Appendix 7.23: Review of Invertebrate Data

ECOSA
Ecological Survey & Assessment Limited

HAMPSTEAD HEATH, CITY OF LONDON

REVIEW OF EXISTING INVERTEBRATE DATA

Final Document

March 2014

Invertebrate, Bird, Mammal, Reptile, Amphibian and Botanical Surveys
Management Plans • Habitat Appraisal • Marine • NVC • EcIA

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HAMPSTEAD HEATH PONDS PROJECT, CITY OF LONDON

REVIEW OF EXISTING INVERTEBRATE DATA

Table of Contents

EXECUTIVE SUMMARY

- Ecological Survey & Assessment (ECOSA) Limited have been contracted by the City of London Corporation to undertake a review of existing invertebrate data held to inform development of the Hampstead Heath Flood and Water Quality Management Works scheme and its accompanying Environmental Impact Assessment (EIA).

- A total of 35 key documents were reviewed extending from 1991 to 2010. These included detailed monitoring programmes for spiders and dragonflies/damselflies. Two reviews carried out by Daniel Hackett (Ref. 21, 22 and 35) provide particularly useful reviews of the invertebrate interest of the sites.

- A number of key areas for additional survey to inform the proposed scheme were identified, these include, a Phase 1 invertebrate habitat survey, surveys of certain key groups such as Lepidoptera, Aculeate Hymenoptera and Diptera which have not been surveyed in full in the past, and a detailed assessment of aquatic invertebrates to include a BMWP score.

1.0 INTRODUCTION

1.1 Background

Ecological Survey & Assessment (ECOSA) Limited have been contracted by the City of London Corporation (CoL) to undertake a review of existing invertebrate data held for Hampstead Heath. The aim of this was to assess whether this data was suitable for assessing the impacts of the proposed Hampstead Heath Flood and Water Quality Management Works and inform the accompanying Environmental Impact Assessment (EIA) for the scheme.

The CoL, as appointed custodian of the Hampstead Heath site, has an obligation to maintain the area for recreational purposes in its preferred natural state. Within their 2007-2017 Hampstead Heath Management Plan, the corporation's committees have identified various environmental improvement objectives covering a wide range of ecological issues. As part of this, the CoL intends to enhance the conservation value of the Heath's ponds as well as improve flood management and water quality at the site. Plans for the Hampstead Heath Flood and Water Quality Management Works are currently under development by the CoL in consultation with English Heritage, the owners of the northeast Kenwood area of the site. To inform their production, a detailed programme of surveys is needed develop a comprehensive hydrological management strategy. As part of this, it was deemed necessary to carry out a review of invertebrate data held for Hampstead Heath.

1.2 Aims and Scope of Report

This report provides a review of the content of various entomological reports for CoL on Hampstead Heath since the early 1990's. It reviews the methods used during the assessments, the species groups covered, the rare and notable species recorded and the relevance of the assessment to the proposed scheme. Recommendations are made for additional works required to allow a full assessment of the value of the area of Hampstead Heath likely to be impacted upon by the proposed scheme.

1.3 Site Setting and Description

Hampstead Heath comprises a 275 hectare area of open space located within the London Borough of Barnet. Immediately to the northeast lies the London village of Highgate. To the north the Heath is bordered by East Finchley and by Golders Green to the northwest. On the western side is Child's Hill. The London village of Hampstead is located adjacent to the southwest of the site, beyond which lies South Hampstead.

Kentish Town borders the southeast of the Heath. Dartmouth Park and Upper Holloway comprise the eastern adjacent areas to the site.

The Hampstead heath site is set within the predominantly urban landscape of the city of London. Barnet is adjoined on three sides by further London Boroughs: Harrow and Brent to the west and Enfield and Haringey to the east. The river Thames runs approximately 8.5 km to the south of the site, beyond the city boroughs of Camden and Westminster. To the north, the city of London extends for at least 10 kilometers before reaching the border towns of Hertford, Cheshunt and St Albans, amongst others. Greenspace areas located within relative proximity to the site include Primrose Hill Park approximately 2 km and Queen Mary's Gardens approximately 2.5 km to the south. Whittington Park and Dartmouth Park lie within 600 m and 1.5 km respectively to the east of the site. Queens Wood and Highgate Wood, to the north of the site, comprise the largest nearby woodland areas. Also to the north is the heavily managed amenity grassland of Highgate Golf Club. Approximately 8km to the west lies Gladstone Park. Few nearby open spaces are of equivalent size to the Heath and most are managed as ornamental parkland.

Hampstead Heath supports a variety of valuable habitats for wildlife such as ancient hedgerows, wetland, grassland, scrub and trees, including many assessed as being of veteran status. As a public "park", its primary use is for recreational activities such as swimming, walking, angling and cycling. Visitor numbers each year are considered to be around 7 million.

1.4 Site Proposals

This report has been provided to inform the Hampstead Heath Flood and Water Quality Management Works scheme, its detailed design and the accompanying EIA. The proposals comprise works to maintain dam structures within the Hampstead Heath site, in the interests of improving flood control such that surrounding residential areas are safeguarded during flooding events. Water quality is also to be improved across the pond system to enhance their ecological value and, for those relevant water bodies, to meet bathing water quality standards.

2.0 INVERTEBRATE DATA REVIEW

2.1 Introduction

Table 1 outlines the status of the species considered in this review and **Table 2** present an overview of the data available from CoL and reviewed under the current study.

2.2 Methods

All invertebrate related documents were obtained from CoL by Simon Colenutt of ECOSA on 29th July 2013. All documents have been reviewed and are summarised in Table 2, this includes consideration of the key conclusions of the document, details of any Red Data Book (RDB) or Notable invertebrates recorded and a summary of the areas of Hampstead Heath that the document relates to. In addition, a summary of the relevance of the work to the proposed Hampstead Heath Flood and Water Quality Management Works scheme is provided. For the purposes of the review it has been necessary to limit the discussion of rare invertebrate species to RDB and notable species and no mention of the many scarce species present has been provided, these RDB and Notable species should be considered priority when assessing impacts of the proposed scheme and when considering habitat management works.

Table 1 Definition of status of invertebrates as shown within Table 2

Status	Definition
RDB 1 - Endangered	Taxa in danger of extinction and whose survival is unlikely if causal factors continue operating: ▪ Species which are known or believed to occur as only a single population within one 10km square of the National Grid. ▪ Species which only occur in habitats known to be particularly vulnerable ▪ Species which have shown a rapid or continuous decline over the last twenty years and are now estimated to exist in five or fewer 10km squares. ▪ Species which are possibly extinct but have been recorded in the 20th century and if rediscovered would need protection.
RDB 2 - Vulnerable	Taxa believed likely to move into the endangered category in the near future if the causal factors continue operating: ▪ Species declining throughout their range. ▪ Species in vulnerable habitats.
RDB 3 - Rare	Taxa with small populations that are not at present Endangered or Vulnerable, but are at risk: ▪ Species which are estimated to exist in only fifteen or fewer post 1970 10km squares. This criterion may be relaxed where populations are likely to exist in over fifteen 10km squares but occupy small areas of especially vulnerable habitat.
Nationally Scarce (Na)	Taxa which do not fall within the RDB categories but which are none - the - less uncommon in Great Britain and thought to occur in 30 or fewer 10km squares of the National Grid.
Nationally Scarce (Nb)	Taxa which do not fall within the RDB categories but which are none - the - less uncommon and thought to occur in between 31 and 100 10km squares of the national Grid.
Nationally Scarce (N)	Species which are estimated to occur within the range of 16 to 100 10km squares.

A brief walkover of the site was carried out on 29th July 2013 so that the author was familiar with the key invertebrate habitats present within the proposed scheme area. The area of the proposed works includes areas of woodland, veteran trees, dead wood, open grassland, waterbodies and scrub. **Figure 1, Figure 2, Figure 3** and **Figure 4** indicate key invertebrate habitat within the area of the proposed scheme.


Figure 1 and **Figure 2** Water body with marginal vegetation and woodland ride within proposed scheme


Figure 3 and **Figure 4** Grassland and woodland edge and dead wood and rot hole on veteran tree

Table 2 Summary of existing invertebrate data

Document Ref. Number	Title	Author	Year	Summary of Work Carried out	Aims	Groups Covered	RDB and Notable Species Recorded	Area	Relevance to Proposed Scheme
1	Report on survey of spiders in scrubland on Hampstead Heath	J Edward Milner	May 1991-May 1992	Assessment of spider fauna using mainly pitfall trapping at 11 trap sites and some sweep netting. A total of 82 species were trapped in the pitfall traps. Fauna recorded 'more similar to a 'garden lawn than to other stretches of semi-natural grassland'. This largely attributed to disturbance, mowing regime and species poor grassland flora as a result of eutrophication from dog faeces.	Informing future management	Arachnidae	*Tapinocyboides pygmaeus* (RDB3) *Lepthyphantes insignis* (Nb) Both recorded from South Heath.	Trap sites located between Bird Sanctuary Pond (15) and Stock Pond (13), in South Meadow, Kite Hill and to north-west of Mixed Bathing Pond (8)	Trap sites included areas within proposed scheme and data could be used in EIA although this data now old.
2	Letter to Superintendant of Hampstead Heath Re: nationally notable species finding	J Edward Milner	November 1991	Brief letter reporting the finding of *Lepthyphantes insignis* (Nb) on South Heath. Also advises to reduce the mowing on South heath.	Report of the discovery of the species.	Arachnidae	*Lepthyphantes insignis* (Nb)	South heath	Site is away from the proposed scheme.
3	Hampstead Heath – West Heath A report on a 12-month survey of spiders in grassland near the single remaining patch of *Calluna vulgaris* Extension of the grassland spider survey 1991-1992	J Edward Milner	1992	Continuation of the previous study (Ref.1) with new area selected for study partly because it contained heathland. Study was a 12 month survey based on pitfall trapping and some sweep netting within this relatively undisturbed area of the heath. A low diversity of 40 species of spider were recorded from 2 sample sites. No scarce species recorded and catch dominated by characteristic grassland species.	Assessment to determine presence of heathland species and assess spider community in area where disturbance relatively low.	Arachnidae	None	West heath	Study site located away from areas of proposed scheme
4	Spiders and disturbance on Hampstead Heath and some other London grasslands *The London Naturalist, No. 72, 1993*	J Edward Milner	1993	Formal submission to *The London Naturalist* of work carried out under Ref. 1. Includes summary of survey work from other grassland sites in London. Reported a total of 154 species of spider having been recorded from the Heath but that 'some of the most attractive but sensitive species almost certainly extinct'.	As Ref.1	As Ref.1	As Ref.1	As Ref.1	As Ref.1
5	Spiders and disturbance – 2 A study on West Heath, Hampstead *The London Naturalist, No. 73, 1994*	J Edward Milner	1994	Formal submission to *The London Naturalist* of work carried out under Ref. 3.	As Ref.3	As Ref.3	As Ref.3	As Ref.3	As Ref.3
6	Report on a spider survey of woodlands at Hampstead Heath December 1994 to December 1995	J Edward Milner	1995	Survey of spiders of the leaf litter of the woodlands on the Heath using pitfall traps. Traps were operated for a 12 month period from December 1994 to December 1995. A total of 58 species were recorded. The diversity within these woodlands was relatively low with the most diverse being an elm thicket on Parliament Hill. This low diversity was attributed to a high level of disturbance.	To assess spider communities of the leaf litter within woodlands.	Arachnidae	None indicated within study.	Nine woodland sites across the Heath.	Sample sites included Stock Pond Wood and Vale of Health Woodland.
7	Grassland monitoring on Hampstead Heath Year 1: Jan 1994 to Jan 1995	J Edward Milner	1995	Monitoring of spiders at grassland sites where management of reduced mowing had been implemented. Survey included pitfall trapping at selected sites across the Heath. A total of 77 species of spider were recorded. The study showed that relaxation of monitoring had resulted in an increase in the diversity with a shift in species composition from pioneer species to grassland species.	To assess change in spider communities following relaxation of management.	Arachnidae	None indicated within study.	Range of sites mainly in the eastern area of the heath.	Sample sites included Kite Hill (now Parliament Hill), Tumulus Field, Lower Cohen's Field and East Heath all sites within or bordering the site of the proposed scheme. While a useful list of species is provided this data is now old and would not be considered sufficiently current for the EIA.
8	The tube-web spider *Atypus affinis* rediscovered on Hampstead Heath after more than a century *The London Naturalist, No. 74,*	J Edward Milner	1995	An account of the rediscovery on Hampstead Heath after more than a century of the spider *Atypus affinis*. A localised species of sandy grasslands	An account of the rediscovery of *Atypus affinis.*	Includes list of other Arachnidae and Coleoptera recorded from the locality.	Local by not RDB or Notable	On steep grassy slope with gorse at Vale of Health	Site located away from area of proposed scheme

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	1995			and heathland. Recommendations are made for management and expansion of the habitat in which the species was recorded.					
9	Grassland invertebrates at Hampstead Heath 1996	Paul Moxey Associates (PMA)	November 1996	Assessment of grassland areas on heath carried out in summer 1996 mainly using visual collection and sweep netting. 242 species recorded of which 1 Na, 2 Nb and 25 considered local. Conclusion was that species diversity was low and the results indicate a 'poor and degraded grassland invertebrate fauna'. It was concluded that this as a result in the intensive mowing regime, level of disturbance, loss of grassland due to scrub invasion and due to enrichment through deposition of dog faeces.	General overview of the quality of the grasslands using invertebrates as indicator species	Coleoptera Diptera Heteroptera Aculeata Orthoptera Lepidoptera (butterflies only) Others	*Gorytes bicinctus* (Aculeata) Nb *Dolichovespula media* (Aculeata) Na *Metriopteras roeselii* (Nb)	South Meadow The Pound Fairground Site West Heath Judges Walk	Sample sites located away from areas of proposed scheme
10	Report on spiders in woodland on Hampstead Heath Year 2: 1996	J Edward Milner	1996	Continuation of work carried out under Ref.7 sampling only the Hampstead Heath Extension using pitfall traps and bark traps. Only 18 species were recorded from the pitfall traps and 8 from the bark traps. The pitfall trap results being very similar to those from the remainder of the Heath sampled in Ref.7. The bark traps recorded 3 new species for the Heath.	To assess the species present in the Hampstead Heath Extension.	Arachnidae	None.	Hampstead Heath Extension	Sample sites located away from proposed scheme.
11	Hampstead Heath: Miscellaneous invertebrates 1996	J Edward Milner	1996	A list of Coleoptera species recorded from the Heath it is stated that 271 species have been recorded to the end of 1996 and its is assumed that this is Coleoptera rather than invertebrates as a whole as is perhaps indicated by the title of the report.	An updated list of Coleoptera from the heath,	Coleoptera	None identified and full list not assessed under the current review.	West Heath Hampstead Heath Extension Sandy heath Hampstead Heath (main area)	Locations for the species not sufficiently precise to determine whether they are from the area of the proposed scheme.
12	Grassland Monitoring on Hampstead Heath for 1997	J Edward Milner	1998	A continuation of the work carried out under Ref. 7. Sampling of grassland sites using pitfall trapping. Reported a continued improvement in ecological conditions following relaxation in mowing. A decline in pioneer species of spider and an increase in grassland specialists is recorded. A total of 81 species recorded more than during the work in Ref.7. A total of 192 species of spider and 284 beetle are reported as having been recorded on the Heath.	Monitoring of fauna following relaxation of mowing.	Arachnidae Coleoptera	*Tapinocyboides pygmaeus* (RDB3) *Lepthyphantes insignis* (Nb) Both recorded as increasing during the study with *T.pygmaeus* also being recorded from East Heath and Tumulus Field and *L.insignis* being recorded widely.	Used same monitoring sites as Ref.7.	As Ref.7.
13	Report on miscellaneous invertebrate records for Hampstead Heath	J Edward Milner	October 1998	A list of invertebrates recorded from the Heath divided into area. Covered a large area of the Heath with species list for each area. List derived from pitfall trapping 'over 6 years' from the Heath.	Compilation of invertebrate inventory for the site.	Pseudoscorpiones Siphonaptera Myriapoda Coleoptera Diptera* Orthoptera* Neuroptera* Lepidoptera* Hemiptera-Heteroptera* Hemiptera-Homoptera* Hymenoptera* Isoptera* *Species not systematically sampled	None indicated in list.	Large areas of grassland, woodland, scrubland and wetland habitats across the Heath.	The following areas are relevant to the proposed scheme (numbers refer to numbering in table within document) 1.111 Kite Hill; 1.112 Tumulus Field; 1.311 Lower Chen's Field; 1.233 Bird Sanctuary (grassland) Phragmites bed); 1.270 Ladies Swimming Club Meadow; 1.611 East Heath (Pryors); 1.612 East Heath (Old Pond); 2.321 Stock Pond Wood; 4.271 Ladies Swimming Club Meadow (wet area); 4.272 Bird Sanctuary Phragmites Bed;

Document Ref. Number	Title	Author	Year	Summary of Work Carried out	Aims	Groups Covered	RDB and Notable Species Recorded	Area	Relevance to Proposed Scheme
									4.572 Viaduct Pond Marsh; and 4.371 Stock Pond Marsh. While these sites are listed as having been sampled the list of species is divided into a different system of 9 'major ecological blocks' with species present in each indicated. A map is referred to which indicates the distribution of these 9 blocks but this is not included within the report. While appearing moderately comprehensive the data is out of date.
14	Spider records for London and Middlesex in 1998, damage to an important spider habitat and a revised species list *The London Naturalist, No. 78, 1999*	J Edward Milner	1999	A general review of spider records and the report of damage by mowing machine to a slope above the Vale of Health where *Atypus affinus* occurred by a mowing machine.	Review of additional records from London and Middlesex.	Arachnidae	None	Vale of Health	None
15	Report on survey of spiders in scrubland on Hampstead Heath	J Edward Milner	Undated	Areas of scrub on the Heath sampled using pitfall traps and some sweep netting with focus on gorse, heather and areas of tall herb such as rose-bay willowherb stands. A total of 88 species were recorded mainly common and ubiquitous species. The gorse within Hatchett's Bottom was found to be the most diverse area and it was concluded that gorse represents an important invertebrate community on the Heath.	To assess spider fauna of the scrubland on the Heath.	Arachnidae	*Entelacara congenera* (Nb) Recorded from gorse in Hatchett's Bottom.	South Meadow Hampstead Gate South Heath Road Hatchett's Bottom West Heath Sandy heath	Sample sites located away from proposed scheme.
16	Hampstead Heath: Grassland invertebrate monitoring report on first six months: November 2001 to May 2002	Acacia Environment	June 2002	A report on monitoring using pitfall traps across the Heath (see also Ref.17 and Ref.19). Also some general sweep netting and collecting carried out. A total of 65 species of spider were recorded. In addition, 25 species were added to the beetle list for the Heath and the list for the site is reported as standing at 325.	Monitoring programme to assess changes to the grassland spider communities.	Arachnidae Coleoptera	*Platyderus ruficollis* (Nb) record listed from May 1995 *Aleochara ruficornis* (Nb) recorded listed from 30th March 1997 *Chrysolina oricalcia* (Nb) recorded listed from September 1996 *Longitarsus dorsalis* (Nb) recorded listed from December 1994 *Longitarsus luridus* recorded listed from October 1994 *Longitarsus parvulus* August 1995 *Choleva cisteloides* (RDBK) All species are coleoptera and taken from complete list of species from Heath published in document. Locations are not specific and simply from the Heath in general.	24 trapping sites across the Heath surveyed.	Sectors 1, 2, 3, 4, 5 and 6 cover areas east of Spaniards Road and therefore incorporate the area of the proposed scheme.
17	Hampstead Heath: Grassland invertebrate survey & monitoring for 12-month period 2001-2002 and Ladies Swimming Pool Meadow:	J Edward Milner, Acacia Environment	November 2002	Appears to be an updated version of Ref.16 and extending to November 2002 using same methods but also includes an assessment of orb-web spiders on the Ladies Swimming Pool Meadow. 87 species of spider were recorded during the study with the total list for the Heath reported as 206. The study reports a	Monitoring programme to assess changes to the grassland spider communities.	Arachnidae Coleoptera Orthoptera	*Tapinocyboides pygmaeus* was taken from Tumulus Field and Parliament Hill Fields with no records from Pryors Field where it was previously recorded. A full list of spider species	20 trapping sites across the Heath surveyed.	Sectors 1, 2, 3, 4, 5 and 6 cover areas east of Spaniards Road and therefore incorporate the area of the proposed scheme. Includes summary of distribution of less common species (Table 3) recorded within trap sites which

Document Ref. Number	Title	Author	Year	Summary of Work Carried out	Aims	Groups Covered	RDB and Notable Species Recorded	Area	Relevance to Proposed Scheme
	Survey of Large Org-Web Spiders: Year 2 (2002)			general increase in grassland specialist species indicating continued improvement in the grassland since mowing has been relaxed. It is reported that '*much of the Heath has a healthy spider fauna and is still improving.*' The beetle list for the site is updated to include a total of 341 species. The orb-web study of the Ladies Swimming Pool Meadow produced a new record for the Heath of *Argiope bruennichi* (Na) which appears to have colonised in 2002. An increase in the number of orb-webs was reported as a result of relaxation in the mowing regime within the field.			recorded from the Heath is provided listing the following rare and notable species: *Theridion familiare* (Nb) *Entelecara congenera* (Nb) *Tapinocyboides pygmaeus* (RDB3) *Lepthyphantes insignis* (Nb) *Tetragnatha pinicola* (Nb) *Zilla diodia* (Nb) *Argiope bruennichi* (Na) *Nigma walckenaeri* (Na) *Coelotes terrestris* (Nb) *Philodromus praedatus (Nb)* *Philodromus collinus* (Nb)		may be useful for assessment of proposed scheme.
18	Ladies Swimming Pool Meadow: Survey of Large Orb-Web Spiders Year 3 (2003)	J Edward Milner, Acacia Environment	October 2003	The orb-web study of the Ladies Swimming Pool Meadow continued but due to a dry summer numbers were generally down with no records of *Argiope bruennichi* although this species was recorded from South meadow and Pryors Field.	Monitoring programme to assess changes to the grassland spider communities.	Arachnidae	None	Ladies Swimming Pool Meadow	Ladies Swimming Pool Meadow is located within the area of the proposed scheme.
19	Hampstead Heath: Grassland/woodland invertebrate monitoring report on third year: November 2003 to the end of October 2004	J Edward Milner, Acacia Environment	November 2004	A continuation of studies of Ref.15 and 16 and reports on catches up to the end of October 2004 some previous monitoring sites were halted whereas sites at Preacher's Hill and on the slope below the Viaduct Pond were added. During the study 97 species of spider were recorded with two new species added and the total for the Heath is reported as 211. An additional 10 beetle species were recorded new for the Heath bring the total to 348 species. The study continues to report on an improvement in the spider fauna from the Heath with the Judges Hollow on Preachers Hill reported as one of the best areas on the Heath.	Monitoring programme to assess changes to the grassland spider communities.	Arachnidae Coleoptera	*Haplodrassus silvestris* (Nb) a rare woodland species was recorded for the first time from the Heath and recorded from Upper Coppice near to Hampstead Gate.	20 trapping sites across the Heath surveyed.	Sectors 1, 2, 3, 4, 5 and 6 cover areas east of Spaniards Road and therefore incorporate the area of the proposed scheme.
20	Hampstead Heath: Grassland Invertebrate Monitoring Report on the year: November 2004 to end of October 2005	J Edward Milner, Acacia Environment	December 2005	A continuation of studies of Ref.16, 17 and 19 and reports on catches up to the end of October 2005. An additional 24 beetle species were recorded new for the Heath bring the total to 406 species. During the study 94 species were recorded of which 3 were new for the Heath and the total for the Heath is reported as 214. The study continues to report on an improvement in the spider fauna from the Heath with particular improvements from Parliament (Kite) Hill, Tumulus Field and the Ladies Swimming Pool Meadow.	Monitoring programme to assess changes to the grassland spider communities.	Arachnidae Coleoptera	*Tapinocyboides pygmaeus* (RDB3) was recorded from Parliament (Kite) Hill for the first time.	20 trapping sites across the Heath surveyed.	Sectors 1, 2, 3, 4, 5 and 6 cover areas east of Spaniards Road and therefore incorporate the area of the proposed scheme.
21	Insect Survey of Hampstead Heath 2006	Daniel Hackett Wildlife Development	March 2007	General summary of records of invertebrates from the Heath with focus on streams and wet flushes, veteran trees and areas of dry grassland. It would appear that the work is based largely on a data search rather than on extensive	To identify any important species and inform management.	All	Appendix 1 lists species from the Heath, those not previously listed above or under Ref.23 are:	Provides a general summary of the invertebrate interest of the watercourses, veteran trees and	Provides a useful summary of the invertebrate interest of the Heath and useful information is presented to assess the proposed scheme.

Document Ref. Number	Title	Author	Year	Summary of Work Carried out	Aims	Groups Covered	RDB and Notable Species Recorded	Area	Relevance to Proposed Scheme
				field survey. There were no notable or red data species recorded from water courses although the survey was relatively brief. The report provides a useful summary of the saproxylic resource at the site and provides recommendations for management. A summary of records of grassland and open habitats is provided. Overall provides a useful summary of the invertebrate interest at the site.			Coleoptera *Lucanus cervus* (Nb) *Geotrupes pyrenaeus* (Na) *Agrilus pannonicus* (Na) *Agrilus sinuatus* (Na) *Cicones undatus* (pRDB1) *Tomoxia bucephala* (Na) *Phoiotrya vaudoeri* (Nb) *Leptura scutellata* (Na) *Anaglyptus mysticus* (Nb) *Notaris bimaculatus* (Nb) Hymenoptera *Crossocerus distinguendus* (Na)	grasslands across the Heath.	
22	Insect Survey of Hampstead Heath 2007	Daniel Hackett Wildlife Development	March 2008	Follow on work from that carried out under Ref.21 with focus on species of ancient trees, hedgerows, streams and wet flushes. Included survey of invertebrate species of ancient trees as well as further data search. Hedgerows were sampled using sweep netting techniques and other habitats of the site were sampled using visual search techniques. A total of 673 beetle species are reported from the Heath. A summary of notable species and their distribution and ecology is provided. Recommendations are provided on habitat management at the site. A Saproxylic Invertebrate Score (SQI) of 378.3 is calculated placing it amongst the top sites in the UK for its saproxylic species.	To identify any important species and inform management.	All	No new species referenced but a useful list of saproxylic species is provided.	Provides a general summary of the invertebrate interest of the watercourses, veteran trees and grasslands across the Heath with particular reference to saproxylic species.	Provides a useful summary of the invertebrate interest of the Heath and useful information is presented to assist in assessing the proposed scheme.
23	Appendix 1 Recorder List for Hampstead Heath to March 2008 from personal recording 1994-2007 [Appendix 1 Hampstead Heath SPL March 2008]	Unknown	March 2008	Download from Recorder (computer programme) of records from Hampstead Heath	List of species recorded on the Heath	Coleoptera Diptera Hymenoptera	Additional species not previously listed above are: Coleoptera *Pterostichus longicollis* (Nb) *Hydroglyphus pusillus* (Nb) *Cercyon ustulatus* (Nb) *Cryptopleurum crenatum* (Nb) *Anacaena bipustulata* (Nb) *Stenus nigritulus* (Nb) *Quedius longicornis* (Nb) *Dexiogyia corticina* (Nb) *Aleochara brevipennis* (Nb) *Agrilus angustulus* (Nb) *Melasis buprestoides* (Nb) *Meligethes incanus* (Nb) *Cryptarcha strigata* (Nb) *Uleiota planata* (Na) *Enicmus brevicornis* (Nb) *Mycetophagus piceus* (Nb) *Eledona agricola* (Nb) *Orchesia micans* (Nb) *Melandrya caraboides* (Nb) *Ischnomera cyanea* (Nb)	Not specific simply refers to records from Hampstead Heath	Provides a useful summary of the invertebrate interest of the Heath and useful information is presented to assist in assessing the proposed scheme.

Document Ref. Number	Title	Author	Year	Summary of Work Carried out	Aims	Groups Covered	RDB and Notable Species Recorded	Area	Relevance to Proposed Scheme
							Aderus oculatus (Nb) *Grammoptera ustulata* (RDB3) *Phytoecia cylindrical* (Nb) *Donacia crassipes* (Nb) *Longitarsus anchusae* (Nb) *Rhynchites cavifrons* (Nb) *Polydrusus sericeus* (Na) *Cneorhinus plumbeus* (Nb) *Magdalis cerasi* (Nb) *Cossonus linearis* (Na) *Cossonus parallelepipedus* (Nb) *Dorytomus ictor* (Nb) *Trichosirocalus horridus* (Na) *Isochnus populicola* (pRDBK) *Taphrorychus bicolor* (Na) *Xyleborus dryographus* (Nb) *Platypus cylindrus* (Nb) *Gnophomyia viridipennis* (Nb) <u>Diptera</u> *Solva marginata* (N) *Brachyopa bicolor* (RDB3) *Orthonevra brevicornis* (N) *Mallota cimbiciformis* (N) *Volucella zonaria* (N) <u>Hymenoptera</u> *Hedychridium coriaceum* (RDB3) *Lasius brunneus* (Na) *Stigmus pendulus* (RDBk)		
24	Appendix 2 Beetles recorded by Edward Milner 1992-2006 on Hampstead Heath [Appendix 2 Ed Milner beetles]	Unknown	Unknown	A list of beetles recorded from the Heath	To provide further list of species recorded from the site	Coleoptera	None indicated in list	Not specific simply refers to records from Hampstead Heath	As not specific to the areas in which species recorded this will be of limited use for informing impacts of the proposed scheme.
25 26 27 28 29 30 31	A survey of the Seven Sisters Ponds on Hampstead Heath Extension in 2006 A dragonfly survey of the Seven Sisters Ponds on Hampstead Heath Extension in 2007 A dragonfly survey of the woodland ponds on Sandy Heath in 2007 A dragonfly survey of the woodland ponds on Sandy Heath in 2008 A dragonfly survey of The Vale of Health and Viaduct Ponds in 2008 A dragonfly survey of the New, Stock, Bird Sanctuary and Model Boating Ponds in 2008 A dragonfly survey of the Hampstead Mixed bathing, No1 and	Alan Reynolds	2006- 2010	A protracted study carried out over five season on the Odonaya fauna of the Heath water bodies. Concludes that the best sites on the Heath are the Seven Sisters Ponds, the Viaduct Pond, the Bird Sanctuary Pond, Highgate No 1 and Hampstead No 1 and No 2 Ponds. A total of 16 species occur on the Heath all of which are widespread and common.	Assess species of dragonfly present and to provide recommendations for management	Odonata	None although some species such as ruddy darter and hairy hawker are more localised.	Ponds on Hampstead Heath	Many of the ponds within the proposed works surveyed and data useful for assessing impacts of proposed scheme.

Document Ref. Number	Title	Author	Year	Summary of Work Carried out	Aims	Groups Covered	RDB and Notable Species Recorded	Area	Relevance to Proposed Scheme
	No2 Ponds in 2009 32 A dragonfly survey of the Highgate Mens Bathing and No1 Ponds in 2009 33 A dragonfly survey of The Vale of Health and Hampstead No1 and No2 Ponds in 2010 34 A dragonfly survey of the Bird Sanctuary and Highgate No1 Ponds in 2010								
35	Hampstead Heath Monolith Survey 2010	Daniel Hackett Wildlife Development	March 2010	A survey of 18 veteran trees (monoliths) to assess how best to manage the compromise between safety and habitat conservation. Survey of the trees was carried out using a 'baited traps on a number of trees. Further collection of species was done using visual techniques on 22nd and 27th June. A total of 26 species of beetle not previously recorded from the Heath were recorded. The Saproxylic Quality Index was recalculated at 415 indicating that the site is close to SSSI quality for its saproxylic species. The site supports a diverse array of saproxylic beetles and a small diversity of saproxylic hoverflies. Recommendations are made fore retaining fallen and standing deadwood on site.	To assess the invertebrate interest and management of monoliths.	Coleoptera Diptera	<u>Coleoptera</u> Ctesias serra (Nb) Dorcatoma flavicornis (Nb) Aleochara stichai (Nb) Pyrochroa coccinea (Nb) Cryptophagus micaceus (RDBK) <u>Aculeate Hymenoptera</u> *Crossocerus congener (*RDBk)	18 trees assessed across the Heath.	Several of the trees assessed are located within the proposed scheme area including: M1 at Bird Bridge; M5 at top end of Lime Avenue; M6 at Viaduct Bridge; M8 at Boating Pond; M15 above Tumulus; and M18 near Boating Lake on north-east side. Others may be located within the area of the proposed scheme, however, the locations provided within the report are not sufficiently detailed to determine precise locations.
Miscellaneous Reports	Email from Daniel Hackett	Daniel Hackett	22nd June 2007	Records of 2 new weevils from Pryor's Field	Informative note	Coleoptera	*Rhynocyllis conicus* (Nb) *Trichosirocalus horridus* (Nb)	Pryor's Field	Within area of proposed scheme
	Hampstead Heath Aculeate Hymenoptera	Daniel Hackett	March 2008	Records from across the Heath	General list of Aculeate Hymenoptera	Aculeate Hymenoptera	None	Wide range of records from across the Heath	All reports of limited use for assessing proposed scheme as not sufficiently specific records and not of notable or rare species.
	Email from Daniel Hackett	Daniel Hackett	20th June 2007	Reports *Agapanthia villosoviridescens* from Hampstead Heath	Informative	Coleoptera	None	Pryors Field	
	Email from Laurence Counter	Laurence Counter	5th October 2009	Reports occurrence of RDB3 bee *Heriades truncorum.*	Informative	Aculeate Hymenoptera	*Heriades truncorum*	Fallen tree besides Model Boating Pond	Located within the area of the proposed works
	Email from Laurence Counter	Laurence Counter	7th February 2010	Report of *Arocatus longiceps* from Hampstead Heath	Informative	Heteroptera	None	London plane in North End area	Located away from the area of the proposed works
	Email from Laurence Counter	Laurence Counter	27th June 2010	Reports *Closterotomus trivialis* from Hampstead Heath	Informative	Heteroptera	None	Recorded as '*small nettle bed behind the cafe on the path leading up the hill*'.	Located away from the area of the proposed works

3.0 SUMMARY EVALUATION, CONSIDERATION OF IMPACTS AND RECOMMENDATIONS

3.1 Introduction

This section presents a summary of the work carried out on invertebrates at Hampstead Heath to date based on the information summarised in **Table 2**. In particular, the data is considered in accordance with the information likely to be required to accompany a planning application for the proposed Hampstead Heath Flood and Water Quality Management Works scheme.

3.2 Year of Evaluation

The documentation available for the site extends back to 1991 although it is evident that data on invertebrates has been collected at Hampstead Heath for many years, with for example, Ref.21 referring to work carried out on Coleoptera in 1863. For the data available for this review there is a good spread of almost annual reporting of invertebrates at the site. For the purpose of the assessment of the proposed scheme the most useful documents in terms of them being relatively recent are documents Ref.21, Ref.22 and Ref.35 for 'terrestrial' species and Ref.25-34 for Odonata.

3.3 Summary of Work Carried Out

The documentation available for review provides a good spread of varying sampling techniques within a range of habitat types. The earlier documents on Arachnids and Coleopteran produced by J Edward Milner (Ref.1 to 20, excluding Ref.16) considered species occurring in a range of habitat types but particularly within grasslands. Subsequent work carried out included sampling of veteran trees, hedgerows and to a lesser degree waterbodies. Much of this work has been carried out using trapping techniques with, proportionately, little visual sampling undertaken.

3.4 Species Groups Covered

There has evidently been a great deal of work carried out in respect of Arachnids and Coleoptera at the site and species lists for these could be considered comprehensive although given time and additional sampling techniques further species could be added to the site inventory. However, a number of other significant groups such as aquatic invertebrate groups (excluding Odonata), Diptera, Hymenoptera and Lepidoptera have not been surveyed in as much detail and therefore lists for these species are likely to be incomplete and omit many rare species. Clearly, there are many 'minor' and lesser known family groups that have

not been surveyed in detail, many of which may support rare species, however, it would not be feasible to expect all groups to be sampled and it is sufficient for key indicator groups to be assessed.

3.5 Areas Covered

Hampstead Heath is a large site covering 320 hectares and therefore surveys will only ever sample the habitats present. The sample of areas subject to survey has been good and focused on the most 'promising' areas.

3.6 Relevance of the Studies to the Proposed Scheme

Unfortunately, due to the nature of the surveys carried out on the site they have not been targeted to the areas likely to be impacted upon by the proposed scheme. Some of the studies reviewed cover elements of the proposed scheme but not in a targeted manner document Ref. 21, 22 and 35 are useful in providing an overview of the potential value of the habitats within the working area and document Ref.25-34 provide a summary of the Odonata species present within the waterbodies subject to the proposed works.

3.7 Recommendations for Further Work to Support Proposed Scheme

As a result of the above comments the following elements of additional work should be carried out to provide sufficient information to assess the impacts on invertebrates to inform the Planning Application for the proposed scheme.

- Phase 1 habitat survey carried out in respect of invertebrates to identify, for example, potentially important veteran trees and areas of deadwood, potentially important nectaring areas, good structured grasslands, structurally diverse woodlands,riparian margins etc;

- Sampling of invertebrates within the proposed scheme area to include Lepidoptera (both moths and butterflies), Diptera and Aculeate Hymenoptera. This survey work should consist of four visits to the site between May and August, inclusive, to coincide with the peak period of invertebrate activity; and

- Sampling of water-bodies and assessment of invertebrate communities in accordance with British Monitoring Work Party (BMWP) quality assessment.

The information gathered during this additional work will allow a robust assessment of the impact of the proposal on invertebrates to be made and will further inform an assessment of the importance of the site for invertebrates and suitable mitigation, compensation and management.