

Legacy Communities Scheme

# A Biodiversity Action Plan for Queen Elizabeth Olympic Park

2019 - 2024









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# PREFACE

**This is the Biodiversity Action Plan (BAP) for Queen Elizabeth Olympic Park for the period 2019 – 2024. The BAP aims to build on all conservation work carried out to date<sup>1</sup>, setting the direction for long-term habitat management to maintain and enhance biodiversity across the Park. This follows the approval of the BAP for 2014 – 2019 approved pursuant to Schedule 10 of the Legacy Communities Scheme (LCS) section 106 agreement.**

The creation of Queen Elizabeth Olympic Park provided a unique opportunity to regenerate part of east London and to reflect a new way of thinking about the design of urban parks, viewing nature and green space as an asset to the city. The Park aimed to be “environmentally sustainable, with a green and blue heart of restored rivers and waterways, wetlands, woodlands, lawns and meadows...as a long-term legacy of the Games”<sup>2</sup>. Sustainability was at the heart of the bid to secure the 2012 Olympic and Paralympic Games for London, and continues to be a thread throughout plans for the long-term future – the Legacy – of Queen Elizabeth Olympic Park.

The construction of the Park offered the chance to secure a net gain for biodiversity, and to address many of the environmental problems affecting the landscape, including contaminated land, invasive species and degraded waterways. The footprint of the Park was occupied by a range of sites and uses, many of which had a biodiversity value (eg post-industrial brownfield

land). In recognition of the natural significance of the site, the planning permission required the preparation of a Biodiversity Action Plan to mitigate losses and establish conservation objectives – “[the BAP] shall clearly identify the areas of recognised wildlife habitat to be provided and the means by which they will be maintained”<sup>3</sup>.

The original BAP<sup>4</sup> (2008) was notable in being the first such plan for an Olympic Park, and outlined proposals to create 10 new habitat types that included wildflower meadows, woodlands, and ponds<sup>5</sup>. The BAP contained 28 action plans for species it was hoped would reside on the Park. Whilst there was a focus on wildlife and habitats, the BAP incorporated a social element that aimed to engage people with the natural environment and the conservation of the Park to “weave together the needs of wildlife with the needs of people”<sup>6</sup>.

The Park was designed as a piece of green infrastructure – “a planned and managed network of green space and other environmental features that are vital to the sustainability of an urban area”<sup>7</sup>. Habitats, trees, and waterways were integrated into the public realm for the benefit of people and the environment. In this way, the Park reflects an ‘ecosystems approach’ to the integrated management of land, water and living resources, one of the key principles of sustainable development.

The BAP provides a guide for all involved in the development, management and maintenance of the Park. It is intended to be a working document, recognising that biodiversity plays a significant role in the management of parks and green spaces<sup>8</sup>.

1 The 2012 Olympic and Paralympic Games were awarded to London on 6th July 2005. The Olympic Delivery Programme was published in July 2006, outlining the plans to deliver a project that was twice the size of Heathrow Terminal 5 in half the time. Work to transform the area from a post-industrial site into a world stage for the London 2012 Games began in earnest in 2007. The Park’s construction resulted in the loss of 45 hectares of biodiverse habitat; planning permission placed an obligation on the Olympic Delivery Authority not only to provide a new 45 hectares of habitat, but to also improve the quality of the habitat being delivered (See: Olympic Delivery Authority, July 2011. ‘Building the Olympic Park, 2005 – 2011’). The Park’s first BAP (c.2008) set the context for the delivery of the new habitats; subsequent BAPs have built on this work, outlining the actions required to manage, protect and enhance the Park’s biodiversity.

2 London Legacy Development Corporation ‘Sustainability’ (see: <https://www.queenelizabetholympicpark.co.uk/our-story/transforming-east-london/sustainability>).

3 Extract taken from the original Olympic Park Planning Permission (Planning Condition OD.0.11)

4 Olympic Delivery Authority (October 2008) Olympic Park Biodiversity Action Plan.

5 The 2008 document was superseded by the 2014 – 2019 Biodiversity Action Plan.

6 Landscape: The Journal of the Landscape Institute. ‘Interview: John Hopkins’ (published autumn 2012).

7 Natural England (2009) Green Infrastructure Guidance. Report NE176.

8 Mayor of London: ‘Green Infrastructure’ ([www.london.gov.uk/what-we-do/environment/parks-green-spaces-and-biodiversity/green-infrastructure](http://www.london.gov.uk/what-we-do/environment/parks-green-spaces-and-biodiversity/green-infrastructure)).



The objectives of this Biodiversity Action Plan are to:

- Build on and deliver the vision for biodiversity enhancement and conservation of the Park, and identify strategic directions that take account of the international national, regional and local conservation scene.
- Provide a guide to nature conservation measures and biodiversity objectives for all those involved in the management and maintenance of the Park.
- Outline the actions required to establish and conserve species and habitats across the Park.
- Set out the maintenance and management regimes for the BAP habitats.
- Promote co-ordinated actions to benefit wildlife in the Park.
- Provide opportunities for local people to get involved in nature conservation work and biodiversity-related activities.

**The basis for the BAP – biodiversity and ecosystem services:**

“Biodiversity describes the variety of life on Earth, from the most common of species to the less well known and rare. It includes all species of animals, plants, fungi and microorganisms, the places in which they live (habitats) and the natural systems that support them”<sup>9</sup>.

Biodiversity provides us with numerous benefits – ecosystem services - that sustain our wellbeing (Table 1). Ecosystem services support the basic functions of life via the production of oxygen and the regulation of the climate, soil formation and nutrient and water cycles. Nature can generate significant cultural benefits for people too, through the aesthetic enjoyment of green and blue spaces and the encouragement of positive behaviours (a care and concern for the natural world). Biodiversity also has an intrinsic value in its own right, aside from the essential contribution that it makes to human wellbeing.

**Table 1:** Examples of ecosystem services generated by biodiversity.

Provisioning	Regulating
Products and services obtained from ecosystems - food, fuel and fibre, genetic resources, water, building materials and medicines.	Benefits obtained through the regulation of ecosystem processes, including climate regulation, air quality, soil protection and erosion control, pest control, waste treatment, pollination and flood mitigation.
Cultural	Supporting
Tourism, recreation and health, aesthetic enjoyment and reflection, knowledge and education, cultural, religious and spiritual values, and connections - providing a sense of place and heritage.	Production of oxygen, photosynthesis, soil creation, nutrient cycling, water cycling, provision of habitat.

Global and national trends demonstrate a widespread decline in biodiversity and the degradation of many ecosystem services<sup>10</sup>. The Millennium Ecosystem Assessment (2005) described how the earth’s ecosystems have changed more extensively and rapidly over the past 60 years than at any other point in history. The UK National Ecosystem Assessment (2011) was the first in-depth review of the UK’s natural environment and the benefits that it provides to society, and highlighted a long-term deterioration in many of the services on which we depend, including air, water and soil quality<sup>11</sup>.

According to the State of Nature Report (2016), the UK has lost significantly more biodiversity than the global average and is considered one

<sup>9</sup> UK Government (2011) 'The Natural Choice: Securing the Value of Nature'.

<sup>10</sup> Gilbert, N. (2011) 'UK ecosystem services declining: Report urges changes in policy governing natural capital. Nature. (<https://www.nature.com/news/2011/110601/full/news.2011.339.html>)

<sup>11</sup> UK National Ecosystem Assessment (2011) A synthesis of key findings. UNEP-WMC



of the most nature-depleted countries in the world<sup>12</sup>.

Habitat loss and fragmentation, climate change, pollution, urban development and the spread of invasive species have all placed considerable pressure on the UK's wildlife over the past 60 years. Negative influences have largely outweighed the positive, resulting in a net loss of nature<sup>13</sup>. Once common species are also displaying negative trends; for example, starlings and song thrushes have shown a steady decline since the 1970s, likely due to a reduction in suitable nesting habitat and the loss of important feeding areas to urban development<sup>14</sup>.

Biodiversity Action Plans are a useful mechanism for the delivery of local scale conservation efforts, improving the environment for people and for wildlife. Local actions can help to turn around the fortunes of biodiversity, thereby contributing towards the UK's national and global conservation commitments.

### **Structure of the Biodiversity Action Plan:**

The BAP is part of a wider set of management and maintenance documents for Queen Elizabeth Olympic Park. As a standalone document, it also establishes the visions, actions and priorities for biodiversity on the Park. The plan is comprised of 3 sections:

- Introduction
- Action Plans: Habitats and Species
- Action Plan: Communities

The introduction provides the background to the Park. It sets the scene for the new BAP, covering the Park's history, development and current management. Since the publication of the last BAP, a number of new policies and strategies have emerged; these documents are reflected throughout the BAP and include the London Environment Strategy (2018)<sup>15</sup> which emphasises the importance of green infrastructure within the urban environment.

The BAP then considers the changing nature of the Park, recognising that a significant part of the Legacy commitment will be delivered over the next 5 years. Much like the original BAP, this plan will bring opportunities to secure net gain for biodiversity, but will also encounter challenges in developing a park that already supports wildlife<sup>16</sup> (mitigation and safeguarding). The London Legacy Development Corporation Local Plan (2015 – 2031) sets out the strategy for the long-term sustainable development of the Park<sup>17</sup>. Policy BN.3 of the Local Plan ('Maximising Biodiversity') aims to protect and enhance biodiversity through the planning process and works alongside the BAP to support the delivery of its objectives.

The habitats, species and community action plans build on all conservation work carried out to date and incorporate lessons learnt during the previous BAP. The plans outline a number of practical actions aimed at protecting and enhancing the Park's biodiversity, as well as providing opportunities for local people to be fully involved and engaged in the BAP's delivery.

<sup>12</sup> Hayhow et al. (2016) State of Nature 2016. The State of Nature Partnership.

<sup>13</sup> The RSPB estimate that 60% of all studied UK species have declined in recent years. RSPB (2013) 'Sixty per cent of UK species in decline, ground-breaking study finds' (see: <http://ww2.rspb.org.uk/our-work/rspb-news/news/346449-sixty-per-cent-of-uk-species-in-decline-groundbreaking-study-finds>).

<sup>14</sup> See: Greater London Authority (2018) London Environment Strategy (Chapter 5: 'Green Infrastructure', pg.151).

<sup>15</sup> Greater London Authority (2018) London Environment Strategy

<sup>16</sup> The Park has a site-wide Ecological Management Plan that provides a framework for the management of ecological features during construction. The plan outlines the potential ecological constraints that may be encountered during construction, and provides guidance on the mitigation to be implemented by contractors to prevent unnecessary adverse effects on species and habitats.

<sup>17</sup> London Legacy Development Corporation. Local Plan (2015 – 2031). (adopted 21/7/15)







# INTRODUCTION

## Queen Elizabeth Olympic Park:

Queen Elizabeth Olympic Park is located in Stratford, east London. The Park lies in a strategic position at the junction of the four Olympic 'host' boroughs: Hackney, Newham, Tower Hamlets and Waltham Forest (Figure 1).

Queen Elizabeth Olympic Park is situated within the flood plain of the River Lee<sup>18</sup>. The Hackney Marshes lie to the northwest, while the residential areas of Leyton, Stratford, Bow and Hackney surround the outskirts of the Park. With 226 hectares of green space and public realm, the Park is a key link along the Lee Valley Regional Park green corridor, which runs for 26 miles from Ware to the River Thames.

## London Legacy Development Corporation:

The London Legacy Development Corporation (LLDC) is responsible for the management of the Park and the delivery of the Legacy, which includes the long-term planning, development and maintenance of the site. The LLDC is the successor to the Olympic Delivery Authority and aims 'to promote and deliver physical, social, economic and environmental regeneration in the Olympic Park and the surrounding area'<sup>19</sup>, and manages the Park as a single estate.

## Planning context:

This BAP is the second submitted pursuant to paragraphs 1.1.1, 1.1.2, 1.2.1, 1.2.2 and 1.2.3 of the LCS section 106 agreement. Paragraphs 1.1.1-1.1.3 require the LLDC, prior to the occupation of any units, to submit a BAP for the Park and liaise with relevant stakeholders in its preparation.

The first BAP was approved in October 2013 (planning reference 13/00391/106) and covered the period 2014 - 2019. As set out on pages 9-10 of that document, this Biodiversity Action Plan will cover the period 2019 - 2024, completing a ten-year BAP for the Park.

The Legacy Communities Scheme (LCS) is the residential-led mixed-use scheme to develop



A kestrel hunting in the Wetland Bowl, North Park

a number of development platforms within the Park. It was originally approved in 2012 (11/90621/OUTODA) and subsequently varied in 2014 (14/00036/VAR), 2018 (17/00236/VAR) and 2019 (18/00471/VAR). The original Section 106 has also subsequently been varied, with the latest variations entered into on 25th July 2019. The LCS covers 64 hectares, although excludes wider Park elements such as the retained parklands, venues (including the London Stadium), and the former International Press and Broadcast Centres (now known as "Here East"). However, the BAP obligations relate to the wider Park.

The BAP, as defined in Schedule 10 of the section 106, requires LLDC to:

- Meet a site-wide habitat quantum across the Park. This includes land within and outside of the LCS boundary;
- Build on and deliver the vision for biodiversity enhancement and conservation in the Park;
- Provide a guide to nature conservation measures and biodiversity objectives for those involved in the management and maintenance of the Park;

<sup>18</sup> The River Lee is a central feature of the Park. From its source in Luton, the river (and its many tributaries) drains large parts of rural Hertfordshire, Bedfordshire and Essex, passing through London on its way to the River Thames (Bow Creek). The Lower Lee catchment (in which the Park sits) runs from Hoddesdon (Hertfordshire) to Newham (London), and includes the heavily urbanised surroundings of Stratford

<sup>19</sup> London Legacy Development Corporation: 'A walk around Queen Elizabeth Olympic Park'.





Figure 1: Habitat map to go in.





Grasses in the Asia Garden, South Park

- Outlines action required to establish and conserve species and habitats of conservation concern in the Park;
- Sets out a detailed maintenance and management regime for the BAP habitat in the Park;
- Outlines long-term management actions to ensure successful establishment and an increase in the value of created habitat;
- Promotes coordinated action and increased effort to benefit wildlife in the Park; and
- Provides opportunities for local people to get involved in nature conservation work and biodiversity-related activities.

#### **Provision of BAP habitat:**

Figure 1 shows that 49.09 hectares of habitat was the quantum target set out in the 2014 BAP. This is broadly consistent with the target of 49.1 hectares that is stated in clause 1.1.1 of Schedule 10 (the minimum BAP provision as stated in clause 1.1.2 is for the provision of 45 hectares).

This clause also states that this figure of 49.1 hectares is based on an assumption that 4.4 hectares of BAP habitat would be provided as part of the Stadium Island provision, and that any reduction in this figure should reduce the site-wide figure accordingly. In 2016 a variation to this figure was approved to the Stadium consent (16/00062/VAR) from 4.4 to 3.44 hectares. This reduces the site-wide BAP target to 48.14 hectares.

As shown in Figure 1, 48.97 hectares of permanent BAP habitat has already been provided. At present, 6.17 hectares of habitat is provided on a temporary basis, taking the current provision to 55.14 hectares. However, whilst these temporary habitats will be removed eventually, there is currently a balance of 7.86 hectares which will be provided as part of the Legacy Communities Scheme, UCL East (planning reference 17/00235/OUT) and Stratford



The Great British Garden, South Park

Waterfront (18/00470/OUT) permissions. These totals are secured by conditions, and exclude the 1.24 hectares of Canal Park already delivered and included within the species-rich grassland typology (a total of 9.1 hectares across the three permissions).

Once this future provision is added (and the temporary removed) to the existing permanent provision, this will provide a site wide total of 56.83 hectares of BAP habitat.

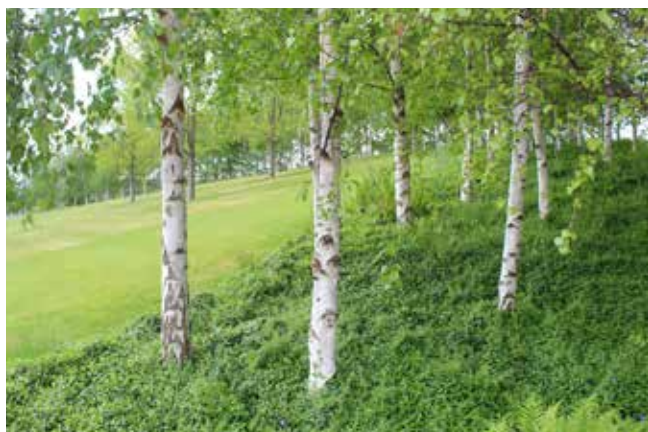
In addition we have also taken into consideration areas of the BAP which were not included in the baseline of the Post-Games Transformation BAP (see Figure 5.6 in the Green Infrastructure Strategy). These areas fall outside of the LCS red line, but within the red line of the Olympic Park plan as defined by Appendix 2 of the Unilateral Undertaking. This includes 11.5 hectares of rivers and canals, and 3.4 hectares of trees and shrubs surrounding Hackney Marshes. This adds an additional 14.9 hectares to the totals set out above as BAP habitat that has been provided within the Olympic Park.

A number of BAP monitoring reports for the 2014-2019 period have already been submitted and approved pursuant to paragraph 1.3 of Schedule 10 (see planning references 15/00255/106 and 18/00237/106). The BAP monitoring reports present the results of ecological surveys carried out on the site since 2014. As well as demonstrating that the Park is fulfilling its original biodiversity ambitions, the data has had a practical application, informing the management of the various habitats found on the Park and highlighting species worthy of inclusion in the new plan .

#### **History: The Park and its transformation:**

Queen Elizabeth Olympic Park is the largest new urban park to be created in the UK for over a century, and was one of the most significant regeneration and public realm projects ever delivered in Europe. The Park created a new landscape of natural habitats, restored waterways and green spaces that were fully





Birch woodland, North Park

integrated with the surrounding communities.

The Lower Lee Valley was once the hub of London's industry, dominated by scrap yards and tanneries, munitions factories and gas works. Following years of neglect, the waterways were polluted, invasive species were widespread and fly-tipping was commonplace<sup>20</sup>. Although the site of London's Olympic Park had many environmental challenges, it did support some significant habitats (eg post-industrial brownfields) and species. The footprint of the Park contained a number of sites that were designated for their nature conservation interest, notably the Bully Point Nature reserve, Eastway Cycle Track, Thornton Fields and Stratford Marsh. In total, 45 hectares of habitat were lost to site clearance and construction. Planning permission placed an obligation on the Olympic Delivery Authority to create at least 45 hectares of habitat as compensation, and to produce a Biodiversity Action Plan that detailed habitat specifications, target species, and the overall aspirations for biodiversity on the Park<sup>21</sup>.

When the Olympic Games were awarded to London in 2005, it provided a unique, once in a generation opportunity to regenerate the area and secure a long-term legacy for the landscape and its communities. The Greater London Plan (1944) was one of the first documents to recognise the potential of the Lee Valley and the site that was to become London's Olympic Park – "the idea of such a park was not new. It was first put forward in Abercrombie's plan to create 'green lungs' for London...but it took a long time to prove a reality."<sup>22 23</sup>



The Californian poppy meadows by Carpenters Lock

The BAP has followed the development of the Park from its creation and the 2012 Games, through to its transformation and legacy; each version of the BAP has reflected the changing nature of the site. The BAP aims to contribute towards the Park's legacy, securing positive long-term management for its habitats and species, and encouraging community involvement in its delivery.

### **The Park today:**

#### **A Park of two characters:**

Today, Queen Elizabeth Olympic Park receives over 6 million visits per year, offering residents and visitors the chance to enjoy a newly created park in the heart of east London.

The Park can be broadly divided into two; each half of the Park has a unique and distinctive character. The North Park was designed to provide a "varied and ecologically rich landscape"<sup>24</sup> of wetlands, woodlands and wildflower meadows with the River Lee at its centre. A total of 6.5 km of waterways have been restored across the Park, creating important corridors for people and for wildlife.

The South Park contains vibrant gardens and meadows, demonstrating how green spaces can be fully integrated into the urban environment. The South Park "builds on London's great tradition of pleasure gardens, and provides a destination park of unusual and distinctive settings with a variety of physical attractions"<sup>25</sup>.

The Canal Park forms a continuous green corridor to the west of the Park. Canal Park was

<sup>20</sup> For more than 100 years, parts of the Olympic site were a dumping ground for domestic and industrial waste; the 20-foot high 'fridge mountain' (on the site of what is now the London Aquatics Centre) was a particularly notable landmark. Much of the land was polluted with contaminants including tar, oil, arsenic and lead. Approximately 1.4 million cubic metres of soil were excavated and cleaned for re-use on the Park – the UK's largest ever soil washing operation. The excavation of the site revealed its rich history, with finds including a 19th Century boat, and 18th Century roadway, iron-age skeletons and numerous other artefacts. On the site of the Velodrome, one trench discovered the former revetments of the 'Tumbling Bay' stream, a channel that had once diverted flow around Temple Mills, and an early example of the River Lee being used as a source of hydraulic power. The Tumbling Bay Playground now stands close to the site of this former stream.

<sup>21</sup> See: London Wildlife Trust (2012) 'A natural legacy of the 2012 Games: London Wildlife Trust's vision for the Queen Elizabeth Olympic Park'.

<sup>22</sup> Digby, B. (2012) *The London 2012 Olympics*. Royal Geographical Society.

<sup>23</sup> The Greater London Plan of 1944 established the strategy for the post-war redevelopment of London. Its predecessor, The County of London Plan (Abercrombie & Forshaw, 1943), recognised the value of green spaces for communities, stating that: 'adequate open space for both recreation and rest is a vital factor in maintaining and improving the health of the people'. The County of London Plan proposed the integration of London's larger open spaces into park systems – 'larger areas of open space...which call for coordination into green wedges leading towards the green belt' - including the Lee Valley, Victoria Park and Hackney Marshes.

<sup>24</sup> Queen Elizabeth Olympic Park: Park Management Plan 'Character Areas' pg.67 (revision 1, January 2017).

<sup>25</sup> Queen Elizabeth Olympic Park: Park Management Plan 'Character Areas' pg.67 (revision 1, January 2017).





North Park wetlands

designed to “provide an effective transition from the rustic canal landscape and the wider industrial context, with ecological patchiness... scrub and ruderal planting, swales and meadow grasses”<sup>26</sup>.

### Participation and stakeholder involvement:

The Legacy Communities Scheme Section 106 Agreement specified that the BAP should provide local people with the opportunity to be involved in nature conservation and biodiversity activities. Community and stakeholder engagement ensures that local people can access the benefits that the Park has to offer, while developing a sense of ownership<sup>27</sup>. OurParklife is a Community Interest company (CIC) that aims to contribute towards the legacy of the 2012 Games by offering employment, training and volunteering opportunities to local people. Launched in 2014, OurParklife seeks to improve the social, economic and environmental wellbeing of residents across the Park by:

- Building local connections – ensuring that local people are kept informed, involved and engaged with the Park
- Providing opportunities for employment and training, offering education sessions for local schools, improving skills and knowledge
- Generating opportunities for new and existing residents to meet and mix, promoting cohesion and inclusion
- Creating opportunities for local people to learn about environmental sustainability and volunteer in conservation-related tasks.

The BAP Steering Group was established in 2014. Our Steering Group partners are wide ranging and include the Host Boroughs and national level conservation organisations. The



The Wetland Bowl in flood (Autumn 2014)

group’s purpose is to share ecological good practice and expertise, identify opportunities for data sharing and shape the delivery of the BAP through a review of annual results and targets.

### Green infrastructure and the benefits of parks for people:

The Park functions as a piece of green infrastructure, delivering benefits for people and the environment. Green infrastructure is “a strategically planned network of high quality green spaces and other environmental features, managed as a multifunctional resource capable of delivering ecosystem services and quality of life benefits required by the communities it serves and needed to underpin sustainability”<sup>28</sup>.

The Park’s Green Infrastructure Strategy aims to make a contribution towards the All London Green Grid – “a new network of wildlife-rich parks will encourage more people to use and appreciate green spaces, which in turn will promote healthier and more active lifestyles and help this part of London adapt to climate change”<sup>29</sup>.

By providing an attractive environment in which to live and work, the Park can help to promote healthy living, create opportunities for recreation, leisure and play, and contribute towards the quality of life of its residents and visitors. The Park’s green infrastructure consists of many different elements: amenity green space and green corridors, allotments, trees and gardens, green roofs and swales, and the mosaic of BAP habitats. Together, these elements deliver widespread benefits that contribute towards the Park’s Natural Capital<sup>30</sup>. The Wetland Bowl is an example of green infrastructure that fulfils an important function and is designed to flood when water levels rise, protecting the Park, its venues, and surrounding properties.

<sup>26</sup> London Legacy Development Corporation (2018) Park Design Guide.

<sup>27</sup> Queen Elizabeth Olympic Park: Park Management Plan ‘Community engagement programme’ pg.89 (revision 1, January 2017).

<sup>28</sup> Natural England (2009) Green infrastructure Guidance. Report NE176.

<sup>29</sup> Legacy Community Scheme (February 2012) Revised Green Infrastructure Strategy. (The All London Green Grid is a policy framework to promote the design and delivery of green infrastructure across London).

<sup>30</sup> Lusardi et al. (2018) Natural Capital Indicators: for defining and measuring change in natural capital. Natural England Research Report, Number 076



A growing body of evidence suggests that a disconnection from the natural world can have a negative effect on people's health and wellbeing<sup>31</sup>. Exposure to green spaces can generate significant social benefits, helping to reduce health inequalities and future care costs; taken for the UK as a whole, the value of this 'Natural Health Service' has been estimated at £34 billion per year<sup>32 33</sup>. High quality green spaces can help to address the so-called "Nature Deficit Disorder"<sup>34</sup>. This term describes the disconnection from the natural world that can occur as a result of people spending more time indoors and/or having limited access to green spaces, such as parks and gardens<sup>35 36</sup>.

Improving access to the natural environment is recognised as a priority in the London Environment Strategy (2018) and the Government's 25 Year Environment Plan (2018). Almost half of London's population are classified as having poor access to parks and green spaces<sup>37</sup>. Greenspace Information for Greater London<sup>38</sup> (GiGL) have developed a method to identify parts of London where people do not enjoy good access to green spaces and the wildlife they support. These are termed 'Areas of Deficiency in Access to Nature' and are defined as "areas where people have to walk more than 1 kilometre to reach an accessible wildlife site of Metropolitan or Borough importance"<sup>39</sup>. 'Areas of Deficiency in Access to Public Open Space' are a separate designation, and reflect the maximum distance that London residents should have to travel to access a Public Open Space, as defined by the London Plan<sup>40</sup>. By understanding areas of deficiency, the intention is that partners can better plan and manage the provision of green and open space in the capital.

### Designing biodiversity into the Park:

The range of habitat types selected to 'create' the Park reflected the diversity of the site prior to construction, as well as the desire to restore different types of vegetation to the area that were otherwise lacking (eg species rich grasslands and native woodlands). The original 2008 BAP established the quantum of new habitat to be delivered, incorporating a flexible margin on the targets (c.20%). The restoration of



Seed heads of common knapweed, over-wintering habitat for *Acinia corniculata*, a picture-winged fly.

the waterways was a major part of the project, and involved the re-profiling of banks and channels that had seen centuries of intensive use<sup>41</sup>. Over 300,000 wetland plants (comprising 28 species) were grown and planted to create the wetland habitats. A variety of habitat installations were built into the fabric of the park; the installations included 150 bat boxes, 525 bird boxes, and two otter holts.

Alongside the quantum totals, the 2008 BAP also set out the longer-term 'Desired Outcomes' for the habitats, in terms of their quality and species composition; the overall intention was to establish a mosaic of habitats that would enable a variety of species to thrive. The Habitat Action Plans (HAPs) and Species Action Plans (SAPs) had an overarching objective to achieve positive gains for nature conservation, 'improving the conservation status of species through habitat creation, enhancement and management'<sup>42</sup>. The detailed specifications for the management of the BAP habitats are set out in the Park Management Plan (eg coppicing cycles and mowing regimes).

### Park management and the Biodiversity Action Plan:

The BAP is part of a wider suite of documents that includes the Park Management Plan and the Park Design Guide. The BAP complements the other documents, ensuring consistency in the way the Park is managed and maintained. The Park Management Plan is reviewed and updated

31 Gelsthorpe (2017) Disconnect from nature and its effect on health and wellbeing. A public engagement literature review. Natural History Museum.

32 NHS (2008) 'Green space' and health (<https://www.nhs.uk/news/lifestyle-and-exercise/green-space-and-health/>)

33 "New research shows UK parks and green spaces generate over £34 billion of health and wellbeing benefits". Fields in Trust (2018).

34 See Moss (2012) 'Natural Childhood: A report for the National Trust'. According to the report, Nature Deficit Disorder describes "the human costs of alienation from nature, among them: diminished use of the senses, attention difficulties, and higher rates of physical and emotional illnesses".

35 As per the above report. Notably, a lack of engagement with the natural world is attributed to the increasing focus on technology and screen-based lifestyles.

36 Greenspace Information for Greater London 'Areas of Deficiency in Access to Nature' (<https://www.gigl.org.uk/w>)

37 See: Greater London Authority (2018) London Environment Strategy (pg.13).

38 GiGL is the capital's environmental records centre, collating and sharing the data that underpins knowledge of London's natural environment ([www.gigl.org.uk](http://www.gigl.org.uk)).

39 Greenspace Information for Greater London 'Areas of Deficiency in Access to Nature' (<https://www.gigl.org.uk>).

40 For regional parks, such as Queen Elizabeth Olympic Park, this distance falls between 3.2 – 8km. Regional Parks are defined as those exceeding 400 Hectares in size (See: <https://www.gigl.org.uk/open-spaces/areas-of-deficiency-in-access-to-public-open-space/>).

41 Prior to the restoration of the waterways, the River Lee's banks consisted largely of steep 'made ground', "the result of centuries of tipping that had raised the ground level by as much as 10 metres. The cocktail of materials on the banks included rubble, glass, animal bones and, more recently, wartime demolition materials from London's east end". (See: Atkins 'London 2012: At the Rivers edge').

42 Olympic Delivery Authority (October 2008) Olympic Park Biodiversity Action Plan (pg.5).



regularly<sup>43</sup>, and contains recommendations to support biodiversity across the site.

The Park Management Plan supports the Green Flag Award, an accreditation that the Park has won every year since 2014<sup>44</sup>. Amongst other objectives, the award seeks to recognise, understand and value biodiversity through the conservation of natural features, flora and fauna. The Green Flag Award Guidance Manual states that these features should be “identified, their characteristics understood and appropriate management strategies put in place to conserve and enhance them”<sup>45</sup>.

The day-to-day management of the Park is guided by the BAP, but is also mindful of conservation laws and regulations – for example, hedgerows are left uncut during the spring and summer months to protect nesting birds during the breeding season (Wildlife & Countryside Act, 1981, as amended).

Park management can be flexible, adapting as opportunities for new habitat become apparent, new challenges are encountered or unusual species are discovered. For example, the meadow cuts are varied each year to create structure for wildlife throughout the seasons. In 2014, a rare fly (*Acinia corniculata*<sup>46</sup>) was recorded over-wintering in the seed heads of knapweed flowers in the swales. Following the find, dead knapweed stems and seed heads are left in place during the autumn and winter months to ensure a continuity in habitat for the fly.

The management of a popular and well-used urban park can bring many challenges. Volunteers have played a significant role in helping to address these pressures through the repair of damaged/vandalised log piles and the removal of invasive plants from the wetlands, as well as other conservation tasks.

The BAP incorporates general principles for habitat management that are intended to act as an overall ‘Species Action Plan’. By promoting sensitive and well-timed management, the BAP can ensure that the Park benefits all wildlife – the common species as well as the rare.

### **A changing Park: Delivering the Legacies Community Scheme (LCS):**

Approximately 10,000 homes will have been constructed on the Park by 2030<sup>47</sup>. The LCS outlines plans for five new neighbourhoods: Chobham Manor, Eastwick, Marshgate Wharf,



The margins of the pond in the Great British Garden – native plants that grow here include hemp agrimony (*Eupatorium cannabinum*) and meadowsweet (*Filipendula ulmaria*).

Pudding Mill and Sweetwater. This phase of the BAP will also see a new cultural and education district – East Bank – developed on Stratford Waterfront, and the creation of a new UCL campus – UCL East – on the former South Park events lawn and Pool Street West.

The LCS recognises the role that green space plays in enriching the environment for the Park’s new communities and businesses. The ‘Built Environment’ BAP habitat will be vital in securing net gains for biodiversity as development progresses. Delivering net gain through the built environment will ensure that the Park meets its wider obligations in terms of local and national policy; for example, the draft New London Plan (2017) places a requirement on new developments to provide high quality green roof habitat for wildlife (Policy 5.11).

The BAP will need to be updated in the coming years to reflect the changing Park and to capture any new areas of habitat that may be created. The plan will need to be flexible to respond to external factors as necessary (eg climate change, future Water Framework Directive enhancements within the Lower Lee catchment).

### **Securing biodiversity net gain:**

Net gain is defined as “development that leaves biodiversity in a better state than before”<sup>48</sup>.

The London Environment Strategy (2018) seeks to secure a net gain in biodiversity (Policy 5.2.1.b) and requires new developments to incorporate ‘ecologically appropriate’ landscaping and other wildlife features (such as nest boxes and bee bricks) into their design. The Government’s 25 Year Environment Plan (2018) contains an objective to ‘embed net gain

<sup>43</sup> At the time of preparation, the most recent update to the Park Management Plan was in January 2019.

<sup>44</sup> The Green Flag Award is recognised as the benchmark national standard for publicly accessible parks and green spaces in the UK (See: [www.greenflagaward.org.uk](http://www.greenflagaward.org.uk)).

<sup>45</sup> Green Flag Award ‘Raising the standard – the Green Flag Award Guidance Manual’. Section 5: Biodiversity, Landscape and Heritage.

<sup>46</sup> Data for *Acinia corniculata* suggest that it may be expanding its range, with records now indicating its presence in London, Sussex, Surrey and Hampshire; despite remaining an elusive species, it is possible that the fly is under-recorded.

<sup>47</sup> London Legacy Development Corporation ‘Homes and Living’ (<https://www.queenelizabetholympicpark.co.uk/the-park/homes-and-living>).

<sup>48</sup> CIEEM/CIRIA/IEMA (2016) Biodiversity Net Gain: Good practice principles for development.





A holly blue butterfly on Californian poppies, South Park.



Park staff installing new bird boxes in preparation for the nesting bird season.



A young goldfinch in the North Park woodlands.



Parks, squares and amenity space by the Timber Lodge, North Park

into new development'<sup>49</sup>. In March 2019, the Government confirmed that the forthcoming Environment Bill would be used to mandate biodiversity net gain<sup>50</sup>.

Net gain recognises that there are opportunities to achieve a positive outcome for biodiversity at all stages of a development, through design, build and maintenance. Examples of how net gain could be achieved on the Park include:

- The creation of new habitat where the opportunity exists, eg new green roofs in the built environment, or reed bed fringes along the canals and waterways.
- The enhancement of existing habitats.
- Improvements to ecological connectivity, better linking the habitats together.
- Delivering the best outcomes for biodiversity – using local knowledge and evidence and quantifying quality and change.
- Exceeding expectations wherever possible.

### Urban Greening Factor:

The London Environment Strategy outlines proposals to increase the amount of green cover in London, with the intention that over half of the city will be green by 2050. The draft New London Plan requires major development proposals to contribute towards the greening of London by incorporating features such as street trees, swales or rain gardens into their designs. The Plan contains an 'Urban Greening Factor', a calculation that has been designed to help boroughs identify the appropriate amount of urban greening required from each development<sup>51</sup>.

The UGF calculation is based on surface cover types and their area, generating a score between 0 and 1 for each site. For example, semi-natural vegetation, wetlands or open water are scored 1; a hedgerow would score 0.6, amenity grassland 0.4 and a concrete surface 0. Guidance states that residential developments should aim for an interim score of 0.4, and commercial developments 0.3.

<sup>49</sup> UK Government (2018) 'A green future: Our 25-year plan to improve the environment'. Department of Food, Environment and Rural Affairs.

<sup>50</sup> DEFRA (13/03/19) Government to mandate 'biodiversity net gain'. (See: <https://deframedia.blog.gov.uk/2019/03/13/government-to-mandate-biodiversity-net-gain/>)

<sup>51</sup> Mayor of London (2018) Draft New London Plan: Policy G5. Urban greening.





Conservation volunteers restoring and re-planting the Californian poppy meadows



Penstemon in the North America Garden



Pied wagtail, which is known to breed within the Olympic Park. All breeding birds, their nests, eggs and young are fully protected by the Wildlife & Countryside Act (1981, as amended).



Another breeding species, chaffinch, in the South Park

### Protecting the Park's wildlife:

The Wildlife & Countryside Act (1981, as amended) is the primary piece of legislation protecting the UK's habitats, plants and animals. The Act protects all wild birds, their nests, eggs and young, as well as a variety of other species. The Act makes it an offence to 'intentionally or recklessly kill, injure or take any wild animal listed on Schedule 5, and prohibits interference with places used for shelter or protection'<sup>52</sup>. Plants listed on Schedule 8 are protected from intentional picking, uprooting, destruction and sale<sup>53</sup>.

Birds listed on Schedule 1 of the Act are fully protected and receive additional protection during the breeding season, as do their nests, eggs and dependent young; to date, five Schedule 1 birds have been recorded on the Park: black redstart (*Phoenicurus ochruros*), Cetti's warbler (*Cettia cetti*), kingfisher (*Alcedo atthis*), fieldfare (*Turdus pilaris*) and redwing (*Turdus iliacus*).

The Act prohibits the release of a number of invasive non-native flora and fauna into the wild. Invasive species pose a significant threat to the environment, damaging sensitive habitats and species; as such, they are considered one of the greatest threats to global biodiversity, alongside climate change and pollution<sup>54</sup>.

Under Section 14 of the Act, it is an offence to "release, or allow to escape into the wild any animal which a) is of a kind which is not ordinarily resident in and is not a regular visitor to Great Britain in a wild state; or b) is included on Part I of Schedule 9"<sup>55 56</sup>. The Act makes it illegal to "plant or otherwise cause to grow" in the wild any plant on Schedule 9, a list that includes Japanese knotweed (*Fallopia japonica*) and floating pennywort (*Hydrocotyle ranunculoides*).

The London Invasive Species Initiative (LISI) has produced a list of species which may pose a risk in London; this list, which helps to prioritise

<sup>52</sup> See JNCC: The Wildlife and Countryside Act (<http://jncc.defra.gov.uk/page-1377>). Animals listed on Schedule 5 include the great crested newt (*Triturus cristatus*), water vole (*Arvicola amphibius*) and all species of bat in the UK, of which there are 18 species (17 breeding). Examples of 'places used for shelter or protection' include otter holts and bat roosts.  
<sup>53</sup> Plants listed on Schedule 8 include the native bluebell (*Hyacinthoides non-scripta*) and Deptford pink (*Dianthus armeria*).  
<sup>54</sup> GB Non-native Species Secretariat (<http://www.nonnativespecies.org/index.cfm?pageid=70>).  
<sup>55</sup> Text extracted from the Wildlife & Countryside Act (1981, as amended) and accessed via: [www.legislation.gov.uk](http://www.legislation.gov.uk)  
<sup>56</sup> Section 14 of the Act also makes it an offence to release or allow any of the native birds listed on Part I of Schedule 9 into the wild without an appropriate licence. This list includes the red kite (*Milvus milvus*) and the barn owl (*Tyto alba*), and aims to prevent the unauthorised release of vulnerable species into unsuitable habitat.





Reducing environmental pressures – volunteers help to clear Himalayan balsam from the North Park reed beds.

actions, is held by GiGL, and includes the Spanish bluebell (*Hyacinthoides hispanica*) and goats rue (*Galega officinalis*).

### Wildlife and development:

Construction activities have the potential to result in an adverse impact on the Park’s habitats and species, for example through the loss and fragmentation of habitat, or the risks posed to hibernating animals from machinery and plant. Construction can also create general disturbances – eg noise, light and dust – that can have a negative effect on surrounding wildlife.

The Park’s Ecological Management Plan (April 2017) sets out a framework for the management and protection of ecological features during construction<sup>57</sup>. The Plan lists the ecological receptors across the Park, and the mitigation required to avoid causing harm and/or disturbance<sup>58</sup>. Development proposals are required to demonstrate, at an early stage, how they will mitigate any adverse impacts and protect biodiversity during construction, for example by minimising light spill to protect bat boxes and roosts, as well as the Park’s dark corridors<sup>59</sup>.

The Ecological Management Plan aims to prevent negative impacts as a result of construction, ensuring that the Park complies with planning policy and legislation, most notably the Wildlife & Countryside Act (1981, as amended). Developers are required to produce site-specific EMPs for each development parcel, a requirement that is fulfilled through the planning process.

### Wildlife and Park operations:

The Park is a popular visitor attraction and



Improving our knowledge of the natural environment – the green roof of the Media & Press Centre, where invertebrate surveys have revealed some interesting and rare finds.

holds a number of high-profile events each year. The Park Management Plan contains an Events Impacts Assessment checklist that outlines the steps required to ensure that events do not have a negative impact on wildlife and/or habitats<sup>60</sup>.

There is a high likelihood that Park operational staff will encounter wildlife during the working day. Operational staff receive biodiversity Toolbox Talks that cover a range of topics, from hedgerows and nesting birds to biosecurity protocols and invasive species, and aim to raise awareness about the biodiversity of the Park, its management and protection.

### Reflecting biodiversity policy:

The Park’s Section 106 agreement states that the BAP should “identify strategic directions that take account of the international, national, regional and local conservation scene”<sup>61</sup>.

The Convention on Biological Diversity (CBD) was the first global treaty to provide a legal framework for the protection of biodiversity. Signed at the 1992 Earth Summit, the CBD required its signatories to develop strategies to halt the loss of biodiversity and secure the sustainable use of its resources.

The UK Biodiversity Action Plan was produced in 1994 to fulfil the UK’s commitments to the CBD and outlined actions to protect a range of habitats that included rivers and streams, hedgerows, broadleaved woodlands and reed beds. The BAP recognised over 1000 species as priorities for conservation action<sup>62</sup>.

Since 1994, a number of global and international agreements have driven the UK’s approach to conservation. The UK Post-2010 Biodiversity Framework (2012) superseded the UK BAP and

<sup>57</sup> London Legacy Development Corporation (April 2017) Site-Wide Ecological Management Plan (LCS-GLB-SUP-ECMP-001-V03).

<sup>58</sup> Receptors: A receptor is defined as anything that could be affected by an environmental impact, including humans, habitats, species, waterways, the landscape or cultural heritage.

<sup>59</sup> To protect the Park’s nocturnal wildlife, certain areas of the North Park are kept dark at night.

<sup>60</sup> See: Park Management Plan (Appendix 10).

<sup>61</sup> Extract taken from the previous LCS Biodiversity Action Plan (2014 – 2019).

<sup>62</sup> A number of species that are present on the Park were UK BAP Priority Species, including the common toad (*Bufo bufo*), grass snake (*Natrix natrix*), common linnet (*Linaria cannabina*), song thrush (*Turdus philomelos*) and the European eel (*Anguilla Anguilla*).





Wildflower meadows and amenity grasslands in the Wetland Bowl, North Park.

represented a change in conservation strategy, recognising the importance of managing the environment as a whole and acknowledging nature in decision making<sup>63</sup>.

The Government's white paper, *The Natural Choice: Securing the value of Nature*, was published in 2011 and outlined ambitions for a "more integrated, landscape-scale approach" to conservation<sup>64</sup>. The paper emphasised the value that could be gained by connecting people to nature, recognising that a high quality natural environment can foster healthy neighbourhoods and be of benefit to physical and mental health.

Conservation efforts in England are currently guided by the 'Biodiversity 2020' strategy<sup>65</sup>. The central vision of the strategy is: "to halt overall biodiversity loss, support healthy well-functioning ecosystems and establish coherent ecological networks, with more and better places for nature for the benefit of wildlife and people"<sup>66</sup>. The strategy has 4 key themes:

- An integrated and large-scale approach to conservation.
- Putting people at the heart of biodiversity policy.
- Reducing environmental pressures.
- Improving our knowledge of the natural environment.

The Government's 25-Year Environment Plan



A common blue butterfly on fleabane on the banks of the River Lee.

(2018) seeks to "improve the environment within a generation...leaving it in a better state than before"<sup>67</sup>. Goals include the delivery of clean air and water, thriving plants and wildlife, and enhanced resilience to climate change. The plan recognises the value of the environment for people - "making sure that there are high quality, accessible, natural spaces close to where people live and work, particularly in urban areas, and encouraging people to spend time in them to benefit their health and wellbeing".

#### Strategies for London:

The London Biodiversity Action Plan (2000, as amended) followed an extensive audit of habitats and species in the capital, and laid the foundations for many of the local BAPs that were developed and delivered at borough level<sup>68</sup>. The Mayor's biodiversity strategy (published in 2002<sup>69</sup>) helped to shape the London Plan (2004, as amended<sup>70</sup>) and outlined a London-wide framework for the protection of the capital's habitats and species. Both documents built on the earlier development of London's Sites of Importance for Nature Conservation (SINC) system, and policies intended to protect sites of wildlife interest and provide access to nature (c.1980s). This background is reflected in the current SINC network of over 1500 sites, as well as current Mayoral and borough plans and strategies relating to the conservation of biodiversity.

63 Following devolution in 1998, the four countries of the UK developed their own strategies for the conservation of biodiversity to better reflect country-level priorities, natural resources, habitats and species. 'Conserving Biodiversity - the UK Approach' (2007) was a shared vision adopted by the devolved administrations and the UK Government to reflect new drivers that had come into force since the publication of the UK BAP (eg the findings of the Millennium Ecosystem Assessment, 2005). The UK Post-2010 Biodiversity Framework (July 2012) represented a strategic change in conservation thinking, following the publication of the CBD Strategic Plan for Biodiversity (2011 - 2020) and the 20 Aichi Targets (arising from Nagoya 2010), and the EU Biodiversity Strategy (2011). The Post-2010 framework shows how the four countries will contribute to the Aichi targets, outlining the actions needed to compliment individual country strategies.

64 DEFRA (2011) *Biodiversity 2020: a Strategy for England's wildlife and ecosystem services* (pg. 4)

65 DEFRA (2011) *Biodiversity 2020: A Strategy for England's Wildlife and Ecosystem Services*.

66 DEFRA (2011) *Biodiversity 2020: a Strategy for England's wildlife and ecosystem services*.

67 UK Government (2018) 'A green future: Our 25 year plan to improve the environment'. Department of Food, Environment and Rural Affairs.

68 The London Biodiversity Partnership was formed in 1996, and comprised a number of conservation organisations that helped to shape and develop the London BAP and its later amendments (c.2008). Although the Partnership was disbanded in 2013, the foundations of its work, and that of the London BAP, continue to shape many borough plans focused on the conservation of biodiversity.

69 The Greater London Authority Act (1999) required the Mayor of London to produce a biodiversity strategy for the capital. Published in 2002, 'Connecting with London's Nature' created a framework through which London's natural environment could be protected and enhanced. It also established the criteria for the assessment/ designation of SINC in London.

70 The London Plan is the strategic development plan for London, prepared by the Mayor in accordance with The Greater London Authority Act (1999). The London Plan sets out an integrated economic, environmental and social framework for the development of London over the next 20 - 25 years, and reflects international and national policies regarding nature conservation.



The draft New London Plan (2017)<sup>71</sup> advocates the use of green infrastructure within the city, recognising that green spaces, street trees and other natural assets can deliver multiple benefits: “promoting mental and physical health and wellbeing; adapting to the impacts of climate change; improving air and water quality; encouraging walking and cycling; and conserving and enhancing biodiversity and ecological resilience alongside more traditional functions of green space such as play, sport and recreation”<sup>72</sup>. The Plan promotes the importance of securing a net gain for biodiversity through new developments, and lists the Park as an example of how green space can be integrated into the public realm – “development proposals in the area should embody the highest achievable environmental standards... for the full range of benefits they bring” (Policy 2.4).

The London Environment Strategy (2018) affirms the Mayor’s commitment to improving the environment, and recognises the Capital’s habitats and species as a vital natural asset. The Strategy outlines the Mayor’s expectation that all London Borough’s and major land owners will share biodiversity data with GiGL and contribute towards the London dataset<sup>73</sup>. The Strategy also contains the criteria that are used to designate SINC’s in London<sup>74</sup>.

### SINC’s – Sites of Importance for Nature Conservation:

Sites of Importance for Nature Conservation are sites identified for their value to wildlife and the benefits that they provide for people through contact with the natural world<sup>75</sup>. Approximately 20% of London is designated as a SINC. London’s portfolio of SINC’s comprises a diverse array of green spaces, from nature reserves and public parks, to community gardens and cemeteries. SINC’s are afforded levels of protection in planning policy<sup>76</sup>, and provide the core framework required to safeguard London’s biodiversity.

Three tiers of SINC are recognised in London:

1. **Sites of Local Importance** – sites with a local conservation value that give people access to nature close to their homes, eg parks or community gardens. Cover just over 1% of London’s land area.

2. **Sites of Borough Importance** – sites that support important habitats, such as grasslands, rivers, reed beds and woodlands. This category includes mature parks and gardens that may have a particular biodiversity interest, eg a high proportion of veteran trees. Cover almost 8% of London.
3. **Sites of Metropolitan Importance** – sites that are important on a London-wide or national scale, containing the best examples of habitats and species, or having a particular significance in heavily built up areas of the city. Cover around 10% of London.

Achieving a SINC designation (Site of Metropolitan Importance, Grade 1 status) is a long-term ambition of the Park.

SINC’s can help to address areas of deficiency in access to nature and public open space – “SINC’s provide ideal opportunities for people to take a walk, relax and escape city life. Without them, most people would have to travel further afield to gain that experience”<sup>77</sup>.

### London Legacy Development Corporation Local Plan (2015 – 2031):

As the Local Planning Authority for the Park, the LLDC is required to produce a Local Plan. The Local Plan “sets out the Legacy Corporation’s strategy for the sustainable development of its area as a whole... and the policies to which applications for planning permission should conform”<sup>78</sup>.

Development proposals are required to demonstrate how they will contribute positively to the area and “enhance their unique built and natural context and create locally distinctive places for people, wildlife and the environment”<sup>79</sup>.

Policy BN.3 ‘Maximising Biodiversity’ requires development proposals to:

1. Maximise opportunities to protect and enhance biodiversity.
2. Provide a net gain in the extent of habitat suitable for species to thrive.
3. Integrate habitat and other measures that will support biodiversity.
4. Ensure measures are taken to conserve and promote Sites of Importance for Nature

<sup>71</sup> The current version of the London Plan (published 2016) is the adopted development plan; the draft ‘New London Plan’ is currently in consultation, and is a material consideration in the planning process, gaining more weight as it moves through the process towards adoption (Mayor of London: ‘What is the New London Plan?’ (See: [www.london.gov.uk](http://www.london.gov.uk)).

<sup>72</sup> See: Policy G1 ‘Green Infrastructure’ (8.1.1) in the draft New London Plan.

<sup>73</sup> See: London Environment Strategy (2018) ‘Proposal 5.2.1.d’, pg. 190.

<sup>74</sup> See: London Environment Strategy (2018) Appendix 5: SINC selection.

<sup>75</sup> London Wildlife Trust. ‘Protecting Local Wildlife Sites’ (See: <https://www.wildlondon.org.uk/SINC-review>).

<sup>76</sup> A number of SINC’s are designated as Local Nature Reserves, or have other statutory designations, which may give them some additional protection through the planning process.

<sup>77</sup> London Wildlife Trust (2015) ‘Spaces Wild: Championing the values of London’s wildlife sites’.

<sup>78</sup> London Legacy Development Corporation (August 2014) Local Plan (2015 – 2031).

<sup>79</sup> As per previous reference.

Conservation (SINCs) where relevant.

5. Retain trees and contribute to tree planting.
6. Take account of habitat and species targets in relevant Biodiversity Action Plans (BAPs) to ensure that proposals are suitable for their location.
7. Support other measures to address BAP objectives, including monitoring.
8. Ensure major applications are accompanied by a Biodiversity Statement.

**Local Biodiversity Action Plans:**

The Lee Valley Regional Park Authority and the four Host Boroughs have Biodiversity Action Plans in place. Many of the habitats and species overlap with those found on the Park, including the black redstart – a flagship species in the Tower Hamlets BAP. Through the delivery of the BAP on Queen Elizabeth Olympic Park, we aim to contribute more broadly towards conservation efforts in the surrounding area.

Working with and supporting the Host Boroughs and Lee Valley in the implementation of their BAPs is of primary importance, and we hope to maximise opportunities to align our conservation efforts with local biodiversity work. Examples of how this could be achieved include: combining skills and expertise in BAP monitoring, filling in knowledge gaps regarding species distribution, engaging with volunteers and working together on shared pressures (eg invasive species).

**Consistent themes:**

A number of themes emerge from the UK’s conservation strategies and policies, themes that we aim to reflect throughout this BAP:

- Addressing the loss of biodiversity through targeted actions for habitats and species.
- Putting people at the heart of biodiversity – increasing awareness, understanding and enjoyment of the natural environment, and delivering opportunities for people through education and volunteering.
- Restoring and enhancing biodiversity in the urban environment through good design, planning and practice.
- Securing net gains for biodiversity wherever possible.
- Reducing environmental pressures, such as invasive species, pests and diseases.
- Sharing and developing knowledge, and using this knowledge to inform and improve management.
- Ensuring that biodiversity is fully taken into account in decision-making.

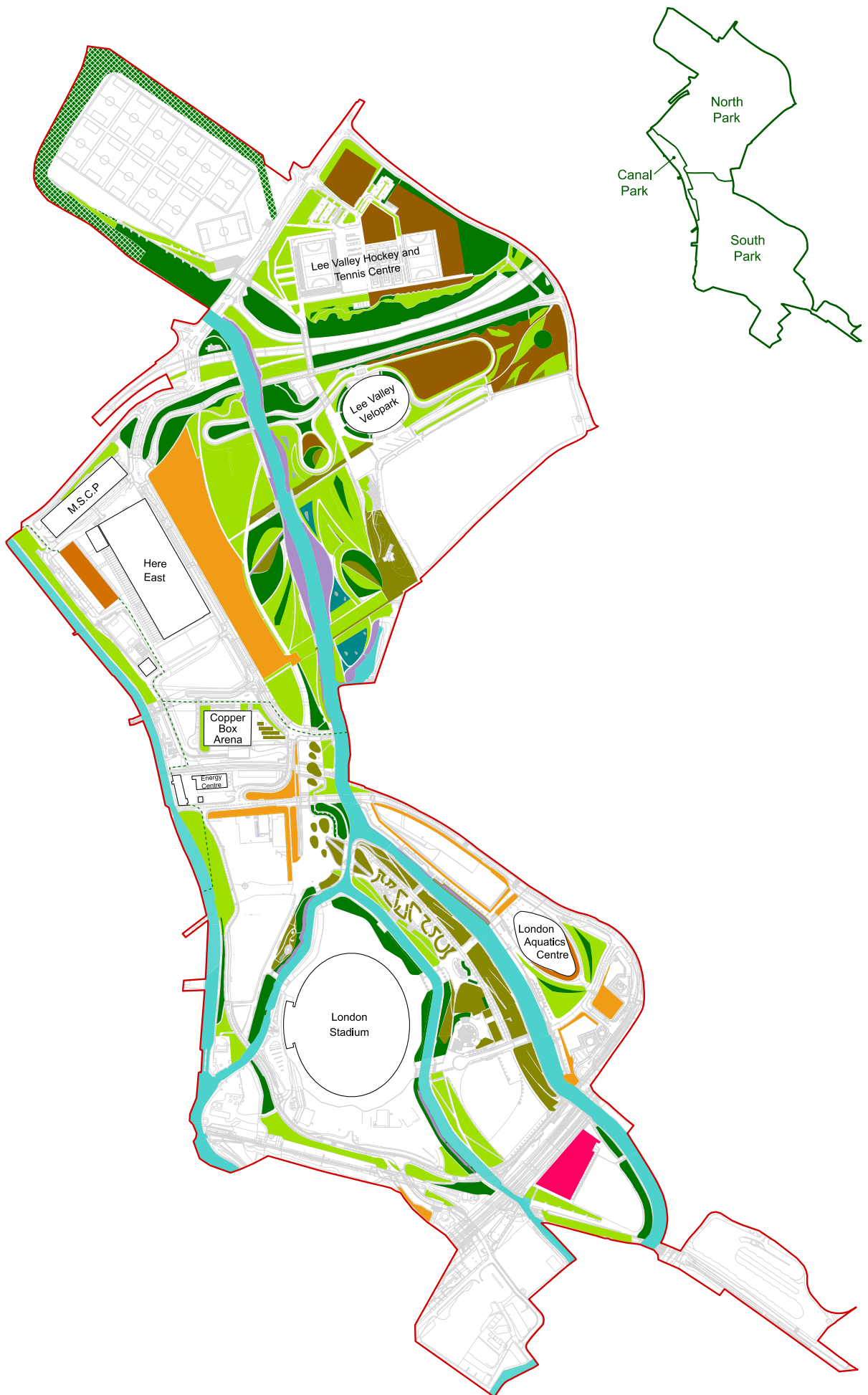
**Biodiversity visions for Queen Elizabeth Olympic Park:**

The biodiversity visions for the Park set out our themes for nature conservation and build on the previous two versions of the BAP. The visions contain long-term aspirations for the Park and create the foundations for many of the BAP community activities and actions (Table 2).

**Table 2:** Biodiversity visions for Queen Elizabeth Olympic Park:

<b>Nature designation</b>	For the quality of biodiversity in the Park to meet criteria for designation as a Site of Metropolitan Importance for Nature Conservation by 2024.
<b>Landscape function and connectivity</b>	For the Park to provide a functional green corridor, facilitating the movement of species through the Lee Valley.
<b>Innovation</b>	To be an exemplar in the delivery and management of wildlife-rich habitats within a high profile urban park.
<b>Climate change adaptation</b>	To manage ecological features within the Park to help protect local communities from the impacts of climate change.
<b>Delivering social benefits</b>	To ensure that biodiversity contributes to social wellbeing and economic welfare, and develops the links between nature and wellbeing. Develop further on the Park’s successful volunteer programme, and incorporate additional biodiversity activities into the programme wherever possible.
<b>Reducing environmental pressures</b>	Use the lessons learnt during the last 5 years to contribute towards the management of environmental pressures including pests, diseases and invasive species.
<b>Raising the profile of biodiversity</b>	Engage people with biodiversity and conservation, and encourage a care for the natural world that extends beyond the Park’s boundaries.





# ACTION PLANS – Habitat

There are ten habitat types on the Park: reed beds and ponds; wet woodlands and rivers; species-rich grassland; trees and scrub; brownfield; built environment; parks; squares; and amenity space and allotments (Table 3). The allotments are now leased to a local allotment society and do not fall under the direct management of the Park. Over 48 hectares of new ‘BAP habitat’ have been created on the Park to date. It is anticipated that further habitat will be created as the LCS is delivered, therefore the habitat quantities will need to be updated and revised at a later date.

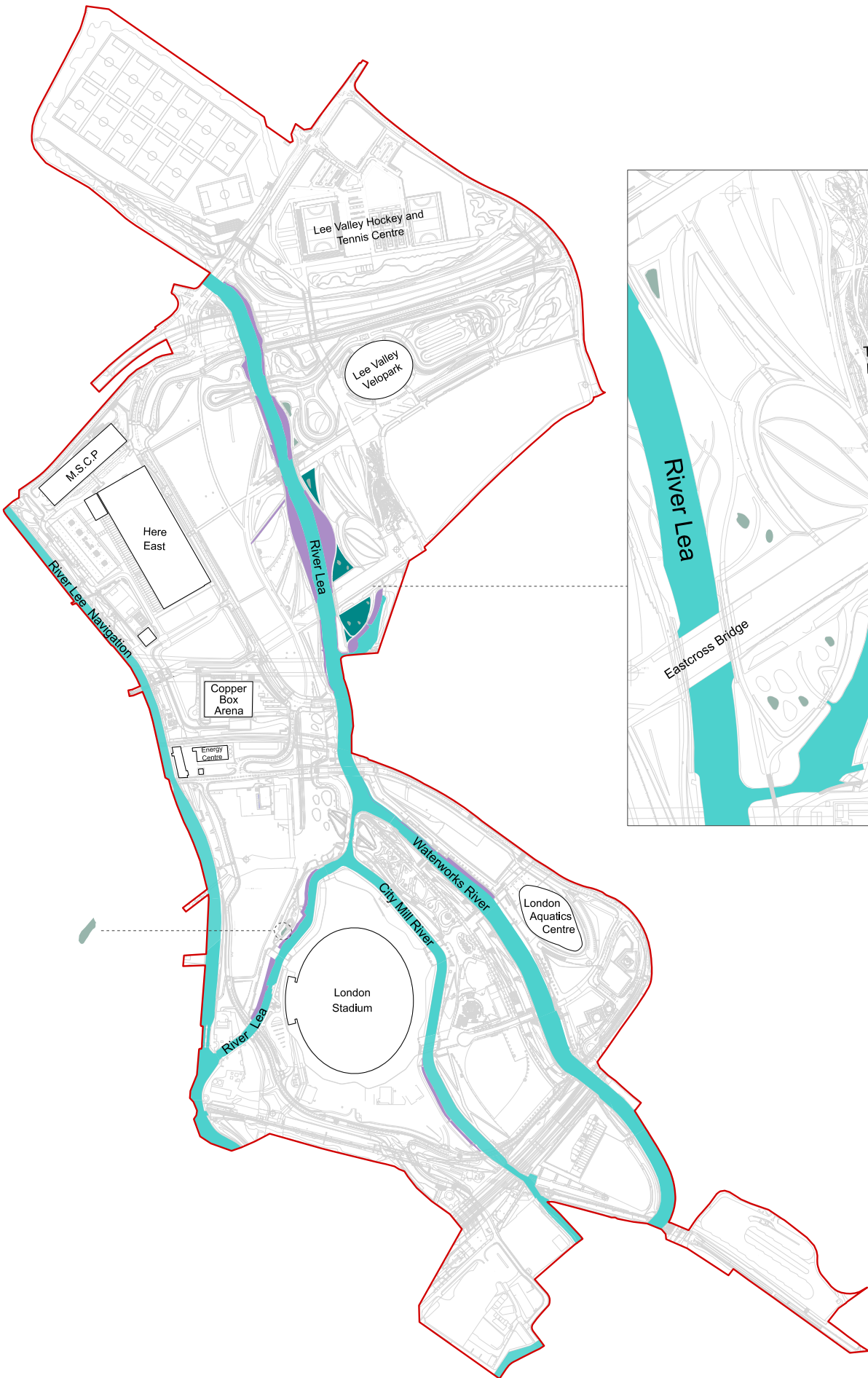


Bird boxes built into the bridge abutments – an example of habitat provided by the built environment. Monitoring has revealed that birds are using the boxes to nest and rear their young.

**Table 3:** Biodiversity Action Plan habitats on Queen Elizabeth Olympic Park.

	BAP habitat	Area (Hectares)	Description
Built environment	Allotments	0.88	Plots that will include hedgerows, grassy areas, compost heaps and other features to attract wildlife.
	Brownfield <sup>&lt;?&gt;</sup>	5.9	Bare and stony ground with patches of pioneer and ruderal vegetation and scrub. Much of the Park’s brownfield habitat is found around Lee Valley VeloPark and the cycle tracks.
	Built environment	0.76	Wildlife features incorporated into buildings and structures, including bat and bird boxes in the bridges, green roofs and living walls.
	Parks, squares and amenity space	6.58	Habitat that forms the fabric of the Park including trees, flower-rich gardens and ornamental plantings, amenity lawns and shrub beds.
Wetlands	Ponds	0.075	Ponds with shallow margins surrounded by native wetland plants. Habitat area calculations include the surrounding terrestrial habitat. The majority of the ponds are found in the North Park; there is another pond in the South Park (Great British Garden).
	Reed beds	1.99	Wetlands that are dominated by common reed. Reed beds are present along many of the Park’s waterways, with the largest stands found in the North Park (River Lee).
	Rivers	0.25	All waterways and rivers on the Park, including the River Lee, Old River Lea, City Mill river, Waterworks river and Lea Navigation. The 0.3 Ha of BAP habitat refers to the former Bully Point (now the North Park wetlands and Wetland Bowl).
Grassland	Species-rich grassland	19.65	Grasslands on low fertility soils, supporting native wildflowers. Found throughout the Park. Grasslands are cut on rotation to provide structure and variety through the seasons.





	BAP habitat	Area (Hectares)	Description
Woodland	Trees and scrub	12.34	Native trees and shrubs including hazel, hawthorn, blackthorn, oak, ash and birch.
	Wet woodland	0.55	Woodland on poorly drained and seasonally wet soils. Willow, alder, black poplar and birch are the main tree species present in the wet woodlands.
<b>Total:</b>		<b>48.975 Hectares</b>	

**The aims of the Habitat Action Plans (HAPs) are to:**

- Protect and encourage species through habitat creation, enhancement and sensitive management.
- Maintain good quality natural habitat that connects the Park with its neighbouring sites, including the Lee Valley.
- Encourage public access to green space and provide opportunities for people to engage with nature.
- Ensure that the habitats enhance resilience to climate change.
- Monitor the progress of the HAPs and the development of the habitats, and use the findings to adjust and improve our management if necessary.



The common blue butterfly, one of the species that benefits from mosaic management.

bare ground for basking, herb-rich swards that contain birds-foot trefoil (its main food plant) and taller vegetation in which it can shelter, roost and lay its eggs.

**WETLANDS**

**Overview:**

Wetland habitats are a distinctive part of the Park’s landscape. Four types of wetland habitat are present on the Park; reed beds, ponds, wet woodlands and rivers.

As well as providing a habitat for wildlife and a recreational resource for visitors, the wetlands supply a range of ecosystem services such as flood attenuation and pollution control. The wetlands are an integral part of the Park’s natural capital – “the elements of nature that directly or indirectly produce value to people, including ecosystems and species, as well as natural processes and functions”<sup>82</sup>. Wetlands and floodplains are widely recognised as natural capital assets that generate many benefits for people<sup>83</sup>. By reducing flood risk and slowing flow during peak rainfall events, the Park’s wetlands deliver a significant flood attenuation function that protects over 5000 properties.

Four rivers cross the Park: the River Lee, Old River Lea, City Mill River and Waterworks River.

**Creating a mosaic across the Park:**

Many of the Habitat Action Plans outline measures to create a mosaic through management. The mosaic approach involves “integrating the requirements of species into habitat management, ensuring that species have the places they need to live and reproduce”<sup>80</sup>.

Mosaic management aims to ensure that a variety of different elements are present across a landscape. These elements can include bare ground, short grass, scattered trees and scrub, and patches of tall ruderal or wildflower-rich vegetation. The overall aim of mosaic management is to provide species with a wide variety of habitats that will enable them to complete their life cycle. England’s ‘Biodiversity 2020’ Strategy states that mosaics are a vital part of the ecological network, enabling species to move between core areas of habitat<sup>81</sup>. Mosaic management can be particularly valuable in supporting the life cycle of butterflies and other invertebrates; for example the common blue butterfly (*Polyommatus icarus*) requires

80 Natural England Access to Evidence (2013) The Mosaic Approach: Managing Habitats for Species (Report: B2020-009).

81 DEFRA (2011) ‘Biodiversity 2020: a Strategy for England’s wildlife and ecosystem services’.

82 Natural England (2018) Natural Capital. (See: <https://eip.ceh.ac.uk/naturalengland-ncmaps>).

83 Lawson et al. (2018) The natural capital of floodplains: management, protection and restoration to deliver greater benefits. Valuing Nature Natural Capital Synthesis Report, VNP09.



The rivers are important ecological corridors that connect many of the habitats together. The majority of the wetland habitat is found along the River Lee in the North Park. The river splits into three at Carpenters Lock; here the rivers become more urban in character, with concrete walls, moorings and pontoons. The Lea Navigation flows alongside the Canal Park, marking the western boundary of the Park.

Species recorded in the Park's wetlands include reed warbler (*Acrocephalus scirpaceus*), water rail (*Rallus aquaticus*), little egret (*Egretta garzetta*), sand martin (*Riparia riparia*), goldcrest (*Regulus regulus*), grey wagtail (*Motacilla cinerea*)

and smooth newt (*Lissotriton vulgaris*), as well as a variety of bats and freshwater fish such as the European eel (*Anguilla anguilla*). Breeding bird surveys have noted an increase in Cetti's warblers (*Cettia cetti*) in the wetlands since 2016 – this is not unexpected; the birds were once considered rare, but have been increasing in numbers across London and the south-east in recent years<sup>84 85</sup>.

### Challenges in managing the wetland habitats:

A well-connected river corridor brings many opportunities for wildlife and for people, but can pose challenges to wetland management (Table 4).

<sup>84</sup> British Trust for Ornithology. 'Cetti's warbler' (<https://www.bto.org/volunteer-surveys/birdtrack/news-archive/2015-05/cettis-warbler>)  
<sup>85</sup> Individual males have been seen singing in scrub, indicating potential breeding territories. Cetti's warbler first bred in the UK in 1973, and the species has since spread rapidly across southern and eastern England. The London Bird Report (2017) estimated that by 2014, territories in London had increased by almost 40%.

**Table 4:** Challenges and pressures on the wetland habitats

Water quality	Pollution from the River Lee can have a negative impact on the ponds when the river is in flood. Fish kills can occur when dissolved oxygen levels are low and temperatures are high. Blue-green algae affected the Stadium Loop during the summer of 2016.
Invasive non-native species (flora)	Seeds and fragments of invasive plants are readily transported onto the Park by water. A number of invasive, non-native aquatic plants are present in the Park's waterways. One such plant is New Zealand pygmyweed ( <i>Crassula helmsii</i> ), which grows in the lagoon between Waterden Road and Carpenters Road.
Invasive non-native species (fauna)	Occasional records of Chinese mitten crab ( <i>Eriocheir sinensis</i> ) and other invasive aquatic fauna, particularly around the Stadium Loop and the Carpenters Lock junction.
Water levels	Water levels can fluctuate along the waterways depending on abstraction rates and conditions further upstream.
Recreational pressures	Boats can damage the reed beds if they turn too fast, buffer against the edge of the habitat or cause pollution (oil and fuel spills). Wash from boats can scour and erode the riverbanks.
Lighting	The River Lee is a relatively dark corridor. Strong or inappropriate lighting can disturb the Park's nocturnal wildlife, including bats.
Development and events	Potential for construction works and events to have a negative impact if poorly mitigated, eg through noise, pollution, artificial lighting or dust.

### Reed beds

Reed beds are associated with open water and the edges of slow-flowing rivers, ditches and streams. Reed beds are not rich habitats, and are typically dominated by the common reed (*Phragmites australis*) and other flood-tolerant grasses. The common reed is the UK's tallest native grass and can reach heights of 2-3 metres, creating dense stands that provide sheltered habitat for wetland birds as well as other wildlife. Reed beds are amongst the most valuable habitats for birds in the UK and can support a diverse assemblage of invertebrates, including several Red Data Book species<sup>86</sup>.

Reed beds are considered rare in the UK; today, fewer than 5000 hectares of the habitat remain. Historically, many of London's reed beds were found along the River Lee and its tributaries, although much of the habitat has since been lost to urban development and the hard-engineering of river edges. The total resource for London is estimated at 125 hectares; the Park currently has 1.6 hectares of reed bed.

The majority of the Park's reed bed is found in the North Park, on the east and west banks of the River Lee, where there are two extensive beds. Smaller fringes of reed bed are found across the Park. The margins of the reed beds

<sup>86</sup> Biodiversity Recording and Information Group (2008) 'UK BAP Priority Habitat Descriptions: Reedbeds'



Purple loosestrife (*Lythrum salicaria*), a tall plant that grows in wetland habitats including reed beds and marshes.

support a greater diversity of wildflowers, such as meadowsweet (*Filipendula ulmaria*), sweet flag (*Acorus calamus*) and purple loosestrife (*Lythrum salicaria*), as well as scattered birch and willow scrub.

The design of the reed beds incorporates features to encourage biodiversity; a variety of inlet channels and backwaters create sheltered and still water for fish fry and young eels, and marginal hunting areas for birds such as grey heron (*Ardea cinerea*).

By following recognised principles of good management, we can ensure that the Park's reed beds offer maximum value to wildlife. This habitat action plan targets two key areas: the creation and management of structural diversity, and the control of invasive non-native plants, which have posed a significant challenge to the management of the reed beds to date.

### 1. North Park reed beds – varying the structure and creating a diverse habitat:

Reed beds are dynamic habitats and can change quickly in response to fluctuating water levels; beds can dry out rapidly if water levels are low, encouraging scrub to establish and spread. A management regime that creates a diversity of structure (a mosaic) in the reed bed is therefore key to maintaining its value for wildlife<sup>87</sup>.

Cutting the reeds on a short rotation can help to create structural diversity. The aim is to have reeds of different ages and heights – young, rejuvenating and mature – to ensure that a variety of species needs are met. For example:

- Freshly cut reeds with stubbles create open areas for hunting and foraging, and are good for wetland birds such as common snipe (*Gallinago gallinago*).
- The edges between freshly cut and mature



Reed beds on the banks of the River Lee, North Park

reeds should encourage reed warblers (*Acrocephalus scirpaceus*), which are thought to breed at higher densities along such margins.

- Dense patches of tall reed offer cover and protection to breeding reed buntings (*Emberiza schoeniclus*).
- Scrub – a mixture of dry and wet scrub (c. 5 – 10%) will benefit nesting birds such as Cetti's warbler.
- Shallower marginal areas that are well-sheltered, providing cover for hunting birds like the grey heron.
- Dead reed stems and litter to benefit wetland invertebrates and grass snakes (potential egg-laying sites).
- A proportion of nettles (*Urtica* sp.) in the reeds can support wildlife; large numbers of butterfly caterpillars were found on nettles in the North Park beds in 2017<sup>88</sup>.
- A diversity of wetland plants along the margins, such as bur-reeds (*Sparganium* sp.) and sedges (*Carex* sp.).



The North Park reed beds – a mosaic of young and mature reeds and other wetland grasses.

<sup>87</sup> RSPB: 'Bringing reed beds to life: Creating and managing reed beds for wildlife'.

<sup>88</sup> Caterpillars of peacock (*Aglais io*) and small tortoiseshell (*Aglais urticae*) butterflies noted during reed bed survey work; the small tortoiseshell's latin name reflects the butterfly's dependence on nettles (*Urtica* sp.) as a host/food plant for its larvae.





A common darter dragonfly basks by the pond in the Great British Garden.

The large stands of reed in the North Park offer the best opportunity to create a structurally-diverse habitat. The reed beds are cut each year (autumn), but there is scope to vary the approach to management and enhance this habitat; opportunities to date have been somewhat limited by the growth of Himalayan balsam (*Impatiens glandulifera*) and the risk of spreading this invasive weed during habitat works.

The Park Management Plan specifies that a maximum of 20% of the reed beds should be cut each year. Suitable areas should be identified and agreed as part of the autumn/winter works schedules.

## 2. Managing invasive non-native species:

The reed bed on the east bank of the North Park has been badly affected by Himalayan balsam in recent years, and significant quantities of the weed are removed each year. Large stands of the plant are present along the Hackney Marshes, and the seeds flow into the Park on the River Lee.

A new Species Action Plan has been included in this document in recognition of the threat posed by Himalayan balsam.

The Park's Conservation Volunteers have carried out regular clearances to limit/control the spread of the plant, and have planted thousands of young reeds to repair damaged areas. Efforts to continue this work will form a key part of this plan.

The London Invasive Species Initiative (LISI) aims to co-ordinate actions to prevent, control and eradicate invasive non-native species (INNS)



Bogbean (*Menyanthes trifoliata*), an aquatic plant that grows on around the margins of the Park's ponds.

in London. Accurate and up to date biodiversity data is a vital part of the effort to control and eradicate INNS. GiGL are the data custodian of LISI, and any records of invasive species on the Park can be submitted to them directly, via an online recording form<sup>89</sup>.

## 3. General management:

- Cutting back the channel edges in the winter will help to control the spread of scrub, as well as competitive grasses and sedges; the proportions of each vegetation type (reed, scrub) should be kept broadly in line with good practice<sup>90</sup>. Encroaching reeds should be cut back at regular intervals to ensure that the channels are retained as open water.
- Reed bed management should take place outside of the nesting bird season (March - July).

## Opportunities:

There is scope to increase and/or enhance the existing reed beds - for example, sections along the Waterworks River could be enhanced as part of the re-development of Stratford Waterfront (East Bank).

New sections of floating reed bed were installed along the walls of the Lea Navigation in 2016. Whilst this could be an option to green the South Park waterways, any proposals should be mindful of the drainage holes that are used by nesting sand martins. Clear and unobstructed access to this nesting colony should be maintained at all times.

Any new reed bed habitat (m<sup>2</sup>) should be added to existing totals to capture net gain.

<sup>89</sup> See: LISI Recording Form (available at: [www.gigl.org.uk/online/invasives.aspx](http://www.gigl.org.uk/online/invasives.aspx))

<sup>90</sup> The RSPB recommends that a reed bed should comprise of 25-30% open water, 40-50% wet reed, 15-25% drier reed and 5-10% wet and dry scrub. (RSPB: 'Bringing reed beds to life: Creating and managing reed beds for wildlife').

Reed beds	
Action	Targets and outcomes
Ensure no net loss in reed bed habitat from the current extent.	No net loss of reed bed habitat from the current 1.6 hectares.
Secure net gain in reed bed habitat where the opportunity allows.	Identify opportunities as part of new development proposals. Add area of newly created habitat (m2) to existing reed bed totals.
Plant new reeds on the east bank of the River Lee with Park Champion volunteers.	To repair and restore areas that have been damaged by Himalayan balsam. Hold at least one event by the end of 2019, and review the need for further work after this date.
Build on management work carried out to date and continue to diversify the structure of the reed beds.	Aim to achieve a mixture of young reed, mature reed and scrub each year. Cut a maximum of 20% of reeds per year, to be agreed as part of the autumn works schedule.
Implement a plan to manage invasive species, including survey, treatment, and monitoring progress.	Plan to be prepared and agreed on an annual basis to protect the reed bed habitat. Treatment must be implemented annually, starting again in spring 2019.
Develop a series of volunteer tasks that help to protect the habitat and engage people with reed bed conservation.	Deliver a minimum of 3 balsam clearance events each year as part of the Conservation Volunteer programme.
Monitor the reed beds as part of the BAP survey work. Carry out an annual habitat assessment. Ensure that data informs management and contributes to London biodiversity data.	Include findings in the BAP monitoring report. Submit data to GiGL annually, including any data that can contribute to the LISI dataset (invasive species).

## Ponds

Ponds are freshwater habitats that can range in size from 1m<sup>2</sup> to 2 hectares. Ponds can support a great diversity of life, from amphibians and reptiles to fish and invertebrates. Around two-thirds of all freshwater species depend on ponds during their life cycle. Estimates suggest that over half a million ponds were lost during the 20th Century; of those that remain, 80% are thought to be in a poor or very poor condition<sup>91</sup>.

Ponds are found across the Park – there are eight ponds in the North Park and one pond in the South Park (Great British Garden). The total area of pond habitat stands at 0.3 hectares, which incorporates the terrestrial margins. The margins of a pond are equally as important as the water, providing a place for shelter, refuge and hibernation during the winter months, as well as feeding opportunities throughout the year.

The ponds have proven to be a popular engagement tool for local school groups who have taken part in regular pond dipping sessions.

Ponds of high ecological quality were recognised as ‘Priority Habitats’ in the UK

BAP<sup>92</sup>. ‘Priority Ponds’ had to meet certain criteria, demonstrating good water quality and supporting a diversity of native plants and other wildlife. These criteria remain useful as a guide for identifying ponds of high quality. Certain invertebrates (such as the nymphs of mayflies and caddisflies) are only found in ponds with good water quality. Broadly speaking, it is thought that around 20% of the UK’s 400,000 ponds will meet one of more of these criteria<sup>93</sup>.

### Measuring pond quality:

The PYSM (‘Sim’) method can be used to assess the ecological quality of a pond. The method requires environmental information on water quality, as well as the plant and animal (invertebrate) communities found in the waterbody. Invertebrate and plant communities are good indicators of pond quality as they are highly sensitive to pollution and nutrient levels. The PYSM method generates a score (%) that can be used to plan management and track its progress. Ponds that achieve a score above 75% can be broadly compared to the priority ponds of the UK BAP<sup>94</sup>. The Park’s ponds were assessed in 2017, achieving scores between 39% – 89%.

<sup>91</sup> British Ecological Society (4/2/10) ‘National survey reveals poor state of British ponds’: <https://www.britishecologicalsociety.org/national-survey-reveals-poor-state-of-british-ponds/>

<sup>92</sup> UK Biodiversity Action Plan. Priority Habitat Descriptions: Ponds (2008). [http://jncc.defra.gov.uk/pdf/UKBAP\\_BAPHabitats-42-Ponds.pdf](http://jncc.defra.gov.uk/pdf/UKBAP_BAPHabitats-42-Ponds.pdf)

<sup>93</sup> Figures exclude ponds in domestic gardens (London Wildlife Trust. ‘Ponds’. [www.wildlondon.org.uk/wildlife/habitats/ponds](http://www.wildlondon.org.uk/wildlife/habitats/ponds)).

<sup>94</sup> The Predictive System of Multimetrics tool (‘PSYM’, Pond Action, 2002) was developed to assess the biological quality of ponds and is used to classify ponds into 4 categories based on an index of biological integrity (scores range 0 – 100%). Ponds achieving a score of 75% or above are classified as priority ponds, in line with PSYM guidance).





The pond in the Great British Garden

The pond in the Great British Garden achieved a score of 89%; the pond supports an array of aquatic wildlife and plants, including smooth newts, flowering rush (*Butomus umbellatus*) marsh marigold (*Caltha palustris*) and bogbean (*Menyanthes trifoliata*). A number of invertebrates indicative of good water quality have been recorded here, such as the great diving beetle (*Dytiscus marginalis*) and the Pond Olive (*Cloeon dipterum*).

**Management:**

There is further work to do to improve the habitat scores and overall condition of the North Park ponds (Table 5). These actions form the basis of the pond Habitat Action Plan, and have been phased over a 4 -5 year period to allow for review/adaptation of the management as necessary.

Poor water quality in the River Lee can have a negative impact on the ponds, especially when the river floods into the Wetland Bowl and surrounding areas. Flood waters can bring pollutants and invasive plants, such as floating



The margins of the pond in the Great British Garden - native plants that grow here include hemp agrimony (*Eupatorium cannabinum*) and meadowsweet (*Filipendula ulmaria*).

pennywort (*Hydrocotyle ranunculoides*) and New Zealand pygmyweed (*Crassula helmsii*), into the ponds.

Sedges, rushes, and wetland grasses can cast a dense shade over the water if allowed to spread, depriving the pond of natural light. Thinning back a proportion of the vegetation (eg reedmace, *Typha latifolia*) each year will allow more natural light into the ponds; this action should benefit a range of aquatic wildlife and encourage the growth of oxygenating plants (eg native pondweeds).

By the end of this BAP, we aim to see an improvement in the habitat quality scores for the North Park ponds, and hope to bring them closer in quality to the pond in the Great British Garden.

Pond management should be carried out in the autumn months to avoid the amphibian breeding season (spring/early summer). Management works should take place before the depths of winter when many species are in hibernation and should not be disturbed.

**Table 5:** A summary of management actions required for the North Park ponds.

Pond	Location	Management
3	North Park	Thin vegetation within 5m of pond (southern edge) in year 1. Ongoing removal of floating pennywort. Investigate water flow issues through the inlet (2019).
4	North Park	Thin vegetation within 5m of pond (southern half) in year 3. Ongoing removal of vegetation mats as required.
5	North Park	A small pond; check for invasive species and clear vegetation to allow more light into the pond (southern edge) in year 1.
6	North Park	Thin vegetation within 5m of pond (southern edge) in year 1 or 2. Ongoing removal of floating pennywort and regular checks for New Zealand pygmyweed (years 1-5).
7	North Park	Thin vegetation within 5m of pond (southern edge) in Year 2. Check silt levels and address if required.
8	North Park	Thin vegetation within 5m of pond (southern edge) in year 4. Check silt levels and address if required.
9	North Park	No major management needed beyond regular checks for invasive species or other issues (years 1-5).

The pond in the Great British Garden demonstrates the standard that we hope the other ponds can achieve. A good quality pond should provide:

- A variation in depth – a mix of deeper water and shallower margins.
- A variety of native plants in and around the water, including submerged, floating and emergent species such as frogbit (*Hydrocharis morsus-ranae*) and arrowhead (*Sagittaria sagittifolia*).
- A diversity of wetland plants on the margins, including ragged robin (*Lychnis flos-cuculi*) and taller species such as hemp agrimony (*Eupatorium cannabinum*) and meadowsweet (*Filipendula ulmaria*).
- Egg-laying plants for newts. Newts lay their eggs on the leaves of submerged or floating plants – the leaf is wrapped around the egg for protection. Newts prefer plants with thin

and easily folded leaves, particularly small broad-leaved plants (eg water mint *Mentha aquatica*) and narrow-leaved plants (eg water forget-me-not *Myosotis scorpioides*).

- Micro-habitats on the margins (eg logs and stones) that provide pond creatures with a place to shelter over the winter.

Biological materials (eg plants or frogspawn) should not be transferred between ponds; this minimises the risk of transferring invasive species and/or disease<sup>95</sup>.

A number of wetland plants have been banned from sale in the UK. These plants are highly invasive and must not be introduced into a pond or other waterbody; they include water fern (*Azolla filiculoides*), water primrose (*Ludwigia grandiflora*), water hyacinth (*Eichhornia crassipes*) and American skunk cabbage (*Lysichiton americanus*)<sup>96</sup>.

<sup>95</sup> See Appendix 2, Guidance notes - Biosecurity 'Ponds and amphibian disease'.

<sup>96</sup> See Plantlife (2016) for the full list: Plants banned by the European Union in 2016 ([www.plantlife.org.uk](http://www.plantlife.org.uk)).

Ponds	
Action	Targets and outcomes
Ensure no net loss in pond habitat from the current extent.	No net loss of pond habitat from the current 0.3 hectares.
Improve the condition of the North Park ponds. Implement the 5-year management plan across the North Park ponds from 2019.	To see an increase in habitat quality scores (%) by 2024. Aim for all ponds to achieve a score of at least 70% by this date.
Reinstate water flow into pond 3.	Carry out a survey to assess water flow issues in 2019.
Implement a plan to manage invasive species, including survey, control and monitoring.	Plan to be prepared and agreed on an annual basis. Treatment is to be implemented annually, starting again in spring 2019.
Continue to use the ponds as an educational resource.	Target to deliver at least 12 education sessions per year with local schools.
Monitor all ponds for blue-green algae during high-risk periods (spring/summer).	Carry out weekly checks on the ponds to monitor and protect water quality. Suspected outbreaks of blue-green algae must be reported to the Environment Agency.
Monitor the ponds as part of the BAP survey work. Carry out an annual habitat assessment. Ensure that data informs management and contributes to London biodiversity data.	Include findings in the BAP annual monitoring report. Submit data to GiGL annually, including any data that can contribute to the LISI dataset (invasive species).
To deliver volunteer tasks that help to protect the ponds and engage people with their conservation.	Prepare pond management tasks annually, as part of the Conservation Volunteer programme. Note that tasks could be based around the 5-year plan (see Table 5).





Wet woodland in the North Park

### Wet woodland

Wet woodlands have poorly drained or seasonally wet soils that are frequently waterlogged in the autumn and winter months. The association between wood and water creates a unique habitat not found in drier woodlands – for example, high humidity and moisture levels will encourage the growth of mosses, ferns and tussocky sedges. The wet woodland resource on the Park is relatively small (approximately 0.9 hectares) and forms a complex of habitat around the North Park wetlands and ponds. The narrow strip of woodland on the banks of the Old River Lea is the only remaining fragment of original woodland left on the site. Tree species present in the wet woodlands include alder (*Alnus glutinosa*), white willow (*Salix alba*), crack willow (*Salix fragilis*) and silver birch (*Betula pendula*).

The native black poplar (*Populus nigra*<sup>97</sup>) is a rare tree of wet woodlands and river corridors. Over 100 black poplars were planted in the wet woodlands during construction and the trees are now well-established. The trees were grown from cuttings taken from the site prior to construction (circa 2005).

#### Management:

The Park Management Plan states that the wet woodlands should be allowed to mature and “establish the character typical of wet woodland, including a diversity of micro-habitat, species and structure”.

- The majority of trees in the wet woodland are standards, meaning that there is little variety in terms of age or structure. A well-planned coppicing or pollarding regime



A kingfisher nesting bank in the wet woodlands.

should help to diversify the structure and meet the aims of the Park Management Plan.

- The Park Management Plan recommends that coppicing should be implemented once the wet woodlands reach thicket stage, with 20-25% coppiced in each cycle. Any weaker stems should be thinned out.
- Sedges (*Carex* sp.) have become very dense in places. Cutting selected areas on rotation should help to create more of a mosaic/ structural variation.
- The coverage of dead wood is low at present. Whilst some work has been carried out to address this, using arisings from woodland works to create hibernacula, there is scope to increase the volume and cover of dead wood for the benefit of biodiversity.

#### Tree surveys:

Full and comprehensive surveys of the Park’s tree stock were carried out in 2017 (South Park) and 2018 (North Park). The reports include a number of recommendations to protect the long-term health of the Park’s trees, including those in the wet woodlands<sup>98</sup>.

Phytophthora, a water-borne fungus that affects alders (*Alnus* sp.), has been recorded on trees along the River Lee. The fungus restricts leaf growth and causes trees to secrete a black tarry sap. As Phytophthora cannot be eradicated, any new or replacement planting should aim to use an alternative species (eg willow) given the risk posed to alders. There is evidence to suggest that coppicing can help to regenerate trees affected by Phytophthora<sup>99</sup>.

<sup>97</sup> The black poplar was once so abundant in the wetlands and marshes surrounding the River Thames that the tree lent its name to the east end district of Poplar. There are many hybrid varieties of black poplar, such as the Lombardy poplar (*Populus nigra* 'italica') and railway poplar (*Populus x Canadensis* 'Regenerata'), which are widespread in parks and alongside waterbodies across London. The native black poplar is one of the rarest large native trees in the UK; estimates suggest that only 8,000 of the trees remain in the wild. There are also many more male than female trees left in the wild, meaning that natural pollination is exceptionally rare. The tree is dioecious and male and female flowers are found on separate trees; historically, many female poplars were cut down as they produce fluffy/downy seeds which can cause irritation. So few female trees are now left that the black poplar cannot regenerate naturally. The tree can be distinguished from hybrids by its distinctive bark, which is deeply ridged and fissured.

<sup>98</sup> Treeworks Environmental Practice (2018) Tree survey- summary report: North Park, QEOP (Reference: 181025-QEOP-NP-TSSR-CH) and Tree survey- summary report: South Park, QEOP (Reference: 170901-QEOP-SP-TSSR-CH).

<sup>99</sup> Forestry Commission Information Note (December 2004) 'Phytophthora disease of alder'.

Wet woodland	
Action	Targets and outcomes
Ensure no net loss of wet woodland habitat from the current extent.	No net loss of wet woodland habitat from the current 0.9 Ha.
Diversify the structure of the wet woodland through coppicing and pollarding.	Start a coppicing programme in line with Park Management Plan recommendations (at thicket stage, coppice 20-25%). Record all works on the tree matrix.
Increase the volume of dead wood in the wet woodlands. Re-use cuttings from tree works to create additional habitat for wildlife.	Increase the volume of dead wood in the wet woodland. Record the volume of wood used (m3).
Implement a plan to manage invasive species, including survey, control and monitoring.	Plan to be prepared and agreed on an annual basis to protect wet woodland habitat. Treatment is to be implemented annually, starting again in spring 2019.
Implement recommendations in the Park's tree reports (dated September 2017 and October 2018) for wet woodland trees, including the black poplar.	To protect the health of the tree stock in the wet woodlands, including the black poplars. Carry out works in accordance with the specified timescales (6 months -5 years).
Monitor the wet woodlands as part of the BAP survey work. Ensure that data informs management and contributes to London biodiversity data.	Include findings in the BAP monitoring report. Submit data to GiGL annually.
Deliver a series of volunteer tasks that help to protect the wet woodlands and engage people with their conservation.	Include wet woodland tasks as part of the Conservation Volunteer programme.

## Rivers

The River Lee and its tributaries form part of London's 'Blue Ribbon' network, a strategic network of rivers, canals and waterways that deliver a variety of functions such as flood management, habitat diversity, green infrastructure and opportunities for recreation and engagement with nature. The Park's four watercourses are a resource for aquatic and terrestrial wildlife such as ducks and geese, over-wintering birds such as gadwall (*Mareca strepera*), and common freshwater fish such as chub (*Squalius cephalus*), roach (*Rutilus rutilus*) and bream (*Abramis brama*). The BAP river habitat total (0.3 hectares) refers to the area around Bully Point (now the Wetland Bowl and North Park reed beds), although all rivers are considered as part of this BAP.

### Water quality:

The River Lee and its tributaries have a long history of poor water quality, reflecting the industrial past of the Lee Valley, as well as waste water treatment and significant volumes of urban run-off. Low levels of dissolved oxygen



The River Lee and the Wetland Bowl.

and "CSO events" (Combined Sewage Overflows) can have a major impact on freshwater fish, resulting in large scale fish kills if the conditions are right. The stretch of the River Lee that runs through the Park received a rating of 'Bad' in the most recent assessment of its ecological status<sup>100</sup>. The next review is due to be completed by the Environment Agency in 2021. The Thames River Basin Management Plan (2015) hopes to see an improvement in water quality

<sup>100</sup>The River Lee is classified as a 'heavily modified' waterbody, and received a rating of 'Bad' for its 'Overall Status' and 'Ecological Status' in 2014, 2015 and 2016. Many factors are cited as explanations for the River Lee not achieving a 'good status'; these factors are complex and widespread across the catchment, and include point source pollution (eg intermittent sewage discharge), misconnections in the drainage network, diffuse pollution from urbanisation and transport corridors, and the presence of contaminated bed sediments owing to former land use and pollution. The objective is to achieve a status of 'Moderate' by 2027. See Environment Agency Catchment Data Explorer: Lee (Tottenham Locks to Bow Locks/Three Mills Locks): <https://environment.data.gov.uk/catchment-planning/WaterBody/GB106038077852>





A swale in the North Park, part of the SUDS design that helps to slow the flow of water into the River Lee; as well as being a natural form of flood defence, the swales also function as biodiversity habitat.

targets for the River Lee by 2021, in part as a result of investment by water companies.

Water quality in the Lower Lee Valley is influenced by a variety of factors across the catchment. Hard surfaces greatly reduce the amount of rainwater that can infiltrate into the ground, and this additional surface water has to be carefully managed to prevent flooding. Sustainable Urban Drainage Systems – ‘SUDS’ – aim to mimic the natural drainage of water, and can be adopted to protect and enhance water quality in urban landscapes. Examples of SUDS include vegetation-rich swales, soakaways and permeable paving.

The LLDC places a requirement on developers to include SUDS in all new schemes, particularly those along waterways, with the aim of protecting and improving water quality. By ensuring that SUDS are incorporated into new developments, the Park can contribute towards the aims of the Thames River Basin Management Plan<sup>101</sup>, Water Framework Directive and the Olympic Legacy Waterways Framework<sup>102</sup>.

#### Wintering birds:

The River Lee and its tributaries are an important migratory, breeding and foraging



A stonechat perches by the River Lee (Autumn 2016). Stonechats are an uncommon visitor to the Park; it is thought that the birds move inland in the autumn and winter months in search of food.

habitat for wildlife, notably wintering wildfowl. Bird monitoring has recorded a diverse range of species utilising the mosaic of wetland habitats during the winter months, such as gadwall, shoveler (*Anas clypeata*) and common snipe (*Gallinago gallinago*<sup>103</sup>). The wetland HAPs seek to ensure that good quality habitat is provided for the Park’s wintering birds (eg by controlling reed encroachment into the channels).

#### General management:

- An eco-boom should be deployed as soon as pollution is detected on the waterways; eco-booms aim to limit the spread of pollutants that are harmful to water quality and wildlife.
- The watercourses should be kept clean and free of litter/debris that could pose a hazard to wildlife.
- Management of the habitats adjacent to the rivers should be mindful of the potential for wildlife to be present, particularly during nesting bird season (broadly March – July).
- Biosecurity protocols should be put in place to ensure that invasive seeds/plant materials are not allowed to enter the watercourse and travel downstream.

<sup>101</sup> See: [www.gov.uk/government/publications/thames-river-basin-management-plan](http://www.gov.uk/government/publications/thames-river-basin-management-plan)

<sup>102</sup> London Legacy Development Corporation/Canal and River Trust. Olympic Legacy Waterways Framework.

<sup>103</sup> Associated with freshwater wetlands, common snipe are wading birds. Wintering populations exceed 10x that of the breeding population, and London is known to have some of the lowest numbers of snipe in Britain.

Rivers	
Action	Targets and outcomes
Ensure that all new developments incorporate SUDS to protect water quality and manage flood risk.	Specific targets to be agreed for each new development. SUDS should be recorded as part of the ‘Built Environment’ habitat totals.
Monitor and survey the rivers at regular intervals.	For the rivers on the Park to be of a quality that is regularly used by wildlife.



Vipers bugloss (*Echium vulgare*) supports a range of insects, including buff-tailed and white-tailed bumblebees. The wildflower takes its name from the flowers, which are said to resemble the head of a viper.

## SPECIES-RICH GRASSLANDS

### Overview:

The species-rich grasslands are the largest BAP habitat type on the Park, covering over 23 hectares. Intended to deliver bold impact and colour during the Games, the grasslands have since evolved to become a key part of the Park's ecology. The majority of the Park's meadows are perennial and support a broad variety of native wildflowers such as field scabious (*Knautia arvensis*), agrimony (*Agrimonia eupatoria*), ox-eye daisy (*Leucanthemum vulgare*) and common knapweed (*Centaurea nigra*). Most of the habitat is found in the North Park, although there are smaller parcels of grassland in the South Park.

Wildflower meadows are exceptionally rare – it is estimated that 97% of all wildflower meadows have disappeared since the 1930's, a loss of habitat that is "without parallel" in the UK<sup>104</sup>. The UK has over 1,500 species of pollinating insect, which include bumblebees, solitary bees, wasps and hoverflies, beetles, butterflies and moths. The loss of wildflower-rich habitat has had a significant impact on pollinating insects, with trends showing a steady decline in both numbers and diversity over the past 50 years<sup>105</sup>.

In 2014 the Government published the National Pollinator Strategy, a 10-year plan to help pollinators "survive and thrive"<sup>106</sup>. The strategy outlines actions to protect pollinators and support their needs in towns and cities. As pollinating insects are inextricably linked to wildflower meadows, the species-rich grassland Habitat Action Plan has the potential to contribute towards the aims of the national strategy, delivering gains for a wide variety of species.



Common knapweed and ox-eye daisy growing in the species-rich grasslands, South Park.

Aside from being a vital resource for pollinators, meadows are key to the survival of other invertebrates, such as grasshoppers, crickets, true bugs, ground beetles and molluscs.

If managed correctly, species-rich grasslands can provide rich hunting grounds for kestrels (*Falco tinnunculus*). These birds of prey depend on a steady supply of small mammals, such as field voles (*Microtus agrestis*), which are typically abundant in rough, grassy habitats. The maintenance of longer grasses and tussocky swards will create ideal hunting habitat for the kestrel; the birds are often seen on the Park, perched high on trees or posts above the grasslands and swales.

Roadside verges: Roadside verges are an overlooked part of the Park's ecology, yet support many plants that are of value to wildlife, such as birds-foot trefoil (*Lotus corniculatus*) and borage (*Borago officinalis*). A well-managed



A thick-legged flower beetle in the Fantasticology meadows – a fair weather beetle, they are typically seen on flower heads on warm, sunny days.

<sup>104</sup> BBC Earth (2015) 'Why wildflower meadows are so special' (See: <http://www.bbc.co.uk/earth/story/20150702-why-meadows-are-worth-saving>).

<sup>105</sup> University of Leeds (2016) Environment news: Loss of wildflowers matches pollinator decline. (See: [https://www.leeds.ac.uk/news/article/3820/loss\\_of\\_wild\\_flowers\\_matches\\_pollinator\\_decline](https://www.leeds.ac.uk/news/article/3820/loss_of_wild_flowers_matches_pollinator_decline)).

<sup>106</sup> UK Government (2014) National Pollinator Strategy: for bees and other pollinators in England.





verge will create connections through the Park, as well as being a biodiversity resource in its own right; the brown-banded carder bee (*Bombus humilis*) for example requires smaller patches of flower-rich habitat that are spread across the landscape.

Short swards and amenity lawns can, if managed correctly, support plants that are of value to pollinators. Many birds (eg starlings and mistle thrushes) depend on short grass when foraging for earthworms and other invertebrates. Amenity lawns are covered further under the 'Parks, Squares and Amenity Space' Habitat Action Plan.

Challenges in managing the species-rich grasslands:

**Table 6:** Challenges and pressures on the species-rich grassland habitats

Events and high impact use	Impact of events within a well-used and high profile urban park, notably damage to the wildflower meadows, and a cutting regime that is out of synch with the seasons (eg cut too early).
Loss of habitat and habitat fragmentation	Loss of wildflower meadows to development, and a loss of connectivity between meadows.
Neglect	A lack of management can transform a species-rich meadow into tall, rank grassland that is dominated by grasses and other competitive species (eg some docks and thistles).
Use of chemicals	Pesticides and herbicides reduce plant diversity and the numbers of pollinating insects.
Unsympathetic mowing	Mowing at the wrong time of year, creating a sward that is uniform in height with little variation in structure or mosaic. Cutting a grassland too early in the year will remove vital resources for pollinators during the spring and summer months.
Competitive species and injurious weeds	Competitive plants, such as goats rue ( <i>Galega officinalis</i> ), creeping thistle ( <i>Cirsium arvense</i> ) and prickly lettuce ( <i>Lactuca serriola</i> ), will reduce the diversity of a grassland if allowed to spread and set seed. Goats rue is a particular issue in parts of the Lee Valley/North Park.

**Management:**

A well-planned mowing regime is required to ensure that resources (seeds, pollen, stems and nectar) are available to wildlife throughout the year.

- A selection of meadows should receive a spring cut earlier in the year. An earlier cut should encourage a second flush of flowering, prolonging the availability of pollen and nectar.
- Scything can help to reduce the vigour of competitive grasses. Conservation volunteers have used scythes on the meadows outside the London Aquatics Centre to good effect; there is potential to apply this traditional management technique more widely across the Park.
- The meadows should support a broad and varied range of butterfly and moth food plants, including birds-foot-trefoil, marjoram (*Origanum majorana*) and vetches (*Vicia* sp.).
- Roadside verges are a crucial part of the Park's wildflower network, acting as 'stepping stones' through the landscape. Roadside verges should be managed

sensitively to protect wildflowers on the margins.

- Parcels of tussocky 'rank' grassland should be left in place through the autumn and winter months to support over-wintering invertebrates. Suitable areas should be identified each year, prior to the annual cuts, and could include the Greenway, or parts of the North Park. Areas should be rotated each year to avoid the build-up of thatch and nutrients.
- Cutting should take place after the wildflowers have gone over and set seed.
- Arisings should be removed after a few days to allow for seed drop and limit the release of nutrients into the soil. Richer soils will encourage the growth of vigorous grasses and competitive plants.
- Areas of long grass should be left in place wherever possible to create additional structure. 'Buffer zones' of longer grass in the North Park lawns have been used to good effect in the past.
- Where possible, seed heads should be left in place to support seed-feeding birds like





Volunteers scythe the meadows by the London Aquatics Centre.



The Fantasticology annual meadows, South Park.

goldfinch (*Carduelis carduelis*) and linnet through the winter months – knapweeds and wild teasel (*Dipsacus fullonum*) are particularly valuable sources of seed.

- Any damage to species-rich grassland should be restored using an appropriate species mix.
- Control of competitive/injurious weeds (eg goats rue) should be carried out as required using an appropriate method (cutting, digging or spot treatment).
- Seed mixes for all new wildflower meadows should contain yellow rattle (*Rhinanthus minor*). Also known as ‘the meadow maker’, this plant is semi-parasitic and can help wildflowers to establish by reducing the vigour of competitive grasses such as couch (*Elymus repens*)<sup>107</sup>.

### Opportunities:

It is anticipated that further opportunities to create wildflower meadows will become apparent through the delivery of the LCS.

New developments will bring opportunities for ‘meanwhile uses’<sup>108</sup> across the Park. The Park Design Guide (2018) encourages and promotes the “creative use of meanwhile uses”<sup>109</sup>. Wildflower meadows are one option for a meanwhile use that would deliver biodiversity benefits and contribute towards the BAP.

### The legacy of the Fantasticology Meadows:

The Fantasticology meadows were located on the eastern banks of the City Mill River, between the ArcelorMittal Orbit and the Southern Loop Road. The meadows were designed to reflect the former industrial heritage of the site<sup>110</sup> and supported a variety of annuals such as tickseed (*Coreopsis* sp.), cornflower (*Centaurea cyanus*) and corn marigold (*Glebionis segetum*). The meadows demonstrated how a landscape feature could be designed for visual impact whilst also functioning for biodiversity, a lesson that should be translated into the future design of the Park.

<sup>107</sup> Plantlife: How to grow yellow rattle (*Rhinanthus minor*). (See: <https://www.plantlife.org.uk/uk/discover-wild-plants-nature/how-to-grow-yellow-rattle-rhinanthus-minor>)

<sup>108</sup> A ‘meanwhile use’ is the short-term use of a site/plot until it can fulfil its longer-term plans; the stitch plantings that surrounded the Park are one example. These temporary landscapes were intended to ‘stitch’ the Park into its fringes and surrounding communities, creating bright and bold displays of flowers that also delivered ecologically, attracting a diversity of insects and birds.

<sup>109</sup> London Legacy Development Corporation (2018) Park Design Guide. (See: [https://www.queenelizabetholympicpark.co.uk/-/media/lldc\\_park-design-guide\\_web.ashx?la=en](https://www.queenelizabetholympicpark.co.uk/-/media/lldc_park-design-guide_web.ashx?la=en)).

<sup>110</sup> The Fantasticology meadows were designed to mimic the footprints of the industrial buildings and warehouses that had once occupied the site of the new Olympic Park. A variety of brightly coloured annual and perennial species were used to create the patterns and ‘footprints’ of the buildings, including circular designs of blue and white flowers representing the gasometers that were once found along this stretch of the City Mill River. (See: <http://www.klassnik.com/pages/Fantasticology.html>).

Species-rich grassland	
Action	Targets and outcomes
Ensure no net loss of species-rich grassland habitat from the current extent.	No net loss of species-rich grassland habitat from the current 23.47 Ha.
Restore the eastern side of Hopkins Field.	Restore 17,500m <sup>2</sup> of species-rich grassland for the benefit of species including the brown-banded carder bee (target date TBC)
Provide over-wintering habitat for invertebrates and other wildlife.	Determine and agree areas of over-wintering habitat each year, prior to the start of the annual meadow cuts. Ensure that at least 1 swale is included each year; ideally select a swale that contains a high proportion of knapweeds.
Create a mosaic of grassy habitats through the annual cutting regime.	To have a variety of structure, age and flowering across the Park. Determine areas each year, as part of the autumn work schedules.
Implement spring cuts on the meadows outside the London Aquatics Centre.	To see an increase in species diversity (currently dominated by grasses). Monitor species composition against current species records.
Apply traditional management techniques to the species-rich grasslands as part of the annual meadow cut.	Select at least 2 meadows per year to be cut with scythes. Monitor species composition against current species records.
To deliver volunteer tasks that help to protect and conserve the species-rich grasslands and engage people with their conservation.	Prepare species-rich grassland volunteer tasks annually, as part of the Conservation Volunteer programme.
Devise a butterfly transect that can be monitored by volunteer surveyors.	Train a team of volunteers prior to the spring 2019 field season. Collate data as part of the BAP monitoring work and develop as a long-term monitoring project.
Monitor the species-rich grasslands as part of the BAP survey work. Ensure that data informs management and contributes to London biodiversity data.	Include findings in the BAP monitoring report. Submit data to GiGL annually.
Ensure that plans are in place to remediate any damage to the species-rich grasslands caused by high usage/events.	Condition surveys to be completed before and after each event.

## BUILT ENVIRONMENT

### Overview:

Urban environments cover 7% of the UK's surface but support over 80% of the population – such high densities of buildings and people can mean that there is little space for nature to co-exist<sup>111</sup>. With opportunities for wildlife limited, the built environment can play a critical role in supporting and enhancing biodiversity in our towns and cities. Although not typically recognised as biodiversity-rich areas, urban environments can support a surprising array of habitats and species, and more than 15,000 species have been recorded in London in the past 50 years<sup>112 113</sup>. A number of specialist and rare species are associated with the built

environment, including the streaked bombardier beetle (*Brachinus sclopeta*) and the peregrine falcon (*Falco peregrinus*).

There are three main types of built environment habitat on the Olympic Park:

- The built environment itself, which includes green roofs and living walls.
- Parks, Squares and Amenity space.
- Brownfield.

The Park contains a variety of features with the potential to support wildlife. Whilst many of these features were deliberately installed during construction (eg nest boxes under the bridges) others have become unintentional habitats – for

<sup>111</sup> Hayhow et al. (2016) State of Nature Report (2016). The State of Nature Partnership.

<sup>112</sup> London Wildlife Trust (2015) 'Spaces Wild: Championing the values of London's wildlife sites'.

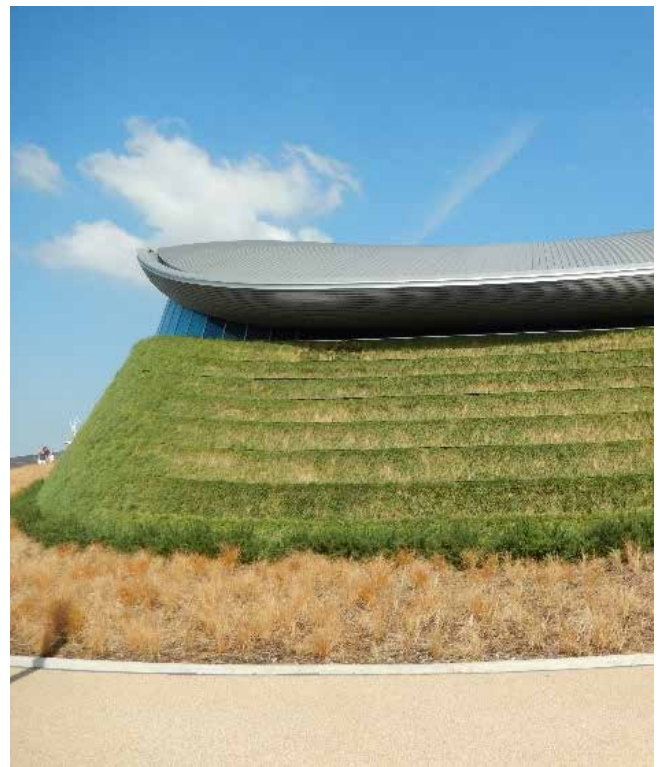
<sup>113</sup> A number of species demonstrate adaptations to the urban environment of London, many of which have earned a 'London' epithet. Examples include London Plane (*Platanus x hispanica*), a characteristic tree of the city that is tolerant of air pollution, and the London Underground mosquito (*Culex pipiens molestus*) which has adapted to life in the warm underground conditions of London's tube network (See: London Wildlife Trust - 'What's in a name? How some species gained a London epithet').







Wildlife in the built environment - a dunnock by the London Stadium



Green wall - London Aquatics Centre

example, house martins (*Delichon urbicum*<sup>114</sup>) have been recorded nesting under the soffits of buildings along the Lee Navigation, and there is a small colony of sand martins in the old mooring holes along Carpenters Lock, a colony that has existed here for many years<sup>115</sup>.

Other examples of urban habitat on the Park include brownfield land, green roofs and the overall 'fabric' of the site, including its gardens and walls. These features provide connections through the landscape, acting as stepping stones between the other BAP habitats such as the woodlands and species-rich grasslands.

#### Opportunities:

It is anticipated that the built environment will offer opportunities to secure net gain for biodiversity as new development progresses across the Park, particularly through the provision of green roofs, living walls and nesting opportunities (eg swift bricks and bee bricks).

#### A 'Smart Park' – monitoring urban wildlife:

The built environment offers the chance to be innovative in the way that biodiversity is monitored in a newly created urban park and to assess the success of the green infrastructure and the benefits that it provides.

New mapping techniques are helping us to understand the Park in more detail, making it a smarter and more sustainable place to live and work – a "Smart Park". A variety of different data feeds operate across the Park and have the potential to be integrated with biodiversity as part of the BAP.

Bat sensors are installed across the site. Developed by UCL and Intel's Collaborative Research Institute, the sensors monitor bat activity and generate updates in real time<sup>116</sup>. In future, it is hoped that these bat sensors will be used across the world to ensure that urban developments have a positive impact on bat populations. The bat sensors have already detected a roost in one of the boxes underneath the F10 Bridge.

<sup>114</sup> House martins are typically recorded along the western boundary of the Park, with territories noted in the eaves of buildings along the Lea Navigation; further nests are likely sheltered from view by the buildings.

<sup>115</sup> Land Use Consultants (November 2008) Olympic Park Kingfisher and Sand Martin surveys.

<sup>116</sup> Bats London. Bats in Queen Elizabeth Olympic Park (See: <http://www.batslondon.com/>).



## Challenges in managing the built environment:

**Table 7:** Challenges and pressures on the built environment habitats

Development	Development can place numerous pressures on urban species – for example through land take and the loss of suitable nesting sites for swifts and house martins in buildings.
Poor appreciation of value	If habitats are not valued, they are unlikely to be protected. Brownfield habitats can be seen as waste lands that are of little value, when in fact they can be very rich in flora and fauna.
Pests and diseases	Pests and diseases (such as the oak processionary moth and ash dieback) pose a threat to trees across the Park, including the oaks along the Promenade.
Anti-social behaviour	Damage from vandalism and anti-social behaviour, eg damage to wildlife boxes and log piles.
Lack of habitat compensation and mitigation	Risks of damage to wildlife and habitats through a lack of and/or unsuitable mitigation before development - eg clearing vegetation at the wrong time of year.
Recreational disturbance	Disturbance from events and high levels of use, eg light and noise, compaction of soils and damage to trees.

### Brownfield

Brownfield sites are those that have been previously built on but are not currently in use<sup>117</sup>. They can comprise former industrial estates, railway corridors, derelict sites, quarries and old spoil heaps. Almost all of the Olympic development site was brownfield land before the Park's creation.

Brownfield land can host a rich mosaic of habitats that in turn support a broad diversity of life – of the five most biodiverse sites in the UK, two are brownfields<sup>118</sup>. Brownfield habitats can be particularly rich in insects – evidence suggests they can be even richer than ancient woodlands<sup>119</sup>. At least 15% of the UK's nationally scarce and rare invertebrates

are recorded on brownfields, and this figure is likely to be an under-estimate<sup>120</sup>. A range of flowering plants are associated with brownfield land in the capital; one example is London rocket (*Sisymbrium irio*) a yellow flower that is a member of the cabbage family. The plant was reported to have flowered in great profusion across London following the Great Fire of 1666<sup>121</sup>.

The majority of the Park's brownfield habitat is found around the Lee Valley VeloPark and the former Olympic BMX track. Patches of brownfield are also present along the Greenway at the southern end of the Park, near to the Northern Outfall sewer<sup>122</sup>.

The Park's brownfield habitat supports some



Brownfield habitat surrounding the Lee Valley Velopark



Brownfield habitat surrounding the Lee Valley Velopark

<sup>117</sup> Buglife 'Brownfields' (See: <https://www.buglife.org.uk/campaigns-and-our-work/habitat-projects/brownfields>)

<sup>118</sup> As above

<sup>119</sup> As above

<sup>120</sup> As above

<sup>121</sup> London rocket was reported to have emerged "in the greatest plenty in 1667 and 1668 within the walls on the rubbish heaps around St Paul's Cathedral" (see: London Wildlife Trust: 'What's in a name? How some species gained a London epithet). Other examples of brownfield wildflowers include the rosebay willowherb, or "Bombweed" (*Chamerion angustifolium*) and danewort (*Sambucus ebulus*), a plant which was characteristic of the area now occupied by Queen Elizabeth Olympic Park, forming dense thickets on the disturbed and nutrient-rich soils.

<sup>122</sup> The Greenway is a cycle/footpath route that connects Hackney Wick with Pudding Mill Lane. The raised embankment follows the route of Bazalgette's Northern Outfall sewer. The Greenway has many elements, including substrate beds, tall ruderal vegetation and log piles that mimic the characteristics of typical brownfield land, providing further ecological diversity around the Park's boundaries.

rare species, including the streaked bombardier beetle. Thought at one time to be extinct, the beetle was re-discovered close to the Thames Barrier in 2006 and has since been recorded on the Greenway. This is one of the rarest invertebrates in the UK and a notable find for the Park. In recognition of this important record, a new Species Action Plan has been prepared for the beetle (see Species Action Plans – Invertebrates).

**Brownfields: a valuable mosaic:**

Low nutrient levels and poor soils mean that fast-growing plants can struggle to survive on brownfield sites – this combination tends to result in patches of open, flower-rich grassland that support a range of species such as viper’s bugloss (*Echium vulgare*), shepherds cress (*Teesdalia nudicaulis*), hoary plantain (*Plantago media*) and mustards (*Sinapsis* sp.). Regular disturbance creates patches of bare ground that warm up quickly, providing basking areas for insects and reptiles and nesting opportunities for solitary bees.

Young pioneer vegetation provides a rich source of food; for example, the toadflax brocade moth (*Calophasia lunula*) depends on a good supply of common and purple toadflax (*Linaria* sp.) which typically grow in abundance on brownfield land.

A diversity of seed-producing ruderal species will benefit seed-eating birds and insects such as *Amara* and *Harpalus* beetles, the larvae of which are prey for the streaked bombardier beetle.

Neglected brownfield features (eg logs, woodpiles, piles of stones, discarded tiles, bricks and rubble) create cool microclimates that are favoured by many species (eg common reptiles).

The value of a brownfield site is heavily dependent on its context. Early post-clearance sites would typically support a greater diversity of the mosaics, features, and vegetation that are considered so beneficial to biodiversity; value would be reduced if the mosaics were lost to scrub encroachment, or to the spread of dominant species (eg large stands of buddleia, *Buddleia davidii*).

**Management:**

Brownfield sites require little in the way of management beyond the control of competitive plants and scrub (eg buddleia or goats rue) to protect the pioneer communities and maintain patches of bare ground. Rotational management can be used to create the habitat mosaics that make brownfield sites so attractive to biodiversity.

Brownfield	
Action	Targets and outcomes
Ensure no net loss of brownfield habitat from the current extent.	No net loss of brownfield habitat from the current 4.2 Ha.
To achieve net gain in brownfield habitat where opportunities exist.	Any areas of new brownfield habitat delivered through the LCS should be captured and added to the current total of 4.2 Ha.
Develop interpretation materials that increase awareness of the value of brownfield habitat on the Park.	Identify areas for new interpretation boards in 2019 highlighting the value of brownfield land.
Monitor the brownfields as part of the BAP survey work. Ensure that data informs management and contributes to London biodiversity data.	Include findings in the biodiversity monitoring report. Submit data to GiGL annually.
Develop new photo-points with Park Champion volunteers that capture brownfield habitat.	For new photo-points to be included in the monitoring from 2019. This is a current gap in the photo monitoring work.





The green roof on the MPC building – an important habitat for invertebrates and birds, such as the black redstart.

### Built environment

The built environment includes buildings, venues and the man-made structures that support biodiversity. There are many built features across the site – old, new and unintentional – that have the potential to support wildlife - examples include green roofs, living walls, bridges, retaining walls, gabions and wildlife boxes. The built environment offers opportunities to secure net gain, but also to improve the quality of the public realm, incorporating green features that are attractive both to people and to wildlife.

#### Management:

The LCS contains a green roof specification (LCS-GLB-CON-APP-GRX-001-V01) that outlines requirements for planting mixes and design features that will benefit biodiversity.

The green roof on the MPC building (Media & Press Centre, Here East) is a good example of how a green roof can be managed to benefit biodiversity and deliver a mosaic of habitats that encourage rare species. The roof should be used as a model to guide future green roof construction across the Park. In general, a green roof should have:

- Areas of bare and friable ground, creating basking areas for thermophilic (warmth-loving) invertebrates and nesting sites for solitary bees.
- A mixture of young pioneer vegetation and taller herbs, including ruderal species such as docks, teasels and thistles.
- Features of interest that create microhabitats and varied microclimates – for example, bricks and tiles, piles of rubble, and dead wood.

#### Potential enhancements – MPC green roof:

The summer of 2018 was exceptionally hot and dry; as a result, the majority of the wildflower resource on the MPC green roof had died off by mid-July. Pockets of vegetation survived in the shade/cooler microclimates surrounding the photovoltaic panels and log piles. Increasing the coverage of log piles (or similar features) on the roof would increase the availability of refugia during periods of environmental stress<sup>123</sup>. Ephemeral water features (eg depressions that can collect rainwater) are another option that could be considered. A greater range in the depth and type of substrate on the roof would add additional heterogeneity into the habitat, although this would be subject to loading constraints.

Any wildlife boxes incorporated into the built environment should be designed to the correct specification of the target species.



A six-spot burnet moth on vipers bugloss, MPC green roof.

<sup>123</sup>The Ecology Consultancy (2018) Queen Elizabeth Olympic Park: Terrestrial Invertebrate Survey.

Built environment	
Action	Targets and outcomes
To achieve net gain in habitat provided by the built environment where opportunities exist.	Any new areas of built environment habitat delivered through the LCS should be captured and added to the current total of 3.32 Ha.
Ensure that suitable wildlife boxes are included in new developments where opportunities allow.	Any new wildlife boxes should be captured and added to the current totals for the Park.
To identify opportunities to further integrate biodiversity with 'Smart Park' projects.	Develop proposals for biodiversity integration from spring 2019.
Monitor the built environment as part of the BAP monitoring. Ensure that data informs management and contributes to London biodiversity data.	Include findings in the biodiversity annual monitoring report. Submit data to GiGL annually.



Echinacea in the World Gardens.

### Parks, Squares and Amenity space

The Parks, Squares and Amenity BAP habitat forms the predominant fabric of the Park; it includes the amenity lawns, ornamental trees and plantings. The Parks ornamental gardens are included in this category, providing an attractive environment for visitors and staff that also functions as a wildlife habitat. The Echinacea beds in the North America Garden for example are an iconic part of the South Park, but also support invertebrates such as the European honey bee (*Apis mellifera*).

#### Amenity grassland – a resource for birds:

Many birds (eg starlings and song thrushes) depend on the shorter swards provided by amenity grasslands, foraging in the turf for worms, molluscs and other insects. By maintaining a mosaic of shorter amenity turf and longer grasses, the Park will offer habitats that can support a variety of garden birds, such as mistle thrush (*Turdus viscivorus*) and pied wagtail (*Motacilla alba*)<sup>124</sup>.

#### Protecting the tree stock: pests and diseases:

The monitoring of tree pests and diseases is an important consideration given that the Park contains species that could be vulnerable



A mistle thrush foraging in amenity grassland, North Park.

to infestations. The oak processionary moth (*Thaumetopoea processionea*) has been recorded on oak trees across the Park. Rapid identification and treatment has prevented the pest from spreading, but ongoing vigilance is needed as the moth can pose a serious threat to human health and the Park's (significant) oak stock. The moth is a notifiable pest and all sightings must be reported to the Forestry Commission. The Forestry Commission continue to visit the Park each year to carry out surveys for the oak processionary moth.

#### Management:

- Species that grow in low maintenance amenity lawns can be of great benefit to urban pollinators (eg self-heal, *Prunella vulgaris*).
- Trees should be checked regularly for the presence of pests or diseases.
- The mowing regime for amenity lawns should complement that of the species-rich grassland, and create structure and variation wherever the opportunity allows.
- Brush/leaf arisings from tree works can be incorporated into habitat piles wherever possible.

<sup>124</sup> Pied wagtails are charismatic black and white birds with a wagging tail and a 'bobbing' flight pattern; pied wagtails are common in towns and cities, especially in areas that are close to water. The birds typically form large roosts in warm areas, and have been observed roosting in large numbers underneath the awnings of the Westfield Centre, Stratford.

Parks, Squares and Amenity space	
Action	Targets and outcomes
To achieve net gain in habitat provided by the parks, squares and amenity space wherever opportunities exist.	New areas of parks, squares and amenity habitat delivered through the LCS should be captured and added to the current totals.
Review existing wildlife boxes and identify the need for repair/replacement.	Carry out the survey by the end of winter 2018/19.
Carry out regular checks for the presence of tree pests, especially oak processionary moth, to protect the health of the Park's tree stock.	Tree pests and diseases to be monitored, reported and treated promptly to protect the health of the tree stock.
Monitor Parks, Squares and Amenity space as part of the BAP monitoring. Ensure that data informs management and contributes to London biodiversity data.	Include findings in the biodiversity monitoring report. Submit data to GiGL annually.



## TREES AND SCRUB

### Overview:

The Trees and Scrub Habitat Action Plan covers the Park's native broadleaved woodlands, hedgerows and shrubs. The North Park woodlands contain a range of native tree species such as oak (*Quercus* sp.), ash (*Fraxinus excelsior*), field maple (*Acer campestre*), hawthorn (*Crataegus monogyna*), hazel (*Corylus avellana*), cherry (*Prunus avium*) and blackthorn (*Prunus spinosa*).

The Park Management Plan states that the woodland BAP habitat should be allowed to mature to reflect a mix of structures (older stems, coppiced stools and younger shoots), species diversity and habitat features. Coppicing should be used to increase diversity and create a range of conditions that support wildlife (eg dappled sunlight and edge habitat to encourage butterflies). With the correct management, the woodlands can generate resources for wildlife throughout the year; for example, berry-producing species such as holly (*Ilex aquifolium*) and rowan (*Sorbus aucuparia*) will benefit the

winter thrushes that visit the Park – fieldfare (*Turdus pilaris*) and redwing (*Turdus iliacus*).

### Veteran trees:

The woodland on the banks of the Old River Lea is the only remaining fragment of original woodland remaining on the Park. Veteran trees are relatively few on the site, although there are some older trees in the Old Ford woodland (now part of the Thames Water plant). Veteran trees and associated dead wood benefit a range of invertebrates (such as woodlice and centipedes) that in turn provide food for other species, and are the foundations of many food chains.

### Tree matrix:

All of the Park's trees have a unique reference number and details of each tree (location, species and condition) are noted on the Tree Matrix. The Tree Matrix contains records of all inspections, works and replacements carried out on the Park's tree stock.

### Challenges in managing the tree and scrub habitat:



Woodland on the edge of the Old River Lea - the only original fragment of woodland remaining on the site.



Native trees and shrubs in the North Park, including silver birch (*Betula pendula*), oak (*Quercus robur*) and rowan (*Sorbus aucuparia*).

**Table 8:** Challenges and pressures on the tree and scrub habitats

Lack of management	A lack of management will limit the value of a woodland for wildlife, allowing competitive species to thrive and shade out typical field layer plants, such as primrose ( <i>Primula vulgaris</i> ) and bluebell ( <i>Hyacinthoides non-scripta</i> ).
Pests and diseases	Pests and diseases pose a significant threat to the Park's trees and woodlands; oak processionary moth, Chalara dieback of Ash and plane tree wilt are some examples of pests and diseases that have the potential to impact on the Park's tree stock.
Invasive ornamental species	Introduced ornamental species (eg Spanish bluebell <i>Hyacinthoides hispanica</i> , or rhododendron <i>Rhododendron ponticum</i> ) can out-compete native woodland species, reducing species diversity.
Surrounding land use and fragmentation.	Pressures from surrounding land use and public access, eg development, vandalism and damage.
Climate change	Climate change can place additional pressure on woodlands – for example through a lack of water as drought conditions become more frequent, or an increased frequency of pests and diseases.

**The importance of woodland management:**

Without active management, the Park's woodlands will become overgrown and will lack many of the features that are so important for biodiversity. A lack of management can allow competitive plants such as bramble (*Rubus fruticosus* agg.) to thrive, shading out typical field layer species such as the native bluebell (*Hyacinthoides non-scripta*<sup>125</sup>) and wood anemone (*Anemone nemorosa*). A programme of coppice management can help to increase the amount of light reaching the woodland floor, improving conditions for woodland butterflies like the speckled wood (*Pararge aegeria*). Active and regular management also ensures that tree pests and diseases can be identified and treated quickly, before they spread to neighbouring areas.

**Tree pests and diseases:**

Pests and diseases pose a significant threat to the health of British trees, woodlands and native biodiversity. Pests and diseases can be spread by many different means, particularly through the movement of people and plant stock, the transport of infected soils and wood chippings, and poor site hygiene practices (eg using contaminated tools). Biosecurity protocols are necessary to contain and control the risk. Further guidance on biosecurity measures is

contained at the back of this document (see Appendix 2).

The Park Management Plan states that 'tree disease management will be carried out in accordance with current advice and best practice issued by the Forestry Commission, DEFRA and other central advisory bodies and institutions'<sup>126</sup>. The Plan further sets out the procedures to be implemented in response to an outbreak of a pest or disease.

Certain tree pests and diseases are notifiable, meaning that outbreaks must be reported to the Forestry Commission. Notifiable pests and diseases are those that pose the greatest threat to our native trees, woodlands and wildlife, and include acute oak decline and Chalara dieback of ash, oak processionary moth (*Thaumetopoea processionea*) and Asian longhorn beetle (*Anoplophora glabripennis*)<sup>127</sup>. The list of notifiable pests and diseases is updated regularly as new threats emerge; full and current listings can be found on the Forestry Commission and UK Government websites.

**Plans for future woodland management:**

The Park's trees are relatively young and even-aged; there is scope to diversify the structure of the woodlands through a coppicing and pollarding regime, in line with specifications in the Park Management Plan.

<sup>125</sup> The native bluebell (*H.non-scripta*) is an iconic flower of British woodlands – over a quarter of the world's bluebell populations are found in the UK. Native bluebells are increasingly threatened by the spread of the Spanish bluebell (*Hyacinthoides hispanica*) which will readily hybridise with the native variety. Any bluebell bulbs that may be planted on the Park at a future date (eg in enhancement projects) must be of native provenance (*Hyacinthoides non-scripta*).

<sup>126</sup> See Park Management Plan (Appendix 10): 'Tree disease management, Phyto-sanitary precautions and the management of injurious and invasive weeds'.

<sup>127</sup> A beetle that is a serious pest of many broadleaved trees. Native to Asia, the beetle is thought to have arrived in the UK on wooden crates imported from China. Although the beetle affects a range of broadleaved trees, it is thought that sycamore is an important host. Not yet widespread in the UK, despite the discovery of a breeding population in Kent in 2012. Such is the concern about the potential impact of this species that the beetle is a notifiable pest; any suspected sightings must be reported immediately to the Forestry Commission.





A standing dead tree, or 'snag', in the North Park wetlands.



Log pile created by volunteers using offcuts from the Park's woodland management.

A broad diversity of native woodland species can help to mitigate the challenges posed by climate change, pests and diseases. Appropriate native species should be selected for any regeneration or replacement works on the Park; this approach should help to increase the resilience of the woodlands to environmental threats.

Conservation volunteers have been involved in various projects to assess, manage and enhance the woodlands including tree surveys, coppicing, and the creation of dead wood habitats. New woodland projects will be identified regularly as part of the conservation volunteer programme.

Full and comprehensive surveys of the Park's tree stock were carried out in 2017 (South Park) and 2018 (North Park). The reports list in detail the management actions required for individual trees and woodland parcels over the next few years, and contain a number of recommendations to protect the long-term health of trees across the Park.

### Dead wood

Dead wood plays a key role in woodland ecosystems. Dead wood supports a variety of specialist species – termed 'saproxylic' species – that depend on decaying wood; it has been estimated that 13% of all animal and plant species in the UK are reliant on this unique habitat<sup>128</sup>. Dead wood supports a range of invertebrates, mammals and cavity-nesting birds; where it occurs in watercourses, it provides sheltered habitat for fish and freshwater invertebrates. A host of species recorded on the Park have a close association with dead wood, including the green woodpecker (*Picris viridis*) and the noctule bat (*Nyctalus noctula*), a tree-roosting species that requires rot holes and crevices in old trees and woodlands. Kestrels will use dead trees as hunting perches; these agile birds of prey are typically seen perched in trees at the top of the North Park.

Two of the BAP invertebrates, the fungus beetle (*Cicones undatus*) and the tumbling flower beetle (*Mordellistena neuwaldeggiana*), are saproxylic species that require an abundance of dead wood. Dead wood can be particularly valuable along woodland edges; where it occurs in association with nectar-producing flowers (eg blackthorn, or umbelifers) it provides a resource that will sustain adult insects as well as their developing larvae.

Standing dead wood (eg dead trees/snags) is a specialist habitat that differs from dead wood laying on the ground. Standing dead wood tends to be warmer than fallen trees or log piles, and rots at a slower rate. As a distinct type of habitat, standing dead wood should be retained in-situ wherever this is feasible. Examples of good quality standing dead wood can be found along the Greenway and City Mill River.

Variety in the type and size of dead wood is key; as a general rule, larger pieces (exceeding 10cm diameter) will provide a greater diversity of microhabitat and microclimate, although smaller pieces and brash can still be of benefit. Living trees can contain elements of dead wood, eg rot holes or old wounds that fill with detritus and attract woodlice and centipedes. Furthermore, seepages (a mixture of sap and rainwater) will appeal to feeding hoverflies and butterflies.

Woodlands that are newly created and/or have a narrow age structure will be naturally lacking in dead wood; increasing the volume of dead wood can add significant value for saproxylic flora and fauna.

### Dead wood – general guidance:

- Allow natural processes to create and maintain dead wood habitat - allow trees to hollow and age wherever possible.
- Retain standing dead trees (snags) where it is safe to do so. This will encourage the formation of beneficial features such as

<sup>128</sup> Buglife (2011) 'Deadwood'. Scottish Invertebrate Habitat Management.

rot holes, peeling bark and fracture cracks. The wet woodlands and interiors of the woodland hillocks would be ideal locations for standing dead wood.

- Aim to achieve continuity in dead wood habitat – as the Park’s trees mature and age, the availability and supply of dead wood should increase. Continuity of habitat is indicated by the presence of wood in various stages of decay, ranging from fresh and intact, to peeling bark and the complete loss of structure.
- A diversity in the type of dead wood will deliver the greater benefits – a range of species, decay classes and sizes should be represented. Wood should be placed in a variety of conditions – open, shade and dappled sunlight – to offer a broader array of habitat.
- Smaller pieces of dead wood can be secured together to create a woodpile (sometimes termed a ‘Waterhouse pile’<sup>129</sup>).
- Dead wood should ideally be placed in contact with the ground and in dappled sunlight; compact piles will help to maintain humidity.
- Thickets of scrub that contain dead stems should be retained.



A green woodpecker in the North Park – a species that requires a good supply of dead wood.

- Where possible, match the type of dead wood to target species – eg the fungus beetle is associated with sycamore wood (*Acer pseudoplatanus*).
- Dead wood in watercourses should be left in place where it does not obstruct the flow.

<sup>129</sup> See Read (2000) (pg.61) ‘Veteran trees; A guide to good management’. English Nature.

Trees and scrub	
Action	Targets and outcomes
Ensure no net loss of tree and scrub habitat from the current extent.	No net loss of tree and scrub habitat from the current 9.9 Ha.
Create a new area of woodland planting on former North Park display meadow and extend the wooded hillock.	New areas of tree and scrub should be captured and added to the current habitat totals.
Record the location and details of any new dead wood habitat created through management or volunteering.	To track and monitor the development of dead wood habitat on the Park and plan for its future management/enhancement.
Start coppicing works on the wooded hillock (west bank of River Lee).	Start works in the winter of 2018/19.
Develop volunteer projects to enhance woodland habitats, including coppicing to increase light levels.	Prepare suitable projects as part of the conservation volunteer programme from 2019 onwards.
Carry out regular checks for the presence of tree pests, especially oak processionary moth, to protect the health of the trees.	For tree pests and diseases to be reported and treated promptly to protect the tree stock on the Park.
Develop the Forest Schools programme with local schools.	Work with one school as a pilot in 2019.
Monitor trees and scrub as part of the BAP monitoring. Ensure that data informs management and contributes to London biodiversity data.	Include in the biodiversity monitoring report. Submit data to GiGL annually.



## Allotments

The Pudding Mill allotments are leased to the Manor Garden Society by LLDC. The site at Pudding Mill was delivered as part of LLDC's commitment to provide allotments 'of greater quality and quantity' than those that were removed to create the Park. The site contains over 50 plots that are let to individual tenants. The Pudding Mill allotment has a companion site, the Marsh Lane allotment in Waltham Forest. Allotments embody the sustainability, environmental and health benefits associated with growing food and being outside; they also have a significant value for wildlife, especially in urban areas where green spaces can be limited. As of 2019, the allotments remain a young and developing habitat.

The site at Pudding Mill does not fall under the direct management of the Park. However, there is scope to develop community projects at a future date that are linked to the BAP and engage plot holders with conservation and biodiversity.

The following list outlines options that can be used to enhance and encourage biodiversity within allotments:

- Reduce (and ideally eliminate) the use of chemicals and artificial fertilisers.
- Adopt companion planting systems to help with the control of pests, growing different plants and crops together for the benefit of one or both. Marigolds for example will attract pollinating insects whilst also repelling whitefly and certain pests of potatoes.
- Bird boxes, log piles and dead wood, beetle banks and piles of rocks and stones can be used to create pockets of valuable habitat.
- Compost heaps can attract grass snakes (ideal egg-laying sites) and slow worms.
- A diversity of planting (a mixture of early and late flowering species) will provide wildlife with resources throughout the year.
- Overgrown and undisturbed areas will benefit wildlife – for example, nettle beds will support over-wintering insects, and are a foodplant of small tortoiseshell and peacock butterfly larvae.
- Hedgerows that contain a range of native species are highly beneficial for wildlife. A 'fedge' is a good alternative to a hedgerow if space is limited (plants are grown through a man-made fence, eg ivy or other climbers).
- Ponds can provide further habitat interest.

Allotments	
Action	Targets and outcomes
Ensure no net loss of allotment habitat from the current extent.	No net loss of allotments from the current 2.1 Ha.

# ACTION PLANS – Species

**The 2008 BAP identified a number of species that were present on or around the site of the new Olympic Park; these became the “BAP species” – species that it was hoped would reside or be recorded on the new Park. Action Plans were prepared for each of the 28 species, outlining habitat targets and the long-term management actions required to support them.**

Despite large-scale habitat creation works, there remain some BAP species that are not present on the site. These elusive species include water vole and otter, common lizard and slowworm, and common toad. It is perhaps not surprising that these species have not been recorded on the site, given the surroundings and constraints that limit connectivity (eg road corridors and heavily urbanised waterways). Although there are occasional records for some of the BAP invertebrates, it is recognised that further work can be done to enhance the habitats and support these species.

The Park has a variety of habitats and features that support wildlife through the year and facilitate species movement across the Park. Maximising the potential of the Park to be a haven for wildlife is a key objective of the BAP; the 2014-2019 plan set the foundations for this to happen, and this plan aims to build on this work.

This section of the BAP updates previous species action plans, using knowledge of where species occur on the Park, and the habitat management needed to support them. The SAPs also contain general management guidelines that will have a wider benefit for all of the Park’s wildlife.

The aims of the Species Action Plans are to:

- Maintain and manage habitats for the benefit of species.
- Identify opportunities to enhance habitats for species.
- Promote awareness and understanding of the Park’s wildlife.
- Protect breeding habitats through key sensitive seasons (spring and summer).
- Identify opportunities to achieve net gain.

- Provide guidance on appropriate mitigation where areas are to be redeveloped.

## New Species Action Plans:

The 2008 BAP recognised that new species were likely to be detected during ecological survey work, stating that some of these species should be reflected in future versions of the plan:

“Indeed as the Park matures, monitoring will reveal new arrivals, some of which may be rare or exciting and which may merit inclusion in future versions of the Olympic Park BAP” (2008: 24).

One species that has had a significant impact on the Park is Himalayan balsam, an invasive plant that has had a widespread and detrimental effect on the wetland habitats. For this reason, we have prepared a new Species Action Plan that aims to address and control the spread of the plant. General guidelines regarding the control and management of other invasive non-native species are also provided.

The streaked bombardier beetle (*Brachinus sclopeta*) is one of the rarest invertebrates in the UK and was a notable find for the Park when it was first recorded along the Greenway in 2014. *Acinia corniculata*, a scarce picture-winged fly, breeds in the seed heads of common knapweed. The fly has been recorded on occasion during invertebrate survey work. In recognition of these important finds, new Species Action Plans have been prepared for these two invertebrates.



A juvenile robin in the Pleasure Gardens, South Park



Table 9 outlines general principles of habitat management that are intended to act as an overall 'Species Action Plan'. By delivering management that is adapted to the seasons and sensitive to biodiversity, the BAP can ensure that the Park supports a broad variety of wildlife – common species, as well as rare.

**Table 9:** General principles for habitat management on the Park

Native species	Give preference to native species of local provenance when designing or enhancing planting schemes. This advice will apply to ground flora, as well as shrubs and trees. Refer to the Park Design Guide for further advice and specifications.
Sensitive timing of management	Poorly-timed works can have a negative impact on wildlife. Nesting birds and hedgerows should be protected throughout the breeding season (broadly March – July, but longer if the weather is favourable). Ponds should be managed in the autumn months to avoid causing disturbance to breeding amphibians.
Low intervention areas	Low intervention 'wild' areas can be highly beneficial to wildlife. Reducing the frequency of mowing in certain areas (eg North Park amenity lawns) would help to achieve this. Nettle beds are of value to common butterflies such as the peacock, which will lay its eggs on the leaves.
Planting schemes	When selecting species for use in planting schemes, consider food, nectar and sheltering opportunities. Double-flowered varieties are not good for foraging bees, as the density of the petals restricts access to pollen and nectar.
Control competitive grasses and other species	Yellow rattle seed can be sown to help reduce the vigour of competitive grasses. Spot treatment may be required if species become an issue and threaten the grassland habitats (eg goats rue, creeping thistle, broad-leaved dock).
Ensure variety is provided through the year	Aim to include a variety of species with different flowering times in planting designs and meadow mixes. This will ensure that a continuity of resources is available through the year.
Winter resources	Hedgerows should be cut as late as possible to ensure that birds are provided with berries/fruits through the autumn and winter months.
Unmanaged strips of grass	A reduced-frequency mowing regime can help to protect flowering plants; longer swards provide structure/shelter within the Park landscape.
Retain deadwood	Dead wood (eg dead trees and log piles) should be retained where it is safe to do so. The life cycles of many invertebrates depend on dead and rotting wood.
Hedgerow bases	Where possible, allow hedgerow bases to thicken – dense growth at the base can help to increase the biodiversity value of a hedgerow.

## BREEDING BIRDS

### Black redstart

**Overview:** The black redstart is a small, robin-sized bird with a dusky grey plumage and a bright orange tail. London is a stronghold for the species; the black redstart is unique amongst British birds because of its dependence on urban and industrial landscapes that are close to human habitation. During World War II, the black redstart's preference for derelict land earned it the nickname of the 'Bombsite Bird'. The bird

will seek out ledges, walls and other features that can shelter and protect a nest. The black redstart is considered one of the rarest breeding birds in the UK, with 80 – 100 pairs breeding each year; the most recent available data puts the estimate at 56 breeding pairs<sup>130</sup>. During construction, the Park was thought to support up to 6% of the UK population.

**Threats:** The black redstart is heavily dependent on brownfield land – sites that are of high economic value to developers, particularly

<sup>130</sup> Population estimate (breeding pairs) based on the most up-to-date information available (see Hayhow et al., The State of the UK's Birds, 2017 report: Scarce and rare breeding birds, pg. 17).



A black redstart by Hackney Wick.



Black redstarts (an adult and juvenile) on brownfield land close to Park HQ.

in city centres. The loss of brownfield land means that green infrastructure in the urban landscape is vitally important to the survival of the species. The provision of green roof habitat in the Park's forthcoming developments will help to ensure that the 2008 SAP target for black redstart continues to be met ("to establish conditions suitable to support a breeding population").

**Opportunities:** The green roof on the Media and Press Centre building provides an example of habitat that is ideal for the bird – pioneer communities, stony ground, piles of rock and rubble and features that could shelter a nest. The roof should be used as a case study to guide future developments, particularly those around Stratford Waterfront and the new UCL campus.

**Legal protection:** The black redstart is listed on Schedule 1 of the Wildlife & Countryside Act (1981, as amended) and is subject to strong legal protection which extends to the birds' nests, eggs and dependent young. UK conservation status: Red List<sup>131</sup>.

<sup>131</sup> RSPB: Birds of Conservation Concern 'UK Conservation Status explained' (See: <https://www.rspb.org.uk/birds-and-wildlife/wildlife-guides/uk-conservation-status-explained/>).

### Managing the Park for black redstart – what do they need?

**Built environment BAP habitat:** Green roofs and brownfield land, providing valuable habitat in built-up urban areas.

**Rock and rubble:** Undisturbed, rocky areas with sparse and patchy ruderal vegetation.

**'Pioneer' plants:** Plants such as docks, plantains, mustards, and field scabious will attract invertebrates for the black redstart to feed on.

**Water:** Water attracts midges that in turn provide food for the bird. On the Park, the majority of black redstart sightings are reported close to water, particularly around Hackney Wick and the Lea Navigation.

**Structures:** Ledges and posts, plant and walls. A variety of structures will provide black redstarts with song posts and suitable nesting sites that are sheltered and well protected.

**Nest boxes:** If nest boxes are to be installed in new developments, they should be open fronted to meet the requirements of the species<sup><?></sup>.



<b>Progress to date:</b> Although considered a rare bird, there have been a number of black redstart sightings on the Park in recent years. The bird has been recorded on the green roof of the MPC, and singing males have been seen perched on lampposts along the River Lee Navigation, Carpenters Road, Canal Park, and White Post Lane, Hackney Wick.	
<b>Original BAP targets (2008)</b>	"To establish suitable conditions with the potential to support a breeding population of black redstart within the Park".
<b>Progress so far</b>	One confirmed and one probable territory in 2012, increasing to four confirmed territories in 2013. Few sightings reported in 2014. One bird recorded in Park HQ in late summer 2015. An increase in black redstart activity in 2016, with a number of sightings within and adjacent to the Park HQ compound, including males seen singing from lamp posts. The bird is thought to have probably bred on site in 2016. An adult bird and juvenile recorded in the Park HQ compound in 2017. Adult bird seen on the edge of the North Park meadows in early spring 2017. Thought probable that the bird bred on site in 2018. 50 black redstart boxes have been installed on the Park to date.

<b>Black redstart (Phoenicurus ochruros)</b>	
<b>Action</b>	<b>Targets and outcomes</b>
Ensure that any future green roof habitat created on the Park incorporates features that support black redstart.	The area of any new green roof habitat should be captured and added to existing totals (net gain). New habitat should be monitored to evaluate its use by black redstart.
Black redstart boxes to be incorporated into new developments where appropriate; boxes should be designed specifically for the black redstart.	Any new black redstart boxes should be mapped, recorded and added to the current total (50).
Construction areas should be surveyed for the presence of black redstart prior to the commencement of works, with suitable mitigation put in place as required.	To comply with legal and planning obligations to protect the black redstart, a Schedule 1 bird.
Continue to monitor black redstart populations across QEOP as part of the breeding bird survey work.	Monitor and collate all records of black redstart as part of the BAP monitoring. Submit data to GiGL on an annual basis.

### Reed bunting

**Overview:** The reed bunting is a sparrow-sized bird associated with wetlands, reed beds and farmland. A seed-feeder, the reed bunting depends on a good supply of ruderal vegetation to sustain its diet. During the breeding season, males are often seen perched on top of the reeds, or are heard by their territorial call. The birds breed low to the ground, in dense vegetation, building their nests from reeds, grasses and mosses.

Records of reed bunting were relatively few before 2011 when the majority of the wetland habitat was created. Since this date, monitoring has captured a gradual increase in breeding territories, reflecting the success of the river restoration works. The reed beds and wetlands on the east of the River Lee (North Park) are a hotspot for the species.

The delivery of the wetland Habitat Action Plans will benefit reed buntings as well as other wetland birds, including the reed warbler, Cetti's warbler,

tufted duck (*Aythya fuligula*) and grey heron.

**Threats:** Reed buntings require plenty of oil-rich seeds and invertebrates in their diet; for this reason, the way in which we manage the Park during the winter is very important. Leaving uncut vegetation in place will ensure that the birds have a source of food to sustain them through the winter months.

Invasive non-native plants, such as Himalayan balsam, can threaten the quality of the bird's main habitat by out-competing the common reed.

**Opportunities:** The development of Stratford Waterfront, one of the East Bank sites, may bring opportunities to increase and/or enhance the reed beds along the Waterworks River at a future date. Reed buntings have been noted in this area.

**Legal protection:** All wild birds, their nests, eggs and young are protected by law under The Wildlife & Countryside Act (1981, as amended). UK conservation status: Amber list (long term trend -31%)<sup>132</sup>.

<sup>132</sup> Long term trend data gives an estimate of species change (%) in the UK between 1970 - 2015, based on the most up-to-date information available (see Hayhow et al.,



A male reed bunting by Carpenters Lock.

### Managing the Park for reed buntings – what do they need?

**Wetland BAP habitat:** Rivers and reed beds, wetland vegetation, ponds, ditches and banks.

**A well-managed reed bed:** Cutting a proportion of the reed beds each year will create a variety of structure and a reed bed 'mosaic' that will benefit the species, as well as other wetland birds.

**Shelter:** Dense patches of reed to protect breeding habitat and nests.

**Weedy vegetation:** The type of vegetation found along the River Lee is particularly attractive to foraging reed buntings – oilseed rape (*Brassica napus*), common fleabane (*Pulicaria dysenterica*), shepherd's purse (*Capsella bursa-pastoris*) and other marginal weeds.

**Long vegetation:** Uncut vegetation encourages insects. This is especially important during the 'hungry gap' (March – April) when many of the birds food sources (over-winter stubbles or old stems and vegetation) are cut or ploughed ready for the new season.

**Sensitive management:** The application of pesticides and herbicides can reduce the amount of food available for the birds. Avoid cutting riparian margins and ditches wherever possible, or aim for a pattern of rotational management where certain areas are left uncut each year.

**Progress to date:** Reed buntings have been seen across the Park's wetland habitats, including the reed beds by Stratford Waterfront. The North Park reed beds are a stronghold for the birds.

**Original BAP targets (2008)**

"To regularly observe reed buntings on the Park. To establish suitable conditions with the potential to support a breeding population of reed bunting within the Park".

**Progress so far**

Reed buntings have bred on the Park every year since 2011. One territory was recorded in 2012, 2013 and 2014 (in the north of the Park). One territory was confirmed in 2015, along with one probable and five possible territories. A breeding pair with 3 juveniles was seen in reed beds in the north of the park in 2016. Singing males and females with nesting materials seen in the reed beds in 2017. Confirmed breeding in 2018. Regular sightings continue on the Park, particularly in and around the Wetland Bowl.



Reed bunting ( <i>Emberiza schoeniclus</i> )	
Action	Targets and outcomes
Maintain reed beds in a condition that will benefit reed buntings and protect them from threats such as invasive species.	Deliver works annually as part of the reed bed Habitat Action Plan. Carry out regular reviews as part of quality monitoring (monthly).
Secure new reed beds through future development where the opportunity allows.	The area of any new reed bed habitat should be captured and added to existing totals (net gain). New habitat should be monitored to evaluate its use by reed buntings.
Retain vegetation along wetland ditches and margins to encourage invertebrates, a vital source of food for young chicks.	Deliver annually as part of the reed bed Habitat Action Plan. Determine and agree areas to be left uncut each year, as part of the autumn works schedule.
Develop volunteer projects to enhance reed bed habitat for reed buntings, including the management of bankside vegetation and the annual reed cuts.	Identify suitable tasks as part of the Conservation Volunteer programme.
Continue to monitor reed buntings across the Park as part of the breeding bird survey work.	Monitor and collate all records of reed buntings as part of the BAP monitoring, Submit data to GiGL on an annual basis.

## Linnet

**Overview:** Linnets are seed-feeding finches. Once considered a bird of farmland and countryside, linnets are increasingly seen in towns and cities. The linnet is a small, slim bird; the male has a crimson forehead and breast, the female is a dull brown colour. Linnets breed in hedgerows and scrub, building cup-shaped nests from mosses, branches and other materials. In towns and cities, linnets are typically associated with brownfield land and allotments, and can form large flocks in winter. Linnets were known to breed on the site before construction started, and continue to be recorded on the Park, particularly around the Lee Valley VeloPark.

**Threats:** Linnets have a melodious song and were a popular song bird in the east end of Victorian London. The trapping of linnets and other finches for sale led to a huge decline in numbers; today, the loss of suitable habitat (eg hedgerows, arable stubbles) is the main threat to the bird. Linnets require a plentiful supply of insects and oil-rich seeds. The loss of ruderal vegetation, to intensive mowing, herbicide use or 'over-tidiness', can have a significant impact on the bird.

**Legal protection:** All wild birds, their nests, eggs and young are protected by law under The Wildlife & Countryside Act (1981, as amended). UK conservation status: Red List (long term trend -55%).



Linnet on the roof of the MPC building.

### Managing the Park for linnets – what do they need?

**Brownfield and Built Environment BAP habitats:** Including green roofs.

**Tree and shrub BAP habitat:** Woodlands and hedgerows for nesting and shelter.

**Dense hedgerows:** Linnets will nest semi-colonially in hedgerows and scrub. Thorny shrubs, such as gorse (*Ulex europaeus*) and blackthorn (*Prunus spinosa*), are favoured nesting sites. Selected hedgerows on the Park could be ‘gapped up’ to enhance nesting opportunities for linnets.

**Weedy vegetation:** Linnets require an abundance of seed – broadleaved weeds such as ribwort plantain (*Plantago lanceolata*), dandelion (*Taraxacum* agg.) and chickweeds (*Stellaria media*), are valuable food sources. Oilseed rape produces oil-rich seeds that are favoured by the bird; the plant is present along the River Lee (North Park).

**Long vegetation:** Uncut patches of vegetation will encourage insects and generate seed.

**Sensitive management:** The use of pesticides and herbicides can reduce the amount of food available to linnets. The loss or inappropriate management of hedgerows and scrub reduces the availability of nesting sites.

**Progress to date:** The majority of linnet sightings come from the north of the Park (Lee Valley VeloPark). Linnets have also been observed on the MPC green roof at Hear East.

<b>Original BAP targets (2008)</b>	“For linnets to be regularly observed in the Olympic Park and to create conditions with the potential to attract a breeding population”.
<b>Progress so far</b>	Two breeding territories were found in 2012. Linnets were thought to have ‘probably’ bred on site in 2013. Single linnets recorded on site in 2014 – ‘possibly breeding’. A single possible territory recorded in 2015. Linnets bred on the Park in 2016, with 1 territory confirmed. A pair were seen on the roof of the MPC building in June 2017. Ad-hoc sighting of an individual bird, seen with nesting materials in its beak, along a hedgerow by the Velodrome in 2017. In 2018, two fledglings were seen on separate occasions being fed by adults, thus confirming that linnets successfully bred on the Park.

### Linnet (*Carduelis cannabina*)

Action	Targets and outcomes
Ensure that any future green roof habitat created on the Park incorporates features that support linnets. Planting designs should incorporate seed-rich species.	The area of any new green roof habitat should be captured and added to existing totals (net gain). New habitat should be monitored to evaluate its use by linnets.
Ensure that winter feeding areas are retained for linnets.	Identify and map suitable areas prior to the start of the annual meadow cuts.
Identify hedgerow gaps in need of repair.	Survey the Park’s hedgerows in 2019. Use appropriate native shrubs to repair any gaps and provide additional nesting cover for the birds. This task could be delivered as part of the Conservation Volunteer programme.
Continue to monitor linnets across the Park as part of the breeding bird survey work.	Monitor and collate all records of linnets as part of the BAP monitoring. Submit data to GiGL on an annual basis.



## Swift

**Overview:** Summer visitors to London, swifts start to appear on the Park in early May, with their screaming, piercing calls often heard over in the north of the Park. Swifts build their nests from feathers or other materials that are collected on the wing and stuck together using saliva. The birds nest under the eaves, gables and soffits of buildings, meaning that they are highly dependent on human structures. Swifts are agile birds that feed on the wing and land only to nest and to breed. Swifts leave the Park towards the end of August to return to their African wintering grounds. The fastest birds in level flight, swifts can fly up to 2 million kilometres in a lifetime.

**Threats:** Swifts return to the same nesting sites each year, making them particularly vulnerable to new development and persecution (eg blocked access to nests). The conversion of old houses and barns has reduced the availability of potential nest sites, a factor that has also had an impact on swallows (*Hirundo rustica*). Swift numbers in the UK have fallen in recent years (a 51% decline since 1995) highlighting

the importance of making provision for swifts in new developments.

**Opportunities:** In recent years, efforts to conserve swifts have focused on incorporating suitable features into the built environment, ensuring that suitable opportunities are provided for the birds and other species (eg bats). Features that support swifts should be incorporated into the Park's forthcoming developments (eg Pudding Mill Lane, Rick Roberts Way or East Bank). Swift bricks are one option for integrating swift habitat into the built environment. The RSPB advise that it is good practice to include one nesting or roosting cavity per residential or commercial unit<sup>133</sup>. Boxes should be placed at a suitable height (at least 4, but ideally 5 metres) as the birds need height in order to take flight.

**Legal protection:** All wild birds, their nests, eggs and young are protected by law through the Wildlife & Countryside Act (1981, as amended). UK conservation status: Amber List (long term trend -51%).

133 RSPB. 'New nest sites' (See: <https://www.rspb.org.uk/our-work/conservation/conservation-and-sustainability/safeguarding-species/help-us-help-swifts/new-nest-sites/>).

### Managing the Park for swifts – what do they need?

**Built Environment BAP habitat:** Suitable nesting sites in buildings – gaps under the eaves or gables, or through the installation of suitable features including swift bricks or swift towers.

**Grasslands, woodlands and water:** Habitats that encourage flying insects, midges and flies, and generate food for swifts to feed on the wing.

**Sensitive management:** The use of pesticides and herbicides can reduce the amount of insects available for the birds.

**Progress to date:** Often recorded over the River Lee and over the grasslands in the north of the Park and around Hackney Wick.

<b>Original BAP targets (2008)</b>	“To create conditions which have the potential to attract a breeding population of swift in the Olympic Park, particularly by creating wetland and terrestrial habitats that generate flying insects”.
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<b>Progress so far</b>	Not recorded in 2012. Observed flying over the Park in 2013 and 2014, but not thought to have bred on or near the site. Not recorded in 2015. Observed flying over the Park in 2016, but not thought to have bred on the site. Observed flying over the Park regularly through summer 2017 (including numerous birds feeding on insects over NC10 meadow on 7th July 2017).
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Swift ( <i>Apus apus</i> )	
Action	Targets and outcomes
Secure new swift habitat as part of the Park's development. Ensure that the built environment includes features to support swifts, including swift bricks.	Any new habitats/features for swifts should be captured and added to existing totals (net gain). New habitats should be monitored to evaluate use by swifts (annually).
Where it is not feasible to include swift features in new buildings, look to secure compensatory habitat elsewhere on the Park.	Compensatory habitat could include a swift tower. New habitat should be monitored to evaluate its use by swifts.
Submit swift records from the Park to the RSPB's swift survey.	To contribute the Park's swift records towards this national monitoring project (annually).
Continue to monitor swifts across the Park as part of the breeding bird survey work.	Monitor and collate all records of swifts as part of the BAP monitoring. Submit data to GiGL on an annual basis.

### Grey heron

**Overview:** A tall, distinctive bird of wetland habitats. Grey herons are seen regularly along the Park's waterways, but are not currently breeding on site due to a lack of suitable nesting habitat (tall trees). The nearest breeding colony - 'heronry' - can be found at Walthamstow Reservoirs to the north of the Park, and is the largest in Greater London. Grey herons will eat a variety of prey including fish, amphibians and small mammals. Shallow wetlands, slow flowing waters and river edges are favoured feeding and hunting habitats for the bird.

**Threats:** Pollution once posed a significant threat to the grey heron, but numbers have

greatly increased in recent years as a result of efforts to improve the water quality of London's waterbodies, including the River Lee. Severe winters can have a considerable impact on grey herons, with frozen water limiting the amount of food available. The BTO Heronries census shows how grey heron numbers have experienced marked fluctuations in response to harsh winters, although the long-term trend points towards a 25% increase on baseline (1928) levels<sup>134</sup>.

**Legal protection:** All wild birds, their nests, eggs and young are protected by law through the Wildlife & Countryside Act (1981, as amended). UK conservation status: Green List.

<sup>134</sup> See Hayhow et al. (2017) The State of the UK's Birds 2017 (pg.14).



A grey heron on the banks of the City Mill River.



**Managing the Park for grey heron – what do they need?**

**Wetland BAP habitats:** Clean waters and sheltered, shallow waters for hunting.

**Wetland vegetation:** Fringes of wetland vegetation adjacent to river edges.

**Prey:** A plentiful supply of food, including freshwater fish, amphibians and small mammals.

**Progress to date:** A common visitor to the park, grey herons are seen along all of the four main waterways. The wetlands in the north of the Park provide sheltered and still waters for feeding.

**Original BAP targets (2008)**

“To regularly observe grey heron within the Olympic Park”.

**Progress so far**

Numerous records of grey heron on the Park since 2012. The bird is not breeding on site due to a lack of suitable habitat. The management of the reed beds and surrounding channels aims to ensure that good quality habitat is available for the bird.

**Grey heron (Ardea cinerea)**

**Action**

**Targets and outcomes**

Continue to provide suitable habitat for grey heron through the delivery of the wetland Habitat Action Plans.

To ensure that good quality foraging habitat is provided for the species (sheltered backwaters and channels for foraging). Carry out regular reviews as part of quality monitoring (monthly).

Continue to monitor grey herons across the Park as part of the breeding bird survey work.

Monitor and collate all records of grey heron as part of the BAP monitoring. Submit data to GiGL on an annual basis.

**House sparrow**

**Overview:** House sparrows are gregarious birds associated with parks, gardens and city centres. House sparrows feed mainly on grains, seeds and cereals, although they will also feed on insects. The birds will utilise a variety of nesting habitat that includes crevices in buildings, trees and hedgerows and climbing plants (eg ivy-covered walls). Once considered a common garden bird, house sparrow numbers have declined significantly since the 1970s. A breeding population was recorded on the former Eastway allotments prior to the construction of the Park.

**Threats:** Many factors are thought to have played a part in the decline of house sparrows, among them vehicular pollution, predation by domestic cats and a reduced availability of grains and cereals (autumn-sown crops) as well as the loss of vegetation from gardens. Modern buildings tend to have fewer opportunities for nesting, meaning that the birds can struggle to find suitable nesting sites.

**Legal protection:** All wild birds, their nests, eggs and young are protected by law through the Wildlife & Countryside Act (1981, as amended). UK conservation status: Red List (long term trend -66%).

**Managing the Park for house sparrows – what do they need?**

**Tree and shrub BAP habitat:** Woodlands and hedgerows for nesting and shelter. Thorny shrubs provide additional protection for the birds. Green walls and climbers may be utilised for nesting.

**Dense hedgerows:** House sparrows will nest semi-colonally in hedgerows and scrub. Selected hedgerows on the Park could be ‘gapped up’ to enhance nesting opportunities for house sparrows.

**Seeds:** House sparrows prefer open areas with lots of seed producing flowers; it is thought that the birds prefer open areas over dense wildflower meadows because they can reach the seeds more easily.

**Sensitive management:** The use of pesticides and herbicides can reduce the amount of food available for the birds. The loss or inappropriate management of hedgerows and scrub reduces the availability of nesting sites.

<b>Progress to date:</b>	Occasional records from the north of the Park and around Lee Valley VeloPark. Although there are records of breeding territories for the birds, house sparrows are generally not a common sight on the Park.
<b>Original BAP targets (2008)</b>	“To establish conditions with the potential to support a breeding population of house sparrow within the Olympic Park”.
<b>Progress so far</b>	Two possible territories recorded in 2012, and one probable territory recorded in 2013. Sightings of a flock of house sparrows in 2014 – possibly breeding as suitable habitat available. Incidental sighting of house sparrows made during 2015 amphibian surveys. House sparrow territory found on the north-west edge of the site in 2016. Although breeding could not be confirmed through behaviour, the birds were seen regularly in suitable habitat in 2017. Confirmed breeding on site in 2018. 75 house sparrow nest boxes have been installed on the Park to date.

House sparrow ( <i>Passer domesticus</i> )	
Action	Targets and outcomes
House sparrow boxes to be incorporated into new built developments where appropriate; boxes should be designed specifically for house sparrows (eg sparrow terraces).	To provide new nesting habitat for house sparrows within the Park. New house sparrow boxes should be recorded and added to the current total (75).
Develop plans to engage schools with wildlife on the Park, including house sparrows and other garden birds.	Develop options as part of the BAP community plan, eg building nest boxes.
Ensure that winter feeding areas are retained for house sparrows.	Identify and map suitable areas prior to the start of the annual meadow cuts.
Identify hedgerow gaps in need of repair.	To improve the availability of nesting habitat for house sparrows. Identify suitable hedgerows as part of habitat monitoring work in 2019.
Continue to monitor house sparrows across the Park as part of the breeding bird survey work.	Monitor and collate all records of grey heron as part of the BAP monitoring. Submit data to GiGL on an annual basis.

## Kingfisher

**Overview:** The kingfisher is associated with slow and shallow waters that also provide good quality fishing habitat. Their presence is an indicator of good water quality; kingfishers will not hunt in poor quality, heavily polluted waters. The birds nest along natural riverbanks, burrowing into soft sediments and muds, and will use twigs or branches over the water as perches to hunt their prey. The lack of steep natural banks is thought to limit breeding opportunities on the Park, although the bird’s shrill call is frequently heard along the River Lee and in the North Park wetlands. Often seen as a flash of blue along the waterways, there have been regular sightings of kingfishers on the Park to date.

**Threats:** Kingfisher numbers can fluctuate year on year. Harsh winters have a severe impact on the birds, reducing the availability of food. Low water levels can expose nesting sites in the summer, making the birds and their young vulnerable to predators.

**Legal protection:** The kingfisher is listed on Schedule 1 of the Wildlife & Countryside Act (1981, as amended) and is subject to strong legal protection which extends to the birds’ nests, eggs and dependent young. UK conservation status: Amber List (long term trend -17%).



A kingfisher perches above the water.



### Managing the Park for kingfishers – what do they need?

**Wetland BAP habitats:** Clean waters and sheltered, shallow water for hunting. Clean water will encourage a good supply of prey, including minnows, sticklebacks, and other small fish.

**Perches:** Perches that are close to still or slow flowing water, for example old branches that over-hang the riverbank, or mooring posts in the shallows.

**Wetland vegetation:** Fringes of wetland vegetation alongside the river edge, offering shelter and protection.

#### Progress to date:

**Original BAP targets (2008)** “To establish conditions with the potential to support a breeding population of kingfisher within the Olympic Park”.

**Progress so far** Records of the bird on the Park in 2012, 2013 and 2014; birds not thought to have bred on site but to have probably bred nearby. Kingfisher observed in suitable breeding habitat in 2015, but no breeding behaviours or likely nest sites identified. One record of a kingfisher along the River Lee in 2016. Sightings in 2017 could indicate kingfisher to be nesting on the Park, or just outside of the Park, although this could not be confirmed. A kingfisher bank was constructed in the North Park wetlands; breeding bird surveys have been unable to confirm its use.

#### Kingfisher (*Alcedo atthis*)

Action	Targets and outcomes
Provide suitable habitat for the kingfisher through the delivery of the wetland Habitat Action Plans.	To ensure good quality habitat is provided for the species. Carry out regular reviews as part of quality monitoring (monthly).
Develop volunteer projects to enhance the wetland habitats for kingfishers.	Identify suitable projects as part of the Conservation Volunteer programme (annually).
Continue to monitor kingfisher populations across the Park as part of the breeding bird survey work.	Monitor and collate all records of kingfishers as part of the BAP monitoring. Submit data to GiGL on an annual basis.

### Starling

**Overview:** Starlings are noisy and gregarious birds common to parks and gardens. Flocks of starlings (often numbering 100+ birds) are regularly seen on the Park. Numbers were few during the Park’s construction; it is thought that this was due to the lack of suitable foraging habitat (amenity grassland and lawns). Starlings will nest in holes in trees or buildings. In the winter they can nest in woodlands or in reed beds, often in roosts numbering several thousand birds. Starlings will eat a wide range of food - insects, berries, seeds and fruits - and will forage on farmlands and amenity grasslands.

**Threats:** Starling numbers have declined dramatically in recent years, despite once being a common and widespread bird; reasons behind the decline are largely unknown<sup>135</sup>. A general shortage of nesting sites and feeding



An adult and two juvenile starlings by Park HQ.

<sup>135</sup> Starlings were once so numerous in London that in August 1949, a large flock landed on the minute hand of Big Ben – the combined weight of the birds caused the clock to slow by 5 minutes (RSPB, 2012: Londoner’s part of the answer to save starlings). Numbers of starlings in the capital are now a fraction of what they once were. Declines in the numbers of UK starlings were first detected in the 1970s and 1980s, and have continued ever since.

areas is likely to have played a role. Pesticide application can greatly reduce the availability of leatherjackets (the larvae of the European crane fly), one of the bird's main food sources. Predation by domestic cats can have an impact on numbers. Although relatively common birds in towns and cities, the decline of starlings elsewhere in the British countryside has resulted in their inclusion on the UK Red List of Birds of Conservation Concern<sup>136</sup>.

**Legal protection:** All wild birds, their nests, eggs and young are protected by law through the Wildlife & Countryside Act (1981, as amended). UK conservation status: Red List (long term trend -81%).



A juvenile starling by Park HQ.

<sup>136</sup> Long-term monitoring data shows that starling numbers have fallen by 81% since 1970. See: See Hayhow et al. (2017) The State of the UK's Birds 2017 (pg.13).

**Managing the Park for starlings – what do they need?**

**Amenity grassland:** Short amenity turf that provides good quality foraging habitat for earthworms, leatherjackets and other invertebrates.

**Scrub:** Patches of scrub that provide nesting habitat and protection from predators.

**A plentiful supply of insects:** Sensitive management that encourages insects and the development of good soil structure.

**Availability of resources through the year:** Seeds and berries during the winter months.

**Progress to date:** Starlings are a regular sight on the Olympic Park and it is common to see large flocks, especially in the North Park where there is lots of amenity grassland and short lawn available – ideal foraging habitat. Young birds have been seen on the Park during nesting season, indicating that starlings are now breeding on the Park.

<b>Original BAP targets (2008)</b>	“To be regularly observed and to create conditions with the potential to attract a breeding population”.
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<b>Progress so far</b>	Thought to have bred in a housing area just outside the Park in 2012. Not recorded in 2013, due to restricted access to the North Park. Starlings recorded on the Park in 2014 and 2015, often in large flocks. Large numbers of the birds recorded in 2016, including juveniles, with one colony confirmed. Starling flocks (100+ birds) seen regularly throughout 2017, with a number of juveniles seen with adult birds from late spring/summer. Bred on site in 2018 with a number of sightings of fledglings. 200 nest boxes installed across the Park.
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Starling ( <i>Sturnus vulgaris</i> )	
Action	Targets and outcomes
Provide suitable habitat for starlings through the delivery of the Habitat Action Plans, including the Park's, Squares and Amenity Habitat Action Plan.	To ensure that good quality habitat is provided for the species throughout the year (eg short grassy areas for foraging). Carry out regular reviews as part of quality monitoring (monthly).
Starling boxes to be incorporated into new built developments where appropriate; boxes should be designed specifically for starlings.	To provide new nesting habitat for starlings within the Park. Any new starling boxes should be recorded and added to the current total (200).
Develop plans to engage schools with wildlife on the Park, including starlings and other garden birds.	Develop options as part of the BAP community plan (eg building nest boxes, RSPB Big Schools Birdwatch).
Ensure that habitat suitable for starlings is protected and enhanced through the winter works schedule.	To ensure good quality habitat is provided for starlings, including scrub, coppiced woodlands and woodland edges. Carry out regular reviews as part of quality monitoring (monthly).
Develop volunteer projects to enhance habitat for starlings and to engage people in their conservation.	Identify suitable tasks as part of the Conservation Volunteer programme.
Continue to monitor starling populations across the Park as part of the breeding bird survey work.	Monitor and collate all records of starlings as part of the BAP monitoring. Submit data to GiGL on an annual basis.

### Sand martin

**Overview:** A summer visitor to the Park, sand martins arrive in mid-April and remain here until September. The birds will nest in steep sandy banks; where natural nests are not available, they will utilise man-made structures. In London, sand martins are typically found close to open water. Sand martins have been nesting in the drainage holes of the Bow Back River and Stadium Loop for many years. Wetlands are important feeding areas for the birds before they start their migration back to Africa, and in late summer it is common to see sand martins feeding on the wing over the River Lee and its reed beds.

**Threats:** Droughts in their African wintering grounds can affect the numbers of sand martins returning to the UK each year. There has been an increase in the numbers seen in east London in recent years, which has offset a national decrease in numbers<sup>137</sup>.

**Opportunities:** A sand martin barrel at Carpenters Lock could be installed to provide compensatory habitat, should BAP targets not be met elsewhere. Such a structure would create additional (safe) nesting habitat for the birds, and offer an opportunity to engage people with their presence on the Park.



A sand martin leaves its nest in the Stadium Loop, City Mill River.

**Legal protection:** All wild birds, their nests, eggs and young are protected by law through the Wildlife & Countryside Act (1981, as amended). UK conservation status: Amber List (long term trend +7%).

<sup>137</sup> Greenspace Information for Greater London. Species Action Plan: 'Sand martin'.



### Managing the Park for sand martins – what do they need?

**Accessible nesting sites:** The birds are known to nest in the drainage holes around the Stadium Loop (City Mill River/Old River Lea). The entrance holes should be kept free of vegetation such as bramble and buddleia – this will ensure that the birds have a clear flight path into their nests.

**Plenty of insects:** Retaining ‘wilder’ areas on the Park – eg patches of long grass close to water – will encourage insects and generate food for sand martins.

#### Progress to date:

<b>Original BAP targets (2008)</b>	“To create conditions suitable to attract a breeding colony for sand martins”.
<b>Progress so far</b>	Two nests recorded on the Park in 2011 and up to 9 pairs thought to have bred on the Park in 2013. Species not recorded on the Park in 2014. One confirmed colony in 2015 and again in 2016 (Carpenters Lock). Pairs were seen entering holes on the edge of Carpenters Lock regularly during the breeding bird surveys of 2017; birds seen carrying nesting materials and young birds later seen leaving the nests, therefore confirming breeding status. Bred on site in 2018.

#### Sand martin (*Riparia riparia*)

Action	Targets and outcomes
Ensure that sand martins are provided with suitable breeding sites. Protect the breeding habitats and colony around Stadium Loop.	Carry out checks of the mooring holes around Carpenters Lock and remove vegetation to maintain a clear flight path to the nests (note that work should avoid the breeding season).
Install additional wooden blocks into the drainage holes around Stadium Loop to protect potential nesting sites from predators.	By spring 2019.
Provide good quality feeding habitat for sand martins through the delivery of the wetland Habitat Action Plans.	To ensure wetland habitats generate flying insects which will support/feed sand martins, especially in late summer. Carry out regular reviews as part of quality monitoring (monthly).
Continue to monitor sand martins across the Park as part of the breeding bird survey work.	Monitor and collate all records of sand martins as part of the BAP monitoring. Submit data to GiGL on an annual basis.

### Song thrush

**Overview:** A familiar bird of parks and gardens, the song thrush is often one of the first songbirds to be heard in the spring. The song thrush requires woodland edges that are close to short grassland, hedgerows and scrub; this mixture of habitat creates ideal conditions for foraging. Song thrushes will nest low to the ground where there is suitable cover. Breeding territories are established in late winter.

**Threats:** The use of molluscicides can have an impact, especially later in the spring when snails are a major part of the diet for adults and their young. The loss of suitable foraging and nesting habitat, including amenity grassland, hedgerows and scrub. Drainage reduces the amount of wet

grassland available for foraging (wet grassland tends to have a better supply of earthworms and leatherjackets). Neglected woodlands are of little value to the song thrush, being dark, dense and overgrown. Predation by domestic cats, crows and foxes.

**Legal protection:** All wild birds, their nests, eggs and young are protected by law through the Wildlife & Countryside Act (1981, as amended). UK conservation status: Red List (long term trend -50%).

<b>Progress to date:</b> Occasional records of song thrush. The majority of the sightings are reported from the North Park, where there is a high proportion of amenity grassland, some of which is adjacent to woodland.	
<b>Original BAP targets (2008)</b>	"To encourage growth in population of song thrush on the Olympic Park".
<b>Progress so far</b>	A single record of a singing male in 2012 and 2013; birds thought to be breeding just off site. Not recorded on the Park in 2014 or 2015. A breeding pair observed on the Park in suitable breeding habitat in 2016 – possibly breeding. It is thought that song thrush probably bred on the Park in 2017, with repeated sightings of a singing male in the same location over a few survey visits, indicating a maintained territory. Possibly bred on site in 2018.

Song thrush ( <i>Turdus philomelos</i> )	
Action	Targets and outcomes
To increase pockets of scrub and low vegetation wherever the opportunity allows, particularly in the North Park and around new developments.	Areas of new scrub habitat should be captured and added to existing habitat totals (net gain). Monitor new habitat to evaluate its use by song thrush.
Identify opportunities for habitat enhancement for song thrush across the Park, for example by enhancing the woodland edges.	Identify suitable tasks as part of the Conservation Volunteer programme.
Ensure suitable song thrush sites are protected and enhanced through the winter works schedule.	To ensure good quality habitat is provided for song thrush – scrub, coppiced woodland and woodland edges. Carry out regular reviews as part of quality monitoring (monthly).
Continue to monitor song thrush populations across the Park as part of the breeding bird survey work.	Monitor and collate all records of song thrush as part of the BAP monitoring. Submit data to GiGL on an annual basis.

## AMPHIBIANS

**Overview:** Three species of amphibian are included in the Olympic Park BAP:

- Smooth newt (*Lissotriton vulgaris*)
- Common frog (*Rana temporaria*)
- Common toad (*Bufo bufo*)

Smooth newts are typically found in damp habitats. They spend part of the year in water (to breed) and part of the year on land (in hibernation). Smooth newts require a good range of aquatic weeds on which to lay their eggs, and need small, broad-leaved plants with thin leaves that are easily folded over; water mint (*Mentha aquatica*) is a favoured plant. Smooth newts have been recorded in all of the Park's ponds. Amphibians require a mosaic of wetland habitats that meet their needs throughout the year, including habitat that is suitable for breeding and hibernation. During the breeding season the males develop a wavy crest on their back, and a distinctive spotted orange/yellow belly.

A number of amphibians were translocated from the site during construction, including 1000 smooth newts from the wetlands surrounding



A smooth newt in the Great British Garden pond.

Bully Point Nature Reserve. Frogspawn has been recorded on occasion in ponds 3 and 4 (North Park). Common toads were known to breed in the Bully Point pond prior to construction, but have not been recorded on the Park in recent years.

Management actions for the ponds will be phased over a 5-year period (see the 'Ponds' Habitat Action Plan). Management will aim to increase the amount of light reaching the water, controlling the growth and spread of bulrushes and other tall plants that can cast dense shade over the ponds. Regular monitoring will be carried out to check for signs of blue-green algae<sup>138</sup>, a type of bacteria that can 'bloom' in great quantities when the conditions are right (a combination of warm temperatures, slow-flowing waters and high nutrient levels).

**Threats:** Loss of suitable breeding habitat and the associated loss of connectivity through development, neglect or infilling of ponds. Amphibians have a permeable skin, making them vulnerable to poor water quality and pollution. Amphibians can be particularly susceptible to disease and fungal infections, such as Ranavirus and Chytridiomycosis<sup>139</sup>. The use of insecticides in the wider environment greatly reduces the availability of food. Roads are a threat to amphibians, and many die each year whilst attempting to reach their breeding ponds. The presence of fish in ponds is known to reduce the survival rate of tadpoles and larvae. Predation from grey herons, grass snakes and weasels (*Mustela nivalis*) is also a factor.



Water mint (*Mentha aquatica*), an important egg-laying plant for smooth newts.

**Legal protection:** Amphibians receive a degree of protection under the Wildlife & Countryside Act (1981, as amended). The level of protection differs according to the species; the common toad, common frog and smooth newt are protected from sale and trade under Section 9 (5) of the Act<sup>140</sup>.

<sup>138</sup> Blue-green algae is a type of cyanobacteria that occurs naturally in freshwater ecosystems. The algae can bloom in suitable conditions (eg high nutrient levels, warm temperatures) and affects the appearance and quality of a waterbody. The bacteria produces toxins that can be harmful to human and animal health if ingested.

<sup>139</sup> Chytridiomycosis is a highly infectious disease caused by the chytrid fungus, thought to be behind the dramatic worldwide decline seen in amphibians. The disease affects skin tissues and respiration. Chytridiomycosis first arrived in the UK (south-east England) in 2005, and was likely brought in to the country via the import of non-native amphibians (i.e. exotic pets). In the UK, toads appear to be the most susceptible of the native amphibians. Ranavirus mainly affects common frogs, and is also thought to have been introduced via exotic species. Biosecurity measures are essential to stop the spread of this and other diseases, eg by having dedicated equipment for each pond that is thoroughly disinfected after use.

<sup>140</sup> Three other species of native amphibian receive full protection under the Wildlife & Countryside Act (1981, as amended): the great crested newt (*Triturus cristatus*), natterjack toad (*Epidalea calamita*) and pool frog (*Pelophylax lessonae*). It is an offence to kill, injure, capture or disturb these species and to destroy or disturb the habitats that they use for breeding and for hibernation.

### Managing the Park for amphibians – what do they need?

- Breeding ponds with good quality surrounding terrestrial habitat.
- Damp areas: including ditches and hedgerows.
- Dead wood: Log piles provide a place to shelter over the winter, creating a stable microclimate.
- A good source of food: Insects and larvae, small worms, water snails and slugs. Leaving grassy margins around a pond can encourage insects; log piles and stones will also help.
- Light: A pond should not be too heavily shaded, especially around its southern margins. Warmer temperatures will help larvae/young to develop.
- Egg-laying plants: A variety of plants on which to lay their eggs (smooth newts). Plants should have thin leaves that are easy to fold – good examples include water mint, sweet grasses (*Glyceria* sp.) and water forget-me-not (*Myosotis scorpioides*).
- Sensitive management: Pesticides/herbicides should not be used close to water, on in habitats that could support amphibians. Pond management should be carried out at an appropriate time of year (autumn) to avoid disturbance to wildlife.



**Progress to date:** Smooth newts have been found in all 9 of the Parks ponds; adults, juveniles, larvae and eggs have been recorded during BAP survey work. The greatest numbers are found in the pond in the Great British Garden. Frogspawn has been recorded on occasion in the North Park ponds (ponds 3 and 4). No records of common toad to date.

<b>Original BAP targets (2008)</b>	To establish breeding populations of all the BAP amphibians in the ponds.
<b>Progress so far</b>	Newts have been recorded in all 9 ponds. The pond in the Great British Garden has consistently recorded high numbers of smooth newt. Ponds in the North Park have suffered from pollution, invasive species, and low water levels during the exceptionally hot summer of 2018. Two ponds now fall under the management of Lee Valley Regional Park Authority (ponds 1 and 2). No common toads recorded on the Park since they were moved off site (c.2010). Occasional reports of frogspawn in the North Park.

Amphibians	
Action	Targets and outcomes
Provide suitable habitat for amphibians through the delivery of the wetland Habitat Action Plans, including 'Ponds'.	To ensure good quality habitat is provided for amphibians across the Park. Carry out regular reviews as part of quality monitoring (monthly).
Implement the pond management plan in stages over the next 5 years.	To improve the condition of the North Park ponds and to achieve an increase in scores for habitat condition (aim for 70%).
Identify opportunities for habitat enhancements for amphibians in the North Park ponds, eg introducing more egg-laying plants.	Identify suitable tasks as part of the Conservation Volunteer programme.
Continue to monitor amphibians across the Park as part of the BAP survey work.	Monitor and collate all records of amphibians as part of the BAP monitoring. Submit data to CiGL on an annual basis.

## REPTILES

**Overview:** Three species of native reptile are included in the Olympic Park BAP:

- Common lizard (*Zootoca vivipara*)
- Slow worm (*Anguis fragilis*)
- Grass snake (*Natrix natrix*)

The common lizard is distributed across the UK mainland. Common lizards were recorded on railway land near to Temple Mills (now East Village/Westfield) prior to the construction of the Park. The species favours open, sunny habitats that include rough grassland, woodland edges, heathlands, railway embankments and wastelands. Common lizards are active during the day; as they are cold-blooded they rely on external heat and will bask in the morning and late afternoon sun to warm their bodies. Lizards hibernate between November and March, and will seek shelter in suitable habitat (eg log piles and stones).

The grass snake is non-venomous. It is a lowland snake that shows a strong association to wetlands although it can be found in other habitats (grasslands, woodlands, heathlands and

allotments). The species hunts amphibians and occasionally fish, small mammals and young birds, and will often hunt underwater. Grass snakes were previously recorded around Bully Point (now the North Park wetlands and Wetland Bowl). Occasional sightings are still reported in the North Park, and along the River Lee.

The slow worm is a legless lizard. The species is found in a wide range of open and partially shaded habitats, eg woodland edges, rough grassland, tall ruderal vegetation and allotments.



Suitable reptile habitat at East Marsh.



A common lizard

Slow worms will seek refuge under wood, stones or other debris, and spend most of their lives underground or hidden in deep vegetation; they are commonly found in gardens and compost heaps. Slow worms feed mainly on slugs and other invertebrates which they hunt at dusk or just after rainfall.

A number of reptiles were translocated from the site during the construction of the Olympic Park.

**Threats:** Despite a widespread distribution in the UK, many reptile species have experienced a decline in recent years. The main causes are thought to be: habitat fragmentation

and degradation due to changes in land use, drainage, scrub encroachment into grassland and heathland and uncontrolled fires. Unintentional disturbance of grass snake egg laying sites (eg compost heaps) has also had an impact.

**Legal protection:** Reptiles receive a degree of protection under the Wildlife & Countryside Act (1981, as amended). The level of protection is variable depending on the species; the grass snake, common lizard and slow worm are protected from intentional killing, injury and trade.

#### Managing the Park for reptiles - what do they need?

- A mosaic of habitat: Lightly managed grasslands and woodland edges. Wetland habitats, including ponds, are attractive to grass snakes.
- Long grass and tall ruderal vegetation: Providing shelter, protection and foraging/ hunting areas.
- Dead wood: Log piles offer shelter over the winter, creating a stable microclimate.
- A good source of food: Insects and their larvae, small worms, water snails and slugs.
- Sensitive management: Pesticides/herbicides should not be used close to water, on in habitats that could support reptiles.

#### Progress to date:

<b>Original BAP targets (2008)</b>	To establish breeding populations of all the BAP reptiles. To establish a complex of lightly managed grassland, woodland and wetland habitat. To monitor the development of the habitats with the view to suitable areas being used as receptor sites.
<b>Progress so far</b>	Despite the creation of suitable habitat, reptile sightings on the Park have been few. Occasional grass snake sightings along/in the River Lee. No sightings to date of common lizard or slow worm.

Reptiles	
Action	Targets and outcomes
Provide suitable habitat for reptiles through the delivery of the Habitat Action Plans, including wetlands, species-rich grassland and trees and scrub.	To ensure good quality habitat is provided for reptiles across the Park. Carry out regular reviews as part of quality monitoring (monthly).
Identify opportunities for habitat enhancements for reptiles in the North Park wetlands and grasslands.	Identify suitable tasks as part of the Conservation Volunteer programme.
Investigate options for the introduction of reptiles (potential receptor site).	This has been suggested as an option, should the species not return to the Park (see 2008 BAP) <sup>&lt;?&gt;</sup> .
Continue to monitor reptiles across the Park as part of the BAP survey work.	Monitor and collate all records of reptiles as part of the BAP monitoring. Submit data to GiGL annually.

### INVERTEBRATES:

Invertebrates are animals that lack a backbone; they make up about two-thirds of all life on Earth. Around 40,000 species of invertebrate have been recorded in the UK, 27,000 of which are insects<sup>141</sup>. Insects deliver an array of ecosystem services on which humans depend, notably pollination and the decomposition of organic materials essential for nutrient cycling, soil formation and plant growth. Insects are the foundations of the food chains that sustain many other species - bats, birds, reptiles, amphibians and small mammals; as such, they are an integral part of an ecosystem.

**Threats:** Long-term monitoring data has indicated a rapid and dramatic decline in insects, with global data demonstrating a 45% decline in abundance over the past 40 years<sup>142</sup>. Trends are apparent across many species groups; for example UK data has shown a 76% decline in the abundance and/or occurrence of resident butterflies over the past 40 years<sup>143</sup>. Factors behind the decline are many and numerous, but habitat loss and fragmentation, pollution, climate change and the overuse of chemicals (eg neonicotinoid insecticides) are thought to have played a significant part.

The loss of invertebrates is also reflected in other groups; for example, declines in house sparrows have been attributed to a reduction in the availability of summer insects<sup>144</sup>.

BAP invertebrates: Seven species of terrestrial invertebrate were listed in the Olympic Park BAP (2014 - 2019):

- Brown-banded carder bee (*Bombus humilis*)
- Flower beetle (*Olibrus flavicornis*)
- Fungus beetle (*Cicones undatus*)



Butterfly caterpillars feeding on nettles in the North Park wetlands.

- Ground bug (*Stictopleurus abutilon*)
- Ground bug (*Stictopleurus punctatonervosus*)
- Toadflax brocade moth (*Calophasia lunula*)
- Tumbling flower beetle (*Mordellistena neuwaldeggiana*)

To date, an extensive list of invertebrates have been recorded on the Park. These lists are published in the biodiversity monitoring report, along with the conservation status of each species.

**Legal status:** The degree of legal protection afforded to invertebrates varies by species. There are various 'status' categories of protection and rarity, and much depends on the breadth of national records, i.e. how many 10km grid squares a species has been recorded within. Broadly speaking, the fewer spots on the map, the rarer a species is. For example:

141 Buglife 'About us' ([www.buglife.org.uk](http://www.buglife.org.uk)).

142 Dirzo et al. (2014) Defaunation in the Anthropocene. *Science*, 345, pg. 401 - 406.

143 BBC: 'UK butterflies in 40 year slump' (<https://www.bbc.co.uk/news/science-environment-35093468>)

144 RSPB (2008) 'Insect shortage leaves sparrows starving' (<http://www2.rspb.org.uk/our-work/rspb-news/news/203663-insect-shortage-leaves-sparrows-starving>).





A green lacewing on ox-eye daisies in the Fantasticology meadows.

- *Acinia corniculata*, a fly that has been recorded on knapweed flowers in the Park, is listed as RDB1 'Endangered'. RDB1 species are amongst the rarest of taxa, and are threatened with extinction in the UK.
- *Polydrusus splendidus*, a nationally scarce weevil of broadleaved trees that has been recorded in the North Park. This is a 'Notable A' species, found in 30 or fewer of the UK's 10km grid squares.
- *Andrena pilipes*, a solitary bee that is present along the Greenway. A 'Notable B' species, meaning that it has been recorded in 31-100 of the UK's 10km grid squares.

The NERC Act (2006)<sup>145</sup> lists those habitats and species that are considered of 'principal importance' to biodiversity conservation in the UK. The brown-banded carder bee (*Bombus humilis*), one of the Park's BAP species, is listed as a Species of Principal Importance.



A damselfly in the North Park meadows.

<sup>145</sup> The Natural Environment and Rural Communities (NERC) Act requires public bodies, including local authorities, to have regard to the conservation of Species and Habitats of Principal Importance when implementing their duties.

Managing the Park for invertebrates – what do they need?	
Habitats and features	What invertebrates benefit ( <b>BAP species in bold</b> )
Wildflower-rich meadows and grasslands, providing a source of pollen and nectar.	<b>Brown-banded carder bee, ground bugs</b> and other pollinating insects including bees, hoverflies, butterflies and day-flying moths (eg cinnabar and mint moths<?>).
Dead wood	<b>Fungus beetle</b> and <b>tumbling flower beetle</b> . Woodlice, beetles, centipedes, and other ‘saproxyllic’ insects (those that depend on dead and decaying wood).
Brownfield habitats with young pioneer plants.	<b>Flower beetle</b> . Invertebrates associated with brownfield land, including the <b>streaked bombardier beetle</b> .
Autumn and winter structure – unmown grass and dead flower stems.	Over-wintering bees and beetles, eg the picture-winged fly, a RDB species that has been recorded in swales in the North Park.
Bare and stony ground	<b>Toadflax brocade moth</b> and invertebrates of waste ground/brownfield land. Beneficial basking areas for thermophilic invertebrates.
Food plants	A wide range of invertebrates will benefit from the presence of their specific food plants eg birds-foot trefoil in the meadows to support the common blue butterfly.
“Stepping stones” – pockets of flowers throughout the Park, including the World Gardens and roadside verges.	A wide range of pollinating insects.

### Brown-banded carder bee

**Overview:** The brown-banded carder bee requires species-rich grasslands and meadows and a plentiful supply of nectar and pollen - the disappearance of wildflower meadows are a major threat to this (and other bee and wasp) species. Nesting bees require grassy tussocks, ideally on south-facing banks. The bee will use smaller patches of grassland to forage and feed, including roadside verges. The bee favours flowers that have long corollas (long petals that are brightly coloured to attract insects) and will forage into the autumn, meaning that late-flowering species are important.

The wildflower meadow on the west bank of the River Lee exemplifies the type of habitat that is attractive to the brown-banded carder bee; the meadow supports a diversity of flowers that are favoured by the species, including red clover (*Trifolium pratense*) and kidney vetch (*Anthyllis vulneraria*).

<b>Progress to date:</b> Recorded on occasion on the green roof at the MPC. Recorded in the Lee Valley.	
<b>Original BAP targets (2008)</b>	To create a range of conditions to enable a breeding population to become established.
<b>Progress so far</b>	Records of the species on the Park are few and far between. The brown-banded carder bee has been recorded in Newham, on Hackney Marshes and in the North of the Olympic Park, as well as the Greenway. The bee was recorded on the green roof of the MPC in 2013, and by the City Mill River in 2018.

<b>Brown-banded carder bee (<i>Bombus humilus</i>)</b>	
<b>Action</b>	<b>Targets and outcomes</b>
Restore the meadow to the east of Hopkins Field to create new habitat that would benefit the species.	To provide suitable habitat for the species and to see an increase in records of the species (only occasional at present). (target date TBC)
Identify areas to be left uncut each autumn and winter to provide foraging and over-wintering sites for the bee and other invertebrates.	Identify and agree suitable areas as part of the annual programme of meadow cuts.
Identify sections of meadow that can receive an early summer cut. This will encourage the growth of flowering species into the autumn, supporting late-foraging bees.	Identify and agree suitable areas as part of the annual programme of meadow cuts.
Identify opportunities for habitat enhancements for the brown-banded carder bee, using the help of volunteers and/or local school groups.	Identify suitable tasks as part of the Conservation Volunteer programme.
Ensure that species mixes used in restoration or enhancement works contain species that will benefit the brown-banded carder bee.	Mixes should include species that are long-flowering, extending the availability of resources into the autumn. The bee prefers flowers with long corollas, eg peas and mints.
Continue to monitor invertebrates across the Park as part of the BAP monitoring work.	Monitor and collate invertebrate records through BAP monitoring. Submit data to GiGL on an annual basis.

### Flower beetle

**Overview:** A small black 'smut' or flower beetle typical of brownfield sites and grassland. The beetle has been reported on brownfield sites and green roofs across the Thames Estuary and Greater London. The flower beetle's main food plant, autumn hawkbit (*Scorzoneroides autumnalis*), is present across the species-rich grassland and brownfield habitats, and was sown with the intention of encouraging and supporting the beetle.

<b>Progress to date:</b>	
<b>Original BAP targets (2008)</b>	To create a range of conditions to enable a breeding population to become established.
<b>Progress so far</b>	Recorded on the MPC green roof in 2018.

<b>Flower beetle (<i>Olibrus flavicornus</i>)</b>	
<b>Action</b>	<b>Targets and outcomes</b>
Restore the meadow to the east of Hopkins Field to create new habitat that would benefit the species.	To provide suitable habitat for the species and to encourage the species onto the Park (target date TBC)
Identify areas to be left uncut each autumn and winter to provide over-wintering sites for the beetle and other invertebrates.	Identify and agree suitable areas as part of the annual programme of meadow cuts.
Ensure that species mixes used in restoration or enhancement works contain autumn hawkbit.	Mixes should include autumn hawkbit to ensure that the beetle's favoured food plant is available.
Continue to monitor invertebrates across the Park as part of the BAP monitoring work.	Monitor and collate invertebrate records through BAP monitoring. Submit data to GiGL on an annual basis.



### Tumbling flower beetle and Fungus beetle

The tumbling flower beetle and fungus beetle have similar requirements and are both dependent on a plentiful supply of dead wood. Dead wood is an important resource for invertebrates although the relatively young age of much of the Park's tree stock makes it a scarce resource at present. There are opportunities to increase the coverage of dead wood across the Park through the delivery of this BAP.

The tumbling flower beetle requires dead wood that is damp and still has bark attached. Dead stems and flower heads are important

over the winter. Umbelifer flowers (such as burnet saxifrage, *Pimpinella saxifraga*) along woodland edges can benefit the species, and evidence suggests that wood from field maple (*Acer campestre*) is particularly attractive to the beetle.

The fungus beetle depends on rotten wood (particularly sycamore) that has been infested with fungus. The species is typically found in log piles on the ground, rather than dead wood that is still attached to living trees. In previous years, the fungus beetle has been recorded around the Old Ford nature reserve, although records of the beetle are relatively few and far between.

Progress to date:	
<b>Original BAP targets (2008)</b>	To provide suitable habitat in order to encourage the spread of the beetles and allow them to become established on the Olympic Park.
<b>Progress so far</b>	Not recorded on the Park in recent years, although there are records from the site dating from 2005 and 2006, around Old Ford.

Tumbling flower beetle ( <i>Mordellistena neuwaldeggiana</i> ) and fungus beetle ( <i>Cicones undatus</i> )	
Action	Targets and outcomes
Work with Park Champion volunteers to increase the availability of dead wood across the Park.	Identify suitable tasks as part of the Conservation Volunteer programme (tasks to be planned at the start of each year).
Identify areas to be left uncut each autumn and winter – ensure that the areas contain umbelifers.	To be identified annually as part of the meadow cuts programme. Note that the bank north of Knights Bridge offers suitable habitat as it contains burnet saxifrage.
Re-use arisings from winter coppicing works to create new log piles along woodland edges. Wood piles should ideally contain some field maple and sycamore.	Identify suitable tasks as part of the Conservation Volunteer programme to create additional habitat for the species.
Continue to monitor invertebrates across the Park as part of the BAP monitoring work.	Monitor and collate invertebrate records through BAP monitoring. Submit data to GiGL on an annual basis.

### Toadflax brocade moth

**Overview:** A small brown moth with a distinctive yellow and green caterpillar. The toadflax brocade moth is a relatively recent colonist, arriving on the south-coast in the 1950's. The moth has two generations per year, which overlap from May to August. The larvae depend on a good supply of their food plants, common toadflax and purple toadflax (*Linaria* sp.). The toadflax brocade moth is characteristic of areas that are sparsely vegetated; it favours coastal shingles, waste grounds and brownfield land.



A toadflax brocade moth caterpillar



Habitat for the toadflax brocade moth - bare ground, shingle and common toadflax plants.

Progress to date:	
<b>Original BAP targets (2008)</b>	"To create a range of conditions to enable a breeding population to become established".
<b>Progress so far</b>	Widely recorded on the Park, including on the MPC green roof and in the Timber Lodge display meadow in 2018. In 2017, Conservation Volunteers created new areas of habitat for the moth in the North Park (gravel strips planted with toadflax sp., approx. 30m2 in area). Toadflax plants have spread naturally across the Park, generating additional patches of habitat for the moth.

Toadflax brocade moth ( <i>Calophasia lunula</i> )	
Action	Targets and outcomes
Map areas of naturalised toadflax as part of habitat monitoring work.	Carry out the first survey in spring 2019. Ensure that these areas are protected through sensitive management.
Ensure that future green roof habitat includes features to support the moth, in particular purple toadflax plants.	The area of any new green roof habitat should be captured and added to existing totals (net gain). New habitat should be monitored to evaluate use by the toadflax brocade moth.
Establish a new project for volunteer surveyors to survey and report toadflax brocade moth caterpillars.	To train volunteers and to increase records of the species (starting 2019).
Continue to monitor invertebrates across the Park as part of the BAP monitoring work.	Monitor and collate invertebrate records through BAP monitoring. Submit data to GiGL on an annual basis.



## The ground bugs

**Overview:** Two species of scentless ground bug are listed in the BAP: *Stictopleurus abutilon* and *Stictopleurus punctatonervosus*. The bugs require a mosaic of sunny, open and flower-rich grassland with patches of bare ground. The bugs show a preference towards yarrow (*Achillea millefolium*), white campion (*Silene latifolia*) and creeping thistle (*Cirsium arvense*), and will over-winter in tall herb/ruderal vegetation. In the Thames Valley, the bugs are locally common on old brownfield and industrial sites. The main threats to the species are the loss of brownfield habitat to development and the poor management of vegetation (cutting down the tall herbs and grasses which provide important over-wintering habitat).

'Weeds' can have conservation benefits and are part of the life cycle of many species. Thistles and wild teasels generate seeds for birds such



Grasslands surrounding East Marsh. The ground bugs have been recorded here in previous years

as goldfinch (*Carduelis carduelis*), and nettles are important food plants for peacock and small tortoiseshell butterflies. Despite their propensity to dominate if left unmanaged, a proportion of these species should be kept in place through Park management.

Progress to date:	
<b>Original BAP targets (2008)</b>	"To create a range of conditions to enable the species to become established".
<b>Progress so far</b>	<i>Stictopleurus abutilon</i> has been recorded in East Marsh (2014). <i>S.punctatonervosus</i> has been recorded on the Greenway and in East Marsh and also along the City Mill River. In 2013, the beetle was recorded in City Mill and North Park wetlands.

Ground bugs - <i>Stictopleurus abutilon</i> and <i>S.punctatonervosus</i>	
Action	Targets and outcomes
Adopt a sensitive approach to the management of species including ragwort, creeping thistle and fleabane.	Tolerate proportions of these species in certain areas of the Park, as appropriate. Carry out regular reviews as part of quality monitoring (monthly).
Identify areas to be left uncut each autumn and winter - ensure that the areas contain some of the favoured flowers of the ground bugs, as well as tall ruderal vegetation.	To be identified and agreed annually as part of the meadow cuts programme.
Ensure that species mixes used in restoration or enhancement works contain flowers that are suitable for the species.	Mixes should incorporate food plants that are favoured by the bugs, such as yarrow and white campion.
Continue to monitor invertebrates across the Park as part of the BAP monitoring work.	Monitor and collate invertebrate records through BAP monitoring. Submit data to GiGL on an annual basis.



## Streaked bombardier beetle

**Overview:** One of two bombardier beetles found in the UK. Bombardier beetles have metallic green wing cases, with orange heads and thoraxes – the streaked bombardier has a distinctive mark on its back that distinguishes it from the common bombardier (*Brachinus crepitans*). Both beetles are considered rare. The beetle employs an unusual defence mechanism to deter predators, spraying a boiling mixture of chemicals from its abdomen<sup>146</sup>.

The beetle is very rare in the UK, and records are restricted to the South of England. The beetle had been presumed extinct until a small colony was discovered on a brownfield site close to the Thames Barrier in 2006<sup>147</sup>. The streaked bombardier beetle was recorded in Mile End Park (Tower Hamlets) in 2010, and on the Olympic Park (Greenway) in 2014.

Little is known about the ecology of the streaked bombardier beetle, but it is thought that its larvae feed on the larvae of *Amara* and *Harpalus* ground beetles, attaching themselves to feed before pupating<sup>148</sup>.

The streaked bombardier is a beetle of brownfield land and requires the features typical of the habitat: rubbles, thin soils, bare ground, tall ruderal vegetation and pioneer communities. Bunds or mounds of soil and rubble can help to create different microclimatic conditions to encourage and support the beetle. As relatively little is known of the beetle's preferences, a broad-brush coverage of ruderal wildflowers

should help to meet the beetle's needs and attract the species on which its larvae predate. Species such as wild carrot (*Daucus carota*), black horehound (*Ballota nigra*), red dead nettle (*Lamium purpureum*) and wild mignonette (*Reseda lutea*) are likely to be attractive to the beetle<sup>149</sup>.

As one of the UK's most threatened invertebrates, and in recognition of this rare beetle being present on the Park, this new species action plan has been added to the 2019 – 2024 BAP.

**Threats:** The re-development of brownfield habitats on which the beetle depends, and the inappropriate management of brownfield land (eg intensive cutting regimes, clearance and removal of ruderal vegetation).

**Creating habitat for the streaked bombardier beetle:**

The creation of mounds or bunds on brownfield sites can help to support and encourage the streaked bombardier beetle. Mounds can be constructed using a variety of materials, such as bricks, hardcore and screened soils, and should have a raised profile (at least 1.5m high) and a sunny, south-facing aspect. Once constructed, mounds need little in the way of management, although a scattering of suitable wildflower seed can help vegetation to establish. Mounds/bunds have proved effective on other sites, providing compensatory habitat for streaked bombardier populations threatened by brownfield development<sup>150</sup>.



The Greenway, where the streaked bombardier beetle has been recorded in previous years.

<sup>146</sup> This defensive spray contains a mixture of hydrogen peroxide and other chemicals to deter predators; it is said the Charles Darwin was once burnt by a streaked bombardier while collecting beetle specimens as part of his studies.

<sup>147</sup> Records of the streaked bombardier beetle had been few and far between until the discovery of the Thames colony on a mound of brick and lime mortar in 2006. Prior to this find, the last record of the beetle had been from Beachy Head (East Sussex) in 1928.

<sup>148</sup> Buglife. Streaked bombardier management sheet. Buglife, Peterborough.

<sup>149</sup> Connop, S. (2012) The Beetle Bump: Innovative urban habitat creation for rare insects. *Essex Naturalist* 29 (New Series).

<sup>150</sup> As above. This paper describes the creation of a 'Beetle Bump' at the University of East London campus (Royal Docks) that was constructed to provide habitat for a small population of streaked bombardier beetles translocated from a development site at Silvertown Quays

Progress to date:	
<b>Original BAP targets (2008)</b>	The streaked bombardier beetle is a new addition to the 2019 - 2024 BAP.
<b>Progress so far</b>	Recorded on the Greenway in 2014.

Streaked bombardier beetle ( <i>Brachinus sclopeta</i> )	
Action	Targets and outcomes
Encourage the beetle's prey (eg <i>Amara</i> and <i>Harpalus</i> larvae) through the sensitive management of vegetation in key locations.	Ensure that tall herb and ruderal vegetation is created/maintained in key areas (Greenway, brownfield BAP habitat) through a sensitive management regime. Carry out regular reviews as part of quality monitoring (monthly).
Where the opportunity allows, create new mounds and bunds in new developments or on brownfield habitat.	To provide suitable habitat for the beetle. Capture any future works as part of the brownfield habitat totals.
Continue to monitor invertebrates across the Park as part of the BAP monitoring work. Ensure that brownfield habitats and the Greenway are included in future invertebrate survey work.	Monitor and collate invertebrate records through BAP monitoring. Submit data to GiGL on an annual basis.

### A picture-winged fly - *Acinia corniculata*

**Overview:** An elusive and rare fly. The majority of records are confined to southern England, with many of these from National Nature Reserves. The fly breeds in the seed heads of common knapweed (*Centaurea nigra*), a plant that is abundant in the Park's wildflower meadows and swales<sup>151</sup>. The fly has been recorded in knapweed seed heads in the North Park. Little is known of the ecology of the fly, although a continuity of flower-rich habitat is thought to be important, as is the retention of dead knapweed stems through the autumn and winter which allow the fly to complete its life cycle.

**Threats:** The loss of flower-rich habitats and inappropriate management (eg inappropriate cutting regimes).

Progress to date:	
<b>Original BAP targets (2008)</b>	<i>Acinia corniculata</i> is a new addition to the BAP for 2019 - 2024.
<b>Progress so far</b>	Previously recorded in the North Park (meadows and swales).

<i>Acinia corniculata</i>	
Action	Targets and outcomes
Ensure that <i>Acinia corniculata</i> is provided with suitable over-wintering habitat each year. Suitable areas must contain a good proportion of common knapweed, on which the fly depends.	To ensure that suitable over-wintering habitat (dead knapweed seed heads and stems) is retained for the fly. At least 1 swale should be included each year.
Monitor the swales to prevent the encroachment of scrub/competitive plants that could reduce the abundance of knapweed.	Carry out regular reviews as part of quality monitoring (monthly) with remediation carried out as required (eg spot treatment).
Continue to monitor invertebrates across the Park as part of the BAP monitoring work, with emphasis on knapweed-rich areas for <i>Acinia corniculata</i> .	Monitor and collate invertebrate records through BAP monitoring. Submit data to GiGL on an annual basis.

<sup>151</sup> Another name given to the species is the 'scarce knapweed fly'.

## EUROPEAN EEL

**Overview:** The River Thames was a historically important habitat for the European eel; one record from 1902 comments that eels were so numerous that they “made a black margin to the river, on either side of the banks”<sup>152</sup>. Eels were once considered so valuable that they were used as currency – the Domesday Book lists a number of water mills that paid their rent in eels.

The European eel has a mysterious but exceptional life cycle. Eels hatch from eggs in the Sargasso Sea (North Atlantic Ocean). The Gulf Stream transports the young eels to UK waters, where they arrive at the mouths of rivers and estuaries as “glass” eels. Some eels will remain in estuaries, whilst others will head inland, maturing into “yellow” eels in suitable habitats over a number of years. Mature silver eels will then migrate back to the Sargasso Sea to spawn and die – a journey of over 3000 miles.

Eels are bottom-dwellers found in slow-flowing watercourses and back-waters. Although an aquatic species, eels are able to travel over land. They feed on small fish and invertebrates, and depend on good quality waters with a diverse mix of complimentary wetland habitat.

**Threats:** Weirs and dams are significant barriers to migration, meaning that far fewer glass eels reach the freshwater habitats they require to reach maturity. Pollution and poor water quality in urban rivers can have a negative impact. It has been suggested that a parasite may be contributing to the decline of the European eel.

Eel passes: Barriers to migration are identified as a major threat to eel populations in the



A channel in the North Park reed beds – young glass eels and mature silver eels have both been recorded here.

Thames Catchment<sup>153</sup>. Eel passes are structures that are built into weirs and locks to allow the safe passage of eels. A number of eel passes are already installed along the River Lee, for example at Lea Bridge Weir. The Old Ford Lock is one of the last remaining locks on the River Lee to not have an eel pass; the installation of an eel pass here would greatly improve connectivity along this stretch of river.

**Legal protection:** Listed as ‘Critically Endangered’ on the IUCN Red List and considered to be outside of sustainable and safe biological limits. The EU has adopted regulations that establish measures for the recovery of European eel stocks; these regulations were transposed into UK law through The Eels (England and Wales) Regulations (2009).

The Regulations give powers to the Environment Agency and other regulatory bodies to implement recovery measures in all freshwater and estuarine habitats in England and Wales.

<sup>152</sup> Extract from C.J. Cornish (1902) *The Naturalist on the Thames*.  
<sup>153</sup> ZSL. *The Thames European Eel Project Report* (November 2018)

Progress to date:	
<b>Original BAP targets (2008)</b>	“To regularly observe common eel in the waterways that flow through the Olympic Park”.
<b>Progress so far</b>	Eels have been recorded in all four of the Park’s waterways, albeit in low densities reflecting the conservation status of the species. Eels are recorded in higher numbers in the North Park wetlands, where there is a greater variation in riparian habitat (reed bed edges, sheltered back waters and channels, wetland vegetation). A variety of life stages have been recorded, from young glass eels to mature silver eels.



European eel	
Action	Targets and outcomes
Maintain good quality riparian habitat for eels through the delivery of the wetland and rivers Habitat Action Plans.	To provide good quality wetland and river habitats to support the European eel and encourage an abundance of aquatic fauna on which the eels feed. Carry out regular reviews as part of quality monitoring (monthly).
Monitor the rivers for the presence of European eel.	For the rivers on the Park to be of a quality that benefits and supports the European eel. Ensure that river surveys for eels (and other freshwater fish) are included in future BAP monitoring plans.

## BATS

**Overview:** Bats are highly adapted nocturnal mammals, seen only briefly, at dusk and dawn. There are 17 species of bat in the UK, 12 of which have been recorded in Greater London. Bats are insectivorous; a common pipistrelle bat can eat up to 3000 insects in a night. Bat roosts have been discovered in a wide variety of settings, although there are three broad types: roosts in trees, roosts that are underground, and roosts in built structures (eg lofts).

Bats require different conditions at different times of the year and will move between roosts to meet their needs. In summer, they will seek warm and dry 'maternity' roosts in which to raise their young. During the winter months, when bats are hibernating, they require roosts with a cool and stable temperature.

Seven species of bat have been recorded on the Park to date: common pipistrelle (*Pipistrellus pipistrellus*), soprano pipistrelle (*Pipistrellus pygmaeus*), Nathusius' pipistrelle (*Pipistrellus nathusii*), noctule (*Nyctalus noctula*), Leisler's (*Nyctalus leisleri*), Daubenton's (*Myotis daubentonii*) and the brown long-eared bat (*Plecotus auritus*).

**Threats:** Bats are highly sensitive to changes in the environment. The main threats to bats include:

- The loss of linear features in the landscape – bats use tree lines and hedgerows to commute between roosts and feeding habitats.
- Destruction of roosts during development, eg the conversion of lofts in domestic dwellings, or the loss of old trees with bat-friendly features (peeling bark, fracture cracks).
- Exclusion of bats from their roosting sites (eg blocked access to roof space).
- The use of toxic chemicals (eg wood treatments).

- A reduction in insect prey due to chemical use (insecticides).
- Vandalism and persecution – bats can be an unwelcome presence on many construction sites.
- Disturbance caused by artificial lighting, noise and dust pollution.

**Legal protection:** Bats are strictly protected under the Wildlife & Countryside Act (1981, as amended). Bats are European Protected Species, and so receive additional protection under the Conservation of Habitats and Species Regulations (2017)<sup>154</sup>. The high degree of legal protection afforded to bats makes it illegal to intentionally or deliberately kill, injure or capture a bat, deliberately disturb a bat, and/or damage, destroy or obstruct access to a roost (whether in active use or unoccupied).

### Bat boxes:

- Bats will utilise artificial roosts (eg bat boxes) if they are installed close to suitable feeding and commuting habitat.
- Microclimate is an important consideration when installing a bat box. Boxes should be sheltered from the wind, and remain unshaded for most of the day during the summer months. The Bat Conservation Trust advises that boxes should have a south-easterly or south-westerly aspect<sup>155</sup>.
- A number of boxes grouped together (eg on a tree trunk) will increase the likelihood of encouraging roosting bats. Grouping together a number of boxes in this way means that bats can select a roost that best meets their needs.
- Boxes should be sited in areas that are close to good feeding habitats (eg freshwater ponds and rivers, hedgerows and woodland edges).

<sup>154</sup> The Regulations transpose the EC Habitats Directive directly into national law, and consolidate the Conservation of Species & Habitats Regulations (2010) with subsequent amendments.

<sup>155</sup> Bat Conservation Trust. Bat Box Information Pack (<https://cdn.bats.org.uk/pdf/Bat-Box-Information-Pack.pdf?mtime=20181101151309>)

- Access to the box should be unimpeded by vegetation or other obstructions – bats require a clear and unlit flight path.
- Artificial light should be directed away from bat boxes.
- Boxes should be mounted securely, at least 4 metres from the ground.

Progress to date:	
<b>Original BAP targets (2008)</b>	“To continue to have bats regularly recorded within the Olympic Park”.
<b>Progress so far</b>	Greatest levels of bat activity are detected close to open water and woodland edges. Four transects are surveyed as part of the BAP monitoring; the East Marsh transect has by far the highest levels of bat activity – the river corridor here is dark and lined with mature trees. An increase in bat activity noted on the Park itself. Bat activity remains low along the Lea Navigation and Greenway; it is thought that this is due to high levels of artificial light and ongoing developments in the area.

Managing the Park for bats – what do they need?
<p><b>Linear corridors</b> – tree lines, hedgerows and woodland edges that the bats can use to navigate the landscape and commute between roosts and feeding habitats.</p> <p><b>Water:</b> Water attracts midges and other insects that provide food for bats. Bats recorded along the Park’s waterways include Daubenton’s, a species that is closely associated with water.</p> <p><b>Bat-friendly planting</b> – night-scented plants such as evening primrose (<i>Oenothera biennis</i>) and honeysuckle (<i>Lonicera periclymenum</i>) attract moths which in turn generate prey for bats.</p> <p><b>Dark corridors</b> – undisturbed, dark areas for feeding and commuting.</p> <p><b>Bat roosts and bricks</b> – features that can be installed into built developments to create secure roosting sites for bats.</p>

Bats	
Action	Targets and outcomes
Bat boxes should be incorporated into new developments where appropriate. Boxes should be designed specifically for bats, and should be suitably located.	To provide new roosting habitat for bats within the Park. Any new bat boxes should be recorded and added to the current total (150).
Ensure that all planning proposals are adequately assessed in relation to potential impacts on bats. Ensure that mitigation is in place to protect bats during development and events.	To ensure that adequate mitigation is secured through the planning process.
Continue to collect data on bat activity as part of the ‘Smart Park’ monitoring work. Use data from the sensors to compliment results from bat transect surveys.	Monitor and collate bat records through BAP monitoring. Submit data to GiGL on an annual basis.
Through the delivery of the Habitat Action Plans (wetlands, woodlands and grasslands) ensure that good quality foraging habitat is provided for bats.	Deliver management in line with the Habitat Action Plans. Carry out regular reviews as part of quality monitoring (monthly).

## RIPARIAN MAMMALS

### Water vole and Otter

**Overview:** The water vole (*Arvicola amphibious*) requires wetlands that have slow-flowing water and consistent water levels. Water voles will excavate extensive burrows into river banks; entrances are usually located underwater to protect the burrows from predators. Water voles feed mainly on grasses and waterside vegetation – reeds, rushes and sedges are favoured. Water voles can be found in many freshwater habitats, including ditches, small ponds, flushes, streams and rivers. They are known to be present in the Lee Valley, although movements are limited by the poor connectivity of the habitat (weirs and hard-engineered river banks).

Otters (*Lutra lutra*) are semi-aquatic mammals. They are solitary and secretive, spending much of the day inside holts – underground dens constructed along river banks or underneath tree roots. Otters have long, linear territories which can extend up to 40km – as a result, population densities tend to be low. Otters feed on a diet of fish, small birds and, occasionally, small mammals and frogs.

**Threats:** Water voles are the fastest declining

mammal in the UK. Numbers have been severely reduced by the American mink (*Neovison vison*). Other reasons for the decline include the loss and degradation of suitable habitat, as well as persecution – water voles are often mistaken for brown rats.

Once common in the UK, otters experienced severe population declines in the 1960s and 1970s. The collapse in numbers is thought to have been caused by pollution, reduced fish stocks, hunting and persecution, and the loss of suitable feeding/hunting habitat. Otters are now thought to be re-colonising many of their former habitats; they are now found in every county within England.

**Legal protection:** Water voles and otters are strictly protected under the Wildlife & Countryside Act (1981, as amended). It is an offence to damage, destroy or block access to any structure or place used by these animals for shelter or protection. The otter receives additional protection under Schedule 2 of the Conservation (Natural Habitats & c.) Regulations 1994, and is a European Protected Species. The otter is also listed on Appendix II of CITES, which prohibits the international trade of protected species.

Progress to date:	
<b>Original BAP targets (2008)</b>	“To create suitable conditions for otters and water voles within the Olympic Park”.
<b>Progress so far</b>	To date, there have been no sightings of water vole or otter on the Olympic Park.

Water vole and otter	
Action	Targets and outcomes
Continue to provide suitable habitat for water vole and otter through the delivery of the wetland Habitat Action Plans.	Maintain good quality habitat for the species with the aim of encouraging the species onto the Park in the future. Carry out regular reviews as part of quality monitoring (monthly).



## INVASIVE NON-NATIVE SPECIES

A non-native species can be defined as “a species introduced (i.e. by human action) outside of its natural past or present distribution”<sup>156</sup>. It is estimated that there are around 2000 non-native species in the UK. Not all non-native species will cause harm, but a small minority are classified as invasive and have a significant impact on our natural environment, economy and society.

The GB Non-Native Species Secretariat defines an invasive non-native species (INNS) as “any non-native animal or plant that has the ability to spread causing damage to the environment, the economy, our health and the way we live”<sup>157</sup>. The Great Britain Invasive Non-Native Species Strategy (published in 2015) estimates that 10 – 15% of non-native species have an adverse impact. Many invasive species are costly to control once established; the cost of eradicating Japanese knotweed alone from the UK has been estimated at £1.5 billion<sup>158</sup>.

The Wildlife & Countryside Act (1981, as amended) is the principal legislation concerning INNS. Under Section 14 (1) of the Act it is illegal to release, or allow to escape into the wild, any animal that is not ordinarily resident in Great Britain, is not a regular visitor to Great Britain in a wild state, or is listed on Schedule 9 of the Act. It is also illegal to plant, or otherwise cause to grow, in the wild any plant listed on Schedule 9.

A number of invasive non-native flora and fauna have been recorded on the Park to date (Table 10). These species have the potential for a detrimental impact on the Park’s native wildlife and habitats if they become established. A select number of the species also pose a threat to human health (eg giant hogweed and oak processionary moth).



Giant hogweed growing underneath the A12

<sup>156</sup> Non-Native Species Secretariat. Definition of terms. See: <http://www.nonnativespecies.org/index.cfm?pageid=64>

<sup>157</sup> As above.

<sup>158</sup> Non-Native Species Secretariat. 'Japanese knotweed and development': <http://www.nonnativespecies.org/index.cfm?pageid=160>

**Table 10:** Invasive species found on the Park

Species	Detrimental impacts and Areas
Giant hogweed (Heracleum mantegazzianum)	A highly invasive plant that is listed on Schedule 9 of the Wildlife & Countryside Act. The sap of the plant poses a health hazard to humans if it comes into contact with the skin, causing blistering on exposure to sunlight. Plants are present along the River Lee between Knights Bridge and Eastcross bridge. The plant has been recorded around the inlet of the Channelsea River (North Park wetlands).
Himalayan balsam (Impatiens glandulifera)	A highly invasive plant that is listed on Schedule 9 of the Wildlife & Countryside Act. The plant will establish readily along watercourses and is present across the Park, although the North Park reed beds are the worst affected areas.
Orange balsam (Impatiens capensis)	A non-native species. Less invasive than Himalayan balsam, although its distribution is known to be increasing in the Lee Valley. Occasionally recorded in the North Park wetlands.
Japanese knotweed (Fallopia japonica)	A highly invasive plant that is listed on Schedule 9 of the Wildlife & Countryside Act. Scattered stems are present along River Lee to the north of the wetlands (west bank). Present along the edge of the Great British Garden.
Floating pennywort (Hydrocotyle ranunculoides)	A highly invasive aquatic plant that is listed on Schedule 9 of the Wildlife & Countryside Act. Present in the reed bed inlet channels and North Park ponds (ponds 4 and 6). Requires regular clearance. Floating pennywort can regenerate from even the smallest of fragments.
New Zealand pygmyweed (Crassula helmsii)	A highly invasive aquatic plant that is listed on Schedule 9 of the Wildlife & Countryside Act. Present in ponds 4 and 6. Known to be present in the lagoon between Waterden Road and Carpenters Road.
American skunk cabbage (Lysichiton americanus)	An invasive non-native plant that can cause significant damage to aquatic habitats if allowed to spread. Not currently listed on Schedule 9 (c. 2019). A small number of the plants have been found growing around the pond in the Great British Garden.
Turkish crayfish (Astacus leptodactylus)	Listed on Schedule 9. Turkish crayfish have been recorded in the River Lee and Waterworks River (junction of Carpenters Lock).
Signal crayfish (Pacifastacus leniusculus)	Listed on Schedule 9. Signal crayfish have been recorded in the River Lee and Waterworks River (junction of Carpenters Lock).
Chinese Mitten Crab (Eriocheir sinensis)	Listed on Schedule 9. The species can cause significant damage to soft river banks. Recorded in the River Lee and Waterworks River (junction of Carpenters Lock).
European pond terrapin (Emys orbicularis)	Listed on Schedule 9. Occasional reports of terrapins in the Stadium Loop.
American mink (Neovison vison)	Listed on Schedule 9. A voracious predator that has had a devastating impact on the UK's native water voles. Present throughout the Lee Valley. A dead American mink was found in the River Lee in 2014.

**Monitoring:** The London Invasive Species Initiative (LISI) aims to co-ordinate actions to prevent, control and eradicate INNS in London. Accurate and up-to-date biodiversity data is a vital part of the effort to control and eradicate INNS. GiGL are the data custodian for LISI, and records of invasive species on the Park can be submitted via an online recording form on the LISI website.

A survey for the presence of invasive flora is carried out each year during the spring, when the first shoots of many species are starting to appear. Treatment must be implemented before plants can flower and set seed (usually later in the summer months). Invasive fauna are often encountered during survey work for other target groups – eg records of Chinese mitten crab and signal crayfish during eel surveys. As noted earlier in the BAP, the Forestry Commission survey the Park each year to assess for signs of the oak processionary moth.

Biosecurity: Biosecurity procedures are essential

in helping to control the establishment and spread of INNS. The Great Britain Non-Native Species Secretariat advocates a “Check, Clean and Dry” approach to biosecurity when working with invasive species:

- **Check:** Check all clothing, tools and equipment for organisms and seeds when you have finished work.
- **Clean:** Wash tools and clothing thoroughly in hot water after each use.
- **Dry:** All tools and clothing should be dried thoroughly after use; invasive aquatic organisms can survive for a time out of water in damp/warm conditions.

Invasive plant material should be disposed of correctly via a licenced waste contractor. It is an offence to allow an invasive non-native species to spread through poor management or disposal.

Further guidance on biosecurity is provided in Appendix 2.

Invasive non-native species	
Action	Targets and outcomes
A full survey of the Park to be completed each year to record the type and distribution of INNS (flora).	Survey to be completed each spring (late March/April as appropriate). Note that further surveys may be required to track and monitor repeat growth.
Use the survey results to produce a treatment plan outlining methods and timeframes.	Annually. Aim to have treatment completed before plants flower and set seed. Keep a record of all treatment work carried out.
To raise awareness of INNS with Park operational staff via Toolbox Talks on biosecurity and invasive plant species.	Annually, before the peak growth period.
To keep a record of invasive fauna recorded on the Park and ensure that treatment is implemented as required.	Add records of invasive fauna to the invasive species register and ensure appropriate and timely treatment is implemented as required.
Continue to monitor INNS across the Park as part of the BAP monitoring work.	Include an update on INNS in the BAP monitoring report. Submit data to GiGL annually, including any data that can contribute to the LISI dataset of INNS in London.



## Himalayan balsam

**Overview:** Himalayan balsam (*Impatiens glandulifera*) is a tall annual plant that grows alongside riverbanks and ditches, especially the nutrient-rich and disturbed soils of urban waterways. It can form dense stands that shade out other wetland plants; when the plant dies back in the winter months, it can leave riverbanks bare, exposed and vulnerable to erosion. The spread of the plant is helped by explosive seedpods that propel seeds up to 7 metres from the parent. Himalayan balsam produces a lot of pollen and is highly attractive to some pollinating insects; there is evidence to suggest that its presence can decrease the pollination of native plant species<sup>159</sup>.

Himalayan balsam is present across the Park, although the North Park reed beds (east bank) have been particularly badly affected in recent years. It remains common along many of the waterways in London, despite efforts to remove it.

**Legal status:** Himalayan balsam is listed on Schedule 9 of the Wildlife & Countryside Act (1981, as amended). The Act makes it an offence to plant Himalayan balsam, or to otherwise cause it to grow in the wild.

**Treatment:** The first shoots appear in March



Volunteers clearing Himalayan balsam from the North Park reed beds.

and April, with the plant flowering in June. Hand-pulling is a quick and effective means of treatment if it is carried out at the right time of year, especially near to water where the use of chemicals is restricted. The plant is shallow-rooted, meaning that the roots can be easily removed by holding the plant firmly at the base of the stem. Repeated visits and treatments are necessary to capture any late germinating plants and to exhaust the existing seedbank.

Invasive plant material should be disposed of correctly via a licenced waste contractor. It is an offence to allow an invasive species to spread through poor management or disposal.

<sup>159</sup> Plantlife: Himalayan Balsam. (<https://www.plantlife.org.uk/uk/discover-wild-plants-nature/plant-fungi-species/himalayan-balsam>)

Himalayan balsam	
Action	Targets and outcomes
A full survey of the Park to be completed each year (spring) to map the extent and distribution of Himalayan balsam.	Survey to be completed each spring (late March/April as appropriate). Note that repeat surveys may be required to track and monitor further growth.
Use the survey results to produce a treatment plan outlining methods and timeframes.	Annually.
Operational staff and volunteers to receive biodiversity training before each treatment period, to include Toolbox Talks on biosecurity and invasive plant species.	Annually, before the peak growth period.
Deliver a series of balsam clearance events using the help of Park Champion Volunteers.	Aim to hold at least 3 events annually, from late spring onwards. Capture a measure of the work completed (eg number of tonne bags cleared).
Treated areas to be reviewed regularly, with further treatment implemented as required.	Review treated areas on a weekly basis through the growing season.
Continue to monitor INNS across the Park as part of the BAP monitoring work.	Include an update on INNS in the BAP monitoring report. Submit data to GiGL annually, including any data that can contribute to the LISI dataset of INNS in London.

# ACTION PLANS – Communities

## BAP COMMUNITY PLAN

The London 2012 Games promised to create a lasting legacy for the people and communities that surround the Park<sup>160</sup>. By offering jobs, voluntary opportunities, education and training, the Park aimed to deliver a social legacy for the area - a theme which continues to underpin much of the work on the Park to date.

The Park Management Plan states that “community engagement is key to the Park’s success ensuring that local people are accessing and benefiting from what the Park has to offer, whilst developing a local sense of ownership. The Park’s teams have developed a programme that provides an important community connection, ensuring that the Park is rooted within the surrounding community”.

The Legacy Communities Scheme Section 106 Agreement outlined a requirement for the BAP to provide local people with opportunities to be involved in nature conservation and the management of the Park. The BAP aims to engage with a wide range of stakeholders to achieve this aim; these include residents and Host Boroughs, local community groups, schools, universities and businesses, our conservation partners and visitors to the Park.

In this section we present an overview of how the BAP can contribute towards the health, prospects and wellbeing of local people and visitors to the Park.

Our BAP community visions are presented in Table 11.

<sup>160</sup> London Legacy Development Corporation: Community Engagement Policy (September 2012).

**Table 11:** Community visions for Queen Elizabeth Olympic Park:

<b>Community visions:</b> What do we want the Park to achieve/deliver?	
Promoting a care for nature	For the Park to be well-loved, used and visited by all. For our biodiversity work to help improve the quality of life for local residents and the variety of people that will visit and experience the Park, thereby becoming a favourite place to spend time and, in doing so, develop an empathy with the natural environment. To provide valuable green space for Host Boroughs and new communities coming onto the Park.
Inspiring conservation	To inspire conservation of the natural environment and biodiversity; to inspire conservation beyond the Park boundaries - for example in homes and gardens, community gardens, schools and allotments.
Providing education and training and contribute towards objectives.	Improve prospects for education and training. To deliver the BAP in ways that support and guide the wider regeneration of east London. To link our BAP initiatives with local development and job creation initiatives within the Park and surrounding Host Boroughs.
Social opportunities	For our biodiversity work to make a significant contribution to social cohesion by involving people of all ages, backgrounds and communities in all aspects of park management, maintenance and BAP monitoring.

## Community engagement and social impact

The BAP is founded on the legacy targets of the 2012 Olympic Games, and the LLDC Community Engagement Policy (published September 2012).

The LLDC Community Engagement programme has four main themes:

- Shaping the physical environment.
- Inspiring the next generation.
- Building social networks.
- Bringing the place to life.

The Community Engagement Policy recognises that “working with existing and emerging communities will be vital to ensuring that old and new communities feel a sense of ownership and responsibility for the Queen Elizabeth Olympic Park”.

The London 2012 Olympic Games promised to promote a lasting legacy for the people and communities framing the Park, offering jobs, voluntary opportunities, education and training for all. This legacy of social opportunity continues to underpin much of the work on the Park.

The linkages between conservation and community development are vital for urban parks; for example, the cooperation and support of local communities can help to address pressures such as anti-social behaviour, vandalism and littering/pollution. The benefits that people derive from a healthy natural environment can be particularly apparent in urban areas where access to good quality green space can be limited – the so-called “nature deficit”.

There are two primary linkages between biodiversity conservation and community development: the contribution that biodiversity makes towards health and happiness (social wellbeing) and the contribution that biodiversity can make towards a person’s future prospects (economic wellbeing). In turn, it should be recognised that people can make a significant contribution to the conservation of biodiversity.

Encouraging access to nature is at the forefront of many conservation strategies in London and the UK, including the recent 25 Year Environment Plan. The Park offer numerous opportunities linked to health, leisure and recreation, including a network of pathways for cycling and walking; many of these routes weave through the Park’s habitats, helping to foster an engagement and awareness of nature.

By encouraging people to take part in the

BAP’s delivery (eg volunteering with practical management or survey work) we hope to inspire individuals and families to spend more time outdoors and lead more active lifestyles.

### Monitoring community engagement and social impact:

A number of Key Performance Indicators are recorded and monitored as part of the Park’s Estates, Facilities and Management (EFM) contract. These include social performance indicators such as skills and training, as well as the number of volunteer hours generated on the Park through conservation projects and activities.

OurParklife seeks to measure the social impact of its work on the Park, defined as “the effect of an activity on the social fabric of the community and the wellbeing of individuals and families”<sup>161</sup>. A report is produced each year, summarising the community activities undertaken and a measure of their social impact.

The Park continues to deliver a social legacy for the area through job creation, skills and education and apprenticeships. Examples include:

- Local employment: 62% of people working on the Park are local.
- Volunteer engagement: Volunteers committed over 17,000 hours to the Park in 2017.
- Environmental education: Educational sessions have been delivered to a number of local schools (primary and secondary), with a target of 12 to be delivered each year.
- Skills and training: A range of internships, apprenticeships and pre-employment training are available to local people.
- A social legacy: Taken together, the Park’s community projects have generated a social value that was estimated at £3.5m in 2017<sup>162</sup>.

### Collaborating with our conservation partners

Working with and supporting the Host Boroughs and Lee Valley in the implementation of their BAP’s is of primary importance, and we hope to maximise opportunities to align our conservation efforts with local biodiversity work. Examples of how this could be achieved include: combining skills and expertise in BAP monitoring/surveys, filling knowledge gaps in the distribution of species, engaging with other volunteers or working together on shared issues and pressures, including invasive species.

<sup>161</sup> Our Parklife: Measuring our social impact. (<https://www.ourparklife.co.uk/about-us/measuring-our-social-impact/>)

<sup>162</sup> Figures reflect the most up-to-date information available (as of 2019). Social value figures for the Park are calculated using the National TOMS framework, which provides a consistent reporting standard for measuring social value that can be used for measurement and validation. See: The Social Value Portal (<https://socialvalueportal.com/national-toms>)





Volunteers creating habitat for the toadflax brocade moth in the North Park.

### Conservation Volunteers

Volunteers are a crucial part of the ongoing success of Queen Elizabeth Olympic Park; their presence is a visible reminder of the community legacy of London 2012.

All volunteers are referred to as Park Champions, in recognition of the significant contribution they make to the operation of the Park. Volunteers are vital to the success of the BAP, and play an



Scything the species-rich grasslands.

active role in its delivery through environmental and wildlife-focused tasks. In this way, the Park's volunteers demonstrate the benefits that can be achieved through a connection with nature, which is widely advocated in conservation strategies (eg the Biodiversity 2020 strategy).

We will continue to provide a variety of opportunities for people to become involved in conservation work through the delivery of this BAP (Table 12).

**Table 12:** Options for future conservation tasks that could be delivered through the Conservation Volunteer programme.

Task	Description
Enhancing and replanting the Californian poppy meadow (South Park).	Replanting Californian poppies on the bank by Carpenters Lock to repair damaged areas and enhance this focal point of the Park.
Woodland management.	Ongoing management tasks for the woodlands as part of autumn and winter works (eg coppicing in the wooded hillocks).
Swale management.	Cut backs of swales (autumn and winter). Projects to diversify the species mix - for example, relocating yellow flag irises to create a more even distribution of the flowers.
Himalayan balsam removal	Ongoing removal of Himalayan balsam from the Parks reed beds.
Reed bed management	General reed bed management tasks, including the annual cuts.
Meadow management	Managing the meadows using traditional techniques such as scything.
Enhancements	Opportunities for enhancement as and when they arise on the Park, eg restoring the display meadow on west bank of River Lee, or diversifying the planting underneath the pines at Carpenters Lock.
Ecology surveys and citizen science projects.	Various opportunities for volunteers to assist with survey work, including birds, invertebrates and amphibians. Some of these surveys can feed into London-wide or national schemes, eg the London Wildlife Trust's Kestrel Count, or the RSPB Big Garden Birdwatch.



Pond dipping in the Great British Garden

Encouraging engagement with BAP monitoring: A number of national-scale conservation surveys take place each year, offering people the chance to take part in biodiversity surveys whilst contributing to large-scale datasets and conservation initiatives. Examples include:

- RSPB Garden Bird Watch (January each year)
- National nest box week (February each year)
- International Day of Biodiversity (22nd May)
- World Environment Day (5th June)
- National Park City Festival
- Big Butterfly Count (annually, for a set period each summer)
- Opportunities to develop citizen science projects, eg BioBlitz days.

Conservation volunteers	
Action	Target
Prepare our Conservation Volunteer Programme.	Spring 2019
Disseminate information on the Conservation Volunteer Programme as part of the volunteer sign-up stage.	Ongoing
Implement the Conservation Volunteer Programme, capturing the number of volunteer hours dedicated to the BAP.	Annually. Include activities and outputs of our Conservation Volunteers in the BAP monitoring report.

**Engagement with schools:**

Engaging with schools is a key priority for us to capture the legacy spirit of the Games and inspire the next generation with a life-long enthusiasm and passion for nature conservation. We aim for children of all ages to be able to experience the natural environment, and to support local schools and their educational activities.

Options for sessions that could be offered through the BAP schools engagement programme include:

- Specific engagement programmes with local schools to host regular visits and build long-term partnerships.
- The use of the Great British Garden, which lends itself well for use as an outdoor classroom space (self-contained and near to new schools, eg the Bobby Moore Academies).
- Wildlife walks, including educational resources (factsheets, worksheets).
- Wildlife surveys, eg mini-beast hunts and pond dipping in the Great British Garden.
- Providing educational packs for teachers that can be downloaded from the Park website.
- The development of a Forest School programme.
- Practical workshops - using lessons from the Park to improve the biodiversity value of school grounds.



School engagement	
Action	Target
Update our BAP School Engagement Programme, identifying suitable tasks and activities.	Spring 2019.
Deliver biodiversity-themed educational sessions on the Park.	Target to deliver at least 12 sessions per year.

**Collaboration with universities:**

Our BAP monitoring has the potential to generate a wealth of data on both biodiversity within a high profile urban park (wildlife and habitats) and the linkages between conservation, social wellbeing and economic welfare. We will seek to add to our analysis of this data by collaborating with universities for dedicated studies by Masters and PhD students. We hope in the future to have a yearly programme of student research that ranges from ecological and horticultural studies to conservation research of practical application.

University College London are constructing a new campus - UCL East - on the South Park (Events Lawn). The campus will cover 4.63 Ha, incorporating academic and research space, student accommodation and retail use. The campus is due to be completed in 2021. Loughborough University London are based at Here East. The campus is a centre for postgraduate study and research.

The presence of UCL and Loughborough University London offers the chance to engage world-leading universities with biodiversity research on the Park.

The outputs of any biodiversity research should be included in future BAP monitoring reports.

**Engaging Park visitors:**

The Park receives over 6 million visits per year. Engaging with the large variety of visitors that the Park receives offers the chance to

inspire people to protect and value the natural environment. We also hope to inspire our visitors to take conservation beyond the Park's boundaries - for example, by creating wildlife boxes for their own gardens or school grounds.

Options to further engage visitors with biodiversity on the Park include:

- Guided wildlife walks (the Park already has a nature trail, available for free from the Information Point).
- Horticultural tours of the World Gardens and Pleasure Gardens.
- Building bat, bug and bird boxes - a task that has already proved popular during community events, eg the Harvest Stomp.
- Demonstrations of good horticultural practice from the Park's specialist teams, including garden tips and hints, guidance on planting design, and the management of selected species.
- Engaging with technology - eg future potential for plant ID apps, as part of the Smart Park project.
- Further development of signage and interpretation materials to inform and interest visitors.
- Social media - for example, visitors and local residents are able to submit photos of the Park and its wildlife via the OurParklife Instagram account (@ourparklifeqeop).



Community groups and park visitors have helped to build a number of wildlife boxes for the Park



**Engaging the Park’s operational staff:**

The Park’s operational staff are key to the successful delivery of the BAP, having extensive knowledge of the Park and its landscape, management and maintenance, and observing its wildlife on a daily basis. Operational staff receive biodiversity training via regular toolbox talks and workshop sessions that help to raise awareness and understanding.

Teams have Biodiversity Champions - individuals who are enthusiastic, committed and passionate about our biodiversity within the Park. The Biodiversity Champions have taken a leading role in gathering the wildlife observations and BAP community engagement activities, eg by assisting our volunteer groups during practical conservation work.



Managing frog ponds

Engaging with park operational staff	
Action	Target
Hold BAP Induction for staff and implement the wildlife observation record sheet.	Ongoing - for all new starters.
Identify Biodiversity Champions and the roles and responsibilities of each Champion.	Ongoing.
Engage with and support Biodiversity Champions in their BAP work.	Ongoing.
Hold BAP workshops for park operational staff.	Hold a workshop every 6 months.
Collate and record wildlife sightings by Park operational staff (ideally sightings should be verified by photograph).	Include staff observations in the biodiversity monitoring report.

**Collaboration with industries and businesses:**

Engaging the private sector with biodiversity action planning can generate many benefits for both the environment and industry. Industry benefits include an improved reputation linked to environmental best practice, staff development through increased skills and knowledge about the environment, and the delivery of key performance indicators regarding sustainability.

The new BAP potentially offers the chance to develop linkages with the Park’s Innovation District, including SMART cities, waste reduction monitoring and the effective management of resources.

There is potential to develop opportunities that engage local businesses in the delivery of the BAP and the conservation of the Park; they are particularly apparent at this stage of the BAP, with many businesses, industries and organisations now moving onto the Park (eg the new International Quarter and Here East).

Corporate volunteering days have proved a popular engagement tool to date, offering businesses and organisations the chance to

work outside on the Park, and to be actively involved in its conservation (eg through habitat management and enhancement tasks).

**BAP BIODIVERSITY MONITORING PROGRAMME**

**Overview:**

The LCS BAP Section 106 agreement outlines the requirements for BAP monitoring on the Park:

“The monitoring pursuant to paragraphs 1.3.1 (a) and 1.3.1 (b) shall take place annually on the anniversary of the Approval of the Biodiversity Action Plan for the first three years following Approval of the Biodiversity Action Plan and thereafter every two years up to Completion of the Development unless otherwise agreed in writing with the LPA”.

The Biodiversity Monitoring Programme helps us to track the progress of our habitat, species and community action plans and obtain year-round data on wildlife on the Park. A variety of surveys are carried out on the Park to monitor the progress of the BAP (Table 13).

Our aims are firstly to gain an understanding of the ecological functionality of this newly formed landscape, particularly how it responds to

activities and major events within the Park, and of the natural connectivity between habitats within the Park. Secondly, we aim to identify and implement continuous improvement measures for conserving and enhancing biodiversity in the Park.

**Table 13:** Summary of ecological survey work carried out on the Park.

BAP species	Methods and timing	Who by?
Black poplar	Annual autumn inspection to record health and spread. Inspected as part of the Park-wide tree survey work, that incorporates all species.	Park staff and arboricultural specialists.
Brown-banded carder bee	Invertebrate surveys include walk-over inspections, sweep netting and beating, at selected locations between May - October.	Surveys, analysis and identification to be carried out by specialist entomologists.
Toadflax brocade moth		
Fungus beetle		
Tumbling flower beetle		
Flower beetle		
Ground beetles (Stictopleurus sp.)		
European eel	Occasional surveys of the waterways (autumn).	Carried out by specialist consultants.
Common frog	Presence and absence surveys, including torchlight surveys and egg searches. Carried out in the spring (March - May).	Specialist consultants, assisted by Park staff and volunteers.
Common toad		
Smooth newt		
Common lizard	Presence/absence surveys to be undertaken. Refugia felts placed in suitable habitat and checked regularly in spring and autumn (morning/late afternoon) on at least 7 occasions.	Specialist consultants, assisted by Park staff and volunteers.
Grass snake		
Slow worm		
Black redstart	Breeding bird surveys along a fixed transect, carried out during breeding bird season (broadly March - July).	Specialist consultants. Casual records also compiled from Park staff and visitors.
Grey heron		
House sparrow		
Kingfisher		
Linnet		
Reed bunting		
Sand martin		
Song thrush		
Starling		
Swift		
Bats	Transects to monitor bat activity (spring - summer - autumn)	Specialist consultants, assisted by Park staff and volunteers.
Water vole	Inspection of riverbanks for signs of mink, otter and water vole between June and November.	Specialist consultants, assisted by Park staff and volunteers. Opportunities for future collaboration, eg co-ordinated monitoring with Lee Valley Regional Park Authority.
Otter		

The results of the BAP monitoring are compiled into a monitoring report that is submitted to LLDC for approval. For the duration of the 2014 - 2019 BAP, the report was submitted annually. For the 2019 - 2024 BAP, the reporting and survey work is likely to follow a two-year cycle.

Survey areas and transect routes (eg breeding bird and bat transects) were established early in the BAP process (circa 2008) and have remained consistent ever since. This consistency means that surveys are

repeatable and trends can be tracked year-on-year. Any amendments to survey routes (eg road closures or development works) are noted in the BAP monitoring report.

The BAP monitoring work does enable a degree of flexibility for new areas to be added wherever resources allow; for example, the World Gardens were surveyed for invertebrate's midway through the previous BAP to generate additional data.

Aside from the main body of survey work, landscape management and maintenance staff and volunteers record anecdotal wildlife observations during their daily work, and add these to our evidence base of wildlife on the Park.

### **BAP Habitat Condition Monitoring Surveys:**

Habitat evaluations against the SINC criteria have been carried out at intervals to monitor the Park's progress towards achieving Site of Metropolitan Importance (Grade 1) status. Management recommendations are also included in the evaluations, to ensure that the habitats remain in, or can work towards, a favourable condition (eg free of invasive/competitive species).

### **Pond surveys:**

The ponds are assessed using the PSYM method (pronounced "Sim"). This is a standard method that is widely applied to assess the ecological quality of a waterbody relative to a national pond baseline. It is based on a number of ecological criteria that include pH, plant species diversity and the composition of invertebrate

communities. Samples must be collected between June and August. The information is used to generate a percentage score that can be useful in planning pond management, as well as tracking its progress and monitoring habitat change (+/-).

### **Photographic Monitoring:**

A team of dedicated Park Champions have been regularly capturing the Park through a series of photo-point surveys. Photos are taken on the same spot to record the changing seasons, history and evolution of the Park. The photo-point surveys have helped us to:

- Capture the history and ever-changing nature of the Park.
- Assess any changes in the habitats (positive and negative).
- Plan and deliver management plans for autumn and winter works.
- Develop volunteering and community engagement plans – eg identifying opportunities for planting enhancements.

Keeping a visual record of changes to the landscape within the Park over time helps to determine the effectiveness of our BAP actions and progress towards our targets. Our photographic record-base also provides material for our BAP community engagement and educational programmes.

### **Photographic Monitoring: BAP habitats:**

Since the last BAP, a number of new sites have been added to the record to capture the changing Park. Photos are taken monthly, in



Robin at Carpenters Lock





Photographing the changing seasons – photo-point monitoring captures the North America Garden in spring and autumn.

good weather conditions, and show a key feature of the Park at one point in time – for example the pond in the Great British Garden, the North Park meadows and the World Gardens of the South Park. The photos are compiled in a report that accompanies the biodiversity monitoring report.

There is clear potential to use video recordings in future monitoring work, depending on location and security. We have trialled trail cameras on the green roof of the MPC – a site that is safe and secure. Nest box cameras could be an option where the power supply allows, and would be a useful tool for community engagement (social media, schools or community hubs).

We aim to continue the success of the photo-monitoring points through this BAP to capture the significant changes anticipated across the Park (eg the development of Stratford Waterfront – East Bank).

BAP photographic monitoring	
Action	Target
Continue with BAP photographic monitoring	Ongoing (completed monthly). Include photo monitoring outputs in the biodiversity monitoring report.
Investigate options to include video monitoring in BAP survey work, eg trail cameras in secure locations.	Spring 2019





# APPENDICES

## APPENDIX 1

### Extracts taken from the LCS s.106 agreement (Biodiversity Action Plan)

“Biodiversity Action Plan” means a plan for the BAP Habitat in the Olympic Park which:

1. Sets out a Olympic Park wide quantum of BAP Habitat of 49.1 ha which is based on the anticipated provision of 4.4ha of BAP Habitat on the Stadium Site as part of Stadium Transformation, and in the event Stadium Transformation does not provide 4.4ha of BAP Habitat on the Stadium Site the Olympic Park wide quantum of BAP Habitat will be reduced accordingly and for the avoidance of doubt in the event the quantum of BAP Habitat in the Olympic Park that is not Site BAP Habitat is reduced during the duration of the Biodiversity Action Plan, the Developer will not be required to increase the quantum of Site BAP Habitat to compensate for such reduction;
2. Builds on and delivers the vision for biodiversity enhancement and conservation in the Olympic Park and identifies strategic directions that take account of the international, national, regional and local conservation scene;
3. Provides a guide to nature conservation measures and biodiversity objectives for all those involved in the management and maintenance of the Olympic Park;
4. Outlines action required to establish and conserve species and habitats of conservation concern in the Olympic Park;
5. Sets out the detailed maintenance and management regime for the BAP Habitat in the Olympic Park;
6. Outlines long-term management actions to ensure successful establishment and an increase in value of created habitat;
7. Promotes coordinated action and increased effort to benefit wildlife in the Olympic Park; and
8. Provides opportunities for local people to get

involved in nature conservation work and biodiversity related activities.

### Biodiversity Action Plan - Legacy Phase

#### 1.1 BAP Habitat

1.1.1 Subject always to paragraph 1.1.2, LLDC shall use Reasonable Endeavours to provide 49.1 ha of BAP Habitat within the Olympic Park and FOR THE AVOIDANCE OF DOUBT the figure of 49.1 ha is based upon the anticipated provision of 4.4 ha of BAP Habitat on the Stadium Site as part of Stadium Transformation and in the event that Stadium Transformation as may be approved by the LPA does not provide 4.4ha of BAP Habitat on the Stadium Site the 49.1 ha Olympic Park wide quantum of BAP Habitat shall be reduced accordingly.

1.1.2 LLDC shall provide no less than 45ha of BAP Habitat in the Olympic Park (which for the avoidance of doubt includes the Site BAP Habitat) SAVE THAT in the event that the LPA approves any planning application that reduces the quantum of BAP Habitat in the Olympic Park that is not Site BAP Habitat, LLDC shall not be required to increase the quantum of Site BAP Habitat to compensate for such reduction.

#### 1.2 Preparation of Olympic Park Wide Biodiversity Action Plan

1.2.1 Prior to Occupation of any Residential Units, LLDC shall prepare and submit to the LPA for Approval a Biodiversity Action Plan for the Olympic Park.

1.2.2 The Developer shall not Occupy any Residential Units unless and until the Biodiversity Action Plan has been submitted to the LPA pursuant to paragraph 1.2.1 and has been Approved.

1.2.3 LLDC shall use Reasonable Endeavours to liaise with Lee Valley Regional Park Authority, Canal & River Trust and the London Borough of Hackney (as land owner of part of the Non LLDC Land) and any other owners of Non LLDC Land in the preparation of the Biodiversity Action Plan in relation to those parts of the Biodiversity Action Plan that relate to Non LLDC Land.



1.2.4 On submission of the Biodiversity Action Plan, the LPA shall consult on the content of the said Biodiversity Action Plan with Natural England, Canal & River Trust, the Environment Agency, Lee Valley Regional Park Authority, London Wildlife Trust, the London Borough of Hackney and such other organisations with an interest in nature conservation work and biodiversity as it may consider appropriate to consult.

1.2.5 Following each monitoring process pursuant to paragraphs 1.3.1(a) and 1.3.1(b), the LPA shall in consultation with LLDC and with regard to the results of the monitoring process required by paragraphs 1.3.1 (a) and 1.3.1 (b), determine whether an update is required to the Biodiversity Action Plan and, if it determines that an update is so required, LLDC shall update the Biodiversity Action Plan as soon as practicable thereafter.

### **1.3 Monitoring, Maintaining and Managing the BAP Habitat**

1.3.1 At the same time as submitting the Biodiversity Action Plan to the LPA, LLDC shall submit details to the LPA for Approval of a mechanism to: (a) monitor the implementation of the Biodiversity Action Plan on the LLDC Land and measure the success of the measures set out therein in respect of the LLDC BAP; (b) use Reasonable Endeavours to secure the monitoring of the implementation of the Biodiversity Action Plan on Non LLDC Land and measure the success of the measures set out therein in respect of Non LLDC BAP; (c) report the information referred to at paragraphs 1.3.1(a) and 1.3.1 (b) to the LPA; and (d) the monitoring pursuant to paragraphs 1.3.1 (a) and 1.3.1 (b) shall take place annually on the anniversary of the Approval of the Biodiversity Action Plan for the first three years following Approval of the Biodiversity Action Plan and thereafter every two years up to Completion of the Development unless otherwise agreed in writing with the LPA.

1.3.2 Immediately following delivery of any Site BAP Habitat and until Completion of the Development, the Developer shall; (a) comply with the provisions of the Approved Biodiversity Action Plan in relation to Site BAP Habitat; (b) commence and continue to monitor all Site BAP Habitat and report the results of such monitoring to the LPA in accordance with the mechanism agreed pursuant to paragraph 1.3.1; (c) maintain all Site BAP Habitat in accordance with the Approved Biodiversity Action Plan; and (d) manage all Site BAP Habitat in accordance with the Approved Biodiversity Action Plan and as required by the monitoring exercise.

## **APPENDIX 2**

### **GUIDANCE NOTES - BIOSECURITY**

#### **a) Biosecurity: General guidance**

Biosecurity measures help to prevent the introduction and spread of harmful pests and diseases. There are many ways in which infected materials can reach a site including on live plants and trees, on wood chippings or pallets, on dirty tools and equipment, in contaminated soils, or by natural means on wind and water. Biosecurity measures are vital to help stop the spread of the pests, diseases and invasive species that threaten our environment. By taking the appropriate steps and following good practice, risks can be significantly reduced:

- Ensure that clothing and equipment (footwear, clothing, tools) are free from soil before entering/leaving a site. Clear off any debris (plant material, mud etc.) before leaving the site and leave it where it was found.
- Clean and dry clothing and equipment thoroughly after each use. Drying for 48 hours will help to disinfect clothing and equipment. Many species can survive for a time in damp, warm conditions.
- Keep access to infected areas to a minimum to help reduce the risk (eg when working in the reed beds, have one entry and exit point). Visit the worst affected areas at the end of the day.
- Ropes used for arboricultural works should be cleaned and dried regularly.
- Tools should be thoroughly cleaned and disinfected after each use.
- Vehicles should be parked on hard standing where possible.
- Disinfectants should be fit for purpose and should be disposed of properly to protect the environment (habitats and watercourses). The product's instruction/ health and safety guidelines should be followed at all times. Washings should not be allowed to enter a watercourse or drain.
- Keep a record of tree and plant stock and where it comes from – this can help with tracking the source in case of an outbreak.
- Monitor tree stock regularly for signs of pests and diseases.
- Any infected waste (eg invasive species, infected tree material) must be disposed of properly and in line with the appropriate guidelines. Disposal should be through a licenced carrier, with waste kept separate from other waste and green materials.

## b) Imported trees and plants:

There are restrictions on bringing certain species of plants and trees (including potted plants and seeds) into England and Wales from the EU. These species require a plant passport for trading within the EU as part of the plant health controls and protocols. Plant health control measures aim to control the movement of stock from infected areas and contain the spread of pests and disease.

Guidelines should be consulted regularly in case of any recent updates or additions to the list.

By law, the Animal and Plant Health Agency should be notified of any imports of trees and seeds of the following species:

Species	Pest/disease of concern
Plane	Plane wilt
Oak	Oak Processionary Moth
Sweet chestnut	Chestnut Blight, Oriental Chestnut Gall Wasp
Pine	Red Band Needle Blight, Pine Processionary Moth
Ash	Ash dieback
Elm	Elm Yellows Phytoplasma
Prunus	Bacterial Shot Hole, Xylella fastidiosa
Common olive	Xylella fastidiosa

## c) Ponds and amphibian diseases:

Infectious disease is a major factor in the decline of amphibians seen at the global level. Ranavirus and Chytridiomycosis are two notable diseases that have been detected in the UK in recent years. By following good practice and biosecurity protocols, the risk of introducing and spreading infectious diseases can be reduced.

The Amphibian and Reptile Groups of the UK (ARG-UK) have produced a guidance note on amphibian disease precautions and advise that:

- Amphibian diseases are frequently found to have been spread by human activity.
- The introduction of non-native species is often a key factor in outbreaks of disease.
- Signs of infection are not necessarily evident on visual inspection of tools, equipment etc.

The note provides general guidance to reduce the risk of introducing/spreading amphibian diseases:

- Avoid handling amphibians unless absolutely necessary.
- If handling amphibians, or if in contact with pond water, wear powder-free disposable vinyl gloves and rinse them before handling amphibians. Latex and nitrile gloves can be harmful to amphibians.
- Use fresh gloves for each site visited.
- Disinfect survey equipment/containers/footwear etc. between each site visit.
- Wash all clothing on a 40°C cycle with biological detergent after exposure to amphibians and/or pond water. If visiting several sites, bring a change of clothes.
- Do not release amphibians anywhere other than the place of capture.
- Park vehicles on hard-standing wherever possible and walk to the pond.
- Treat dead or sick amphibians as a high infection risk and do not handle unless necessary.

Further advice and guidance can be found in the revised ARG-UK Advice Note (No.4)<sup>163</sup>.

<sup>163</sup> See ARG-UK Advice Note 4: Amphibian disease Precautions: A Guide for UK Fieldworkers (revised March 2017): <https://www.arguk.org/info-advice/advice-notes/324-advice-note-4-amphibian-disease-precautions-a-guide-for-uk-fieldworkers-pdf-2>



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