ABBEY PARK HOTEL GOLF COURSE, REDDITCH

BIODVERSITY NET GAIN CONCEPT PLAN

A Report to: Barratt Homes / David Wilson Homes Mercia

Report No: RT-MME-157753

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REPORT VERIFICATION AND DECLARATION OF COMPLIANCE

This study has been undertaken in accordance with British Standard 42020:2013 “Biodiversity, Code of practice for planning and development”.

Report Version	Date	Completed by:	Checked and Approved by:
Final	26/05/2022	Richard Wheat ACIEEM (Principal Ecologist) Carol Flaxman ACIEEM (Principal Consultant)	Tom Docker CEcol MCIEEM (Managing Director)

The information which we have prepared is true, and has been prepared and provided in accordance with the Chartered Institute of Ecology and Environmental Management’s Code of Professional Conduct. We confirm that the opinions expressed are our true and professional bona fide opinions.

DISCLAIMER

The contents of this report are the responsibility of Middlemarch Environmental Ltd. It should be noted that, whilst every effort is made to meet the client’s brief, no site investigation can ensure complete assessment or prediction of the natural environment.

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1. INTRODUCTION

1.1 PROJECT BACKGROUND

In April 2022, Barratts/David Wilson Homes commissioned Middlemarch Environmental Ltd to produce a Biodiversity Net Gain Concept Plan for land at Abbey Park Hotel Golf Course, near Redditch, Worcestershire.

The works are instructed as part of a planning application for a residential development scheme, on land off Hither Green Lane, which lies adjacent to the west of Abbey Park Hotel. A Biodiversity Net Gain Assessment carried out for the proposed development in 2021, identified a current biodiversity loss equivalent to -3.64 Biodiversity Units (BU) (Habitats) and -1.51 BU (Hedgerows), a deficit that could not be addressed by the on-site landscaping proposals associated with the development scheme. The works detailed in this report include a review of opportunities for biodiversity enhancement within Abbey Hotel Golf Course, to identify and quantify if sufficient uplift in biodiversity value can be achieved, to offset residual losses of biodiversity from the adjacent development scheme.

1.2 PROJECT SCOPE

The Biodiversity Net Gain Concept Plan describes the process for identifying the biodiversity enhancement opportunities at a site. The Concept Plan draws upon relevant desk-based environmental and field survey data for the site and surrounding context, to determine the existing ecological baseline and environmental gradients present. These are considered alongside the resource and management limitations for the site, as well as local nature conservation or other environmental targets, to define the appropriate enhancement opportunities in line with best practice Biodiversity Net Gain principles.

The Biodiversity Net Gain Concept Plan is supported by a Biodiversity Metric Assessment which has been carried out in parallel with the Concept Plan (Appendix A). The Biodiversity Metric Assessment uses a metric tool to quantify the value of any biodiversity enhancements so that the suitability of the site, and the viability of any enhancements, as a biodiversity offset scheme can be established.

The Biodiversity Net Gain Concept Plan provides an indicative overview of the biodiversity enhancements that could be achieved on site. The fulfilment of these proposals to the outline specification detailed in this report will, however, be dependent on the detailed design (including planting materials and equipment) and long-term management, which is not within the scope of this report.

The Biodiversity Net Gain Concept Plan is informed by some limited field survey data, but this does not constitute a comprehensive audit of the presence or potential presence of these species within the site. Further species surveys may need to be undertaken as part of the detailed design to inform any constraints posed by these species.

1.3 SITE DETAILS

Site Name	Abbey Park Hotel Golf Course
Location	Land to the east and south of Hither Green Lane
Grid Reference (Centroid)	SP051691
District Authority	Redditch Borough Council (Worcestershire)
Area	10.29 ha
Ownership	Private
Public Access	Private

Table 1.1: Site Details

1.4 DOCUMENTATION PROVIDED

The conclusions and recommendations made in this report are based on information provided by the client regarding the scope of the project. Documentation made available by the client is listed in Table 1.2

Document Name / Drawing Number	Author
The Abbey Hotel – Proposed Masterplan Option 4	Gaunt Golf Design

Table 1.2: Documentation Provided by Client

2. METHODS

2.1 DESK STUDY

An ecological desk study was undertaken to review the baseline environmental context for the site and surrounding landscape. The desk study involved accessing available environmental data about topography, geology, hydrology, ecology, and landscape character within a 1 km radius of the site. The data was obtained from the following sources:

- Natural England – Multi Agency Geographical Information for the Countryside[1],
- UK Government – Flood Map for Planning Service[2],
- Worcestershire Biological Records Centre – Non-statutory wildlife sites and protected/notable species within 1 km (see summary in Appendix B),
- Worcestershire County Council – Green Infrastructure[3] and Landscape Character Maps[4]; and,
- UK Centre for Ecology and Hydrology (UKCEH) – Landcover Map[5]

2.2 FIELD SURVEY

A field survey was conducted following the Phase 1 Habitat Survey methodology of the Joint Nature Conservation Committee[6] and the Institute of Environmental Assessment[7]. Phase 1 Habitat Survey is a standard technique for classifying and mapping British habitats. The aim is to provide a record of habitats that are present on site. During the survey, a Habitat Condition Assessment was carried out to determine the ecological status of each habitat recorded. The condition assessment was assessed using published criteria in Panks *et al.* (2021)[8], the details of which is presented in Section 6 for each habitat recorded in the site.

The survey was carried out on 27th April 2022 by Carol Flaxman ACIEEM (Principal Consultant) and Sam Weir (Ecological Project Officer). Table 2.1 details the weather conditions at the time of the survey.

Parameter	Condition
Temperature (ºC)	10
Cloud (%)	100%
Wind (Beaufort)	F2
Precipitation	Nil

Table 2.1: Weather Conditions During Field Survey

The survey was focussed to areas that were considered to provide the greatest opportunities for biodiversity improvement. Areas to the north and east of the site, that were in the ownership boundary of the Abbey Park Hotel, were omitted due to the extent of formally managed golf areas. Similarly, Dagnell End Meadows SSSI was also excluded as the nature conservation status of the SSSI, rules it out for further nature conservation enhancement. Habitats surrounding the identified opportunity areas were mapped for context but were these were not, in all cases, subject to full assessment (e.g. condition assessment).

Field Survey Constraints

The field survey was carried out in April 2022, which is within the recommended field survey season for Phase 1 Habitat Surveys; however, the survey was completed early in the survey season and it was recognised that Himalayan balsam *Impatiens glandulifera*, which had been identified during a previous visit

[1] Natural England (2022) Multi-Agency Geographical Information for the Countryside (Available https://magic.defra.gov.uk/)
[2] GOV.UK (2022) Flood Map for Planning (Available https://flood-map-for-planning.service.gov.uk/)
[3] Worcestershire County Council (2022) Worcestershire Green Infrastructure Strategy: Overall Spatial Approach. Available https://gis.worcestershire.gov.uk/website/GIPriorities/.
[4] Worcestershire County Council (2022) Landscape Character Assessment. Available https://gis.worcestershire.gov.uk/website/LandscapeCharacter/.
[5] UK CEH (2022) Environmental Information Data Centre – Landcover Map 2020 10 m Web Map Service. Available https://catalogue.ceh.ac.uk/maps#layers/51bcb92a-dd88-4034-ba65-a9d432dd632a
[6] Joint Nature Conservation Committee (2010). *Handbook for Phase 1 Habitat Survey: A technique for environmental audit (reprint).* Joint Nature Conservation Committee, Peterborough.
[7] Institute of Environmental Assessment. (1995). *Guidelines for Baseline Ecological Assessment, Institute of Environmental Assessment*. E&FN Spon, An Imprint of Chapman and Hall. London.
[8] Panks, S., White, N., Newsome, A., Potter, J., Heyton, M., Mayhew, E., Alvarez, M., Russell, T., Scott, S.J., Heaver, M., Scott, S.H., Treweek, J., Butcher, B. and Stone, D. (2021) T*he Biodiversity Metric 3.0 – Auditing and accounting for biodiversity: Technical Supplement*. Natural England.

to the site in early August 2021, was not visible at the time of the 2022 survey. Due to seasonal limitations, some plant species may have been over-looked during the survey, but this was not considered to be a constraint to the classification of habitat condition or type for those recorded in the site. The locations of dense stands of Himalayan balsam noted in August 2021 have been included in this assessment.

2.3 CONCEPT PLAN

The Concept Plan considers opportunities and constraints for habitat enhancement/creation informed by the design brief, the existing and future baseline conditions at the site, and the context of the site in relation to local policies, nature conservation, landscape priorities, and supporting ecological networks.

Opportunities are developed into concept proposals which seek to both improve the nature conservation status of the site within realistic parameters, whilst also contributing towards local nature conservation, landscape or wider environmental priorities for the site or area. Enhancement proposals are characterised as interventions that could lead to an improvement in habitat quality or condition above the existing baseline conditions at the site. Descriptions of the concept design are detailed in Section 5.

The Concept Plan is informed by a Biodiversity Metric Assessment to calculate the value of any biodiversity enhancements at the site. The assessment uses a metric tool which provides a proxy measurement of biodiversity value using habitat attributes. The tool quantifies the biodiversity value of the site before and after any prospective enhancements, the difference in values equating to the proposed biodiversity uplift that the enhancement could achieve. The methods, application, and limitations of the metric assessment, together with the completed Biodiversity Metric Tool are included in Appendix A.

3. BASELINE CONTEXT

3.1 TOPOGRAPHY

The site is situated predominantly on level, low-lying ground between 89-92m above ordnance datum (AOD), but slope upwards towards the east extending up to c.104m AOD.

3.2 GEOLOGY

The site overlies three different soil types. Along the river corridor and the southern boundary of the golf course, the soils are classified as being '*Loamy and clayey floodplain soils with naturally high groundwater*'. Principal land cover on this soil type includes grasslands and arable. To the north of this lies an area of '*Loamy soils with naturally high ground water'* that has a typically low fertility which supports wet acidic meadows, pastures, and woodlands. To the west of the site, the soils are described as slightly acid loamy and clayey soils with impeded drainage. Principal semi-natural land cover for this soil type is a wide range of pastures, broad-leaved woodlands, and mixed woodland types

The land is deemed to be Grade 3 Agricultural Land (Agricultural Land Classification).

3.3 HYDROLOGY

The course of the River Arrow runs to the south of the site, demarcating the southern boundary. The Dagnell Brook runs on a north/south axis through the site, to the east of Hither Green Lane, and discharges into the River Arrow to the south.

The site lies partially within Environment Agency Flood Zones 2 and 3, with a large area of flood zone 3 following the course of the Dagnell Brook, and some marginal areas of Flood Zone 2 along the River Arrow on the southern boundary.

Aerial images appear to show several small to medium size waterbodies scattered throughout the site.

3.4 ECOLOGY

Table 3.1 below summarises the broad ecological context within a 1 km (2 km for statutory nature conservation sites) radius of the site.

Receptor	Description
Ecological Networks	
National Habitat Network	The site overlies several core and enhancement areas within the National Habitat Network. This includes a core area for lowland meadow, which corresponds to an existing priority grassland (see statutory sites below), and a priority area for habitat creation/restoration on the southern boundary of the site. The remaining site areas fall with area covered by Network Enhancement Zones 1 and 2.
Sub-regional Green Infrastructure	The site is situated within an area defined as of average green infrastructure value in the Worcestershire Green Infrastructure Strategy. Priorities for this area include restoring environmental quality and supporting socio-economic enhancements.
Buglife B-Lines	The site is within an area defined by Buglife as a B-line strategic area for grassland creation to benefit pollinators.
Nature Conservation Sites	
Statutory Sites	There are three statutory nature conservation sites within a 2 km radius of the site. The nearest is Dagnell End Meadow Site of Special Scientific Interest (SSSI), designated for its ancient permanent pasture, which lies within the central area of the golf course. Proctor's Barn Meadows Local Nature Reserve (LNR) and Reddtich Woods: Pitcheroak Wood LNR lies approximately 760 m and 2 km to the south-east and southwest of the site respectively.
Non-statutory sites	There are three non-statutory nature conservation sites within a 1 km radius of the site. Two, the Dagnell Brook Local Wildlife Site (LWS) and the River Arrow LWS are located within and adjacent to the site respectively. A third, Abbey Forge and Mill Pond LWS is located 50 m to the south.

Table 3.1: Summary of the Ecological Context of the Site (Continues)

Receptor	Description
Habitats	
Ancient Woodlands	There are no ancient semi-natural woodlands within a 1 km radius of the site.
Priority Habitats	An area of lowland meadow associated with Dagnell End Meadows is situated within the site. There are also numerous records of the priority habitat type – Deciduous broad-leaved woodland within a 1 km radius of the site. The closest parcels are located within the site to the east and just beyond the south-western boundary of the site.
Landcover	Landcover types within a 1 km radius of the site include predominantly improved pasture, arable and horticulture and suburban with pockets of broadleaved, mixed and yew woodland, freshwater, and coniferous woodland.
Species	
Protected Species	The desk study (Appendix A) identified records up to 6 bats species, otter, badger, and great crested newt within a 1 km radius of the site, all of which afford varying protection under UK Wildlife legislation. Records of two bird species – barn owl and kingfisher – which are listed under Schedule 1 of the Wildlife and Countryside Act were also recorded within a 200 m radius of the site.
Priority Species	There are numerous records of Species of Principal Importance with a 1 km radius, these include three species of bat (noctule, soprano pipistrelle and brown long-eared), hedgehog, otter, common toad, great crested newt, grass snake, two butterfly species (white-letter hairstreak and brown hairstreak) and ten moth species (August thorn, broom moth, cinnabar, dot moth, grey dagger, lackey, latticed heath, mottled rustic , rosy rustic and shaded broad-bar).

Table 3.1: Summary of the Ecological Context of the Site (Continued)

3.5 LANDSCAPE AND MANAGEMENT

Table 3.2 summarises the landscape designations, character, and management of the site.

Receptor	Description
Landscape Character	
National Landscape Character	The site sits within the National Landscape Character Area 97 'Arden'. This area is described as low lying and gently rolling with small fragmented semi-natural and ancient woodlands, and characterised by mature oaks set in hedgerows, distinctive field boundaries, historic parklands, and narrow river corridors. Principal land uses include mainly residential, agricultural, and industrial areas with numerous transport corridors, all of which have had a strong influence of the character and development of the landscape area.
Local Landscape Character	The site lies wholly with in Landscape Cover Parcel AR13b which is classified as being low lying, having a land use type 'Urban' and tree cover type 'unwooded'.
Landscape Designations	
Statutory Historic Designations	There are no statutory historic designations within the site, but Bordesley Abbey lies immediately to the south of the site beyond the River Arrow. A further three ancient monuments are situated within a 1 km radius of the site. These are the Mount, the Forge Mill and Churchyard cross in St Leonards Churchyard.
Non-statutory historic designations	There are approximately 13 listed buildings within a 1 km radius of the site. The nearest is Dagnell End Farmhouse situated immediately to the north of the Golf Course beyond Dagnell End Road.

Table 3.2: Summary of the Landscape Context of the Site

4. FIELD SURVEY DATA

4.1 ECOLOGY

4.1.1 Habitats

Table 4.1 details the types, extent and ecological condition of the habitats which were recorded on site during the field survey visit. An annotated map, detailed descriptions habitat condition of each habitat are shown in Drawing C157753-01-01, and the accompanying target notes and condition tables in Section 7. Photos of each habitat are included in Section 8.

Habitat	Target Note	Area (Ha) / Length (Km)	Condition	Photo
A1.1.1 Broad-leaved semi-natural woodland	TN3	0.14 ha	Moderate	8.1
A1.1.2 Plantation broad-leaved woodland	TN4, TN11	1.36 ha	Moderate	8.2 and 8.3
A1.1.2 Plantation broad-leaved woodland	TN7	0.98 ha	Fairly-poor	8.2 and 8.3
A2.1 Dense scrub	TN1, TN8	1.07 ha	Poor	8.4 and 8.5
A3.1 Broad-leaved scattered trees	-	1.14 ha	Not assessed	8.6
B2.2 Neutral semi-improved grassland	TN2	0.43 ha	Good	8.4
B6 Poor semi-improved grassland	TN5, TN9	1.10 ha	Poor	8.5 and 8.6
C3.1 Tall ruderal	TN10	0.34 ha	Poor	-
G1.1 Eutrophic standing water	-	0.18 ha	Not assessed	8.7
J1.2 Amenity grassland	TN6	7.75 ha	Poor	8.8
J2.2.1 Species-poor intact hedgerow	-	0.14 km	Not assessed	-

Table 4.1: Summary of Habitats Recorded During the Field Survey

4.1.2 Species

Table 4.2 details the potential habitat opportunities for species/species groups that were recorded on site during the survey.

Species/Species Group	Description
Amphibians	Environmental DNA surveys for great crested newt were completed at all ponds within 250 m of the proposed development boundary during June 2021; this included some, but not all, of the ponds associated with the wider golf course. No great crested newt DNA was detected in the ponds surveyed. The frequently mown amenity grassland habitats within the areas of the golf course subject to this assessment, provide limited opportunities for amphibians. The areas of woodland, scrub and less frequently managed areas of grassland provide opportunities for foraging and sheltering common amphibians.
Bats	The diversity of habitats within the areas surveyed and the wider golf course comprise open water, river corridor and woodland edge which provide opportunities for foraging and commuting bats.
Birds	The areas of woodland and dense scrub are suitable for foraging and nesting common species of bird. The heavily managed and disturbed habitats restrict opportunities for ground nesting species.
Plants	The surveyed areas chiefly comprise common and widespread plant species typical of the habitats present.
Terrestrial Mammals	The woodland and grassland habitats present are suitable for common terrestrial mammals including badger, rabbit, fox, and deer species; evidence of all these species has been identified on site during visits to the surveyed areas including a badger latrine.
Invertebrates	The woodland and grassland habitats are suitable for common and widespread invertebrate species.
Reptiles	The proposed development area adjacent to the west of the site is known to support a population of grass snake as identified during 2021 surveys. The areas surveyed during this assessment are also suitable for this species.

Table 4.2: Summary of Habitat Opportunities Recorded for Species on Site

4.2 LANDSCAPE AND MANAGEMENT

The site is currently being managed as an active golf course. Management appears to include intensive mowing along existing greens and fairways, together with occasional and/or intermittent vegetation management along existing footpaths, playing areas, and infrastructure.

5. CONCEPT PLAN

This section summaries the influencing factors that will inform the habitat creation options. This considers the existing and future site context and any opportunities and constraints for habitat creation. The detailed concept proposals are described in Section 5.4. These are illustrated on the Concept Plan (Drawing C157753-01-02) in Section 7.

5.1 ENHANCEMENT BRIEF

The primary aim of the concept plan is to identify sufficient opportunities for biodiversity enhancements to offset the residual loss of -3.61 BU (habitats) and 1.53 BU (Hedgerows), from the proposed development off Hither Green Lane, to the west of the golf course. The enhancements should seek to reflect habitats that are impacted by the proposed development including grassland, woodland, hedgerows, and ponds.

The land under consideration is an active golf course and any proposed enhancements will need to be aligned with the site's principal use for recreation. Much of the area to the north of the site comprises actively managed golf course and so enhancements are focussed on existing semi-natural vegetation in the southern half of the site. Consideration will need to be given to the available management equipment for nature conservation management to ensure effective long-term delivery.

5.2 FUTURE BASELINE

Proposed Use and Management

The golf course layout is currently under review and a proposed course realignment is set out in the Abbey Hotel Masterplan Option 4. Whilst this realignment has yet to be implemented, opportunities for habitat creation/enhancement should be located away from the proposed new tees, fairways, and greens to ensure that they can be incorporated into, and managed as part of, the future course layout.

Climate Change

Any long-term habitat enhancement proposals should take account of the likely future climate baseline to ensure proposals are adequately robust to climate change effects. The UK Climate Change Projections[9] suggest that the UK could experience:

- Hotter drier summers - with temperature increases of between 3.7 ℃ and 6.8 ℃ by 2070, and the frequency of hot spells (daytime temperatures exceeding 30 ℃ for more than 2 consecutive days) increasing.
- Higher precipitation – with increases in hourly rainfall and an increase in the likelihood of extreme rainfall events.
- More extreme events - with decreases in average summer rainfall and increases in winter rainfall.

The habitat enhancement proposals should be designed to be resilient against these predicted climate changes so that the biodiversity value of these features is maintained in the long-term.

5.3 APPRAISAL OF OPPORTUNITIES AND CONSTRAINTS

Table 5.1 below provides a summary analysis of the constraints and opportunities at the site, taking into account site context, future baseline and environmental conditions.

Environment Attribute	Constraints/Opportunities
Geology	The existing soil types within the site have the capacity to support a range of semi-natural habitats which typically include woodland, scrub, and acid/ neutral grassland. Areas with naturally high ground water and impeded drainage may also be suitable for creation of wetland habitats such as ponds.

Table 5.1 Opportunties and Constraints for Habitat Enhancement/Creation (Continues)

[9] Met Office Hadley Centre (2019) *UK Climate Change Projections: Headline Findings Version 2.* (Available https://www.metoffice.gov.uk/research/approach/collaboration/ukcp/index)

Environment Attribute	Constraints/Opportunties
Geology (Continued)	The soil types have low to high fertility, with the bulk of the low fertility soils associated with Dagnell End Meadow SSSI in the centre of the site. Higher fertility soils may exclude species-rich grassland swards, therefore grassland enhancements should be principally focussed on enhancements to sward structure with a moderate composition of neutral grassland indicators, rather than typical hay meadow communities.
Hydrology	The extent of active floodplain along the Dagnell Brook and the southern margins may influence enhancement aims and management objectives within these areas. This may include restricted timings to avoid periods of inundation, or selecting appropriate planting, or seed stock to ensure tolerance to seasonally flooded conditions.
	Due to the strategic position of the site along the River Arrow and Dagnell Brook, opportunities could be sought to increase habitats that minimise soil erosion and nutrient run off associated with the golf course, and/or increase water attenuation within the site.
Ecology	Dagnell End Meadow SSSI is a site of national importance. Due to Natural England's target objectives to maintain all SSSI's in favourable condition, any enhancements proposed within this area would not be considered as an 'additional' conservation benefit. Works within proximity to the SSSI may need to seek prior consent from Natural England.
	The site offers excellent opportunities to improve connectivity to Dagnell End SSSI by enhancing existing areas of modified or neutral grassland in close proximity to the SSSI.
	The River Arrow and Dagnell Brook are strategic wildlife corridors and Local Wildlife Sites. Opportunities should be sought to buffer, improve/enhance existing or create new habitats in proximity to these features to improve their value and connectivity for biodiversity.
	Existing woodland habitats on site are typically species-poor plantations with limited age and height structure. Opportunities should be sought to improve the structural composition of these woodlands to support natural processes and provide improve conditions for foraging/roosting bats and nesting birds.
	Habitat enhancement/creation works need to be managed to avoid risk to protected species. Woodland or scrub management will need to avoid risks to roosting bats and nesting birds. Excavation or ground works will need to consider proximity to badger setts, given their presence in the surrounding landscape.
	The presence of Himalayan balsam along the river corridor is likely to be a management consideration for any habitats proposed in this area. Target conditions for any habitat enhancements should reflect the continued presence of this species even if its extent and spread is controlled.
Landscape	The creation/enhancement of grassland and woodland habitats within the golf course will continue to support the wooded parkland aesthetic of the golf course, in line with the Arden national character area. Given its designation as urban land within the Worcestershire Landscape Character Assessment, it is considered that any enhancement to semi-natural habitats will be beneficial to the landscape character parcel in which the site sits.
	Opportunities for new hedgerow creation could be provided along the residential properties off Hither Green Lane, to provide landscape buffering for the users of the golf course. Hedgerows should be created in line with the Arden character area profile with standard oak trees along with a mix of locally native species.

Table 5.1 (Continued): Opportunities and constraints for habitat enhancement/creation

5.4 CONCEPT PROPOSALS

The following measures are proposed in order to support the creation of a species-rich neutral grassland at the site. A visual representation of these proposals is included in Drawing C156018-01-02 in Section 7.

5.4.1 Grassland Enhancement (Area A)

An existing area of modified grassland along the River Arrow (See Drawing C157753-01-02) could be enhanced to establish a 0.73 ha area of neutral grassland corresponding to Phase 1 Habitat Survey definition - B2.2 Semi-improved neutral grassland. It is proposed that the grassland will achieve a Moderate condition score[10] meeting at least, the following four grassland condition criteria:

[10] Panks, S., White, N., Newsome, A., Potter, J., Heyton, M., Mayhew, E., Alvarez, M., Russell, T., Scott, S.J., Heaver, M., Scott, S.H., Treweek, J., Butcher, B. and Stone, D. (2021) T*he Biodiversity Metric 3.0 – Auditing and accounting for biodiversity: Technical Supplement*. Natural England.

1. The appearance and composition of the vegetation very closely matches characteristics of the species grassland habitat type. Wildflowers, sedges, and indicator species for the specific grassland habitat type are clearly and easily visible throughout the sward,
2. Sward height is varied (at least 20% of the sward is less than 7cm and at least 20% is more than 7 cm), creating microclimates which provide opportunities for insects, birds, and small mammals to live and breed,
3. Cover of bare ground between 1% and 5% including localised areas; and,
4. Cover of bracken less than 20% and cover of scrub (including bramble) less than 5%.

Due to the presence of Himalayan balsam along the riparian corridor, it is considered that criteria 5 (maintaining an absence of invasive non-native species), may not be achievable, but through targeted management, it is considered possible to control cover of the species at thresholds below 5%; thereby not adversely impacting on the fulfilment of the remaining condition criteria. The target condition is therefore dropped from moderate to fairly-poor for the purposes of the biodiversity metric calculations.

It is anticipated that the target habitat type and condition could be achieved in a 10-year time frame, in accordance with the following habitat enhancement methods:

- *Himalayan balsam control* – Stands of existing Himalayan balsam will be pulled/cut in July, prior to seeding and prior to any works commencing, to further stop the spread of this species during initial enhancement works.
- *Ground preparation* – Existing grassland areas will be cut short, to a height of 50mm prior to establishment to reduce competitive grasses and notifiable weeds (docks, nettles and thistles). Selected areas will be scarified or harrowed to open up the sward in selected locations in preparation for seeding.
- *Overseeding* – The proposed enhancement areas will be overseeded with a suitable locally sourced/native seed mixture. Priority should be given to green hay from the adjacent Dagnell End Meadow SSSI, although consent from Natural England will be needed. Where green hay is not available a British origin seed mixture should be sought with tussock forming species indicative of seasonally wet soils. Natural England should similarly be consulted to confirm the acceptability of the mix and/or recommend seeding proximity to the SSSI.

Management
Management should focus on establishing a neutral grassland sward, with good sward structure, and a moderate species composition. Mowing will be important to manage competitive grasses, reduce excessive nutrient build up, and managing scrub encroachment from the riparian woodland and trees. However, to maintain grassland structure, 50% of the area could be cut each year on rotation. The sward should be cut once to a height of 150 mm in late July/August and the cuttings left in situ for 5 – 7 days, before being gathered and removed to an allocated composting area.

The sward should be inspected annually, and any shoots of Himalayan balsam should be pulled and removed to an allocated composting site. Excessive growth of notifiable weeds should be controlled through cutting, pulling, or weed wiping with an appropriate herbicide. Broad herbicide application should not be used.

5.4.2 Grassland Enhancement (Area B)

An existing 0.62 ha area of neutral grassland and scrub could be restored in the southwest of the site. The grassland will correspond to Phase 1 Habitat Survey definition - B2.2 Semi-improved neutral grassland and it is proposed that the grassland will achieve a Moderate condition score[11] meeting at least four of the following five grassland condition criteria:

1. The appearance and composition of the vegetation very closely matches characteristics of the species grassland habitat type. Wildflowers, sedges, and indicator species for the specific grassland habitat type and clearly are easily visible throughout the sward,

[11] Panks, S., White, N., Newsome, A., Potter, J., Heyton, M., Mayhew, E., Alvarez, M., Russell, T., Scott, S.J., Heaver, M., Scott, S.H., Treweek, J., Butcher, B. and Stone, D. (2021) T*he Biodiversity Metric 3.0 – Auditing and accounting for biodiversity: Technical Supplement*. Natural England.

2. Sward height is varied (at least 20% of the sward is less than 7cm and at least 20% is more than 7 cm, creating microclimates which provide opportunities for insects, birds, and small mammals to live and breed,
3. Cover of bare ground between 1% and 5% including localised areas,
4. Cover of bracken less than 20% and cover of scrub (including bramble) less than 5%; and,
5. There is an absence of invasive non-native species (as listed on Schedule 9 of WCA, 1981). Combined cover of undesirable species and physical damage (such as excessive poaching, damage from machinery use or storage, damaging levels of access, or any other damaging management activities) accounts for less than 5% of total area.

It is anticipated that the target habitat type and condition could be achieved in a 10-year time frame, in accordance with the following habitat enhancement methods:

- *Scrub Management* – Existing areas of encroaching bramble scrub will be cut back to restore an open sward across the management area (See Drawing C157753-01-02). Cuttings will be removed to an appropriate composting area
- *Year 1 Topping* - The remaining sward will be topped in Year 1 with all arisings removed and disposed to an appropriate composting area,
- *Weed management* – Any extensive stands of notifiable weeds (thistles, docks and nettles) will be spot treated using an appropriate herbicide. Indiscriminate herbicide spraying is not permitted,

Management
Management should comprise an annual cut in August to control scrub encroachment and management nutrient build-up in the soils. A later cut will support later flowering species and retain a seed and nectar source on site, in and amongst, the more intensively managed golfing areas. The sward should be inspected annually, and excessive growth of notifiable weeds should be controlled through cutting, pulling or weed wiping with an appropriate herbicide. Broad herbicide application should not be used.

5.4.3 Woodland Enhancement (Area C)

The existing 0.98 ha area of plantation woodland could be restored in the southwest of the site. The woodland will correspond to Phase 1 Habitat Survey definition – A1.1.1 Broad-leaved semi-natural woodland or A1.1.2 Broad-leaved plantation and it is proposed that the woodland will achieve a Moderate condition score[12], whereby the woodland will score 26 or above points, using the woodland condition criteria. In particular, the following condition criteria will be targeted for enhancement:

- Criteria 1 - Age class – increase the number of age classes of trees within the woodland from one to two,
- Criteria 4 - Increase the number of native trees species found across the woodland from four to greater than five,
- Criteria 7 – Woodland generation increase from no regeneration age classes present, to one or two age classes present: and,
- Criteria 12 – Increase the cover of dead wood across the woodland from below 25% to between 25 – 50% of the woodland area.

It is anticipated that the target habitat type and condition could be achieved in a 20-year time frame, in accordance with the following habitat enhancement methods:

- *Thinning* – Selectively thin canopy trees over years 1 – 5 to create approximately 30% open habitat in the woodland. Target trees should be conifers, non-native broad-leaved or ornamental cultivars to increase the proportion of native species within the canopy. Woodland thinning must not exceed 5 cubic metres in any calendar quarter. Thinning operations must be timed to avoid the bird nesting season (March – August inclusive).
- Dead wood – Felled trees as part of the above thinning operations, or any other thinning operations on site, should be left in situ, or where this is not possible, processed and stacked as log piles throughout the wood.

[12] Panks, S., White, N., Newsome, A., Potter, J., Heyton, M., Mayhew, E., Alvarez, M., Russell, T., Scott, S.J., Heaver, M., Scott, S.H., Treweek, J., Butcher, B. and Stone, D. (2021) T*he Biodiversity Metric 3.0 – Auditing and accounting for biodiversity: Technical Supplement*. Natural England.

- *Underplanting* – New native and locally distinctive trees and shrubs should be planted throughout the woodland gaps, to increase woodland structure and regeneration potential. Planting should be carried out at a low density approx. 600 whips/ ha and spaced at random intervals.

Management
The woodland should be subject to low intervention management after initial thinning and underplanting, to allow the development of the canopy and shrub layer. Management should include regular checks to monitor trees health, and remedial action for any notifiable tree diseases, or where trees pose a risk to health and safety within the golf course. Regular inspections of litter or damaged tree guards (where used) should be carried out to improve the aesthetic appearance of the woodland.

5.4.4 Pond Creation (Area D)

A new pond measuring approximately 270 m^2 (0.27 ha) could be created in an area of semi-natural grassland to the west of Dagnell Brook (See Drawing C157753-01-02). The pond will correspond to Phase 1 Habitat Survey definition – G1,1 eutrophic standing water and it is proposed that the pond will achieve a good condition score[13] whereby at least seven of the following eight criteria are met:

1. The pond is of good water quality, with clear water (low turbidity) indicating no obvious signs of pollution.
2. There is semi-natural habitat (i.e. moderate distinctiveness or above) for at least 10 m from the pond edge,
3. Less than 10% of the pond is covered with duckweed or filamentous algae,
4. The pond is not artificially connected to other waterbodies, either via streams, ditches, or artificial pipework,
5. Pond water levels should be able to fluctuate naturally throughout the year. No obvious dams, pumps, or pipework,
6. There is an absence of non-native plant species.
7. The pond is not artificially stocked. If the pond contains fish, it is native fish species at low densities,
8. In non-woodland ponds, plants, be they emergent submerged or floating (excluding duckweeds), should cover at least 50% of the pond area that is less than 3 m deep; and,
9. The surface of non-woodland ponds is no more than 50% shaded by woody bankside species.

It is anticipated that the target habitat type and condition could be achieved in a 5-year time frame, in accordance with the following habitat enhancement methods:

- *Ground investigations* – Initial investigation works to inform design of the pond (e.g. soil types, soil disposal areas).
- *Ground preparation and excavation* – Strim back existing grassland vegetation around proposed pond location and working areas prior to ground works. Excavate pond in a teardrop or figure ‘8’ shape and create steps with different water depths. Sub-soil could be spread on adjacent pond margins to create low-nutrient substrate for reseeding.
- *Overseeding* – Overseed with an appropriate wildflower pond mixture and/or wet grassland mixture around pond margins. Natural England should be consulted on the proposed wet grassland mixture to ensure that it does not conflict with management objectives in the adjacent Dagnell End Meadows SSSI.

Management
The pond should be managed by low intervention management including routine checks for the presence of invasive non-native plant species. Where identified, remedial actions should be taken to eradicate these species before they become established within the pond or adjacent habitats. Pond water levels should be allowed to fluctuate naturally, and marginal vegetation strimmed back intermittently to create a diverse marginal structure to support plant diversity. Stocking of fish should be prohibited with any introductions removed from the pond.

[13] Panks, S., White, N., Newsome, A., Potter, J., Heyton, M., Mayhew, E., Alvarez, M., Russell, T., Scott, S.J., Heaver, M., Scott, S.H., Treweek, J., Butcher, B. and Stone, D. (2021) T*he Biodiversity Metric 3.0 – Auditing and accounting for biodiversity: Technical Supplement*. Natural England.

5.4.5 Hedgerow Planting (Area E)

A new 250 m long section species-rich native hedgerow could be planted adjacent to area D (See Drawing C157753-01-02). The hedgerow will correspond to Phase 1 Habitat Survey definition – J2.1.1 species-rich intact hedgerow and it is proposed that the hedgerow will achieve a good condition score[14] whereby at least seven of the following eight criteria are met:

1. The hedgerow height is on average >1.5 high along its length,
2. The hedgerow is on average >1.5 m wide along its length,
3. Gaps between ground and base of the canopy are<0.5 m for >90% of the length of the hedgerow,
4. Gaps make up <10% of the total length of the hedgerow with no canopy gaps >5 m,
5. There is a >1 m wide margin of undisturbed ground with perennial herbaceous vegetation for >90% of the hedgerow length,
6. Plant species that are indicative of nutrient enrichment of soils dominate <20% cover of the area of undisturbed ground,
7. >90% of the hedgerow and undisturbed ground is free of invasive non-native and neophyte species; and,
8. >90% of the hedgerow and undisturbed ground is free of damage caused by human activities.

It is anticipated that the target habitat type and condition could be achieved in a 10-year time frame, in accordance with the following habitat enhancement methods:

- *Ground preparation and excavation* – Strim back existing vegetation to a height of 50 mm along the proposed hedgerow location,
- *Planting* – Plant a mixed native stock (minimum 5 native species in equal proportions) as a staggered double row at 60 cm centres with tree stakes and guards.
- *Watering* – Water existing planting stock during dry period in the first year of establishment
- *Replacement planting* – Replace any failed planting stock on a like-for like basis to ensure no net loss of hedgerow area,
- *Trim hedgerow* – trim hedging stock after 1st year to encourage bushy growth of the hedgerow,
- *Laying (Optional)* – Consider formally laying hedgerow in Year 10, once the hedgerow is formally established.

Management
Management of the hedgerow should be informal and carried out once every three years on rotation with other hedgerows within the site. Hedgerows should be trimmed to a minimum height of 2 m and 1.5 m in width, with the hedgerow bottom margins left uncut for approximately 1.5 m from the centre line of the hedgerow. Tree guards should be removed as required once the hedging stock has become established.

5.5 MONITORING

The scheme above will need to be subject to regular ecological monitoring to document progress against the target habitat type and condition, and to identify any indicators of environmental change that could affect the fulfilment of the conservation objectives throughout the life of the scheme. A monitoring programme, which should include a visit by a suitably qualified ecologist through the scheme duration, will need to be carried out as part of the final enhancement scheme.

[14] Panks, S., White, N., Newsome, A., Potter, J., Heyton, M., Mayhew, E., Alvarez, M., Russell, T., Scott, S.J., Heaver, M., Scott, S.H., Treweek, J., Butcher, B. and Stone, D. (2021) T*he Biodiversity Metric 3.0 – Auditing and accounting for biodiversity: Technical Supplement*. Natural England.

6. DISCUSSION AND RECOMMENDATIONS

6.1 CONCEPT PLAN

The BNG Concept Plan detailed in this report sets out an approach to enhancing the nature conservation status of Abbey Park Hotel Golf Course. Subject to alignment with any existing management operations and proposed golf course re-alignments (See Section 5.2), the Concept Plan indicates that the site provides suitable opportunities for the enhancement of neutral grassland and woodland, together with the creation of a hedgerow, and pond feature and sets out the broad requirements and parameters for how this could be achieved in principle. The Biodiversity Metric Assessment undertaken by Middlemarch Environmental Ltd, in parallel with this report (Appendix A), indicates that, if implemented, the measures detailed in the Concept Plan could provide up to 5.81 BU (Habitats) and 1.96 BU (Hedgerows).

The proposed development at Hither Green Lane has a residual requirement for 3.64 Biodiversity Units (BU) (Habitats) and 1.51 BU (Hedgerows). Subject to agreement with Abbey Park Hotel Golf Course regarding the proposed enhancement measures detailed in this report, together with a legal mechanism underpinning the delivery of such an agreement over the 30 year management period, it is considered that the Abbey Park Hotel could offer sufficient biodiversity uplift opportunities to offset residual effects from the proposed development scheme at Hither Green lane.

The biodiversity enhancement values indicated above are however, dependent on further detailed design and successful long-term delivery of the concept proposals. A Biodiversity Enhancement and Management Plan (BEMP) should therefore be produced setting out the habitat enhancement, creation, and establishment specifications, as well as adaptive long-term management prescriptions to demonstrate how the concept proposals will be delivered. To accord with Biodiversity Net Gain Principles[15], the BEMP must cover a duration of 30-years if the scheme is to be taken forward as a prospective biodiversity offset scheme for the adjacent development scheme at Hither Green Lane. The BEMP should also include a monitoring strategy to review progress against conservation targets and inform adaptive approaches to management throughout the life of the scheme. A BEMP is consequently recommended in Section 6.1.

6.2 RECOMMENDATIONS

R1 **Biodiversity Enhancement and Management Plan** – A 30-year Biodiversity Enhancement and Management Plan (BEMP) should be produced to set out the detailed habitat creation and enhancement specifications and long-term management prescriptions, that will be required to ensure the scheme will achieve its conservation objectives over the lifespan of the project. The BEMP should also be inclusive of a long-term monitoring strategy to measure progress against conservation objectives and inform an adaptive approach to long-term management.

[15] CIRIA, CIEEM and IEMA. Biodiversity Net Gain – Good Practice Principles for Development. Available: https://cieem.net/resource/biodiversity-net-gain-good-practice-principles-for-development/

7. DRAWINGS

Drawing C157753-01-01 – Phase 1 Habitat Plan and target notes

Drawing C157753-01-02 – Biodiversity Net Gain Concept Plan

C157753-01-01

Legend

- Indicative ownership boundary
- Survey extent
- Scattered tree
- Dry ditch
- Species-poor intact hedgerow
- Hardstanding
- A — Amenity grassland
- SI — Poor semi-improved grassland
- SI — Neutral semi-improved grassland
- Semi-natural broad-leaved woodland
- Tall ruderal
- Dense scrub
- Broad-leaved plantation woodland
- Scattered broad-leaved trees
- Standing water
- Dagnell End Meadow SSSI
- Target note

A - Locally abundant glaucous sedge.
B - Locally abundant common nettle.
C - Himalayan balsam

Project	Hither Green Golf Course
Drawing	Phase 1 Habitat Map
Client	Barratt David Wilson Homes Mercia
Drawing Number: C157753-01-01	Revision: 00
Scale @ A3: 1:1,500	Date: May 2022
Approved By: CF	Drawn By: JR

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- Scattered broad-leaved trees
- Standing water
- Dagnell End Meadow SSSI
- Target note

A - Locally abundant glaucous sedge.
B - Locally abundant common nettle.
C - Himalayan balsam

N

Project	Hither Green Golf Course
Drawing	Phase 1 Habitat Map
Client	Barratt David Wilson Homes Mercia
Drawing Number: C157753-01-01	Revision: 00
Scale @ A3: 1:3,000	Date: May 2022
Approved By: CF	Drawn By: JR

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HABITAT DESCRIPTIONS AND CONDITION ASSESSMENT TABLES

The following table summarises the condition assessment for habitats recorded in the survey area using Panks *et al.* (2021)[16].

Area Habitat					Condition Sheet Criteria Score														
Polygon / Line Ref.	**JNCC**	**UK Hab (field key)**	**Habitat Description**	**Condition Sheet Used**	**C1**	**C2**	**C3**	**C4**	**C5**	**C6**	**C7**	**C8**	**C9**	**C10**	**C11**	**C12**	**C13**	**Total Score**	**Condition Assessment**
TN 1	Dense scrub	**Bramble scrub** h3d	Area of dense unmanaged scrub located in the eastern survey area dominated by bramble *Rubus fruticosus agg.* with frequent common nettle *Urtica dioica*. Occasional self-seeded dog rose *Rosa canina agg.*, hawthorn *Crataegus monogyna* and ash *Fraxinus excelsior* shrubs were present within the scrub.	**Scrub**														N/A	Poor
TN2	Neutral semi-improved grassland	**Other neutral grassland** g3c secondary codes 10 11	Unmanaged grassland in the eastern survey area measuring 30-40cm in height. Species include frequent common nettle (a locally dominant patch was at the southern end (TNB)), Yorkshire-fog *Holcus lanatus*, tufted hair-grass *Deschampsia cespitosa* and meadow foxtail *Alopecurus pratensis* with locally frequent common sorrel *Rumex acetosa*, common hogweed *Heracleum sphondylium*, cock's foot *Dactylis glomerata*, false oat-grass *Arrhenatherum elatius* and very locally frequent common knapweed *Centaurea nigra* (1%). Occasional hard rush *Juncus effusus* and soft rush *Juncus inflexus* and locally dominant glaucous sedge *Carex flacca* (located at TNA) were also noted. Scattered self-seeded goat willow *Salix caprea* trees and scattered young, planted alder *Alnus glutinosa*, oak *Quercus robur* and birch *Betula pendula* were present within the grassland, growing 3-5m tall. A line of goat willow trees was present along the south edge and dry ditches were also present.	**Grassland (medium, high & very high distinctiveness)**	F	F	F	P	F									1	Poor
TN3	Broadleaved semi-natural woodland	**Wet woodland** w1d	Even-aged canopy in the eastern survey area comprising goat willow, poplar *Populus sp.* and occasional crack willow *Salix x fragilis* and some younger self-seeded goat willow. Poplar may have been planted but willow appear to be self-seeded. Ground flora comprises frequent common nettle, glaucous sedge, cleavers *Galium apraine*, creeping thistle *Cirsium arvense*, hair-grass species *Deschampsia sp.*, ivy *Hedera helix* and occasional meadow sweet *Filipendula ulmaria*.	**Woodland**	1	3	3	2	3	3	2	3	1	2	1	1	1	26	Moderate
TN4	Broadleaved plantation woodland	**Other Woodland; Broadleaved** w1f7 secondary code 36	Pockets of even aged plantation woodland along north edge of the western survey area and within the centre of the eastern survey area. Species vary between different areas and comprise poplar sp., silver birch, goat willow, grey willow *Salix cinerea*, whitebeam *Sorbus sp.* and Norway maple *Acer platanoides*. Hawthorn, blackthorn *Prunus spinosa* and field maple *Acer campestris* were in shrub layer. Ground flora shaded and sparse of some areas, other areas comprised locally abundant bramble scrub and other areas support grassland species. Species included varying abundances of common nettle, red campion *Silene dioica*, wood avens *Geum urbanum*, creeping buttercup *Ranunculus repens*, ivy and broad-leaved dock *Rumex obtusifolius* as well as grass species similar to the adjacent amenity grassland.	**Woodland**	1	3	3	3	2	3	2	3	1	2	1	1	2	27	Moderate
TN5	Species-poor semi-improved grassland	**Other neutral grassland** g3c	Unmanaged areas of grassland along the southern edge of the western survey area which does not appear to be frequently or recently managed with vegetation growing 30-40cm in height. Species comprise abundant meadow foxtail, creeping bent *Agrosits stolonifera* and Yorkshire fog with locally frequent common bent *Agrostis capillaris*, creeping buttercup, creeping thistle, red fescue *Festuca rubra*, timothy *Phleum pratense*, perennial rye-grass *Lolium perenne*, cleavers and common nettle. Cuckoo flower *Cardamine pratensis*, stitchwort *Stellaria sp.* and lesser celandine *Ficaria verna* were occasional within sward. Himalayan Balsam was noted on the edge of the grassland in August 2021 (TNC) and extends along the riverbank. Occasional young, planted trees within grassland growing up to 4 m tall include oak species and alder.	**Grassland (medium, high & very high distinctiveness)**	F	F	F	P	F									1	Poor

[16] Panks, S., White, N., Newsome, A., Potter, J., Heyton, M., Mayhew, E., Alvarez, M., Russell, T., Scott, S.J., Heaver, M., Scott, S.H., Treweek, J., Butcher, B. and Stone, D. (2021) T*he Biodiversity Metric 3. – Auditing and accounting for biodiversity: Technical Supplement*. Natural England

Area Habitat			Condition Sheet Criteria Score																
Polygon / Line Ref.	**JNCC**	**UK Hab (field key)**	**Habitat Description**	**Condition Sheet Used**	**C1**	**C2**	**C3**	**C4**	**C5**	**C6**	**C7**	**C8**	**C9**	**C10**	**C11**	**C12**	**C13**	**Total Score**	**Condition Assessment**
TN6	Amenity grassland	**Modified grassland** g4	The majority of the surveyed areas comprise short mown (less than 5cm) amenity grassland managed as golf greens with areas of rough around the greens which are less frequently mown (up to 15cm tall). Species present included perennial rye-grass, red fescue, white clover *Trifolium repens* and creeping buttercup. Sand bunkers are present within the golf greens.	**Grassland (low distinctiveness)**	F	F	P	F	F	P	P							3	Poor
TN7	Broadleaved plantation woodland	**Other Woodland; Broadleaved** w1g7 secondary code 36	Young, even aged woodland comprising hawthorn, prunus species, oak species and blackthorn. Unmanaged, vegetated ground flora comprises common nettle, common hogweed, broad-leaved dock, meadow foxtail, creeping buttercup, Yorkshire fog, creeping thistle, bramble, tufted hair grass and common bent. The woodland is currently unmanaged. Some of the adjacent gardens to the east of the surveyed area have encroached into the woodland edge.	**Woodland**	1	3	3	2	3	3	1	3	1	1	1	1	2	25	Fairly-Poor
TN 8	Dense scrub	**Mixed scrub** h3h	Areas in the eastern survey area comprise self-seeded scrub including hawthorn, blackthorn and locally abundant bramble as well as some areas of planted species including field maple additionally. Areas of dense scrub adjacent to the river in the western survey area include hawthorn, blackthorn and locally abundant bramble. Locally frequent common nettle is present throughout the areas of scrub.	**Scrub**	P	F	F	P	F									2	Poor
TN9	Species poor semi-improved grassland	**Other neutral grassland** g3c secondary code 11	Small areas of grassland where some trees have previously been planted and does not appear to be currently managed. The grassland sward comprises a mix of grassland and tall ruderal species including locally abundant broad-leaved dock as well as creeping buttercup, creeping thistle, meadow foxtail, common bent, false oat grass, vetch species *Vicia sp.*, false oat grass and great willowherb *Epilobium hirsutum*. The planted trees within the grassland were growing 3-4 m tall and included oak species, birch species, alder, ash, hawthorn and dog rose with some more established conifer species also present.	**Grassland (medium, high & very high distinctiveness)**	F	F	F	P	F									1	Poor
TN10	Tall ruderal	**Other neutral grassland** g3c Secondary code 16	Unmanaged tall ruderal adjacent to the river in the western survey area. the vegetation is dominated by common nettle (90%) with constant and frequent cleavers. Common hogweed, wild garlic *Allium ursinum*, garlic mustard *Alliaria petiolata*, cow parsley *Anthiscus sylvestris* and Himalayan balsam were also present.	**Grassland (medium, high & very high distinctiveness)**	F	F	F	P	F									1	Poor
TN11	Broadleaved plantation woodland	**Other Woodland; Broadleaved** w1g7 secondary code 36	An area of woodland in the eastern survey area where the western edge of the woodland has been subject to some recent management via tree coppicing. The woodland is even aged and supports abundant poplar species and frequent goat willow and grey willow. Hawthorn, blackthorn and occasional dog rose are in shrub layer. The ground flora shaded and supports common nettle (25%), red campion, garlic mustard, wood avens, creeping buttercup and broad-leaved dock with occasional lords and ladies *Arum maculatum*.	**Woodland**	1	3	3	3	1	3	2	3	1	2	1	2	1	26	Moderate

C157753-01-02

Legend

- Indicative ownership boundary
- Survey extent
- Area A - Grassland Enhancement
- Area B - Grasland Enhancement
- Area C - Woodland Enhancement
- Area D - Pond Creation
- Area D - Grassland Restoration
- Area E - Species-rich hedgerow creation

PH1 Features

- Scattered tree
- Dry ditch
- Species-poor intact hedgerow
- Hardstanding
- A — Amenity grassland
- SI — Poor semi-improved grassland
- SI — Neutral semi-improved grassland
- Semi-natural broad-leaved woodland
- Tall ruderal
- Dense scrub
- Broad-leaved plantation woodland
- Scattered broad-leaved trees
- Standing water
- Dagnell End Meadow SSSI

N

Project	Hither Green Golf Course
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Client	Barratt David Wilson Homes Mercia
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Scale @ A3: 1:1,500	Date: May 2022
Approved By: CF	Drawn By: JR

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405200 405300 405400 405500 405600

268900 268800 268700 268600

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Legend

- Indicative ownership boundary
- Survey extent
- Area A - Grassland Enhancement
- Area B - Grasland Enhancement
- Area C - Woodland Enhancement
- Area D - Pond Creation
- Area D - Grassland Restoration
- Area E - Species-rich hedgerow creation

PH1 Features

- Scattered tree
- Dry ditch
- Species-poor intact hedgerow
- Hardstanding
- Amenity grassland
- Poor semi-improved grassland
- Neutral semi-improved grassland
- Semi-natural broad-leaved woodland
- Tall ruderal
- Dense scrub
- Broad-leaved plantation woodland
- Scattered broad-leaved trees
- Standing water
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Project	Hither Green Golf Course
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Scale @ A3: 1:3,000	Date: May 2022
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8. PHOTOS

Plate 8.1 – Broad-leaved semi-natural woodland (TN3)

Plate 8.2 – Plantation broad-leaved woodland (TN7)

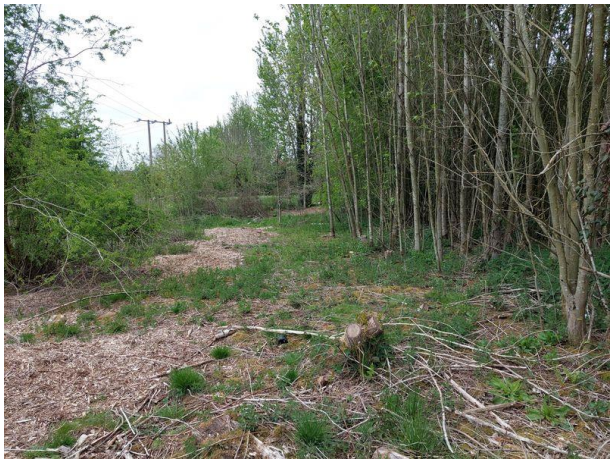

Plate 8.3 – Plantation broad-leaved woodland (TN11)

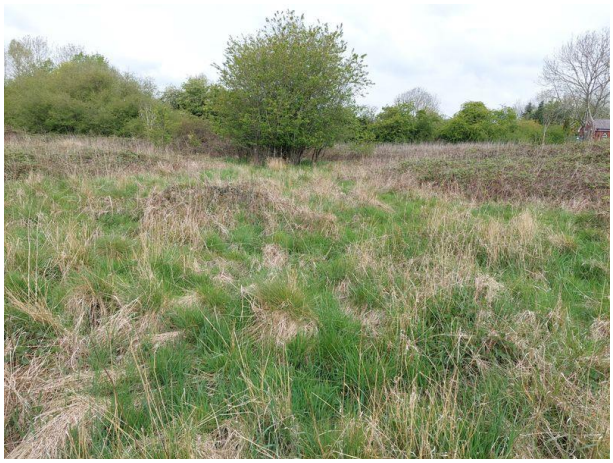

Plate 8.4 – Dense scrub (TN1) and neutral semi-improved grassland (TN2)

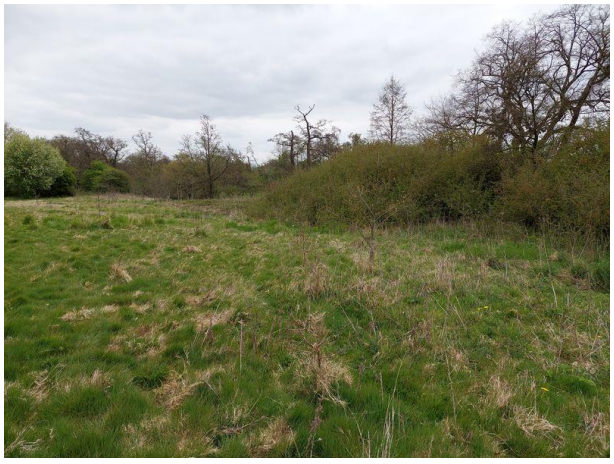

Plate 8.5 – Dense scrub (TN8) and poor semi-improved grassland (TN5)

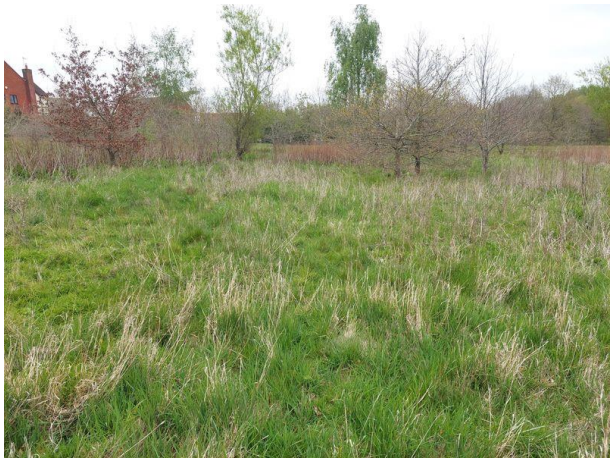

Plate 8.6 – Young-planted broad-leaf scattered trees and poor semi-improved grassland (TN9)

Plate 8.7 – Eutrophic standing water

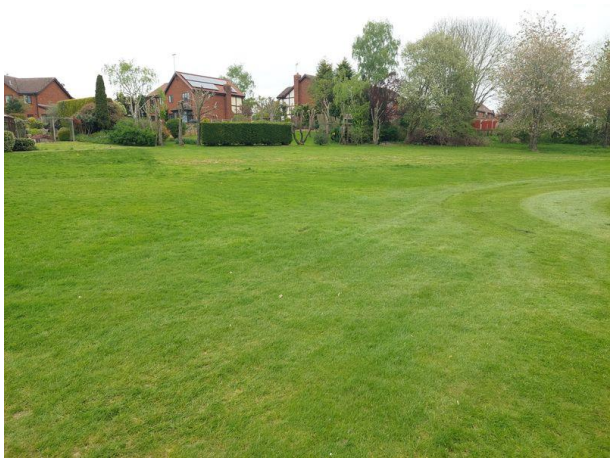

Plate 8.8 – Amenity grassland (TN6)

APPENDIX A

Biodiversity Metric Assessment

BIODIVERSITY METRIC ASSESSMENT – ABBEY PARK HOTEL GOLF COURSE

This section describes the data and assumptions used to inform a Biodiversity Metric Assessment for the above Biodiversity Net Gain Concept Plan at Abbey Park Hotel Golf Course in Redditch, Worcestershire. The completed Biodiversity Metric is included in Appendix C of this Report.

ASSESSMENT SCOPE

The purpose of the Biodiversity Net Gain (BNG) Assessment is to identify the change in biodiversity value that may result from a change in land use (e.g. development) or management (e.g. biodiversity enhancement) at the site and to establish if a net gain for biodiversity can be acheived. The BNG Assessment utilises a biodiversity metric to provide a proxy measure of biodiversity based on habitat attributes, which can then be used to determine the relative change in biodiversity value resulting from any land use or management measures proposed.

It should be noted that the metric is only a proxy for biodiversity using habitat values and that any proposed enhancements should be designed using appropriate ecological expertise. Existing levels of protection afforded to protected species and to habitats are not changed by use of the metric and statutory obligations will still need to be satisfied. In addition, the metric cannot account for impacts on, or enhancements to, irreplaceable habitats or protected sites, which will need to be assessed separately.

BIODIVERSITY METRIC TOOL

The biodiversity calculations were undertaken using 'The Biodiversity Metric 3.0' and associated User Guide[17] and Technical Supplement[18].

EXISTING BASELINE DATA

The baseline habitat data and condition assessment for the site is taken from the field survey data in Section 4 of this report. A Phase 1 Habitat Plan showing the extent and location of each habitat recorded is shown in Drawing C157753-01-01 in Section 7 of this report.

The Biodiversity Metric 3.0 calculator tool utilises the UK Habitat Classification System (UKHab) as the standard data input for habitats. The Phase 1 Habitat Survey data for the site was subsequently converted for the purposes of the metric calculation using the Phase 1 habitats to UKHab translation feature included in the Biodiversity Metric 3.0 calculator tool or professional opinion.

Each existing habitat or linear feature recorded within the site is assigned a score for 'Distinctiveness', 'Condition' and 'Strategic Significance'. Table A1 below describes how each habitat attribute has been determined for the existing baseline habitats in the metric assessment.

Attribute	Description
Distinctiveness	An automated score based on the type of habitat present and its value to wildlife. Highly diverse habitats such as those listed as Habitats of Principal Importance under the NERC Act (2006) or Annex 1 habitats in the Habitats Directive (1992) score highly in this category whilst highly modified and low diversity habitats such as arable crops will have low distinctiveness scores
Condition	A score based on the quality of the habitat parcel against published condition criteria (See Section 7).
Strategic significance	A score based on information set out in local plans or policies. In this instance, a strategic location was defined as strategic woodland or grassland area identified on the Biodiversity Delivery Areas compiled by Worcestershire County Council.[19]

TableA 1: Habitat Attributes for Existing Baseline Habitats

[17] Panks, S., White, N., Newsome, A., Potter, J., Heyton, M., Mayhew, E., Alvarez, M., Russell, T., Scott, S.J., Heaver, M., Scott, S.H., Treweek, J., Butcher, B. and Stone, D. (2021) T*he Biodiversity Metric 3.0 – Auditing and accounting for biodiversity: User Guide*. Natural England.

[18] Panks, S., White, N., Newsome, A., Potter, J., Heyton, M., Mayhew, E., Alvarez, M., Russell, T., Scott, S.J., Heaver, M., Scott, S.H., Treweek, J., Butcher, B. and Stone, D. (2021) T*he Biodiversity Metric 3.0 – Auditing and accounting for biodiversity: Technical Supplement*. Natural England.

[19] Worcestershire County Council (2016) Biodiversity Delivery Areas. Available https://www.worcestershire.gov.uk/downloads/download/1087/biodiversity_delivery_area.

FUTURE BASELINE DATA

The future baseline conditions of the site are based on the Biodiversity Net Gain Concept Plan Proposal Areas detailed in Section 5 of this report and as indicated on Middlemarch Environmental Drawing C157753-01-02. Table A2 below describes how each habitat attribute has been determined for the future baseline habitats in the metric assessment.

Attribute	Description
Distinctiveness	An automated score based on professional opinion about the projected habitat type proposed, taking into account the biodiversity net gain proposals detailed in Section 5 of this report.
Condition	A target condition score of the proposed habitat parcel based on professional opinion about the outline enhancement and future management proposals detailed in Section 5 of this report.
Strategic significance	A score based on information set out in local plans or policies (See Table 1)
Time to Target Condition	Time to target condition is automatically assigned in accordance with the Biodiversity Metric Tool 3.0. The Biodiversity Net Gain Concept Plan identifies an additional 5-years temporal factor to be applied to new grassland creation to account for realistic timeframes for arable reversion.
Difficulty of Recreation	An automated value based on the difficulty of creating the target habitat. This value is unchanged from the values generated in Metric 3.0.
Spatial Risk Multiplier	An automated value assigned to all proposed habitats based on its proximity to a proposed development. In this instance, the proposed development at Hither Green Lane which is located immediately adjacent to the west of Abbey Park Hotel Golf Course.

Table A2: Habitat Attributes for Existing Baseline Habitats

METRIC ASSUMPTIONS

The following assumptions were applied as part of the metric assessment:

- The Biodiversity Metric assessment was carried out for the proposed areas of enhancements/creation defined by Areas A – E of the BNG Concept Plan, as described in Section 5 and as shown on Drawing C157753-01-02 in Section 7.

- For the purposes of the assessment, the term ‘Habitat Loss’ is applied to proposals that result in a change of habitat type or habitat ‘distinctiveness’. This is defined in the Biodiversity Metric even where the new habitat type is created without any physical loss of the previous habitat type (e.g. creation of scrub over grassland). ‘Habitat Enhancement’ is applied where the habitat type and ‘distinctiveness’ remains the same, but the ‘condition’ of the habitat is improved.

- The BNG Assessment necessitates an estimation of future baseline values, based on professional opinion, to determine the change in biodiversity value that could occur as a result of the proposals at the site. The assumptions about target habitat types or condition in this report is based on professional opinion about the likely achievable outcomes at the site based on the proposed planting plans and presumed management resources. All target habitats presume the implementation of a long-term Management Plan to achieve these ends as is recommended in Section 5 of this report.

- The Biodiversity Metric Calculations are based on the Biodiversity Net Gain Concept Plan outlined in this report. If these proposals change, or if detailed proposals are produced, an updated Biodiversity Metric Assessment should be carried out to determine if there are any changes to the habitat values provided.

- The enhancements proposed at Abbey Park Hotel Golf Course are considered to be offsite enhancements as the principal use of any credits identified will be for the purposes of biodiversity offsetting for the adjacent Hither Green lane Development Scheme. Due to errors in the metric tool, the % gain flags an error. This does not have any effect on the BU identified and so for the purposes of this report, the % increase is calculated manually.

HEADLINE RESULTS

Table A3 summarises the headline result of the Biodiversity Metric Assessment for the enhancement areas. The detail metric assessment is included separately to this report (See Appendix C).

	Habitat units	Hedgerow units
On-site baseline	12.48	0.00
On-site post-intervention	17.66	1.96
Total net unit change	+5.18	1.96
Total net % change	+141.51%	100%

Table A3: Biodiversity Metric Assessment – Headline Results

HABITAT TRADING

The Biodiversity Metric Assessment shows that the enhancement proposals are not compliant with the trading rules of the metric. The trading issues relate to the removal of bramble scrub to restore an existing area of neutral grassland in Area B. It is considered that the extent of bramble scrub to be removed has developed as a result of a lack of management and so is an undesirable secondary feature within an otherwise desirable habitat. Removal of the scrub will ensure the nature conservation status of the grassland is restored and so in this case the trading rules do not reflect the wider nature conservation priorities of the site.

APPENDIX B

Ecological Desk Study Data Summary – Worcestershire Biological Records Centre

Table B1 below summarises the statutory nature conservation sites within a 2 km radius of the site and the non-statutory sites within a 1 km radius of the site.

Site Name	Designation	Proximity to Survey Area	Description
UK Statutory Sites			
Dagnell End Meadow	SSSI	Within site boundary	Dagnell End Meadow is an area of ancient permanent pasture lying in the valley of the River Arrow. It represents one of the last surviving areas of such pasture in this part of Worcestershire.
Proctor's Barn Meadows	LNR	760 m south-east	The Meadow is being managed to maintain a number of wildflower meadows, some important scrubland, rejuvenate old hedgerows and de-silt old ponds. Offering a large number of flowering species.
Redditch Woods: Pitcheroak Wood	LNR	2.0 km south-west	These are predominantly oak woodlands with both pedunculate and sessile oak dominating the canopy, though other species are also found. The ground flora is similarly diverse with a range of woodland indicators augmented by rich grassland in the glades. In places the flora tends towards a more acidic mix with species including heather and tormentil occurring. Bats and a variety of nesting birds and a range of butterflies are known to be present.
Non-statutory Sites			
Dagnell Brook	LWS	Within site boundary	The Dagnell Brook is a small tributary of the River Arrow. It is tree lined for much of its length and forms an important wildlife corridor through this part of the county, especially where it flows through otherwise improved farmland. Faunal records for the brook are incomplete but otters are known to be present and there are past records for white-clawed crayfish.
River Arrow	LWS	Within site boundary	Rising from an overflow at Lower Bittell Reservoir, the River Arrow flows south through Redditch to join the River Avon at Salford Priors in Warwickshire. For much of its length it is lined with trees and shrubs (which in some places broaden out into woodland) and creates an important wildlife corridor through the landscape. Otters are known to be present and kingfishers breed in several places.
Abbey Forge and Mill Pond	LWS	50 m south	A group of four ancient mill and fish ponds ranged around the site of Bordesley Abbey and falling within the wider Scheduled Ancient Monument. The pools feed into the River Arrow to the north of the pool complex and are for the most part fringed with a mixture of woodland and grassland. The pools are likely to be important for a range of invertebrates including dragonflies. The site is also considered to be valuable for breeding birds and is likely to provide foraging habitat for bats.
Key: SSSI: Site of Special Scientific Interest LNR: Local Nature Reserve LWS: Local Wildlife Site			

Table B1: Summary of Nature Conservation Sites

The survey area falls within the SSSI Impact Risk Zone associated with Dagnell End Meadow SSSI which lies within the central area of the site.

Table B2 below summarises records of protected and notable species within a 1 km radius of the site.

Species	No. of Records	Most Recent Record	Proximity of Nearest Record to Study Area	Species of Principal Importance?	Legislation / Conservation Status
Mammals – bats					
Soprano pipistrelle *Pipistrellus pygmaeus*	8	2017	Potentially on site[+]	✓	ECH 4, WCA 5, WCA 6, LBAP
Brown long-eared bat *Plecotus auritus*	4	2016	Potentially on site[+]	✓	ECH 4, WCA 5, WCA 6, LBAP
Common pipistrelle *Pipistrellus pipistrellus*	18	2014	20 m north	-	ECH 4, WCA 5, WCA 6, LBAP
Unidentified myotis *Myotis* sp.	2	2014	300 m south-west	-	ECH 4, WCA 5, WCA 6, LBAP
Noctule *Nyctalus noctula*	2	2014	300 m south-west	✓	ECH 4, WCA 5, WCA 6, LBAP
Unidentified bat *Chiroptera* sp.	1	2004	640 m south-east	#	#, LBAP
Mammals – other					
Badger *Meles meles*	5	2009	†	-	WCA 6, PBA
Hedgehog *Erinaceus europaeus*	10	2017	60 m north-east	✓	WCA 6
Otter *Lutra lutra*	1	2003	60 m north-west	✓	ECH 2, ECH 4, WCA 5, WCA 6, LBAP
Amphibians					
Common toad *Bufo bufo*	5	2002	Potentially on site[+]	✓	WCA 5 S9(5)
Common frog *Rana temporaria*	4	2001	Potentially on site[+]	-	WCA 5 S9(5)
Great crested newt *Triturus cristatus*	1	1999	560 m south-east	✓	ECH 2, ECH 4, WCA 5, LBAP
Smooth newt *Lissotriton vulgaris*	1	1999	560 m south-east	-	WCA 5 S9(5)
Reptiles					
Grass snake *Natrix helvetica*	3	2010	160 m south-west	✓	WCA 5 S9(1), WCA 5 S9(5)
Birds					
Kingfisher *Alcedo atthis*	1	2015	Potentially on site[+]	-	WCA1i
Barn owl *Tyto alba*	1	2016	140 m south-west	-	WCA1i
Invertebrates					
White-letter hairstreak *Satyrium w-album*	2	2018	420 m south-east	✓	WCA 5 S9(5), LBAP
Brown hairstreak *Thecla betulae*	2	2019	930 m south-east	✓	WCA 5 S9(5), LBAP
Plants					
Bluebell *Hyacinthoides non-scripta*	1	2006	Potentially on site[+]	-	WCA 8 S13(2)

Key:
†: Badger records are confidential and therefore proximity is not provided within the report.
[+]: Grid reference provided was six figures and as such, the record may be located within 100 m of the study site.

PBA: Protection of Badgers Act 1992.

Table B2: Summary of Protected and Notable Species (continues)

Key:
WCA 1i: Schedule 1 Part 1 of Wildlife and Countryside Act 1981 (as amended). Birds protected by special penalties at all times.
WCA 5: Schedule 5 of Wildlife and Countryside Act 1981 (as amended). Protected animals (other than birds).
WCA 5 S9(1): Schedule 5 Section 9(1) of Wildlife and Countryside Act 1981 (as amended). Protected animals (other than birds). Protection limited to intentional killing, injury or taking.
WCA 5 S9(5): Schedule 5 Section 9(5) of Wildlife and Countryside Act 1981 (as amended). Protected animals (other than birds). Protection limited to selling, offering for sale, processing or transporting for purpose of sale, or advertising for sale, any live or dead animal, or any part of, or anything derived from, such animal.
WCA 6: Schedule 6 of Wildlife and Countryside Act 1981 (as amended). Animals which may not be killed or taken by certain methods.

Species of Principal Importance: Species of Principal Importance for Nature Conservation in England.
LBAP: Local Biodiversity Action Plan of Worcestershire.

Note. This table does not include reference to the Berne Convention (Convention on the Conservation of European Wildlife and Natural Habitats), the Bonn Convention on the Conservation of Migratory Species of Wild Animals or the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).

Table B2 (continued): Summary of Protected and Notable Species

Birds
The desk study provided records of three bird species listed as Species of Principal Importance, comprising house sparrow *Passer domesticus* and lesser spotted woodpecker *Dryobates minor* (also Birds of Conservation Concern Red List species), as well as reed bunting *Emberiza schoeniclus* (also a Birds of Conservation Concern Amber list species).

Invertebrates
The desk study provided records of 10 moth species listed as Species of Principal Importance, comprising: August thorn *Ennomos quercinaria*, broom moth *Ceramica pisi*, cinnabar *Tyria jacobaeae*, dot moth *Melanchra persicariae*, grey dagger *Acronicta psi*, lackey *Malacosoma Neustria*, latticed heath *Semiothisa clathrate*, mottled rustic *Caradrina Morpheus*, rosy rustic *Hydraecia micacea* and shaded broad-bar *Scotopteryx chenopodiata*.

The desk study also provided a single record of small heath butterfly *Coenonympha pamphilus* which is listed as Species of Principal Importance.

Plants
The desk study provided records of several locally notable plant species, including the nationally scarce stinking hellebore *Helleborus foetidus* and tubular water-dropwort *Oenanthe fistulosa* which is listed as a Species of Principal Importance.

Invasive Species
Table B3 below summarises invasive species records within a 1 km radius of the site.

Species	No. of Records	Most Recent Record	Proximity of Nearest Record to Study Area	Legislation / Conservation Status
Cotoneaster *Cotoneaster* sp.	1	2006	Potentially on site+	WCA 9
Key: WCA9: Schedule 9 of Wildlife and Countryside Act 1981 (as amended). Invasive, non-native, plants and animals.				

Table B3: Summary of Invasive Species Records

APPENDIX C

Abbey Hotel Golf Course - Biodiversity Metric 3.1

(Attached separately)