



**MOD ACADEMY
WATERCOURSE MANAGEMENT PLAN
February 2006**

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1. INTRODUCTION

1.1 This plan has been prepared at the request of *the client*. A new grounds maintenance contract is currently being drafted for the site, and biodiversity requirements are being integrated into the contract in order to meet the client's objective:

"to manage all aspects of nature conservation within the site and its associated estate in accordance with the company's commitment to protect and enhance the natural habitat of the estate, maximising biodiversity and to comply with current national legislation".

1.2 The site, as a whole, is of importance for biodiversity, supporting substantial areas of lowland mixed deciduous woodland, wet woodland and parkland - all of which are priority habitats within the UK Biodiversity Action Plan (UKBAP). In addition, the site supports calcareous streams, ditches, lakes and ponds. These habitats support a diversity of species of conservation concern (SoCC) which are protected under European and/or UK legislation and/or listed as priority species within the UKBAP.

1.3 Species that qualify for one or more of the following are species of conservation concern: -

- Threatened endemic and other globally threatened species.
- Species where the UK has more than 25% of the world or appropriate bio-geographical population.
- Species where numbers or range have declined by more than 25% in the last 25 years.
- In some instances where the species is found in fewer than 15 ten km squares in the UK.
- Species listed in the EU Birds or Habitats Directives, the Bern, Bonn or CITES Conventions, or under the Wildlife and Countryside Act 1981 and the Wildlife Order (Northern Ireland) 1985.

1.4 UK BAP Priority Species are species which qualify for one or more of the following priority species: -

- Species which are globally threatened.
- Species which are rapidly declining in the UK, i.e. by more than 50% in the last 25 years.

- 1.5 Presently, information on the presence, distribution and populations of species of conservation concern is limited for the site. No information is currently available to demonstrate that populations of SoCC are stable and healthy. Seemingly innocuous habitat changes, such as the development of trees with increased shading to watercourses and their banks, or dredging which results in a more homogenous channel, can render habitats unsuitable for many species. It is possible that water voles, *Arvicola terrestris*, have disappeared from the site due to mink predation, and the loss of open stream and lake banks which support the lush vegetation upon which water voles depend for cover and food. White-clawed crayfish, *Austropotamobius pallipes*, may now be restricted to small pockets of remaining suitable habitat and therefore be at risk of extinction at the site. Good quality habitat needs to be sufficient in both area and connectivity.
- 1.6 A valuable ecological survey was carried out by the client's Conservation Committee in 2004 of the south bank of the (name) Brook (including the hedgerow areas around the adjacent to the Tennis Courts), north bank of (name) Brook, the lagoon and the entrance to the site. This recorded presence of a number of species of conservation concern including white-clawed crayfish and barn owl (see section 3 for details). However, the survey covers only part of the Defence Academy site and due to limited resources was not able to carry out surveys for other species of interest (e.g. bats, reptiles etc), or assess the size and health of populations of these species. Further surveys are therefore necessary to ascertain the presence, distribution and populations of species of conservation concern for the whole site.
- 1.7 This survey plan identifies priorities for survey work on the watercourses and provides protocols. Following these surveys, the current status of species of conservation concern will be better understood and it will be possible to provide detailed management prescriptions to maintain (or recover populations to) sustainable levels. The draft watercourse management plan can then be refined to include these detailed management prescriptions.

2. BRIEF

2.1 The brief for this work as drafted and submitted by PBA Consulting was as follows: -

Scoping Survey for Protected Species and Other Species of Conservation Concern (SoCC)

Introduction

The site currently supports a good diversity of habitats including substantial areas of broadleaved woodland, open water, conservation grassland and the brook. The Biodiversity Study 2004 is an excellent summary of the habitats and many of the species to be found on the site. There is a proposal to produce a biodiversity action plan for the site. It is important that this plan is targeted at the key species and habitats of interest to ensure the value of the site is maintained and where possible enhanced.

To achieve this, PBA Consulting proposes to carry out a scoping survey of the watercourses and assess the suitability and quality of habitats for protected and other species of conservation concern (E.g. UK Biodiversity Action Plan Priority Species). PBA Consulting can then identify the need for detailed surveys in 2006. Such detailed surveys can only be carried out in the spring and summer months.

On completion of the scoping survey, a report will be prepared which will provide survey protocols, estimated costs, and initial recommendations for the development of the biodiversity action plan.

Detailed surveys in 2006 are essential to identify protected, and other, species of conservation concern and are likely to include:-

- crayfish trapping to assess current distribution and population levels of the native white-clawed crayfish and the presence/absence of the American signal crayfish.
- torching and bottle trapping for great crested newts in suitable ponds.
- using tins/carpet tiles/felt squares to locate reptiles.
- inspecting banks for water voles.
- inspecting loft spaces, cellars and other underground spaces, trees etc which have the greatest potential as bat roosts.
- carrying out dusk bat activity surveys using bat detectors to ascertain which bat species are using the site and in what way.

It is recommended that GPS is used to record species/features and it is important that standard protocols are followed in all surveys. The survey programme should be developed in conjunction with the client.

3. HABITATS AND SPECIES OF CONSERVATION CONCERN

3.1 The site supports the following key habitats which are described in more detail in the draft biodiversity management plan, January 2006. The letters UKBAP after the habitat name denotes that the habitat is a priority habitat for action in the UK Biodiversity Action Plan.

- Lowland mixed deciduous woodland UKBAP.
- Wet woodland UKBAP.
- Parkland UKBAP.
- Open water – lakes.
- Streams.
- Grassland.
- Ponds.
- Built environment.

3.2 The ranges of habitats on the site compliment each other to support a diversity of associated species, many of which depend on more than one habitat. There are areas that are more 'wild' than others, such as the woodland and streams to the south of the golf course, they have a 'wilderness' quality and are likely to require minimal management. Other areas are a mix of formal landscaping or grazing and therefore management for wildlife needs to be balanced with other interests.

3.3 Protected species and other species of conservation concern recorded in the Biodiversity Study of 2004 are listed in table 1 below.

**Table 1: Protected Species/ Species of Conservation Concern
Recorded at the Site.**

Code	Common Name	Scientific Name
A1	Common Toad	<i>Bufo bufo</i>
A2	Common Frog	<i>Rana temporaria</i>
A8	White Clawed Crayfish	<i>Austropotamobius pallipes</i>
A9	Bullhead or Millars Thumb	<i>Cottus gobio</i>
B16	Barn Owl	<i>Tyto alba</i>
B19	Starling	<i>Sturnus vulgaris</i>
B23	Song Thrush	<i>Turdus philomelos</i>
B25	Linnet	<i>Carduelis cannabina</i>
B26	Dunnock	<i>Prunella modularis</i>
B29	Yellowhammer	<i>Emberiza citrinella</i>
B31	Swallow	<i>Hirundo rustica</i>
B8	Green Woodpecker	<i>Picus viridis</i>
M3	Badger	<i>Meles meles</i>

3.4 Other species which are likely to, or may, be associated with the watercourses and wetland areas are as follows: -

- bat species.
- water vole *Arvicola terrestris*.
- otter *Lutra lutra*.
- reptile species (grass snake *Natrix natrix* and slow-worm *Anguis fragilis*).
- great crested newt *Triturus cristatus*.
- invertebrate species.

3.5 Not all of the species recorded above are of high conservation significance (e.g. common frog, common toad) although; it is clearly desirable that the site supports healthy populations of all of these species.

3.6 Survey priorities have been set according to conservation importance and the likelihood of presence on the site. For some species groups (e.g. invertebrates), we do not have sufficient data to know whether species of conservation concern, occur and hence 'species group' surveys are recommended. Surveys of breeding birds will help to ensure that adequate habitat is maintained (e.g. a dense shrub layer for song thrush, warblers etc and mature trees for woodpeckers, nuthatch, owls etc).

4. SURVEY OBJECTIVES

4.1 The objectives for survey work are as follows: -

- to provide a baseline of habitat and species information for the site.
- to confirm presence/absence of SoCC species on the site.
- to ascertain the distribution of SoCC species on the site.
- to obtain a measure of the population levels of SoCC species on the site.
- to inform the draft watercourse management plan to ensure that the requirements of all SoCC species present (and those with potential to be present) are maintained and/or enhanced to sustain healthy, viable populations

5. SURVEY STRATEGY

Habitats

- 5.1 There are a number of habitats that are associated with the watercourses and wetlands. These include:
- streams and banks.
 - lakes and banks.
 - riparian woodland within 20m of streams or lakes.
 - adjacent open habitats (e.g. grassland/tall herb).
- 5.2 The attributes of these habitats determine their suitability for different species of conservation concern. For example, a complete absence of marginal and bank vegetation in a river, due to over-shading by trees, is unsuitable for water voles which require lush marginal/bank vegetation for cover and food. A silted up channel with few features will be suboptimal for white-clawed crayfish, which prefer undermined, overhanging banks; sections that exhibit heterogeneous flow patterns; cobbles and rock riffles; roots and woody vegetation; and under water-saturated logs.
- 5.3 The river corridor survey methodology provides a straightforward means of mapping channel and riparian habitat characteristics for streams and lakes. Maps are produced for 500m sections and show habitat types and features within, and adjacent to, the watercourse.
- 5.4 Much work has been undertaken by English Nature and others in developing methodologies for carrying out condition assessment of habitats including rivers. The Environment Agency has developed the River Habitat Survey methodology. These methodologies have advantages due to their comprehensiveness, rigour and repeatability for monitoring. However, the brook and lakes at the site have a relatively simple structural and ecological character and hence these survey methodologies would provide more information than is necessary, as well as incurring a high level of cost. River corridor survey is more cost effective with the main output being a map showing all key characteristics and features along the watercourse, and opportunities for enhancement.

Species

- 5.5 Species or species groups, associated with the watercourses/lake, of greatest importance to survey are listed below: -
- bat species.
 - water vole.
 - Otter.
 - breeding birds.
 - reptile species (grass snake and slow-worm).
 - great crested newt.
 - bullhead or millars thumb.
 - invertebrate species.
 - white-clawed crayfish.
- 5.6 Badger and barn owl are not included as they are not particularly associated with the watercourses/lakes. However, it is likely that these species will be recorded in the course of other surveys. Common frog and common toad, their spawn and tadpoles should be recorded where found in the course of other surveys.
- 5.7 Different species require very different survey methods. Some are relatively straightforward to survey (e.g. water voles) whilst others require much higher levels of survey effort to establish presence, distribution on site and population levels. In relation to bats, it may only be possible to identify species that forage along and around the watercourses and not locate where they roost (which may be trees, buildings, bridges etc.) Brief details of survey methodologies are given below for key species/species groups.

Table 2: Survey Methodologies by Species/Species Groups	
Species/species group	brief outline of survey methodology
river corridor survey (RCS)	map 500m sections of watercourse (including lakes) showing characteristics, key features (including more diverse plant communities) and opportunities for enhancement.
bat species	<i>roosts</i> 1. day-time search of accessible loft spaces, cellars, tunnel at Beckett House and the Tea House and other buildings, underground structures on site. 2. dusk emergence surveys from buildings, trees etc where roosts suspected. <i>foraging/commuting</i> 3. night-time activity surveys along watercourses/ lakes.
water vole	A search for signs of water voles (e.g. burrows, latrines, feeding signs etc). This can be carried out at the same time as the river corridor survey.
breeding birds	Ideally a Common Bird Census methodology would be undertaken which involves 6 to 8 early morning walks to record birds and activity.
reptile species	Place roofing felt mats/carpet squares to attract reptiles.
great crested newt	4-6 nights bottle trapping/torching/netting of ponds in April/May. Survey at same time as white-clawed crayfish trapping.
bullhead	Survey at same time as searching for white-clawed crayfish.
invertebrate species	Entomologist to use variety of methods to sample invertebrates, focusing on habitat with greatest potential.
white-clawed crayfish	Standard methodology involves direct search under logs, rocks, debris etc. This is supplemented by overnight trapping in deeper water.

5.8 Detailed survey requirements are listed in Table 3 below.

Table 3: Details of Proposed Survey Methodologies				
survey type	details	estimate of man days	reports	notes
river corridor survey (RCS)	map 500m sections of all watercourses/lakes detailing where enhancements could be made	3	1	there are c.8.5 500m stretches of watercourse or lake margin
bats	day-time inspections of accessible loft spaces, cellars, tunnel at Beckett House/Tea House and other buildings/underground structures on site	2	1	2 surveyors, n.b. would need to be accompanied by member of staff
	dusk emergence surveys from buildings, trees etc where roosts suspected.	2		2 evenings with 2 surveyors
	night-time activity surveys along watercourses/lakes.	4		4 evenings with 2 surveyors
water vole	search for signs of water voles (e.g. burrows, latrines, feeding signs etc). This can be combined with river corridor survey.	0 see note	0.5 depending whether recorded	if combined with other surveys e.g. RCS
otter	search for spraint	0 see note		if combined with other surveys
breeding birds	10 early morning visits, recording birds on map.	5	1	
reptiles	Place 100 mats every 30-50m in suitable sunny locations along watercourse and lake margins.	1*	0.5	* 1 day to place mats and remove at end of survey, checking would take place at same time as other surveys e.g. CBC
great crested newt	4-6 nights egg searching, bottle trapping and using torches	4-6	0.5	ideally carry out at same time as crayfish trapping
other amphibians		0 see note		record where observed during other surveys
bullhead		0 see note		combine with crayfish survey
invertebrates	up to 3 days collecting, 3 days identification and writing-up	3	3	spread through spring/summer period
white-clawed crayfish	up to 3 days to survey watercourses with 2 nights trapping in lakes, deeper watercourses	5	0.5	
TOTALS		29	8	

6. SURVEY PROTOCOLS

6.1 Protocols for survey work are given below.

River corridor survey (RCS)

6.2 The protocol is given in *River Corridor Surveys; Methods and Procedures*, Conservation Technical handbook No. 1, National Rivers Authority (1992), Bristol. Maps are produced for 500m stretches showing watercourse characteristics and features.

Bats

Daytime Surveys

6.3 Buildings/structures identified for surveys should be checked externally and internally (especially loft spaces and cellars) for bats or signs of bats by a licensed surveyor.

Dusk Emergence Surveys

6.4 Buildings/structures/trees with greatest potential for bats should be checked for bat emergence at dusk with the use of bat detectors. Note that bat roosts are difficult to locate in trees due to the variety of roost types used by different bats and because bats may also roost in small numbers.

Night-time Activity Surveys

6.5 The watercourse/lakes should be walked on 4 evenings and bats recorded along with activity type (e.g. commuting, foraging), following different routes on each visit. This provides general information on the use of the site by bats, which species and their numbers.

Water Vole

6.6 Signs including burrows, latrines, tracks, runs, feeding signs should be searched for in the course of the river corridor survey.

Otter

6.7 Otter signs (including spraint and tracks) should be searched for during the course of other surveys.

Breeding Birds

6.8 The BTO Common Birds Census (CBC) is the most appropriate methodology for the site. The watercourses/lakes need to be walked on 10 visits from March to July during the early morning.

6.9 The CBC output is a map of birds recorded on each visit and showing territories along with a bird list with number of territories for each species. Note that territories will extend beyond watercourse corridor.

Reptiles

- 6.10 To determine presence or likely absence of reptile species, there should be a minimum of 7 survey visits between mid/late March and late June, and/or between late August and late September during appropriate weather conditions (Foster & Gent, 1996 or *Froglife Advice Sheet 10: Reptile Surveys* for guidance). Visits in late August/September are particularly useful to confirm whether breeding takes place on the site, as young animals are most likely to be detected at this time. Artificial refuges should be at least 0.5m² in size and set out at a density of at least one per 30m of open watercourse bank. To obtain a population estimate at least 20 visits are recommended. This is not recommended here due to the added expense. However, if site personnel were involved the refuges could be checked more times.

Great Crested Newt

- 6.11 Ecoconsult has recorded great crested newts in the disused Wilshire and Berkshire Canal within 500m immediately to the south in the past so there is a high likelihood of finding great crested newts at the site.
- 6.12 The standard survey protocols are given in Great Crested Newt Mitigation Guidelines, English Nature 2001. Three methods (preferably torch survey, bottle-trapping and egg search) should be used on 4 visits in suitable weather conditions, between mid-March to mid-June, with at least two of these visits during mid-April to mid-May. If present, 2 additional visits are required, one of these visits during mid-April to mid-May to provide a population estimate. The lagoon and ponded brook at SU253888 have the greatest potential to support great crested newts and there should be surveyed using all three methods. Egg searching should be carried out along lake margins and egg searching/torch survey should be carried out at the golf course lake (n.b. this is a fairly shallow featureless lake) and the small ponds on the boundary to the east and behind the stables.

Bullhead

- 6.13 Bullhead can be searched for whilst searching for crayfish.

Invertebrates

- 6.14 Invertebrates are collected using a variety of methods such as direct collecting, sweep netting, beating, pitfall traps, suction equipment etc. Up to 3 days of field work spread between April – September and 3 days of identification and report writing are likely to be required at Shrivenham.

White-Clawed Crayfish

- 6.15 There is a standard methodology for crayfish surveys (Monitoring the White-clawed Crayfish, Conserving Nature 2000 Rivers Monitoring Series No. 1, Stephanie Peay, Life in UK Rivers, 2003). This involves a manual search for crayfish under refuges. In deeper water (over 60cm), baited traps will be employed on two nights. Note that trapping requires a licence from the Environment Agency under the Salmon and Freshwater Fisheries Act 1975 and it can take 20 days to obtain. A provisional assessment of numbers of traps required to survey the site is provided in Appendix 3.

GPS

- 6.16 Global Positioning Systems (GPS) will be employed to record features electronically as far as possible in the field which will minimise time needed to input data in the office. The advantages of having data digitised to co-ordinates are that information can be displayed on maps to aid interpretation and use of the data.

Other Surveys that would be Desirable

- 6.17 There are many other species groups that would be desirable to carry out surveys for. These include lichens, mosses and liverworts, fungi etc. Surveys are likely to identify some species which scarce or notable. Their needs could then be built in to the management plan. One day survey effort per group or, in the case of fungi, two days would provide reasonable lists to be produced. These groups have not been included in the programme/costs at this stage but could be included depending on the resources available.

Using Results to Produce Detailed Prescriptions in Biodiversity Action Plan

- 6.18 The surveys will provide information to guide the locations and nature of habitat enhancements such as channel re-profiling, crayfish habitat creation, tree and shrub scalloping to allow more light to watercourses etc. These detailed management proposals need to be consented where necessary by the Environment Agency (work related to watercourses) and English Nature (work relating to protected species) before being incorporated into the biodiversity management plan.

Summary

- 6.19 Appendix 1 below outlines the proposed survey programme by month and Appendix 2 provides an outline of trapping requirements.

APPENDIX 1
SURVEY PROGRAMME 2006

survey	January	February	March	April	May	June	July	August	September	October	November	December
river corridor survey					3							
bats – daytime inspection						2						
bats – dusk emergence						2						
bats – activity surveys watercourses/lakes					1	1	1	1				
water vole					1							
otter												
breeding birds			2	2	2	2	2					
reptiles			1	1	1	1		1	2			
great crested newt				2-3	2-3							
bullhead (combine with crayfish)						3						
invertebrates				1		1		1				
white-clawed crayfish						3	2					
write up results									8			
update biodiversity action plan									4	4		

NUMBERS EQUAL NUMBER OF VISITS, NOT MAN DAYS

APPENDIX 2

PROVISIONAL OUTLINE OF TRAPPING REQUIREMENTS

Area	suitability for trapping	length/ metres	trap density/100m	no. of traps	notes
Brook	very shallow for virtually whole length	1720	0.5	10	manual search, ad hoc trap placement in deep sections
lagoon	good	320	10	32	trapping only
2 small brook sections north of lake	few locations	220	10	22	manual search, ad hoc trap placement in deep sections
total lake margin	good	1380	5	75	trap at 1 trap per 20m, with additional traps at footbridge
golf course north arm excluding <i>Glyceria</i> dominated stretch	occasional deeper places	220	2	4	ad hoc trap placement in deep sections
golf course south arm	largely too shallow	500	1	5	ad hoc trap placement in deep sections
stream below golf course	largely too shallow	760	1	8	ad hoc trap placement in deep sections
Totals		5120		150	