



Preliminary Ecological Appraisal and Biodiversity Net Gain Feasibility Report Pill Common

Laurie Jackson MCIEEM

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Summary

- A Preliminary Ecological Appraisal, Habitat Suitability Index assessment for Great Crested Newt *Triturus cristatus*, and Biodiversity Net Gain assessment were undertaken on 17 March 2022 at Pill Common, West Burton in West Sussex.
- The site does not hold any statutory or non-statutory conservation designations. The closest statutory designation is Duncton to Bignor Escarpment Special Area of Conservation and Site of Special Scientific Interest, approximately 315m to the south-west. The entire site is within the South Downs National Park.
- The site comprised lowland mixed deciduous woodland with West Burton Stream (a chalk stream) flowing from north-west to south-east, which was dammed in the centre of the site, forming Pill Pond.
- The site was assessed as having high potential for bats and breeding birds; moderate potential for Badger *Meles meles*, Great Crested Newts in their terrestrial phase, and reptiles; and low potential for Great Crested Newts in their aquatic phase, and Hazel Dormouse *Muscardinus avellanarius*. The Species of Principle Importance Marsh Tit *Poecile palustris* and Dunnock *Prunella modularis* were recorded during the survey.
- The proposals will cause short-term disturbance within the woodland along with the permanent loss of Pill Pond. The restoration of West Burton Stream through the removal of existing water control structures and the relocation of a channel section away from a footpath are considered to provide long-term benefits.
- On the basis of the current plans no further survey work is recommended. A number of measures have been recommended to mitigate the possible impacts upon protected species that the site has the potential to support.
- A Biodiversity Net Gain (BNG) assessment for Pill Common provided a baseline of 5.84 habitat units and 2.8 river units. The proposed enhancement measures score a total of 1.69 habitat units and 0.49 river units. The post-work calculation is 5.9 habitat units (an increase of 0.96%) and 3 river units (an increase of 7.35%).
- The principle behind BNG is to ensure nature is left better off overall than before a project began. As a conservation-driven project, the proposals aim to restore West Burton Stream towards a more natural state, which should provide long-term benefits on- and potentially off-site. This accords with the recommendations in the national Chalk Stream Restoration Strategy (Rangeley-Wilson 2021), however the small nature of the site and the current condition of existing habitats (generally *fairly good* or *moderate*) presents difficulty in providing further enhancements above those already proposed, and it is not considered feasible to achieve 10% BNG on-site.

1. Introduction

1.1 Background information

A Preliminary Ecological Appraisal (PEA) was undertaken on 17 March 2022 at Pill Common, West Burton in West Sussex. The PEA comprised a desk study, extended Phase 1 habitat survey and protected species assessment, and was accompanied by a Habitat Suitability Index (HSI) assessment for Great Crested Newt *Triturus cristatus* and a Biodiversity Net Gain (BNG) assessment.

1.2 Survey aim

The aim of this survey work was to gather data on the existing conditions at Pill Common ahead of the proposed West Burton Stream restoration project, in order to:

- assess the potential of the site to support protected/notable species/habitats;
- evaluate the potential impacts of the restoration project, and identify whether further ecological survey work is required;
- make recommendations for mitigation and enhancement measures, and ongoing management at the site to benefit biodiversity; and
- evaluate the feasibility of providing quantifiable BNG on-site using Defra's Biodiversity Metric.

1.3 Site information

The site covers approximately 0.36ha, centred on grid reference SU99501398 and comprises lowland mixed deciduous woodland and a chalk stream (West Burton Stream), which has been dammed to form a small pond (Pill Pond).

It is proposed to restore the stream channel (Thomas 2022), by:

- removing existing water level control structures to facilitate slow and safe drainage of Pill Pond over a two-day period;
- temporarily installing jute sedimats immediately downstream to trap any sediment disturbed during the works, and relocating these to banks upon completion, for seeding or plug planting;
- possible relocation of one small tree to the north of Pill Pond, with all other trees to be retained, and some coppicing and pruning required for access;

- landscaping of sediments and stone from within the footprint of the pond to form new stream margins, with hazel faggots and jute mats used to stabilise the banks; and
- excavation of a new stream channel (approximately 20m) to the south of Pill Pond, moving it by approximately 2m in order to alleviate undercutting of the public right of way.

It is proposed to undertake works during late-summer/early-autumn 2022.

2. Methodology

2.1 Introduction

Survey work was undertaken by Laurie Jackson, a qualified professional ecologist with experience in a range of ecological survey techniques, including all that are applied here. Survey map, photographs and survey data are provided in the Appendices, with the Biodiversity Metric calculation spreadsheet provided separately.

2.2 Desk study

The desk study included a search using the interactive mapping application Magic (Defra 2022), and an ecological data search was commissioned from the Sussex Biodiversity Record Centre. The aim of the desk study was to gather existing data relating to ecology, including records of protected and/or notable habitats and species, and the location of statutorily and non-statutorily designated sites, within a 1km radius of the site.

2.3 Habitat survey

The extended Phase 1 habitat survey was undertaken on 17 March 2022 following recognised methodology (JNCC 2010). The survey involved a walkover to classify habitats on site and compile a list of plant species present.

2.4 Protected species assessment

The protected species assessment involved using the results of the desk study alongside observations made during the site visit. Factors including the quality and extent of habitat, along with the range and distribution of a species, were used to qualify its potential of occurring as:

- Low - factors include poor quality habitat, no recent records from the desk study, fragmentation of habitat, range and distribution of species.
- Moderate - factors include moderate habitat quality, recent records from desk study, extent of habitat, range and distribution of species.
- High - factors include high quality habitat, recent records from desk study, extent of habitat, range and distribution of species.

2.5 Habitat Suitability Index (HSI) assessment

The HSI assessment was undertaken on 17 March 2022 following recognised methodology (Oldham *et al.* 2000). The assessment involves evaluating suitability indices that are thought to affect Great Crested Newts, to calculate relative habitat suitability. These indices are: location, pond surface area, pond drying, water quality, shade, presence of wildfowl, presence of fish, number of ponds in local area, terrestrial habitat quality and macrophyte cover.

2.6 Biodiversity Net Gain (BNG) assessment

The BNG assessment was undertaken using Defra Biodiversity Metric 3.0 to determine proxy biodiversity values, using habitat data gathered during the survey (pre-development), and the proposals in the method statement (post-development). Biodiversity Metric 3.0 uses the UK Habitat Classification (Butcher *et al.* 2020).

The aim of BNG is to ensure that development or land management change leaves the natural environment measurably better than its baseline condition. A mandatory minimum requirement of 10% BNG is expected to become law in autumn 2023, under the Environment Act 2021 (as amended).

Eight principles and six rules have been set out for achieving BNG (Natural England 2021). These include the continued application of the mitigation hierarchy, to ensure that potential impacts on biodiversity are avoided, and then minimised, with compensation for losses that cannot be avoided. The avoidance of impacts on irreplaceable biodiversity. A requirement for compensation measures to be ecologically equivalent in type, amount and condition, to contribute towards nature conservation priorities, and to enhance ecological connectivity, with conservation outcomes proposed exceeding any existing obligations.

2.7 Limitations

The habitat survey was undertaken in mid-March, which is outside of the optimum April to September survey period. Some plants may not have been apparent or identifiable to species level, however it is generally still possible to assess the habitat present. A list of vascular plant species was compiled for the site and a protected species assessment undertaken; however a PEA does not constitute a full and thorough survey for any such group.

3. Results

3.1 Desk study

Pill Common is located within the South Downs National Park (SDNP). The purpose of the SDNP is to conserve and enhance the natural beauty, wildlife and cultural heritage of the area, and to promote opportunities for the understanding and enjoyment of the special qualities of the National Park by the public.

The site does not hold any statutory or non-statutory conservation designations (Defra 2022). The closest statutory designation is Duncton to Bignor Escarpment, designated a Special Area of Conservation (SAC) and a Site of Special Scientific Interest (SSSI) for its Beech *Fagus sylvatica* woodland. Duncton to Bignor Escarpment is approximately 315m to the south-west, and the site falls within the Impact Risk Zone for the SSSI. Due to the nature and scale of the proposed development, it is unlikely to pose any risk to this SSSI (Natural England 2019), with any hydrological link considered to be from Duncton to Bignor Escarpment to Pill Common due to the topography.

Located within the South Downs National Character Area, the site sits on freely draining lime-rich loamy soils (Cranfield University 2022). The surrounding landscape comprises farmland, along with areas of woodland and chalk grassland, and the villages of West Burton, Bury and Bignor.

Pill Pond is an online pond connected to West Burton Stream, with a pond present at this location since at least the late 19th Century (National Library of Scotland 2022). There are no further ponds at the site, with a further six ponds present within 1km. West Burton Stream flows east to the River Arun, approximately 3.1km away.

The search of biological records returned records of a number of protected/notable species and species identified as Species of Principal Importance (HMSO 2006) within 1km of the site, for which suitable habitat is considered to be present at the site. These include: Slow-worm *Anguis fragilis*, Common Toad *Bufo bufo*, Small Heath *Coenonympha pamphilus*, Yellowhammer *Emberiza citrinella*, Hedgehog *Erinaceus europaeus*, Spotted Flycatcher *Musciapa striata*, Grass Snake *Natrix helvetica*, Noctule *Nyctalus noctula*, Marsh Tit *Poecile palustris*, Soprano Pipistrelle *Pipistrellus pygmaeus*, Brown Long-eared Bat *Plecotus auritus*, Dunnock *Prunella modularis*,

Bullfinch *Pyrrhula pyrrhula*, Song Thrush *Turdus philomelos* and Common Lizard *Zootoca vivipara*.

Table 1: results of the desk study for Pill Pond relating to protected/notable species recorded from 1980 onwards

Species	Details
Badger	Records are not freely available for this species.
Bats	Seven species have been recorded within 1km of the site: Western Barbastelle <i>Barbastella barbastellus</i> , Serotine <i>Eptesicus serotinus</i> , Noctule, Nathusius' Pipistrelle <i>Pipistrellus nathusii</i> , Common Pipistrelle <i>Pipistrellus pipistrellus</i> , Soprano Pipistrelle and Brown Long-eared Bat, along with further records not identified to species level.
Birds	108 species have been recorded within 1km of the site, including Birds of Conservation Concern (BoCC) Red and Amber list species Stanbury <i>et al.</i> 2021), Species of Principal Importance (HMSO 2006) and Schedule 1 species (HMSO 1981). A number of the species recorded locally and considered notable (BoCC) could potentially use habitat at Pill Common. Species whose nesting requirements could be met at Pill Common include Greenfinch <i>Chloris chloris</i> , Stock Dove <i>Columba oenas</i> , Woodpigeon <i>Columba palumbus</i> , Kestrel <i>Falco tinnunculus</i> , Spotted Flycatcher Marsh Tit, Dunnock, Tawny Owl <i>Strix aluco</i> , Wren <i>Troglodytes troglodytes</i> , Song Thrush and Mistle Thrush <i>Turdus viscivorus</i> .
Great Crested Newt	No records within 1km of the site.
Hazel Dormouse	No records within 1km of the site.
Reptiles	Four species have been recorded within 1km of the site: Slow-worm, Grass Snake, Adder <i>Vipera berus</i> and Common Lizard.

3.2 Habitat survey

The site occupied a narrow strip of habitat to the west of West Burton bounded by arable fields to the north and south, and a small area of improved grassland to the west. The site comprised lowland mixed deciduous woodland, with frequent Hazel *Corylus avellana*, Ash *Fraxinus excelsior* and Elder *Sambucus nigra*, occasional Field Maple *Acer campestre* and Pedunculate Oak *Quercus robur*, and rare Holly *Ilex aquifolium* and Blackthorn *Prunus spinosa*. Ground flora included frequent Ramsons *Allium ursinum*, with Lord's-and-ladies *Arum maculatum*, Wood Avens *Geum urbanum*, Ground Ivy *Glechoma hederacea*, Dog's Mercury *Mercurialis perennis*, Germander Speedwell *Veronica chamaedrys* occasional, and Bugle *Ajuga reptans*, Cuckooflower *Cardamine pratensis*, Lesser Celandine *Ficaria verna*, Herb-Robert

Geranium robertianum, Bluebell *Hyacinthoides non-scripta* and Primrose *Primula vulgaris* rare.

The woodland had a reasonable age and structural diversity, with both standing and fallen deadwood present (Photograph 1). Multiple signs of Fallow Deer *Dama dama* were present, including tracks and droppings, however there was still regeneration of woody plants within the woodland. Along both the eastern and western boundaries raised banks were present, with mature Ash, Pedunculate Oak and Hazel (Photograph 2).

West Burton Stream (a chalk stream) entered the site from the north, flowing close to the eastern boundary into Pill Pond (Photograph 3). The pond was formed behind an earth, stone and concrete dam (Photograph 4), with a low-level pipe and wooden drop board sluice present (Photograph 5). South of the dam, the stream entered a sharp bend to the west (Photograph 6) before continuing close to the western site boundary. Here the stream course ran adjacent to a public right of way, which was supported in part by wooden boarding to alleviate undercutting by the stream (Photograph 7).

The water depth in the stream was typically less than 5cm, rising to up to 25cm in deeper pools. The stream bed comprised a mix of fine sediment, with larger stones and rocks providing variation in flow, and creating riffles and pools, alongside exposed muddy platforms. The stream banks were generally steep and sparsely vegetated with ferns, Pendulous Sedge *Carex pendula* and Ramsons. Woody debris was present in several parts of the channel (Photograph 8), providing additional habitat diversity and flow variation within the stream. A drainage ditch entered the stream to the south of the dam, from an arable field to the west, this was dry at the time of the survey.

Pill Pond was 5-10cm deep, bounded by an area of exposed sediment, leading to a more open area predominantly dominated by grasses (Photograph 9). There was no submerged vegetation evident, with a small amount of Yellow Iris *Iris pseudacorus* emerging around the pond's margin. There was no evidence of any amphibians using the pond for breeding at the time of the visit. Stacked brash piles were present on a bank close by, from recent coppicing work undertaken at the site.

3.3 Protected species assessment

The site offered opportunities for a range of species including some that are legally protected. On the basis of the habitats present those considered here are: Badger *Meles meles*, bats, birds, Great Crested Newt, Hazel Dormouse and reptiles.

The site has been assessed as follows:

- moderate potential for badgers, including sett-building opportunities;
- high potential for commuting, foraging and roosting bats;
- high potential for breeding birds, with woody habitat providing breeding opportunities for a range of bird species;
- low potential for Great Crested Newt breeding and moderate potential for terrestrial habitat;
- low potential for Hazel Dormouse within woody habitats; and
- moderate potential for reptiles within woodland glades, woody boundaries and banks.

3.3.1 Badger

No evidence of Badgers was recorded however it is likely that they are widespread within the local area, and the site is considered to have moderate potential for foraging and commuting, with woody habitats and banks providing opportunities for sett building.

3.3.2 Bats

The site is located in a rural area and has a reasonable network of watercourses and woody habitats that form corridors of habitat through the local landscape, in particular to larger blocks of woodland to the south. Potential roost features were noted on trees within the woodland, including some of the mature Ash and Pedunculate Oak. The site is considered to have high potential for commuting, foraging and roosting bats.

3.3.3 Birds

The woody habitat including understorey layer, along with fallen deadwood and stacked brash piles provide the greatest opportunities for breeding birds, and the site

is considered to have high potential for breeding birds. The Species of Principal Importance (HMSO 2006) Marsh Tit and Dunnock were recorded during the survey.

3.3.4 Great Crested Newt

Pill Pond was assessed as having average suitability for Great Crested Newt breeding using the HSI assessment. The factors that decrease the suitability of Pill Pond are its relatively small area, and the apparent lack of macrophyte cover (Photograph 10). Aquatic vegetation is important for egg-laying, with areas of open water used by males for courtship displays. There are no records for this species within 1km of the site (Sussex Biodiversity Record Centre 2022).

Table 2: results of the HSI assessment

Factor	Pill Pond	
	Score	HSI
Location	Zone A: optimal	1
Pond area	110m ²	0.22
Pond drying	never	0.9
Water quality	poor	0.33
Shade	80%	0.6
Fowl	absent	1
Fish	possible	0.67
Ponds	six	1
Terrestrial habitat	good	1
Macrophytes	0%	0.31
Total	0.62 - average	

The site as a whole is considered to have low potential for Great Crested Newt breeding, and moderate potential for foraging, sheltering commuting and hibernating.

3.3.5 Hazel Dormouse

The site has low potential for Hazel Dormouse due to its small size and fragmentation, however the corridors of woody habitat that link it to larger blocks of woodland to the south does offer some potential for this species' presence.

3.3.6 Reptiles

The site provided suitable habitat for reptiles, with woodland glades, variable vegetation structure including scrub and short grassland, along with bare ground and banks, which offered opportunities for foraging, sheltering, commuting and hibernating reptiles. The main issue for reptiles is habitat fragmentation, with the site being predominantly surrounded by arable farmland, however the site is part of a linear east-west habitat corridor, and overall was considered to have moderate potential for reptiles, with Slow-worm and Grass Snake the most likely species.

Badgers are protected under the Protection of Badgers Act 1992 (as amended) against killing and injury, damage and destruction of their setts, and disturbance whilst setts are in current use. All species of bats, Great Crested Newts and Hazel Dormouse are protected under the Conservation of Habitats and Species Regulations 2017 (as amended) and the Wildlife and Countryside Act 1981 (as amended) against killing, injury, capture and disturbance, and damage and destruction of their breeding or resting places. Birds, their nests and eggs are protected under the Wildlife and Countryside Act 1981 (as amended). All reptiles are protected under the Wildlife and Countryside Act 1981 (as amended), which among other things, protects them against intentional killing and injury. Two additional species, Smooth Snake *Coronella austriaca* and Sand Lizard *Lacerta agilis*, receive higher legal protection, however this site is outside of their range.

3.5 Biodiversity Net Gain (BNG) assessment

Habitat types have been qualified using the UK Hab Classification System (Butcher *et al.* 2020), with areas calculated using onsite and aerial mapping. This information has been used to calculate the baseline habitat units for the site using Defra Biodiversity Metric 3.0.

The post-work assessment was based on the method statement for the site (Thomas 2022), which will result in the loss of 0.011ha standing water, restoration of 0.095ha lowland mixed deciduous woodland, 0.003ha of aquatic marginal vegetation and 21m of priority river habitat, and creation of 0.006ha of aquatic marginal vegetation and 25m of priority river habitat.

Table 3: BNG baseline assessment

UK Hab Habitat Type (Phase 1 Habitat)	Area (ha)	Units
w1f7 other lowland mixed deciduous woodland (A1.1.1 semi-natural broad-leaved woodland)	0.35	5.78
r1a6 other eutrophic standing waters (G1.1 eutrophic standing water)	0.011	0.05
f2d aquatic marginal vegetation (F2.1 marginal vegetation)*	0.003	0.02
baseline habitat units		5.84
UK Hab Habitat Type (Phase 1 Habitat)	Length (km)	Units
r2a6 other priority habitat rivers (G2 running open water)	0.2	2.8
dam	0.001	0
baseline river units		2.8

* guidance for Biodiversity Metric 3.0 indicates floodplain wetland mosaic is the most appropriate habitat to use in the calculation spreadsheet, although this is not the habitat present

The proposed enhancement and creation measures score a total of 1.69 habitat units and 0.49 river units. The post-work calculation for Pill Common is 5.9 habitat units and 3 river units, representing an increase of 0.96% in habitat units and an increase of 7.35% in river units.

Table 4: BNG assessment of proposed enhancement and creation

UK Hab Habitat Type (Phase 1 Habitat)	Area (ha)	Units
w1f7 other lowland mixed deciduous woodland (A1.1.1 semi-natural broad-leaved woodland) - enhancement	0.095	1.64
f2d aquatic marginal vegetation (F2.1 marginal vegetation) - enhancement*	0.003	0.03
f2d aquatic marginal vegetation (F2.1 marginal vegetation) - creation*	0.006	0.02
UK Hab Habitat Type (Phase 1 Habitat)	Length (km)	Units
r2a6 other priority habitat rivers (G2 running open water) - enhancement	0.021	0.36
r2a6 other priority habitat rivers (G2 running open water) - creation	0.025	0.13

* guidance for Biodiversity Metric 3.0 indicates floodplain wetland mosaic is the most appropriate habitat to use in the calculation spreadsheet, although this is not the habitat present

4. Conclusions

4.1 Conclusions

The site does not hold any statutory or non-statutory conservation designations. The closest statutory designation is Duncton to Bignor Escarpment SAC and SSSI, approximately 315m to the south-west. The entire site is within the South Downs National Park.

The site comprised lowland mixed deciduous woodland with a reasonable age and structural diversity, with both standing and fallen deadwood present. Wooded banks were present on the eastern and western sides of the site. West Burton Stream (a chalk stream) flowed north-west to south-east through the site, with a dam in the centre of the site forming Pill Pond.

The site was assessed as having moderate potential for foraging and commuting Badgers, with opportunities for sett building; high potential for commuting, foraging and roosting bats; high potential for breeding birds; moderate potential for Great Crested Newt in their terrestrial phase, and low potential for breeding; low potential for Hazel Dormouse; and moderate potential for reptiles. The Species of Principal Importance Marsh Tit and Dunnock were confirmed as present at the site, with suitable habitat present to support further species.

The proposals will cause some short-term disturbance within the woodland, along with the permanent loss of Pill Pond, however the restoration of this stretch of West Burton Stream is considered to provide a long-term benefit in ecological terms. The relocation of the stream channel to the south of Pill Pond will cause short-term disturbance within the woodland, however the plans to create a new stream channel with soft margins, along with the reduction in encroachment on the watercourse by the adjacent right of way is considered to provide a long-term benefit in ecological terms. The greatest potential for impacts during the works are during the removal of vegetation to facilitate works access and excavation of the new stream channel, and during the dam removal and channel excavation.

South Downs National Park Authority requires BNG as part of development proposals within SDNP, with a minimum of 10% being sought, which makes a meaningful contribution to nature recovery (South Downs National Park Authority 2022). The proposals outlined here do not achieve 10% BNG, with the small nature of the site

and the current condition (generally *fairly good* or *moderate*) of existing habitats making it unfeasible to achieve 10% BNG on-site. Further detail is provided in the Biodiversity Net Gain Feasibility Report below.

On the basis of the current plans no further survey work is recommended. A number of reasonable avoidance measures have been outlined below, with the aim of mitigating possible impacts upon protected species that the site has the potential to support. Should the presence of any protected species be confirmed or suspected during works, these must cease immediately, and an experienced ecologist be contacted for advice.

4.2 Mitigation measures

These recommendations have been made on the basis of the current proposals. If there are significant changes to the design or layout that have the potential to impact the ecology of the site, these should be reviewed by an experienced ecologist.

4.2.1 Clearance of vegetation

Clearance of vegetation suitable for breeding birds (including trees, woody shrubs and tall herbs) should be undertaken outside of the bird-nesting season, considered to be March to August inclusive. If any vegetation is cleared during the bird-nesting season, a thorough check must first be undertaken by a suitably experienced person to ensure no nesting birds are present. Work in the vicinity of a confirmed nest must stop until the nest is no longer in use (Schedule 1 bird species receive additional protection against disturbance): it is recommended to contact a suitably experienced ecologist for more guidance on the appropriate distance from a nest at which work can continue.

No large trees are to be directly impacted by the proposals, however there is potential for vibration and noise disturbance during excavation work, which has the potential to impact upon any roosting bats. The timing of the works outside of the bat maternity season (May to August) is considered to be a reasonable avoidance measure.

The disturbance of fallen deadwood should be minimised as far as possible, as it provides an important resource for many species, and can be used by protected species such as reptiles for shelter. Where deadwood is disturbed, it should be

retained on site, as close as possible to its original position, and moved carefully to preserve as much of its structural integrity as possible. It is recommended that any disturbance of deadwood be undertaken outside of the reptile hibernation season (late-October to March).

4.2.2 Pond drainage

It is recommended the drainage of the pond be undertaken as late in the autumn as possible (ideally October onwards) to reduce the likelihood of amphibians being present. The method statement (Thomas 2022) outlines proposals to safeguard fish during this process.

Chalk stream systems are sensitive to fine sediments and the installation of the jute sedimats prior to work (Thomas 2022) should ensure any sediment disturbed during the works is trapped, protecting downstream habitat.

4.2.3 Stream restoration

Earthworks should proceed slowly and from as few points as possible, to minimise the potential for compaction and disturbance to vegetation. It is recommended that earthworks be undertaken outside of the reptile hibernation period (late-October to March), and that an ecologist/ranger is present to oversee works, to ensure that if any animals (such as reptiles) are found, they can be captured by hand and safely relocated to another area of the site (outside of the works area and on the same side of the watercourse as they were captured).

Any temporary storage of spoil should be in as few places as possible, to minimise the potential of damaging woodland vegetation.

It is recommended that measures be put in place during works to safeguard Badgers and other species that could be commuting through, or foraging in or around the work area. These included ensuring any trenches left uncovered have a means of escape (such as a ramp), and no obvious mammal pathways are blocked.

It is recommended that a clear delineation be made between the existing footpath and the filled channel of West Burton Stream, in the section to be relocated due to erosion. This is to ensure that the ground is able to recolonise with woodland ground flora and is not subject to erosion, poaching and nutrient enrichment impacts from

the footpath. If any signage is to be installed at the site in the future, it is recommended that it makes reference to the potential harm caused by dogs treated with flea treatments entering aquatic environments.

4.3 Enhancement and compensation measures

The restoration of the chalk stream is the main compensation for the loss of Pill Pond. Whilst these are two different types of freshwater habitat, online ponds such as Pill Pond often have limited value ecologically, and serve to trap sediment, obstruct movement of stream species, and change the water temperature (chalk streams naturally have relatively low temperature fluctuation).

It is proposed to enhance the newly restored stream margins through planting of aquatic marginal vegetation within the low-lying area, which is currently floristically poor. New planting should use only native species typical of the area, and avoid potentially invasive species. Species typical of chalk stream margins that can tolerate more-shaded conditions include Blue Water-speedwell *Veronica anagallis-aquatica*, Water Forget-me-not *Myosotis scorpioides*, Yellow Iris *Iris pseudacorus*, Purple Loosestrife *Lythrum salicaria*, Branched Bur-reed *Sparganium erectum*, Greater Tussock Sedge *Carex paniculata*, Reed Canary-grass *Phalaris arundinacea*, Brooklime *Veronica beccabunga*, Water Mint *Mentha aquatica*, Great Willowherb *Epilobium hirsutum* and Common Comfrey *Symphytum officinale* (Rangeley-Wilson 2021). It should be noted that some emergent species such as Yellow Flag, Purple Loosestrife and Great Willowherb can become more dominant in smaller spaces, and lower density planting of these species (if used) should be considered. There may also be an opportunity to introduce submerged and/or floating species such as Common Water Starwort *Callitricha stagnalis*, Water-cress *Nasturtium officinale*, Horned Pondweed *Zannichellia palustris* and Fennel Pondweed *Potamogeton pectinatus*. Plants should be obtained from reputable suppliers to reduce the potential of contamination with potentially invasive aquatic species.

The coppicing and pruning undertaken as part of the preparation for the works will be beneficial in allowing additional light into the woodland, and increasing structural diversity as the cut stools regrow.

Brash created from the coppicing and pruning of trees for access can be used to create areas of fallen decaying wood that may also be used as sheltering and hibernating places by reptiles.

4.4 Biodiversity Net Gain (BNG) Feasibility Report

4.4.1 Introduction

This BNG Feasibility Report has been laid out in accordance with best practice guidance (CIEEM 2021). The methods used to assess BNG, along with details of the baseline conditions and proposed design can be found above, with baseline and proposed habitat plans in the Appendices.

4.4.2 BNG assessment

In making the BNG assessment, the eight principles have been applied:

Table 5: application of the BNG principles in the assessment

Principle	Evidence of application
1: the metric does not change the protection afforded to biodiversity	Potential impacts on protected species have been considered separately, with mitigation measures proposed
2: biodiversity metric calculations can inform decision-making where application of the mitigation hierarchy and good practice principles conclude that compensation for habitat losses is justified	The mitigation hierarchy has been followed, with habitats retained where possible, measures put in place to minimise potential damage, and opportunities for habitat restoration identified
3: the metric's biodiversity units are only a proxy for biodiversity and should be treated as relative values	This is recognised
4: the metric focuses on typical habitats and widespread species; important or protected habitats and features should be given broader consideration	Protected and locally important species have been considered, and no impacts on protected sites or irreplaceable habitats are predicted
5: the metric design aims to encourage enhancement, not transformation, of the natural environment	Restoration of West Burton Stream is considered to be a good ecological reason to transform pond habitat into chalk stream habitat
6: the metric is designed to inform decisions, not to override expert opinion	Proposals are guided by appropriate ecological advice
7: compensation habitats should seek, where practical, to be local to the impact	The compensation proposed is considered to contribute to nature recovery through the restoration of a chalk stream
8: the metric does not enforce a mandatory 1:1 minimum habitat size ratio for losses and compensation but consideration should be given to maintaining habitat extent and habitat parcels of sufficient size for ecological function	The restoration of a chalk stream and its associated riparian habitat is considered to be an appropriate outcome for the site

The baseline assessment for Pill Common is 5.84 habitat units and 2.8 river units. The proposed enhancement and creation measures score a total of 1.69 habitat units and 0.49 river units. The post-work calculation for Pill Common is 5.9 habitat units and 3 river units, representing an increase of 0.96% in habitat units and an increase of 7.35% in river units. The marginal increase in habitat units is believed to be in part due to the distinction of linear habitat (rivers) within the metric, meaning that the restoration of the chalk stream channel is not recognised in the calculation as compensating for the loss of the pond.

The principle behind BNG is to ensure nature is left better off overall than before a project began. As a chalk stream, West Burton Stream is attributed *very high* habitat distinctiveness by the metric, and Pill Pond *medium*, and as such the proposals are considered to meet Rule 3 of addressing habitat loss by delivering equivalent or a higher distinctiveness (and/or condition) habitat.

As a conservation-driven project, the proposals aims to restore West Burton Stream towards a more natural state, which should provide long-term benefits on-and potentially off-site. This accords with the recommendations in the national Chalk Stream Restoration Strategy to restore chalk streams (Rangeley-Wilson 2021).

4.4.3 Feasibility of BNG

The small nature of the site and the current condition of existing habitats (generally *fairly good or moderate*) presents difficulty in providing further enhancements above those already proposed, and it is not considered feasible to achieve 10% BNG on-site. There would be opportunities on neighbouring land, however these would have to be negotiated with the relevant landowner:

- A small area of improved grassland to the north of the site could present an opportunity to create a new, off-line pond to maintain the availability of standing water habitat.
- There may also be opportunities to buffer Pill Common from the adjacent arable land by increasing the area of grass margins and woody shrub cover, and implementing practices to prevent soil erosion. This could be particularly beneficial to the north of the site and alongside the drainage ditch entering from the west, as a means of preventing diffuse pollution, including nutrients and fine sediment, from the adjacent arable land reaching the chalk stream.

4.5 Management and monitoring recommendations

The key aspects of chalk stream management relate to water quantity, water quality and physical habitat, some of which are outside the scope of site-based management. The removal of the dam and relocation of part of the channel away from the footpath should help to reduce the accumulation of excessive fine sediment within the stream, and it is recommended that this be periodically monitored.

A key aspect that can be managed is the interaction of woody debris with the stream. Existing woody debris should be left *in situ*, along with newly acquired woody material. There may be opportunities to create decaying wood along the riverbank using practices such as ring-barking.

Due to the small size of the site management of the woodland is recommended only on an occasional basis, where there are opportunities to promote structural diversity through small-scale coppicing, and to ensure there is an ongoing supply of fallen and standing deadwood.

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Appendix 1 - Survey map

Map 1: Pill Common 1 Phase 1 habitat survey map



Map 2: Pill Common BNG assessment UK Hab habitat baseline



Map 3: Pill Common BNG assessment UK Hab habitat post intervention



Appendix 2 - Photographs

Photograph 1: lowland mixed deciduous woodland, showing age and structural diversity and deadwood



Photograph 2: wooded bank in the east of the site



Photograph 3: West Burton Stream entering Pill Pond



Photograph 4: dam creating Pill Pond



Photograph 5: water level control at Pill Pond



Photograph 6: meander in West Burton Stream south of the dam



Photograph 7: wooden boards supporting the public right of way alongside West Burton Stream



Photograph 8: woody debris and varying streambed substrate in West Burton Stream



Photograph 9: Pill Pond and adjacent marginal habitat



Photograph 10: Pill Pond with lack of emergent vegetation



Appendix 3 - Survey data

S41: Section 41 of Natural Environment and Rural Communities Act 2016; WCA: Wildlife and Countryside Act 1981; Cons Regs: The Conservation of Habitats and Species Regulations 2017; BoCC: Birds of Conservation Concern 5 Stanbury *et al.* 2021)

Table 5: plant list

Scientific name	Common name	Notes
<i>Acer campestre</i> *	Field Maple	Occasional
<i>Agrostis stolonifera</i>	Creeping Bent	
<i>Ajuga reptans</i>	Bugle	Rare
<i>Allium ursinum</i> *	Ramsons	Frequent
<i>Anthriscus sylvestris</i>	Cow Parsley	Rare
<i>Arum italicum</i>	Italian Lords-and-ladies	Rare
<i>Arum maculatum</i>	Lords-and-ladies	Occasional
<i>Asplenium scolopendrium</i> *	Hart's-tongue Fern	Occasional
<i>Brachypodium sylvaticum</i>	False Brome	
<i>Cardamine pratensis</i>	Cuckooflower	Rare
<i>Carex pendula</i> *	Pendulous Sedge	Locally Frequent
<i>Cirsium sp.</i>	a thistle	Rare
<i>Clematis vitalba</i>	Traveller's-joy	Rare
<i>Corylus avellana</i>	Hazel	Frequent
<i>Dactylis glomerata</i>	Cock's-foot	
<i>Dryopteris filix-mas</i>	Male Fern	Rare
<i>Festuca sp.</i>	a fescue	
<i>Ficaria verna</i>	Lesser Celandine	Rare
<i>Filipendula ulmaria</i>	Meadowsweet	Rare
<i>Fraxinus excelsior</i>	Ash	Frequent
<i>Galium aparine</i>	Cleavers	Occasional
<i>Geranium robertianum</i>	Herb-Robert	Rare
<i>Geum urbanum</i>	Wood Avens	Occasional
<i>Glechoma hederacea</i>	Ground Ivy	Occasional
<i>Hedera helix</i>	Ivy	Occasional
<i>Heracleum sphondylium</i>	Hogweed	
<i>Hyacinthoides non-scripta</i> *	Bluebell	WCA Sch8, Rare
<i>Ilex aquifolium</i> *	Holly	Rare
<i>Iris pseudacorus</i>	Yellow Iris	
<i>Juncus inflexus</i>	Hard Rush	Rare
<i>Mercurialis perennis</i>	Dog's Mercury	Occasional
<i>Poa annua</i>	Annual Meadow-grass	
<i>Poa nemoralis</i> *	Wood Meadow-grass	
<i>Polystichum setiferum</i> *	Soft Shield-fern	Occasional
<i>Primula vulgaris</i> *	Primrose	Rare
<i>Prunus spinosa</i>	Blackthorn	Rare
<i>Quercus robur</i>	Pedunculate Oak	Occasional
<i>Ranunculus auricomus</i> *	Goldilocks Buttercup	Rare
<i>Ranunculus repens</i>	Creeping Buttercup	Rare
<i>Ribes rubrum</i> *	Red Currant	Rare
<i>Rubus fruticosus</i> agg.	Bramble	Occasional
<i>Rumex acetosa</i>	Common Sorrel	Rare
<i>Rumex obtusifolius</i>	Broad-leaved Dock	Rare
<i>Rumex sanguineus</i>	Wood Dock	Occasional
<i>Ruscus aculeatus</i> *	Butcher's-broom	Rare
<i>Salix sp.</i>	a willow	Rare
<i>Sambucus nigra</i>	Elder	Frequent
<i>Taraxacum officinale</i> agg.	Dandelion	Rare
<i>Tussilago farfara</i>	Colt's-foot	Rare
<i>Urtica dioica</i>	Common Nettle	Occasional
<i>Veronica chamaedrys</i>	Germander Speedwell	Occasional
<i>Viola sp.</i>	a violet	Rare

* Ancient Woodland Indicator (Rose 1999)

Table 6: incidental species list

Common name	Scientific name	Notes
Birds		
Eurasian Treecreeper	<i>Certhia familiaris</i>	
Woodpigeon	<i>Columba palumbus</i>	BoCC Amber
Raven	<i>Corvus corax</i>	over
Carriion Crow	<i>Corvus corone</i>	
Blue Tit	<i>Cyanistes caeruleus</i>	
Great Spotted Woodpecker	<i>Dendrocopos major</i>	
Robin	<i>Erithacus rubecula</i>	
Common Chaffinch	<i>Fringilla coelebs</i>	
Red Kite	<i>Milvus milvus</i>	WCA Sch1, over
Grey Wagtail	<i>Motacilla cinerea</i>	BoCC Amber
Great Tit	<i>Parus major</i>	
Common Chiffchaff	<i>Phylloscopus collybita</i>	
Marsh Tit	<i>Poecile palustris</i>	BoCC Red; S41
Dunnock	<i>Prunella modularis</i>	BoCC Amber; S41
Goldcrest	<i>Regulus regulus</i>	
Wren	<i>Troglodytes troglodytes</i>	BoCC Amber
Blackbird	<i>Turdus merula</i>	
Diptera: flies		
Marmalade Fly	<i>Episyrphus balteatus</i>	
Stripe-eyed Dronefly	<i>Eristalis tenax</i>	
Hemiptera: true bugs		
Green Shieldbug	<i>Palomena prasina</i>	
Mammals		
Fallow Deer	<i>Dama dama</i>	signs