The Ecology Co-op
ENVIRONMENTAL CONSULTANTS
Building B, Lords Wood Barns, Petworth, West Sussex, GU28 9BS

Tel: 01798 861 800 - E-Mail: info@ecologyco-op.co.uk - Website: www.ecologyco-op.co.uk

9th November 2023

Ref: Repeat Ecological Appraisal (PEA) – The Dairy, Waterlooville

Dear Mr Paul Harvey,

The Ecology Co-op has been commissioned to undertake a Preliminary Ecological Appraisal of The Dairy, Waterlooville by Peter Earnest Home. This letter report presents a summary of a survey undertaken by Owen Crawshaw, BSc (Hons), MCIEEM, and Charlotte Hammond, BSc, on 6th September 2023.

The site is in the rural village of Catherington. The central grid reference for the site is SU 693 141. The site comprises of two workshop buildings, one comprises a large barn and the other is split into a garage and workshop for a double-glazing window business. The western side of the site houses a mobile home, stables and containers for storage. The site is made up of hard standing and vegetated scrub patches. Figure 1 shows an aerial view of the site, with the approximate boundary outlined.

Figure 1. An aerial image showing the site boundary (outlined in red) at The Dairy, Waterlooville. Produced using Google maps (2023).

The proposed development is a hybrid application for a commercial plot and seven self-build plots (see Figure 2).

Figure 2. A proposed plan showing the hybrid application with the detailed layout of the commercial unit and illustrative drawings of the residential plots. Provided by Lundi Architects. Dated August 2023. Drawing no. LA2332 007 Rev E.

A summary of the habitats contained within the site is provide in Table 1 below. A UKHab map is presented in Figure 3.

Table 1. UKHab descriptions of the habitats at Tollgate Farm, Effingham.

UKHab Habitat	Polygon/Line ID (Figure 3)	Secondary Codes (see Appendix 2)	Description
g4 – modified grassland	MG1	73, 161,1330	A short sward grassland mixed with gravel and bare ground. The dominant grass species is perennial ryegrass *Lolium perenne*. Species identified include sow thistle *Sonchus oleraceus*, dock sp., dandelion *Taraxacum* sp., cocksfoot *Dactylis glomerata*, false oat *Arrhenatherum elatius*, red clover *Trifolium pratense*, stinging nettle *Urtica dioica*, hedge bindweed *Calystegia sepium*, mallow *Malva sylvesris*, ornamental dog wood *Cornus florida* and willow herb *Epilobium parviflorum*.
	MG2 & MG3	64	There are patches of short sward mown grassland in the south-east and western corner of the site with white clover *Trifolium repens*, perennial rye, greater plantain *Plantoago major*, dandelion, bay shrub *Laurus nobilis* and stinging nettle *Urtica dioica*. MG3 has the addition of cress *Lepidium sativum*, cocksfoot and yarrow *Achillea millefolium*.
s – sparsely vegetated land	SVL1	16	An area in the eastern part of the site with pasture knot weed, scentless mayweed *Tripleurospermum inodorum,* fat hen weed *Chenopodium album*, yarrow *Achillea millefolium,* bittercress *Cardamine hirsute*, red clover, ribwort plantain *Plantago lanceolata*, herb robert *Geranium robertianum*, common mallow, spotted medick *Medicago arabica* , black medick *Medicago lupulina*, St John's-wort *Hypericum perforatum*, creeping cinquefoil *Potentilla reptans*, and field bindweed. Grasses identified were perennial rye.
	SVL2	161	An area in the south-eastern part of the site with tall forbs, dominated by nettle with bittercress, hedge bindweed, hogweed, creeping buttercup *Ranunculus repens*, broad leaf dock *Rumex obtusifoluis,* and mugwort. There is scattered rubble and a bonfire patch within the vegetation. There is also a medium sized pile of manure and old grass cuttings.
	SVL3	17	A patch of ruderal grass in the north-west

			corner of the site. The following species were identified: bristly oxtongue *Helminthotheca echioides*, ribwort, dandelion, dock *sp,* speedwell *Veronica Sp*, mallow, willow herb, elder *Sambucus nigra*, *clematis* sp. and teasels *Dipsacus fullonum.*
w1g6 – line of trees	LOT1		A line of trees is present along the eastern boundary and consists of field maple *Acer campesatre*, ash *Fraxinus excerlsior*, and hawthorn *Crataegus monogyna*. Ground flora identified includes bramble, yarrow, teasle, mugwort, and dock.
h2b – other hedgerow	OH1	48	A hedgerow runs along the northern boundary that is divided by the site entrance; there are multiple gaps, and the hedgerow is heavily pruned. Species identified include cypress sp. *Cupressus sempervirens,* ash, sycamore *Acer pseudoplantanus*, willow *Salix* sp., buddleia, hazel *Corylus avellana*, yew *Taxus baccata*, elder, rose of Sharon *Hibiscus syriacus* and snowberry *Symphoricarpos.*
u1b – developed land sealed surface	N/A	1230	The site's entrance is tarmacked, leading off the access road. The rest of area consists of hard standing consisting of loose gravel.
u1b50 – buildings	N/A	88, 90	Garage/workshop – the building in the centre of the site is split into two comprising a garage and a workshop for a double-glazing business. The western side of the building is used for car repairs. The interior has a roof void measuring 6m x 5m x 1.5m which was not fully accessible due to the plywood ceiling. The void is used for storage. The eastern half also had an internal roof void measuring 6m x 5m x 2m. The building has a concrete framework with no ridge board or roof under lining. There is small amount of daylight at the eaves from inside the void but no obvious evidence of bats using the building. Externally, the garage/workshop is constructed of solid brickwork. There is a rotten timber lintel on the north-west corner. There are some gaps at the eaves on the north-west elevation with evidence of an old bird's nest. The western elevation consists of a metal roller shutter door with a large crack. The southern elevation has a large crack in the brickwork at the eaves. There is a pitched roof with corrugated asbestos sheets. Adjoining the southern elevation are two metal containers and one large timber frame shelter. The shelter has a flat

			chrysotile roof and corrugated metal paneled walls. Agricultural barn – the barn is comprised of a breeze block plinth with a steel frame. The panel walls consist of corrugated metal. There is a sloping roof with corrugated chrysotile sheets. Internally there are large timber batons with no roof void or under lining . The barn is used for hay storage and woodcutting. There is no evidence of nesting birds or nesting owls. Other buildings include a mobile home, multiple metal storage containers.
u1c- artificial unvegetated unsealed surface	N/A	580	The southern boundary is largely taken up by a sand horse paddock.

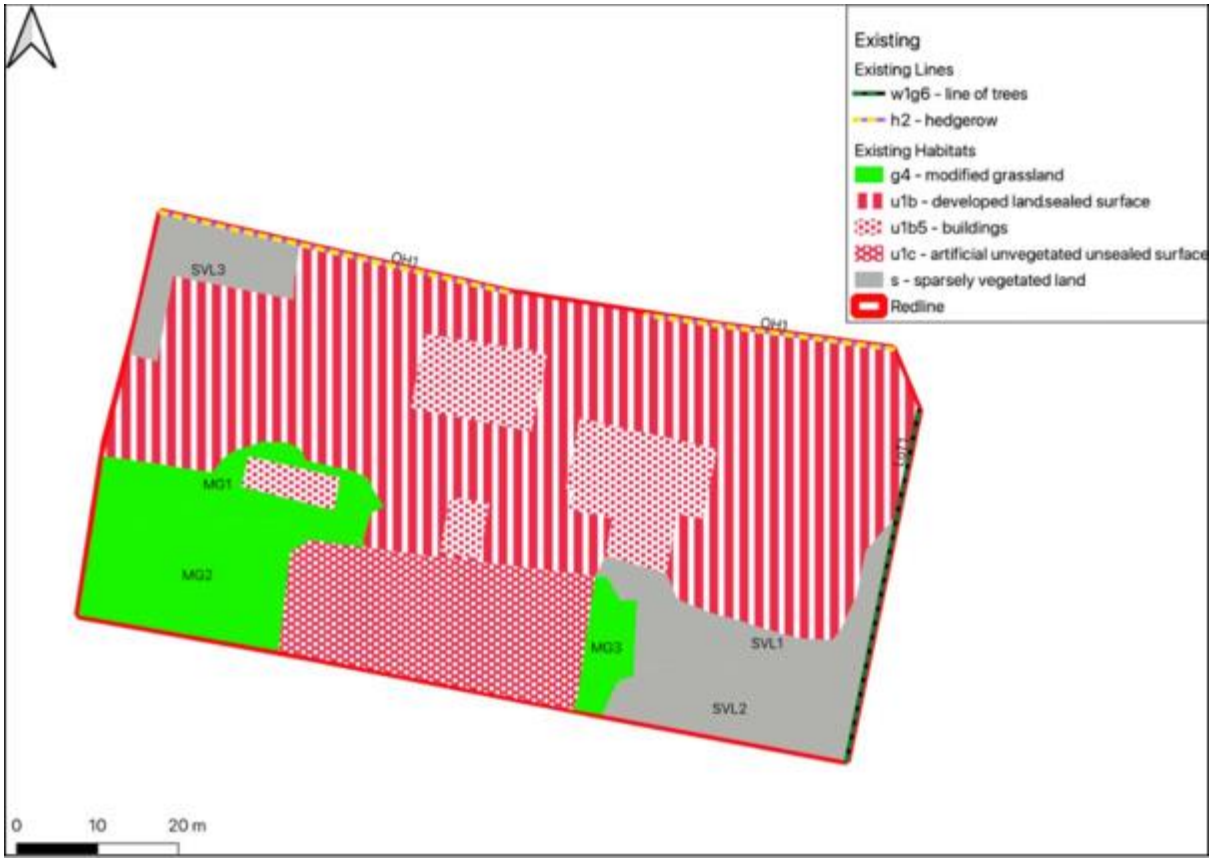


Figure 3. A UKHab map of the site at The Dairy. Produced using QGIS Software (version 3.16 Hannover).

A 1km records search for statutory/non-statutory designated sites and protected/notable species within 1km of the site was undertaken through Hampshire Biological Records Centre (HBIC), the results are provided in Table 2 and Appendix 3.

Table 2. A summary of ecological features, constraints & opportunities, further surveys and necessary avoidance/mitigation/compensation measures at The Dairy.

Ecological Feature	Ecological Constraints	Timing of Surveys	Ecological Opportunities
Habitats			
Priority Habitat(s)	There are no priority habitats contained within the site or directly adjacent to the site. Within 1km of the site there are small patches of lowland mixed deciduous woodland. The HBIC identified three areas of ancient semi-natural woodland within 1km of the site: Rabbits Copse, Horndean, Coombs Copse and Catherington Lith.	N/A	N/A
On-site Habitats	The proposed plans will result in the small-scale loss of sparsely vegetated land and managed modified grassland. The habitats provide low ecological value and their loss will not significantly impact on the overall ecology of the site or wider surroundings.	N/A	It is recommended that the proposed gardens be planted with wildflower seed mix to enhance the areas for pollinators. It is also recommended that native trees and shrubs be planted within the proposed front and rear gardens.
Protected Species			
Badgers	There is no evidence of badgers on site and the site itself is unlikely to support badgers. The HBIC records do not provide information on badger records.	N/A	N/A
Roosting Bats	The cracks identified on the garage/workshop may be used by crevice dwelling bats. Overall, the building is considered to have low potential for crevice dwelling bats. Chrysotile is an unfavourable material for bats due to the poor thermoregulation it offers. The HBIC records returned 54 bat records within 1km of the site. The closest being a common pipistrelle *Pipistrellus pipistrellus* recorded 184m from the site. The following records were returned by HBIC: • 19 common pipistrelle records • 2 brown long-eared *Plecotus auritus*	May–August	It is recommended that prior to works being carried out, the cracks on the western and southern elevation of the garage/workshop are subject to an endoscope survey by a suitably qualified ecologist. As a precautionary measure, the chrysotile sheets on the garage/workshop must be taken off under supervision by a suitably qualified ecologist. The developer is also encouraged to consider including integral bat roosting opportunities into the fabric of new buildings such as bat tiles and internal voids/access points for bats. For

	• 5 Myotis *Sp* • 4 noctule *Nyctalus noctule* • 16 serotine *Eptesicus serotinus* • 3 soprano pipistrelle *Pipistrellus pygmaeus*		example, three Schwegler 2FR bat tube could be built into the south, west and east facing elevations and 3no. purpose designed bat tiles onto the south-facing pitched roofs of the house. Alternatively, 2FE Schwegler Wall-Mounted bat shelters could be installed upon the external faces of the building close to the eaves of the building on the south or eastern face.
Commuting and Foraging Bats	The site has the potential to support foraging and commuting bat species due to the bordering tree line and hedgerows. The retained tree lines and hedgerows should be protected with Hera fencing during development and construction phases.	N/A	The use of artificial lighting inappropriately can result in significant disturbance to bats. The detailed design should include a lighting scheme that minimises these impacts by following the Bat Conservation Trust's guidance on lighting, reproduced in Appendix 4 of this report.
Breeding Birds	The hedgerows and trees within the site provide suitable nesting habitat for a variety of common and widespread garden and farmland bird species. Any trees or hedgerows due to removed should be carried out outside of the nesting bird season (March-August). If this is not possible, they should first be checked by a qualified ecologist. The horse stables showed evidence of old nesting swallows *Hirundo rustica,* they were not active at the time of the survey. The HBIC returned 22 records of notable bird species, of these species, red kite *Milvus milvus* was the closest at 130m from the site, however, is considered unlikely to breed within the site given the lack of suitable habitat.	N/A	It is recommended that a minimum of four bird nest boxes are installed on trees within the site to provide an enhancement for nesting birds. The proposed dwellings should also incorporate swallow nest cups into the design. Where possible suitable nesting bird habitat should be retained.
Dormice	The site lacks suitable habitat or connective habitat to woodland. The boundaries of the site do not connect to the wider landscape due to the surrounding roads and access tracks, therefore, dormice are considered likely to be absent from the site.	N/A	N/A

	The HBIC did not return any records of dormice from within the search area.		
Great Crested Newts	No ponds were identified during the walkover survey and no ponds were visible within 500m of the site on aerial imagery. There is no suitable habitat for great crested newts within the site and there no records within 1km returned by HBIC. Therefore, great crested newts are likely to be absent from the site.	N/A	N/A
Reptiles	There is little suitable habitat for reptiles; there are patches of tall ruderal scrub offering some ground cover. The surrounding habitat consists of horse paddocks, tightly grazed and mown grass paddocks which is unsuitable for reptiles. Connectivity of the northern and eastern boundaries to suitable habitat in the surrounding area is prevented by the presence of roads. HBIC returned a record of one slow worm *Anguis fragilis*, the record was 781m from the site's boundary.	N/A	Although the site has limited suitable habitat for reptiles, transitory reptiles could migrate on to the site along the boundary features. As a precautionary method it is recommended that an ecologist should check the suitable habitat prior to it being cut and works starting.
Hedgehogs	The scrub on site may provide shelters for hedgehogs *Erinaceus europaeus*. As such, precautionary measures are recommended including the hand searching of these features by a suitable qualified ecologists prior to their removal and avoiding the hibernation period.	N/A	The proposed gardens and boundries should include 'hedgerow highways' within the fence lines to allow hedgehogs to safely forage and commute between gardens and the wider landscape. Hedgehog highways are easy to incorporate, consisting of holes approximately 13cm by 13cm at the base of the fence. Plaques can be installed adjacent to the hole to easily identify the features so that they are maintained in perpetuity.
Notable Invertebrates	The site has the potential to support multiple invertebrate species. HBIC records returned 36 lepidoptera species listed on the S41.	N/A	The proposed plans can provide enhancements for invertebrates by including wildflower planting and enhancing the retained hedgerows. The following tree species are recommended: wild cherry *Prunus avium*, wayfaring tree *Viburnum lantana*, hawthorn *Crataegus monogyna*, elder *Sambucus nigra*,

			field maple *Acer campestre*, and sea buckthorn *Hippophae rhamnoide*. Bee bricks
Invasive Species	No invasive species were identified during the site visit but the hedgerow along the northern boundary had non-native species present.	N/A	Any new planting should include native species.
Designated Sites			
Catherington Down (Site of Specific Scientific Interest) (Local Nature Reserve)	The proposed development site is located 138m west of the designated site. It is designated for its open chalk grassland habitat with woodland around the edges. The area is becoming floristically rich with frequent lady's bedstraw *Galium verum*, agrimony *Agrimonia eupatoria*, red clover *Trifolium pratense*, ribwort plantain and common sorrel *rumex acetosa* occurring rarely. The same site is also designated as a Local Nature Reserve with the chalk grassland containing numerous insect species.	N/A	The construction phase is likely to have impacts on the Caterington SSSI due to its proximity. Impacts such as dust, lighting, physical damage, vibration and noise are considered have the potential to negatively impact the site. To reduce any adverse effects during the construction phase, heras fencing should be placed around the site and no lights should be directed towards the SSSI during in or post construction. Building materials/stockpiles that could create dust pollution should be sprayed with water during periods of dry/windy weather to prevent excessive drying and dust formation. The 9 residential properties alone are unlikely to cause adverse recreational impacts on the SSSI as natural currently list 0 pressures for Cathrington Downs. If other large residential schemes are proposed within the area then a financial contribution may be required to offset any significant adverse effects on SSSI.
Catherington Lith (LNR)	Ancient woodland located 625.3m east from the site's boundaries. The Lith has remnants of chalk grassland and supports a wide variety of bird species including whitethroats *Sylvia Communis*, yellow hammers *Emberiza Citrinella*, linnets *Carduelis cannabina*	N/A	Low impact risk due to development scale and proximity.

	and long-tailed tits *Aegithalos caudatus.*		

The proposed development will impact upon existing areas of bare ground, sparsely vegetated land (ruderal vegetation) and a small area of modified grassland. The limited amount of habitat to be lost under these proposals will not significantly impact upon the ecology of the site or the wider surroundings. With the adoption of reasonable avoidance measures relating to bats, reptiles, birds and hedgehogs, the works will have no foreseeable impacts on protected/notable species. The proposals present the opportunity for biodiversity enhancements through the enhancement of grassland/wildflower areas and installation of bat and bird boxes.

If you have any queries about the findings of this assessment, then please do not hesitate to contact me.

Yours sincerely,

Charlotte Hammond

BSc (Hons)
Email: charlotte@ecologyco-op.co.uk

Appendix 1. Photographs

Photograph 1. MG1

Photograph 2. MG2

Photograph 3. MG3

Photograph 4.SVL1

Photograph 5. SVL3

Photograph 6. LOT1

Photograph 7. Internal roof void above the garage

Photograph 8. Inside the workshop with brick build and no lining

Photograph 9. Internal space above the workshop.

Photograph 10. Inside the workshop

Photograph 11. The store on the rear of the garage and workshop with a large gap at the top but tight weatherboarding.

Photograph 12.A corrugated store with overlapping corrugated metal sheets and chrysotile roof.

Photograph 13. Agricultural barn with breeze block plinth and steel frame

Photograph 14. Internal view of the agricultural barn

Photograph 15. Evidence of old birds' nest in the horse stables.

Photograph 16. Brick build garage, with metal shutter door.

Photograph 17. A large crack with potential to support crevice dwelling bats

Photograph 18. The rear view of the agricultural barn and associated hard standing.

Appendix 2. Secondary Codes

Table 3: UK habitat codes with habitat feature description

UKHab secondary codes	Description
10	Scattered scrub
11	Scattered trees
12	Scattered bracken
13	Scattered dwarf shrubs
14	Scattered rushes
15	Rushes dominant
16	Tall herb
17	Ruderal/ ephemeral
18	Calcareous - acidic mosaic
19	Ponds (Priority Habitat)
20	Wood-pasture and parkland
21	Traditional orchards
22	Juniper on heaths or calcareous grasslands (H5130)
23	Caves not open to the public (H8310)
24	Depressions on peat substrates (H7150)
25	Coastal and floodplain grazing marsh
26	Machair (H21A0)
27	Heathland on maritime cliffs and slopes
28	Dunes with creeping willow (H2170)
29	Inland saltmarshes (H1340)
30	Estuaries (H1130)
31	Large shallow inlets and bays (H1160)
32	Reefs (H1170)
33	Ancient woodland site
34	Arable reversion grassland
35	Biodiversity offset
36	Plantation
37	Semi-natural woodland
38	Secondary woodland
39	Freshwater - man-made
40	Freshwater - heavily modified
41	Freshwater - natural
42	Castle/ historic building
43	Recreated habitat
44	Landfill
45	Canalside
46	Railside
47	Native
48	Non-native
49	Veteran Trees
51	Coppice
52	Coppice with standards
53	Felled

54	Ground prepared for planting
55	High forest
56	Young trees - planted
57	Young trees - self-set
58	Grazed
59	Cattle grazed
60	Sheep grazed
61	Horse grazed
62	Other grazed
63	Burnt
64	Mown
65	Hay
66	Frequently mown
67	Dry stone wall
68	Mortared wall
69	Fence
70	Hedgebank
71	Earthbank
72	Stone-faced bank
73	Bare ground
74	Ploughed
75	Active Management
76	Recent Management
77	Neglected
78	Abandoned
79	Ancient management
80	Unmanaged
81	Flailed hedgerow
82	Laid hedgerow
83	Grip
84	Grip blocking
85	Cutover peat
86	Accessible natural greenspace
87	Airport
88	Barn
89	Car Park
90	Commercial building
91	Development site
92	Educational building
93	Fish farm
94	Green lane
95	Grouse moor
96	Industrial building
97	Industrial/ Retail building
98	Institutional building
99	Nature reserve
100	Oil/gas drilling or extraction
101	Open cast mining

102	Mine
103	Permanent agricultural grassland
104	Port/ marina
105	Quarry - hard rock
106	Quarry - sand and gravel
107	Railway
108	Reservoir
109	Residential
110	Retail
111	Road
112	Ruined building
113	Sea wall
114	Solar panel array
115	Track
116	Wind farm
117	Dry
118	Mesic
119	Seasonally wet
120	Wet
121	Waterlogged
122	Inundation vegetation
123	Neutral grassland with calcicoles
124	Cave open to the public
125	Soil erosion
126	Snow patch
127	Peat
128	Spring
129	Flush
130	Ecotone
131	Tidal river
132	Nutrient-poor substrate
133	Nutrient-enriched substrate
134	Base-rich substrate
135	Acidic substrate
136	Compacted substrate
137	Ridge and furrow
138	Saline influence
139	Active shingle rivers
140	Anthills
141	Backwaters
142	Base-rich water
143	Coarse woody debris in-channel
144	Chalk rivers
145	Complex woody structure
146	Exposed riverine sediments
147	Fallen dead wood abundant
148	Flower forage abundant
149	Gravel beds

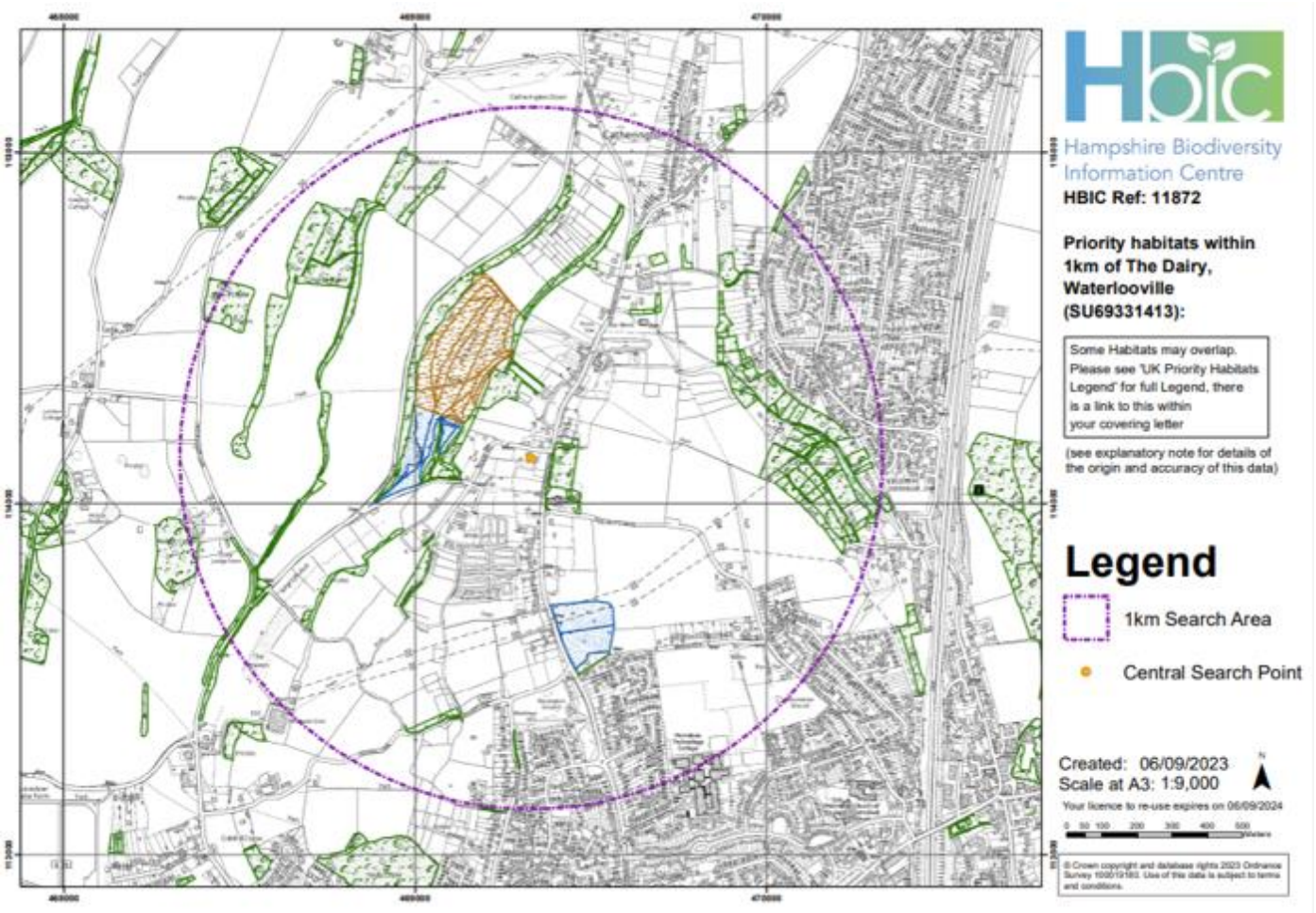
150	High humidity levels
151	Landslips
152	Large hollows or cavities
153	Mudbanks
154	Open grown trees
155	Riffles
156	Rock outcrop
157	Shallow pools
158	Shelter from wave action
159	Standing dead wood abundant
160	Sward type mosaic
161	Tall or tussocky sward
162	Temporary water bodies
163	Unobstructed river system
164	Wet moss lawns
165	Waterfall
166	Woodland open space
167	Topogenous
168	Soligenous
169	Rich fen
170	Poor fen
171	Fertile fen
172	Infertile fen
173	Swamp
174	Tall fen
175	Small sedge fen
176	Bryophyte dominated
177	Open water fen
178	Transition fen
179	Basin fen
180	Flood plain fen
181	Basin raised bog lagg fen
182	Flood plain raised bog lagg fen
183	Spring fen
184	Surface flow spring fen
185	Percolation spring fen
186	Surface flush or rill or soakaway
187	Valley fen
188	Ladder fen
189	Scattered grass
190	Hedgerow with trees
191	Ditch
192	No tillage
195	Seed forage abundant
196	Caravan park
197	Turlough (H3180)
198	Mediterranean temporary ponds (H3170)
199	Sea caves (H8330)

200	Parks and gardens
210	Urban park
211	Pocket park
212	Neighbourhood park
213	Community park
214	District park
215	Regional park
220	Country park
230	Garden
231	Vegetated garden
232	Un-vegetated garden
300	Natural and semi-natural open space
310	Grasslands
320	Heathland
330	Scrub
340	Woodland
341	Woodland; broadleaved
342	Woodland; mixed
343	Woodland; coniferous
350	Abandoned ruderal and derelict areas
351	Vacant/derelict land
352	Disused quarry
360	Fresh water body
361	Natural lake or pond
362	Artificial lake or pond
363	Natural lake
364	Natural pond
365	Artificial lake
366	Artificial pond
370	Wetlands
380	Coastal
381	Beaches and sand dunes
382	Foreshore/rocks
383	Tidal water
384	Open saline water
400	Green corridors
410	Watercourse
411	Natural watercourse
412	Artificial watercourse
420	Green access route
421	Walking/cycling route
422	Riparian routes
430	Transport route open space
431	Road island/verge
432	Railway corridor
500	Outdoor sports facilities
510	Sports pitches
511	Natural sports pitches

512	Artificial sports pitches
520	Recreation ground
530	Ball courts
531	Natural ball court
532	Artificial ball court
540	Golf course
550	Race course
560	Bowling green
570	Equestrian centre
580	Other recreational
600	Provision for play and fitness
610	Children’s Play Space
611	Children's Play Space; natural
612	Children's Play Space; non-permeable
620	Outdoor gym
621	Natural outdoor gym
622	Non-permeable outdoor gym
630	Adventure playground
631	Natural adventure playground
632	Non-permeable adventure playground
640	Youth area
700	Open space around premises
710	Educational premises open space
711	Natural educational sports pitches
712	Artificial educational sports pitches
713	Other educational open space
720	Municipal premises open space
730	Commercial premises open space
740	Housing estate open space
800	Cemeteries and churchyards
810	Cemetery
820	Churchyard
900	Small-scale food growing
910	Allotments
920	Orchard
930	City farm
940	Community garden
1000	Productive spaces
1010	Agricultural land
1011	Pasture or meadow
1012	Arable land
1013	Agroforestry
1020	Nursery/horticulture
1030	Sand pit quarry or open cast mine
1040	Reservoirs
1050	Fish farms
1100	Urban greening
1110	Green roof

1111	Extensive green roof
1112	Intensive green roof
1113	Brown roof
1120	Green wall
1121	Ground based green wall
1122	Façade-bound green wall
1130	Balcony green
1140	Ground level planters
1150	Flower bed
1160	Introduced shrub
1170	Tree
1171	Mature tree
1172	Young tree
1173	Tree avenue/alley
1180	Hedgerow
1190	Sustainable urban drainage feature
1191	Bioswale
1192	Rain garden
1200	Other functional open space
1210	Other natural functional greenspace
1220	Civic spaces
1221	Permeable civic spaces
1222	Non-permeable civic spaces
1230	Other hard surfaced areas
1231	Permeable paving
1232	Non-permeable paving

Appendix 3. Non-statutory Designated Sites within 1km (reproduced from HBIC)



Appendix 4. Reducing impacts of Artificial Light

Bright external lighting can have a detrimental impact upon foraging and commuting bat flight paths, but more importantly can also cause bats to remain in their roosts for longer. Artificial lighting can also cause significant impacts to other nocturnal species, most notably moths and other nocturnal insects. It can also result in disruption of the circadian rhythms of birds, reducing their fitness.

Guidelines issued by the Bat Conservation Trust should be referred to when designing the lighting scheme. Note that lighting designs in very sensitive areas should be created with consultation from an ecologist and using up-to-date bat activity data where possible. The guidance contains techniques that can be used on all sites, whether a small domestic project or larger mixed-use, commercial or infrastructure development. This includes the following measures:

Avoid lighting key habitats and features altogether

There is no legal duty requiring any place to be lit. British Standards and other policy documents allow for deviation from their own guidance where there are significant ecological/environmental reasons for doing so. It is acknowledged that in certain situations lighting is critical in maintaining safety, such as some industrial sites with 24-hour operation; however, in the public realm, while lighting can increase the perception of safety and security, measurable benefits can be subjective. Consequently, lighting design should be flexible and be able to fully consider the presence of protected species.

Apply mitigation methods to reduce lighting to agreed limits in other sensitive locations – lighting design considerations

Where bat habitats and features are considered to be of lower importance or sensitivity to illumination, the need to provide lighting may outweigh the needs of bats. Consequently, a balance between a reduced lighting level appropriate to the ecological importance of each feature and species, and the lighting objectives for that area will need to be achieved. The following are techniques which have been successfully used on projects and are often used in combination for best results:

- dark buffers, illuminance limits and zonation;
- sensitive site configuration, whereby the location, orientation and height of newly built structures and hard standing can have a considerable impact on light spill;
- consideration of the design of the light and fittings, whereby the spread of light is minimised ensuring that only the task area is lit. Flat cut-off lanterns or accessories should be used to shield or direct light to where it is required. Consideration should be given to the height of lighting columns. It should be noted that a lower mounting height is not always better. A lower mounting height can create more light-spill or require more columns. Column height should be carefully considered to balance task and mitigation measures. Consider no lighting solutions where possible such as white lining, good signage, and LED cats eyes. For example, light only high-risk stretches of roads, such as crossings and junctions, allowing headlights to provide any necessary illumination at other times;
- screening, whereby light spill can be successfully screened through soft landscaping and the installation of walls, fences and bunding;
- glazing treatments, whereby glazing should be restricted or redesigned wherever the ecologist and lighting professional determine there is a likely significant effect upon key bat habitat and features;
- creation of alternative valuable bat habitat on site, whereby additional or alternative bat flightpaths, commuting habitat or foraging habitat could result in appropriate compensation for any such habitat being lost to the development;
- dimming and part-night lighting. Depending on the pattern of bat activity across the key features identified on site it may be appropriate for an element of on-site lighting to be controlled either

diurnally, seasonally or according to human activity. A control management system can be used to dim (typically to 25% or less) or turn off groups of lights when not in use.

Demonstrate compliance with illuminance limits and buffers

- Design and pre-planning phase; it may be necessary to demonstrate that the proposed lighting will comply with any agreed light-limitation or screening measures set as a result of your ecologist's recommendations and evaluation. This is especially likely to be requested if planning permission is required.
- Baseline and post-completion light monitoring surveys; baseline, pre-development lighting surveys may be useful where existing on or off-site lighting is suspected to be acting on key habitats and features and so may prevent the agreed or modelled illuminance limits being achieved.
- Post-construction/operational phase compliance-checking; as a condition of planning, post-completion lighting surveys by a suitably qualified person should be undertaken and a report produced for the local planning authority to confirm compliance. Any form of non-compliance must be clearly reported, and remedial measures outlined. Ongoing monitoring may be necessary, especially for systems with automated lighting/dimming or physical screening solutions.

Lighting Fixture Specifications

The Bat Conservation Trust recommends the following specifications for lighting on developments to prevent disturbance:

- lighting spectra: peak wavelength >550nm
- colour temperature: <2700K (warm)
- reduction in light intensity
- minimal UV emitted
- upward light ratio of 0% and good optical control.