

ECOLOGICAL ENHANCEMENT STRATEGY

Kneller Hall, Twickenham

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Ecological Enhancement
Strategy
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1 INTRODUCTION

- 1.1.1 RPS were commissioned by DWD to prepare an Ecological Enhancement Strategy, to support the re-development of Kneller Hall, Twickenham.
- 1.1.2 The re-development involves the demolition of a number of the existing buildings on site, and the creation of a new school, and multi-use open space for students and community groups.
- 1.1.3 The application is also supported by a Preliminary Ecological Appraisal, and Ecology Survey Report, both prepared by RPS in 2022. These surveys found the site to comprise a number of habitats including grasslands, hardstanding, buildings, ornamental shrub planting and scattered trees. Phase 2 ecology surveys confirmed the likely absence of bats roosting in any of the buildings on site and results of a botanical survey indicated some areas of semi-improved acid grassland, not classified as Biodiversity Action Plan (BAP) habitat.
- 1.1.4 This Ecological Enhancement Strategy provides details of the ecological mitigation and enhancement to be included within the final scheme. It is split into sections, detailing mitigation / enhancements measures for habitats, and then the various target species for which on-site mitigation / enhancement is required (bats and birds). It will also ensure that the following points are addressed:
- Details of habitat creation or enhancements, including suitably detailed drawings and cross sections as required;
 - Details of species enhancements including relevant scale plans and drawings showing the location, elevation and type of features such as bat and bird boxes etc. as appropriate;
 - Selection of appropriate strategies for retaining target habitats; and
 - Demonstration of how the site will achieve Biodiversity Net Gain (BNG).
- 1.1.5 The accompanying figures and appendices provide details of how the mitigation and enhancement measures will be achieved within the scheme.

1.2 The site and setting

- 1.2.1 The Kneller Hall is located on Kneller Road, Twickenham, TW2 7DN (OS Grid reference TQ 146 741). The site comprises largely hardstanding and school buildings that are largely no longer in use, with areas of amenity grassland surrounding most buildings, and an area of scattered trees over grassland along the northern site boundary. Several large areas of species-poor acid grassland are present on the site, which are of varying quality. In the centre of the site there was some ornamental planting and introduced shrub beds surrounding a small pond.
- 1.2.2 The site is located in a predominantly suburban area, comprised of rows of semi-detached and terraced 1930's housing. Murray Park and Gainsborough Gardens recreation ground offer open green space nearby, and further afield, the area is characterised by Twickenham stadium and the River Thames.

1.3 Existing features of relevant conservation interest on site

- 1.3.1 The following features on site or near the site were identified during the Preliminary Ecological Appraisal (RPS, 2022), and Ecology Survey Report (RPS, 2022), as habitats or species of conservation interest that require consideration within this strategy:
- Several areas of semi-improved acid grassland (of varying quality);

- A low level of activity by various bat species foraging/commuting on site; and
- Nesting bird habitat.

1.4 Recommendations for ecological mitigation and enhancement

- 1.4.1 This Ecological Enhancement Plan has been developed alongside the masterplan for the site; to ensure that the biodiversity and ecological value of the site is not comprised during the re-organisation.
- 1.4.2 It should be read in conjunction with the other ecological reports prepared by RPS, such as the Preliminary Ecological Appraisal (PEA) (RPS, 2022), and the Ecology Survey Report (RPS, 2022).

2 MANAGEMENT OBJECTIVES

2.1.1 Table 2.1 below sets out specific management objectives for the site.

Table 2.1 – Management Objectives at Kneller Hall, Twickenham.

Habitat Type	Management Type	Management Objectives
Acid Meadow Grassland	Habitat Enhancement / Creation	To provide foraging habitat and nesting material for a range of wildlife species, particularly birds and reptiles, but also invertebrates, through the planting of species-rich grass areas.
Green Roofs / Walls	Habitat Creation	To provide suitable habitat for invertebrates and in turn foraging bats and birds.
Swales	Habitat Creation	Improve foraging opportunities for bats.
Hedgerows	Habitat Creation and Habitat Maintenance	To provide green corridors throughout the site to facilitate wildlife movement. To provide nesting and foraging habitat for birds and dormice, and shelter for a range of wildlife. Retained hedgerows to be protected.
Scattered Trees	Habitat Creation and Habitat Maintenance	To provide nesting and foraging habitat for birds and dormice, and shelter for a range of wildlife, including bats. To provide long-grass rides within the woodland that increase the variety of habitat present.
Other features	Habitat Creation	Woodpiles to provide cover for reptiles, particularly for use during hibernation, and invertebrates. Insect boxes to provide suitable habitat for invertebrates. Bird boxes to provide additional nesting habitat for birds known to occur on site. Bat boxes to provide additional roosting habitat for bats known to occur on site.

3 ACID GRASSLAND

- 3.1.1 Most of the acid grassland currently present on site is being retained, in its current position. Within the current masterplan, it is not considered suitable to translocate any areas of acidic grassland within the site, where it is not currently present, and so, some areas of the grassland will be lost to facilitate the development.
- 3.1.2 Acid grassland is currently present where there are existing sports playing pitches, used for rugby, football and cricket (with an area totalling 4.52 ha). These pitches are understood to have been used by the former occupier, the Royal Military School of Music. As part of the proposed development, these pitches are proposed to be enhanced to enable them to be used by both the school and local community groups. Specialist advice from a sports pitch consultant has confirmed that acid grass is not a suitable grass type for sports pitches, and therefore it will be necessary to remove the acid grassland from these parts of the site. This is discussed further in the Sports Provision Report, prepared by ADP and submitted with this application.
- 3.1.3 Initially, the project landscape architect (in consultation with RPS Ecology) investigated translocating the acid grassland, currently found on the sports pitches to other parts of the site. However, it was concluded that this would not be the more suitable strategy because these areas were small in their extent, and it was considered that the soil conditions were not suitable for a range of reasons.
- 3.1.4 Therefore, it was agreed that to ensure that acid grassland is retained and enhanced on the site, that a more suitable strategy was to enhance existing species-poor acid grassland on site, by translocating to these areas, the more species-rich acid grassland that cannot be retained in their current position and need to be removed. Together with implementing an appropriate management plan for the areas of retained grassland.
- 3.1.5 Whilst the proposed enhancement strategy will result in a net decrease in the quantity of acid grassland present at the site, in terms of the sqm area cover, it will result in an enhanced quality of acid grassland, moving it outside of the areas that have previously been and will continue to be used as sports pitches.
- 3.1.6 It may also be possible to explore off-site opportunities, within the local area for any remaining acid grassland to be translocated to, that is not retained on the site.

3.2 Acid meadow grassland enhancement

- 3.2.1 During the construction period, topsoil from more species-rich areas within the grassland will be stripped during site preparation and moved to an appropriate location on site storage during construction. These works will be overseen by an acid grassland specialist, to be employed by the client, and will work in conjunction with the landscape team and RPS.
- 3.2.2 Soil will be stockpiled in mounds no more than 2 m high to avoid heating/severe compaction issues and will not be tracked across during development activities.
- 3.2.3 The translocation site for the grassland topsoil is anticipated to be towards the north-east and eastern boundaries of the site, to enhance the currently, more species-poor areas. This part of the site is an area that will be less intensively used by the school, meaning that the acid grassland has greater potential to grow and become more species - rich.
- 3.2.4 The stored topsoil will be spread across areas the proposed translocation site, either used exclusively or mixed with any other topsoil necessary to achieve the desired depth of planting substrate. The topsoil will be over-seeded with an appropriate acid grassland seed mix. The seeds should be gently raked in and then rolled or trampled in by foot.

- 3.2.5 All species used within the mixes will UK natives and will be provided by <https://www.wildflowerturf.co.uk/>, who source their seeds from UK seed houses, and the mixes adopted will have a UK provenance.
- 3.2.6 During the first year the site should be cut frequently to maintain a grass height of approximately 10 cm. This will encourage root growth while preventing the existing grasses from dominating and smothering the newly germinated wildflowers.
- 3.2.7 Optimum sward height range for maintenance of favourable condition: 2-10 cms with up to 10% bare ground.
- 3.2.8 Ongoing management for this habitat type (after establishment) can be found in Table 12.1 (Long-term management and maintenance). The location of the habitat can be seen on Figure 1.

4 GREEN ROOFS

- 4.1.1 The provision of extensive green roofs within the scheme will provide significant enhancements for wildlife, including nesting and foraging habitat from small birds, as well as botanically diverse areas which will provide important habitat for invertebrates.
- 4.1.2 Species mixes for these areas have been chosen to be of specific benefit to wildlife and include a range of pollinators. The management of these areas will include regular watering and maintenance, to ensure establishment of the intended species, along with periodic weed removal (as necessary). These areas will be monitored on an annual basis for the first five years following establishment, to ensure they are performing as intended. If, any remediation actions are required, a report will be prepared by RPS ecologists / landscape architects and implemented by the client (or their nominated management company).
- 4.1.3 On the assumption that these areas will meet the following criteria, they are given a habitat condition of good:
- Invasive, non-native species cover less than 5% of the total vegetated area;
 - There is a diverse range of species, providing nectar sources for insects;
 - Vegetation structure is varied. A single ecotone should not account for more than 80% of the total habitat area.

5 SWALES

- 5.1.1 The landscaping plans have included a swale / infiltration basin, in the form of a wet meadow to the northeast of the site.
- 5.1.2 The wetland meadow grassland will provide a good habitat feature, this will be of particular benefit to mobile wildlife such as birds, bats and invertebrates, and will provide a significant enhancement over the situation that is currently present (an improved grassland area).
- 5.1.3 This area will be seeded with an appropriate wetland grass mix (British Seed Houses WFG9, for example) to provide a botanically diverse sward.
- 5.1.4 Such habitats will provide foraging opportunities for bats, invertebrates, reptiles and birds and will be over-seeded with a variety of botanically diverse seed mixtures depending upon the anticipated soil humidity.
- 5.1.5 Given the informal nature of these areas, there will be no significant lighting present, creating a dark corridor for animal movement (particularly bats). Any lighting necessary for security reasons would be low-level and directional to where required.

5.2 Wetland meadow grassland creation

- 5.2.1 In order to create a successful wetland grassland meadow, the grass must first be cut as short as possible and the entire area thoroughly raked over to remove dead grass, loose vegetation and create bare patches of soil for seeding into.
- 5.2.2 A suitable species rich wetland wildflower mix should be used, the seeds should be gently raked in and then rolled or trampled in by foot.
- 5.2.3 All species used within the mixes will UK natives and will be provided by <https://www.wildflowerturf.co.uk/>, who source their seeds from UK seed houses, and the mixes adopted will have a UK provenance.
- 5.2.4 Mow newly sown meadows regularly throughout the first year of establishment to a height of 40-60 mm, removing cuttings if dense. This will control annual weeds and help maintain balance between faster growing grasses and slower developing wildflowers.
- 5.2.5 Any perennial weeds (such as dock) should be carefully removed (either dug out or spot treated).
- 5.2.6 Ongoing management for this habitat type (after establishment) can be found in Table 13.1 (Long-term management and maintenance).

5.3 Management for biodiversity benefit

- 5.3.1 Where appropriate, the grassland will be managed for biodiversity benefit. This will include the following:
- Areas of grass to be subject to a range of mowing regimes to be sympathetic to wildlife and to enable grasses and associated plants to flower and set seed during the summer. This will include areas being left long through the summer months and then cut once plants have set seed.

6 HEDGEROWS

- 6.1.1 Currently, there are a number of ornamental hedgerows across the site, most of which are species poor.
- 6.1.2 To further enhance the site, a series of new native hedgerows will be planted across the site.
- 6.1.3 The following key principles with respect to hedgerows will be followed, to ensure the establishment of such features represent a significant enhancement over the current situation and that they are managed for biodiversity benefit:
- All new hedgerows will comprise native species (except where required for operational reasons – low hedge boundaries, for example);
 - All new hedgerows will be species-rich, comprising at least five woody species chosen from the following:
 - A. hawthorn *Crataegus monogyna*;
 - B. blackthorn *Prunus spinosa*;
 - C. field maple *Acer campestre*;
 - D. hazel *Corylus avellana*;
 - E. holly *Ilex aquifolium*;
 - F. beech *Fagus sylvatica*;
 - G. guelder-rose *Viburnum opulus*;
 - H. dog-rose *Rosa canina*; and
 - I. dogwood *Cornus sanguinea*.
- 6.1.4 All hedgerows (where possible and space allows) will feature a long-grass buffer of at least 3 m wide at their base in order to maintain their diverse nature. Such features will be established through the retention of existing grassland (where possible) or by leaving new grassland un-mown to become long and tussocky.
- 6.1.5 All new hedgerows will be encouraged to grow as thick as possible by topping and facing-up every other year once plants have flowered and fruited (usually late autumn).
- 6.1.6 Existing retained hedgerows or tree groups around the site will be protected during the re-organisation to suitable standards (Netlon fencing, for example). Such retained hedgerows will be enhanced, where necessary, by filling gaps using plants chosen from the list above and will be subject to a similar managed regime as described above.

7 SCATTERED TREES

- 7.1.1 The current site has several areas and lines of trees present, with one area being notably denser towards the northeast corner of the site. Trees present included lime *Tilia sp.*, London plane *Platanus x acerfolia*, ash *Fraxinus excelsior*, coppiced hazel, hornbeam *Carpinus betulus*, field maple, hawthorn, dogrose, spindle *Euonymus europaeus*, pine *Pinus sp.*, and dogwood.
- 7.1.2 These areas of scattered trees are largely planned to be retained, as per *BS5837: Trees in Relation to Design, Demolition and Construction* standard.
- 7.1.3 Further new scattered native tree planting will be included within the scheme, to strengthen the existing site boundaries, and to provide further green corridors of movement across the site. The planting of new tree and woodland habitat will also provide new habitat on site for a range of species, such as bats.
- 7.1.4 Scattered tree planting should include the following species:
- hawthorn;
 - blackthorn;
 - field maple;
 - hazel; and
 - beech.
- 7.1.5 The new tree planting will be sourced from a local, reputable nursery, to ensure that they are of good quality. Planted blocks will be interspersed with long-grass glades, to create a mosaic of habitats that will be of particular benefit to foraging bats, invertebrates, and birds.

8 BAT MITIGATION AND HABITAT ENHANCEMENT

8.1.1 During the PEA, several buildings were identified to have varying levels of potential for supporting roosting bats. Phase 2 Ecology Surveys (carried out between May – August 2022) of the site did not record any bats emerging from or re-entering any of the identified features (RPS 2022). Notwithstanding this, recommendations have been made to enhance the site for bats post development.

8.2 Foraging / commuting bats

8.2.1 Generally, bat commuting and foraging activity within the application boundary were limited to along the treelines; with very little occurring around the areas of hardstanding.

8.2.2 The new habitat creation on site, including through the grass meadows, swale, scattered tree planting, and will provide a network of bat foraging and commuting habitat, linked through linear corridors provided on site.

8.2.3 All of the existing linear features used by bats for foraging/commuting on site will be retained, with lux levels >1 (bright moonlight), meaning that post development, there will be no impacts to the foraging bat habitat on site.

8.2.4 In order to increase the bat roost potential on site, bat boxes / bricks will be included across the development. This will include the following types of box to be split evenly across the site:

- Schwegler 2FN; and
- Schwegler 2FF.

8.2.5 Both boxes provide roosting habitat for a range of species. These will be sited as high up as possible on buildings or tree facing onto informal/natural greenspace to ensure a close proximity to foraging habitat. Their exact location is illustrated in Figure 1 (Ecological Enhancements).

8.2.6 Once installed, bat boxes require little maintenance. However, they will be inspected annually to ensure that any damage can be made good.

9 BIRD MITIGATION AND HABITAT ENHANCEMENT

- 9.1.1 The existing hedgerows and scattered trees provide suitable habitat for breeding birds. All bird nests are protected by law. Therefore, any vegetation clearance (such as hedgerow or tree removal) should take place outside of the breeding bird season, which is generally considered to be from March to August inclusive.
- 9.1.2 If this is not possible, prior to removal, such vegetation should first be checked for the presence of nesting birds by an experienced ecologist. If any nests are found, they would have to be left undisturbed until the chicks had fledged (usually around six weeks).
- 9.1.3 The new green infrastructure to form part of the masterplan provides additional tree planting across the site, which will provide suitable habitat for foraging and nesting birds. This will provide a significant enhancement for bird species, compared to the situation that is present within the application boundary currently.
- 9.1.4 The re-development will also incorporate a range of bird boxes to enhance the nesting opportunities within the site (refer to Figure 1 for the locations).
- 9.1.5 Boxes will be provided on retained trees within the application site, comprising a range of different bird nesting boxes. The boxes may need to be placed in different locations, depending on the species habitat requirements.
- 9.1.6 Bird boxes will be inspected annually, and any damage made good. Old nests will be also removed to ensure any parasites etc are removed.

10 LOG PILES AND INSECT BOXES

- 10.1.1 In order to create sheltering and foraging opportunities for reptiles, two hibernacula will be built in the corners of site that are most protected by trees, the locations of these can be seen on Figure 1.
- 10.1.2 Such features will be created from any woody vegetation cleared both during site preparation/construction and during routine management of tree stock on site. The requirement to create such woodpiles from brash won during such works will be incorporated into the necessary management specifications for the open space on site.
- 10.1.3 Woodpiles will be created in a variety of shapes and sizes depending upon the size of material available as even small piles created from thin branches (<5 cm in diameter) will be beneficial to wildlife. They should not exceed 2 m x 1 m x 1 m in size, however, to avoid attracting undue attention, they should generally be located away from more open public places.
- 10.1.4 Biennially, woodpiles will be inspected and topped up with fresh wood, as necessary, to maintain the broad size requirements described above.
- 10.1.5 Close to these areas' insect boxes (a total of two) will be attached to retained or planted trees at a height of 1-2 metres. They should be placed so that they can be warmed by the morning sun.

11 TIMETABLE

- 11.1.1 The delivery of biodiversity mitigation and enhancement measures will be concurrent with the development of the site.
- 11.1.2 Construction does not currently have set start date and therefore before any works commence the timetables suggested below should be confirmed with the project ecologist. If any delays are incurred during the planning process, this table of works may need to be reviewed and updated accordingly.

12 LONG TERM MANAGEMENT

- 12.1.1 Table 12.1 below, outlines the long-term management strategy for the habitats and enhancements on site. More details can be found in the Landscape and Ecological Management Plan (LEMP) for the scheme.

Landscape Element	Maintenance Objectives	Maintenance Requirements	Reference
Existing Planting			
1 Solitary trees (Parkland trees)	<ul style="list-style-type: none"> ▪ Enhance visual amenity ▪ Reinforce site layout and legibility ▪ Enhance biodiversity ▪ Bats: Maintain and enhance existing bat foraging habitats around the site ▪ Bats: Create and maintain a new commuting flight path across the site ▪ Screening to the built form. 	<ul style="list-style-type: none"> ▪ Inspect trees public safety on an annual basis or immediately after any extreme weather event such as high winds. ▪ Maintain a well-balanced crown, shape and character typical of the species, clear of any crossing or rubbing growth allowing a clear stem, 2 m above ground level. ▪ Maintain a crown height of 4.5 m on tree directly bounding main access ways. ▪ Remove any dead, dying and damaged branches or growth obstructing pedestrian or vehicular routes (obtain advice from an ecologist regarding possible presence of bat roosts prior to undertaking work). ▪ Retain live or dead wood cut from trees on site in habitat piles. ▪ Replace any damaged bat boxes. Seek advice from licensed bat-worker prior to moving or disturbing damaged boxes. ▪ Review trees for any rot-holes, cracks or other features which could present potential for roosting features. Where such features are present, consult a suitably experienced and qualified ecologist prior to undertaking any works which could damage or disturb such features. ▪ Undertake Pest and Disease Control using suitable pesticides or fungicides as advised, only if severe infestation occurs. 	BS 3998: Recommendations for tree work The Arboricultural Association Standard Conditions of Contract and Specification for Tree Works
Planted Elements			
2 Planted Trees	<ul style="list-style-type: none"> ▪ Enhance visual amenity ▪ Reinforce site layout and legibility ▪ Enhance biodiversity ▪ Bats: Maintain and enhance existing bat foraging habitats around the site. ▪ Bats: Create and maintain 	<ul style="list-style-type: none"> ▪ Pruning shall be carried out as necessary to establish a well-balanced head relative to the natural form and shape of the species and purpose. Maintain a well-balanced crown, shape and character typical of the species, clear of any crossing or rubbing growth allowing a clear stem, 2m above ground level (retain if field tree feathered to ground) ▪ Remove any dead, dying and damaged branches or growth obstructing pedestrian or vehicular routes including the removal of any suckers at the tree base. 	BS 3998: Recommendations for tree work BS 7370-4: Grounds maintenance Recommendations for maintenance of soft landscape

Landscape Element	Maintenance Objectives	Maintenance Requirements	Reference
	<ul style="list-style-type: none"> a new commuting flight path across the site. ▪ Screening to the built form. 	<ul style="list-style-type: none"> ▪ Stack cut wood within north and south east corners of the site in agreed locations to encourage ecological diversity. ▪ Tree support systems, ties and protective guards shall be checked regularly during establishment and adjusted where necessary. Any broken or missing items shall be replaced, and ties adjusted to allow growth and prevent rubbing of bark. ▪ Replace any damaged bat boxes. Seek advice from licensed bat-worker prior to moving or disturbing damaged boxes. ▪ Undertake Pest and Disease Control using suitable pesticides or fungicides as advised, only if severe infestation occurs. ▪ Maintain a weed free area at the base of all trees, 1 m diameter mulch area for trees in grass or planting. 	<p>The Arboricultural Association Standard Conditions of Contract and Specification for Tree Works</p>
<p>3 Planted Native Hedgerow</p>	<ul style="list-style-type: none"> ▪ Enhance visual amenity ▪ Enhance biodiversity, ▪ Bats: Maintain and enhance existing bat foraging habitats around the site. ▪ Habitats: Create and maintain new patches of scrub and small copses. ▪ Integrate with surrounding landscape and character ▪ Screening to the built form. 	<ul style="list-style-type: none"> ▪ Hedgerows that adjoin footpaths and which are therefore likely to cause obstruction if growth is left unchecked should be cut back annually outside the bird breeding season (March to August inclusive) to a neat and consistent finish to maintain a dense screen and all arisings removed off site. ▪ Hedgerows on site are to be cut every 1-2 years (on rotation) to allow flowering and fruiting and the development of a structure of benefit to wildlife, outside the bird breeding season (March to August inclusive). Shred arisings and compost on site. ▪ Remove any dead, dying and damaged growth or growth obstructing pedestrian or vehicular routes outside of bird breeding season (March to August inclusive). ▪ Check condition of stakes, and spiral guards, ties, guys and shelters and replace broken or missing items until such a time as they become redundant. Adjust if necessary to allow for growth and prevent damage to bark. ▪ Re-firm any plants that have been disturbed by adverse weather or interference. ▪ Undertake pest control with approved pesticides in accordance 	<p>BS 4428: Code of practice for general landscape operations</p> <p>BS 7370-4: Grounds maintenance Recommendations for maintenance of soft landscape</p>

Landscape Element	Maintenance Objectives	Maintenance Requirements	Reference
		with manufacturer's instructions in approved locations only.	
4 Planted Woodland, Screen and Groundcover Mix	<ul style="list-style-type: none"> ▪ Enhance visual amenity ▪ Enhance biodiversity ▪ Bats: Maintain and enhance existing bat foraging habitats around the site. ▪ Habitats: Create and maintain new patches of scrub and small copses ▪ Integrate with surrounding landscape and character 	<ul style="list-style-type: none"> ▪ Ensure all planted areas are kept free of pernicious weeds by the use of suitable herbicides hand pulling and/or maintain levels of mulch. ▪ Fork over beds as necessary to eliminate any hollows or cambers, ensuring the depth of mulch is maintained. Redistribute mulch as necessary to maintain specified levels. ▪ Check condition of stakes, ties, guys and shelters and replace broken or missing items until plant establish. Adjust if necessary to allow for growth and prevent damage to plants. ▪ Cut back any damaged, dead or diseased branches to a healthy node outside of bird breeding season (March to July inclusive). ▪ Re-firm any plants that have been disturbed by adverse weather or interference. ▪ Undertake pest control with approved pesticides in accordance with manufacturer's instructions in approved locations only. ▪ Replace dead / dying plants as necessary. ▪ Redistribute mulch to provide groundcover as required 	<p>BS 4428: Code of practice for general landscape operations</p> <p>BS 7370-4: Grounds maintenance Recommendations for maintenance of soft landscape</p> <p>The Arboricultural Association Standard Conditions of Contract and Specification for Tree Works</p>
5 Planted Amenity Areas (Ornamental shrubs)	<ul style="list-style-type: none"> ▪ Enhance visual amenity ▪ Create visual interest and articulation in the soft landscape ▪ Create an attractive place to socialise and enjoy a holiday break ▪ Integrate with surrounding landscape features and character. ▪ Enhance biodiversity 	<ul style="list-style-type: none"> ▪ Ensure all planted areas are kept free of weeds by the use of suitable herbicides; maintain levels of mulch and hand weeding in more prominent areas as required. ▪ Fork over beds as necessary to eliminate any hollows or cambers, ensuring the depth of mulch is maintained. Redistribute mulch as necessary to maintain specified levels. ▪ Check condition of stakes, ties and guys and replace broken or missing items until plant establish. Adjust if necessary to allow for growth and prevent damage to plants. ▪ Cut back any damaged, dead or diseased branches to a healthy node or any growth obstructing adjacent areas of hard standing. ▪ Remove any dead flowers/foilage at times appropriate to the 	<p>BS 4428: Code of practice for general landscape operations</p> <p>BS 7370-4: Grounds maintenance Recommendations for maintenance of soft landscape</p>

Landscape Element	Maintenance Objectives	Maintenance Requirements	Reference
	<ul style="list-style-type: none"> Screening to the built form. 	<ul style="list-style-type: none"> species. Refirm any plants that have been disturbed by adverse weather or interference. Undertake pest control with approved pesticides in accordance with manufacturer's instructions in approved locations only. Do not use adjacent to play areas. Prune annually shrubs using normal horticultural standards to form attractive natural habit. Clip ornamental hedges annually to form a neat, compact hedgerow. Maintain at approx. height of 0.9 - 1.2m. Dead head bulb planting once the flowering period has finished, trim back dead vegetative growth. Check the condition of the supports for any non-clinging climbing shrubs until they establish. Note that climbing plants have potential to provide refuge for species such as bats and birds. Replace dead / dying plants as necessary. Compost arisings and vegetation waste on site. 	
<p>6 Acid Meadow</p>	<ul style="list-style-type: none"> Enhance visual amenity Provide valuable habitat to reptiles and invertebrates 	<ul style="list-style-type: none"> Cut all fringe areas adjacent to footpaths / hard surfaces fortnightly between April and November, mow to a height of >40 mm. Cut all other areas in late July – early August following the displacement of any annual seeds. Leave cut grass in situ for 3-5 days, before removing all arisings off site to approved tip or compost on site. Carry out further cuts until November and again in early spring to maintain sward at 3 – 4 cm. Compost arisings on site. Stop cutting grass in mid-April to allow grass to grow Cut a neat and consistent finish including edges, without rutting or scalping, ensuring adjacent areas of hard standing free are kept free of arisings. Hand pull or spot herbicide spray invasive weed species. Allow leaf litter and fallen woody material to mulch / compost naturally. 	<p>BS 7370-1: Grounds maintenance</p> <p>Recommendations for establishing and managing grounds maintenance organisations and for design considerations related to maintenance.</p>

Landscape Element	Maintenance Objectives	Maintenance Requirements	Reference
		<ul style="list-style-type: none"> ▪ Remove litter, rubbish and other debris from grassed areas prior to cutting. ▪ Exercise extreme care when working in close proximity to existing/new trees and prevent damage to stems/trunks. ▪ Do not apply organic or inorganic fertilisers ▪ Do not apply insecticides, herbicides or fungicides, as these can destroy valuable wildlife. The exception is herbicides for the control of specific problem weeds (i.e. nettle, spear thistle, creeping thistle, curled dock, broadleaved dock and ragwort) – herbicides for these species should be applied by weed wiper or spot treatment with a back-pack sprayer. ▪ Do not plough, level or re-seed the grassland areas, except with the same species-rich seed mix as used originally. 	
<p>7 Amenity Grass</p>	<ul style="list-style-type: none"> ▪ Enhance visual amenity ▪ Integrate with surrounding landscape and character ▪ Provide easily accessible areas of short amenity grass for the use of community. 	<ul style="list-style-type: none"> ▪ Maintain all areas to a maximum height of 5 cm during March / April and end of September / October or at times when grass exceeds 5 cm. Compost arisings on site. ▪ Cut a neat and consistent finish including edges, without rutting or scalping, ensuring adjacent areas of hard standing free are kept free of arisings. ▪ Remove litter, rubbish and other debris from grassed areas prior to cutting. ▪ Exercise extreme care when working in close proximity to existing/new trees and prevent damage to stems/trunks. 	<p>BS 7370-1: Grounds maintenance</p> <p>Recommendations for establishing and managing grounds maintenance organisations and for design considerations related to maintenance.</p>

Table 12.2 Timetable of Management Prescriptions

ACTIVITY	J	F	M	A	M	J	J	A	S	O	N	D
GENERAL AMENITY GRASS:												
Cut grass (remove arisings)												
Weed control												
RETAINED ACID GRASSLAND:												
Cut / strim <u>long grass</u> after flowering (remove arisings)												
Strim <u>meadow</u> grass (remove arisings)												
Pernicious + invasive weed control only												
SWALE (WET MEADOW):												
Cut / strim <u>long grass, after flowering</u> (remove arisings)												
Strim <u>meadow</u> grass (remove arisings)												
Pernicious + invasive weed control only												
Watering (until establishment)												
AMENITY SHRUB PLANTING:												
Maintain mulch												
Weed control												
Selective pruning												
Trim groundcover & climbers												
Dead heading (exact timing species specific)												
Watering (until establishment)												
TREE PLANTING:												
Maintain mulch												
Weed control												
Selective pruning												
Watering (until establishment)												
Pernicious + invasive weed control only												
Check and adjust support												
TIMING OF OPERATIONS:												
Bird nesting season												
Bat hibernation season												

REFERENCES



RPS (2022). *Kneller Hall, Twickenham: Preliminary Ecological Appraisal*. RPS Southampton: Unpublished Report.

RPS (2022). *Kneller Hall, Twickenham: Ecology Survey Report*. RPS Southampton: Unpublished Report.











FIGURES

Figure 1: Ecological enhancements






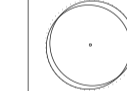
LEGEND

-  PLANNING APPLICATION RED LINE
-  METROPOLITAN OPEN LAND (MOL) DEMARKATION LINE




SOFT LANDSCAPE

	Approx. Area (m ²)
 WILDFLOWER MEADOW	24176
 ACID GRASSLAND	21441
 AMENITY LAWN	19894
 AMENITY GARDEN PLANTING	797
 PLANTERS	298
 FLOWERING LAWN	2541
 BORDER PLANTING	331
 GREEN ROOF	3204
 GREEN WALL/ CLIMBING PLANTS	25
 WETLAND SEED MIX	935







TREE STRATEGY

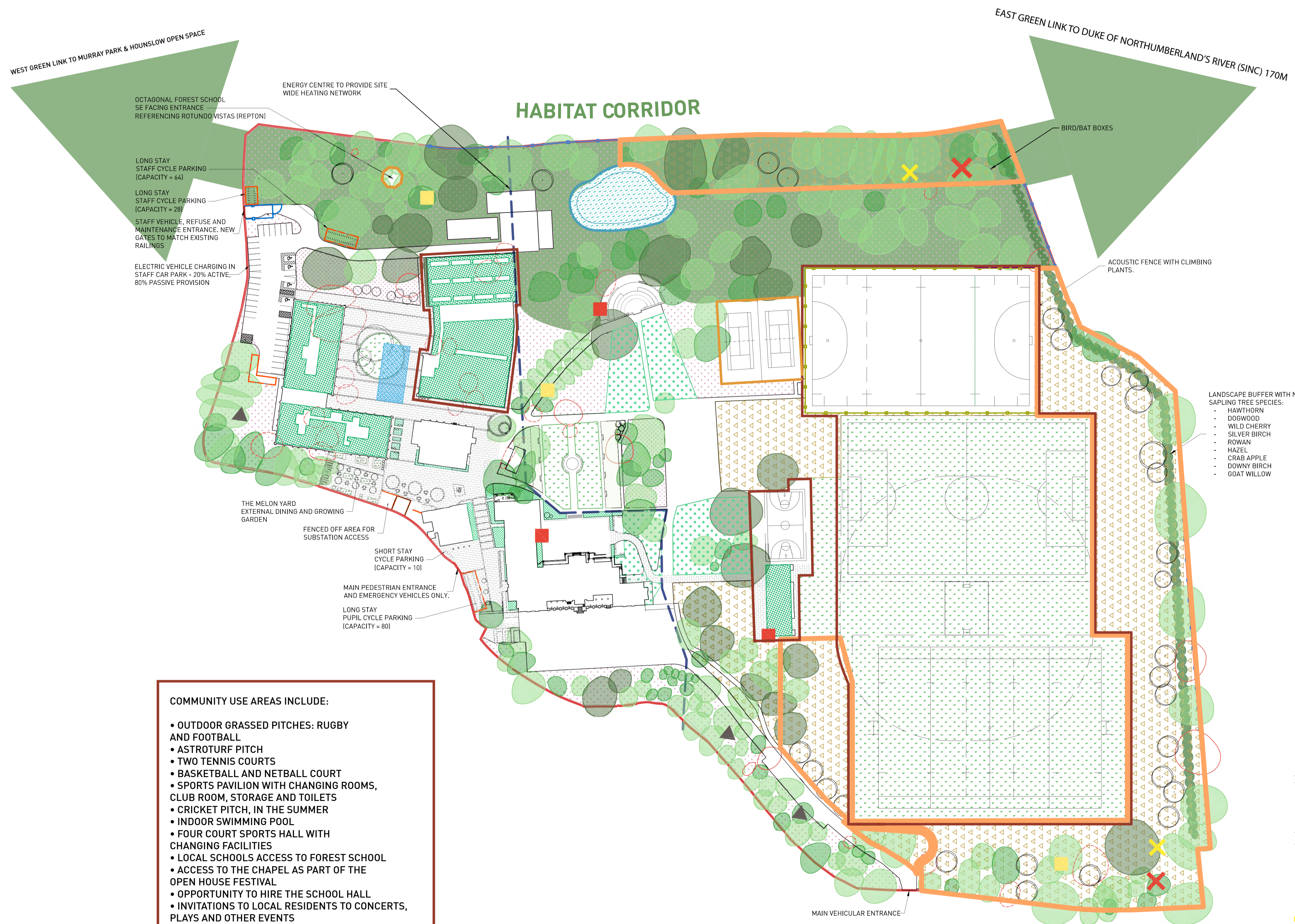
 EXISTING TREE (CATEGORY A)	 PROPOSED NATIVE HEDGEROW - 322m ²
 Existing Tree (Category B)	
 Existing Tree (Category C)	
 EXISTING TREE (REMOVED)	No. Trees
 PROPOSED TREE	
	32
	64

SUSTAINABLE DRAINAGE

	Approx. Area (m ²)
 SWALE	935
 PERMEABLE PAVING	4892.39
 SOAKAWAY	264

ECOLOGICAL ENHANCEMENT

-  RETAINED ACID GRASSLAND
-  INSECT BOXES
-  BIRD BOXES
-  BAT BOXES ON BUILDINGS
-  BAT BOXES ON TREES
-  LOG PILES FOR REPTILES



COMMUNITY USE AREAS INCLUDE:

- OUTDOOR GRASSED PITCHES: RUGBY AND FOOTBALL
- ASTROTURF PITCH
- TWO TENNIS COURTS
- BASKETBALL AND NETBALL COURT
- SPORTS PAVILION WITH CHANGING ROOMS, CLUB ROOM, STORAGE AND TOILETS
- CRICKET PITCH, IN THE SUMMER
- INDOOR SWIMMING POOL
- FOUR COURT SPORTS HALL WITH CHANGING FACILITIES
- LOCAL SCHOOLS ACCESS TO FOREST SCHOOL
- ACCESS TO THE CHAPEL AS PART OF THE OPEN HOUSE FESTIVAL
- OPPORTUNITY TO HIRE THE SCHOOL HALL
- INVITATIONS TO LOCAL RESIDENTS TO CONCERTS, PLAYS AND OTHER EVENTS

STAGE 3

0 1:1000 50m

REVISION	DATE	DESCRIPTION	ARCHITECT	PARTNER
S0 P1	07/09/22	ISSUE FOR REVIEW	CM	ADP
S0 P2	12/08/22	ISSUE FOR REVIEW	CM	ADP

CHECK ALL DIMENSIONS AND VERIFY ON-SITE. REPORT ANY ERRORS OR OMISSIONS

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JOB TITLE:
KNELLER HALL

DRAWING TITLE:
GIS LANDSCAPE PLAN

SCALE: 1:1000	DRAWING SHEET SIZE: A1
JOB CODE: 001506	DRAWING NUMBER: ADP-XX-XX-DR-L-1905
REVISION: S0 P1	

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APPENDICES

Appendix 1: Biodiversity Net Gain Assessment

Date: September 2022

Lakesbury House,
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Hampshire SO53 5SS
T +44 2380 810 440

KNELLER HALL, TWICKENHAM – BIODIVERSITY NET GAIN ASSESSMENT

RPS was commissioned by DWD to undertake an assessment of Biodiversity Net Gain (BNG), of the Kneller Hall proposed development, in support of the upcoming planning application for the creation of a new school, new homes, and multi-use open space for students, residents and community groups at Kneller Road, Twickenham, TW2 7DN.

Biodiversity Net Gain Definition and Methods

Biodiversity Net Gain is defined in Baker *et al* (2019)¹ as:

"Development that leaves biodiversity in a better state than before"

The requirement for developments to seek to achieve BNG arises from the National Planning Policy Framework (NPPF), which states in Para. 174 that:

"Planning policies and decisions should contribute to and enhance the natural and local environment by ... minimising impacts on and providing net gains for biodiversity."

There is no single set method for quantifying the assessment of BNG, but one method is the use of biodiversity calculators to assess the biodiversity value of habitats pre- and post-development based on habitat type, distinctiveness and condition.

A biodiversity index is derived for the baseline and for the proposed development, and BNG is considered to be achieved where an increase in value is delivered (on or offsite), and where habitats of a higher value are not replaced exclusively with habitats of a lower value.

Defra made available its beta test update of its BNG assessment tool in December 2019, which was subsequently updated in March 2022 to version 3.1. This tool has been used for the assessment in this report. The tool and associated documents were downloaded from <http://publications.naturalengland.org.uk/publication/5850908674228224>

Biodiversity Net Gain Assessment

The baseline for assessment of BNG used the Phase 1 Habitat Survey for the site produced as part of the original Preliminary Ecological Appraisal (RPS, 2022) and the results of the NVC Survey as part of the Phase 2 Ecology Surveys (RPS, 2022). These identified that the site was largely dominated by the old school buildings, semi-improved acid grassland sports pitches, scattered trees and some areas of other modified grassland associated with walkways.

The extent, distinctiveness and condition of the baseline habitats present on site is provided in the BNG excel spreadsheet, attached to this assessment.

r, J., Hoskins, R. & Butterworth, T. (2019). *Biodiversity Net Gain – good practice principles for development*. Ciria, London.

Description of on-site pre-development habitats

The application site covers an area of 10.03 ha, and is comprised of buildings, hardstanding, semi-improved acid grassland, amenity grassland, ornamental planting and coniferous and broadleaved scattered trees (RPS, 2022). All of the pre-development habitats have been allocated a habitat condition, in line with the Natural England guidance (March 2022). A summary of the habitats and their conditions have been provided, below.

An illustrative figure of these habitats (and their areas) is presented in Figure 1 (pre-development habitats).

Building and hardstanding (developed land, sealed surface)

The site comprises 1.96 ha of developed land / sealed surfaces (i.e., hardstanding and buildings) (RPS, 2022). Following the Natural England guidance on habitat condition types, these would not require condition assessment, being of no value, by default.

Lowland acid grassland

Much of the eastern part of the site associated with the existing sports pitches (4.52 ha) was covered by semi-improved acid grassland, some areas of which had a greater species richness than others. Only one of the five criteria for this habitat (*'the appearance and composition of the vegetation closely matches characteristics of the specific grassland habitat type'*) wasn't met, which therefore means the habitat was assigned a condition of 'moderate', in line with the Natural England guidance on such habitats.

Modified grassland

Several areas of either amenity or improved grassland were located throughout the site, associated with walkways, totalling 2.89 ha.

Although this habitat was assessed to achieve five of the seven criteria, it did not achieve criterion 1 (*'there must be 6-8 species per m²'*) and therefore, it is automatically assigned a 'poor' condition, in line with the Natural England habitat guidance.

Introduced shrubs (ornamental planting)

There was a small area 0.11 ha of ornamental planting, pre-development, mainly focused on the central courtyard area. Following the Natural England guidance on habitat condition types, this would not require condition assessment, being of a low value by default.

Ornamental pond

As an urban habitat this pond only met the following criteria:

- Invasive non-native species (Schedule 9 of WCA) cover less than 5% of total vegetated area.

Therefore, based on the above, it can only be assigned a habitat condition of 'poor'.

Coniferous scattered trees

There were only a few coniferous trees on site, all planted near to the broadleaved trees in the northeast section of the site. They met the following criteria for urban trees:

- More than 70% of trees within the block are native species.
- The tree canopy is predominantly continuous, with gaps in canopy cover making up <10% of total area and no individual gap being >5m wide.
- The trees are mature (or more than 50% within the block are mature or veteran)
- There is little of no evidence of an adverse impact on tree health by anthropogenic activities such as vandalism or herbicide use. There is no current regular pruning regime so the tree retain >75% of expected canopy for their age range and height.

Therefore meeting 4 out of 6 criteria this habitat type is assigned 'moderate' condition.

Broadleaved scattered trees

There were over 100 broadleaved trees on site either planted in rows to create walkways or in groups towards the boundaries. They were of a similar age and subject to the same low level of maintenance as the coniferous trees also planted on site and satisfied the following criteria:

- More than 70% of trees within the block are native species.
- The tree canopy is predominantly continuous, with gaps in canopy cover making up <10% of total area and no individual gap being >5m wide.
- The trees are mature (or more than 50% within the block are mature or veteran)
- There is little of no evidence of an adverse impact on tree health by anthropogenic activities such as vandalism or herbicide use. There is no current regular pruning regime so the tree retain >75% of expected canopy for their age range and height.

Therefore meeting 4 out of 6 criteria this habitat type is assigned 'moderate' condition.

Description of proposed habitats on-site with biodiversity benefits and outline management

Of the 10.03 ha covered by the site, it is anticipated that post-development, circa 2.19 ha will comprise hardstanding and buildings (i.e., developed land with a sealed surface); with the remaining comprising modified grassland sports pitches, wildflower meadows, raised planters and urban trees.

Urban trees

A total of 64 new, native scattered trees are included on the masterplan with planting focusing on filling gaps on the eastern boundary. Based on the guidance for urban trees, these will be classified as being of moderate condition.

Ground level planters

Raised planters will be included in the landscape scheme and will be seeded with a low maintenance wildflower mix. This habitat will be present on the ground floor with beds present over several areas of the site, totalling an area of 0.0514 ha.

Following the Natural England guidance on habitat condition types, this would not require condition assessment, being of a low value by default.

Lowland acid grassland

A portion of the existing acid grassland is to be retained on the site, and during construction will be protected from damage. The acidic grassland will be overseeded with an appropriate mix and managed in such a way that the habitat condition could be enhanced to good; more details of which can be found in the Ecological Enhancement Strategy for the site.

Wildflower meadow grassland

Areas of wildflower meadow (2.26 ha) are to be created across the development, associated with open spaces / biodiversity areas and the ecological buffers on site. The wildflower meadow mix used will be the Emorsgate Special Meadow Mix (or something similar). This mix has a large number of meadow grass and herb species, and it based on the composition, would most reasonably fall into the habitat condition category 'other, semi-improved neutral grassland'.

The condition, when assessing against the condition criteria, would most likely fit into the moderate condition category, as it meets the following:

- Sward height is varied (it is expected that this will occur naturally through the diversity of species);
- Cover of bare ground between 1%-5%;
- Cover of bracken less than 20% and scrub less than 5%; and
- The absence of non-native, invasive species.

Amenity / modified / species-poor improved grassland

Areas of species-poor, improved grassland will fill the parts of the site not currently dominated by acid grassland to fill the gaps between sports pitches and areas of scattered trees totalling 2.29 ha.

Introduced shrub and ground level planters

Areas of introduced shrubs, ornamental planting and raised planters are to be included within the scheme, post-development. These will be scattered around the scheme, with the largest area was associated with a central garden area. The total area for this habitat type is 0.18 ha.

Following the Natural England guidance on habitat condition types, this would not require condition assessment, being of a low value by default.

Biodiverse green roof

A green roof will cover multiple buildings (0.32 ha) on site and will be managed for biodiversity benefit.

Species here have been chosen to be of specific benefit to wildlife and include a range of pollinators. The management of these areas will include regular watering and maintenance, to ensure establishment of the intended species, along with periodic weed removal (as necessary). These areas will be monitored on an annual basis for the first five years following establishment, to ensure they are performing as intended. If, any remediation actions are required, a report will be prepared by RPS ecologists / landscape architects and implemented by the Francis Crick Institute.

On the assumption that these areas will meet the following criteria, they are given a habitat condition of *fairly good*.

- Invasive, non-native species cover less than 5% of the total vegetated area;
- There is a diverse range of species, providing nectar sources for insects;
- Vegetation structure is varied. A single ecotone should not account for more than 80% of the total habitat area.

Façade bound green wall

A green wall is proposed on two of the western school buildings which will total an area of 0.0025 ha. This will largely be comprised of a series of climbing shrubs, chosen to be of specific value to wildlife. As some of these species will be ornamental (albeit pollinators), it is considered that the most appropriate habitat condition be *'fairly poor'*.

Ornamental hedgerow

0.0322 km of ornamental hedgerow is being introduced into the scheme, post-development, associated with the current and proposed walkways. Following the Natural England guidance on habitat condition types, this would not require condition assessment, being of a low value by default.

Summary

The site, pre-development comprised only two habitats aside from the main building and hardstanding, namely the ornamental planting and ephemeral vegetation. Considering all of the above, the pre-development score for the site is calculated to be **52.97** biodiversity units.

The post-development plans for the site include the planting of ornamental species and scattered trees which accounts for the majority of the post development score. Therefore, the overall score for the site is a gain of **+ 0.66%** of the pre-development score (or an increase of **0.35** habitat units) and a **100%** gain of the pre-development hedgerow score, given the lack of any on the site, pre-development.

Do let me know if you require any further information.

Our ref: ECO02281_874 Kneller Hall



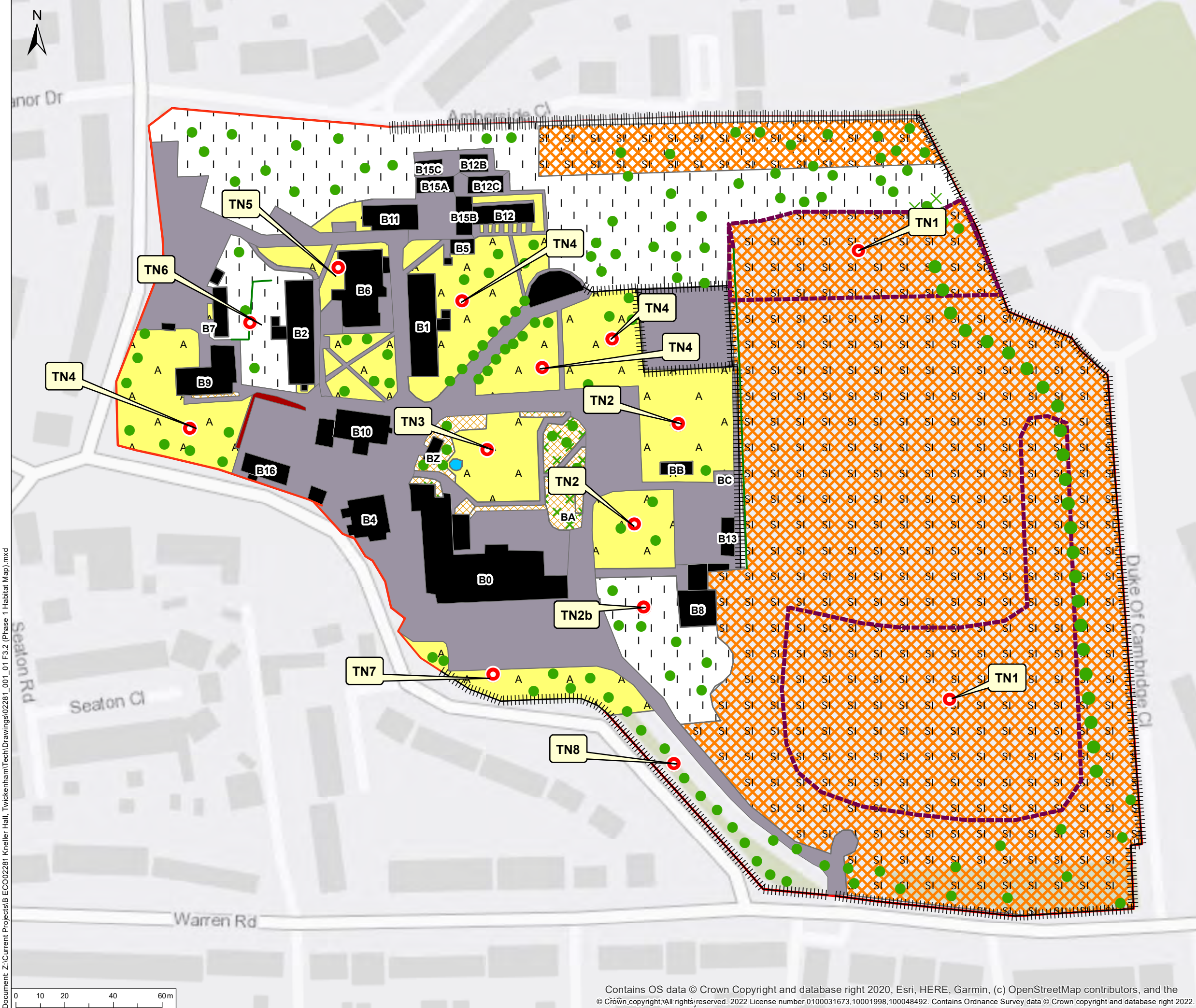
Yours sincerely,
for RPS Consulting Services Ltd

A handwritten signature in blue ink, appearing to read 'Hannah Knight'. The signature is written in a cursive style and is enclosed within a faint, light blue circular stamp.

Hannah Knight MSc ACIEEM
Associate - Ecology



Figure 1 – Pre-development Plans



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- Legend**
- Semi-improved acid grassland
 - Red line boundary
 - Amenity grassland
 - Improved grassland
 - Introduced shrub/ Ornamental planting
 - Introduced shrub with native scattered scrub
 - Pond
 - Brick wall
 - Buildings and structures
 - Hard standing
 - Fence
 - Dentoos species-richer grassland
 - Fence
 - Intact hedge - species-poor
 - Wall
 - Scattered tree - broadleaved
 - Scattered tree - coniferous
 - Scattered scrub

Rev	Description	By	CB	Date

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Client **DWD**
 Project **Kneller Hall, Twickenham**
 Title **Phase 1 Habitat Map**

Status **Issue** Drawn By **LW** PM/Checked By **HM/HK**
 Project Number **ECO02281** Scale @ A3 **1:1,500** Date Created **20/09/22**
 Figure Number **3.1** Rev **01**

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Document: Z:\Current Projects\B ECO02281 Kneller Hall, Twickenham\Tech\Drawings\02281_001_01_F3.2 (Phase 1 Habitat Map).mxd



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Figure 2 – Post-development Plans

LEGEND

- PLANNING APPLICATION RED LINE
- METROPOLITAN OPEN LAND (MOL) DEMARKATION LINE

SOFT LANDSCAPE

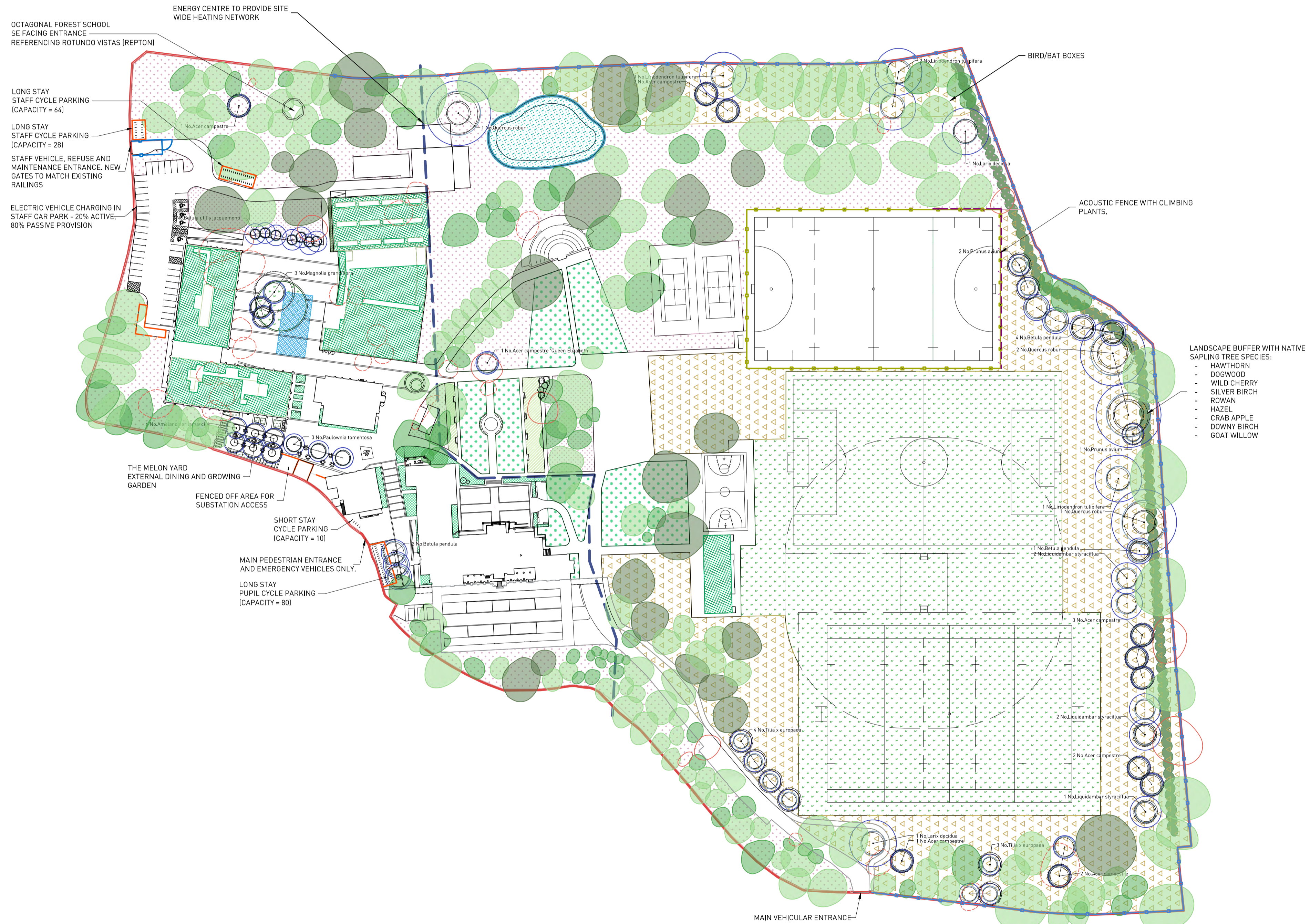
	Approx. Area (m ²)
WILDFLOWER MEADOW	24176
ACID GRASSLAND	21441
AMENITY LAWN	20245.25
AMENITY GARDEN PLANTING	61.05
PLANTERS	407.62
FLOWERING LAWN	3488.54
BORDER PLANTING	331
GREEN ROOF	2540
GREEN WALL/ CLIMBING PLANTS	25
WETLAND SEED MIX	935

TREE STRATEGY

	EXISTING TREE (CATEGORY A)		PROPOSED NATIVE HEDGEROW - 322m ²
	Existing Tree (Category B)		
	Existing Tree (Category C)		
	EXISTING TREE (REMOVED)	No. Trees	32
	PROPOSED TREE	No. Trees	64

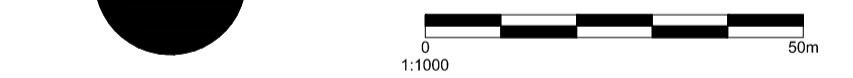
SUSTAINABLE DRAINAGE

	Approx. Area (m ²)	
	INFILTRATION BASIN	935
	PERMEABLE PAVING	7706.78
	SOAKAWAY	264



- LANDSCAPE BUFFER WITH NATIVE SAPLING TREE SPECIES:
- HAWTHORN
 - DOGWOOD
 - WILD CHERRY
 - SILVER BIRCH
 - ROWAN
 - HAZEL
 - CRAB APPLE
 - DOWNY BIRCH
 - GOAT WILLOW

STAGE 3



REVISION	DATE	DESCRIPTION	ARCHITECT	PARTNER
S0 P1	16/08/22	ISSUE FOR REVIEW	CM	ADP
S0 P2	17/08/22	ISSUE FOR REVIEW	CM	ADP

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JOB TITLE:
KNELLER HALL

DRAWING TITLE:
SOFTSCAPE LANDSCAPE PLAN

SCALE: 1:1000	DRAWING SHEET SIZE: A1
JOB CODE: 001506	DRAWING NUMBER: ADP-XX-XX-DR-L-1902
	REVISION: S0 P2