.68	-	-30.56
Tall ruderal	0.36	0.04	-	-88.89
Standing water	2.31	1.00	2.88	+67.97
Buildings or hardstanding	37.08	24.90	23.62	+30.85
Arable	44.51	6.94	-	-84.81
Amenity grassland	0.94	0.47	5.27	+510.63
Semi-improved grassland	-	-	42.43	100
Marsh or marshy grassland	-	-	1.04	100
Total	198.04	94.76	100.28	N/A
* 3.08 ha creation of broadleaved plantation to compensate for direct and indirect effects on ancient woodland is not included in the metric as ancient woodland is considered 'irreplaceable'				

Table 3.10: Phase 1 linear habitats

Phase 1 habitat category	Length (m)			Percentage change
	Before works	After works (Retained)	After works (Created)	
Linear trees	204	204	-	0
Native species-rich intact hedge	2556	1154	4616	+80.59
Intact hedge	2757	1208	-	-56.18
Defunct hedge	1706	887	-	-48.01
Running water	1432	1120	450	+9.63
Total	8655	4573	4833	N/A

3.1.3 The summary of the results of the metric calculation are presented in Tables 3.11 and 3.12.

Table 3.11: Metric calculation results (non-linear)

Condition	Phase 1 habitat category	Biodiversity units			
		Before works	After works (Retained)	After works (Created)	Difference
Good	Broad-leaved semi-natural woodland	80.91	66.73	-	-14.18
	Broad-leaved plantation	87.38	53.22	-	-34.16
	Standing Water	23.57	13.31	14.50	4.24
	Semi-improved Grassland	-	-	242.45	242.45
	Marsh/Marshy Grassland	-	-	4.48	4.48
Moderate	Broad-leaved semi-natural woodland	5.68	0.97	-	-4.72
	Broad-leaved plantation	645.31	475.56	71.54	- 98.28
	Mixed Plantation	25.04	4.05	-	-20.99
	Recently Felled Woodland	1.79	1.27	-	-0.52
	Poor Semi-improved Grassland	8.67	2.72	-	-5.95
	Tall Ruderal	0.63	0.15	-	-0.48
	Standing Water	12.21	3.12	9.51	+ 0.42
Poor	Broad-leaved plantation	14.64	11.02	-	-3.62
	Bare Ground	0.02	0.02	-	0
	Improved Grassland	70.06	13.34	-	-56.72
	Poor Semi-improved Grassland	28.40	21.37	-	-7.03
	Tall Ruderal	0.40	0.005	-	-0.395
	Standing Water	0.01	0.00	-	-0.01
	Buildings/Hardstanding	0.00	0.00	-	0
	Arable	89.02	13.88	-	-75.14
	Amenity Grassland	1.88	0.95	8.79	7.86
Total		1095.62	681.685	351.27	-62.74

Table 3.12: Metric calculation results (linear)

Condition	Phase 1 Habitat Category	Biodiversity units			
		Before works	After works (Retained)	After works (Created)	Difference
Good	Native species-rich intact hedge	34.13	13.91	48.89	+28.67
	Defunct hedge	11.21	4.72	-	-6.49
	Running water	26.46	20.16	4.5	-1.8
Moderate	Linear trees	2.45	2.45	-	0
	Native species-rich intact hedge	7.92	4.57	-	-3.35
	Intact hedge	23.36	14.49	-	-8.87
	Defunct hedge	12.57	7.08	-	-5.49
Poor	Intact hedge	4.86	3.04	-	-1.82
	Defunct hedge	0.21	0.21	-	0
Total		123.17	70.63	53.39	+0.85

3.1.4 In summary, the results show an overall biodiversity unit loss of 4.99%, which is considered to be no net loss (Ref 1).

4 Conclusions

- 4.1.1 Biodiversity units would be marginally lower as a result of the Scheme, with a -4.99% net loss in biodiversity units. This considered to be an overall no net loss of biodiversity (Ref 1).
- 4.1.2 However, it should be noted that although there will be a loss in terms of the metric, the retained/created habitats that will be present in quanta over and above what is existing (broad-leaved plantation, standing water, semi-improved grassland, running water and most notably native species-rich intact hedgerow, which will increase in quantum by 80.59% as a result of the Scheme) are those of highest ecological value that are considered in the metric (aside from broad-leaved woodland).

5 References

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- Ref 4 Chief Highway Engineer Memorandum 422/18: Chief Highway Engineer Memorandum 422/18: Supporting Transparency around our Biodiversity Performance
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