



Bushy Park and Home Park SSSI

Supporting Information

A supplement to the notification document

Issued by Natural England's Thames Valley Team on 5 September 2014

Contact points and further information

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Summary

Bushy Park and Home Park SSSI is notified under Section 28 of the Wildlife & Countryside Act 1981, as inserted by Schedule 9 to the Countryside and Rights of Way Act 2000.

Bushy Park and Home Park SSSI is considered to be of special interest for its nationally important:

- **Acid Grassland** – The site supports the lowland acid grassland National Vegetation Classification (NVC) grassland types: U1-sheep's fescue *Festuca ovina*-common bent *Agrostis capillaris*-sheep's sorrel *Rumex acetosella* grassland which conforms mainly to the U1b typical sub-community, and U1d sweet vernal grass *Anthoxanthum odoratum*- bird's-foot-trefoil *Lotus corniculatus* sub-community, and U4 sheep's fescue *Festuca ovina*-common bent *Agrostis capillaris*-heath bedstraw *Galium saxatile* grassland, the community showing closest affinities to the U4b Yorkshire-fog *Holcus lanatus*-white clover *Trifolium repens* sub-community. These occur on the free-draining sandy soils associated with the floodplain of the River Thames. The acid grassland communities are present throughout the site, occurring as a mosaic with neutral grassland, woodland and wetland habitats.
- **Veteran Trees** - Bushy Park and Home Park SSSI supports a nationally important population of c.200 veteran trees, approximately 94 of which have reached ancient age class. The veteran tree population comprises mainly of pedunculate oak *Quercus robur* and limes *Tilia* species. Of note is the presence of numerous veteran hawthorn trees, an unusual feature linked to the historic use of the site for deer coursing. The hawthorn trees provide an important nectar source for the invertebrates for which this site is also notified.
- **Invertebrate assemblages**- The site supports assemblages of invertebrates associated with heartwood decay, bark and sapwood decay and with fungal fruiting bodies (saproxylic). Many of these invertebrate species are nationally rare and are thought to represent a fauna that was once much more widespread in southern lowland forests and wood-pasture but which has declined due to the loss of veteran trees. They appear now to only be found on sites where there has been long-term continuity of veteran trees.

1 Information used to support the selection of Bushy Park and Home Park SSSI

Feature	Data source	Author	Date	Content
General	Ecological Surveys of Bushy Park. Prepared for The Royal Parks.	Land Use Consultants	2005	Ecological surveys of the site
	Home Park and Hampton Court Palace: Review of existing ecological data. Prepared for the Historic Royal Palaces.	Betson, N., Buckenham, A. & Howson, A.	2007	An ecological audit of the site and a review of existing ecological data
	Hampton Court Palace. Gardens, estate and landscape conservation management plan.	Historic Royal Palaces	2011	A current management plan for part of the site
	Revised Guidelines for the Selection of Biological SSSIs. Part 1: Rationale, Operational Approach and Criteria for Site Selection. Joint Nature Conservation Committee, Peterborough.	Bainbridge, I., Brown, A., Burnett, N., Corbett, P., Cork, C., Ferris, R., Howe, M., Maddock, A. & Pritchard, S. (eds.)	2013	National selection guidelines for biological SSSIs
	Guidelines for the Selection of Biological SSSIs. Part 2. Chapters 2b. Woodlands, 3. Lowland grasslands, 9. Upland habitats and 17. Invertebrates.	JNCC	2013	National selection guidelines for biological SSSIs.
Invertebrate Assemblage	The use of saproxylic invertebrates in the selection and evaluation of areas of relic forest in pasture-woodlands	Harding, P.T. & Alexander, K.N.A.	1994	Use of the Index of Ecological continuity
	Pollard and veteran tree management II.	Corporation of London. Read H.J. (ed.)	1996	Management of veteran trees and species associated with veteran trees with threshold scores for regional, national and international importance for saproxylic invertebrates.
	The Saproxylic Quality Index	Fowles A.P., Alexander K.N.A. & Key R.S.	1999	The Saproxylic Quality Index: evaluating wooded habitats for the conservation of dead-wood Coleoptera
	Revision of the Index of Ecological Continuity as used for saproxylic beetles. English nature Research report 574.	Alexander K.N.A.	2004	Revised scores for assessing site ecological continuity for saproxylic beetles

Feature	Data source	Author	Date	Content
	Bushy Park Moth Survey. Prepared for The Royal Parks.	Freed, T.	2009	Moth survey results for the site from 2005 to 2008
	Home Park, Hampton Court 2011: Survey of Animals and Plants.	Cole, S.	2011	Survey report for Home Park
	Staggering Gains. Report of the 2011 survey of stag beetle in Greater London. London Wildlife Trust.	Wileman, T. & Frith, M.	2011	Information on the Greater London stag beetle population
	Survey of the beetles of Bushy Park, Middlesex, U.K., with special reference to the species associated with veteran trees.	Hammond, P. M.	2011	Beetle survey results
	Bushy Park – Results of Diptera surveys by Peter Chandler in 2011.	Chandler, P.	2012	Diptera survey results
	Bushy Park Invertebrate Species Lists.	The Royal Parks	2012	All recorded invertebrate species in Bushy Park
	A Survey of the Terrestrial Invertebrates – Hampton Court Palace, Home Park, Middlesex.	Denton, J.	2013	Information on saproxylic species and invertebrates
	Assessment of sites in Great Britain using IEC and SQI (pers. com.).	Alexander., K.	2014	Updated list of site rankings for saproxylic invertebrates using IEC and SQI assessments.
	Specialist Support for notification of Bushy Park and Home Park as a SSSI for invertebrates.	Webb, J.	2014	Support for notifying the site for invertebrates from Natural England's Senior Invertebrate Specialist
Veteran trees	Royal Parks Historical Survey. Hampton Court and Bushy Park. Volume 2 Report of survey.	Travers Morgan Planning	1982	Historical planting of trees at Bushy and Home Park
	Veteran Trees Initiative: Specialist Survey Method. Published by English Nature, Peterborough.	Fay, N. & de Berker, N.	1997	Specialist survey to promote the management and continuity of England's veteran tree heritage
	Defining age in trees: a discussion paper. English Nature Research Reports 539.	Fay ,N.	2002	Information on veteran tree assessments
	Decaying Wood: An Overview of Its Status and Ecology in the United Kingdom and Continental Europe1USDA Forest Service Gen. Tech. Rep. PSW-GTR-181.	Butler, J., Alexander, K., & Green, T.	2002	Information on decaying wood in Europe

Feature	Data source	Author	Date	Content
	Development of a Veteran tree site assessment protocol. English Nature Research Report 628.	Castle, G. & Mileto, R.	2005	Information on veteran tree assessments
	Guidance to support the selection of sites as SSSIs for veteran Trees. Joint Nature Conservation Committee.	Joint Nature Conservation Committee	2006	Assessment protocol for selecting veteran trees for SSSIs
	2012 Veteran Tree Survey, The Royal Parks, Bushy Park.	Treeworks Environmental	2012	Survey of veteran trees in Bushy Park
	Hampton Court: Home Park: Ancient and Veteran Tree Assessment 2012.	Mosaic Mapping	2012	Survey report
	Bushy Park Adjacent Sites: Veteran Tree Survey Feb 2014.	Treeworks Environmental	2014	Survey data
	Specialist Support for notification of Bushy Park and Home Park as a SSSI for veteran trees.	Perry, S.	2014	Support for notifying the site for veteran trees from Natural England's wood pasture and parkland specialist
Acid Grassland	British Plant Communities. Volume 3: Grasslands and montane communities. Published by Cambridge University Press, Cambridge.	Rodwell, J.S. (ed)	1992	National Vegetation Classification for grasslands
	Phase 2 surveys of acid grassland and heathland in Greater London.	Williams, P. R.	1993	An assessment and record of NVC communities across London
	A review of the extent, conservation interest and management of lowland acid grassland in England.	Sanderson, N. A.	1998	Review of lowland acid grassland
	UK Biodiversity Action Plan (BAP) Priority Habitat Descriptions- Lowland Dry Acid Grassland Published online at http://jncc.defra.gov.uk/pdf/UKBAP_BAPHabitats-26-LowlandDryAcidGrass.pdf	Biodiversity Reporting and Information Group (ed. A. Maddock).	2008	Status of lowland dry acid grassland habitat as defined by the UK BAP
	Home Park Phase 2 NVC Habitat Survey Report.	London Wildlife Trust	2010	Survey results and management recommendations for the site
	Home Park. Acid Grassland/Heathland Restoration Proposal.	London Wildlife Trust	2010	A proposal for restoration of the acid grassland on part of the site.

Feature	Data source	Author	Date	Content
	National Vegetation Classification Survey of the Grassland of Bushy Park. Prepared for The Royal Parks.	Land Use Consultants	2011	Grassland survey results for the site
	Natural England SSSI notification strategy – lowland grassland SSSIs.	Jefferson, R.G.	2013	Priorities for lowland grassland SSSI notification

2 Explanation of how Bushy Park and Home Park meets the SSSI selection guidelines

This section explains how the information listed in section 1 has informed our decision to notify the SSSI, according to the *Guidelines for selection of biological SSSIs* (Joint Nature Conservation Committee, 2013), hereafter referred to as ‘the Guidelines’.

2.1 Lowland dry acid grassland

Bushy Park & Home Park comprises around 165 ha of lowland dry acid grassland conforming to U1-sheep’s fescue *Festuca ovina*-common bent *Agrostis capillaris*-sheep’s sorrel *Rumex acetosella* grassland which conforms mainly to the U1b typical sub-community, and U1d *Anthoxanthum odoratum*-sweet vernal grass *Lotus corniculatus* bird’s-foot-trefoil sub-community and U4 sheep’s fescue *Festuca ovina*-common bent *Agrostis capillaris*-heath bedstraw *Galium saxatile* grassland, the community showing closest affinities to the U4b Yorkshire-fog *Holcus lanatus*-white clover *Trifolium repens* sub-community. Lowland dry acid grassland is listed as a habitat of principal importance under section 41 of the NERC Act, 2006.

Lowland acid grassland habitat has undergone a significant recent decline, almost entirely due to changing agricultural practice. The Natural England State of the Natural Environment Report 2008 cites a decline of 20% in the area of lowland acid grassland between 1990 and 1998. The national decline has continued into the 21st Century; an assessment of the condition of semi-natural grassland types in non-statutory sites in England in 2005 found only 21% of lowland acid grassland outside of the SSSI series were considered to be in a favourable condition, largely due to neglect or agricultural improvement. These losses have led to severe declines in the characteristic plant species of lowland acid grasslands in recent decades (see for example Sanderson 1998). In addition to the U1 and U4 grassland types there is also approximately 29ha of transitional acid grassland which has not been ascribed to a community, occurring in Home Park as a mosaic with the U1 grassland, there are also small areas of transition/mosaics occurring in Bushy Park between the acid grassland and other semi-natural vegetation types. The site has suffered in recent years from under-grazing, however this can be remedied, and if recovered this area will contribute a significant area towards the total of U1 and U4 grassland is therefore included within the site boundary.

The Guidelines (Chapter 3, section 3.5, p.5) state that:

‘Examples of grassland with any of the communities listed in Table 9, either singly or in mixtures, should be at least 0.5 ha in area to qualify for selection.’

For lowland acid grasslands, the Guidelines (Chapter 3, section 3.5, p.9.) further state for U1-U3 that:

“...any unmixed stand of 5 ha or more or any area of mixed grassland and heathland of 10 ha or more should be selected.”

The U1 habitat type is considered to be a community of high botanical interest. Bushy Park and Home Park supports approximately 78ha of U1 grassland thus, U1 qualifies for SSSI notification as it exceeds the minimum threshold of 0.5 ha, and also exceeds the threshold of 5 ha above which the Guidelines state that all examples of single communities should be selected.

Bushy Park and Home Park SSSI also supports approximately 87 ha of U4b sub community. The NVC type U4 grassland is not listed in table 9 in Chapter 3 of the Guidelines, although it is covered within the upland chapter of the Guidelines, where it is more common.

Natural England's SSSI notification strategy for lowland grassland (Jefferson, 2013) states that:

'In the case of U4 grasslands in the lowlands, it is important to focus on the notification of botanically-rich examples i.e. U4c which is a very rare sub-type and U4a. The former is restricted to soils over limestone where the soil pH is reduced usually due to a cover of drift over the bedrock...'

Natural England's draft SSSI notification strategy for lowland grassland goes on to state that:

'U4b is generally more species-poor and sites with this sub-type would be a lower priority for notification especially in the upland fringes where this community is relatively widespread.'

Part 1. of the Guidelines (section 5.10.1, p.25) has the following to say on application of the guidelines for rare habitats:

'The continuing loss and increasing scarcity of near- and semi-natural habitats over much of lowland Britain has led to the view that, for some habitats, all remaining examples above a certain quality should be protected. The scarcer the habitat, the stronger is the case that the qualifying standards should be more flexible.'

U4 grassland is rare in the English lowlands (< 5000 ha) while U1 has a greater estimated extent (<12,500 ha) but is still very localised in its occurrence. Like other lowland semi-natural grasslands, both types have suffered from large but unquantified losses due to conversion to arable, agricultural improvement and afforestation over the last 60 years. These losses have led to the severe decline in the characteristic plant species of acid grasslands in recent decades (see for example Sanderson 1998).

The estimated national resource of lowland dry acid grassland is approximately 20,000 ha. Overall, Greater London supports around 6% of the national resource of acid grassland, with the area of acid grassland in Greater London estimated to be c.1250ha (London Biodiversity Partnership 2005). Sanderson (1998) considered that conserving the acid grasslands in the Greater London area is a high priority for conservation of the overall resource of acid grassland. The area of acid grassland at this site is significant given that it represents over 1% of the estimated national resource of Lowland dry acid grassland – the equivalent figures for component NVC types are U1 = 0.6% and U4 = 1.74 %. The combined area contributes approximately 13.2% of the total lowland dry acid grassland in Greater London. Currently the site is assessed as unfavourable recovering; remedying the grazing of the site should increase the overall diversity of the sward.

The occurrence of autumn squill (*Scilla autumnalis*) in the acid grasslands is notable in that this is a nationally scarce species (occurring in less than 100 10 km squares in Great Britain) (although not considered endangered/threatened in the UK red list) and largely confined to the coasts of Devon and Cornwall. Sites for this species in the Thames basin have declined over the last 50 years and the population at this site represents an important stronghold in the region.

Natural England's draft SSSI notification strategy for lowland grassland (Jefferson, 2013) advocates the selection of botanically-rich examples of U4 grassland in the lowlands. Accordingly, it proposes the addition of this community to table 9 in the Guidelines. This proposal is supported by the grassland specialists in Scottish Natural Heritage and Natural Resources Wales. U4 grassland is an eligible community type for selection in the uplands chapter, where such grasslands are more widespread. The large size and relative scarcity of this habitat in the lowlands merits the selection as a notified feature.

The proposed notification has taken account of the draft SSSI notification strategy for lowland grasslands and accords with its key recommendations.

In summary the site is considered to be of special interest due to its:

- Mosaic of U1 and U4 acid grassland (including the U1d, U1f and U4b sub communities).
- Large extent of U1 and U4 grassland in the national context
- Large proportion of the remaining grassland in the Greater London area

2.2 Veteran Trees

Bushy Park and Home Park SSSI has a long history of management as a deer park following its main enclosure, and subsequent additional enclosures and landscaping extending the area in later years. This long continuity of habitat protection and stable management has resulted in a landscape in which veteran trees have a strong association with the parkland setting.

The age and large size of many of the veteran trees has the potential to provide an abundance of dead and fallen timber. Inside the trees, fungi which actively break down the heartwood produce a rich internal wood mould. This habitat, located deep within a large living tree, can provide a stable environment for many rare and specialised saproxylic invertebrates and fungi for many years.

Veteran and ancient trees have dead and decaying wood with particular types of heart and ripe wood decay. As the trees mature the pH of the bark changes and may become an important substrate for lichens. Likewise, the large number of veteran hawthorns is likely to be valuable for the wood decay found in cavities and hollows within the trees. The presence of hawthorn also provides an important nectar source for saproxylic beetles and other invertebrates.

The veteran tree population is distributed across the site amongst avenues of trees, and in woodland, and is predominantly comprised of lime *Tilia x europaea* and *T. platyphyllos* and pedunculate oak *Quercus robur*, with a significant population of approximately 196 veteran hawthorns *Crataegus monogyna*.

The veteran tree guidelines (section 1.2 p. 1) state that:

“in an area of search, the assessment of veteran tree sites should be undertaken in accordance with the protocol set out in table 1. The use of this protocol is described with examples in ENRR 628”.

The veteran tree guidelines (section 1.4 p.1) further state that:

“the protocol enables sites to be compared and roughly graded in terms of their value for veteran trees and likely associated interests, although it does not set the threshold for A/SSSI status.”

Table 2.1.below (and continued overleaf) summaries the assessment of Bushy Park and Home Park using the veteran tree site assessment protocol. The site scores high in all 3 of the primary assessment criteria. The site scores high in 5 of the secondary assessment criteria, and medium in 4.

Table 2.1. Assessment of Bushy Park and Home Park using the veteran tree site assessment protocol

Field measure	Notes	Assessment (value)
Primary assessment criteria		
<i>*Veteran trees calculation includes ancient trees in addition to non-ancient veterans.</i>		
No. of veteran trees*	c.200 veterans, mainly oak and large- leaved lime	High >100 veterans
No. of ancient trees	c.94 ancient trees, mainly oak and large-leaved lime	High >15
No. of trees >1.5m dbh ¹	c.20	High >15

¹ dbh = diameter at breast height.

Secondary assessment criteria		
Extent of site	541.03ha	High >50ha
Tree cohort continuity	Numerous non veteran/ancient trees present. Areas of wood-pasture with young-mature to mature/veteran trees in the bounds of the golf course, with mature-veteran and mature trees across the site.	Medium – future generations present but gaps in cohorts/new generations
Visible deadwood (standing and fallen, and including rot holes, hollow trunks, etc)	Bushy Park has relatively low levels of deadwood. 41% of surveyed trees within the park have no aerial deadwood, 78% of surveyed trees have no fallen deadwood. Indicates that management practices may be removing deadwood. Home Park has low quantity of observed dead wood. Some dead trees present but small quantity of fallen timber.	Medium- present but evidence of removal
Ground vegetation	Ground flora is significantly modified but includes features of long-established parkland.	Medium – semi improved
Veteran trees nearby (sites and trees in the landscape)	The site is in close proximity to Richmond Park and Kew Gardens as well as Greenwich Park, Hampstead Heath, Kensington Palace Gardens, all of which support veteran/ancient trees.	High – site is adjacent to Richmond Park
Diversity within veteran tree population (species, form, age, situation)	There is diversity in age, species and form of the veteran trees, and situation. There are over 20 different species present, with some specimens which have not been identified to species and may be hybrids. Species present include hawthorn, oak, ash, alder, lime, field maple, crack willow, black poplar, sweet chestnut, horse chestnut and sycamore. There are new plantings, mature, veteran and ancient tree age classes. There are veterans with coppiced, maiden, layered, natural pollards, managed pollards and forked forms. Veterans occur in a variety of situations along boundaries, in isolation, in groups and in woodland.	High – Diversity in at least three characteristics (species, age, form and situation)
Associated species interest (e.g. – lichens, saproxylic invertebrates)	High associated invertebrate interest. Lichens have not been surveyed. Fungi have not been surveyed in detail.	Medium – some interest known
Documented habitat continuity – historical continuity	Has very long documented history. A royal deer park with 15 th century origins enlarged by subsequent monarchs.	High – documentary evidence of several centuries of habitat continuity
Potential	Some trees may be adversely affected by soil compaction, affecting the functioning of shallow roots. It may be possible to address this through access management. The relatively poor representation of standing and fallen dead wood is of concern. There is scope to improve this through changes in management, whilst protecting visitor safety. There is a future cohort of veteran trees present, so the veteran tree interest is likely to increase as current non-ancient veteran and young trees reach maturity.	High – interest likely to increase in short- to medium-term
Score for primary assessment criteria: 3 high. Score for secondary assessment criteria: 5 high, 4 medium.		

Sources: Castle & Mileto (2005), Faye & Gardner (Treeworks survey 2012) English Heritage description (June 1997)

Table 2.2 Comparison with other comparable sites in Greater London assessed using the veteran tree site assessment protocol

Site name	Assessment for primary criteria			Assessment for secondary criteria			Rank on primary criteria	Rank taking into account all criteria
	H	M	L	H	M	L		
Bushy Park and Home Park	3	0	0	5	4	0	1	1
Richmond Park	3	0	0	8	0	0	1	2
Holwood Estate	3	0	0	6	2	0	1	3
Osterley Park	1	2	0	6	1	0	2	4
*Kensington Gardens	1	2	0	3	2	2	2	5
Tooting Common	1	1	1	4	3	2	3	6
Greenwich Park	1	1	1	4	1	4	3	7
*Wimbledon Common & Putney Heath	0	3	0	4	2	1	4	8
West Wickham Common	0	3	0	3	4	1	4	9
*Morden Hall	0	2	1	2	6	1	5	11
*Hayes Common	0	2	1	2	4	1	5	10

*Sites where the veteran tree interest is less than 1 tree/hectare

The sites covered by this survey were selected using information from a variety of sources, including local Natural England staff, the Arboricultural Association of London and local members of the Ancient Tree Forum. The Ancient Tree Hunt Project, supported by the Woodland Trust, helped identify sites in the area of search.

The Guidelines (section 1.5, p.1) state that:

“The following test should be applied to determine whether sites identified as scoring highly using the assessment protocol should be designated as SSSI. Namely, does a possible new site:

- i. Significantly increase the range or number of veteran trees protected;
- ii. Represent a significantly different aspect of the veteran tree resource; or
- iii. Have significantly higher value than the main sites currently selected?”

Does the site significantly increase the range or number of veteran trees protected?

Bushy Park and Home Park together comprise a veteran tree resource of approximately 200 veteran trees, of which 94 are ancient. The Ancient Tree Forum has recorded 44 sites in England with more than 100 veteran trees and less than half of these are designated as SSSI. Only two other SSSIs have been selected specifically because they support large aggregations of veteran trees – Castle Hill Deer Park and Windy Pits, North Yorkshire and Blackmore Vale Commons and Moors, Dorset. Bushy Park and Home Park will strengthen the national representation of veteran trees in the SSSI series. Other SSSIs with large numbers of veteran trees have been designated because of the assemblages of species supported by the trees, not because of the veteran tree population *per se*.

Does the site represent a significantly different aspect of the veteran tree resource?

Bushy Park and Home Park represents a significantly different aspect of the veteran tree resource to Richmond Park SSSI as the veteran trees in Bushy and Home Parks are slightly younger and are growing in a more closed canopy situation than those at Richmond Park.

Is the site significantly higher in value than the main sites currently selected?

This new site is not significantly higher in nature conservation value than Richmond Park SSSI which is the nearest site with a valuable population of veteran trees, but it does represent an important addition to the designated resource, strengthening the potential 'fragility' of the overall veteran tree population and associated invertebrate assemblages. Bushy Park and Home Park supports a large number of veteran trees occurring in open parkland. Good historic records of development of the site as a park, including approximate ages of tree canopy also adds to the value of the site.

2.3 Invertebrate assemblage

Previously an understudied site, the invertebrate interest of Bushy Park and Home Park SSSI was predominantly overlooked until the early 2000s when extensive surveys were conducted across the site to address this. The site has since been found to support a nationally important saproxylic invertebrate assemblage –species are dependent on decaying wood and associated microhabitats to complete their life cycles. The surveys of the special saproxylic invertebrate interest of Bushy Park and Home Park SSSI has shown assemblages most typically associated with fungal fruiting-bodies, bark and sapwood decay and heartwood decay. The importance of the site is further indicated by the presence of a number of rare and scarce species, in particular in its beetle fauna.

The outstanding saproxylic invertebrate fauna of Bushy Park and Home Park require continuation of a diverse deadwood habitat. Larger diameter trees are thought to provide a greater number of saproxylic micro-niches (bark and sapwood decay, rot holes, sap runs, fungal fruiting bodies, etc.). Since many of the species do not travel far, the higher the number of older trees, the more likely it is that a site will provide a greater continuity of micro-niches and significant buffering from external changes, providing a stable long-term environment for species, often for several hundreds of years.

Regarding the need for protecting saproxylics the Guidelines (Chapter 17, section 3.1, p.7) state that:

“It is...the rarer, more specialised invertebrate species that need particular attention...It has become apparent that features such as ancient trees with dead and decaying wood...have been insufficiently represented in the past. Each of these micro-habitats can support a rich assemblage of invertebrates, including many specialist species not found elsewhere, and sites containing the best examples of such features...are candidates for selection as SSSIs.”

Assessment of assemblages is mentioned in Chapter 17, section 3.5., p. 9 of the Guidelines:

‘outstanding assemblages’ which should be ‘...based on systematic sampling procedures and using community analysis techniques to identify and classify recurrent invertebrate assemblages.’ and go on state that ‘the process of analysing species assemblages, combined with assessing the presence of rare species at localities within a major habitat type, is likely to provide a sound basis for selecting important invertebrate sites in future’.

Accordingly, the Guidelines (Chapter 17, section 5.1, p.10) go on to state that:

“The overall approach adopted here is to aim to safeguard the strongest populations of threatened invertebrates and to protect those sites supporting assemblages of scarce, 'specialist' invertebrates...”

Since the guidelines were written Natural England has been developing the Invertebrate Species-habitats Information System (ISIS). This is a system which classifies typical invertebrate assemblages found in certain habitats (in the way that the National Vegetation Classification system does for vegetation) so that typicality and changes can be traced. Surveys of Bushy Park

and Home Park have identified that the invertebrate assemblages are made up of species most typically associated with the following ISIS assemblage types:

- A213 fungal fruiting-bodies assemblage
- A212 bark and sapwood decay assemblage
- A211 heartwood decay assemblage

ISIS is a valuable tool for describing and understanding the assemblages of invertebrates that a site supports but it does not provide a means for readily comparing sites and assessing their relative value.

Saproxylic assemblages have received a certain degree of attention over the past few decades. The development of two specific community analysis techniques for site assessment has enabled identification of important sites for saproxylic invertebrates through a statistical approach. These are the Index of Ecological Continuity (IEC) and the Saproxylic Quality Index (SQI). Both of these assign scores to specific beetle species but use different methods of calculating one overall score for the site.

The IEC (Harding & Rose 1986) and its subsequent revision (Alexander 2006) has been used to identify Britain's most important sites for the saproxylic invertebrates of veteran trees and wood-pasture type habitats, and a hierarchical site table has been presented. The IEC provides a method of grading sites based on presence of species which indicate long term ecological continuity; this provides a way of assessing sites significance in ecological terms rather than using rarity. The Index is based on a list of 180 native saproxylic beetles (of the 700 British native saproxylic beetles) thought likely to be the remnants of the saproxylic beetle assemblage of Britain's post-glacial wildwood. In order to provide a realistic assessment of the site's value the survey data needs to comprise of several years' worth of survey over all seasons of beetle activity.

Bushy Park and Home Park SSSI supports one of the strongest populations of saproxylic invertebrates in the UK. With an IEC score of 152 and placing it 4th of 145 sites assessed, only Windsor Great Park, the New Forest and Richmond Park exceed this score, and these sites are comparatively larger and better studied than Bushy Park and Home park SSSI. With further survey work the IEC and SQI scores for the site is likely to increase further. Using this score the site exceeds the threshold of >80 for international importance (Alexander 1996). Table 2.3. shows the top ranking sites in England as assessed by Alexander pers. com. (2014).

Table 2.3. Index of Ecological Continuity for the top ten sites based on Alexander (2014).

Rank	Site	County	Site status	IEC (Alexander 2014)
1	Windsor Great Park & Forest	Berkshire	SSSI	235
2	New Forest	Hampshire	SSSI	171
3	Richmond Park	Greater London	SSSI & NNR	156
4	Bushy Park and Home Park	Greater London	SSSI	152
5	Moccas Park	Herefordshire	SSSI & NNR	135
6	Bredon Hill	Worcestershire	SSSI	120
7	Hatfield Forest	Essex	SSSI & NNR	104
8	Sherwood Forest	Nottinghamshire	SSSI & NNR	103
9	Silwood Park	Berkshire		103
10	Epping Forest	Essex	SSSI	97

The second analysis technique the SQI is calculated against a standard list of 597 saproxylic species (as published in Fowles *et al.*, 1999) for which rarity scores, based on their known distribution, have been assigned. The sum of these rarity scores for a site list gives the Species Quality Score (SQS) and the Index (SQI) is derived by dividing SQS by the number of contributing species. The SQI provides a method for reducing the bias of observer effort but is dependent upon

comprehensive surveys recording information on all saproxylic species, not just the rarer elements. A threshold of 40 qualifying species is required before SQI can be calculated to minimise impact of rare species in a small sample. Table 2.4. below shows the site in comparison to the ten highest ranking sites in England.

Table 2.4. Saproxylic Quality Index for top ten sites ranked by Fowles (2014)

Rank	Site	Species	SQS	SQI (Fowles 2014)
1	New Forest, Hants.	326	2792	856.4
2	Windsor, Berks.	364	3084	847.3
3	Langley Park, Bucks.	153	1178	769.9
4	Richmond Park (Post 1950), Surrey	254	1790	704.7
5	Bushy Park and Home Park	259	1810	698.8
6	Silwood Park, Berks.	159	1090	685.5
7	Hatfield Forest (Post 1980), Essex	234	1602	684.6
8	Moccas Park, Herefs.	241	1545	638.4
9	Croome Park, Worcs.	111	692	623.4
10	Parham Park (Post 1980), W. Sussex	82	504	614.6

In his recent assessment of 175 sites this places Bushy Park in the current top ten of all sites in Britain (see table 2.4, above) as the fifth highest based on its SQI of 698.8. Bushy Park and Home Park SSSI is therefore regarded as having an outstanding assemblage of saproxylic invertebrates. The authors of the SQI (Fowles *et al.*, 1999) suggest that an SQI of 500 is probably an appropriate threshold for assessing national importance and 590 for European importance. This demonstrates the site's importance both at the national and international scale for its saproxylic invertebrates and contains many rare species.

On rare species the Guidelines (Chapter 17, section 3.4.5, p.8) state that:

“Wherever possible, Red Data Book species should be conserved as part of rich invertebrate faunal assemblages”;

and, for nationally scarce species (those known or estimated to occur in 16-100 10km grid squares in Great Britain), the Guidelines (Chapter 17, section 3.4.6, p.9) state that:

“These too should generally be conserved as part of rich invertebrate faunal assemblages.”

The site is known to support a substantial number of nationally scarce and otherwise uncommon beetles including *Aeletes atomarius*, *Stenichnus godarti*, *Trichonyx sulcicollis*, *Velleius dilatatus*, *Aplocnemus impressus*, *Diplocoelus fagi*, *Teredus cylindricus*, *Scryptia fuscula* and many more, all of which are part of the saproxylic assemblage for which this site has been notified for.

The habitat qualities which are important for the survival of some of the rarer invertebrate species are still not fully understood. However, it is known that it is very difficult to quickly re-create the quality of habitat (particularly old un-improved grasslands and very large diameter trees) which may have been a remnant of the former wildwood, or established through gradual colonisation over a long period, therefore it is important to conserve such quality, where it exists.

In summary, the saproxylic invertebrate fauna of Bushy Park and Home Park SSSI includes a number of rare and scarce specialist species, including a species not known from any other site in Great Britain. The site is assessed as being of national importance placing it in the top ten sites in Britain, and both its IEC and SQI scores qualify the site as of international importance.

2.5 Site boundary determination

Bushy Park and Home Park SSSI consists of the historic parkland of Bushy Park and Home Park. The two areas of parkland were once managed together as a single deer park. The historic

buildings, gardens and courtyards of Hampton Court Palace lie just to the west of Home Park outside the SSSI boundary. The site is bordered by the River Thames which lies to the south and east, and the urban areas of Teddington and Hampton Wick.

The justification for the boundary of the Bushy Park and Home Park SSSI is described below but can be summarised as follows:

- All the best examples of qualifying types of lowland dry acid grassland, including mosaics with other grassland types and partially improved stands are included.
- The boundary includes the core area of the known veteran tree population, however in order to define an identifiable and practical boundary and exclude areas which are of lower value by reason of the past management some interest has been excluded.
- Open grown and enclosed veteran trees have been included in the site boundary
- Areas which contain supporting habitat for the features of interest, such as areas of scrub for provision of nectar for saproxylic invertebrates, or the immediate area around trees to allow sufficient area for protection of the roots have been included.

The basic principle in determining the SSSI boundary was to use the historic park boundary as the starting point as this is a clearly defined feature, and contained all of the qualifying acid grassland and the majority of the known resource of veteran trees and saproxylic invertebrate habitat. However, some areas of land within the historic park boundary have been modified to varying degrees, developed in various ways, or managed in ways which are not compatible with maintenance of nature conservation interest. A small number of veteran trees (and associated invertebrate habitat) also lie outside of the boundary. The Guidelines (Part 2, chapter 10, p.2) state:

“Habitats at the totally artificial end of the range, such as gardens and town parks, are, however, excluded from consideration, and the list is limited to those in which the bulk of the flora and fauna consists of species not deliberately planted or domesticated on the site.”

Part 1, section 3.5, p.10 of the Guidelines also states:

‘Designation as SSSI is normally inappropriate to most sites of highly artificial character, including most of the urban environment and intensively-managed farmland. However, there are certain situations where sites are of SSSI quality given their species complement (e.g. rare bats or rare lichen assemblages on or in buildings). These sites may include artificial waterbodies, mining features, old buildings, and also certain coastal and floodplain pastures, plantations, arable fields, and areas of previously-developed land’.

Much of the land in and around the park has been altered significantly by man. Early on in the site’s history areas containing today’s veteran trees were altered through management. As a general protocol the areas of ornamental planting, formal gardens, allotments, hard standing, walkways and pony paddocks have been excluded. Some areas are excluded from the SSSI as they do not support the features of special interest, or are not considered to contribute towards maintenance of the special interest. Additional excluded areas are those considered as supporting interest but within a lower value area owing to the land being at the totally artificial end of the spectrum (e.g. managed gardens and allotments), or that has been regarded as outside of the core area of the site. Effort has been made however to include areas which have high densities of qualifying veteran trees where the quality is not compromised.

The Guidelines (Chapter 2, section 5.1, p.12) state that:

“...it is usual to notify woods as more or less complete units. In some cases there may need to be a balance between including the whole of the ecological unit and defining a boundary that is clear on the ground. If boundaries within woods are required, these should follow well-defined features such as rides, streams or compartment boundaries.”

The site supports other non-qualifying habitats which are part of the site fabric. These areas form mosaics with qualifying grassland, and surround many of the open grown veteran trees, thereby providing a resource for invertebrates. These communities provide significant habitat diversity and surveys have found them to be important for a suite of invertebrates.

The Guidelines (Chapter 17, section 3.2, p.7) state that:

‘Another requirement of many invertebrates is habitat mosaics, both in terms of a variety of structural conditions within a habitat type...and also through the occurrence of different habitats such as grassland, woodland and wetland in close proximity. This is because some invertebrates live in situations which may be classed as transitional between habitat types or because there is a need for different habitat conditions at different stages of the life history...The increasing fragmentation and isolation of many semi-natural habitats poses particular problems for invertebrates which require habitat mosaics, as well as diminishing the chances of local movement or recolonisation for those invertebrates associated with a single habitat type’.

The boundary of the SSSI has been drawn to follow the nearest physical feature on the ground where possible. A variety of easily identifiable features have been used to define the boundary, including fences, walls, tracks and the edges of surfaced areas or curtilages of buildings. There are however a few locations where no physical boundary exists between the SSSI and adjacent land. In these cases the boundary generally forms a straight line between identifiable features. These points are described in the notification maps.

The physical boundary of the SSSI is marked mostly by the park wall. Elsewhere, fence lines, roads, tracks and in one case GPS-marked bollards have been used to delineate the SSSI boundary. See the map at Annex 4 of the notification document for detail of the boundary. The SSSI has been divided into units to aid future assessment and management. These are based on ecological compartments and current management of the land, with boundaries that are clearly identifiable on the ground. Features used to define the unit boundaries include fences, footpaths, tracks and roads.

3 Assessment of the current condition of Bushy Park and Home Park SSSI

Table 3.1. Current condition assessment of the interest features.

Site unit number *	Interest features	Reported condition**	Date of last assessment
1	Invertebrate assemblages	Favourable	July 2014
	Veteran trees	Unfavourable - recovering	February 2014
2	Invertebrate assemblages	Favourable	July 2014
	Veteran trees	Unfavourable - recovering	April 2012
	Acid grassland	Favourable	June 2014
3	Invertebrate assemblages	Favourable	July 2014
	Veteran trees	Unfavourable - recovering	April 2012
	Acid grassland	Favourable	June 2014
4	Invertebrate assemblages	Favourable	July 2014
	Veteran trees	Unfavourable - recovering	April 2012
	Acid grassland	Favourable	June 2014
5	Invertebrate assemblages	Favourable	July 2014

	Veteran trees	Unfavourable - recovering	April 2012
	Acid grassland	Favourable	June 2014
6	Invertebrate assemblages	Favourable	July 2014
	Veteran trees	Unfavourable - recovering	April 2012
	Acid grassland	Favourable	June 2014
7	Invertebrate assemblages	Favourable	July 2014
	Veteran trees	Unfavourable - recovering	April 2012
	Acid Grassland	Favourable	June 2014

* **Site units** are divisions used by Natural England for administrative purposes only.

**** Reported condition**

SSSIs are designated because of special biological or geological features. When these features are being managed so that their special nature conservation interest is being maintained they are said to be in favourable condition. This is a United Kingdom standard and the terminology and definitions are more fully described in 'A Statement on Common Standards Monitoring', produced by the Joint Nature Conservation Committee in 1998.

4 Selection of 'operations requiring Natural England's consent'

Natural England selects operations from a master list when determining the list of operations requiring consent for individual SSSIs. The selection is based on the likelihood that the operations may cause damage to the special features that are the reasons for designation of the SSSI. As well as selecting operations from the master list, the precise wording of each operation may be tailored to suit the particular circumstances at the site.

It is not possible to predict every possible eventuality that may arise on a site but the aim is to identify all operations where it is reasonably foreseeable that, if carried out at certain times or in a particular manner somewhere within the SSSI, they are likely to damage the special interest features. The table below records at least one reason justifying the inclusion of each operation in the list for Bushy Park and Home Park SSSI. It is not intended to be exhaustive and in most cases there will be other ways in which the specified operation is likely to cause damage.

Standard reference number	Type of operation	At least one reason for listing
1	Cultivation, including ploughing, rotovating, harrowing and re-seeding.	The interest features could be damaged/destroyed.
2	Grazing and alterations to the grazing regime (including type of stock, intensity or seasonal pattern of grazing).	The interest features could be affected by changes in grazing and may be damaged or destroyed by over/under grazing.
3	Stock feeding and alterations to stock feeding practice.	Localised nutrient enrichment or poaching may damage interest features.
4	Mowing or cutting vegetation and alterations to the mowing or cutting regime (such as from haymaking to silage).	Interest features are sensitive to cutting or mowing.
5	Application of manure, slurry, silage liquor, fertilisers and lime.	Interest features are sensitive to nutrient enrichment.

Standard reference number	Type of operation	At least one reason for listing
6	Application of pesticides, including herbicides (weedkillers) whether terrestrial or aquatic, and veterinary products.	Interest features and associated flora/fauna are sensitive to these.
7	Dumping, spreading or discharging of any materials.	Risk of obscuring or smothering interest features. Risk of loss of species.
8	Burning.	Interest features are sensitive to burning.
9	Release into the site of any wild, feral, captive-bred or domestic animal, plant, seed or micro-organism (including genetically modified organisms).	The introduction of invasive species can negatively affect species composition.
10	Killing, injuring, taking or removal of any wild animal (including dead animals or parts thereof), or their eggs and nests, including pest control and disturbing them in their places of shelter.	Could lead to unforeseen changes in community composition and damage to interest features.
11	Destruction, displacement, removal or cutting of any plant or plant remains, including (tree, shrub, herb, hedge, dead or decaying wood, moss, lichen, fungus, leaf-mould or turf).	Could cause direct damage to interest features.
12	Tree and/or woodland management and alterations to tree and/or woodland management (including, planting, felling, pruning and tree surgery, thinning, coppicing, changes in species composition, removal of fallen timber).	Could damage veteran trees.
13a	Draining (including the use of mole, tile, tunnel, or other artificial drains).	Interest features vulnerable to sudden changes in soil water regimes.
13b	Modification to the structure of water courses (eg. rivers, streams, springs, drains and ditches), including their banks and beds, as by realignment, re-grading, damming or dredging.	
13c	Management of aquatic and bank vegetation for drainage purposes.	
14	Alterations to water levels and tables and water utilisation (including irrigation, storage and abstraction from existing water bodies and through boreholes). Also the modification of current drainage operations.	
15	Infilling or digging of ditches, dykes, drains, ponds, pools, marshes or pits.	
20	Extraction of minerals including hard rock, topsoil, subsoil, sand, gravel and spoil.	Direct loss of interest features.
21	Destruction, construction, removal, rerouting, or regrading of roads, tracks, walls, fences, hardstands, banks, ditches or other earthworks, including soil and soft rock exposures or the laying, maintenance or removal of pipelines and cables, above or below ground.	Direct loss of or incidental damage to interest features.

Standard reference number	Type of operation	At least one reason for listing
22	Storage of materials.	Risk of obscuring or smothering interest features.
23	Erection of permanent or temporary structures, or the undertaking of engineering works, including drilling.	Direct loss or incidental damage of interest features and associated flora/fauna. Risk of loss of species or disturbance to species.
24a	Modification of natural or man-made features and clearance of boulders, large stones and loose rock.	
26	Use of vehicles or craft.	Risk of physical damage to interest features, including tree roots.
27	Recreational or other activities likely to damage or disturb the features of special interest.	Risk of damage to interest features or disturbance of species.
28a	Game and waterfowl management and hunting practices and alterations to game and waterfowl management and hunting practice.	Inappropriate location and types could damage interest features and disturb species.

5 Site unit maps

The map on the following page show the provisional boundaries of the site units, which are divisions used by Natural England for administrative purposes only.

See separate pdf files on the [publication page](#).

6 Photographs

Photograph 1.

A massive veteran tree on the northern boundary of Bushy Park. Such trees are very important for specialised invertebrates and fungi



Photograph 2.

Veteran hawthorn trees are a feature of Bushy Park and many have abundant growth of mistletoe



Photograph 3.

A typical view of the flower-rich acid grassland with frequent large ant-hills.



Photograph 4.

The range of habitats present in close proximity to veteran trees is an important factor in supporting a high diversity of invertebrates



Photograph 5.

The acid grassland supports a range of locally scarce and notable plants such as trailing St John's wort



Photograph 6.

Bushy Park and Home Park SSSI support a large number of scarce specialised invertebrates associated with veteran trees and parkland. Species recorded include the rove beetle *Euryusa sinuata* which has only been recorded at a small number of sites in England.



Photograph 7. Aerial image Bushy Park and Home Park SSSI with units



Bushy Park and Home Park

SSSI boundary outlined in red

Summary map of all units in aerial view

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