ARUP

DEFRA

Science Capability for Animal Health (SCAH)

Biodiversity Net Gain Strategy

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Executive Summary

This Biodiversity Net Gain (BNG) strategy and corresponding BNG calculation has been produced in support of the Animal and Plant Health Agency (APHA) facility and associated land development for the Department for Environment, Food & Rural Affairs (Defra).

BNG proposals have been developed in line with relevant guidance and have been specifically designed to align with the BNG Good Practice Principles for development, ensuring that proposals provide holistic qualitative benefits as well as the quantifiable values determined through the BNG calculation.

BNG proposals principally centre upon the employment of the mitigation hierarchy throughout the design process, avoiding habitats of higher biodiversity value, wherever feasibly possible, with measures to minimise losses where this has not been achievable within the constraints of the design.

The Proposed Development is an outline planning application for Defra's Science Capability for Animal Health (SCAH) programme (hereafter referred to as the 'Proposed Development'), which involves consolidation, replacement, and upgrading of the facilities at the APHA Site.

Losses of biodiversity from the Proposed Development primarily focus on lower value habitats such as modified grassland and urban habitat, but also include areas of the following: lowland mixed deciduous woodland; mixed scrub, introduced shrub, ruderal/ephemeral, rural trees, species-rich native hedgerow with trees, species-rich native hedgerow; native hedgerow with trees, and native hedgerow.

BNG proposals to compensate for these losses include creation of: wet woodland, riparian habitat, other neutral grassland, modified grassland, screen planting, amenity planting and modified grassland within recreational staff areas, feature landscaping, green roofs, green facades, sustainable urban drainage and ornamental planting. Further habitat enhancement would include to the River Bourne and adjacent riparian habitats, lowland mixed deciduous woodland, scrub, pond, modified grassland and hedgerows.

The above on-site measures achieve **24.70% net gain for habitat, 33.57% gain for hedgerow** and **16.26% gain for watercourse** biodiversity units respectively. This exceeds national requirements of 10% gain for all habitat group, and the project aim of 20% for area and hedgerow habitats

1. Introduction

1.1 Background

This biodiversity net gain (BNG) strategy has been prepared by Ove Arup & Partners Ltd. ('Arup') on behalf of Defra to support a Masterplan for an Outline Planning Application (MOPA) at the Animal and Plant Health Agency (APHA) Site (the Site), New Haw.

The Site comprises grazing pasture, woodland, hedgerow, scrub, ponds, bare ground, the River Bourne, buildings, hardstanding, and ornamental planting, and is 93.93ha in total size. A site location plan is shown in Figure 1.

Figure 1 Site Location Map

1.2 Proposed Development

1.2.1 Overview

This BNG strategy supports the outline planning application for Defra's Science Capability for Animal Health (SCAH) programme (hereafter referred to as the 'Proposed Development'), which involves consolidation, replacement, and upgrading of the facilities at the Site. It would ensure the UK's critical national capability for managing the extensive

and continuously evolving threats posed by the spread of high-risk diseases carried by animals is maintained.

1.2.2 Landscape and biodiversity objectives

The landscape and biodiversity objectives for the Proposed Development are set out within the outline Landscape and Ecology Maintenance and Monitoring Plan (OLEMMP, document reference: SCAHZZ-ARP-TPO-ZZ-RP-L-0001) and Development Specification (document reference: SCAHZZ-ARP-TPO-ZZ-SP-A-0001), and listed below:

- ***"Integrated landscape:*** *The proposed landscape will establish a campus that sits comfortably within its surroundings by creating a sustainable, world-class research campus, that positively contributes to its wider built and natural environments.*
- ***Biodiversity gains****: Habitat creation and strengthening of wildlife corridors across the site will improve connectivity to the wider landscape. The masterplan will aim to achieve a 20% increase in biodiversity units across the site. Biodiversity gains at the site will be cognisant of, and incorporate, the specific constraints imposed by the animal health work undertaken at Weybridge.*
- ***Sustainable framework:*** *Improvements to natural environments, recreational spaces, infrastructure, and sustainable water management are embedded in the designs. The framework will contribute to the legacy of the site and the world class aspirations of APHA and Defra."*

To achieve these objectives, the Proposed Development would deliver the following as outlined in the Landscape and Biodiversity parameter plan:

- redevelopment of the Main Site, Halls Site, Grange Site and Coombelands Site to include new build as well as refurbishments, soft landscaping (including intensive green roofs, green walls, urban tree planting, ornamental shrub planting and sustainable urban drainage systems (SuDS));
- new screen planting in the form of mixed woodland;
- new biodiverse wildflower meadow within two Field parcels in the northeast of the Site;
- enhancements to areas of grazed and hay pasture within fields adjacent to the River Bourne;
- new wet woodland planting north of the River Bourne;
- new riparian habitat mosaic adjacent to the River Bourne in the east and west of the Site (including ponds (permanent and ephemeral), wet ditches, reed bed, neutral grassland, scrub and tree planting);
- enhancements to the River Bourne and adjacent habitats;
- new hedgerow planting within Coombelands Site;
- enhancement of hedgerows throughout the Site; and,

- enhancements to all woodland throughout the Site, including areas within Hall's Farm Wood and Grassland Site of Nature Conservation Importance (SNCI).

1.2.3 Development stages

Construction of the Proposed Development would be delivered in stages over a 10-15 year programme (commencing in 2024, following grant of planning permission) and would progress without impeding current operational activities on the Site. The sequence of development encompasses the following key stages:

- Enabling works – duration of 3-5 years
- Main construction – duration of 5-7 years
- Placemaking – duration of 3-5 years

Given the scale and duration of the project, the timings of habitat creation and enhancement have been staggered throughout the different project stages to ensure the Site remains a viable resource for local wildlife throughout the project life cycle. Areas of early planting are shown on the Strategic Infrastructure Phasing Parameter Plan (document reference: SCAHZZ-ARP-TPO-ZZ-PL-A-0012).

1.3 Scope of Report

The purpose of this report is to complement and explain the finalised BNG calculation undertaken for the Proposed Development and should be read in conjunction with the accompanying Defra and Natural England Biodiversity Metric 4.0 calculator[1] (hereafter termed the BM 4.0). The scope of this strategy is to:

- summarise the baseline biodiversity conditions which have been used to inform BNG calculations;
- outline the methodology and assumptions used to undertake the BNG calculations;
- detail the post-construction habitat creation and enhancement measures proposed within the BNG calculation, in line with the Landscape and Biodiversity Parameter Plan (document reference: SCAHZZ-ARP-TPO-ZZ-PL-A-0006) and OLEMMP; and,
- define a schedule for management and monitoring to be undertaken to ensure post-construction BNG requirements are achieved.

This report has been prepared with reference to current guidelines for the BM 4.0[1]. The structure follows the guidance provided within the Chartered Institute of Ecology and Environmental Management (CIEEM) BNG report and audit template[2] for outline developments.

[1] Natural England (2023) *Natural England Joint Publication JP039 Biodiversity Metric 4.0: Auditing and accounting for biodiversity*. Peterborough. Available at: http://publications.naturalengland.org.uk/publication/6049804846366720. Accessed 24 January 2024

[2] CIEEM (2021) *Biodiversity Net Gain Report and Audit Templates*. Chartered Institute of Ecology and Environmental Management, Winchester, UK

2. Planning Policy, Legislation, and Guidance

2.1 Legislation

BNG is an approach to development that aims to leave the natural environment in a measurably better state than it was in beforehand.

The Environment Act 2021[3] requires new development under the Town and Country Planning Act 1990 to deliver 10% BNG, to be evidenced using a metric, i.e., a standardised accounting tool. This requirement is mandatory for new planning applications from February 2024.

2.2 National Planning Policy

In 2018, there was a step change in government planning policies and objectives in relation to biodiversity and development. The objective that development should deliver BNG was set within the government's 25 Year Environment Plan[4], and the requirement for development in England to deliver measurable BNG was included within the National Planning Policy Framework (NPPF)[5]. Paragraphs 158, 180, 185 and 186 of the NPPF are of relevance to BNG and are summarised below:

- Paragraph 158 - Transition to a low carbon future in a changing climate, taking full account of flood risk and coastal change.
- Paragraph 180 - Planning policies and decisions should contribute to and enhance the natural and local environment, including through the protection and enhancement of valued landscapes, and by minimising impacts on and providing net gains for biodiversity.
- Paragraph 185 - To protect and enhance biodiversity and geodiversity. Plans should identify, map and safeguard components of local wildlife-rich habitats and wider ecological networks, promote the conservation, restoration and enhancement of priority habitats, ecological networks and the protection and recovery of priority species; and identify and pursue opportunities for securing measurable net gains for biodiversity.
- Paragraph 186 - When determining planning applications, local planning authorities should apply the following principles:
  - Refusal of development where significant harm to biodiversity resulting from a development cannot be avoided, adequately mitigated, or, compensated;
  - development within or outside a Site of Special Scientific Interest, and likely to have an adverse effect, should not normally be permitted;

[3] Environment Act (2021) Available at: https://www.legislation.gov.uk/ukpga/2021/30/contents/enacted

[4] GOV.UK. (2019). 25 Year Environment Plan. Available at: https://www.gov.uk/government/publications/25-year-environment-plan (Accessed: 18/12/2023)

[5] Department for Housing, Communities and Local Government, (2023), *National Planning Policy Framework*. Department for Housing, Communities and Local Government, London. Available at: https://draftable.com/compare/NVUZwvbIfDcx

- refusal of development resulting in the loss or deterioration of irreplaceable habitats; and
- support of development whose primary objective is to conserve or enhance biodiversity.

2.3 Local Planning Policy

There are several elements of the Runnymede 2030 Local Plan and its policies that focus on biodiversity. Those relevant to the Proposed Development include:

- Policy SD7 Sustainable Design;
- Policy EE9 Biodiversity, Geodiversity and Nature Conservation;
- Policy EE11 Green Infrastructure; and,
- Policy EE12 Blue Infrastructure.

These policies all clearly set the importance of the natural environment, and the critical role nature can play in improving human health and wellbeing, and our resilience to climate change. At a local and national level, there is a clear message that developments should aim to deliver net gains for biodiversity through design.

3. Methods

3.1 Baseline Ecological Data

Baseline ecological information for the Proposed Development is presented within a range of biodiversity reports produced to inform the environmental impact assessment (EIA) for the Proposed Development. The following have been used to inform this BNG assessment and are contained in Appendix G of the Environmental Statement (ES):

- Biodiversity Net Gain baseline report – Appendix G2;
- Baseline ecological report – Appendix G4;
- Preliminary ecological appraisal report – Appendix G5;
- Hedgerow report – Appendix G6;
- Arboriculture report (document reference: SCAHZZ-WSP-TPO-ZZ-SU-G-0002); and,
- Baseline survey update technical note – Appendix G3.

3.1.1 Desk Study

A desk study was undertaken by WSP Ltd UK in March 2020 and reviewed in April 2023 to ensure it remained valid in line with Chartered Institute of Ecology and Environmental Management advice note on lifespan of ecological data[6]. The aim of the desk study was to ascertain the ecological baseline information available within the public domain, and to obtain information held by relevant third parties. A 2km search radius was used from the application boundary. Information was obtained from the Surrey Biodiversity Information Centre (SBIC) including:

- records of legally protected and notable species; and,
- records of non-statutory designated sites.

Freely downloadable datasets from Natural England were consulted for information regarding the presence of statutory designated sites within 2km. This search was extended to 10km for sites of European importance (Special Areas of Conservation (SAC) and Special Protection Areas (SPA)) and internationally designated Ramsar sites.

Freely downloadable datasets from Natural England were consulted for information regarding Habitats of Principal Importance (HPI) and woodland listed on the Ancient Woodland Inventory within 2km of the Site.

Open source 1:25,000 Ordnance Survey mapping was used to identify any mapped water bodies and watercourses within 500m of the Site. Aerial imagery was also used to support this.

[6] CIEEM (2019), Advice note: on the lifespan of ecological reports & surveys. Available at: https://cieem.net/wp-content/uploads/2019/04/Advice-Note.pdf

3.1.2 Field Study

3.1.2.1 Habitat Survey

Phase 1 habitat surveys of the Site were conducted by WSP Ltd UK between April and November 2020. The surveys covered the entire Site. In addition, where accessible an overview of habitats surrounding the Site was gathered. Habitats were described and mapped following standard Phase 1 habitat mapping methodology[7]. A list of plant species was compiled, and relative abundance estimated using the DAFOR[8] scale[9].

WSP Ltd UK subsequently produced a Biodiversity Net Gain baseline report whereby the Phase 1 habitats were converted into UK Habitats Classification (UKHab) Version 1 habitats as required for use within the Defra and Natural England Biodiversity Metric 3.0. The calculator has since been updated to the BM 4.0, and Version 2[10] (V2) of UKHab has been released. In line with CIEEM advice[6], an update survey of the Site was carried out in April 2023 to verify there had been no change to habitats or their management, and that habitat classification was still valid in line with the new UKHab V2 guidelines. Condition assessment information for each baseline habitat type is provided in Appendix A.

3.1.2.2 MoRPh Survey

A Modular River Survey (MoRPh) assessment for the River Bourne was conducted by WSP Ltd UK in June 2021 and a follow-up survey in March 2022. The results have been used to calculate the baseline river units within the BM 4.0. A detailed methodology on how the survey was conducted can be found within the Biodiversity Net Gain baseline report.

3.1.2.3 Technical Competence and Experience

The phase 1 habitat surveys, UKHab conversion and update ecological walkover survey were undertaken by ecologists experienced and suitably qualified in habitat assessment. The MoRPh assessment was undertaken by an experienced aquatic ecologist who had received River Condition Assessment training.

3.2 Approach to BNG

3.2.1 Design

The approach to consideration and incorporation of BNG into the design at each project stage aligns with the BNG Good Practice Principles for Development[11], produced by Construction Industry Research and Information Association (CIRIA), CIEEM and the Institute of Environmental Management and Assessment (IEMA). This includes application

[7] JNCC (2010). Handbook for Phase 1 Habitat Survey: A Technique for Environmental Audit. JNCC, Peterborough.

[8] The name DAFOR is an acronym for the abundance levels recorded: Dominant, Abundant, Frequent, Occasional and Rare.

[9] BSBI (2011) Recording the British and Irish Flora 2010-2020, Annex 1: guidance on sampling Approaches.

[10] UKhab Ltd (2023). UK Habitat Classification Version 2.0. Available at: https://ukhab.org/

[11] J. Baker, R. Hoskin, T. Butterworth (2019) *Biodiversity Net Gain. Good practice principles for development. A practical guide.* Available at: https://cieem.net/resource/biodiversity-net-gain-good-practice-principles-for-development/

of the mitigation hierarchy to avoid and minimise the of loss of habitats, wherever possible, particularly where these habitats are of higher ecological value or may be difficult to reinstate. Full details of how the design and construction of the Proposed Development has aligned with the BNG Good Practice Principles are provided throughout section 5.

3.2.2 Mapping

All baseline and proposed habitats were mapped using ESRI ArcMap Geographic Information System (GIS) to calculate the area/length of each habitat. A minimum mappable unit of three decimal places was used for mapping (0.001ha), deemed appropriate given the scale of the Site and the scale of some of the proposed habitats. Any habitats present under this threshold would be subsumed into the appropriate adjacent habitat. For example, a patch of scrub 5m^2 within grassland would not be mapped and would be considered part of the grassland, but this scrub would be considered for the habitat condition assessment of the grassland.

These mapped habitats, along with onsite condition assessments, were used in the BM 4.0 to establish the baseline and proposed biodiversity units for area based and linear habitats. A series of data cleaning and quality assurance checks were undertaken to ensure the GIS polygons did not overlap and that there were no significant gaps within the data.

3.2.3 Calculation

Where habitat categories within the BM 4.0 do not align with the UKHab Classification[10], professional judgement and interpretation of category classifications within UKHab and The Biodiversity Metric 4.0 User Guide – Technical Annex 2[12] have been used to determine the appropriate translation. These cases are indicated where relevant in section 4.

Habitat proposals are shown in the Landscape and Biodiversity Parameter Plan for the Proposed Development. Condition scoring for both the baseline scenario and post-construction scenario has been determined using standardised criteria supporting the BM 4.0**Error! Bookmark not defined.**. Post-construction condition scores have been estimated based on dialogue with the landscape architects on what is likely to be attainable based on the establishment and management regimes set out within the OLEMMP.

Strategic significance of habitats within the BM 4.0 has been determined through alignment with local priority habitats[13] in the Runnymede 2030 Local Plan; for ‘formally identified in local strategy’, and professional judgment for ‘location ecologically desirable but not in local strategy’ and ‘area/compensation not in local strategy/no local strategy’. Additionally, habitats within and directly adjacent to the Halls Farm and Woodland SNCI

[12] Natural England, (2023); ‘The Biodiversity Metric 4.0 User Guide – Technical Annex 2.

[13] Priority habitats are those which have been deemed to be of principal importance for the purpose of conserving biodiversity as required by the UK BAP. They are listed and Habitats of Principle Importance under the Natural England Inventory.

and hedgerows that qualify as 'Important' under the Hedgerow Regulations[14] are classed as 'formally identified in local strategy'.

3.2.4 Technical Competence and Experience

The BNG assessment was undertaken by an experienced ecologist who has undertaken the necessary BNG training courses provided by CIEEM:

- Designing for Biodiversity Net Gain; and,
- Biodiversity Metric V4.0 Training.

In addition, advice was sought in relation to post-construction watercourse assessment from an experienced botanist who had received River Condition Assessment training.

3.3 Limitations and Assumptions

3.3.1 Implementation

The calculated BNG score is given with the assumption that the biodiversity improvements would be managed and monitoring in line within the OLEMMP, ensuring that habitats are established successfully, reach their desired condition, and are maintained for a minimum of 30 years.

3.3.2 Condition assessment

The condition assessment of habitats was not undertaken during the Phase 1 habitat surveys. They were undertaken retrospectively by WSP Ltd UK ecologists using Phase 1 habitat survey data, Ordnance Survey (OS) mapping, and aerial imagery. The condition assessment results were verified during the update site walkover in April 2023 and using information of existing management regimes collected to inform the OLEMMP. As such, the condition assessment results are considered to be robust.

3.3.3 MoRPh Assessment

The June 2021 MoRPh survey was limited by the growth of dense vegetation on the riverbanks, which hampered observations. The follow up survey was planned at a time of year where vegetation growth was not extensive to offset this limitation in March 2022, however heavy rainfall was encountered. This caused siltation in the river channel and hampered observations of the riverbed due to high water turbidity. By combining the data with observations from June 2021 this does not represent a significant constraint.

3.3.4 Committed development

The B445/448 planning application (reference RU.22/1846) falls within the Coombelands Site and was approved in October 2023. As part of the application a BNG assessment[15] was produced and conditioned. As such, the red line boundary for the application has

[14] The Hedgerow Regulations 1997. Available at: https://www.legislation.gov.uk/uksi/1997/1160/contents/made

[15] WSP UK Ltd (2023) B445/B448 Biodiversity Net Gain Assessment.

been included within this BNG strategy and the lost/creation habitats directly inserted within the GIS and BM 4.0 to ensure consistency across the applications.

3.3.5 Design Maturity and BNG score

The current design is at Stage 2. The Proposed Development is for outline planning approval from Runnymede Borough Council. Landscape details would be secured by way of a planning condition. Where proposals are made for habitat creation and enhancement contributing towards BNG, including planting specifications, species mixes and management regimes, these should be taken as a guide to be refined as part of the landscape details.

As the Proposed Development is submitted for outline planning permission, much of the Site is split into development plots and representative habitat areas e.g., riparian habitat mosaic. The actual habitats present within these areas would be decided at detailed design. In the interim, assumptions on the % ratio of certain habitat types within these areas has been used to calculate the proposed habitat score for these areas. A full breakdown of the assumptions for each area is provided in Appendix B.

Target habitat type and condition for post-construction habitats are provided as a realistic estimate of what is considered achievable given existing constraints. As the project is to be secured through outline planning, it is expected that re-submission of a BNG Design Stage Report with the subsequent Reserved Matters Application(s) would be required, unless no significant changes to the original design are proposed, or commitments made in this strategy are approved at the outline stage e.g. habitats within the Fields. This would include an updated BNG calculation using an appropriate metric to demonstrate that the previously approved level of net gain in the outline application can still be achieved.

4. Baseline Ecological Conditions

Full details of the desk study and field survey, including descriptions, species lists and photographs, are provided within the reports outlined in section 3. Results of relevance to this BNG strategy are summarised below.

4.1 Desk Study

The presence and proximity of designated sites is relevant to the BNG assessment as this can be used as justification to inform the strategic significance of a given habitat.

There are no statutory sites located within the Site boundary. There is one site, the Basingstoke Canal SSSI located 0.8km to the south.

Nine Sites of Nature Conservation Importance (SNCIs) are found within the search area. Halls Farm Wood and Grassland SNCI is found within the Site. This area of woodland is to be retained and enhanced as part of the Proposed Development.

This area of woodland is also classed as Lowland Mixed Deciduous Woodland priority habitat. Another parcel of priority habitat woodland is found within the Site centrally and adjacent to the River Bourne. In addition, field survey results suggest that all other areas of lowland mixed deciduous woodland and all hedgerows within the Site also fit the habitat descriptions for their respective priority habitat types. However, they are not mapped within the Natural England priority habitat inventory. These habitats would be retained and enhanced as part of the Proposed Development, with only small sections of non-inventory habitat lost and replaced to facilitate construction.

The River Bourne that flows through the Site is classed as a priority river habitat by Natural England. The river is listed due to its high level of naturalness that supports a characteristic species assemblage. It is a good example of river habitat locally and would be retained and enhanced through the Proposed Development.

4.2 Field Study

The baseline habitats on-site are recorded in Table 4-1 and are presented within Figure 2. The table also includes the area/length assessed, translation to BM 4.0 categories (where required) and condition score.

Table 4-1: Summary of baseline habitats

Phase 1 habitat type	UKhab V2 classification	BM 4.0 Classification	Total area (ha)	Total length (km)	Condition	Total Habitat Units
Area based habitats						**293.31**
Broad-leaved semi-natural woodland (A1.1.1)	Woodland and forest – Lowland mixed deciduous woodland	Woodland and forest – Lowland mixed deciduous woodland	5.943	N/A	Moderate	82.01
Broad-leaved plantation woodland (A1.1.2)						
Scrub – Dense/continuous (A2.1)	Heathland and shrub – Mixed scrub	Heathland and shrub – Mixed scrub	1.799	N/A	Poor	7.92
Improved grassland (B4)	Grassland – Modified grassland	Grassland – Modified grassland	65.479	N/A	Poor	144.05
Poor semi-improved grassland (B6)						
Cultivated/disturbed land – amenity grassland (J1.2)						
Continuous Bracken (C1.1)	Sparsely vegetated land – Ruderal/ephemeral	Sparsely vegetated land – Ruderal/ephemeral	2.241	N/A	Poor	4.48
Tall ruderal (C3.1)						
Standing water (G1)	Lakes – Ponds (non-Priority Habitat)	Lakes – Ponds (non-Priority Habitat)	0.014	N/A	Poor	0.06
Introduced shrub (J1.4)	Urban – Introduced shrub	Urban – Introduced shrub	0.435	N/A	N/A – No condition assessment for this habitat	0.87

Phase 1 habitat type	UKhab V2 classification	BM 4.0 Classification	Total area (ha)	Total length (km)	Condition	Total Habitat Units
Buildings (J3.6)	Urban – Developed land; sealed surface	Urban – Developed land; sealed surface	16.711	N/A	N/A – No condition assessment for this habitat.	0.00
Other habitat – hardstanding (J5)						
Bare ground (J4)	Urban – Vacant/derelict land/bare ground	Urban – Vacant/derelict land/bare ground	1.006	N/A	N/A – No condition assessment for this habitat	0.00
Scattered trees	Individual trees – Rural trees	Individual trees – Rural trees	0.406	N/A	Poor	1.62
Scattered trees	Individual trees – Rural trees	Individual trees – Rural trees	5.704	N/A	Moderate	45.63
Scattered trees	Individual trees – Rural trees	Individual trees – Rural trees	0.555	N/A	Good	6.66
Linear habitats						**29.29**
Native species-rich hedgerow (J2.3.1)	Hedgerows – Species-rich native hedgerow	Species-rich native hedgerow with trees	N/A	0.307	Moderate	12.26
Native species-poor hedgerow (J2.1.2)	Hedgerows – Native hedgerow	Native hedgerow with trees	N/A	0.76	Moderate	0.67
Native species-poor hedgerow (J2.1.2)	Hedgerows – Native hedgerow	Native hedgerow with trees	N/A	0.065	Poor	0.29
Native species-rich hedgerow (J2.3.1)	Hedgerows – Species-rich native hedgerow	Species-rich native hedgerow	N/A	0.781	Moderate	7.05
Native species-poor hedgerow (J2.1.2)	Hedgerows – Native hedgerow	Native hedgerow	N/A	0.627	Moderate	2.76
Native species-poor hedgerow (J2.1.2)	Hedgerows – Native hedgerow	Native hedgerow	N/A	0.112	Poor	0.25

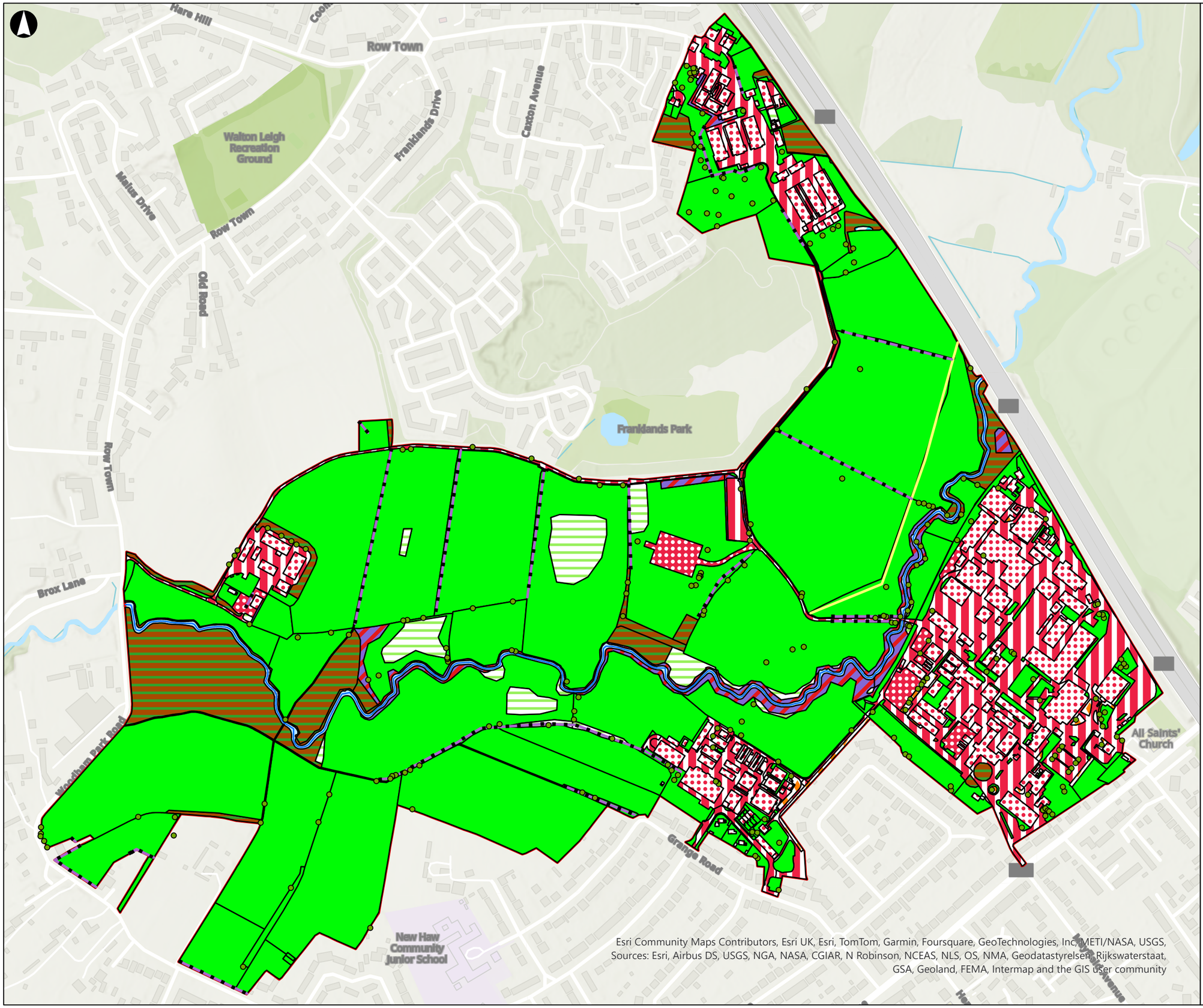
Phase 1 habitat type	UKhab V2 classification	BM 4.0 Classification	Total area (ha)	Total length (km)	Condition	Total Habitat Units
River habitats						**39.59**
Running water (G2)	Rivers & Streams (Priority Habitat)	Priority Habitat	N/A	1.847	Moderate	31.88
Running water (G2)	Rivers & Streams (Priority Habitat)	Priority Habitat	N/A	0.145	Fairly Poor	2.30
Running water (G2)	Rivers & Streams (Priority Habitat)	Priority Habitat	N/A	0.235	Fairly Good	5.41

The following habitats are identified within local and/or national strategies and as such are recorded as 'Formally identified in local strategy' in the BM 4.0:

- Lowland mixed deciduous woodland and river habitat qualify as priority habitat within the Natural England inventory;
- the lowland mixed deciduous woodland within the west of the Site also falls within Halls Farm Woodland and Grassland SNCI; and,
- three hedgerows qualify as Important under the Hedgerow Regulations[14] criteria.

The water course habitat is split into seven sections (from east to west going upstream) within the BM 4.0 to reflect those assessed during MoRPh surveys. Watercourse encroachment extent is recorded as 'minor' for section 1, as although there is no encroachment within the section, it is adjacent to the next section of the river which runs under the M25 motorway and is culverted. This constitutes between 5-20% of the bank length within the section. Section 2 is also recorded as 'minor' for watercourse encroachment, due to the presence of a single lane road bridge which runs over the river and the base of which encroaches on the bank edge. This constitutes between 5-20% of the bank length within the section.

Section 2 is also recorded as 'moderate' for riparian encroachment extent. This is due to the presence of the road bridge, which occupies between 10-25% of the riparian zone in the section. Riparian encroachment is also present in section 7, where the public right of way crosses the river with a footbridge. In section 7, the encroachment occupies 0-10% of the riparian zone so is recorded as 'minor' in the BM 4.0. All other sections are recorded as 'no encroachment'.



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Legend

- RedLine Boundary
- c1f
- g1c
- g4
- h3
- r1
- u1b
- u1b5
- u1c
- w1f
- h2a
- h2a5
- r2a
- Rural tree

Coordinate System: British National Grid

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Metres

0 70 140 280

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Rev	Date	By	Chkd	Appd	Authd

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Client

Defra - Department for Environment Food and Rural Affairs

Project Name

Science Capability for Animal Health (SCAH)

Drawing Title

Figure 2 – BNG Baseline Plan

Scale at A3

1:5,500

Role

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Suitability

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Project Number

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Rev

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Drawing Number

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5. BNG Good Practice Principles for Development

The following section details how the BNG Good Practice Principles have been applied throughout the design and construction planning of the Proposed Development. Through aligning with these principles, the Proposed Development aims to implement BNG in a manner that secures outcomes provides holistic and multifunctional benefits for biodiversity and people, as well as satisfying the quantitative gains set out in the BM 4.0.

Specific design and construction measures (including post-construction habitat creation and enhancement proposals) are outlined where relevant within this section, with greater detail provided in sections 6 and 7.

5.1 Principle 1 – Application of the mitigation hierarchy

Application of the mitigation hierarchy has been utilised throughout design development to shape both the footprint of the Proposed Development as well as temporary losses incurred through construction.

Efforts for avoidance of habitats have been made particularly in relation to habitats of medium to high distinctiveness, used as a proxy in the BM 4.0 to represent higher biodiversity value. Key examples of avoidance measures include:

- areas of Lowland Mixed Deciduous Woodland priority habitat within the Site are to be retained and enhanced;
- existing areas of scrub are to be retained and enhanced;
- the existing pond to the south of Coombelands Site is to be retained and enhanced;
- the majority of hedgerow present within the Site would be retained and enhanced;
- where possible, individual trees would be retained and protected as part of the Proposed Development, particularly within the Fields, where most existing trees are native and mature;
- the River Bourne and adjacent riparian habitats would be retained and enhanced;
- siting of works areas and access routes are located within low biodiversity value modified grassland and avoid high distinctiveness habitats wherever feasible; and,
- Lighting has been designed throughout the Proposed Development to retain dark and/or natural light levels within areas of ecological value e.g. the River Bourne corridor.

5.2 Principle 2 – Avoid losing biodiversity that cannot be offset elsewhere

No irreplaceable habitats are present within the Site and as such there are no impacts.

Halls Farm Woodland and Grassland SNCI is located within the Site. No habitat within the SNCI site would be lost to facilitate the Proposed Development. Temporary works areas have been moved to ensure a 20m buffer is retained between the SNCI and the Proposed Development throughout all stages of the development. Mitigation measures outlined

within the Framework Construction Environmental Management Plan (CEMP, document reference: SCAHZZ-ARP-TPO-ZZ-RP-EN-0001) would be implemented to prevent degradation of the SNCI. All habitat within the SNCI would be enhanced as part of the Proposed Development.

5.3 Principle 3 – Be inclusive and equitable

The Site is owned by Defra but is managed/maintained by a range of parties that are represented by the Land Management Working Group (LMWG). The LMWG consists of representatives from APHA (responsible for Fields maintenance), Defra Property Group (responsible for all property and maintenance operations) and Mitie (current facility management contractors, responsible for security). The Proposed Development has been developed in consultation with the LMWG throughout the design process.

Engagement has been undertaken with stakeholders including Runnymede Borough Council, Surrey Wildlife Trust, the Environment Agency, Natural England, and Holme Farm Community Group[16] during the design process, to ensure local and landscape scale implications of the Proposed Development on biodiversity are considered.

The designs ensure that Public Rights of Way which pass through the Site are retained throughout construction and beyond, ensuring local residents are not negatively impacted by the Proposed Development. Additionally, the creation of recreational areas and enhanced access to natural greenspace for APHA staff would improve the wellbeing of those working at the Site.

5.4 Principle 4 – Address risks

Within the BM 4.0, multipliers are applied to correct for disparity, risk in delivery or uncertainty in the effectiveness of restoration or habitat creation and management techniques. These address the risks associated with the level of difficulty in restoration or creation for different habitats and the temporal risks associated with the time taken for the habitat to reach target condition. The type and condition of the habitats proposed is considered to be achievable within the constraints of the Site location and design.

Advanced planting of wet woodland, riparian habitat and trees within the Fields would take place in the first two planting seasons of the development. Enhancements to habitats including woodland, the pond at Coombelands Site, scrub, hedgerows and the River Bourne would also occur at this time.

Creation and enhancement of all other habitat occur at the earliest available suitable period following completion of construction (within the Site rationalisation stage). The risk of delay is accounted for through the ‘delay in habitat creation’ multiplier in the BM 4.0.

Habitat loss within temporary works areas is considered to be ‘permanent’ due to the longevity of the temporary works (up to 15 years). As such there is no ‘temporary loss’ of habitat through the Proposed Development.

[16] Holme Farm lies west of the Site, upstream along the River Bourne and is used by volunteers to deliver workshops and events for the local community

To ensure habitat is managed and maintained post construction, an Expert Panel would be employed to review annual monitoring reports and make recommendations for remedial measures should progress against objectives within the OLEMMP not be met.

All created and enhanced habitats would be managed and monitored during the development programme and for a minimum of 30 years after completion of the Proposed Development.

5.5 Principle 5 – Make a measurable Net Gain contribution

It in anticipated that the determination of the planning application for the Proposed Development will be submitted after the implementation of the Environment Act. As BNG contribution has been quantifiably measured using the BM 4.0[12]. The Proposed Development exceeds the mandatory 10% required through the Environment Act for all habitats, and meets the project aim of 20% for both area and hedgerow habitats.

5.6 Principle 6 – Achieve the best outcomes for biodiversity

Broader biodiversity enhancement is included within the Proposed Development in addition to quantitative biodiversity gain. The habitat creation proposals are designed for the benefit of faunal species and not solely to focus on achievement of the maximum possible BNG score. These include:

- habitat creation and strengthening of wildlife corridors across the Site to improve connectivity to the wider landscape;
- addition of bat and bird boxes within retained trees across the Fields;
- construction of hibernacula within areas riparian habitat mosaic to support amphibian and reptile species;
- addition of invertebrate features (bee bricks, invertebrate hotels, dead wood etc) within landscaped areas of the Main Site, Grange Site and Coombelands Site;
- habitat enhancement within the River Bourne would provide suitable sheltering and breeding habitat for fish;
- habitat enhancement within the River Bourne and along the banks of the river would provide suitable habitat for otter;
- additional native bee hives at an apiary site location (exact location to be confirmed) to strengthen local honeybee populations;
- eradication of invasive species from habitats within the Site;
- addition of useable greenspaces for staff across the Site; and,
- provision of information boards along Public Rights of Way to inform general public of the habitat enhancement works undertaken along the River Bourne corridor.

5.7 Principle 7 and 8 - Be additional & Create a Net Gain legacy

The Proposed Development would achieve a quantifiable BNG. Additionally, the Proposed Development's target of 20% exceeds the mandatory 10% to be imposed by the Environment Act, highlighting substantial additionality arising from the implementation of quantified BNG on the Proposed Development.

The OLEMMP (see Section 7) sets out a 30-year Management and Monitoring Plan (MMP) for the habitat proposals associated with the Proposed Development, including defined roles and responsibilities for enacting this plan. This mechanism would secure the long-term legacy of BNG benefits associated with the Proposed Development, particularly an increase in the prevalence of woodland, riparian habitat and species-rich grasslands.

In addition, the Proposed Development seeks to:

- develop and implement strategies to control and manage invasive species that threaten native ecosystems;
- select robust, climate resilient plant species that are sourced from a provenance that would be likely to tolerate future climate conditions;
- provide flood mitigation which would improve flood risk within the Site and downstream of the River Bourne;
- ensure management and maintenance measures that improve soil quality; and,
- manage all water assets to improve water quality and maintain a healthy aquatic ecosystem.

5.8 Principle 9 – Optimise sustainability

A key aim of the Proposed Development is to embed a sustainability framework within the design, which provides improvements to the natural environment, recreational spaces, infrastructure, and sustainable water management. Features of the Proposed Development which contribute to the framework includes but are not limited to: creating habitat of high biodiversity value, enhancing existing habitats of value to help them improve their role in ecosystem services, flood alleviation, SuDS, soil management, use of sustainable materials and control of invasive non-native species.

5.9 Principle 10 – Be transparent

Relevant parties would be kept informed pre, during and post construction to remain transparent. This report will be publicly available via the planning portal pre and during construction, and on the Defra website after construction.

6. Proposed Design and Project Implementation

This section summarises the key habitat losses and gains resulting from the Proposed Development.

6.1 Losses Incurred Through Construction

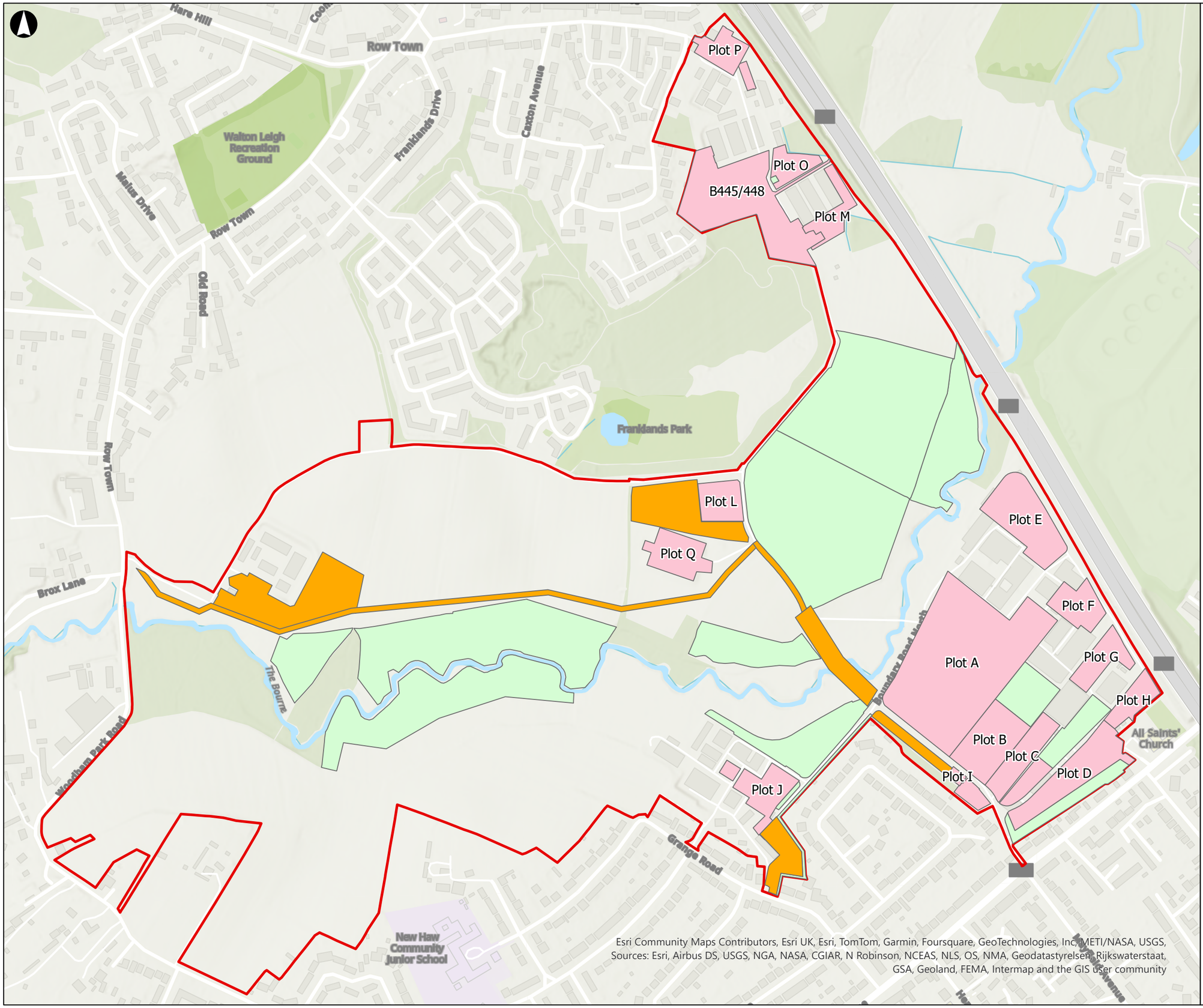
Habitat loss to facilitate the construction of the Proposed Development within the Main Site, Coombelands Site, Grange Site and Halls Site would predominantly consist of urban habitats, modified grassland and urban trees. Additionally, habitat would be lost within the Fields to facilitate the creation of new habitats of higher biodiversity value, this predominantly consists of modified grassland.

In addition, there would be further losses of habitat within areas to be temporarily used by the Proposed Development for the duration of construction (temporary areas). These are the temporary construction haul route, temporary carparks, temporary laydown areas, temporary construction vehicle areas, the temporary bridge and temporary buildings. The location of the temporary construction haul route is yet to be determined, but a potential zone for the route is indicated on the Temporary Works Parameter Plan. The worst-case scenario for biodiversity has been assumed within this assessment, whereby the route is located in the southernmost part of the potential zone, closest to habitat of value for biodiversity. The majority of habitat lost to facilitate temporary works is modified grassland, with small areas/lengths of lowland mixed deciduous woodland, scrub, ruderal/ephemeral, species-rich native hedgerow with trees and species-rich native hedgerow.

Overall, the following habitat would be lost through construction:

- Modified grassland;
- Lowland mixed deciduous woodland;
- Mixed scrub;
- Introduced shrub;
- Ruderal/ephemeral;
- Rural trees;
- Species-rich native hedgerow with trees;
- Species-rich native hedgerow;
- Native hedgerow with trees; and,
- Native hedgerow.

Each of the areas of habitat loss described are highlighted in Figure 3.



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Legend

- RedLine Boundary
- Development plots
- Habitat creation
- Temporary works

Coordinate System: British National Grid

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Metres

0 70 140 280

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Rev	Date	By	Chkd	Appd	Authd

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Client

Defra - Department for Environment Food and Rural Affairs

Project Name

Science Capability for Animal Health (SCAH)

Drawing Title

Figure 3 – Construction Losses Plan

Scale at A3

1:5,500

Role

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Suitability

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Project Number

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Rev

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Drawing Number

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6.2 On-site post-construction habitat proposals

Post-construction habitat creation and enhancement proposals (hereafter referred to as habitat proposals) have been developed to avoid ecological impacts wherever possible. The designs integrate the required use of the Site as a science facility with the project aims to produce a sustainable and integrated landscape which promotes biodiversity gains. These habitat proposals within the following Parameter Plans and documents:

- SCAHZZ-ARP-TPO-ZZ-PL-A-0004 - Development Plots Parameter Plan
- SCAHZZ-ARP-TPO-ZZ-PL-A-0005 - Development Heights Parameter Plan
- SCAHZZ-ARP-TPO-ZZ-PL-A-0006 - Landscape and Biodiversity Parameter Plan
- SCAHZZ-ARP-TPO-ZZ-PL-A-0008 - Temporary Works Parameter Plan
- SCAHZZ-ARP-TPO-ZZ-PL-A-0012 - Strategic Infrastructure Phasing Parameter Plan
- SCAHZZ-ARP-TPO-ZZ-PL-A-0010 - Illustrative Masterplan
- SCAHZZ-ARP-TPO-ZZ-SP-A-0001 - Development Specification
- SCAHZZ-ARP-TPO-ZZ-RP-L-0001 - Outline LEMMP

6.2.1 Creation

Habitat creation areas are split between areas within the Fields and River Bourne corridor, which are described as ‘rural’ within the OLEMMP, and areas within the Main Site, Coombelands Site, Grange Site and Halls Site, such are described as ‘urban’ in the OLEMMP.

Assumptions have been made on the types and ratio of habitats within creation areas that are still in outline design. These areas include: riparian habitat area, feature landscape, staff amenity areas, plots and the number/location of rural trees. These assumptions are detailed in Appendix B.

Reference to when each habitat would be created during the development stages is referenced below. The timings are captured within the BM 4.0 under ‘delay in starting habitat enhancement’.

Habitats created within the ‘rural’ site are summarised below and fully outlined within the OLEMMP and Landscape and Biodiversity parameter plan:

- Wet woodland is proposed along the northern bank of the River Bourne, which is seasonally wet due to flooding. The habitat would include inundation-tolerant tree species to improve flood management and habitat diversity. This area would be part of advanced planting during the site placemaking stage.
- Riparian habitat is proposed in two fields adjacent to the River Bourne. Each riparian habitat area consists of other neutral grassland, pond (priority habitat),

reedbed, scrub, ephemeral water bodies and wet ditches. This area would be part of advanced planting at the beginning of the enabling stage.

- Modified grassland would be created within the flood compensation area (FCA). The habitat would be created when the FCA is complete, at the beginning of the site placemaking stage.
- Other neutral grassland would be created in two fields between the Main Site and Coombelands Site. Excavated material from the flood compensation area creation would be used to reprofile the fields and reduce the nutrient content of the soil. The fields would be re-seeded and managed as species rich hay meadows.
- Rural trees would be added as scattered trees within habitat creation areas and retained habitats across the rural site. Species would be native, and the size of plants would be a standard tree or above.
- Development Plots L and Q are located within the fields, adjacent to Halls access road. Habitat created within these areas is modified grassland. Plots L and Q would be created at the beginning of the placemaking stage.

Habitats created within the 'urban' site are summarised below and fully outlined within the OLEMMP and Landscape and Biodiversity parameter plan:

- Other broadleaved woodland would be used as screen planting in areas located along the Site boundaries at Main Site, Grange Site, and Coombelands Site where the boundary borders residential properties. It would help mitigate visual impacts of the Proposed Development. Screen planting would be part of advanced planting during the site enabling stage.
- Feature landscape areas are located at Main Site and consists of a frontage garden, a central courtyard, and a north-south avenue linking the two and extends further north. Habitat within these areas are rural trees, modified grassland, developed land; sealed surface and introduced shrub. Trees planted would be a mix of native and non-native species, their size would be heavy standard or above. Habitat would be created within the feature landscape at the beginning of the placemaking stage.
- There are three staff amenity / recreation areas located adjacent to Grange Site, at Halls Site and at Coombelands Site. Habitat within these areas are rural trees, modified grassland, developed land; sealed surface and introduced shrub. Trees planted would be native and include a variety of fruiting species, their size would be heavy standard or above. Habitat would be created within the staff amenity / recreation areas at the beginning of the placemaking stage.
- Development Plots the urban site (including buffer planting and green links) are located within the Main Site, Grange Site, Halls Site and at Coombelands Site. Habitat within these areas are rural trees, modified grassland, sustainable urban drainage, introduced shrub, developed land; sealed surface and rural trees. Trees planted would be a mix of native and non-native species, their size would be heavy

standard or above. In addition, plots within the Main Site that contain buildings adjacent to green links would include biodiverse green roofs and façade bound green walls. Habitat would be created within the Plots at the beginning of the placemaking stage.

- Habitat within the B445/B448 planning application would be created as described within the previous BNG assessment[15]. Habitats include a rain garden, other neutral grassland, modified grassland, developed land; sealed surface, rural trees and species-rich native hedgerow. Habitat within the B445/B448 site would be created one year in advance of the Proposed Development.

Each of the areas of habitat creation described are highlighted in Figure 3.

6.2.2 Reinstatement

All habitats lost from the temporary areas would be reinstated at the end of the of the placemaking stage. Created habitats would be like for like with those lost from the baseline, except for hedgerows, which would be enhanced in line with other hedgerows throughout the Site.

Each of the areas of habitat creation described are highlighted in Figure 3.

6.2.3 Enhancement

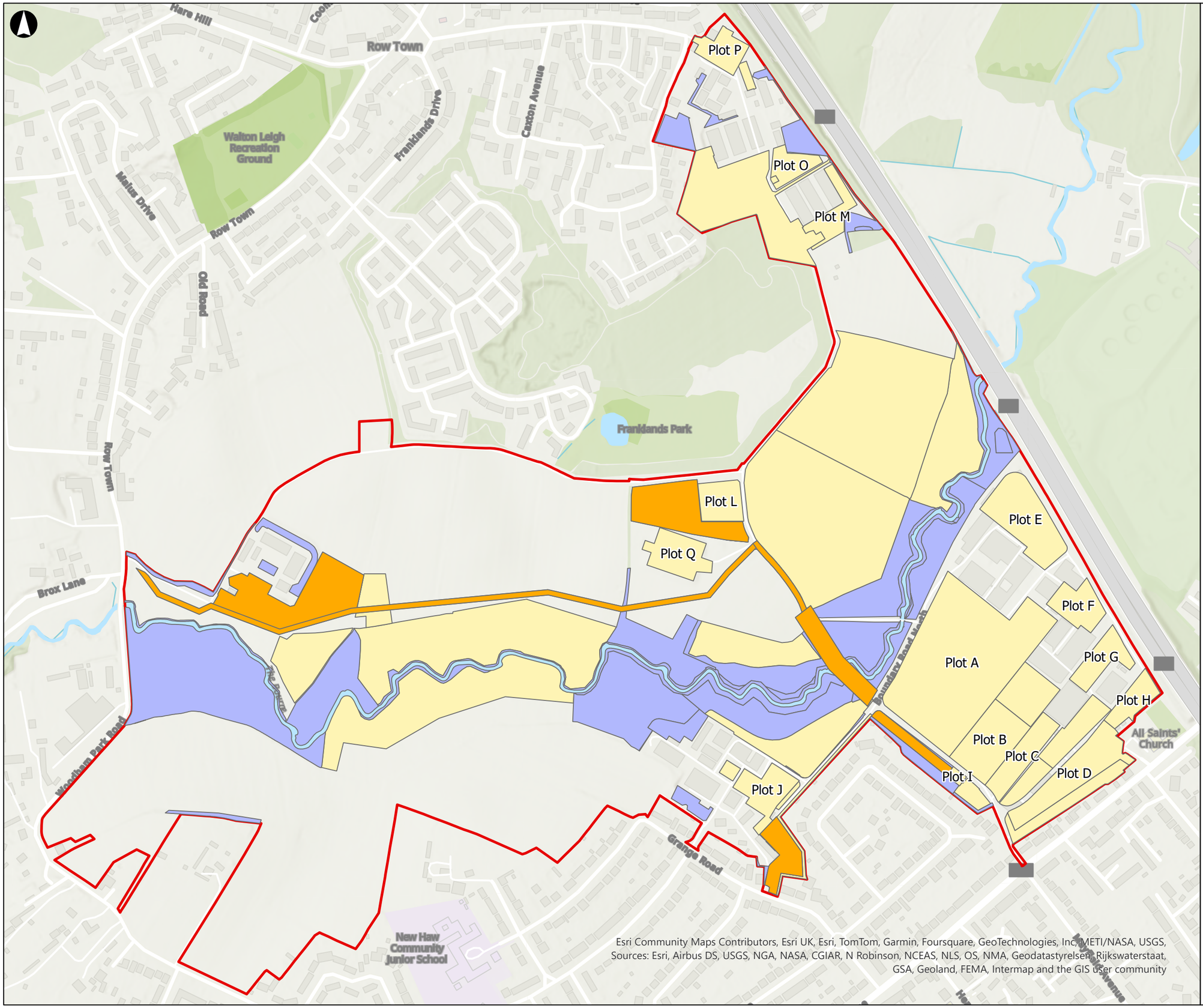
Habitat enhancements would primarily be within the ‘rural’ part of the Site. They are summarised below and fully outlined within the OLEMMP:

- All existing lowland mixed deciduous woodland within the Site would be enhanced to create rich and diverse habitats. Hall's Farm Woodland and Grassland SNCI would be enhanced to meet its designation requirements. The enhancement would be implemented at the beginning of the placemaking stage.
- Existing scrub habitat, located within areas of woodlands and along the banks of the River Bourne, would be managed and enhanced. Areas of scrub along field margins would be managed to prevent encroachment onto adjacent grassland habitat. Enhancement would occur at the beginning of the enabling works stage.
- Modified grassland along the river corridor would be enhanced through seeding to improve species diversity and richness, inclusion of biodiverse field boundaries and improved management practices. Enhancement would occur at the beginning of the site placemaking stage.
- The existing pond to the south of Coombelands Site would be enhanced at the beginning of the placemaking stage. Enhancement would include, marginal, inundation, and submerged planting, vegetation management along the banks to reduce shading, and measures to improve in water quality.
- All hedgerows within the Site would be enhanced through gap planting with native species (where gaps >10% exist), improved management, removal of invasive species and introduction of biodiverse field margins. Hedgerows within advanced

planting areas would be enhanced during the first suitable season of the enabling stage. Hedgerows within the rest of the Site would undergo enhancement at the beginning of the placemaking stage.

- Enhancement of the River Bourne would be implemented at the beginning of the enabling works stage, except for in section 2, where the temporary construction bridge would be in place until the end of the placemaking stage. The river and it's riparian habitats would be enhanced through the following interventions:
    - improvements to bank top water related features e.g. ponds and ditches;
    - eradication of invasive species (e.g. Himalayan balsam *Impatiens glandulifera*) from the Site, with the assumption that 100% removal is unlikely due to presence of invasives upstream;
    - improvements to bank face, marginal and in channel vegetation through planting and management;
    - addition of dead wood within the channel to slow water flow and provide a resource for aquatic species;
    - addition of coir substrate to the channel bed to mitigate previous dredging, reduce the channel depth without bank reprofiling and produce riffles which would support aquatic species; and,
    - improvements to water quality through SuDS, reedbed, woodland scrapes and ditches.

Each of the areas of habitat enhancement described above are highlighted in Figure 4.



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RedLine Boundary
Creation
Enhanced
Temporary works

Coordinate System: British National Grid

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Metres

0 70 140 280

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Rev	Date	By	Chkd	Appd	Authd

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Client

Defra - Department for Environment Food and Rural Affairs

Project Name

Science Capability for Animal Health (SCAH)

Drawing Title

Figure 4 – Created and Enhanced Habitat Plan

Scale at A3

1:5,500

Role

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Suitability

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Project Number

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Rev

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Drawing Number

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6.2.5 Fauna

Habitat enhancement and the addition of features for protected and notable species would be included within the Site to improve biodiversity resources and support local wildlife populations, with the majority of provisions within the 'rural' part of the Site.

Provisions for fauna include:

- Bats - Proposed bat boxes installed on trees across the Fields to provide roosting opportunities for local bat populations.
- Birds - Proposed bird boxes installed on trees across the Fields to provide nesting opportunities for local bird populations.
- Invertebrates - Proposed invertebrate features (bee bricks, invertebrate hotels, dead wood etc) installed on new and refurbished buildings and within the Site to provide shelter and feeding opportunities for invertebrate populations.
- Amphibians and reptiles - Proposed hibernacula would provide refuge for amphibian and reptile populations within the riparian habitat areas. Pond creation and enhancement would provide breeding habitat for amphibians.
- Fish - Habitat enhancement within the River Bourne would provide suitable habitat for fish.
- Otter - Habitat enhancement within the River Bourne and along the banks of the river would provide suitable habitat for otter.

6.3 Post-Construction Unit Summary

The BNG contribution achieved by each of the habitat proposals on-site are presented in Figure 5.

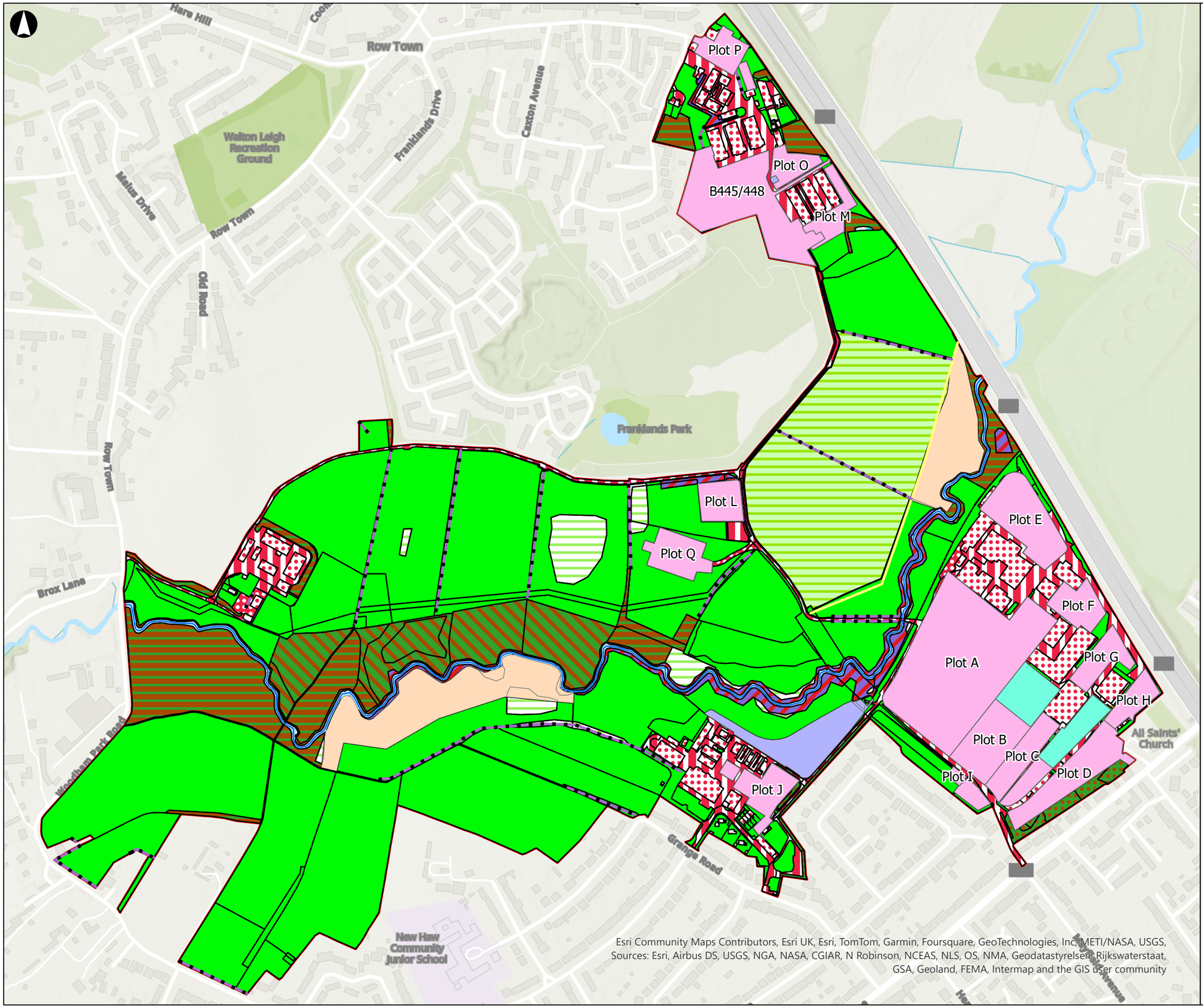
Total net unit change (Including all on-site & off-site habitat retention, creation & enhancement)	*Habitat units*	72.45
	Hedgerow units	9.83
	Watercourse units	6.65
Total net % change (Including all on-site & off-site habitat retention, creation & enhancement)	*Habitat units*	24.70%
	Hedgerow units	33.57%
	Watercourse units	16.26%
Trading rules satisfied?	Yes ✓	

Figure 5: Headline results from the BM 4.0 for on-site habitat proposals for the Proposed Development

The Proposed Development exceeds the 20% target for the area habitat and hedgerow habitat constituent parts of the BM 4.0 and surpasses the mandatory target of 10% required through the Environment Act for river habitats, with trading rules for all habitats also satisfied. The Proposed Development is line with the BNG Good Practice Principles

for additionality, and minimising risk in relation to the successful integration of habitats in achieving the BNG target.

The areas covered by all habitat proposals are highlighted in Figure 6.



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Legend

- RedLine Boundary
- c1f
- g1c
- g3c
- g4
- h3
- r1
- u1b
- u1b5
- u1c
- w1d
- w1f
- w1g
- Development Plot
- Feature landscape
- Riparian habitat
- Staff amenity
- h2a
- h2a5
- r2a

Coordinate System: British National Grid
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Metres
0 50 100 200 300

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Defra - Department for Environment Food and Rural Affairs

Project Name
Science Capability for Animal Health (SCAH)

Drawing Title
Figure 6 – BNG Post-construction Plan

Scale at A3
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Role
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Suitability
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Project Number	Rev
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Drawing Number
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7. Management and Monitoring Plan

The BNG MMP focuses on the delivery of long-term management measures and monitoring requirements for each of the proposed habitat creation and enhancement measures set out throughout section 6. To ensure the actions outlined in the MMP are achievable and measurable, proposals have been developed to align closely with the condition scoring criteria set out in the BM 4.0. The condition scoring criteria within the BM 4.0 would consequently be utilised to monitor the establishment of these habitats to their target type and condition.

The MMP is set out within the OLEMMP document which should be read alongside this strategy. The document covers the OLEMMP objectives, management considerations, tree strategy and maintenance specifications. Within Appendix C of the OLEMMP, the following tables specify the requirements for each retained, enhanced and created habitat within the Site:

- Table C1: Feature descriptions
- Table C2: Key Targets and Indicators
- Table C3: Maintenance Measures – Initial Phase (years 0-5)
- Table C4: Maintenance Measures – Long Term (years 5-30+)
- Table C5: Monitoring Measures

Management and maintenance activities would be undertaken by contractors who are trained and/or qualified to complete the task. It would be the responsibility of Defra (via the SCAH programme) to resource these activities. In addition, the detailed design of the Site and any remedial actions required following monitoring would have oversight from the expert panel (a team of biodiversity and land management experts e.g. Natural England, Defra and the Environment Agency). A full schedule outlining the management prescriptions, monitoring frequency, and responsible parties for undertaking the actions detailed within this MMP are provided within the LEMMP.

Appendix A

Baseline Habitat Condition Assessments

A.1 Baseline Habitats Condition Assessments

Lowland Mixed Deciduous Woodland

Lowland mixed deciduous woodland					
Condition Assessment Criteria					
Indicator		**Good (3 points)**	**Moderate (2 points)**	**Poor (1 point)**	**Score per indicator**
A	**Age distribution of trees**	Three age-classes[1] present.	Two age-classes[1] present.	One age-class[1] present.	3
B	**Wild, domestic and feral herbivore damage**	No significant browsing damage evident in woodland[2].	Evidence of significant browsing pressure is present in 40% or less of whole woodland[2].	Evidence of significant browsing pressure is present in 40% or more of whole woodland[2].	2
C	**Invasive plant species**	No invasive species[3] present in woodland.	Rhododendron *Rhododendron ponticum* or cherry laurel *Prunus laurocerasus* not present, other invasive species[3] <10% cover.	Rhododendron or cherry laurel present, or other invasive species[3] >10% cover.	1
D	**Number of native tree species**	Five or more native tree or shrub species[4] found across woodland parcel.	Three to four native tree or shrub species[4] found across woodland parcel.	Two or less native tree or shrub species[4] across woodland parcel.	3
E	**Cover of native tree and shrub species**	>80% of canopy trees and >80% of understory shrubs are native[5].	50 - 80% of canopy trees and 50 - 80% of understory shrubs are native[5].	<50% of canopy trees and <50% of understory shrubs are native[5].	2
F	**Open space within woodland**	10 - 20% of woodland has areas of temporary open space[6]. Unless woodland is <10ha, in which case 0 - 20% temporary open space is permitted[7].	21 - 40% of woodland has areas of temporary open space[6].	<10% or >40% of woodland has areas of temporary open space[6]. But if woodland <10ha has <10% temporary open space, please see Good category[7].	3
G	**Woodland regeneration**	All three classes present in woodland[8]; trees 4 - 7 cm Diameter at Breast Height (DBH), saplings and seedlings or advanced coppice regrowth.	One or two classes only present in woodland[8].	No classes or coppice regrowth present in woodland[8].	2

Lowland mixed deciduous woodland					
Condition Assessment Criteria					
Indicator		**Good (3 points)**	**Moderate (2 points)**	**Poor (1 point)**	**Score per indicator**
H	**Tree health**	Tree mortality less than 10%, no pests or diseases and no crown dieback[9].	11% to 25% mortality and/or crown dieback or low-risk pest or disease present[9].	Greater than 25% tree mortality and or any high-risk pest or disease present[9].	2
I	**Vegetation and ground flora**	Recognisable NVC plant community[10] at ground layer present, strongly characterised by ancient woodland flora specialists.	Recognisable woodland NVC plant community[10] at ground layer present.	No recognisable woodland NVC plant community[10] at ground layer present.	1
J	**Woodland vertical structure**	Three or more storeys across all survey plots or a complex woodland[11].	Two storeys across all survey plots[11].	One or less storey across all survey plots[11].	1
K	**Veteran trees**	Two or more veteran trees[12] per hectare.	One veteran tree[12] per hectare.	No veteran trees[12] present in woodland.	1
L	**Amount of deadwood**	50% of all survey plots within the woodland parcel have deadwood, such as standing deadwood, large dead branches and or stems, branch stubs and stumps, or an abundance of small cavities[13].	Between 25% and 50% of all survey plots within the woodland parcel have deadwood, such as standing deadwood, large dead branches and or stems, stubs and stumps, or an abundance of small cavities[13].	Less than 25% of all survey plots within the woodland parcel have deadwood, such as standing deadwood, large dead branches and or stems, stubs and stumps, or an abundance of small cavities[13].	3
M	**Woodland disturbance**	No nutrient enrichment or damaged ground evident[14].	Less than 1 hectare in total of nutrient enrichment across woodland area and or less than 20% of woodland area has damaged ground[14].	More than 1 hectare of nutrient enrichment and or more than 20% of woodland area has damaged ground[14].	2
Total Score					26
Condition Score					Moderate

Mixed Scrub

Mixed Scrub		
Condition Assessment Criteria		Criterion passed
A	The scrub is a good representation of the habitat type it has been identified as, based on its UKHab description (where in its natural range). The appearance and composition of the vegetation closely matches the characteristics of the specific scrub type. At least 80% of scrub is native, and there are at least three native woody species[1], with no single species comprising more than 75% of the cover (except hazel *Corylus avellana*, common juniper *Juniperus communis*, sea buckthorn *Hippophae rhamnoides* or box *Buxus sempervirens*, which can be up to 100% cover).	Yes
B	Seedlings, saplings, young shrubs and mature (or ancient or veteran[2]) shrubs are all present.	No
C	There is an absence of invasive non-native plant species[3] (as listed on Schedule 9 of WCA[4]) and species indicative of sub-optimal condition[5] make up less than 5% of ground cover.	No
D	The scrub has a well-developed edge with scattered scrub and tall grassland and or forbs present between the scrub and adjacent habitat.	No
E	There are clearings, glades or rides present within the scrub, providing sheltered edges.	No
Number of criteria passed		1
Condition Score		Poor

Modified Grassland

Modified Grassland			
Condition Assessment Criteria		Amenity areas	Pasture (grazed and cut)
A	There are 6-8 vascular plant species per m^2 present, including at least 2 forbs (this may include those listed in Footnote 1). **Note - this criterion is essential for achieving Moderate or Good condition.** Where the vascular plant species present are characteristic of medium, high or very high distinctiveness grassland, or there are 9 or more of these characteristic species per m^2 (excluding those listed in Footnote 1), please review the full UKHab description to assess whether the grassland should instead be classified as a higher distinctiveness grassland. Where a grassland is classed as medium, high, or very high distinctiveness, please use the relevant condition sheet.	No	No
B	Sward height is varied (at least 20% of the sward is less than 7 cm and at least 20% is more than 7 cm) creating microclimates which provide opportunities for vertebrates and invertebrates to live and breed.	No	No
C	Some scattered scrub (including bramble *Rubus fruticosus* agg.) may be present, but scrub accounts for less than 20% of total grassland area. Note - patches of scrub with continuous (more than 90%) cover should be classified as the relevant scrub habitat type.	No	Yes
D	Physical damage is evident in less than 5% of total grassland area. Examples of physical damage include excessive poaching, damage from machinery use or storage, erosion caused by high levels of access, or any other damaging management activities.	No	No
E	Cover of bare ground is between 1% and 10%, including localised areas (for example, a concentration of rabbit warrens)[2].	Yes	Yes
F	Cover of bracken *Pteridium aquilinum* is less than 20%.	Yes	Yes
G	There is an absence of invasive non-native plant species[3] (as listed on Schedule 9 of WCA[4]).	No	No
Essential criterion achieved (Yes or No)		No	No
Number of criteria passed		2	3
Condition Score		Poor	Poor

Pond (non-priority habitat)

Pond (non priority habitat)		
Core Criteria - applicable to all ponds (woodland[1] and non-woodland):		
A	The pond is of good water quality, with clear water (low turbidity) indicating no obvious signs of pollution. Turbidity is acceptable if the pond is grazed by livestock.	Fail
B	There is semi-natural habitat (moderate distinctiveness or above) completely surrounding the pond, for at least 10 m from the pond edge for its entire perimeter.	Fail
C	Less than 10% of the water surface is covered with duckweed *Lemna* spp. or filamentous algae.	Pass
D	The pond is not artificially connected to other waterbodies, e.g. agricultural ditches or artificial pipework.	Pass
E	Pond water levels can fluctuate naturally throughout the year. No obvious artificial dams[2], pumps or pipework.	Pass
F	There is an absence of listed non-native plant and animal species[3].	Fail
G	The pond is not artificially stocked with fish. If the pond naturally contains fish, it is a native fish assemblage at low densities.	Pass
Additional Criteria - must be assessed for all non-woodland ponds:		
H	Emergent, submerged or floating plants (excluding duckweed)[4] cover at least 50% of the pond area which is less than 3 m deep.	N/A
I	The pond surface is no more than 50% shaded by adjacent trees and scrub.	N/A
Number of criteria passed		4
Condition Score		Poor

Ruderal/ ephemeral

Ruderal/ ephemeral		
Condition Assessment Criteria		Criterion passed
Core Criteria - must be assessed for **all urban habitat types**:		
A	Vegetation structure is varied, providing opportunities for vertebrates and invertebrates to live, eat and breed. A single structural habitat component or vegetation type does not account for more than 80% of the total habitat area.	No
B	The habitat parcel contains different plant species that are beneficial for wildlife, for example flowering species providing nectar sources for a range of invertebrates at different times of year.	No
C	Invasive non-native plant species (listed on Schedule 9 of WCA[1]) and others which are to the detriment of native wildlife (using professional judgement)[2] cover less than 5% of the total vegetated area[3]. **Note - to achieve Good condition, this criterion must be satisfied by a complete absence of invasive non-native species (rather than <5% cover).**	No
Number of criteria passed		0
Condition Score		Poor

Hedgerows

Hedgerow favourable condition attributes																
Attributes and functional groupings (A, B, C, D and E)		**Hedgerow number**														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Core groups - applicable to all hedgerow types		**Criterion passed**														
A1.	Height	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
A2.	Width	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	N	Y
B1.	Gap - hedge base	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
B2.	Gap - hedge canopy continuity	Y	Y	Y	Y	N	N	N	N	Y	Y	Y	N	N	Y	N
C1.	Undisturbed ground and perennial vegetation	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
C2.	Nutrient-enriched perennial vegetation	Y	Y	Y	N	Y	N	N	N	N	Y	Y	Y	N	Y	N
D1.	Invasive and neophyte species	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
D2.	Current damage	N	N	N	N	N	N	N	Y	N	N	N	N	N	N	N
Additional group - applicable to hedgerows with trees only																
E1.	Tree class	Y	Y	Y	-	-	-	-	-	-	N	N	-	-	-	-
E3.	Tree health	N	N	N	-	-	-	-	-	-	Y	N	-	-	-	-
Total Score		3	3	3	4	4	4	4	3	3	3	4	3	4	3	4
Condition Score		Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate

In addition to the hedgerows above, the condition of the two hedgerows present in the baseline of the B445/448 development plot is poor. The assessment is detailed within the B445/448 BNG report.

River

MoRPh Criteria	River Section						
	1	**2**	**3**	**4**	**5**	**6**	**7**
B1	3	4	2	2	2	2	3
B2	2	2	1	2	1	0	3
B3	0	0	0	0	0	0	0
B4	-2	-3	-2	-1	-2	-3	-4
B5	-2	-3	-2	-2	-2	-2	-3
C1	3	3	3	2	1	2	2
C2	2	1	2	3	1	1	3
C3	3	2	2	3	2	1	2
C4	4	4	4	4	4	2	2
C5	2	1	1	1	1	2	1
C6	1	2	4	4	4	2	2
C7	0	-2	0	0	0	0	0
C8	0	-1	0	0	0	0	0
C9	0	-1	0	0	0	0	0
C10	-1	-3	-1	0	0	0	-2
D1	1	1	2	1	2	1	1
D2	1	1	3	1	2	0	0
D3	0	0	0	1	1	1	1
D4	0	0	0	1	1	1	1
D5	-1	0	-1	0	0	0	0
E1	0	0	2	0	3	2	0
E2	3	2	3	3	4	2	4
E3	1	0	1	1	0	1	2
E4	0	0	0	2	1	0	1
E5	0	0	0	1	1	0	1
E6	2	1	2	1	1	1	1
E7	0	0	0	0	0	0	0
E8	0	0	0	0	0	0	0
E9	0	0	0	0	0	0	0
E10	0	-2	0	0	0	0	-2
E11	0	-1	0	0	0	0	0
E12	0	0	0	0	0	0	0
Average +	1.47	1.26	1.68	1.74	1.68	1.11	1.58
Average -	-0.46	-1.23	-0.46	-0.23	-0.31	-0.38	-0.85
Condition	1.01	0.03	1.22	1.51	1.38	0.72	0.73
River Type	F	F	F	F	F	F	F
Condition Score	**Moderate**	**Fairly poor**	**Moderate**	**Fairly good**	**Moderate**	**Moderate**	**Moderate**

Rural trees

The condition of rural trees was assessed as reported the WSP Ltd UK Arboriculture Report (document reference: SCAHZZ-WSP-TPO-ZZ-SU-G-0002).

Appendix B

Outline Design Assumptions

B.1 Outline Design Assumptions

As the Proposed Development is currently outline, much of the Site is split into development plots and representative habitat areas e.g., riparian habitat and feature landscape. The actual habitats present within these areas would be decided at detailed design. In the interim assumptions on the percentage ratio of certain habitat types within these areas have been used to calculate the proposed habitat score for these areas. Detail of the assumptions for each area are provided below.

Plot Areas (A-Q)

Plot ratios outlined in the Development Specification were used to calculate the area of each plot available for habitat creation. The following assumptions were made:

- Of the plot area NOT allocated to development, 20% would be used for habitat creation.
- The remaining 80% of plot area NOT allocated to development would be used as pedestrian footpaths and other areas of hard standing.
- Habitat within the habitat creation areas would be equally split between following habitat types: Introduced shrub, modified grassland and SuDS. This was the same for all plot areas except for Plots L and Q where habitat creation is assumed to be only modified grassland.
- 10% of new buildings within the Main Site plots would have biodiverse green roofs.
- New buildings within green corridors**Error! Bookmark not defined.** would have green facades. The area of the green facade was calculated using the Development Heights Parameter Plan for each specific plot and the estimated length of proposed buildings (shown within the Illustrative Masterplan Parameter Plan - this design is within the maximum parameters and so presents a conservative design assumption), where they are adjacent to the green corridor. The estimated length of each building was calculated in GIS.
- No plots within Grange Site, Halls Site or Coombelands Site would contain green roofs or green facades.

Riparian habitat:

The ratio of habitats within these areas was decided using professional judgement and information within the OLEMMP. The habitat areas would be comprised of the following ratio:

- Other neutral grassland – 75%
- Ponds (priority habitat) – 12.5%
- Temporary lakes, ponds and pools – 5%

- Mixed scrub – 5%
- Reedbed – 2.5%

Feature landscape:

The ratio of habitat in these areas was decided using information on landscape design provided in OLEMMP. The habitat areas would be comprised of the following ratio:

- Modified grassland – 40%
- Introduced shrub – 50%
- Developed land; sealed surface – 10%

Staff amenity areas

The ratio of habitat in these areas was decided using information on landscape design provided in the OLEMMP. The habitat areas would be comprised of the following ratio:

- Modified grassland – 70%
- Introduced shrub – 20%
- Developed land; sealed surface – 10%

Rural trees

The number of trees lost and retained within the Proposed Development was taken from the landscape drawings outlined within the OLEMMP. The designs took a precautionary approach that assumed all trees within plot areas would be removed. However, plot coverage ratios ensure no plot can be fully developed across its footprint and every effort to retain trees would be made through detailed design. As such the actual number of trees lost is likely to be less than reported within this assessment.

The number of created trees, their condition, and the time of planting within each part of the Site was estimated using the Tree Strategy from the OLEMMP. It was assumed that all trees at the time of planting would be classed as ‘small’ under the diameter requirements outlined in the BM 4.0 user guide. Those planted within the Fields and staff amenity areas were assumed to be of good condition and those within the Main Site, Grange Site, Coombelands Site and Halls Site to be of moderate condition. The following numbers were estimated:

- Small trees (good) - 180
- Small trees (moderate) - 100