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Cambridge Sport Lakes

Environmental Statement:

Ecology and Nature Conservation

March 2005

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Issue and Revision Record

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B	December 2004	L Huckstep	C Patterson	D Hutchinson	Second Issue
C	March 2005	L Huckstep	C Patterson	D Hutchinson	Third Issue

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1 Ecology and Nature Conservation

1.1 Introduction

Cambridge Rowing Trust is proposing to construct and maintain the Cambridge Sport Lakes and Country Park on land between Milton and Waterbeach, north of Cambridge - **Annex A: Ecological Constraints Map, Figures A1-A3**. The proposed development would include a range of sporting facilities and include the creation of approximately 220 acres of Country Park to link up with the already established Country Park at Milton. This section of the Environmental Statement has been prepared by Mott MacDonald. An ecological baseline has been established in order to identify and quantify the potential impacts to Ecology and Nature Conservation.

The information to complete this ecological assessment has been gathered from a number of sources involving a range of desk studies, screening consultation and targeted ecological studies.

This chapter presents:

- A Summary of the assessment methodology used
- A Summary of the baseline ecological surveys
- A Phase 1 Habitat Survey undertaken during Spring 2004
- Bird, Badger, Water Vole, Otter, Aquatic Invertebrate, Reptile and Amphibian surveys undertaken between March and July 2004
- An assessment of the impacts of construction and operation on biodiversity
- Mitigation measures for construction and operation
- Location and ecological constraints mapping.

2 Methodology

2.1 Assessment Methodology

In considering the potential impacts of a development the purpose of ecological assessment is to judge whether those impacts are likely to be 'significant'. For this report the Institute of Ecology and Environmental Management (IEEM) criteria for assessing the significance of impacts on species and habitats followed the Guidelines for Ecological Impact Assessment: Amended Pilot November 2002.

The general study area for all ecological surveys is defined in the Ecological Constraints Map. Ecological surveys presented in **Annexes B-F** provide the baseline data on which the potential impacts arising from the scheme – direct or indirect, temporary short- or long-term – were assessed. Note that each Annex may be extracted as a stand-alone report.

The formal screening opinion provided by South Cambridgeshire District Council (SCDC) in June 2003 is presented in **Annex G**.

2.2 Ecological Survey Work undertaken

The following surveys were carried out between March and July 2004:

- Phase 1 Habitat Survey (May-July 2004). Incorporated detailed target notes for all ditches, woodland and hedgerows. **Annex B.**
- Breeding and Wintering Bird Survey (March-July 2004). British Trust for Ornithology. **Annex C.**
- Specialist Bat Survey (April-June 2004). **Annex D.**
- Specialist Badger, Water Vole, Otter, Reptile and Amphibian Survey (May-June 2004). **Annex E**
- Specialist Aquatic Invertebrate Surveys (May 2004). **Annex F**

2.3 Consultations

Consultation commenced during an initial scoping exercise undertaken in 2003 and was ongoing during the survey period. Consultees include:

- The Environment Agency
- English Nature
- Milton Country Park
- Local Wildlife Trust
- Suffolk Bat Group
- South Cambridgeshire District Council

3 Baseline Conditions

The SCDC screening opinion, recommend that a Phase 1 Habitat Survey and an assessment of the impact of the development on protected species is undertaken. The results of the baseline studies undertaken in 2004 are presented below.

3.1 Designated Sites

There are no statutory designated areas of ecological importance within the study area. However, there are two areas of local ecological importance close to the boundary. Milton Country Park, comprising a mosaic of woodland scrub, grassland and large expanse of open water, provides an important habitat for a number of protected species especially breeding and wintering birds. To the east of the site, the River Cam is an important aquatic habitat with a number of valuable riparian trees, wet meadows, ditches and associated protected species. To the east of the Cam the riparian habitat is designated a Nature Conservation Zone (South Cambridgeshire Local Plan, 2001). To the north are two County Wildlife Sites approximately 1 km from the area: Cambridge Road Pollard Willows and Clayhithe Pollard Willows.

Approximately 5km to the north of the site, the River Cam washes are designated Sites of Special Scientific Interest (SSSI) due to the important diversity of protected species within the flood meadows.

3.2 Habitat and Protected Species Evaluation

Habitat evaluation within this report focuses on habitat types and protected species of importance potentially impacted by the development.

3.2.1 Habitats and Flora

The following habitat types were considered of ecological value during the Phase 1 mapping. The Phase 1 Habitat Survey Report, Target Notes and Habitat Maps are included in **Annex B**.

Approximately 75% of the potential development site comprises arable and improved fields with a distinctive open fenland habitat largely represented by a regimented pattern of drainage ditches which function as the main wildlife corridors and habitats of value in central areas. Other valued habitats are the pockets of fragmented woodland and scrub in northern (Carr Dyke) and southern areas.

Woodland

Woodland habitats of ecological value are located to the north (Carr Dyke) and south of the scheme. Two small semi-improved broadleaved blocks of woodland may potentially be lost to the scheme development at the eastern edge. There would also be a loss of scattered bankside trees and small pockets of scrub associated with drainage ditches.

Hedgerows

The study area comprises of native species-rich and species-poor hedgerows, the majority being generally represented by species-poor hedges. Hedgerows provide an important wildlife corridor in an area of intensive agricultural land use. Loss and general fragmentation through the land-take will reduce the conservation value of the remaining hedgerows.

Grassland

The majority of grassland within the site area can be considered improved and of low ecological value. A southern meadow to the west of the River Cam and a small field adjacent to Carr Dyke comprises semi-improved neutral grassland of higher ecological value. Other areas contain small pockets of poor semi-improved mesotrophic grassland. The National Vegetation Classification (NVC) type MG1 has a frequent distribution along all drainage ditches.

Drainage Ditches

Drainage ditches are an important wetland habitat and can have a high ecological value. The study area contains approximately 16 interconnecting ditches that vary in water levels and botanical structure. Overall, the ditches are not of an exceptional quality. However, all have good potential for supporting a number of protected species, in particular breeding and wintering birds associated with reed beds. Ditches with a regular slow flow were found to support a greater diversity of macrophytes.

3.2.2 Breeding and Wintering Birds

Forty-seven species of bird were recorded within the study area during the spring and thirty-five were recorded during the early summer period including seven additional species. In total fifty-four species were recorded. The study was based on the Common Bird Census (CBC) techniques. The full methodology and species distribution for this report is included in **Annex C**: Breeding and Wintering Bird Survey.

Eight Skylark territories, five pairs of Yellowhammer and one pair of Reed Bunting and Grey Partridge were present within the study area. A number of BAP bird species including notable species such as Kestrel, Turtle Dove, Nightingale, Song Thrush, Linnet and Bullfinch were also recorded at low frequencies. There were no records of Sedge and Reed Warbler along dry drainage ditches.

A literature search revealed no specific reference to Barn or Short-eared Owls for this site, however it is possible that these species occur at very low frequency. Other low frequency recordings include Fieldfares (Amber Listed).

Table 3.1 and **Table 3.2** show records for species of conservation concern. Full count records are presented in **Annex C:** Site Impact Assessment for Birds 2004.

Table 3.1: Species recorded at the site of proposed sport lakes between 5 March and 7 May 2004

(showing species categorised as high conservation concern (**) and medium conservation concern (*) by Gregory et al. (2002))

Species	Number of visits recorded	Maximum count	Total across all visits
Greylag Goose	1	2	2
Canada Goose	1	2	2
Mallard	4	6	12
Sparrowhawk	1	1	1
Red-legged Partridge	1	2	2
Grey Partridge **	3	2	5
Pheasant	5	5	13
Moorhen	2	2	3
Black-headed Gull	1	3	3
Stock Dove *	1	6	6
Woodpigeon	9	16	81
Collared Dove	2	1	2
Swift	1	3	3
Green Woodpecker *	3	1	3
Great Spotted Woodpecker	1	1	1
Skylark **	9	60	102
Pied Wagtail	5	2	7
Wren	10	5	33
Dunnock *	8	3	17
Robin	6	2	8
Nightingale *	1	1	1
Blackbird	10	13	58
Fieldfare *	1	11	11
Song Thrush **	5	3	10
Mistle Thrush *	4	9	12
Grasshopper Warbler **	1	1	1
Whitethroat	3	8	18
Blackcap	2	3	4
Chiffchaff	4	3	9
Willow Warbler *	2	2	3
Long-tailed Tit	1	1	1
Blue Tit	6	4	17
Great Tit	6	5	13

Jay	1	1	1
Magpie	7	4	18
Jackdaw	1	1	1
Rook	9	15	66
Carrion Crow	3	7	10
Starling **	4	100	137
House Sparrow **	1	1	1
Chaffinch	3	4	6
Greenfinch	8	5	15
Goldfinch	3	20	25
Linnet **	1	6	6
Bullfinch **	1	2	2
Yellowhammer **	6	8	28
Reed Bunting **	7	5	13

Table 3.2: Estimated minimum number of breeding pairs for species of high conservation concern

Species	Minimum number of breeding pairs	Maximum count
Grey Partridge	1	2
Skylark	8	60
Yellowhammer	5	8
Reed Bunting	1	2

3.2.3 Amphibians

No species of amphibian were recorded during the 2004 survey. All drainage ditches and potential terrestrial habitats were assessed and found to be sub-optimal. Report methodology and findings are presented in **Annex E.**

3.2.4 Reptiles

No species of reptile were recorded during the 2004 survey, despite identification of optimal grass snake habitat. Both common lizard and grass snake have the potential to be present in low numbers. Methodology and findings are presented in **Annex E.**

3.2.5 Badgers

No badger setts were found within the study area during the 2004 survey. Badger droppings were observed in two areas suggesting the site may be used for foraging. Location of field signs is shown in **Annex E: Figures E1 – E3** Protected Species Locations.

3.2.6 Bats

During the daytime assessment, likely bat foraging areas were identified as well as potential bat roosting sites in a small number of trees located mainly at the south of the site **Table 3.3**. During evening activity surveys no emerging bats were recorded and no bat roosts were positively identified. No existing records of bats were found for the site. Low numbers and diversity of bats were recorded during the surveys - Common Pipistrelles, Soprano Pipistrelles, a Noctule and a Myotis bat **Table 3.4** and **3.5**. The results of the survey show that the site is of limited use to bats; this use appeared to be restricted to hedges and woodland in the south of the site and the Carr Dyke in the north-east.

Table 3.3: Summary of trees identified as having potential for roosting bats.

Species	Location	Notes	Bat roost potential
Ash	TL 48460 62453	Ivy covered.	Low
Ash x2	TL 48472 62487	Damage / splits. Hole on the east side of one of the trees.	High
Ash	TL 48511 62549	Hole on east side of tree where branch had broken off.	High
Willow	TL 48515 62581	Multi-stemmed. Two holes visible.	High
Willow	TL 48526 62617	Hole on east side.	High
Willow	TL 48621 62759	Holes.	Medium
Ash	TL 48647 62783	Hole on east side.	Medium
Horse chestnut & oak	TL 49043 63893	No obvious defects but good potential due to size of trees.	Medium

Table 3.4: Bats recorded during activity survey at south of site.

19th May	Still, dry, patchy cloud, mild (15.1° C @ 21:45). Sunset = 20:51	
Time	**Species**	**Location**
21:43	Soprano Pipistrelle	Along hedge / path. TL 485 626
21:46	Soprano Pipistrelle x2	Along hedge / path. TL 486 627
22:01	Myotis	Along hedge / path. TL 486 627
22:39	Myotis	Along hedge / path. TL 486 627
22:40	Common Pipistrelle	Along hedge / path. TL 485 626

Table 3.5: Bats recorded during activity survey at north of site.

2nd June	Still, dry, some high cloud, cool (10.3° C @ 21:50). Sunset = 20:10	
Time	**Species**	**Location**
21:50	Noctule	Feeding over Car Dyke. TL 495 645
21:50	Soprano Pipistrelle	Feeding around willow along Car Dyke
21:54	Soprano Pipistrelle	Feeding around willow along Car Dyke
21:55	Soprano Pipistrelle	Feeding along Car Dyke
21:57	Soprano Pipistrelle	Feeding along Car Dyke
21:58	Soprano Pipistrelle	Feeding along Car Dyke TL 495 644
22:00	Soprano Pipistrelle	Over meadow in between hedges TL 495 644
22:03	Common Pipistrelle	Close to Car Dyke over meadow
22:05	Common Pipistrelle	Close to Car Dyke over meadow
22:42	Soprano Pipistrelle	Over Car Dyke

3.2.7 Water Voles

Thirteen drainage ditches were assessed for their potential to support water voles. Survey results showed field signs (**Table 3.3)** indicating their presence was identified at three ditches. The quality of the habitat can be described as medium to high potential. Due to the interconnecting feature of the drainage ditches it is possible that further ditches may also support water voles. Report methodology and findings are presented in **Annex E.**

Table 3.6: Water Vole Field Signs

Watercourse	Field Signs	Population Estimate
Dyke 5	FS, D	Small
Dyke 11	FS, D, L	Medium
Dyke 12	FS, D	Small

The population estimate was made on the number of field signs found.
Key:
FS - Feeding Station
D - Droppings
L - Latrine

3.2.8 Otters

No signs of otters were recorded within the study area during the 2004 survey. However, along the boundary of the study area an otter spraint was located on the east bank of the River Cam under the A14 road bridge at Milton. Report methodology and findings are presented in **Annex E.**

3.2.9 Other Mammals

Foxes and rabbits were observed during the 2004 survey and Muntjac deer were recorded in small numbers.

3.2.10 Aquatic Invertebrates

Five sampling locations were surveyed in May 2004 and are shown in the Aquatic Invertebrate Report **Annex F.** All sample sites had moderate to good biological water quality, but are probably influenced by organic pollution, such as agricultural run-off, to a certain extent. The assemblages of taxa found at all sites were fairly typical for small, slow-flowing, lowland ditches and no rare or notable taxa were found.

Table 3.4 shows all the invertebrate taxa found during the survey and assessment of the biological water quality using standard scoring systems of the Biological Monitoring Working Party (BMWP) and the Average Score Per Taxon (ASPT). Both scores were combined to give an overall description of the biological water quality of a watercourse using the Lincoln Quality Index (LQI) shown in Table 3.8.

Table 3.7: Freshwater invertebrate taxa and abundances at each sampling site

Invertebrate taxa	Site 1	Site 2	Site 3	Site 4	Site 5
Mollusca (snails)					
Sphaeriidae: *Sphaerium* sp.	15	1	89		
Sphaeriidae: *Psidium* sp.	4			3	
Hydrobiidae: *Bithynia tentaculata*	15		6		
Physidae: *Physa fontinalis*	1				
Physidae: *Aplecta hypnorum*				5	

Planorbidae: *Planorbis contortus*	5	4			
Planorbidae: *Planorbis complanatus*		32			
Planorbidae: *Planorbis spirobis*		6			
Planorbidae: *Planorbis planorbis*				8	
Planorbidae: *Planorbis corneus*	2				
Valvatidae: *Valvata piscinalis*	59				
Lymnaeidae *: Lymnaea peregra*	1		2	2	3
Lymnaeidae: *Lymnaea stagnalis*	2		3	4	4
Lymnaeidae: *Lymnaea palustris*	1				
Oligochaeta (worms)					
Oligochaeta	34	15	1		7
Hirudinea (leeches)					
Erpobdellidae: *Erpobdella octoculata*	4				2
Glossiphoniidae: *Glossiphonia complanata*	4				
Invertebrate taxa	**Site 1**	**Site2**	**Site 3**	**Site 4**	**Site 5**
Crustacea					
Gammaridae: *Crangonyx pseudogracilis*	1	12	1	5	2
Asellidae: *Asellus aquaticus*	1	10	4	4	16
Ephemeroptera (mayflies)					
Baetidae*: Cloeon dipterum*		1			
Caenidae: *Caenis luctuosa*			2		
Odonata (damselflies and dragonflies)					
Libellulidae (immature specimens)		1	1	3	
Coenagridae: *Coenagrion* sp. (damaged specimens)	7				
Hemiptera (bugs)					
Gerridae (immature)					18
Nepidae:*Nepa cinerea*					
Megaloptera (alderflies)					
Sialidae: *Sialis lutera*			3		
Coleoptera (beetles)					

Dytiscidae (larvae)		3	6	3	
Dytiscidae: Hydroporinae (larvae)		2			1
Dytiscidae: *Hydroporus palustris* (adults)		1		1	
Dytiscidae: *Ilybius ater* (adults)		1		1	1
Haliplidae (larvae)			1		
Helodidae (larvae)				56	17
Hydrophilidae (larvae)				3	
Hydrophilidae: *Helophorus* sp. (adults)				2	1
Invertebrate taxa	**Site 1**	**Site 2**	**Site 3**	**Site 4**	**Site 5**
Hydrophilidae: *Anacaena* sp. (adults)					2
Hydrophilidae: *Hydrobius fuscipes* (adults)				3	1
Chrysomelidae: Galerucinae (adults)			6		
Chrysomelidae: Halticinae (adults)					3
Trichoptera (caddisflies)					
Limnephilidae (early instars)		1	3		
Diptera (true flies)					
Chironomidae	1	16	13	5	3
Ceratopogonidae			2		
Culicidae				10	
Stratiomyidae				3	
Ptychopteridae					1
Total no. of taxa	**18**	**15**	**16**	**18**	**16**
BMWP score	**47 ***	**42 ***	**62 ****	**46 ***	**43 ***
No. of scoring families	**14**	**10**	**14**	**11**	**11**
ASPT	**3.35 ***	**4.20 ****	**4.43 *****	**4.18 ****	**3.91 ****

Notes:

BMWP scores and implied water quality:

Poor *

Moderate **

Good ***

ASPT and implied water quality:

Poor *

Moderate **

Good ***

Very Good **** Very Good ****

Exceptional *****

Table 3.8: The Lincoln Quality Index Results

Sampling Site	Biological Water Quality
Site 1	Moderate Quality (E)
Site 2	Good Quality (C)
Site 3	Good Quality (C)
Site 4	Moderate Quality (D)
Site 5	Moderate Quality (D)

The methods for establishing the LQI, BMWP and ASPT are fully referenced in the Aquatic Invertebrate Survey **Annex F.**

4 Construction Impacts

4.1 Designated Sites

There are no statutory designated sites within the study area.

The Alan Burrough Training Lake would be situated along the eastern edge of Milton Country Park. The proposed scheme will not directly impact the Country Park site in terms of land loss. However, there is potential for temporary impacts of noise and pollution from dust and other pollutants to impact on the site during construction, and changes to the existing boundary ditches hydrological regime may affect water levels in the existing boundary ditches' changing the distribution of macrophyte communities. The potential impact during construction is considered minor negative.

Construction impacts on the biodiversity of the River Cam are unknown at this stage.

4.2 Habitats and Protected Species

Woodland

Woodland habitats are likely to be temporarily affected by dust and other residual impacts during construction. The impact is considered to be potential minor negative.

Hedgerows

Hedgerow clearance during initial construction will result in a loss of wildlife corridors through further hedgerow fragmentation. Remaining hedgerows are likely to be temporarily affected by dust. The impact is considered to be potential minor negative during construction.

Grassland

Initial construction of the cut to divert the River Cam would result in a small loss of southern semi-improved grassland sections to the west of the River Cam. Drainage ditch clearance would also result in a loss of bank top and ditch side grassland communities. Remaining grassland habitats on site are likely to be temporarily affected by dust and other residual impacts. The impact during construction is considered neutral.

Drainage Ditches

There are potential risks from increased siltation and pollution loading to remaining ditches during initial construction. Changes to the hydrological regime of ditches may affect the distribution of macrophyte communities. The impact during construction is considered to be minor negative.

4.2.1 Breeding and Wintering Birds

Vegetation clearance prior to construction would be timed to avoid disturbance to breeding birds and therefore would be carried out in autumn and winter.

Construction activities would generate a level of noise from traffic and machinery that is likely to have some impact on breeding and wintering birds within the scheme. Areas outside the development are potentially threatened by construction, access routes or future increases in disturbance. The areas of concern support varied habitats of mature trees or hedges and pastures, the loss of which would be difficult to mitigate in the short or medium term.

The breeding and wintering bird survey found that the study area was representative rather than remarkable in terms of its bird species and composition; it is likely that some short term displacement of some breeding birds would occur during the initial construction phase. The impact during construction is considered to be minor negative.

4.2.2 Amphibians

Amphibians could be affected by habitat loss from construction clearance. However, during the baseline survey the overall habitat is considered of low ecological value for amphibians. The impact during construction is therefore considered neutral.

4.2.3 Reptiles

Reptiles could be affected by habitat loss from construction clearance. The survey produced a negative result for the species. However, habitat areas of high potential value, were identified during the baseline survey. The impact during construction is considered local minor negative.

4.2.4 Badgers

Badgers may be affected by noise disturbance from construction traffic and equipment. No active setts were identified during the survey. However, foraging badgers may be at risk from increased construction traffic as a result of new roads within the scheme. The impact during construction is considered to be local minor negative

4.2.5 Bats

Clearance of hedgerows and scattered tress would result in noise and disturbance to roosting bats The impact during construction is considered a local minor negative.

4.2.6 Water Voles

Water voles would be affected by noise disturbance from construction traffic and equipment and loss of ditch habitat during clearance. This impact during construction is considered to be local minor negative.

4.2.7 Otters

No signs of otter were found within the site, however it is possible otters occur in the vicinity of the study area along the River Cam. The impact during construction is considered neutral.

4.2.8 Other Mammals

Small mammals and deer would be affected by noise disturbance and loss of habitat. The impact during construction is considered neutral.

4.2.9 Aquatic Invertebrates

To prevent accidental pollution from spillages and sediment runoff from contamination, a detailed environmental management plan for the site would be established to ensure that construction-related materials and silt are not discharged into the surrounding drainage ditches. This would include mitigation measures to deal with accidental pollution to ditches. The impact to ditches during construction is considered local minor negative.

5 Operational Impacts

5.1 Designated Sites

There are no statutory designated sites within the study area.

Consideration should be given to the potential impact of increased pollution loading associated with the construction of the canal on the boundary ditches of Milton Country Park and the River Cam.

5.2 Habitats and Protected Species

Woodland

Approximately 15% of semi-natural woodland and 10% scrub habitat would be lost to the land take. In additional approximately forty individual scattered trees associated with drainage ditches would be lost, a number of trees are mature and of potential importance to protected species. The impact of woodland habitat loss is considered potential minor negative in the short term as mitigation tree planting will reduce the impact.

Hedgerows

Four Hedgerows are considered likely to be impacted by the development, through direct loss. Two are considered to meet the ecological criteria for ‘importance’ under the Hedgerow Regulations 1997. In additional a further eight hedgerows would be affected by construction. The impact of hedgerow habitat loss is potentially negative in the short term. However, replanting of new hedgerow lengths to

connect northern and southern woodland habitats, strengthening wildlife corridors is considered a positive impact in the long-term.

Grassland

Initial construction of the cut to divert the River Cam would result in an overall loss of approximately 10 % of semi-improved grassland of which 3 % would involve a small loss of southern semi-improved neutral grassland sections to the west of the River Cam. Drainage ditch clearance would also result in a loss of bank top and ditch side grassland communities. This impact is considered minor negative in the short term. In the long term the impact would potentially be neutral during to replanting of species-rich grassland.

Drainage Ditches

Five drainage ditches (Phase 1, target noted; 1,3,7,9 & 16) would be lost by the development land take. In addition, five ditches (Phase 1, target noted; 2,4,5,6 &12) would result in an 80% loss of ditch habitat. Remaining ditches would be affected by the loss of interconnecting ditches resulting in changes to the hydrological regime.

There would be a biodiversity loss of macrophyte and aquatic invertebrates' communities. Breeding bird and possible water vole habitats would initially diminish. This impact would be considered to be local moderate negative.

5.2.1 Breeding and Wintering Birds

Wintering and breeding birds could be potentially affected by the loss of the following habitats:

- Tree-lined track west of the Fen Road railway and running perpendicular to Fen Road, comprises mature trees with relatively high bird densities and species richness. This track will form the boundary of the southern section of the proposed development area ("The Alan Burrough Training Lake"). If lost impact would be considered local minor negative in the long- term.
- The hedges running south east from Hepworth Farm are relatively mature, relatively rich in bird species and would warrant protection. They may not be threatened by the proposed development from the A10 (Ely Road). If affected the impact would be considered local minor negative in the long-term.
- Habitats along the edge of Carr Dyke are important for several bird species including Nightingale. Increased access and disturbance are likely to impact on these habitats and reduce their value for birds resulting in a short-term local minor-negative impact.
- Lowland agricultural habitat will be lost during the land take. This type of habitat has been identified as important for certain BAP species (Gummer et al 1984). The impact would be considered local minor negative in the long-term.

5.2.2 Amphibians

No ponds capable of supporting amphibians would be lost through scheme land take. The new scheme is likely to provide a range of aquatic habitats suitable for amphibians. This impact is considered to be a neutral.

5.2.3 Reptiles

Initial land-take for the scheme would result in a reduction in both terrestrial and aquatic habitats associated with the ditches. However, new habitats are likely to be created around the new storage lake facility. This impact is considered to be a neutral.

5.2.4 Badgers

Land-take for the scheme would remove hedgerows and woodland pockets of potential importance for badgers. No active setts were located during the 2004 survey. The impact at this stage is therefore considered neutral.

5.2.5 Bats

Additional planting of trees together with retention of existing mature trees and southern hedges would increase the overall availability of potential roost sites for bats. Therefore the proposed development could potentially improve the site for bats and create a link between Carr Dyke to the north, connecting to the existing bat foraging areas adjacent to Fen Road in the South and Milton Country Park. However, initial clearance of woodland, hedgerows and scattered trees would result in a potential loss of bat roost; the impact is therefore considered minor local negative in the short-term.

Artificial lighting however may cause disturbance to bats and therefore where possible inappropriate lighting should be avoided. Proposals are not clear at this stage and the potential disturbance to bats from lighting should be reviewed.

5.2.6 Water Voles

Loss and severance of ditches will reduce the length of potential water vole habitats. The impact at this stage is therefore considered local minor negative.

5.2.7 Otters

Potential otter habitat would only be slightly diminished during the land take for the development. The operational impact is considered neutral.

5.2.8 Other Mammals

Land-take for the development would initially restrict the habitat potential for small mammals. However, mitigation measures would create potential new habitat. The impact is therefore considered neutral.

5.2.9 Aquatic Invertebrates

Site 1 (see **Annex F**) may be directly affected by the canal link from the Alan Burrough Training Lake to the River Cam, which could have an impact on the input of water into this ditch. The ditch at Site 2 will be completely lost under the Competition Lake, as will the western section of the ditch at Site 3. These two sites both had good biological water quality, compared to moderate at the other sites. Site 3 in particular had the highest BMWP and ASPT of all five sites. The existing railway ditch (Site 4 and Site 5) will be retained.

A section of the open channel at Site 3 and the whole of Site 2 will be lost during construction; therefore it is important that habitat diversity and water quality do not deteriorate in the remaining open channel sections. The impact is considered local negative due to the loss of habitat and invertebrate species. A number of interconnecting drainage ditches would be moderately affected.

6 Mitigation Strategy

6.1 General Mitigation Measures

Initial construction should ensure that all vegetation clearance is undertaken in phased stages to minimise potential impacts to protected species. A pre-clearance search of all protected species habitats should be undertaken to avoid unnecessary mortality. Where protected species are identified construction work should cease and the environmental manager / site ecologist notified to allow safe translocation methods for the species to be carried out in consultation with the appropriate statutory body utilising non-statutory bodies (Local Wildlife Trusts and Groups) for guidance and advice.

Where species such as water voles have already been identified as residing within an area to be cleared, an early trapping and translocation programme to an appropriate new receptor site outside of the site boundary should be undertaken. A monitoring programme for all translocated species should be established and protective fencing erected around the new receptor site habitat. All species should be appropriately monitored throughout and after the construction phase. Further detailed mitigation measures would be developed prior to pre-clearance and detailed in the ecological management plan for the scheme.

Protective fencing along the boundary of Milton Country Park would protect the Park edge habitats from impacts during construction of the Alan Burrough Training Lake.

6.1.1 Habitats and Protected Species

Woodland

The loss of woodland habitat which is largely confined to individual and small groups of trees would be mitigated by re-planting an extensive tract of mixed broadleaved woodland to connect northern and southern wooded habitats. Additional site planting would also increase the woodland habitat within the area. Mature trees that are retained should be fenced off during construction.

Hedgerows

The provision of additional boundary hedgerows would provide habitat for a variety of species including invertebrates and breeding birds. Re-planting of hedgerows with native trees along the development boundary will help to re-connect the fragmented hedges and connect areas of high conservation in the north (Carr Dyke) to Milton Country Park in the south providing an additional wildlife corridor.

Grassland

Where possible grassland areas of semi-natural status should be retained as an additional mitigation measure, the majority of grassland in central areas is improved and of a lower ecological value. Where possible consideration should be given to translocating bankside semi-improved grassland strips to newly established grassland areas.

Drainage ditches

The creation of a perimeter ditch would provide a new length of ditch as part of the landscape works. The new length of ditch would require management to enhance biodiversity and prevent the ditch becoming degraded, eutrophic and species poor due to polluted run off from the site. Translocation of macrophyte communities from ditches lost during clearance would enhance the habitat. Further study is required prior to translocation to identify the most valuable communities requiring translocation.

6.1.2 Breeding and Wintering Birds

Key habitats identified in the site include areas of woodland, scrub, hedgerows, wet and dry ditches and associated vegetation. Areas of mature trees, early succession woodland and scrub are important for Red and Amber Listed species such as Turtle Dove, Song Thrush, Willow Warbler and Nightingale.

Mitigation could be developed in line with Government objectives for BAP species and habitats. The site development should strive to avoid the removal of mature trees or hedges or cause damage to those existing along the edge of the site during the period of construction.

The following restoration and habitat creation measures are recommended as additional mitigation measures:

- Profile of native shrubs, rough grassland and water that would attract Song Thrushes, various warblers, finch species and Reed Buntings.
- The lake fringe would benefit water birds (Moorhen and Water Rail) if given a shallow profile, perhaps along the eastern fringe.
- Wet areas, in combination with drier scrub and thickets would improve conditions for Dunnock, Bullfinch, Tree Sparrow and possibly Nightingale.
- The development should also consider shallow open areas to the lake, again perhaps associated with the quieter south eastern edge, between the storage lake and railway line.
- Exposed mud could attract waders, waterfowl and wagtails, or a common reed fringe would benefit reed bed species such as Reed Warbler and Reed Bunting.
- Open rough grassland behind this would replace that lost along field ditches and boundaries, and provide habitat for Meadow Pipits, Grey Partridge, and foraging Barn Owl or Short-eared Owl in winter.
- Encouragement of trees, scrub and thickets between the proposed boat trailer park, Carr Dyke and the railway embankment, would both encourage and protect species such as Nightingale and Turtle Dove from excessive long-term disturbance.

Provided that the mitigation for loss of habitats is thorough, the impact of the development on the majority of the site could largely be that existing conditions are restored and indeed improved upon the existing habitat.

6.1.3 Amphibians

Existing amphibian habitat is considered sub-optimal. However, amphibians may move into the site and therefore a watching brief would be maintained for amphibians during construction and the area securely fenced off.

6.1.4 Reptiles

Reptiles may benefit from a programme of phased clearance prior to construction with translocation of species to a safe area, fenced off with reptile proof fencing during construction. Habitat enhancement for reptiles would require establishing a range of terrestrial (tall rough grass/basking zones), incorporating new aquatic habitats into the scheme storage lake area.

6.1.5 Badgers

No active badger setts were identified on site; however it is likely that badgers are foraging within the area. Monitoring of potential badger activity should be ongoing during initial clearance and construction as, due to the mobility of badger populations, new setts may be created as additional mitigation. If setts are identified work should cease and the appropriate licence applied for and action taken to safeguard the species. Work within 30m of active sett would require a licence from English Nature. Badgers appear to be foraging along the western edge of the scheme. Consideration should be given to badger fencing within this area during initial construction.

Due to the loss of western hedgerows, re-planting of woodland to the western edge would re-connect fragmented woodland habitats and be of potential benefit to foraging badgers.

6.1.6 Bats

The proposed scheme should take into consideration the areas identified as preferred bat foraging habitat in the north and south of the site. These areas should be retained as additional mitigation and further improved by planting trees and shrubs to provide foraging areas and flight lines to connect fragmented woodland habitats. The felling of any mature trees, particularly those identified as having bat roosting potential, should only be carried out in the absence of bats. Further surveys to confirm the absence of bats should be carried out prior to any felling operations. It is likely that the felling of any trees identified as having bat roosting potential will need to be carried out carefully, to avoid damaging any unseen bats present. Any trees confirmed as bat roosting sites are likely to require a licence from the Department of Environment Food and Rural Affairs before they can be felled legally.

Where lighting is used for reasons of public safety, for example along access roads and footpaths, its design should direct the light only where required. The installation of certain types of white lighting, such as mercury vapour lamps, may benefit foraging bats as these attract night flying insects.

6.1.7 Water Voles

Direct loss of water vole habitat requires an additional detailed mitigation strategy to be implemented. As water vole activity has been identified on three ditches, a further survey is recommended to ensure displacement of the population does not occur and appropriate mitigation measures are put in place. A method statement for trapping and translocation should be approved by statutory consultees. The population should be translocated to a suitable habitat that can support a viable population that will continue to be monitored after translocation.

The environmental management plan should ensure exclusion of water voles from working areas along watercourses during construction with subsequent habitat reinstatement and enhancement where possible with provision of culverts incorporating ledges suitable for the passage of water voles and otters. Drainage ditches should be managed to retain their rich riparian vegetation and bank structure in order to be of potential habitat value to water voles.

6.1.8 Otters

Otter home range can extend over a long distance along a river and its tributaries. Although otters are not currently on site, they may move into the study area, looking to colonise new habitat. Any new bridge with culverts should be designed to allow safe passage of otters. Statutory consultees should be consulted regarding mitigation measures.

6.1.9 Other Mammals

A programme of phased pre clearance would allow small mammals to move into new areas. Fencing of construction works would prevent mammals re-entering construction zones.

6.1.10 Aquatic Invertebrates

It is recommended that the storage lake should include shallow margins and vegetation that would provide suitable habitat for invertebrates as additional mitigation. Depending on the phasing of work, it may be possible to translocate some vegetation and sediment, from the sections of Site 2 and Site 3 which will be lost, into the new Perimeter Drain along the western side of the site.

A detailed environmental management plan should be in place to ensure that construction-related materials and silt are not discharged into any watercourse and should include measures to deal with accidental pollution incidents.

It is recommended that a monitoring programme following construction is carried out to establish whether there has been any change from the baseline. This should be carried out at the same time of year as this baseline survey.

7 Conclusion

The main negative impact of the scheme arises from the loss of habitat, disturbance and displacement of protected species during initial construction. No statutory designated sites are affected by the Scheme. Lowland agricultural habitat is the largest habitat type to be lost. This type of habitat has been identified as important for certain BAP species arable birds, but is of low botanical value. Mature scattered individual trees, hedgerows and drainage ditches will also be lost, through overall woodland and semi-improved grassland loss will be minimal.

Drainage ditches provide one of the most valuable aquatic habitats of the site recognised within the Local Habitat Action Plan (LHAP) for Cambridgeshire as supporting a diverse flora and fauna. Mitigation measures should consider the objectives and long term targets of the LHAP. The landscape design of new aquatic marginal and wetland habitats (marshland habitat surrounding the storage lake) would mitigate against the loss of aquatic habitat and create a range of habitats of preference to protected and BAP listed species.

An extensive tract of woodland planting has been incorporated into the proposed design, strengthening the existing fragmented habitat connection between Milton Country Park and Carr Dyke woodland to the north, therefore enhancing the continuity of wildlife corridors.

The overall balance of impacts in terms of biodiversity would be beneficial if negative impacts are carefully considered within the mitigation strategy and addressed during construction and operation within the Environmental Management Plan.

Table **7.9** summarises the ecological impacts of construction and operational activity identified during the baseline habitat and protected species survey.

Table 7.9: Impact Assessment Table

Ecological Feature/Habitat	**Potential Ecological Impact**	**Proposed Mitigation for negative impact**
Woodland	Temporary dust and pollution	Environmental Management Plan - Implementation of dust suppression plan
	Habitat loss	Compensatory habitat creation
Hedgerows	Temporary dust and pollution	Environmental Management Plan - Implementation of dust suppression plan
	Habitat loss	Compensatory habitat creation
Grassland	Temporary dust and pollution	Environmental Management Plan - Excavation to take place in moist environment
	Habitat loss	Compensatory habitat creation
Drainage Ditches	Increased pollution loading Habitat Loss	Environmental Management Plan - to control discharge and spillage incidents Compensatory habitat creation
	Pollution of existing ditches	Environmental Management Plan to control discharge and spillage incidents
Breeding and Wintering birds	Noise and physical disturbance, loss of nesting sites	Pre-clearance timed to avoid breeding bird season
	Habitat fragmentation	Compensatory habitat creation
Amphibians	Disturbance if on site	Phased clearance, translocation
	Loss of habitat	Compensatory habitat creation
Reptiles	Disturbance if on site	Phased clearance, translocation

	Loss of habitat	Compensatory habitat creation
Badgers	Loss of foraging areas, disturbance during construction	Phased clearance, badger fencing to be considered.
	Habitat fragmentation, potential mortality due to site traffic	Compensatory woodland habitat creation

Bats	Habitat loss and Disturbance of roosts	Pre-clearance check of all potential bat tree roosts prior to felling, replacement of potential roosts.
	Fragmentation of established pathways	Creation of a continuous wooded block to connect fragmented habitats
Water voles	Habitat loss and Disturbance	Translocation with post monitoring scheme
	Fragmentation	Ledges where new culverts are designed
Otters	Disturbance	Phased clearance
	Fragmentation	Ledges where new culverts are designed
Other Mammals	Disturbance	Phased clearance
	Habitat Loss	Compensatory habitat creation
Aquatic Invertebrates	Pollution	Environmental Management Plan to control discharge and spillage incidents
	Habitat Loss	Compensatory habitat creation and translocation