



Great Wolf Resorts

BIODIVERSITY NET GAIN

Biodiversity Net Gain Assessment Report





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WSP

110 Queen Street

Glasgow

G1 3BX

Phone: +44 141 429 3555

Fax: +44 141 429 3666

WSP.com



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EXECUTIVE SUMMARY

WSP was commissioned by Great Wolf Resorts to carry out an Initial Biodiversity Net Gain (BNG) assessment of an 18.39 hectare area of land to the north-west of Bicester Golf Course, referred to as the 'Site'. The Site currently comprises nine holes of the existing 18-hole golf course which forms part of the wider site also occupied by the Bicester Hotel Golf and Spa. The 'Proposed Development' includes construction of a resort hotel and associated access from the A4095.

This report details the methods, results and recommendations of the Biodiversity Net Gain assessment, the scope of which is:

- To establish the total number of baseline biodiversity units (BU) and linear units within the Site;
- To establish the total number of biodiversity units and linear units which will be retained, created or enhanced under the proposed landscape mitigation plan; and
- To determine whether the Proposed Development will result in a net loss, no net loss or a net gain for biodiversity, with a focus on Habitats of Principal Importance (HPI).

This is the second BNG assessment, the first undertaken in September 2019. This assessment is based on an updated landscape plan created by Bradley Murphy Design in September 2019. The second landscape plan aimed to improve the BNG outcomes of the development, focusing on achieving a net gain for hedgerow habitats and watercourses, and increasing the creation of broadleaved woodland/scattered trees in areas of proposed grassland.

The BNG Assessment was undertaken using the Defra Metric (2012a) and following standard best practice guidance for biodiversity net gain (CIEEM, IEMA & CIRIA, 2016 & BRE, 2018).

The majority of the Site is currently of low biodiversity value, comprising approximately 68% amenity grassland (J1.2). Habitats of higher biodiversity value include standing water (G2), broadleaved and mixed plantation woodland (A1.1.2 and A1.3.2), broadleaved parkland/scattered trees (A3.1) and hedgerows (J2.1.2, J2.3.1 and J2.3.2).

The Proposed Development aims to enhance the majority of the existing amenity grassland to semi-improved neutral grassland (B2.2). The remaining areas of the Site will comprise the hotel complex and associated hardstanding and landscape planting. Existing waterbodies, woodland and hedgerows will be retained and enhanced where possible.

No irreplaceable habitat or statutory designated sites are directly impacted by the Proposed Development. Under current landscape plans, the Proposed Development would result in an overall net gain (+27%) in area-based biodiversity units, with no area-based HPI habitat lost. There would be a net gain of linear units generated by hedgerow HPI (+117%). There is a net loss in three woodland habitat types (broadleaved parkland/scattered trees, coniferous parkland/scattered trees and Mixed parkland/scattered trees), but the Proposed Development has achieved net gain for similar habitat types: mixed plantation woodland and broadleaved plantation woodland.

Consequently, the Proposed Development achieves an overall biodiversity net gain. There is a loss



of ditches mapped as running water in the baseline Phase 1 habitat survey. It is considered that this is adequately compensated for by the provision of vegetated swales.

Since completion of the BNG Assessment, BMD have issued an updated iteration of the landscape design (BMD, November 2019). These changes are not captured within this BNG Assessment. Changes to proposed post-development habitats are minor (adjustment to proposed water slide locations and addition of ditch features around the car park). These changes would likely result in a minor increase in post-development BU which would not significantly alter the outcome of the assessment. Nevertheless, it is recommended that an updated BNG Assessment is undertaken at the post-planning stage to ensure the BNG outcome accurately reflects the final design.

Contact name Luke Roberts

Contact details | Luke.Roberts@wsp.com

1 INTRODUCTION

1.1 PROJECT BACKGROUND

- 1.1.1. WSP was commissioned by Great Wolf Resorts (GWR) to carry out a Biodiversity Net Gain (BNG) assessment on an 18 hectare (ha) area of land to the north-west of Bicester Golf Course, referred to as the 'Site'. The Site comprises nine holes of the existing 18-hole golf course which forms part of the wider site also occupied by the Bicester Hotel Golf and Spa. This report refers to the Site defined by the Red Line Boundary (RLB) as shown in Appendix A.
- 1.1.2. The Proposed Development will include construction of a hotel and leisure complex, and the creation of an access road from the A4095.

1.2 BIODIVERSITY NET GAIN: OVERVIEW AND POLICY

- 1.2.1. Biodiversity Net Gain is the end result of a process applied to development so that overall, there is a positive outcome for biodiversity.
- 1.2.2. The benefit of undertaking a BNG Assessment at this early stage in the planning process is that results can be used to:
- Inform the ongoing design of ecological and landscape mitigation.
 - Identify whether current Proposed Development design will likely achieve a net gain, net loss, or no net loss (NNL) for biodiversity.
 - Demonstrate policy compliance in support of any decision-making.
- 1.2.3. Furthermore, should Great Wolf Resorts decide to set the objective of no net loss (NNL) or biodiversity net gain for the Proposed Development, early identification of risks and opportunities will be instrumental in helping achieve this aspiration.
- 1.2.4. Although not currently a legal obligation for UK development, the updated National Planning Policy Framework (NPPF)¹ makes clear the expectations for development to achieve biodiversity net gain in England.
- 1.2.5. In addition, on 14th March 2019, Her Majesty's Treasury confirmed that, following consultation, the government will use the forthcoming Environment Bill to mandate BNG for development in England, ensuring that the delivery of much-needed infrastructure and housing is not at the expense of vital biodiversity. Additionally, the 25 Year Environment Plan² states the UK Government intention to, "*seek to embed a 'net environmental gain' principle for development to deliver environmental improvements*".

¹ Ministry of Housing, Communities and Local Government (2019). National Planning Policy Framework (NPPF). https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/779764/NPPF_Feb_2019_web.pdf

² Her Majesty's Government (2018) A Green Future: Our 25 Year Plan to Improve the Environment [Online] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/693158/25-year-environment-plan.pdf

- 1.2.6. There is also relevant local policy within the Cherwell Local Plan ³ Policy ESD10: Protection and Enhancement of Biodiversity and the Natural Environment, which has a target of achieving “a net gain in total areas of biodiversity importance in the District”. The policy states that: “Protection and enhancement of biodiversity and the natural environment will be achieved by the following:
- ‘In considering proposals for development, a net gain in biodiversity will be sought by protecting, managing, enhancing and extending existing resources, and by creating new resources.
 - Planning conditions/obligations will be used to secure net gains in biodiversity by helping to deliver Biodiversity Action Plan targets and/or meeting the aims of Conservation Target Areas. Developments for which these are the principal aims will be viewed favourably’.

1.3 SCOPE OF REPORT

- 1.3.1. This report details methods, results and recommendations of the BNG assessment, the scope of which is:
- To establish the total number of baseline biodiversity units (BU) and linear units (LU) within the Site;
 - To establish the total number of BU and LU which will be retained, reinstated or created under the proposed landscape mitigation plan; and
 - To determine whether the Proposed Development will result in a net loss, NNL or a net gain for biodiversity, with a focus on Habitats of Principal Importance (HPI).

³ Cherwell District Council (2016) Adopted Cherwell Local Plan 2011-2031
<https://www.cherwell.gov.uk/downloads/download/45/adopted-cherwell-local-plan-2011-2031-part-1-incorporating-policy-bicester-13-re-adopted-on-19-december-2016>

2 METHODOLOGY

2.1 OVERVIEW

2.1.1. A summary of the BNG assessment methodology and details of project specific data sources, assessment limitations and subsequent assumptions are provided in the following methodology section. The full BNG assessment methodology is detailed in Appendix B.

2.2 DATA SOURCES

2.2.1. This BNG Assessment was informed by:

1. Preliminary Ecological Appraisal (WSP, February 2018).
2. Great Wolf Landscape Masterplan (Bradley Murphy Design Ltd, September 2019).
3. Publicly available Open Source Natural England datasets⁴ for HPI , ancient woodland (classed as irreplaceable habitat), and statutory designated sites for nature conservation.

2.3 BNG ASSESSMENT

2.3.1. The following industry recognised best practice methodologies were followed:

- **Defra** (2012b). Biodiversity Offsetting Pilots: Technical Paper- the Metric for the Biodiversity Offsetting Pilots in England.
- **Natural England** (2010). Higher Stewardship, Farm Environment Plan (FEP) Manual, 3rd Edition.
- **BRE** (2018). GN36 - BREEAM, CEEQUAL and HQM Ecology Calculation Methodology – Route 2.
- **CIEEM, IEMA & CIRIA** (2016). Biodiversity Net Gain: Good Practice Principles for Development

2.3.2. The application of the standardised methods, detailed in these documents as a BNG assessment, results in the calculation of: a baseline biodiversity value; a post-development biodiversity value; and a net change in biodiversity value due to the Proposed Development.

2.3.3. The quantitative outcomes of the BNG assessment calculations can then be categorised as achieving one of the outcomes listed in Table 2-1. The quantitative outcome of the assessment will be dependent on the biodiversity units and linear units achieving a net gain or>NNL. There must be a net gain in both biodiversity units and linear units if the project is to achieve an overall net gain.

⁴ Natural England Open Data Geoportal. Available from: <https://naturalengland-defra.opendata.arcgis.com/>

Table 2-1 – Quantitative outcomes of BNG calculations

Post-development Biodiversity Value	Predicted Scheme-wide Outcome
Less than 95% of the baseline value	Net loss (NL) of biodiversity
95% - 104% of baseline value	No net loss (NNL) of biodiversity
105% or more of baseline value	Biodiversity net gain (BNG)

2.3.4. Quantitative outcomes of the calculations are a singular element of a BNG assessment. The outcome of a BNG assessment also requires consideration of adherence to the Good Practice Principles.

2.4 LIMITATIONS AND ASSUMPTIONS

2.4.1. The following project specific limitations and assumptions have been applied for this assessment.

BASELINE BIODIVERSITY

2.4.2. The biodiversity calculation has been carried out on the habitats within the red line boundary (as at 05/07/19). Habitats mapped outside of this boundary as part of the Phase 1 Habitat Survey are not included within the assessment.

2.4.3. The Phase 1 Habitat map included areas where multiple habitats were assigned. Where this occurred the habitat with the highest distinctiveness was carried forward for use in the calculations.

2.4.4. The access track for the Proposed Development is already in place and has been accounted for within the Phase 1 Habitat data and therefore will not affect the biodiversity value of the site post-development.

POST-DEVELOPMENT BIODIVERSITY

2.4.1. The proposed landscape plan shows areas of habitat labelled as shrub habitat. For the purposes of the calculations this has been assumed to be habitat classed as scrub (A2.1) within the JNCC Phase 1 Handbook. This habitat is classified with native and locally occurring species and as such is of higher ecological value than shrub. Ornamental and planted areas as proposed on the landscape plan have not been included within the scrub habitat and has been calculated separately as introduced shrub (J1.4).

2.4.2. It has been assumed that all habitat marked as retained will not be directly impacted by the proposed development.

2.4.3. An assumption of the change in ecological value calculation is that the loss of 315.5m running water has been compensated for by the creation of 466.0m of swale habitat, mapped as area-based marshy grassland. In the context of BNG, area-based habitat cannot provide direct quantifiable compensation for the loss of running water linear habitat. Existing running water on site comprises heavily modified ditch features that appear to regularly dry out. The swales incorporated within the landscape plan will be vegetated with native marshy grassland species and contained with ditches. They are considered to represent an ecologically equivalent habitat (likely of greater value) and

therefore provide compensation for the loss of running water habitat. It is therefore deemed appropriate to override the outcome of a quantifiable net loss of linear watercourse habitat with an outcome of net gain for watercourse habitat. To avoid double counting the biodiversity value generated by created swale habitat, the total area of these features (0.1 ha) has been removed from the area-based biodiversity unit calculation.

- 2.4.4. The habitat types listed in the landscape masterplan and their translated Phase 1 Habitat types are listed in Table 2-2 and shown in Appendix C. The distinctiveness, target condition, time to target condition risk multiplier and difficulty to create risk multiplier is listed for each habitat type, based on whether it is to be created or enhanced.

Table 2-2 – Post-development created and enhanced area-based habitats

Type Phase 1 Habitat Type	Distinctiveness	Target Condition	Difficulty to Create	Time to Creation (years)
A1.1.2: Woodland: Broadleaved – plantation (enhanced)	Medium	Moderate	Low	20
A1.3.2: Woodland: Mixed – plantation (enhanced)	Medium	Good	Low	15
A2.1: Scrub – dense/continuous (enhanced)	Medium	Good	Low	3
A2.1: Scrub – dense/continuous (created)	Medium	Good	Low	5
A3.1: Parkland/scattered trees – broadleaved (enhanced)	Medium	Good	Low	15
A3.3: Parkland/scattered trees – mixed (enhanced)	Medium	Good	Low	15
B2.2: Semi-improved neutral grassland (created)	Medium	Moderate	Low	10
B2.2: Semi-improved neutral grassland (enhanced)	Medium	Good	Low	10
B5: Marshy grassland (created)	High	Moderate	High	10
B5: Marshy grassland (enhanced)	High	Moderate	High	5
B6: Poor semi-improved grassland (enhanced)	Low	Good	Low	1

G1: Standing water (created)	High	Moderate	Medium	5
G1: Standing water (enhanced)	Low	Good	Low	5
J1.2: Amenity grassland (created)	Low	Poor	Low	1
J3.6: Buildings (created)	N/A	N/A	N/A	N/A
J4: Bare ground (created)	Low	Poor	N/A	N/A
J5: Hardstanding (created)	N/A	N/A	N/A	N/A

- 2.4.5. As a precaution, habitats with two possible distinctiveness scores within the Defra guidelines have been allocated the most appropriate category based on ecological expertise.
- 2.4.6. In the post-development landscape plan, areas of created bare ground (J4) are new pathways created throughout the Site for the Proposed Development.
- 2.4.7. All areas of retained habitat should undergo appropriate management to ensure biodiversity enhancement, including planting of local plant and tree species where possible.
- 2.4.8. Determination of the risk factor ratings (time to creation and difficulty to create) required for the enhancement and creation of habitats has been assigned by a professional ecologist with specialist experience in habitat creation, enhancement and management.

3 RESULTS

3.1 BASELINE HABITATS

3.1.1. The habitats present on Site are listed in Table 3-1 alongside their distinctiveness and condition categories, with the total area of the habitats on Site (18.39 ha) and the associated baseline biodiversity units (56.58 BU).

Table 3-1 – Summary of baseline area calculations

Phase 1 Habitat Type	Distinctiveness Score	Condition Score	Area of Habitat (ha)	Biodiversity Units (BU)
A1.1.2: Woodland - broadleaved plantation	Medium (4)	Poor (1)	0.85	3.4
A1.3.2: Woodland - mixed plantation	Medium (4)	Poor (1)	1.22	4.88
A2.1: Scrub - dense/continuous	Medium (4)	Poor (1)	0.03	0.12
A3.1: Parkland/scattered trees - broadleaved	Medium (4)	Poor (1)	1.05	4.2
A3.2: Parkland/scattered trees - coniferous	Medium (4)	Poor (1)	0.22	0.88
A3.3: Parkland/scattered trees - mixed	Medium (4)	Poor (1)	0.31	1.24
B2.2: Semi-improved neutral grassland	Medium (4)	Poor (1)	0.46	1.84
B6: Poor semi-improved grassland	Low (2)	Poor (1)	0.43	0.86
G1: Standing water	High (6)	Moderate (2)	1.08	12.96
J1.2: Amenity grassland	Low (2)	Poor (1)	12.45	24.90
J1.3: Ephemeral/short perennial	Low (2)	Poor (1)	0.01	0.02
J1.4: Introduced shrub	Low (2)	Poor (1)	0.15	0.3
J4: Bare ground	Low (2)	Poor (1)	0.01	0.02
J5: Other habitat (bunkers)	Low (2)	Poor (1)	0.12	0.24
TOTAL:			18.39	55.86

3.1.2. The baseline linear biodiversity calculation for hedgerows present on site is presented Table 3-2 below. There is a total of 182 m of hedgerow habitat within the Site, providing 546 baseline linear units.

Table 3-2 – Summary of baseline linear unit calculation: hedgerows

Phase 1 Habitat Type	Condition Score	Length (m)	Linear Units (LU)
J2.1.2: Intact species-poor hedge	Good (3)	58.00	174.00
J2.3.1: Species-rich hedge with trees	Good (3)	8.50	25.50
J2.1.1 : Boundaries : Hedges - Intact - native species-	Good (3)	115.50	346.50
TOTAL:		182.00	546.0

- 3.1.3. The baseline linear biodiversity calculation for the watercourses present on Site is presented in Table 3-3 below. There is a total of 324.37 m of watercourse habitat within the Site, providing 324.37 baseline watercourse LU.

Table 3-3 – Summary of baseline linear unit calculation

Phase 1 Habitat Type	Length (m)	Linear Units (LU)
G2: Running water	324.37	324.37
TOTAL:	324.37	324.37

3.2 POST-DEVELOPMENT HABITATS

- 3.2.1. Post-development habitats, as presented in the landscape plan, have been grouped depending on whether they are to be retained, enhanced or created. The full calculations for those habitats, with target condition and risk multipliers, is shown in Table 3-4 to 3-9.

RETAINED

- 3.2.2. Retained habitat accounts for 4.28 ha of the Proposed Development, generating a total of 20.76 BU. A summary of the post-development biodiversity unit calculation for retained habitat is provided in Table 3-4.
- 3.2.3. A summary of the post-development linear unit calculation for retained hedgerow habitat is provided in Table 3-5.
- 3.2.4. No watercourse habitat will be retained by the development.

Table 3-4 – Summary of post-development biodiversity unit calculation: retained area-based habitat

Phase 1 Habitat Type	Area of Habitat (ha)	Biodiversity Units (BU)
A1.1.2: Woodland: Broadleaved Plantation	0.32	1.28
A1.3.2 : Woodland : Mixed - plantation	0.78	3.12
A3.1 : Parkland/scattered trees: Broadleaved	0.39	1.56
A3.2 : Parkland/scattered trees : Coniferous	0.15	0.60
A3.3 : Parkland/scattered trees : Mixed	0.01	0.04
G1.1 : Standing water : Eutrophic	0.89	10.68
J1.2: Amenity grassland	1.74	3.48
TOTAL:	4.28	20.76

Table 3-5 – Summary of post-development linear unit calculation: retained hedgerows

Phase 1 Habitat Type	Condition Score	Length (m)	Linear Units
J2.3.2: Species-poor hedge with trees	Good (3)	115.5	346.5
J2.3.1 : Boundaries : Hedges - With trees - native species-rich	Good (3)	8.5	25.5
TOTAL:		124.00	372.00

ENHANCED

- 3.2.5. Enhanced habitat accounts for 2.75 ha of the Proposed Development, generating a total of 19.16 BU. A summary of the post-development biodiversity unit calculation for enhanced habitat is provided in Table 3-6 below.
- 3.2.6. Under current landscape design proposals, no hedgerows will be enhanced within the Proposed Development.
- 3.2.7. No watercourses within the Proposed Development will be retained and therefore no watercourses will be enhanced.

Table 3-6 – Summary of post-development biodiversity unit calculation: enhanced area-based habitat

Phase 1 Habitat Type	Area of Habitat (ha)	Biodiversity Units (BU)
A1.1.2 : Woodland : Broadleaved - plantation	0.01	0.23
A1.3.2 : Woodland : Mixed - plantation	0.15	0.97
A3.1 : Parkland/scattered trees : Broadleaved (Medium)	0.05	0.28
B2.2 : Neutral grassland : semi-improved	2.49	17.68
TOTAL:	2.75	19.16

CREATED

- 3.2.8. Created habitat accounts for 11.26ha of the Proposed Development, generating a total of 31.07 BU. A summary of the post-development biodiversity unit calculation for created habitat is provided in table 3-7 below.
- 3.2.9. The created linear habitats are displayed in Table 3-8. Under current landscape design proposals, 813m of hedgerow will be created within the Proposed Development. As noted in Section 2.4, no linear watercourse habitat is to be created but 466m of swales will be created, totalling approximately 0.1ha. These are an ecologically equivalent habitat to the running water habitat lost.

Table 3-7 – Summary of post-development biodiversity unit calculation: created area-based habitat

Phase 1 Habitat Type	Area of Habitat (ha)	Biodiversity Units (BU)
A1.1.2: Woodland: Broadleaved - plantation (Medium)	2.18	13.08
A1.3.2: Woodland: Mixed - plantation	0.23	1.38
A2.1: Scrub: Dense/continuous	0.48	4.78
A3.1: Parkland/scattered trees: Broadleaved (Medium)	0.07	0.42
B2.2: Neutral grassland: semi-improved	0.58	4.94
B5: Marsh/marshy grassland (High)	0.63	1.77
G1.1: Standing water: Eutrophic (High)	0.20	3.60
J1.2: Cultivated/disturbed land: Amenity grassland	0.43	0.80

Phase 1 Habitat Type	Area of Habitat (ha)	Biodiversity Units (BU)
J3.6: Built-up areas: Buildings	6.41	0.00
J4: Bare ground	0.15	0.30
TOTAL	11.36	31.07

Table 3-8 – Summary of post-development linear unit calculation: created linear-based habitat

Phase 1 Habitat Type	Length of Habitat (m)	Linear Units
J2.1.1: Boundaries: Hedges - Intact - native species-rich	520.50	520.50
J2.1.2: Boundaries: Hedges - Intact - species-poor	42.00	42.00
J2.3.1: Boundaries: Hedges - With trees - native species-rich	134.50	134.50
J2.3.2: Boundaries: Hedges - With trees - species-poor	115.50	115.50
TOTAL	812.50	812.50

SUMMARY OF HABITAT CHANGE

- 3.2.10. A summary of the areas and calculated biodiversity units for retained, enhanced and created habitats is presented in Table 3-9, with hedgerows detailed in Table 3-10. Overall, the area of the proposed development will achieve a total of 70.99 area-based BU.

Table 3-9 – Summary of post-development unit calculation for retained, created and enhanced area-based habitats

Action	Area of Habitat (ha)	Biodiversity Units (BU)
Retained	4.28	20.76
Enhanced	2.75	19.16
Created	11.36	31.07
TOTAL	18.39	70.99

Table 3-10 - Summary of post-development unit calculation for retained and created hedgerows

Action	Length (m)	Linear Units (BU)
Retained	124.00	372.00
Created	812.50	812.50
TOTAL	936.50	1,184.50

3.3 CHANGE IN BIODIVERSITY

- 3.3.1. The results of the BNG assessment conclude that the Proposed Development will achieve a net gain for area-based BU, with an increase of 27% from baseline BU (Table 3-11). It will also result in a 117% net gain of hedgerow LU. No watercourse is provided in the post-development layout but the provision of 466m of swale is considered to adequately compensate for the loss of 315.5m of ditch (mapped as running water in Phase 1 typology).
- 3.3.2. A full summary of the change in BU and LU, with the percentage change from baseline for each habitat type, and outcome of net loss, no net loss or net gain can be found in Appendix D.

Table 3-11 – Summary of overall change in BU and LU

Habitat Type	Baseline	Post-Development	Net Change
Area-based habitats (BU)	55.86 BU	70.99 BU	15.13 (27.09%)
Hedgerow (LU)	546 LU	1184.5 LU	638.5 (117%)

4 CONCLUSION AND RECOMMENDATIONS

4.1 CONCLUSIONS

- 4.1.1. No irreplaceable habitat or statutory designated sites are directly impacted by the Proposed Development. Under current landscape plans, the Proposed Development would result in an overall net gain (+27%) in area-based biodiversity units, with no area-based HPI habitat lost. The Proposed Development will also achieve a 117% net gain in hedgerow habitats.
- 4.1.2. Overall, following the current landscape plan, the Proposed Development will achieve a net gain in biodiversity.

4.2 RECOMMENDATIONS

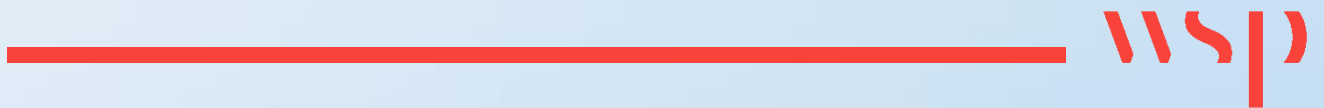
- 4.2.1. If the Proposed Development follows the current Landscape Plan, an overall net gain should be achieved; for area habitats, hedgerows habitats and watercourse habitats. It is recommended that a Biodiversity Management Plan is written to enable to the site to achieve its full biodiversity potential.
- 4.2.2. It is recommended that suitable areas earmarked for enhancement undergo planting of local tree and plant species in order to increase the distinctiveness and condition, and therefore the biodiversity value, of the habitats within the Proposed Development.
- 4.2.3. A general recommendation is to remove any non-native species throughout the Site by contracting a specialist to provide and implement a plan of eradication if a non-native species is found.
- 4.2.4. Since completion of the BNG Assessment, BMD have issued an updated iteration of the landscape design (BMD, November 2019). These changes are not captured within this BNG Assessment. Changes to proposed post-development habitats are minor (adjustment to proposed water slide locations and addition of ditch features around the car park). These changes would likely result in a minor increase in post-development BU which would not significantly alter the outcome of the assessment. Nevertheless, it is recommended that an updated BNG Assessment is undertaken at the post-planning stage to ensure the BNG outcome accurately reflects the final design.

5 REFERENCES

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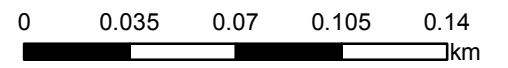
Appendix A

PHASE 1 HABITAT SURVEY MAP





- Key**
- Red Line Boundary
- Lines**
- Running Water
 - Intact Hedge - Species-Poor
 - Hedge with Trees - Species-Rich
 - Hedge with Trees - Species-Poor
 - Dry Ditch
- Polygons**
- Broadleaved Woodland - Plantation
 - Mixed Woodland - Plantation
 - Dense Scrub
 - Broadleaved Parkland/Scattered Trees
 - Coniferous Parkland/Scattered Trees
 - Mixed Parkland/Scattered Trees
 - Neutral Grassland - Semi-Improved
 - Species Poor Semi-Improved Grassland
 - Standing Water
 - Amenity Grassland
 - Ephemeral/Short Perennial
 - Introduced Shrub
 - Bare Ground
 - Other Habitat (Sand)



Client:	DP9
Project:	Bicester
Title:	Phase 1 Habitat Survey

Drawing No: Figure 1	Drawn: BW
Date: October 2019	Checked: LR
Scale: 2,500 @ A3	Approved: VP

Appendix B

BIODIVERSITY NET GAIN ASSESSMENT: DETAILED METHODOLOGY

BIODIVERSITY NET GAIN ASSESSMENT: DETAILED METHODOLOGY

OVERVIEW

BNG assessment calculations are separated into four key sections which are used to produce the quantitative outcomes of the assessment. They are:

1. Separating out irreplaceable baseline habitats and any mitigation proposed for impacts to irreplaceable habitats, from the main data set;
2. Quantification of baseline biodiversity units using Phase 1 Habitat data and habitat condition assessment data;
3. Quantification of post-development biodiversity units using Phase 1 Habitat data translated from the post-development draft landscape masterplan; and
4. Assessing the net change in biodiversity value as a result of the Proposed Development.

5.1.1. Collectively these elements of the BNG assessment are used in conjunction with qualitative information relating to the BNG good practice principles to produce a scheme-wide BNG assessment outcome.

IRREPLACEABLE HABITATS

It is important to note that biodiversity net gain or no net loss cannot be achieved for the development as a whole if there is a negative impact on an irreplaceable habitat (Appendix B - Principle 2). Best practice guidance advises that irreplaceable habitats should not be included in any assessment of impacts (CIEEM, IEMA and CIRIA, 2019 and DEFRA, 2012a).

In these situations, any compensation offered to address impacts on irreplaceable habitats should be agreed directly with the relevant statutory nature conservation agency (in this case Natural England (NE)).

Unavoidable impacts on irreplaceable habitats should not undermine the BNG assessment process for other habitats. Projects in this situation should aim to achieve no net loss or net gains for non-irreplaceable habitats.

There are no irreplaceable habitats impacted by the Proposed Development for the Bicester Golf Course.

BASELINE BIODIVERSITY UNIT CALCULATIONS

AREA-BASED HABITATS

The biodiversity baseline value of the non-irreplaceable area-based habitats within the Site were quantified in terms of biodiversity units (BU). Calculation of BU for habitat areas was in accordance with DEFRA's technical paper (2012a), guidance for developers (2012b) and guidance for offset providers (2012c). This is the standard metric used for calculating BU in the UK.



The DEFRA metric assesses biodiversity based upon numerical scores based on values of habitat distinctiveness, habitat condition and the area in hectares (ha, 2 d.p.) of individual habitat polygons:

$$\text{Baseline Biodiversity Units (BU)} = \text{Area (ha)} \times \text{Distinctiveness} \times \text{Condition}$$

The BNG calculation covered all area-based habitats within the Site.

2.3.4 The following Phase 1 habitat typologies are excluded from the biodiversity unit calculation:

- Fence (J2.4);
- Dry ditch (J2.6);
- Boundary removed (J2.7);
- Buildings (J3.6); and
- Hardstanding / built up areas (J5).

These habitat types do not generate BU so they are excluded from BNG calculations. However, the total areas of buildings and hardstanding are reported in results tables to show the total area of the Site has been considered in both baseline and post-development calculations.

LINEAR HABITATS

DEFRA recognise that hedgerows are a very important feature in terms of biodiversity value: “*Their contribution, by area, to biodiversity in the landscape is far greater than even the most biodiversity rich habitats*” (DEFRA, 2012a). Hedgerows therefore cannot be treated as other area-based habitats and are considered in terms of linear units (LU) rather than BU. Both are arbitrary units which are not directly comparable with each other.

The biodiversity value of non-irreplaceable linear habitats within the Site was quantified in terms of LU. Calculation of LU for linear hedgerow habitats was based on DEFRA’s technical paper (DEFRA, 2012a), guidance for developers (DEFRA, 2012b) and guidance for offset providers (DEFRA, 2012c). This is the standard metric used for calculating LU in the UK.

The DEFRA metric assesses biodiversity based upon numerical scores of habitat condition and the length in metres (m, to the nearest 0.5 m) of individual habitat polylines:

$$\text{Baseline Linear Units (LU)} = \text{Length (m)} \times \text{Condition}$$

Under the DEFRA 2012 metric there is no means of incorporating habitat condition in to the BNG assessment for G2.1 Running water habitat, as there is no accurate method of assessing watercourse condition. Consequently, the length of these habitats in metres are reported as a distinct type of LU which is specific to this habitat type. As with BU and LU generated from other habitats, the LU generated for G2.1 Running water are treated as arbitrary and are not comparable with BU or LU from other habitats.

HABITAT DISTINCTIVENESS

Habitat distinctiveness is defined as a collective measure of biodiversity and includes parameters such as the number and variety of species found within the habitat (richness and diversity), how rare the species are, and how many species the habitat supports that are not common elsewhere.

To determine habitat distinctiveness, Phase 1 Habitat types were transposed into the standard habitat distinctiveness typology and bands issued by DEFRA (“the DEFRA habitat type”). For some habitat types, multiple distinctiveness bands can apply, depending on the quality of the habitat. Decisions on which distinctiveness band to assign were based on criteria listed in Appendix C of BRE (2019) GN36 – BREEAM, CEEQUAL and HGM Ecology Calculation Methodology – Route 2. This document enables consistent assessment of distinctiveness for all habitats.

The DEFRA distinctiveness bands and associated scores are described in Table A-1.

Table A-1 – Habitat distinctiveness bands and scores

Distinctiveness Band	Distinctiveness Score	Habitat Types Included
High	6	HPIs i.e. those which meet the criteria to qualify as habitats of principle importance (JNCC, 2011). This excludes ancient woodland and other habitats which are considered irreplaceable.
Medium	4	Other semi-natural habitats that do not fall within the scope of HPI definitions, i.e. all other areas of woodland (e.g. broadleaved plantation), other grassland (e.g. semi-improved), other uncultivated field margins, road verge and railway embankments (excluding those that are intensively managed).
Low	2	Improved grassland, arable fields (excluding any uncultivated margins), domestic gardens, regularly disturbed bare ground (e.g. quarry floor, landfill sites etc.), verges associated with transport corridors.

All hedgerows are assumed to be of High distinctiveness because the vast majority of hedgerows will meet HPI criteria. For this reason, distinctiveness is not included as part of the linear unit calculation. This follows the approach set out by DEFRA.

HABITAT CONDITION

Condition, in the context of BNG, is defined as the quality of a particular habitat. For example, a habitat is in poor condition if it fails to support the rare or notable species for which it is valued, or if it is degraded as a result of pollution, erosion, invasive species or other factors.

The DEFRA metric requires habitat condition to be assessed using the system presented in Natural England's Farm Environment Plan (FEP) manual (Natural England, 2010).

Habitat condition scores were assigned based on the criteria in Table A-2.

Table A-2 – Habitat condition bands and scores

Condition Band	Condition Score	Criteria for Assessing Condition
Good	3	Any habitat which passes all FEP criteria.

Moderate	2	Any habitat which fails one FEP criterion.
Poor	1	Any habitat which fails two or more FEP criteria.

The following general assumptions on habitat condition can be made in the absence of primary and retrospective HCA data:

- All Low distinctiveness habitats were allocated a condition score of Poor.
- All Medium and High distinctiveness habitats were allocated a condition score of Moderate.
- In the absence of HCA data for hedgerows, hedgerows were assumed to be in Good condition. The exception to this rule is defunct hedgerows. Defunct hedgerows fail one of the FEP condition assessment criteria by nature of being defunct, therefore all defunct hedgerows were assumed to be in Moderate condition.

POST-DEVELOPMENT BIODIVERSITY UNIT CALCULATIONS

The post-development biodiversity value was quantified using the Proposed Development's draft landscape masterplan (Appendix C). This approach quantifies the biodiversity units expected on site post-development after habitat retention and creation.

AREA-BASED HABITATS

The biodiversity value of the non-irreplaceable area-based habitats present in the landscape mitigation was quantified in terms of BU. Calculation of BU for post-development habitat areas was in accordance with DEFRA's technical paper, guidance for developers and guidance for offset providers. This is the standard metric used for calculating BU in the UK.

Post-development biodiversity units are calculated in a similar way to baseline biodiversity units. However, in addition to the proposed habitats area, condition and distinctiveness, the key risks to delivery are taken into account through incorporation of risk factors. The DEFRA metric sets out three risk factors: distance from the Scheme (Spatial Risk); time taken for created or enhanced habitats to reach target condition (Temporal Risk); and how difficult it is to create or enhance any given habitat (Delivery Risk). The specific details and values of these risk factors are listed below (see Post-development Risk Factors).

To calculate post-development BU for the area-based habitats the potential post-development biodiversity units (pBU) are calculated using the following calculation:

$$\text{Potential Post-Development Biodiversity Units (pBU)} = \text{Area (ha)} \times \text{Distinctiveness} \times \text{Condition}$$

The created post-development BU are then calculated by applying the Spatial Risk, Temporal Risk and Delivery Risk factors to the pBU using the following calculation:

$$\text{Created Post-Development BU} = \text{pBU} \times \text{Spatial Risk factor} \times \text{Temporal Risk factor} \times \text{Delivery Risk factor}$$

The enhanced post-development BU are calculated by adding the baseline biodiversity value of the habitat to be enhanced to the difference between the baseline habitat biodiversity value and its pBU (pre-risk enhancement BU, BU diff.) when the Spatial Risk, Temporal Risk and Delivery Risk factors have been applied. This is calculated using the following equation:

$$\begin{aligned} \text{Pre-risk enhancement BU (BU diff.)} &= \text{pBU} - \text{Baseline BU} \\ \text{Enhanced Post-Development BU} &= \\ \text{Baseline BU} &+ (\text{BU diff.} \times \text{Spatial Risk factor} \times \text{Temporal Risk factor} \times \text{Delivery Risk factor}) \end{aligned}$$

LINEAR HABITATS

The post-development LU from hedgerow habitats and watercourse units created are expressed simply as a length in metres.

$$\text{Post-Development Linear Units (LU)} = \text{Length of Linear Habitat (m)}$$

DISTINCTIVENESS

Selection of distinctiveness bands and associated numerical scores for post-development habitats followed the approach outlined in the baseline habitat section (see above).

TARGET CONDITION

The aim for post-development habitat target condition is dependent on their difficulty to create and their distinctiveness. Appendix C of BRE (2019) GN36 – BREEAM, CEEQUAL and HGM Ecology Calculation Methodology – Route 2 provides the difficulty to create information for each Phase 1 Habitat type. Good condition is considered achievable for Phase 1 Habitat types which are of low or medium difficulty to create. Habitats which have a high difficulty to create are anticipated to reach a target condition of Moderate. Habitats with low distinctiveness can achieve a maximum target condition of moderate. However, poor target condition is appropriate for low distinctiveness habitats with intensive management regimes (e.g. amenity grassland) or those with bare ground characteristics.

POST-DEVELOPMENT RISK FACTORS

Spatial Risk

The Spatial Risk is the risk associated with delivering compensation for the loss of a habitat at a distance from that loss. The further from the site of the loss, the greater the risk. Spatial Risk has not been included in the preliminary post-development calculation as it is assumed that habitat compensation and retention will be delivered within the same ecological network as the loss occurs.

Temporal Risk

In delivering compensation for loss of habitats, the timing of impact may not coincide with the new habitat reaching the required quality or level of maturity which could result in loss of biodiversity for a period of time. This risk is accounted for by applying a 'Temporal Risk' multiplier to the biodiversity unit calculations.

DEFRA has no default values for the time taken to reach a specific condition for each habitat type. Therefore, default values and temporal risk bands were taken from Appendix C of BRE (2019) GN36 – BREEAM, CEEQUAL and HGM Ecology Calculation Methodology – Route 2 as outlined in the report and Table A-3.

Table A-3 – DEFRA temporal risk factors

Years to Target Condition	Temporal Risk Factor
Under 1 year	1
1	0.97
2	0.93
3-5	0.83
6-10	0.71
11-15	0.59
16-20	0.50
21-25	0.42
26-30	0.35
32+	0.33

Delivery Risk

Delivery Risk is the risk associated with the difficulty to create or restore any specific habitat. Values for this risk factor have been extracted from Appendix C of BRE (2019) GN36 – BREEAM, CEEQUAL and HGM Ecology Calculation Methodology – Route 2 and DEFRA’s guidance to offset providers. Table A-4 shows the risk factors assigned to each level of Delivery Risk for habitats created for the Proposed Development.

Table A-4 – DEFRA delivery risk factors

Difficulty of Creation or Enhancement	Delivery Risk Factor
Very High	0.10
High	0.33
Medium	0.67
Low	1.00

NET CHANGE IN BIODIVERSITY VALUE AND ASSESSMENT OUTCOME

The baseline and post-development biodiversity units (excluding irreplaceable habitats and their compensation) were compared to assess whether the Proposed Development achieves a quantitative biodiversity net gain for non-irreplaceable habitats on site.

The following formula is used to calculate the change in BU as a consequence of the Proposed Development:

$$\text{Net change in biodiversity value} = \text{Post-Development BU (created and retained)} - \text{Baseline BU}$$

If the resulting score is negative, there is a loss in biodiversity for area-based habitats. If the score is close to zero (with the post-development BU being within 95%-104% of the baseline BU) there is no net loss of biodiversity for area-based habitats. If there is an increase in the BU of 5% or more, the project is capable of delivering net gain for biodiversity for the area based habitats. The percentage should be rounded to the nearest whole percentage point (Table A-5). The same formula and process applies to calculating the change in LU.

Subsequently, the quantitative outcomes of the BNG assessment calculations can then be categorised as achieving one of the outcomes listed in Table A-5. The quantitative outcome awarded to the Proposed Development will be based on the BU or LU value with the lowest net percentage change value.

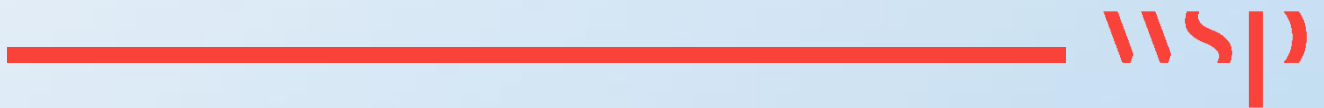
Table A-5 – Quantitative outcomes of BNG calculations

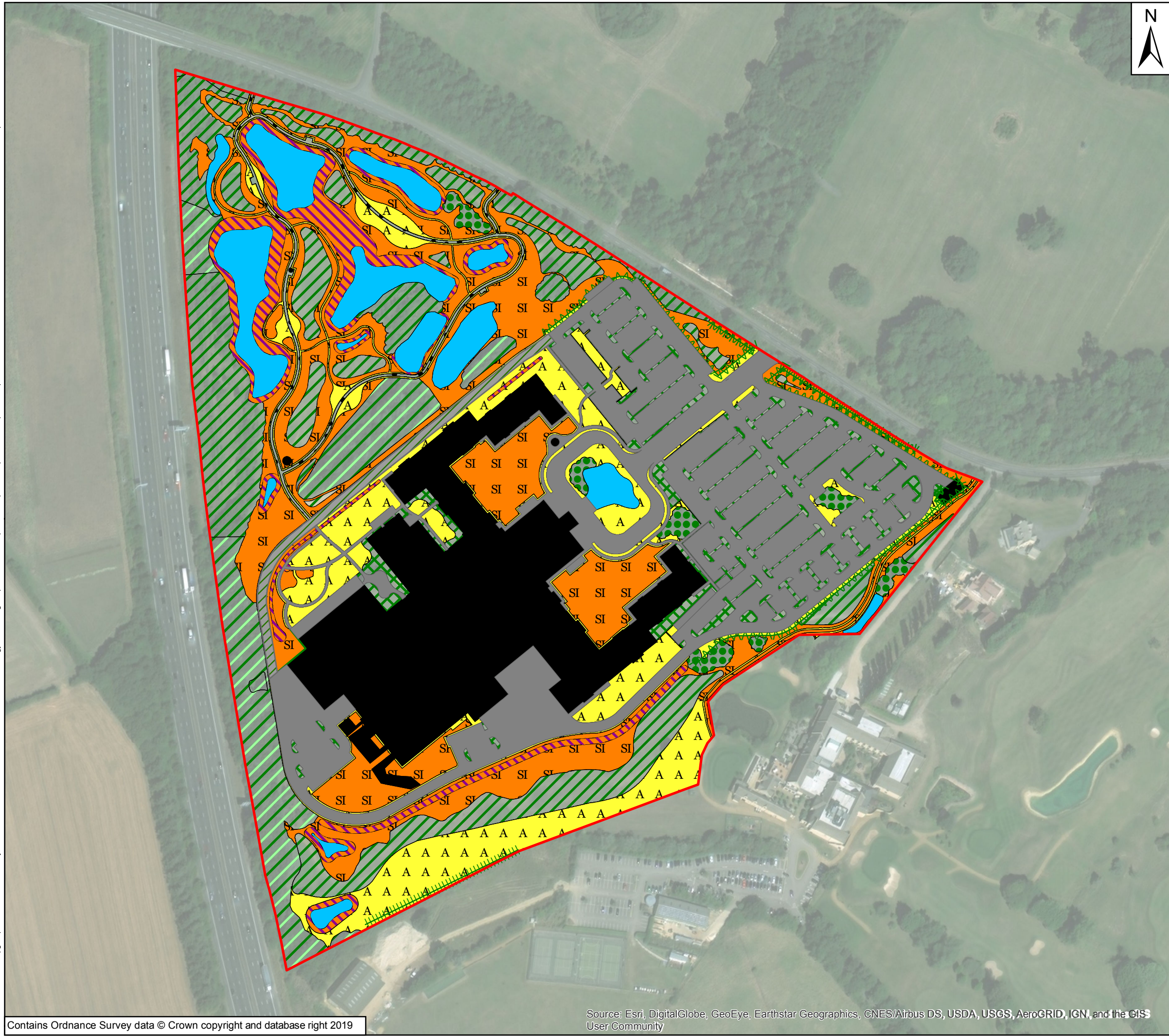
Calculation Result	Predicted Scheme-wide Outcome
Less than 95% of the baseline value	Net loss (NL) of biodiversity
95% - 104% of baseline value	No net loss (NNL) of biodiversity
105% or more of baseline value	Biodiversity net gain (BNG)

- 5.1.2. The quantitative outcomes of the assessment are a singular element of the BNG assessment and associated best practice principles. For a BNG assessment to be completed, the quantitative outcome is in conjunction with qualitative information relating to the other BNG good practice principles.

Appendix C

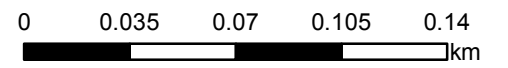
POST-DEVELOPMENT HABITAT MAP





Key

- Red Line Boundary
- Post Development Hardstanding**
- Hardstanding
- Grasscrete
- Post Development Phase 1 Line Codes**
- Hedge with Trees - Species-Poor
- Hedge with Trees - Species-Rich
- Intact Hedge - Native Species-Rich
- Intact Hedge - Species-Poor
- Post Development Phase 1 Polygon Codes**
- Amenity Grassland
- Bare Ground
- Broadleaved Parkland/Scattered Trees
- Broadleaved Woodland - Plantation
- Buildings
- Marsh/Marshy Grassland
- Mixed Woodland - Plantation
- Neutral Grassland - Semi-Improved
- Scrub - Dense/Continuous
- Standing Water



Client:	Great Wolf Resorts
Project:	Bicester Golf Course
Title:	Post Development Habitat Map

Drawing No: Figure 2	Drawn: BW
Date: October 2019	Checked: LR
Scale: 2,500 @ A3	Approved: VP

Appendix D

SUMMARY OF CHANGE IN BIODIVERSITY UNITS AND LINEAR UNITS

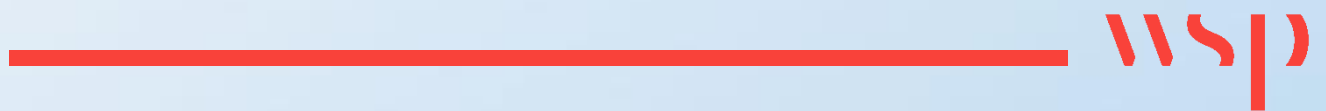




Table D-1 – Change in area-based biodiversity units and outcome of assessment

Phase 1 Habitat Type	Baseline BU	Post-development BU	Change in BU	Outcome
A1.1.2: Woodland - broadleaved plantation	3.40	14.59	11.19	Net Gain (329.12%)
A1.3.2: Woodland - mixed plantation	4.88	5.47	0.59	Net gain (12.09%)
A2.1: Scrub - dense/continuous	0.12	4.78	4.66	Net Gain (3,883.33%)
A3.1: Parkland/scattered trees - broadleaved	4.2	2.26	-1.94	Net Loss (-46.19%)
A3.2: Parkland/scattered trees - coniferous	0.88	0.60	-0.28	Net Loss (-31.82%)
A3.3: Parkland/scattered trees - mixed	1.24	0.04	-1.20	Net Loss (-96.77%)
B2.2: Semi-improved neutral grassland	1.84	22.62	20.78	Net Gain (1129.35%)
B5: Marshy grassland	0.00	1.77	1.77	Net Gain (no baseline)
B6: Poor semi-improved grassland	0.86	0.00	-0.86	Net Loss (-100%)
G1: Standing water	12.96	14.28	1.32	Net Gain (10.19%)
J1.2: Amenity grassland	24.90	4.28	-20.62	Net Loss (-82.81%)
J1.3: Ephemeral/short perennial	0.02	0.00	0.02	Net Loss (-100%)
J1.4: Introduced shrub	0.3	0.00	-0.30	Net Loss (-100%)

Phase 1 Habitat Type	Baseline BU	Post-development BU	Change in BU	Outcome
J4: Bare ground	0.02	0.30	0.28	Net Gain (1400%)
J5: Other habitat	0.24	0.00	-0.24	Net Loss (-100%)
TOTAL	55.86	70.99	15.13	Net Gain (27.09%)

Table D-2 – Change in hedgerow linear units and outcome of assessment

Phase 1 Habitat Type	Baseline LU	Post-development LU	Change in LU	Outcome
J2.1.1: Native species rich intact hedge	0.00	520.5	520.5	Net gain (No baseline)
J2.1.2: Intact species-poor hedge	174	42.0	-132	Net loss (-75.9%)
J2.3.1: Species-rich hedge with trees	25.5	16.0	109	Net gain (427.5%)
J2.3.2: Species-poor hedge with trees	346.4	462.0	-230.9	Net loss (-66.66%)
TOTAL	545.9	1184.5	266.5	Net gain (117%)



110 Queen Street
Glasgow
G1 3BX

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