

University of Manchester, Fallowfield

Ecological Constraints and Opportunities Report

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Glossary

Term	Definition
BAP	Biodiversity Action Plan
CBD	Convention on Biological Diversity
CIEEM	Chartered Institute of Ecology and Environmental Management
CRoW	Countryside and Rights of Way
GMCA	Greater Manchester Combined Authority
GMEU	Greater Manchester Ecological Unit
GMLRC	Greater Manchester Local Record Centre
HPI	Habitats of Principal Importance
MAGIC	The Multi-Agency Geographical Information for the Countryside
NERC	Natural Environment & Rural Communities
NPPF	National Planning Policy Framework
PBSA	Purpose-Built Student Accommodation
PEA	Preliminary Ecological Appraisal
PRA	Preliminary Roost Assessment
RLB	Rider Levett Bucknell
SINC	Site of Special Scientific Interest
TN	Target Note
UKBAP	UK Biodiversity Action Plan
UKHab	UK Habitat Classification System survey
WCA	Wildlife & Countryside Act

1 Summary

Buro Happold has been appointed by Rider Levett Bucknell (RLB) to provide ecology consultancy services to support the delivery of a Feasibility Study for the Fallowfield Campus site as part of the University of Manchester's student residences strategy to provide new Purpose-Built Student Accommodation (PBSA).

A Preliminary Ecological Appraisal of the site has been undertaken to assess its baseline value for ecology and identify potential ecological constraints and opportunities on the site. The Preliminary Ecological Appraisal comprises a desk study and an extended UK Habitat Classification survey (UKHab), undertaken on 3rd November 2022 to identify and assess habitat features of significance and with potential to support protected species. The survey also included a ground level assessment of the trees and an external assessment of the buildings on site to support roosting bats.

The desk study returned no statutory designated sites within 2km of the site. One non-statutory designated site was identified within 1km of the site known as The Fallowfield Loop, a disused railway cutting designated as a Regionally Important Geological Site (RIGS). Five protected species records were returned within the site boundary. These records comprise three records of common pipistrelle *Pipistrellus pipistrellus* bat roosts, and two records of the European hedgehog *Erinaceus europaeus*.

The site mainly comprises buildings, hardstanding, other neutral grassland bordering and between buildings, patches of broadleaved woodland, scattered broadleaved trees, hedgerows, line of trees and an off-site pond to the north of the site.

Constraints

Evidence was found that the Schedule 9 invasive non-native plant species Japanese Knotweed, was present on site between buildings B18 and B22. It is recommended that a detailed survey is carried out by a specialist contractor to ensure removal of the species before any future works commence. In addition, an eradication programme should be put in place to remove the other Schedule 9 invasive plant species also recorded on site.

A total of 37 buildings and structures were assessed externally for the potential to support roosting bats, where 29 of the buildings were assessed as having high, moderate or low potential to support roosting bats, and eight as having negligible potential. Ahead of any proposals to demolish or refurbish buildings identified to have bat roosting potential, further surveys including an internal inspection of roof voids, where present, and presence/ absence surveys should be undertaken. In addition, seven trees on site were assessed as having any potential to support roosting bats, six of which having low potential and one moderate. It is recommended that any trees identified to have potential to support roosting bats should be retained and protected. The site also offers foraging opportunities for bats and therefore, a sensitive lighting design should be promoted for the site.

Opportunities

To improve the biodiversity value of the site, and support any future redevelopment of the site in achieving a biodiversity net gain, ecologically valuable habitats such as the broadleaved woodland, should be retained, protected and where feasible, enhanced.

Further enhancements could be supported with the provision of biodiversity enhancements such as bird and bat boxes, and biodiverse green roofs, which would also increase green infrastructure within the site.

2 Introduction

Buro Happold has been appointed by Rider Levett Bucknell (RLB) to provide ecology consultancy services to support the delivery of a Feasibility Study for the Fallowfield Campus site as part of the University of Manchester's student residences strategy to provide new Purpose-Built Student Accommodation (PBSA). The site included within this constraints and opportunities assessment, and as surveyed as part of the Preliminary Ecological Appraisal included within the scope of these works, is situated in Fallowfield Campus, 293 Wilmslow Rd, Fallowfield, Manchester M14 6HD (central OS grid reference SJ857942) and is hereafter referred to as the 'site'.

The scope of work is to support future further development by identifying potential ecological constraints and opportunities on the site and related to potential impacts resulting from development of it. This report outlines the constraints and opportunities as identified by the Preliminary Ecological Appraisal.

2.1 Site context

The site is located in a generally urban landscape with large patches of parkland found west, north and east of the site including Platt Fields Park, Birchfield's Park and Unsworth Park respectively. The site is made up of the University of Manchester student accommodation and is bordered by A roads on the west and southside of the site. Residential estates and commercial buildings are located on the other side of the A roads and similar development also envelope the parkland areas further afield. There is a large variety of sporting facilities surrounding the site such as Platt Lane sports complex, BMX tracks, and artificial playing fields (see Figure 2-1).

Figure 2-2 illustrates the different areas of the campus within the site, including the northern section which is part of the wider Fallowfield Campus, but is outside of the indicated redline for this Feasibility Study. These sections include Ashburne Hall (northern section), Owens Park (central section), Oak House (south-eastern section), Woolton Hall (south-western section), and the car park (north-eastern section).



Figure 2-1 Location of the site within the wider landscape



Figure 2-2 The site divided into building area sections

3 Methodology

A Preliminary Ecological Appraisal (PEA) has been undertaken of the site to identify potential ecological constraints and opportunities for future development as part of the Feasibility Study. In line with current best practice guidance provided by CIEEM (2017), the PEA was comprised of a desk study to gather baseline information regarding the ecology of the site and its likely zone of influence, a habitat survey and an external preliminary bat roost assessment.

3.1 Desk Study

A data search was commissioned from the local environmental records Greater Manchester Local Record Centre (GMLRC) for the presence of non-statutory designated sites and records of protected and priority species within 2km of the site.

Statutory designated sites, priority habitats and records of granted protected species mitigation licences from Natural England within 2km of the site were reviewed from the open-source Multi-Agency Geographic Information for the Countryside (MAGIC) website.

3.2 Extended UK Habitat Classification System Survey

A site-based survey to identify habitats, using the UK Habitat Classification System survey (UKHab) (Butcher et al., 2020), and the presence or potential for presence of protected, priority or notable species was also undertaken by a suitably experienced ecologist (Full Member of the Chartered Institute of Ecology and Environmental Management (CIEEM)) on 3rd November 2022. The survey included a walkover of the whole site extent and the surrounding areas, where access was possible, to gain a greater understanding of the site context, its immediate surrounds and connectivity to adjacent habitats. Target notes (TN) were used to record any habitats or features of particular interest and any sightings, signs or evidence of protected or notable fauna, or any potential habitats or features suitable to support these species.

3.3 Preliminary Roost Assessment

The site survey also included a Preliminary Roost Assessment (PRA) of the buildings on site for their potential to support roosting bats. An external survey of the buildings was undertaken by a Natural England bat licensed ecologist and MCIEEM, in accordance with best practice guidance for bat surveys (Collins, 2016), using close-focussing binoculars, an endoscope and a high-powered torch, where necessary to support the survey. The buildings were assessed for the presence of potential roosting features which may offer roosting space for bats, including lifted roofing and ridge tiles, lifted lead flashing, gaps behind barge boards, missing mortar and cracks in brickwork. Upon assessment, buildings were categorised into levels of potential for roosting bats as summarised from best practice guidance (Collins, 2016) in Table 3-1. This initial assessment is made on the external features only and may be subject to change following a full detailed building inspection, if required at a later date.

Table 3-1 Guidelines for assessing the potential suitability of trees and buildings to support bat roosts

Suitability	Description of roosting features
Negligible	No suitable features or trees identified on site that will offer a suitable roosting feature for bats.
Low	A structure with one or more suitable features that could be used by individual bats opportunistically. However, these suitable features do not provide enough space, shelter, protection, appropriate conditions

Suitability	Description of roosting features
	and/or suitable surrounding habitat to be used on a regular basis or by larger numbers of bats. A tree of sufficient size or age where PRFs may be expected, but not seen, or features seen with limited roosting potential.
Moderate	A structure or tree with one or more suitable features that could be used by a number of bats and are supported by suitable adjacent habitat and connectivity. However, they are not considered likely to support a roost of high conservation status.
High	A structure or tree with one or more suitable features identified that are obviously suitable for use by larger numbers of bats on a regular basis indicating suitability to support hibernation and maternity roosts.
Confirmed roost	Bats are confirmed roosting in a feature identified on a structure or a tree through the identification of a bat itself within the feature or evidence such as droppings found within or nearby to a suitable feature.

3.4 Limitations/ constraints to surveys

The internal courtyard areas of the site were not accessible and hence the trees, and elevations of the buildings, within these areas were not inspected. This is not considered to be a significant constraint to the outcome and advice contained within this report, however these should be surveyed ahead of any planning application for future redevelopment of the site.

4 Results

4.1 Desk study

4.1.1 Designated sites

No statutory designated sites were identified on or within 2km of the site boundary. One non-statutory designated site was identified within 1km of the site. The Fallowfield Loop, a disused railway cutting is designated as a Regionally Important Geological Site (RIGS). RIGS are areas of high geodiversity interest designated through locally developed criteria. The Fallowfield Loop spans an unconformity between Permian Manchester Marls desert sandstones and Carboniferous Westphalian D coal measures which was recorded when the railway cutting was created.

4.1.2 Habitats

The desk study identified six parcels of Habitat of Principal Importance (HPI), also known as priority habitat types, within the site boundary. These six HPI's were all parcels of deciduous woodland, found north and south of site. An additional 110 parcels of deciduous woodland priority habitat were identified within 2km of the site boundary. Further to this, five parcels of the priority habitat traditional orchards were identified within 2km of the site, with the closest located approximately 210m west of the site. In addition, one parcel of wood pasture and parkland Biodiversity Action Plan (BAP) priority habitat was identified approximately 1.8km northeast and one parcel of the priority habitat open mosaic habitat on previously developed land is located approximately 290m south.

4.1.3 Species

The desk search using MAGIC returned five granted European Protected Species licences within 2km of the site. All licences relate to common pipistrelles *Pipistrellus pipistrellus*. The closest licence is located approximately 1.3km north.

A total of 411 reference records for protected and priority species were returned from the data search within a 1km radius of the site. Species records occurring post-2011 are presented in Appendix A.

Four protected, priority or notable species records were returned within the site boundary. These records comprise three records of common pipistrelle bat roosts, all dated 2015 (25/06/2015, 23/07/2015 and 18/06/2015) and one record of the European hedgehog *Erinaceus europaeus* dated 2015 and 2018 (01/07/2015 and 15/06/2018). Two records of song thrushes *Turdus philomelos* and one hedgehog were also located along the border of the site, on the roads directly adjacent to the site (see Figure 4-1).

A number of section 41 listed birds have been recorded within 1km of the site including, but not limited to, bullfinch *Pyrrhula pyrrhula*, dunnock *Prunella modularis*, house sparrow *Passer domesticus* and song thrush *Turdus philomelos*. Additionally, two records of invertebrate species dated post-2011 were returned, both of which are UKBAP species: the small square-spot moth *Diarsia rubi* and the buff ermine moth *Spilosoma luteum*. No records of invertebrates were returned within the site boundary and the records are likely associated with the larger open spaces within 1km of the site. Ten records of European hedgehog *Erinaceus europaeus* dated post-2011 were recorded within 1km of the site.

A total of 76 bat species records dated post-2011 were returned within 1km of the site. The records comprise at least four species (not all records were identified to species level) including common pipistrelle, soprano pipistrelle *Pipistrellus pygmaeus*, Daubenton's bat *Myotis daubentonii* and noctule *Nyctalus noctula*.



Figure 4-1 Post-2011 species records located within and in close proximity to the site boundary based on the GMEU ecological data search

4.2 Field survey

4.2.1 Habitat

The site comprises numerous buildings associated with the western side of the campus that range in age from over 100 years to halls of residence constructed in the 1950s to 1990s, many with later additions and renovations. Well-maintained amenity grassland is present between the buildings and along the pedestrian walkways and car parks. There are also areas of mixed woodland, predominately around the periphery of the site, together with introduced shrubs and ornamental planting, flower and raised beds. There is also a large number of mature trees across the site throughout the amenity grassland.

The habitats recorded on site are surrounding the site are illustrated in Figures 4-2 to 4-4 and are described in Table 4-1.

4.2.2 Invasive non-native species

There is evidence that Japanese knotweed *Fallopia japonica*, listed on Schedule 9 of the Wildlife and Countryside Act 1981 (as amended) was present on site. At the time of survey it was understood that there is a wider campus eradication programme to remove Japanese knotweed. There was evidence of the species between B18 & B22 (see Table 4-1 and Appendix B) and it is recommended that a detailed survey is undertaken by a specialist contractor to ensure the full removal of the species prior to any works commencing.

In addition, a number of other plant species listed under Schedule 9 were also identified on site during the habitat survey, which include Curled waterweed *Lagarosiphon major/Elodea densa*, *Cotoneaster spp.*, and *Montbretia Crocosmia x crocosmiiflora*. These are highlighted in Table 4-1 (in bold) in the locations where they were recorded. It is recommended that an eradication programme is implemented, under the advice of a specialist contractor, to ensure the appropriate removal of these species.



Figure 4-2 Habitats recorded within and surrounding the site



Figure 4-3 Habitats recorded within site boundary



Figure 4-4 Habitats recorded off-site to the north and east of the site boundary

Table 4-1 Habitats identified on site and their description

UK Hab Primary Code	UK Hab Secondary Code	Habitat	Definition	Target Note (TN) and/ or polygon reference on habitat map	Photograph
u1b5 (urban)	98 (Institutional building), 109 (Residential)	Buildings	There is a total of 27 main buildings on site, with a further 7 buildings consisting of garages, substations, bike sheds/shelters etc.	Referenced as building numbers (B1 to B27 on Figure 4-2) and TN1, TN10, TN12, TN17, TN19, TN21 & TN22	See Appendix B
w1g7	47 (Native) and 48 (non-native)	Other broadleaved woodland	Mixed broadleaved and yew woodland with species including non-native and native trees, such as London Plane <i>Platanus x hispanica</i>, sycamore <i>Acer pseudoplatanus</i>, oak species <i>Quercus</i> spp, ash <i>Fraxinus excelsior</i>, beech <i>Fagus sylvatica</i>, Scot's pine <i>Pinus sylvestris</i> and yew <i>Taxus baccata</i>. In addition, there are occasional mature specimen trees likely to be associated gardens surrounding the Grade II listed buildings within the Ashburne Hall area. There is an old historic wrought iron gateway leading down a disused now grassed access route to the main Ashburne buildings. The woodland does not appear to have been in recent management and there is a dense understorey of laurel, variegated laurel <i>Prunus lusitanica variegata</i>, holly <i>Ilex aquifolium</i>, ivy, elder <i>Sambucus nigra</i> and sycamore saplings. There was evidence of Japanese knotweed <i>Fallopia japonica</i> stands within the gardens. It is understood that Japanese knotweed is present within the wider campus and eradication has/is being undertaken.	TN2	

UK Hab Primary Code	UK Hab Secondary Code	Habitat	Definition	Target Note (TN) and/ or polygon reference on habitat map	Photograph
g3c	66 (Frequently mown), 11 (Scattered trees)	Other neutral grassland with scattered mature/ veteran and planted young trees.	Amenity grassland with scattered trees associated within the gardens/parkland of Ashburne Hall. The grassland is well maintained, regularly mown and species poor including red fescue <i>Festuca rubra</i>, annual meadow-grass <i>Poa annua</i>. within the habitat including creeping buttercup <i>Ranunculus repens</i>, dandelion <i>Taraxacum officinale</i> agg., daisy <i>Bellis perennis</i>, white clover <i>Trifolium repens</i>.	TN3	
r1a	362 (Artificial lake or pond)	Eutrophic standing waters	Artificial and lined pond with stone edging. Vegetation included <i>Nymphaea</i> spp, yellow iris <i>Iris pseudacorus</i> curled waterweed <i>Lagarosiphon major</i>/ <i>Elodea densa</i> The waterbody is surrounded by amenity grassland.	TN4	

UK Hab Primary Code	UK Hab Secondary Code	Habitat	Definition	Target Note (TN) and/ or polygon reference on habitat map	Photograph
u1b (urban)	89 (Car park), 11 (Scattered trees) with amenity grassland (g3c) along the southern boundary	Developed land, sealed surface	A car park is located northeast of the site which contains scattered trees within tree pits down the centre of the car park (young <i>Carpinus betulus</i> and <i>Acer</i> (Maples). There is a small grassed bund along the southern edge of the car park with a row of semi-mature trees, with species including <i>Salix</i> spp, <i>Betula</i> spp, <i>Quercus robur</i>, <i>Tilia</i> spp, <i>Prunus</i> spp. The grassland is closely mown (g3c) with blanket moss abundant with <i>Festuca rubra</i>, <i>Poa annua</i>, <i>Lolium perenne</i>.	TN5	
u1e	68 (Mortared wall), 69 (Fence)	Built linear features - wall	There is a red brick wall that runs around the northern edge of the car park (TN5). The wall was in a good condition and no PRF noted. However, it is partially covered in vegetation, including ivy <i>Hedera helix</i> and other ornamental species. There are smaller sections of red brick wall around the site, primarily around the Asburne Hall section in the north. Given the accuracy of the mapping, it has not been possible to map all these linear features.	Adjacent to TN5	
w1g6	47 (Native) & 48 (Non-native) 56 (young tree, planted)		A row of planted (young) hornbeam <i>Carpinus betulus</i> , <i>Prunus</i> sp, and <i>Salix</i> sp that has been planted in front of the wall.	TN16	

UK Hab Primary Code	UK Hab Secondary Code	Habitat	Definition	Target Note (TN) and/ or polygon reference on habitat map	Photograph
w1g6	1170 (Tree), 1171 (Mature)	Line of trees	Mature tree line of large common lime <i>Tilia x europaea</i> located along fence line between Owen's Park and Ashburne Hall. All trees appear to be in relatively good condition, with no visible PRFs noted. However, access was limited along the northern side of the trees. Likely to offer foraging and nesting habitat for species. Continuing east, along the fence line, there is also a line of whitebeam young/semi-mature <i>Sorbus aria</i> (five trees) running along a brick wall.	TN6 TN6a	 

UK Hab Primary Code	UK Hab Secondary Code	Habitat	Definition	Target Note (TN) and/ or polygon reference on habitat map	Photograph
g3c	66 (Frequently mown), 11 (Scattered trees)	Other neutral grassland	Amenity grassland with scattered trees incorporated. The grassland is well maintained, regularly mown and species poor including red fescue <i>Festuca rubra</i>, annual meadow-grass <i>Poa annua</i>. within the habitat including creeping buttercup <i>Ranunculus repens</i>, dandelion <i>Taraxacum officinale</i> agg., daisy <i>Bellis perennis</i>, white clover <i>Trifolium repens</i>. The trees within this area include mature beech, sycamore, lime, a single yew, <i>Prunus</i> sp, and a row of young Scot's pine. There is also a large, mature Eucalyptus tree on the corner of 'Tree Court'. The trees are generally in a good condition with a single sycamore and the mature beech have a small number of features, and have low potential.	TN7	
u1	11 (Scattered trees), 10 (Scattered scrub),	Raised beds with scattered trees and/or shrub	Areas of raised beds and flower borders including scattered trees and/ or scattered shrub predominantly ornamental species. Located around buildings of Owen's Park central courtyard.	TN8	

UK Hab Primary Code	UK Hab Secondary Code	Habitat	Definition	Target Note (TN) and/ or polygon reference on habitat map	Photograph
g3c	66 (Frequently mown), 11 (Scattered trees)	Other neutral grassland	Area comprises row of trees on grass (g3c) bund along an access track between B12 – B14. On the eastern edge of a mix of mature sycamore, lime, <i>Prunus sp</i>, and a single yew. Along the western side of a row of large mature lime trees, behind which is a line of young hornbeam & a single cedar tree, and small group of Scot's pine. The lime trees, despite their size and age are in a good condition, with only a small amount of dead wood within the canopy (neg-low bat potential)	TN9	
u1b (urban)	111 (Road), 1232 (Non-permeable paving), 89 (Car park)	Developed land, sealed surface	Includes hardstanding surfaces such as a road and pavement around the building as well as small areas of parking located around buildings.	Illustrated as hardstanding on associated mapping – not specially target noted.	
u1b (urban)	500 (Outdoor sports facilities)	Tennis court	Tennis court found north of site, adjacent to Lees Wing (B4) gravel hardstanding surrounds court.	Illustrated as tennis court on associated mapping.	

UK Hab Primary Code	UK Hab Secondary Code	Habitat	Definition	Target Note (TN) and/ or polygon reference on habitat map	Photograph
u1	10 (Scattered scrub), 48 (Non-native), 1160 (Introduced shrub)	Introduced shrub	Small planting areas found throughout site surrounded by amenity grassland (g3c) that include non-native scrub species such as laurel, variegated laurel <i>lusitanica variegata</i>, <i>Berberis japonica</i>, <i>cotoneaster</i> spp, <i>Hebe</i> spp, <i>Fatsia japonica</i>, <i>Choisya ternata</i>, snowberry, <i>Rhus</i> sp, privet, <i>Pyracantha</i>. <i>Montbretia Crocosmia x crocosmiiflora</i>. Individual trees are also often present through the scrub. There was evidence of Japanese knotweed <i>Fallopia japonica</i> stands within the bordered area to the east of B21. It is understood that Japanese Knotweed is present within the wider campus and eradication has/is being undertaken.		
u1	11 (Scattered trees), 10 Scattered scrub,	Raised beds with scattered trees and/or shrub	Areas of raised beds and flower borders including scattered trees and/ or scattered shrub predominantly ornamental species. Located around B21. The trees within/adjacent to the borders include sycamore, beech and whitebeam, together with a small group (three) semi-mature lime trees within a raised bed. In addition, there is a row of trees along the eastern edge of B21 with species including horse chestnut, sweet chestnut, elm, sycamore and lime. One of the horse chestnut trees has a large cavity on the south-eastern side and has moderate bat potential.	TN13	

UK Hab Primary Code	UK Hab Secondary Code	Habitat	Definition	Target Note (TN) and/ or polygon reference on habitat map	Photograph
h2b	48 (Non-native), 1180 (Hedgerow)	Other hedgerows	There are a number of well maintained, low level hedgerows (<1m in height) across the site, interspersed with the ornamental planting. Species included privet, snowberry (Mother of Pearl agg.) laurel. There are a number of hedges within the south eastern and eastern side of the site, along Whitworth Lane.	Approx location illustrated on Figure 4-2	
h2b	47 (Non-native), 1180 (Hedgerow)	Other hedgerows	In addition to the ornamental hedges, there are also a number of native species-poor hedgerows, all of single to two species composition (beech and/or hornbeam). They are more aesthetic, rather than of ecological value, given they are short in level and height, although will provide nesting opportunities for common species of birds.	Approx location illustrated on Figure 4-2	

UK Hab Primary Code	UK Hab Secondary Code	Habitat	Definition	Target Note (TN) and/ or polygon reference on habitat map	Photograph
w1g7	341 (Woodland, broadleaved), 47 (Native) 48 (Non-native)	Other broadleaved woodland	Mixed broadleaved and yew woodland with species including non-native and native trees, such as sycamore <i>Acer pseudoplatanus</i>, horse chestnut <i>Aesculus hippocastanum</i>, willow <i>Salix</i> sp., lime, poplar <i>Populus</i> sp, oak <i>Quercus robur</i> ash <i>Fraxinus excelsior</i>, alder spp., silver birch <i>Betula pendula</i>, beech <i>Fagus sylvatica</i>, Scot's pine <i>Pinus sylvestris</i> and yew <i>Taxus baccata</i>. Ash die back was noted throughout the majority of the larger ash trees. There are also occasional apple <i>Malus</i> spp and <i>Prunus</i> spp along the western edge. There is a dense understorey in section of the woodland, although there has been some clearance of trees along the road edge, together with the understorey that has opened up sections. Species include hazel <i>Corylus avellana</i>, field maple <i>Acer campestre</i>, holly <i>Ilex aquifolium</i>, ivy, elder <i>Sambucus nigra</i> and sycamore saplings. There is a large amount of non-native shrubs throughout including laurel, variegated laurel <i>luisitana variegata</i>, <i>Berberis japonica</i>, <i>cotoneaster</i> spp, <i>Fatsia japonica</i>, <i>Choisya ternata</i>, snowberry, <i>Rhus</i> sp. The understorey was sparse at the time of the survey with some ivy <i>Hedera helix</i>, willowherb and nettle. There are also a number of mature London Plane trees towards the main entrance to the south.	TN11	 Example of woodland along western edge  Example of wooded woodland with mature holly along south-eastern boundary

UK Hab Primary Code	UK Hab Secondary Code	Habitat	Definition	Target Note (TN) and/ or polygon reference on habitat map	Photograph
g3c	66 (Frequently mown), 10 (Scattered scrub) 11 (Scattered trees), 47 (Native), 48 (Non-native)	Other neutral grassland with scattered trees and scrub (mix of native and ornamental species)	Area of grassland to the north of B23, comprises amenity grassland with scattered and increasingly dense scrub and semi-mature groups of trees. Grass species similar composition as the rest of the site with trees including sycamore, <i>Quercus</i> sp, large holly, <i>Malus</i> spp, yew, Scot's pine with hawthorn. There is a well maintained beech hedgerow that runs through the area around the (offsite) substation, together with a privet hedgerow bordering the access route.	TN14	
g3c	66 (Frequently mown), 11 (Scattered trees)	Other neutral grassland	Amenity grassland with scattered trees incorporated surrounding the Oak House area. The grassland is well maintained, regularly mown and species poor including red fescue <i>Festuca rubra</i>, annual meadow-grass <i>Poa annua</i>. within the habitat including creeping buttercup <i>Ranunculus repens</i>, dandelion <i>Taraxacum officinale</i> agg., daisy <i>Bellis perennis</i>, white clover <i>Trifolium repens</i>. The scattered trees include a range of ages from recently planted <i>Betula</i> sp, to semi-mature – mature <i>Quercus</i> sp (including <i>Quercus robur</i>) and ash, sycamore and lime, together with <i>Malus</i> and <i>Prunus</i> spp. Some of the trees appear to have received more recently managed and were in a good condition with no visible bat roosting features.	TN15	

UK Hab Primary Code	UK Hab Secondary Code	Habitat	Definition	Target Note (TN) and/ or polygon reference on habitat map	Photograph
g3c	66 (Frequently mown), 11 (Scattered trees)	Other neutral grassland	Amenity grassland surrounding the Woolton Hall buildings. The grassland is well maintained, regularly mown and species poor including red fescue <i>Festuca rubra</i>, annual meadow-grass <i>Poa annua</i>. within the habitat including creeping buttercup <i>Ranunculus repens</i>, dandelion <i>Taraxacum officinale</i> agg., daisy <i>Bellis perennis</i>, white clover <i>Trifolium repens</i>. Occasional lime trees to the periphery of the buildings, with scattered young planted trees.	TN16	

4.2.3 Preliminary Roost Assessment

4.2.3.1 Buildings

The buildings onsite can be separated into four distinct areas based on their construction and age (see Figure 2-2):

- Ashburne Hall (B1 to B6) Older collection of buildings, including the Grade II listed Behrens House, that are located within landscaped grounds. Building 6 Sheavyn House, is a more recent addition. These buildings have pitched tiled roof with dormer windows, numerous chimneys and ventilation slits on some of the gable ends that may provide access into the roof voids. They are generally considered to offer high potential for bats, with the surrounding grounds and woodland offer good, unlit foraging habitat
- Owen's Park (B7 to 14a) More recent construction of brick (some with concrete support structures) with either flat or shallow pitched metal roofs. The majority have numerous weep holes above the windows and potential gaps beneath the fascia boards/soffits that could offer roosting opportunities. They have negligible to high potential to support bats.
- Oak House (B15 to B21) More recent construction of brick with a shallow pitched tiled roof with small soffits or fascia boards. The majority have numerous weep holes above the windows and potential gaps beneath the fascia boards/soffits that could offer roosting opportunities. They have negligible to high potential to support bats.
- Woolton Hall (B22 to B27): Brick construction with a pitched metal roof and large timber soffits. They have ornate ventilation slits on some of the gable ends that could allow access into any roof voids that may be present.

Detailed building descriptions are provided in Appendix B with a summary of in the results of the external building survey provided in Table 4-2. The locations of the buildings are illustrated in Figures 4-3 and 4-4.

Table 4-2 Bat roost potential of each building

Building Group	Building Number & Name	Bat Roost Potential
Ashburne Hall	B2: Behrens House	High
	B1: Main Building	High
	B3: Ward Wing	High
	B4: Lees Wing	High
	B5: Mary Worthington Wing	High
	B6: 15 &	High
	'TN1' Gate house	High
	'TN23': Substation within Ashburne Hall	Negligible
Owen's Park	B7: Campus Reception	Low
	B8: Source Cafe	Low
	B9: Tower	Moderate:
	B10: Tree Court	High
	B11: Little Court	High
	B12: Green Court	High
	B13: The Mall	Low
	B14: The Limes	Negligible

Building Group	Building Number & Name	Bat Roost Potential
	B14a: Outbuilding adjacent to The Limes	Negligible
	'TN10': Garage Block	Low
	'TN18': 'Substation'	Low
Oak House	B15: Carill House	Moderate
	B16: Squirrels Bar	High
	B17: Beech Court	High
	B18: Maple Court	High
	B19: Holly Court	High
	B20: Sycamore Court	High
	B21: Chestnut Court	High
Woolton Hall	B22: Main Building	Low
	B23: Ashley	Negligible
	B24: Spencer	High
	B25: Lindsay	High
	B26: Morley	High
	B27: Cavendish	High
	'TN12': 'The Bungalow'	High
	'TN19': 'Cycle Store'	Negligible
	'TN20': Garages/ outbuildings adjacent to B22/ 23	Negligible
	'TN21'	Negligible
	'TN22'	Negligible

4.2.3.2 Trees

The trees within the amenity areas surrounding the buildings were assessed from ground level using high powered binoculars for their potential to support roosting bats. The trees across the site were generally considered to be in a good condition with evidence of regular maintenance presumable to ensure they do not pose a health and safety issue. Therefore, the any areas of significant deadwood had been removed therefore reducing suitability for bats. The trees with bat roost potential are described in Table 4-3 and identified in Figures 4-3 and 4-4.

Table 4-3 Trees with bat roost potential

Tree Reference and Species	Potential Roost Features	Bat Roost Potential
T1: Ash	Significant damage to the main trunk creating crevice at 1.8m in height.	Moderate
T2: Sycamore	Single crevice on southeast elevation that has healed but still travels furth up trunk	Low
T3: Sycamore	Small dead wood within canopy and single knot hole on eastern elevation	Low
T4: Eucalyptus	Large mature tree with naturally peeling bark that may offer some roosting opportunities	Low
T5: Horse chestnut	Damage to eastern side of tree with canker present	Low
T6: Beech	Large mature tree with some dead wood within canopy	Low

Tree Reference and Species	Potential Roost Features	Bat Roost Potential
TN7: Horse chestnut	Raised bark across main trunk with some cankers present	Low

4.2.3.3 Foraging opportunities

The habitats onsite will provide some commuting and foraging resources for local bat populations, in particular the woodland belts and mature trees. However, the site is likely to be well lit and given the species are likely to be those more adapted to the urban environment, such as pipistrelles.

4.2.4 Other protected, priority or notable species

The following species were also considered during the PEA survey:

- **Badgers:** No evidence of badgers was found during the survey, and the majority of the site is unsuitable for sett building habitat with the exposed amenity grassland. The woodland surrounding the periphery of the site could provide some habitat, but no signs of pathways, latrines or setts were recorded.
- **Breeding birds:** Birds are likely to utilise the buildings, hedgerows, broadleaved woodland and line of trees, and the site offers connectivity to the wider landscape providing foraging opportunities.
- **Great crested newts:** The pond that lies within Ashburne Hall area could support great crested newts. However, only two waterbodies have been identified within 1km of the site and these are considered to be separated by major roads and extensive hardstanding. The pond was assessed as being of 'below average' suitability through the Habitat Suitability Index (HSI), although this is an indication of suitability rather than determining absence of the species. The surrounding habitat is considered to be poor due to the open amenity grassland that is regularly maintained. The areas of woodland and scrub to the northeast may offer some shelter but again, this is isolated from the wider landscape by roads and hardstanding that may add as a barrier to movement.
- **Reptiles:** As with the great crested newts, the extensive areas of amenity grassland will not offer suitable habitat for reptiles. The scrub and woodland could provide some habitat, but it is isolated from the wider landscape by roads and hardstanding that may add as a barrier to movement.
- **Hedgehog:** The habitats onsite could provide opportunities for hedgehog, which are better adapted as a species to urban environments.

No evidence of other protected species was found on site during the survey.

5 Legislation and planning policy

This section provides an overview of legislation and national and local planning policies that are relevant to the site and are considered as part of the constraints and opportunities analysis for potential future development of the site. Any future development should this be sought in the future, this will need to demonstrate how it aligns to biodiversity legislation as well as supporting national and local policy ambitions for biodiversity and specifically identified species.

5.1 International legislation

- United Nations Convention on Biological Diversity (1992);
- The Convention on Wetlands of International Importance especially as Waterfowl Habitat 1971 (Ramsar Convention); and
- European Council Directive 2009/147/EC on the Conservation of Wild Birds (the Birds Directive).

5.2 National legislation

- Conservation of Habitats and Species Regulations (2017);
- Wildlife & Countryside Act (WCA) (1981 as amended);
- Countryside and Rights of Way (CROW) Act (2000);
- Natural Environment & Rural Communities (NERC) Act (2006);
- Protection of Badgers Act (1992); and
- Hedgerows Regulation (1997)

All bats and their breeding sites or resting places (roosts) are protected under the Conservation of Habitats and Species Regulations 2019 (as amended) and the Wildlife and Countryside Act 1981 (as amended). The deliberate capture, disturbance, injury or killing of bats is prohibited, as is damaging, destroying or obstructing access to any place used by bats for shelter or breeding, whether they are present or not. Reckless disturbance or obstruction of access to a roost are also criminal offences.

In 2021 the Environment Act gained Royal Assent, providing a new legislative framework for developments to consider in respect of potential environmental impacts and opportunities. Within the Environment Act there is a call for all developments to deliver a 10% net gain for biodiversity using a measured approved metric approach. This is due to become mandatory from winter 2023 in England.

The Wildlife and Countryside Act 1981 as amended provides for the legal protection of wild birds. All nesting birds including their nests, eggs and young are protected from killing, injury, taking or selling with additional protection for species listed on Schedule 1. For these species, adult birds and their young are protected from intentional or reckless disturbance while at or near the nest.

Section 40 of the Natural Environment and Rural Communities Act (NERC) Act 2006, also known as the biodiversity duty, requires all public bodies to have regard to biodiversity conservation when carrying out their functions. A list of

habitats and species of principal importance in England, drawn up under section 41, is used to guide local and regional authorities in implementing their biodiversity duty.

5.3 National planning policy and guidance

- National Planning Policy Framework (NPPF) (MHCLG, 2021);
- Planning Practice Guidance 2014 (MHCLG, updated 2018);
- Office of the Deputy Prime Minister Circular 06/2005, (ODPM, 2005); and
- Draft Planning Practice Guidance (2018) (Draft PPG).

The revised National Planning Policy Framework (NPPF), updated in February 2019 and revised July 2021, sets out the Government's planning policies for England and how these should be applied. The revised NPPF continues to stress the importance of the local authority contribution to improving and protecting the environment through development of a systematic approach to enhancing biodiversity, minimising waste and pollution, and mitigation/adaptation to climate change impacts. Chapter 15 requires that local planning authorities, when considering planning applications, should aim to conserve and enhance biodiversity. This is underpinned by Planning Practice Guidance 2014 (MHCLG, revised 2019) which suggests:

- The NPPF is clear that pursuing sustainable development includes moving from a net loss of biodiversity to achieving net gains for nature, and that a core principle for planning is that it should contribute to conserving and enhancing the natural environment and reducing pollution;
- Biodiversity enhancement in and around development should be led by a local understanding of ecological networks, and should seek to include habitat restoration, re-creation and expansion; improved links between existing sites; buffering of existing important sites; new biodiversity features within development; and securing management for long term enhancement. New or improved habitat needs to be located where it can best contribute to local, national and international biodiversity restoration.;
- Where a development cannot satisfy the requirements of the 'mitigation hierarchy', planning permission should be refused as per paragraph 180 of the NPPF; and
- Sufficient green infrastructure should be designed into a development to make the proposal sustainable. High-quality networks of multifunctional green infrastructure contribute a range of benefits, including ecological connectivity, facilitating biodiversity net gain and nature recovery networks and opportunities for communities to undertake conservation work.

5.4 Local policies and strategies

- Greater Manchester Strategy 2021-2031
- Local Development scheme 2022-2025
- 5-Year Environment Plan for Greater Manchester 2019-2024
- Manchester's Local Development Framework Core Strategy Development Plan Document 2012-2027

- Places for everyone (publication stage)
- Manchester Climate Change Framework 2020-2025
- Greater Manchester Resilience Strategy 2020-2030

The Greater Manchester Strategy 2021-2031 sets out the route required to deliver a greener, fairer and more prosperous city region for people, places and the planet, with outcomes aligned to the 17SDGs. There is an ambition of creating a carbon neutral Greater Manchester by 2038 with better air quality and natural environment.

The 5-year environment plan 2019-2024 sets out Greater Manchester's aim to be a carbon neutral city region by 2038 and the actions required in the next 5 years to meet this target. Aim 4 of the Plan is to protect, maintain and enhance our natural environment for all our benefit, taking steps to implement and achieve environmental net gain. Achieving a net gain for new development is a key priority within the natural environment stream of the plan.

The Resilience Strategy 2020-2030 sets out Greater Manchester's response to resilience challenges and opportunities. Protecting and promoting the resilience value of the natural environment is a vision highlighted within the plan. Measures identified to align with this vision include increasing the size, spread quality and interconnectedness of green infrastructure networks, increasing investment in the natural environment, implementing nature based solutions and improving monitoring and reporting.

Both Greater Manchester and Manchester City Council have adopted documents with their commitments to progress biodiversity conservation locally and focus on the priorities for biodiversity in Manchester. These include:

- Greater Manchester Biodiversity Action Plan (BAP) (2009);
- Biodiversity Strategy 2022-2030: The City of Manchester's Nature Recovery
- Manchester Biodiversity Action Plan 2012-2016; and
- Valuing Manchester's Nature (2012).
- Greater Manchester Green Infrastructure Framework ('GMGIF');
- Greater Manchester Ecological Framework (GMEF);
- Urban Pioneer /Natural Capital Account and Investment Plan; and
- Manchester's Great Outdoors – a Green and Blue Infrastructure Strategy for Manchester 2015 – 2025 and Stakeholder Implementation Plan 2015-2018 (MCC, 2015).

6 Ecological constraints and opportunities

This section provides an overview of ecological constraints and opportunities and further considerations for requirements for future development, including reference to local or national planning policy and legislation as appropriate. A plan identifying spatial constraints or opportunities, where applicable, is provided in Figure 6-1.

6.1 Ecological constraints and further survey requirements

Key ecological constraints that have been identified on site include:

- A number of the buildings onsite have potential to support bats and further surveys will be required on buildings that are to be demolished or any that are to be modified that could impact on a potential bat roosting feature. Bat activity surveys, known as presence/absence surveys, can only be undertaken May to September. Buildings that have been assessed as having high potential will need three surveys, spaced at least two weeks apart in suitable weather, with those having moderate or low, requiring two and a single survey respectively. Should a bat roost be identified, then appropriate mitigation will need to be accommodated within the design. The type of mitigation required will be dependent on the roost status and size but it is likely that measures can be incorporated into the new buildings through access into integral bat tubes/boxes and/or access beneath tiles or into soffits.
- It is also recommended for buildings that have roof voids that a full internal building inspection is undertaken to search for bats or evidence of bats. This survey can be undertaken at any time of year.
- Trees identified to have potential to support roosting bats should be retained and protected. Any development proposals will need to have a suitable offset from the trees to ensure that they are not adversely affected. Where trees require removal that have not currently been identified as having potential for bats, a precautionary inspection should be undertaken to ensure no opportunities have developed. Any trees assessed as having moderate or high potential will require additional surveys to ascertain whether a roost is present prior to their removal. Any trees assessed as having low potential will require a pre-felling check.
- It is also recommended that eDNA survey is undertaken on the two waterbodies within the campus to identify whether they support great crested newts. These surveys can be undertaken 15th April to 30th June and return either a presence or absence result. If the result identifies the presence of great crested newts, then further surveys may need to be undertaken or an acceptance to join the District Level Licensing (DLL) scheme. The need for the eDNA survey can also be negated if the DLL option is selected at an early stage. The need for these will be determined by any future redevelopment proposals for the site and how the ponds and surrounding habitat may or may not be impacted by development if found to support great crested newts.
- Trees identified to have potential to support roosting bats should be retained and protected. Any development proposals will need to have a suitable offset from the trees to ensure that they are not adversely affected. Where trees require removal that have not currently been identified as having potential for bats, a precautionary inspection should be undertaken to ensure no opportunities have developed. Any trees assessed as having moderate or high potential will require additional surveys to ascertain whether a roost is present.

- As indicated in Figure 6-1 the woodland areas on site are designated as the most valuable habitat and should be retained and protected through future development of the site. The mature tree line between the Ashburn Hall and Owen's Park areas are also likely to offer a green link across the site and to the wider area. Development will need to be set back from the woodland edge, and tree lines, to ensure that it does not impact on the root protection area and affect the longevity of the trees on site, in line with arboriculture recommendations and best practice.
- To inform a detailed Biodiversity Net Gain assessment, a condition survey will be required at the appropriate time of year (June to September) on the grassland and woodland habitats.
- A sensitive lighting design should be promoted for the site. Whilst the site is currently well lit, there are opportunities to reduce the light spill whilst maintaining an appropriate level of lighting for safe use of the site. Lighting should be targeted only to areas where it is needed for safety and access. It should not be promoted away from buildings as this will reduce the suitability of the site for nocturnal species and will also have impacts on diurnal species such as birds. Lighting should be highly directional to reduce light spill and skyglow and in accordance with best practice guidelines.

6.2 Ecological opportunities

Key ecological opportunities for the site, to reduce impacts and provide enhancements for local biodiversity, with the aim of maximising the Biodiversity Net Gain (BNG) that can be delivered within the site boundary, are outlined below:

- Incorporating biodiverse green roofs on top of appropriate buildings will improve the biodiversity value of the site and provide habitat for wildlife. They can provide food, cover and overwintering habitats for a range of invertebrates which can in turn feed a variety of local bird and bat species. They can also provide seeds and fruits for birds and can contribute to delivering a new ecologically valuable habitat appropriate to the local area and a biodiversity priority habitat. Additionally, green roofs can be used to attenuate roof run-off, reduce urban heat island effect, insulate buildings and enhance amenity and provide habitat for wildlife. These are key for spatially constrained urban environments. Biodiverse roofs should be used to support the increase of green infrastructure within the local area of the development. Table 6-1 displays the different types of green roofs and their description; biodiverse green roofs provide the greatest benefit for biodiversity.
- The additional benefit of improving the biodiversity value on site is that it will also promote a stronger ecological connection running through the site. Native shrub, hedgerow and tree planting in linear features such as the existing treeline and creating new tracts of native planting in the other neutral grassland verges to promote better ecological connectivity through the site compared to the existing conditions and to increase heterogeneity in the habitat structure. Where these are included within a proposed design, a preference for native species that are known to survive well within an urban environment should be favoured. Ornamental planting should include those of value to native pollinators, even where they may not be native species.
- The woodland on site will hold the majority of the biodiversity units for the site. Retaining and protecting the woodland areas through any redevelopment of the site will maintain these biodiversity units into post-development units to support the delivery of BNG. Depending on their current condition, the woodlands could be brought into a more sensitive and biodiversity-focussed management regime. This could improve their condition score and be viewed as an 'enhancement' in BNG. Additional species planting will also increase the diversity of species in the hedge, providing a more varied foraging resource for species.

- Sensitive approaches to work during any future construction phases, as detailed in working methods statements, including vegetation removal and building demolition, may be suitable to minimise direct impacts from any future works on species utilising the site.
- Any future development also provides an opportunity to incorporate further features for biodiversity through both the natural areas surrounding the site. Incorporating generalist bird boxes suitable for widely distributed bird species in appropriate locations can be provided in relatively undisturbed areas such as the treeline. Incorporation of bat boxes in existing trees and proposed buildings should also be sought, to be installed at least 4m from ground level, with the entrance unlit and free of obstructions. Incorporation of invertebrate towers and bug hotels would make unintrusive features near open spaces. Example features and species they may attract are provided in Table 6-2, Table 6-3 and Table 6-4.



Figure 6-1 Ecological constraints and opportunities as identified across the Feasibility Study site and off-site

Table 6-1 Summary of different green roof types and broad specifications. The table is an abridged version from the FLL – the German Guidelines for Green Roofs

Feature	Description	Typical substrate depth	Typical roof loadings (dead load)	Water retention annual average (%) / Coefficient ¹	Vegetation options / plant species diversity	Contributes to biodiversity?	Accessible for amenity use?	Image
Extensive green (sedum) roof	Lightweight with minimal maintenance and lower water requirements than intensive green roofs	Mat based: 20-60mm depth Substrate-based: 60-100mm depth	50kg/m ² (sedum mat/blanket) - 110kg/m ² (substrate)	40 - 50% / 0.6 - 0.5	Sedum moss / low plant species diversity	Not considered biodiverse, but do provide some invertebrate forage in early summer. Can be combined with solar PV and blue roof	Generally maintenance only	 Extensive sedum green roof above cycle store/ garages (Nyborg, Denmark)
Extensive wildflower roof	Planted in shallow, low nutrient substrates to increase local plant diversity and provide wildlife habitat, minimal maintenance	80mm-150mm – ideal if depth is varied across the roof as it can support a greater diversity of plants and therefore biodiversity	100 – 200 kg/m ²	55 - 60% / 0.5 - 0.45	Sedum moss wildflowers grasses sedges / high species diversity	Yes – biodiverse. Typically have better water holding capacity than brown roofs. Can be combined with solar PV and blue roof	Generally maintenance only	 Jakob Burkhardt biodiverse roofs (Basel, Switzerland)

¹ <https://livingroofs.org/storm-water-run-off/> Table is abridged from the FLL – the German Guidelines for Green Roofs.

Feature	Description	Typical substrate depth	Typical roof loadings (dead load)	Water retention annual average (%) / Coefficient ¹	Vegetation options / plant species diversity	Contributes to biodiversity?	Accessible for amenity use?	Image
Brown/ biodiverse roof	Planted in areas, but not uniformly so native plant species colonise the roof over time. Substrate depth varies across the roof. Designed to mimic brownfield habitats for species such as black redstart	80mm-150mm	100 – 200 kg/m ²	-	Not planted -	Can be difficult to get a diversity of vegetation to establish due to roof top conditions (heat/wind/ drought stress). Also of limited water holding capacity due to substrate (high proportion of recycled brick/aggregate /cement). Can be combined with solar PV and blue roof	Generally maintenance only	 Typical brown roof with self-seeded brownfield habitat on a mixed recycled substrate
Semi-intensive / intensive green roof (roof gardens/ terraces and podium decks)	Can support a wider range of plants, require regular maintenance and irrigation	150mm - >500mm depth	150-500 kg/m ²	60 – >90% / 0.4 - 0.1	Trees, shrubs, lawns, perennial beds, climbers / low – high species diversity dependent on selection	Potentially yes if a proportion of the plants are selected for biodiversity/wildlife value. Can be combined with blue roof.	Yes	 Intensive green roof (roof garden) (London, UK).

Table 6-2 Example bird boxes

Feature	Description	Specification
Vivara Pro Woodstone 32mm Nest Boxes 	This type of smaller entrance hole nest boxes are suitable for a number of general birds which are well adapted to urban environments and would be expected to be seen within urban landscaping such as blue tits, coal tits and house sparrows. The boxes will be placed on 'large' planted trees with trunks large enough to support a box at a preferred height at between 1.5-3m. They will be sited in proximity to other vegetation, such as trees and shrubs to provide cover as well as native grassland which will provide foraging opportunities.	Entrance hole diameter: 32mm * Width: 20cm * Height: 31cm * Length: 20cm * Weight: 6.9kg
Vivara Barcelona Open fronted nest box 	General-purpose open fronted nest box. Suitable for robins and wrens (if well hidden), spotted flycatchers, pied and grey wagtails, song thrushes and blackbirds.	Dimensions: * 19 x 24 x 17.5 cm
Schwegler 1MR or 2MR Avianex wall nest box 	Designed to be fixed to fences, tree or any other form of wall. 1MR: the 32mm diameter hole will attract a wide range of small garden birds. Removable front panel. 2MR: Ideal for pied wagtails, spotted flycatchers, robins and wrens.	Dimensions: * 19 x 27 x 23 cm
Wildlife World Urban Bird Nestbox 	Can be hung either as a diamond or a square depending on your preference. The inner wooden bird box also has a sliding panel at the rear for cleaning and the next box entrance hole is protected with a crisp stainless steel 32mm hole protector.	Dimensions: * Height: 160mm * Width: 160mm * Length: 155mm * Weight: 900g Material: Clayplas+ (70% clay : 30% recycled plastic), FSC timber
Green and Blue Birdball 	The Birdball birdhouse provides a stylish and safe environment for small nesting birds. The entrance hole is large enough to allow easy access for blue tits, coal tits, marsh tits and long tailed tits but small enough to keep out predators. The Birdball is inspired by the natural form of bird's nests. Can either be suspended from a branch or wall mounted.	Dimensions: * Diameter: 180mm * Entrance hole: 25 – 28mm Material: slipcast in clay
Schwegler 2GR nest box 	A large multi entrance nest box with an extended entrance which provides protection from predators. The front panel is removable which gives plenty of access for bird ringing etc, and can be replaced with an oval entrance hole. Available with an oval hole or three 27mm entrances for more light, encouraging nesting low down at the rear of the box. The small hole size makes this box especially suitable for smaller tit species.	Dimensions: * 20 x 31 x 27 cm

Table 6-3 Example bat boxes

Feature	Description	Specification
Schwegler 1FR Bat Tube 	Designed to be installed on the external walls of buildings, either flush or beneath a rendered surface. Discrete as only the entrance hole is visible following installation. Can be painted to match the building with an air permeable paint. Designed to meet the characteristic behavioural requirements of the types of bats that inhabit buildings. No maintenance required.	Dimensions: * Height: 47.5cm, * Width: 20cm, * Depth: 12.5cm, * Entrance dimensions: 15 x 9 x 2cm * Weight: 9.8kg Material: Woodcrete
CJ Wildlife Beaumaris Woodstone Bat Box 	The Beaumaris box has a single narrow cavity which makes it suitable for crevice roosting bats such as the common pipistrelle, soprano pipistrelle, Nathusius' pipistrelle, Brandt's bat and whiskered bat. Suitable for attaching to external walls and available in two sizes: the Midi and the Maxi.	Midi dimensions: * Height: 65cm * Width: 40cm * Depth: 28cm * Weight: 4.4kg Maxi dimensions: * Height: 65cm * Width: 50 cm * Depth: 38cm * Weight: 8kg
Vivara Pro Low profile Woodstone Bat Box 	Designed to accommodate up to 15 common pipistrelle bats. There is a landing ramp and rough interior surface to enable easy movement around the box, and the front panel is removable for inspection and cleaning. Designed to be attached to the external wall of a building at least 3 metres above the ground.	Dimensions: * Height: 440 * Width: 290 * Depth: 90 mm * Weight: 4.7kg Material: WoodStone
Schwegler 1FQ Bat Roost 	The 1FQ Bat Roost is ideal for all types of bats which inhabit buildings. The shape and design make it equally attractive to bats as a roost or nursery and it is also very attractive to the human eye, which is an important consideration. It can easily be attached to most types of external brick, timber or concrete. The box should be positioned a minimum of three metres above the ground and where there is a clear flight path for bats entering and leaving. Maintenance free.	Dimensions: * Height: 60cm * Width: 35cm * Depth: 9cm * Weight: 15.8kg Material: Woodcrete
Schwegler 1WQ Summer Winter Bat Roost 	Designed for the safe hibernation of bats in winter as well as for roosting, forming of colonies and raising of young during summer. Suitable for typical building-inhabiting species such as pipistrelles, serotine, noctule or Bechstein's. Attaches easily to most types of external brick, timber or concrete walls. Maintenance free.	Dimensions: * Height: 580mm * Width: 380mm * Depth: 120mm * Weight: 22kg Material: Woodcrete

Feature	Description	Specification
1WI Schwegler Summer and Winter Bat Box 	Designed for year-round occupation - suitable for both hibernation of bats in winter as well as for roosting, forming of colonies and raising of young during the summer. Designed to be set into an external wall or incorporated into the masonry and rendered flush with the surface so that only the entrance is visible. Suitable for bat species that typically inhabit buildings, such as common pipistrelles, serotine bats and occasionally noctule or Bechstein's bats. Maintenance free.	Dimensions: * Height: 54.5cm, * Width: 34.5cm, * Depth: 9.5cm * Weight: 15kg
Norfolk bat bricks 	Made from natural clay materials and ideal habitat for crevice dwelling bats. These bricks are not designed to provide entry into a cavity as they are sealed across the back.	Dimensions: * Height: 20cm, * Width: 10cm, * Depth: 7cm
 Miramare Bat Box	The bat box has four internal compartments and is made from FSC certified WoodStone. It can be mounted using brackets and has two additional fixing eyes that allow a rope or wire to be passed around a tree trunk. Mount 3 – 5 m high, two/ three boxes on a tree together, at varying heights and different orientation between east, south or west facing to provide a variety of conditions.	Dimensions: * Height: 85cm * Diameter: 25cm * Weight: 22.2kg Materials: FSC certified WoodStone and exterior grade plywood
 1FF Schwegler Bat Box with Built-in Wooden Rear Panel	This bat box has an opening at the bottom, allowing droppings to fall out so it does not need cleaning, making it suitable for hanging in inaccessible places such as high in trees. The box is made from long-lasting Woodcrete, concrete and clay. It can be sited in trees or on buildings and is best positioned at a height of between 4 to 6 metres. Mount 3 – 5 m high, three boxes on a tree together, at varying heights and different orientation between east, south or west facing to provide a variety of conditions.	Dimensions: * Height: 43cm * Width: 27cm * Length: 14cm * Entrance hole: 12cm x 24cm * Weight: 9.5kg Material: Schwegler Woodcrete Colour: Black with stable hard-wearing wooden insert Supplied with: Galvanised steel hanger and aluminium tree-friendly nail
 2FN Schwegler Bat Box	The bat box has two entrances, one at the front and one at the rear against the tree, and it has a domed roof to allow the bats to form roosting clusters for warmth. This bat box is also designed to be effective against small predators and excludes draughts and light. The bat box also has an opening on the bottom, therefore does not require cleaning. It is constructed with Woodcrete, concrete and clay. Mount 3 – 5 m high, three boxes on a tree together, at varying	Dimensions: * Height: 36cm * Diameter: 16cm * Weight: 4.3kg Material: Schwegler Woodcrete Colour: Black with grey front panel Supplied with: Galvanised steel hanger and aluminium tree-friendly nail

Feature	Description	Specification
	heights and different orientation between east, south or west facing to provide a variety of conditions.	
 1FD Schwegler Bat Box	This bat box has been developed specifically for smaller bats as both the interior and the type and size of the entrance hole match the requirements of smaller species. It features a special layout inside the domed roof, an increased interior height, and two grooved internal wooden front panels with precise spacing between them. This model has proved highly effective as a nursing area. The front panel can be removed for cleaning and inspection. This box is designed to be sited on trees using the galvanised steel hanger and aluminium nail provided. Mount 3 – 5 m high, three boxes on a tree together, at varying heights and different orientation between east, south or west facing to provide a variety of conditions.	Dimensions: * Height: 36cm * Diameter: 16cm * Weight: 4.8kg Colour: Black, grey front panel Material: Schwegler wood-concrete, galvanised steel hanger

Table 6-4 Example invertebrate features

Feature	Description	Specification
Insect Tower 	This type of box provides habitat for solitary bees and other insects. The design of the tower provides a range of different habitats to support a variety of insect species. The nesting tubes are suitable for solitary bees to build their nests in, the vertical slots are designed to encourage butterflies, the other refuge holes are suitable for ladybirds and lacewings and the pinecones offer a habitat for a range of other species. The Insect Towers can be mounted on trees.	Dimensions: * Height: 65cm * Width: 21cm * Depth: 12.5cm * Weight: 3kg
BeePost 	Freestanding bee towers designed for solitary bees. The posts should be positioned in a warm sunny spot, south facing, with no vegetation in front of the holes. They are designed to be set into a concrete base approximately 30mm into the ground.	Dimensions: * Height: 230mm * Width: 12cm * Depth: 12mm * Weight: 75kg Material: Concrete Colour: White Origin: Cornwall, UK

Feature	Description	Specification
Green and Blue Bee Brick/Block/Pot 	Use Beebrick/Block in place of a standard brick or block in construction to create habitat for solitary bees. Alternatively, use as a standalone bee house within soft landscaping. BeePot is designed to be standalone planter. Provides much needed nesting space for solitary bee species such as red mason bees and leafcutter bees, both of which are non-aggressive. Place in a warm sunny spot on a south-facing wall at a minimum height of 1m, with no vegetation obstructing the holes. It is highly recommended that bee-friendly plants are located nearby so that the bees using the bricks have food.	Bricks dimensions: * Height: 65-105mm * Width: 70-215mm * Depth: 105mm * Weight: 1.1 - 2.9kg BeePot dimensions: * 285 x 195 x 200mm, * Weight: 8kg Material: Concrete (75% recycled waste material from the Cornish China clay industry)
Wildlife World Urban Insect Hotel 	Can be hung either as a diamond or a square. The drilled canes of the bee nester has holes the optimum size for solitary bees, though other insects may overwinter in the nest box. The inner section of the insect hotel is removable with slotted overwintering chambers. Adding natural materials such as drilled canes, hollow stems or bark in the triangular spaces will encourage more insects to the hotel. Hang between 0.75m and 1.5m above ground in a warm sunny position, preferably to catch morning sun - facing south / southeast is perfect.	Dimensions: * Height: 160mm * Width: 160mm * Depth: 155mm * Weight: 900g Material: Clayplas+ (70% clay and 30% recycled plastic), FSC timber, cane
CJ Wildlife WoodStone Insect Block 	The WoodStone Insect Block provides a valuable habitat for a range of insects including solitary bees, lacewings and ladybirds. It is constructed from durable, FSC certified WoodStone with a nesting area created from reed stems.	Dimensions: * Height: 18cm * Width: 9cm * Depth: 26cm * Weight: 2.8kg
Schwegler Insect Nesting Aid and Clay and Reed Insect Nest 	Provide a habitat for species of solitary Hymenopterans, such as wild bees, sand wasps and common wasps. These species fulfil essential ecological roles including pollination and pest control. Reeds provide a range of environments to suit different insects (designed to attract only harmless insects). Ideally place the nesting aid in a sunny site that is protected from wind and rain. Examples of good sites include allotment sheds, pergolas, walls, gardens and even balconies up to the third or fourth floor. Leave outside during the winter otherwise the insects will emerge from their winter hiding places too early and die.	Dimensions: * Height: 26cm * Width: 14cm * Depth: 8 cm * Weight: approx. 1.7 kg Dimensions: * Height: 290mm * Width: 225mm * Depth: 205mm * Weight: 5.7 kg Material: woodcrete, clay, and reeds

7 References

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Appendix A Desk Study

Protected species records

Table 7-1 Protected and notable species recorded post-2011 within 1km of the site

	Common name	Species name	Status	No. of records	Distance of most recent record (m)	Date of nearest record
Bats	Common pipistrelle	<i>Pipistrellus pipistrellus</i>	HabRegs2, HSD4, WCA5	54	442	25/06/2015
	Bat species	<i>Chiroptera</i>	WCA5	1	786	01/12/2013
	Daubeton's bat	<i>Myotis daubentonii</i>	HabRegs2, HSD4, WCA5	3	549	19/09/2012
	Myotis species	<i>Myotis spp.</i>	HabRegs2, WCA5	1	922	12/10/2013
	Noctule bat	<i>Nyctalus noctula</i>	HabRegs2, HSD4, Sect.41, UKBAP, WCA5	6	566	19/09/2012
	Soprano pipistrelle	<i>Pipistrellus pygmaeus</i>	HabRegs2, HSD4, Sect.41, UKBAP, WCA5	11	442	19/09/2012
Birds	Grey heron	<i>Ardea cinerea</i>		5	603	21/03/2014
	Bullfinch	<i>Pyrrhula pyrrhula</i>	Sect.41, UKBAP	98	995	08/12/2013
	Dunnock	<i>Prunella modularis</i>	Sect.41, UKBAP	61	520	16/02/2014
	Herring gull	<i>Larus argentatus</i>	Sect.41, UKBAP	1	623	26/11/2013
	House sparrow	<i>Passer domesticus</i>	Sect.41, UKBAP	71	687	31/03/2020
	Song thrush	<i>Turdus philomelos</i>	Sect.41, UKBAP	41	481	19/01/2014
	Starling	<i>Sturnus vulgaris</i>	Sect.41, UKBAP	13	481	21/05/2019
Other mammals	Hedgehog	<i>Erinaceus europaeus</i>	RLGB.VU, Sect.41, UKBAP	10	959	15/06/2018
Invertebrates	Small square-spot	<i>Diarsia rubi</i>	UKBAP	1	934	09/07/2013
	Buff ermine	<i>Spilosoma luteum</i>	UKBAP	1	636	18/09/2015

Appendix B Bat Roost Assessment of Buildings

Figure 7-1 Building summary descriptions

Building Group	Building Number & Name	External Description including Potential Roosting Features (PRFs)	Bat Roost Potential	Photograph
	B2: Behrens House	Grade II Listed C19th building. Understood to be the original building of Ashburne Hall. It is constructed of brick and sandstone ashlar with scored stucco. It is two storey with a cellar. It has a hipped slate roof. There are lower bay windows present and a large stone porched entrance. Large chimney stacks present with lead flashing around base. Walls in a good condition with PRF present beneath tiles and lead flashing.	High	 B2: Southern elevation

Building Group	Building Number & Name	External Description including Potential Roosting Features (PRFs)	Bat Roost Potential	Photograph
	B1: Main Building	The Ashburne Hall buildings (B1 & B3-5) form a large 'L' shaped complex of attached building all of similar age and construction. They are brick built over three floors with the roof line being dormered. The multi pitched complex roof is slate with numerous valleys, smaller extensions, together with flat roof sections. There are small areas of hanging tiles on the sides of the dormer windows. There are a number of chimneys, with lead flashing at the bases. Predominantly open eaves. Ventilations slits are present on a number of gable ends, potentially allowing access into any roof voids that may be present. There is a more recent extension to the rear of B2 with a flat roof. There were a number of weep holes present within the brick work that may provide access into cavity. Numerous external features that could offer PRF: Tiles; lead flashing, around dormers, chimney, eaves & valleys.	High	 B1: Western elevation
	B3: Ward Wing			 B3: Western elevation

Building Group	Building Number & Name	External Description including Potential Roosting Features (PRFs)	Bat Roost Potential	Photograph
	B4: Lees Wing		High	 B4: Southern elevation
	B5: Mary Worthington Wing		High	 B5: Eastern elevation

Building Group	Building Number & Name	External Description including Potential Roosting Features (PRFs)	Bat Roost Potential	Photograph
	B6: 15 &	More modern building around over three storeys with the roof line also partially converted (occasion dormer windows and skylights) Some lead flashing present around dormer windows. Brick built with a slate/composite pitched roof. Large uPVC/composite soffits. Vented gable apex that could allow access into any roof voids that may be present. Brick work in a good condition, as are slates but some slipped missing slates noted.	High	 B6 Northern elevation
	'TN1' Gate house	Two storey rendered building with a shallow pitched slate roof and central chimney with lead flashing at base. Sealed eaves. Render in a good condition with no BRF noted. Likely BRF beneath tiles although the roof line was not visible the entire way around the building.	High	 TN1: Western elevation

Building Group	Building Number & Name	External Description including Potential Roosting Features (PRFs)	Bat Roost Potential	Photograph
	TN23: Substation within Ashburne Hall	New brick built substation with sloping membrane roof.	Negligible	 TN23: Substation
Owen's Park	B7: Campus Reception	Two storey brick-built building with a concrete structure. Upper floor extends slightly over the ground floor and gaps are present within the join of the concrete panels. In addition, there are a number of weepholes present across the building. External stairway that leads up to flat roof section of B8.	Low: Weep holes Gaps between concrete panels	 B7: Eastern elevation from central courtyard. B8 to the rear

Building Group	Building Number & Name	External Description including Potential Roosting Features (PRFs)	Bat Roost Potential	Photograph
	B8: Source Cafe	Similar construction to B7 with a concrete structural support and brick with a flat roof. Two and three storeys.	Low Weep holes	 B8: Western elevation
	B9: Tower	High raise tower over several storeys. Flat roof. Concrete & brick structure. Numerous weep holes primarily two above each window. Gaps noted along the underside of the concrete support panels.	Moderate: Number of weepholes & gaps within concrete	 B9: Tower with B7 & B8 in foreground from main entrance

Building Group	Building Number & Name	External Description including Potential Roosting Features (PRFs)	Bat Roost Potential	Photograph
	B10: Tree Court	Large square building with a central courtyard (not accessed). Brick built over four storeys with a flat roof. Fascia boards are present the entire way around the building. Weepholes present above most windows and gaps noted around fascia boards.	High: Large number of weepholes, gaps at fascia and surrounding trees increase potential.	 B10: South-eastern corner showing full eastern elevation
	B11: Little Court	Large square building with a central courtyard (not accessed). Brick built over three storeys with a flat roof. Fascia boards/metal soffits are present the entire way around the building. Weepholes present above most windows and gaps noted around fascia boards.	High: Large number of weepholes, gaps at fascia and surrounding trees increase potential.	 B11: Western elevation

Building Group	Building Number & Name	External Description including Potential Roosting Features (PRFs)	Bat Roost Potential	Photograph
	B12: Green Court	Large 'L' building with a central courtyard (not accessed). Brick built over three storeys with a flat roof. Fascia boards/metal soffits are present the entire way around the building. Weepholes present above most windows and gaps noted around fascia boards.	High: Large number of weepholes, gaps at fascia and surrounding trees increase potential.	 B12: Southern elevation looking into courtyard
	B13: The Mall	Similar construction over four floors with a flat metal sheet roof and barge boards. Weep holes were not visible, although the metal fascia around the lower section was raised, allowing access beneath.	Low – Limited to the lower section as illustrated by red arrow	 B13: North & eastern elevation

Building Group	Building Number & Name	External Description including Potential Roosting Features (PRFs)	Bat Roost Potential	Photograph
	B14: The Limes	Similar construction to B7 with concrete supports and brick. Flat roof. Lead flashing present around the single storey extension to the northern elevation but this appeared to be well sealed within no PRF noted.	Negligible	 B14 North-western corner
	B14a: Outbuilding adjacent to The Limes	Single storey brick-built outbuilding, with a flat felt and timber barge boards, which are in a poor condition on the western edge. The building is partially open sided to the eastern elevation. The gap around the barge board was inspected and was heavily filled within debris and cobwebs that would restrict access for bats.	Negligible	 B14a: Eastern elevation

Building Group	Building Number & Name	External Description including Potential Roosting Features (PRFs)	Bat Roost Potential	Photograph
	TN10 Garage Block	Single storey modern garage block constructed of concrete panels with a flat roof. Small gaps noted around the join of the roof line and between concrete panels. Inspected with endoscope, where accessible, and could offer low potential for crevice dwelling species as the gaps are open and travel beneath panels.	Low	 /TN10: Garage block to the east of B14 showing western elevation
	TN18 'Substation'	Brick building 'substation' with a flat roof which is covered in ivy. Rear of the building not fully accessible. Gap noted on northern corner of flat roof with timber roof structure visible.	Low	 Substation: Eastern elevation

Building Group	Building Number & Name	External Description including Potential Roosting Features (PRFs)	Bat Roost Potential	Photograph
Oak House	B15: Carill House	Brick built construction with a multiple mono shallow pitched tiles roof. There are large gaps along the roof verges where the mortar has fallen away. The roof line was not fully visible from the ground but there may be gaps between the tiles that could offer PRFs.	Moderate	 B15: Northern elevation on the right, with southern and eastern elevation of B19 to the left and rear
	B16: Squirrels Bar	Brick built construction with a multiple mono pitched tiles roof. Brick work in a good condition but gaps noted between the tiles at the gable ends and fascias.	High	 B16: Showing multi-pitch of western and northern elevation

Building Group	Building Number & Name	External Description including Potential Roosting Features (PRFs)	Bat Roost Potential	Photograph
	B17: Beech Court	Large building brick built over four storeys with a shallow pitched tiled roof. Fascia boards are present the entire way around the building. Weepholes present above most windows and gaps noted around fascia boards.	High: Large number of weepholes, gaps at fascia and surrounding trees increase potential.	 B17: Eastern and partial southern elevation
	B18: Maple Court	Large building brick built over four storeys with a shallow pitched tiled roof. Fascia boards are present the entire way around the building. Weepholes present above most windows and gaps noted around fascia boards.	High: Large number of weepholes, gaps at fascia and surrounding trees increase potential.	 B18: Western and northern elevation

Building Group	Building Number & Name	External Description including Potential Roosting Features (PRFs)	Bat Roost Potential	Photograph
	B19: Holly Court	Large building brick built over four storeys with a shallow pitched tiled roof. Fascia boards are present the entire way around the building. Weepholes present above most windows and gaps noted around fascia boards. On the western gable, missing mortar was noted	High: Large number of weepholes, gaps at fascia and surrounding trees increase potential.	 B19: Southern elevation of B19 & 20 from southern pedestrian access
	B20: Sycamore Court	Large building brick built over four storeys with a shallow pitched tiled roof. Fascia boards are present the entire way around the building. Weepholes present above most windows and gaps noted around fascia boards. On the northern gable, missing mortar was noted.	High: Large number of weepholes, gaps at fascia and surrounding trees increase potential.	 B20: North and western elevation from courtyard

Building Group	Building Number & Name	External Description including Potential Roosting Features (PRFs)	Bat Roost Potential	Photograph
	B21: Chestnut Court	Large building brick built over four storeys with a shallow pitched tiled roof. Fascia boards are present the entire way around the building. Weepholes present above most windows and gaps noted around fascia boards. On the northern gable, missing mortar was noted.	High: Large number of weepholes, gaps at fascia and surrounding trees increase potential.	 B21: Eastern elevation, showing mature limes
Woolton Hall	B22: Main Building	Large two storey brick-built building with a multi-pitched metal roof. Large timber soffits, which appeared well sealed through. Lead flashing at join between sections and elevations. Main ornate entrance to Woolton Hall on western elevation.	Low – lead flashing	 B22: 'Woolton Hall' Southern elevation

Building Group	Building Number & Name	External Description including Potential Roosting Features (PRFs)	Bat Roost Potential	Photograph
	B23: Ashley	Two storey brick-built building with a multi-pitched metal roof. Large timber soffits, which appeared well sealed through. Ventilation slits on gable ends have been sealed over. Lower single storey flat roof sections adjoining between B22 & B23.	Negligible	 B22: Northern elevation
	B24: Spencer	Large three storey brick built building with a metal roof. Large timber soffits. Gaps noted along base of soffits. Ornate ventilation slits on the gable ends that could provide access into roof voids.	High	 B24: Western elevation

Building Group	Building Number & Name	External Description including Potential Roosting Features (PRFs)	Bat Roost Potential	Photograph
	B25: Lindsay	Large three storey brick built building with a metal roof. Large timber soffits. Gaps noted along base of soffits. Ornate ventilation slits on the gable ends that could provide access into roof voids.	High	 B22: Northern elevation of B27 and western & northern elevation of B25
	B26: Morley	Large three storey brick built building with a metal roof. Large timber soffits. Gaps noted along base of soffits. Ornate ventilation slits on the gable ends that could provide access into roof voids.	High	 B26: Eastern elevation

Building Group	Building Number & Name	External Description including Potential Roosting Features (PRFs)	Bat Roost Potential	Photograph
	B27: Cavendish	Large three storey brick built building with a metal roof. Large timber soffits. Gaps noted along base of soffits. Ornate ventilation slits on the gable ends that could provide access into roof voids.	High	 B27: Western elevation showing missing fascia board
	TN12: 'The Bungalow'	Brick built with a multi sloping tile roof. Open porch to front (northern elevation) with a sloping tiled roof. There is an extensive covering of moss across the roof line. Shaded by surrounding trees. Gaps noted between tiles, weep holes and gaps between fascia.	High	 TN12 Northern elevation

Building Group	Building Number & Name	External Description including Potential Roosting Features (PRFs)	Bat Roost Potential	Photograph
	TN19 'Cycle Store'	Single story brick buildings with a shallow pitched corrugated roof.	Negligible	 TN19: Southern elevation and western gable
	TN20 Garages/ outbuildings adjacent to B22/ 23	Three outbuildings adjacent to B22 & B23. Single storey buildings constructed of brick with a flat roof. Timber barge boards/small soffits present. Gap noted along one elevation and this was inspected with an endoscope. It was found to be heavily cobwebbed, reducing suitability.	Negligible	 TN20 Southern elevation

Building Group	Building Number & Name	External Description including Potential Roosting Features (PRFs)	Bat Roost Potential	Photograph
	TN21	Partially sunken brick-built structure within bund along southern woodland (TN11).	Negligible	 TN21: Northern elevation
	TN22	Curved polycarbonate cycle store.	Negligible	 TN22: Cycle stores

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