Greenwich Peninsula
Land Management Plan
on behalf of English Partnerships

Section B

Component Area Management Plan

1. Millennium Village Marsh (incorporating the Greenwich Peninsula Ecology Park)

April 2001

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EXECUTIVE SUMMARY

Some 119.6 hectares of the Greenwich Peninsula in East London have been subject to regeneration measures. The regenerated landscape includes notable areas of open space with habitats and landscapes, which require management. Responsibility for land management for these areas lies with an organisation called the Greenwich Peninsula Trust.

A Land Management Plan has been prepared in relation to this land holding and is in two sections. Section A covers the land holding in general and provides detail on those elements which are best considered at the peninsula-wide scale. Section B comprises a series of five component area plans relating to identifiable management units within the overall holding. The above area forms part of the redeveloped Greenwich Peninsula, for which all Green Space shall be managed holistically, to ensure that standards of management are consistent, high and in keeping with the carefully developed design intentions for landscape, ecology, transport and other aspects of human amenity. This component document should be read in conjunction with the Peninsula-Wide Management Plan and is the first 20-year component area management plan strategy to the Millennium Village Marsh, which incorporates the Greenwich Peninsula Ecology Park. This is an innovative concept in such a setting (amidst a prestige new urban development), and a bold assertion of the government's commitment (via English Partnerships) to ecological and sustainable design in brownfield site redevelopment.

The Village Marsh, at time of writing (January 2001) is at an early stage in its evolution. Features are, however, already of Borough Grade II Value and should increase to Metropolitan Value with appropriate management.

The key aims of management are: to develop and maintain healthy, diverse and attractive wetland ecosystems on the site to ensure that the site is both safe and educational; to ensure that their ecological development is recorded and to promote dissemination of monitoring data from this land mark scheme to assist in the guidance and development of other regeneration schemes close to major rivers in our cities.

PART 1 – DESCRIPTION

1.1 GENERAL INFORMATION

Location

The centre of the Village Marsh is at grid reference TQ399793. The location within the Greenwich Peninsula is shown in Figure 1.1.

Land Tenure

Details can be found in 'Section A of the Greenwich Peninsula Management Plan'.

Management Infrastructure

Details can be found in 'Section A of the Greenwich Peninsula Management Plan'.

Map Coverage

See Appendix 1 for list of as-built plans that cover this area. Details of where these are located within the Management Library can be found in 'Section A of the Greenwich Peninsula Management Plan'.

Document and Photographic Library

See the relevant reference section in 'Section A of the Greenwich Peninsula Management Plan' for documents which relate to this area.

The library locations of further photographic, diagrammatic and other relevant archive are as follows *(To be filled out as required)*:

Management Compartments

Two sub-areas

The Millennium Village Marsh is divided into two main sub-areas:

- The Greenwich Peninsula Ecology Park – a controlled access area
- The Outer Marsh – a public access area.

The delineation of each is shown in Figure 1.1.

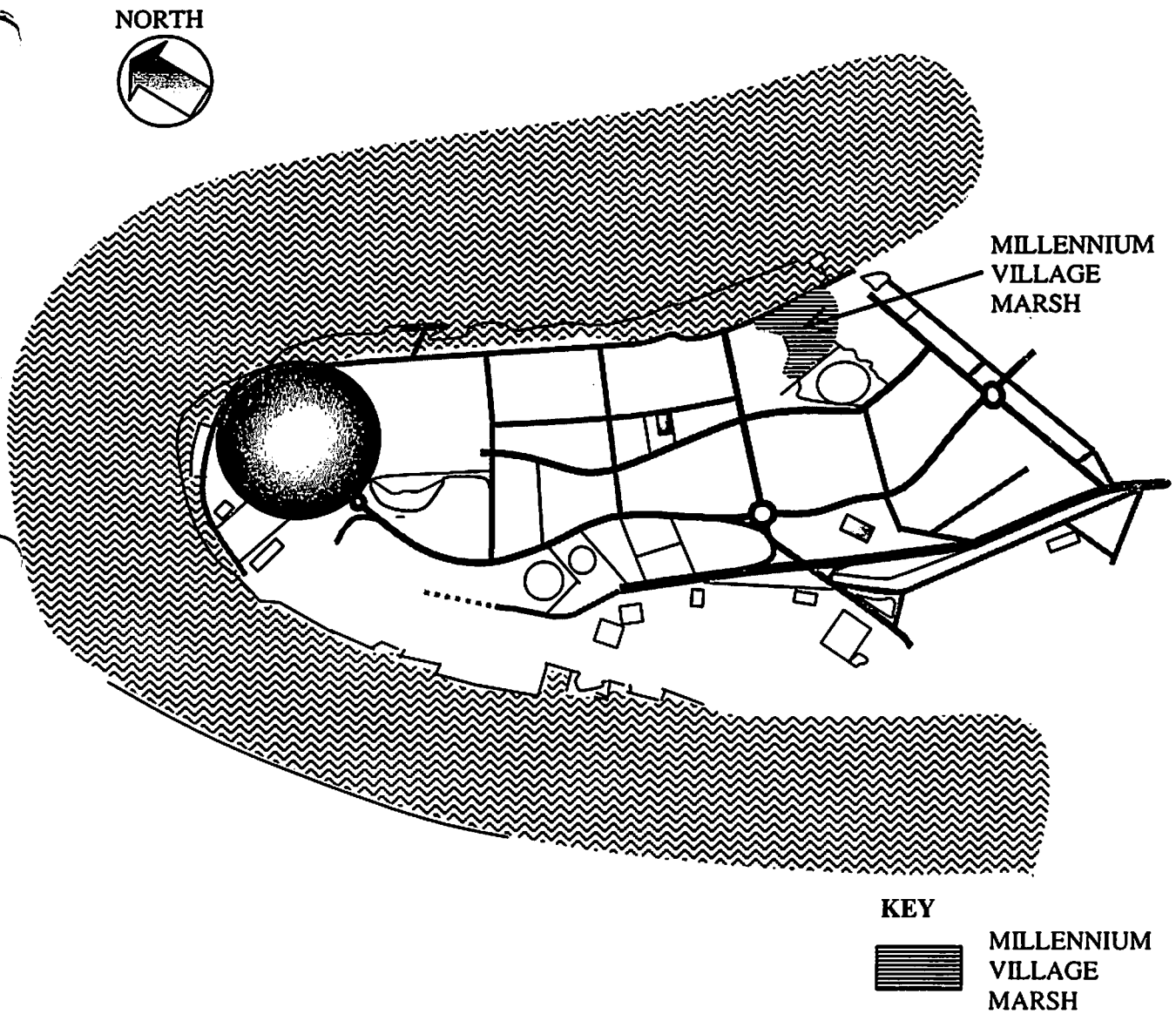
Management Compartments within the Millennium Village Marsh

- Lakes, aquatic planting and water treatment features
- Common Reed-dominated soil-planted beds
- Duck marsh
- Shingle beach and roosting island
- Tall herb sward
- Flower-rich picnic areas
- Gravel area

- Ponds
- Willow beds
- Thorn scrub areas
- Alder/willow woodland
- Artificial refuges for wildlife

Hard landscape (Interpretation Area, Dipping Platforms, Hides, Boardwalks and screens, Peripheral Fencing, Control Point, Lighting, CCTV, Litter bins, Safety equipment).

Figure 1.1 - Location of Millennium Village Marsh within the Greenwich Peninsula



1.2 ENVIRONMENTAL INFORMATION

Physical

Climate

Details can be found in 'Section A of the Greenwich Peninsula Management Plan'. Micro-climatically, the marsh is likely to change dramatically with both the maturation of the habitat and the gradual construction of the encompassing village.

Geology, Geomorphology and Hydrology

Details of remediation works can be found in 'Section A of the Greenwich Peninsula Management Plan'.

A clay cap underlies the site and there is a bentonite wall between the marsh and the river wall.

Hydrology is artificially controllable by an installed system of pipes, pumps, overflows and valves. The functioning of this system is explained in the Bibliography Section 3.0 (Nuttalls 2000).

Soils

All soils and substrates have been imported or manufactured on site. The specifications that apply to different areas are summarised in the Table 1.1. This information is included as a guide to the general soil characteristics that can be found on site, local conditions may vary.

Topography

Overall levels across the peninsula are relatively flat. The local levels within the Millennium Village Marsh are:

- lower level riverside walk at 5.2 m to 5.7 m AOD, separated from the Village Marsh by a retaining wall, the levels at the back of the wall being 6.5 m to 7.2 m AOD;
- series of boardwalks at 5.8 m AOD with short sections at 6.0 m AOD;
- the deepest part of the Greenwich Peninsula Ecology Park (controlled access area) lake is 2.85 m AOD;
- the bed level of Outer Marsh area water bodies varies between 4.35 m and 4.5 m AOD.

Table 1.1 - Topsoil/Subsoil Specifications

Substrate Zone	Initial Ecological Prescriptions and Rationale (Bibliography Section 3.0 WS Atkins 1998 Further Advice on Scheme Design, including Appendices incorporating amendments to WS Atkins 1998)	Prescribed Depths
TOPSOIL TYPE 2 Topsoil for soil-planted reedbeds in Village Marsh.	Natural soil or soil substitute. Moderately eutrophic nutrient status (25-35 mg/kg P and 10-15 mg/kg mineralisable N). Low hydraulic conductivity.	150 mm topsoil (over 350 mm subsoil).
TOPSOIL TYPE 3 Topsoil for Ecology Park island, marsh and wet woodland (Except ditches in woodland, which also had a gravel layer - see specification).	Natural soil or soil substitute organic loam 15-30 mg l^{-1} phosphorus ($NaHCO_3$ extractant) Hydraulic conductivity > or equal to 1 m per day (i.e. > or equal to 45 mm hr^{-1}).	Island and Marsh: 300 mm of topsoil (over 200 mm of subsoil). Wet woodland: 400 mm of topsoil (over 800 mm of subsoil).
SHINGLE BEACH AND SPIT, INNER LAKE EDGES AND POND BEDS	Type 1 - 10-20 m diameter river washed gravel. Type 2 - mixed cobble and gravel (river washed). Diameter = 30% of mix. Deposited and lightly raked to an uneven finished surface but not compacted.	75-100 mm of river washed gravels (over 200-225 mm of subsoil).
SUBSOIL	Low nutrient sandy/ loamy < 15 mg l^{-1} available phosphorus Hydraulic conductivity > or equal to 45 mm hr^{-1}.	As for Topsoil Type 3
MAIN LAKE BED AND PONDS GRANULAR FILL	Granular fill of low nutrient status except where visible. permeability to be as the river washed gravels (see shingle beach and spit, inner lake and pond beds). To be deposited and lightly raked to an uneven finished surface, but not compacted.	> or equal to 200 mm over a 100 mm of medium sand.
BLINDING LAYER	Sand above clay cap but below geotextile membrane.	50 mm
LAKE LINERS	LDPE underlain by geotextile felt.	0.75 mm

Human/Cultural

Archaeology/Past Land Use

Details can be found in 'Section A of the Greenwich Peninsula Management Plan'.

Present and Predicted Land Use Categories

The Village Marsh is intended as a publicly accessible park for passive amenity and education. The central core is a controlled access area. Both the core and its surrounds are to be managed to achieve and maintain a high wetland and other wildlife value, as partial mitigation and compensation for habitat loss caused by clearance of the Greenwich Peninsula for redevelopment.

Landscape Context

Details can be found in 'Section A of the Greenwich Peninsula Management Plan' for the site wide and surrounding context. The Millennium Village Marsh will be at the centre of the Millennium Village.

Details of Recreational Uses

Details can be found in 'Section A of the Greenwich Peninsula Management Plan' for site wide uses. The Village Marsh will be used for passive recreation such as bird watching and educational uses of an ecological nature.

Public/Organisational Interest and Involvement – Present and Predicted

Details can be found in 'Section A of the Greenwich Peninsula Management Plan'. It has been a key intention since the concept design of the park that public involvement be maximised and encouraged fully.

Educational/Research/Interpretational Uses and Facilities

Details can be found in 'Section A of the Greenwich Peninsula Management Plan'. Further details are as follows *(to be added as required).*

Biological and Ecological

Historic

General comments on the ecological resource of the whole peninsula (past or present) and general ecological history of the area may be found in 'Section A of the Greenwich Peninsula Management Plan'.

A detailed ecological site-specific survey of the Village Marsh Area was not undertaken prior to construction. Information on the habitats present in 1989 in the general area is presented in Bibliography Section 2.0 (WS Atkins 1990). The descriptions of species of plant identified in this survey referred to the peninsula as a whole rather than any specific location

on the peninsula. Essentially the area where the Village Marsh is now located was a mixture of hard standing, walls, smaller areas of dense scrub cover, rich ruderal swards and long grassland. No data were gathered or collated on any faunal group relevant to the Village Marsh site *per se.*

Existing

A document/file listing of all plant species planted in the park and their general locations is provided in Bibliography Section 3.0 (WS Atkins 1998) and on map coverage for the site (Appendix 1). The planted species include the following species which are uncommon in a London context. The decision to include plants of this kind within the scheme was taken advisedly for the following reasons:

- the scheme is well-documented and a library exists with all planting plans available for public inspection;
- an attempt was made to create certain habitats reminiscent of the semi-neutral habitats according to latest tests on habitat creation. For example the carr woodland area was based partly on a National Vegetation Classification (NVC Woodland 5 'Alder Woodland with Tussock Sedge') model – for which the planting of Greater Tussock Sedge was an important component (see Bibliography, Section 6.0; Rodwell 1995).

Table 1.2 - Plants considered uncommon in London that have been planted in the Millennium Village Marsh

Scientific Name	Common Name	Rare in London – less than 5% tetrads Source: London Biodiversity Audit 2000	% 2 x 2 km tetrads in London Source: Burton 1983
Acorus calamus	Sweet-flag		8
Butomus umbellatus	Flowering-rush		3
Caltha palustris	Marsh Marigold	•	5.75
Carex paniculata	Greater Tussock Sedge	•	1.75
Carex pseudocyperus	Cyperus Sedge		3.5
Ceratophyllum demersum	Rigid Hornwort		7.5
Equisetum fluviatile	Water Horsetail		3.5
Equisetum palustre	Marsh Horsetail		10
Eupatorium cannabinum	Hemp-agrimony		9.5
Galium palustre	Common Marsh-bedstraw		10
Geum rivale	Water Avens	•	0.5
Hipparis vulgaris	Mare's-tail		1.75
Lychnis flos-cuculi	Ragged Robin		9.5

Scientific Name	Common Name	Rare in London – less than 5% tetrads Source: London Biodiversity Audit 2000	% 2 x 2 km tetrads in London Source: Burton 1983
Lysimachia vulgaris	Yellow Loosestrife		4.25
Myosoton aquaticum	Water Chickweed		8.25
Myriophyllum spicatum	Spiked Water-milfoil	•	4.5
Nuphar lutea	Yellow Water-lily		9
Nymphaea alba	White Water-lily		4.5
Populus nigra ssp. betulifolia	Black Poplar	•	8*
Sagittaria sagitifolia	Arrowhead		3.75
Salix purpurea	Purple Willow		2
Typha latifolia	Lesser Reedmace		6
Veronica catenata	Pink Water-speedwell		2.25

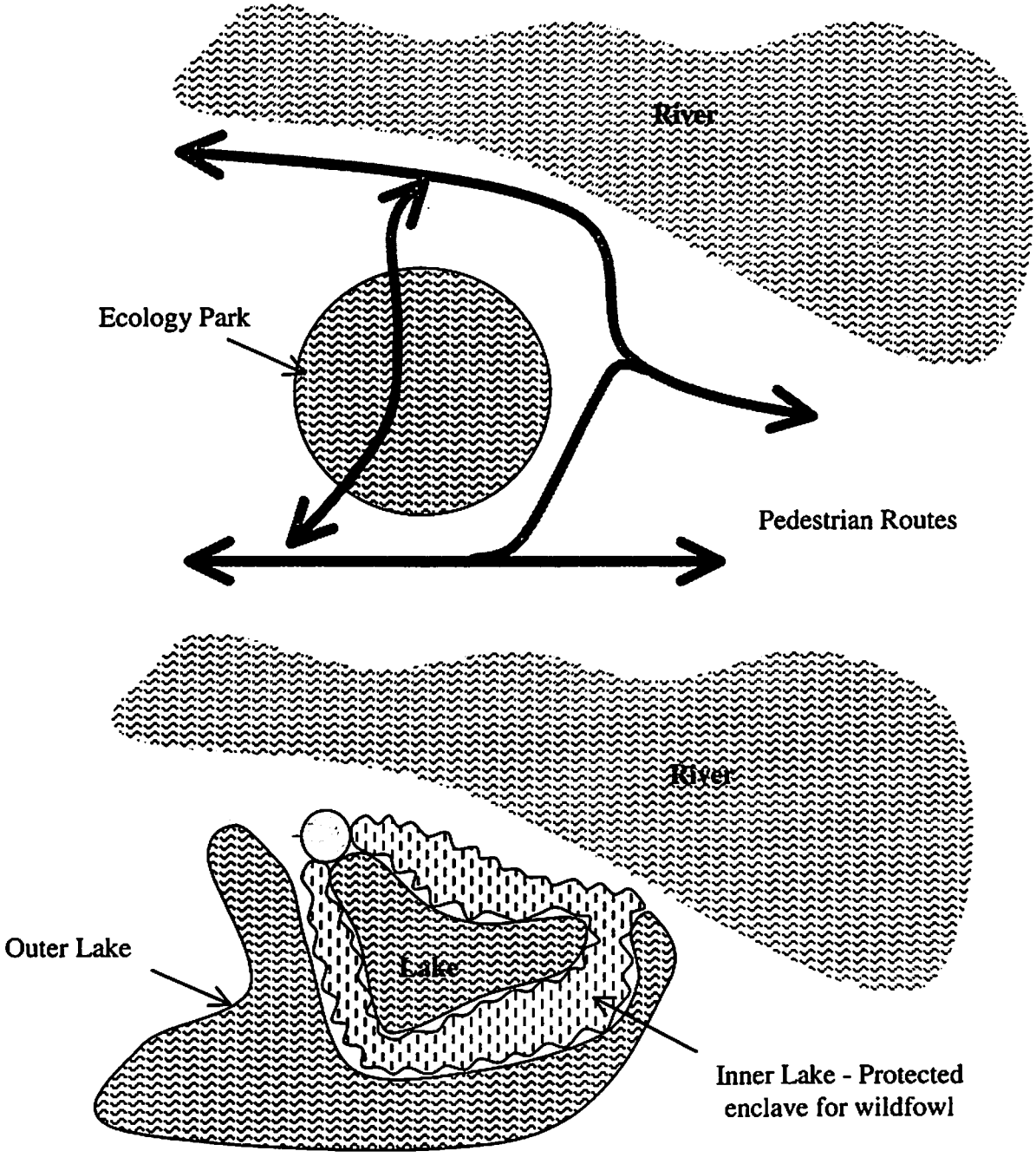
* Please note that Black Poplar is a Priority species of Conservation Concern under the UK BAP.

Only incidental observations of fauna have been gathered to date. The most significant record is that of a Little Ringed Plover nest within the park. This species is listed on Schedule I of the Wildlife Countryside Act 1981 (as amended). Many Pied Wagtails and some Grey Wagtails have been noted utilising the lakes/edges. Moorhens and Canada Geese showed nesting activity in Spring 2000. The dead wood habitat introduced Stag Beetle *Lucanus cervus* larvae. Stag Beetles are listed in the UK Biodiversity Action Plan Species as a species of conservation priority and concern. This species has suffered past decline is 'characteristic' of London and culturally valued.

1.3 LANDSCAPE DESIGN STRATEGY

Details of the Peninsula-wide strategy can be found in 'Section A of the Greenwich Peninsula Management Plan'. The design strategy for the Millennium Village Marsh is detailed in Nicholas Pearson Associates *et al* 1998 (June).

Figure 1.2 - Outline Summary of Design Strategy for Millennium Village Marsh



PART 2 – EVALUATION & OBJECTIVES

2.1 SITE EVALUATION

Summary of Key Landscape Features and Elements

Key features of the Village Marsh Landscape in terms of aesthetic design intent, microclimatic control etc include the following:

- Key interface between built form and water including use of reflections;
- Recreation of a link with former vegetative history of the peninsula via the experience of walking through woodlands over water and across marshland;
- In the central core of the marsh a 'feel' of seclusion and escape form the urban fabric whilst in the heart of the urban setting;
- Sequential vistas and visual experiences through the marsh related to the pedestrian, creating increased variety and a sense of place;
- Designed 'tension' between the formal parkland to the west and the Village Marsh emphasised via a rectilinear path; and
- Year-round aesthetic of the whole wetland at a harmonious whole as viewed from overlooking built form.

Nature Conservation and Biodiversity Evaluation of Site

Refer to 'Section A of the Greenwich Peninsula Management Plan' for Peninsula-wide evaluation.

The Village Marsh needs to be evaluated holistically, although particular elements may have particular value, especially in the future. Reference has been made to the Ratcliffe Criteria in this assessment (see Peninsula-wide plan).

Table 2.1 - Summary of Features and Evaluation – Historic: c. 1980s

Element	Description	Evaluation
Whole Village Marsh Area, formerly in industrial use then colonised naturally to develop a complex of habitats.	According to Bibliography Section 2.0 WS Atkins (1990), predominantly hard standing, but with areas of rich natural habitat, scrub and rank grassland.	Unknown.
Flora	Unknown but possibly areas of importance, including uncommon plants in a London context.	Unknown.
Invertebrates	Unknown but probably high diversity of uncommon species (see Bibliography Section 6.0; Gibson 1998).	Unknown.
Birds	Unknown (see Bibliography Section 2.0; McKenzie 1997) but suitable habitat for notable species.	
Other fauna	Unknown.	Unknown.

Table 2.2 - Summary of Features and Evaluation – 2000

Element	Description	Evaluation
Habitat complex	A recently constructed / planted wetland mosaic with exceptional interpretational facilities and components.	Borough Grade II
Flora	A few of the species planted in the park are London – notable.*	High Local Value
Fauna	Use by Little Ringed Plover, Pied and Grey Wagtails. Imported Stag Beetles (see previous) in dead wood refuges.	Borough Value

Table 2.3 - Summary of Features and Evaluation – Predicted 2020

Element	Description	Evaluation
Habitat complex	Mature small but well-managed wetland of complementary habitats and terrestrial / aquatic communities. High appropriate biodiversity. Good water quality. High educational value and accessibility. Good historical record.	Metropolitan Value
Flora	Colonisation predicted by many London notables – especially on shingle/gravel areas, and low nutrient marshy grasslands.	Metropolitan Value
Fauna	Should develop very considerable interest for invertebrates, amphibians birds and bats. May even merit designation as a statutory Local Nature Reserve.	Metropolitan Value

Site Value in the Wider Perspective and Implications for Management

Refer to 'Section A of the Greenwich Peninsula Management Plan'. The Millennium Village Marsh is, by virtue of its design features and innovative qualities, a particularly important part of the landscape design 'message' transmitted beyond the peninsula. The creation of an Ecology Park to such high design standards, at the heart of a prestige new built development, sends particularly strong messages from English Partnerships about the value placed by government on ecological sustainability, and wetlands globally.

Key Environmental Relationships with Implications for Management

The environmental relationships between elements of the existing landscape that must be understood in order for appropriate management to be carried out are discussed here. It should be noted that key successional and natural processes are essential components of the design and should not be disrupted unduly for reasons of e.g. 'tidiness' or 'safety' without careful reference to the objectives of the plan.

During management of the village marsh, a number of interactions need to be borne in mind. These include interactions between soil and water. Settlement of soils may affect the extent of different emergent and marginal communities. Continued leaching of nutrients from topsoils used in the substrate for reedbeds will continue to create the potential for eutrophication of the water colour, as will deposition of nutrients from air, rain and wildlife.

2.2 MANAGEMENT POLICY

Refer to 'Section A of the Greenwich Peninsula Management Plan' for Peninsula wide policy.

AIM: To develop and maintain a landmark new Ecology Park with associated wetland buffer zone in the heart of London as a strategic example of government thinking on policy on the ecologically sustainable development on brownfield sites. The whole wetland area is intended to provide important mitigation for loss of former habitat as well as aesthetic educational and specific ecological functions.

Table 2.4 - Ideal Management Objectives

NUMBER OF IDEAL OBJECTIVE	DESCRIPTION OF OBJECTIVE
IDEAL OBJECTIVE 1:	TO DEVELOP AND MAINTAIN ALL HABITATS TO THEIR PRESCRIBED EXTENTS AND LOCATIONS AS SET OUT IN THE DETAILED DESIGN DRAWINGS, SO AS TO ACHIEVE ALL INTENDED AMENITY, MITIGATION AND WILDLIFE FUNCTIONS.
IDEAL OBJECTIVE 2:	TO MAINTAIN WATER QUALITY IN THE LAKES TO WITHIN PRESCRIBED LIMITS TO MEET AESTHETIC AND ECOLOGICAL REQUIREMENTS.
IDEAL OBJECTIVE 3:	TO MAINTAIN TARGET WATER LEVELS IN THE TWO LAKES WITHIN THE PRESCRIBED LIMITS TO BENEFIT HUMAN AMENITY AND TO PROMOTE WILDLIFE VALUE.
IDEAL OBJECTIVE 4:	TO MINIMISE HUMAN DISTURBANCE TO WILDLIFE AND HABITATS AS FAR AS POSSIBLE, WHILST PROMOTING CONTROLLED PUBLIC ACCESS TO THE ECOLOGY PARK AND FREE PUBLIC ACCESS TO THE REST OF THE VILLAGE MARSH.
IDEAL OBJECTIVE 5:	TO PROMOTE AND PROTECT THE LONG-TERM AMENITY INCLUDING AESTHETIC, RECREATIONAL, EDUCATIONAL AND RESEARCH BENEFIT FOR THE VISITING PUBLIC, AND NEIGHBOURING RESIDENTS.
IDEAL OBJECTIVE 6:	TO PROMOTE PUBLIC SAFETY AT ALL TIMES.
IDEAL OBJECTIVE 7:	TO UNDERTAKE MONITORING, SURVEY AND RESEARCH AND THE KEEPING OF DETAILED ENVIRONMENTAL AND BIOLOGICAL RECORDS IN ORDER TO FACILITATE THE ACHIEVEMENT OF OTHER MANAGEMENT OBJECTIVES.
IDEAL OBJECTIVE 8:	TO PUT IN PLACE AND MAINTAIN AN EFFECTIVE AND PROGRESSIVE SYSTEM OF MANAGEMENT THAT INVOLVES LOCAL PEOPLE AND INTERESTED ORGANISATIONS IN APPROPRIATE WAYS AND PROMOTES INTEGRATION WITH OTHER OPEN SPACE ON THE PENINSULA.

Table 2.5 - Operational Objectives (in relation to Ideal Objectives) and Prescriptions

Objective Number	Operational Objective	Outline Prescriptions
IDEAL OBJECTIVE 1:	TO DEVELOP AND MAINTAIN ALL HABITATS TO THEIR PRESCRIBED EXTENTS AND LOCATIONS AS SET OUT IN THE DETAILED DESIGN DRAWINGS, SO AS TO ACHIEVE ALL INTENDED AMENITY, MITIGATION AND WILDLIFE FUNCTIONS.	
Operational Objective 1.1	Establish and maintain healthy soil-planted emergent reed-dominated beds over the 0.3±0.02 hectares of soil-planted emergent beds.	1.1.1 Cut flowering seed heads before seed set, if required, at least in early years to prevent excessive colonisation by reeds via seed dispersion, and dispose of panicles off site. 1.1.2 In winter each year, hand-cut to below waterline, those reeds which have spread beyond their prescribed extent. 1.1.3 After the first 5 years, cut in winter one third of the reed stand once every ten years, to a height above maximum water line.
Operational Objective 1.2	Establish and maintain the land to the lakeside of the shingle beach within the Ecology Park as a Duck Marsh of c. 1 hectare.	1.2.1 Within the Duck Marsh maintain no more than 50% permanent vegetative cover of marshland plants. Hand-pull unwanted plants as required in the late summer before seed set. 1.2.2 Manipulate water levels so that the Duck Marsh inundation regime is as described in Appendix 3, and colonisation by annual plants which decay on submergence in autumn is encouraged.
Operational Objective 1.3	Establish and maintain shingle beach and ridge as good habitat for wading birds, ducks and invertebrates.	1.3.1 Hand-pull expanding grass-tussocks or colonising invasive common plants from shingle beach as required to prevent excessive spread. 1.3.2 Maintain roosting spit as open bare shingle habitat by hand pulling of all colonising vegetation. 1.3.3 Maintain channel between spit and remainder of the beach, by hand excavation as necessary.
Operational Objective 1.4	Establish and maintain tall herb sward over an extent of approximately 0.1 hectares on the island.	1.4.1 Following defects liability period, cut to ground level in the autumn and remove all cuttings to concealed compost heaps within the Ecology Park. 1.4.2 In subsequent years cut and remove arisings as necessary to maintain vigorous but diverse sward. 1.4.3 Protect tall herb-sward as necessary with temporary fencing to deter damage by geese.

Objective Number	Operational Objective	Outline Prescriptions
Operational Objective 1.5	Establish and maintain flower rich relatively dry picnic and assembly area adjacent to interpretative sign.	1.5.1 Cut in such a way as to facilitate public presence whilst maintaining floristic diversity. 1.5.2 Re-seed as required.
Operational Objective 1.6	Establish and maintain raked gravel areas for natural colonisation by annual plants.	1.6.1 Each year in late autumn, lightly rake over the gravel area on the Ecology Park island to promote the survival and subsequent germination of naturally colonised seed of annual plants.
Operational Objective 1.7	Establish and maintain ponds as good habitats for aquatic plants, invertebrates, amphibians, reptiles and passerine birds.	1.7.1 In spring annually, and at other times during the growth season as required, skim any excess duckweed from the surface of the ponds and remove blanket weeds manually, cutting the weed in sections to facilitate the escape of animal life. Put arisings adjacent to pond for a few days and then remove to a compost heap away from pond edge (mixing well into heap to encourage breakdown). Aim for approximately 40% to 50% macrophyte cover. 1.7.2 Annually in autumn remove leaves from surface of ponds. 1.7.3 Once fully established de-silt as required in the autumn following best conservation practice, allowing animals that may have colonised the ponds to return to the ponds from dredgings placed at the pond edges. Operation will require the stopping-up of the inlet from the lake and the draining down of the pond using a portable electric pump. Plants and animals removed from the ponds by hand should be stored carefully in water before returning to the refilled ponds. De-silting to be carried out piecemeal once every 3 to 4 years with full clean out as required (e.g. once every 10 years). 1.7.4 If colonisation by fish appears to be causing problems, drain down ponds in autumn as prescribed in 1.7.3 and remove fish. 1.7.5 Annually in summer maintain pond fringes by hand scything to give a variety of sward heights from closely mown to long. 1.7.6 If problems develop via waterfowl damage or predation of pond life by e.g. Grey Herons, take appropriate steps to protect the pond, e.g. use of peripheral netting (which should be checked daily to ensure that animals do not get entangled). 1.7.7 In the case of predicted prolonged winter freezing, place a small electric water heater into the pond(s) as soon as ice begins to form. Use extension lead from hide power point.

Objective Number	Operational Objective	Outline Prescriptions
		1.7.8 In pond designed as a series of very shallow inter-linked pools, very carefully modify by hand over time to achieve a suitably diverse array of shallow pool habitats for dragonflies and other invertebrates as well as small birds. 1.7.9 Do not permit the artificial stocking of the pond except as a recorded experiment. Only native species to be introduced and none listed on Schedule V of the Wildlife and Countryside Act 1981 (as amended). 1.7.10 Should invasive alien species colonise the Millennium Village Marsh, undertake immediate remedial action to permanently eradicate such species, or minimise their adverse effects on desired flora and fauna. Species of particular concern include: • Japanese Knotweed – *Fallopia japonica* • Alien Floating Marsh Pennywort – *Hydrocotyle ranunculoides* • New Zealand Swamp Stonecrop – *Crassula helmsii* • Water Fern – *Azolla filiculoides* • Parrots Feather – *Myriophyllum aquaticum* • Nutalls Pondweed – *Elodea nutallii* • Curly Pondweed – *Largdriosiphon major*
Operational Objective 1.8	Establish willow beds and clumps to achieve good wildlife habitat and required shelter and screening functions. Good screening to be achieved between Ecology Park and the remainder of the Village Marsh and between the Ecology Park lake and any people on the island. Height to be maintained to avoid excessive topographical confinement which may deter waterfowl.	1.8.1 Carry out all operations as per defects liability period. 1.8.2 Maintain height of willow belts and clumps at around 3 metres by hand held machine cut in winter. 1.8.3 Where necessary to promote denser screening at lower levels, coppice parts of the willow on an appropriate rotational cycle (possibly 6-yearly). 1.8 4 Remove arisings off-site or use in educational events.
Operational Objective 1.9	Establish and maintain belts of spiny shrubs as deterrent to entry to the Ecology Park other than via the Control Point.	1.9.1 Manage annually by hand-pruning as required in winter to maintain overall height of around 1.5-2 metres, with dense bushiness at all heights.
Operational objective 1.10	Establish and maintain alder/willow woodland outside of Ecology Park, including the associated ground flora and irrigation channels.	1.10.1 Manage as required during defects liability period. 1.10.2 Maintain by necessary thinning, coppicing and hand excavation in the long term.

Objective Number	Operational Objective	Outline Prescriptions
Operational Objective 1.11	Provide and maintain artificial refuges for wildlife.	1.11.1 Maintain bird boxes via annual check after the breeding season and cleaning out of each box. 1.11.2 Maintain Kingfisher habitat via clearance of vegetation. Ensure that emergent vegetation from immediately in front of the artificial kingfisher burrow is cleared each year in advance of the breeding season; hand excavate substrate as required to ensure standing water occurs below the burrow. 1.11.3 Modify perching poles as required to promote use by desirable species. 1.11.4 Modify tern rafts by compartmentalisation and addition of gravels to attract nesting terns. 1.11.5 Modify positions of rafts subject to findings of monitoring. 1.11.6 Maintain bat tower as suitable bat hibernaculum by annual emptying and cleaning when bats not in residence. 1.11.7 Maintain amphibian hibernacula by promoting good vegetative cover between hibernacula and ponds. 1.11.8 Maintain deadwood refuges by careful replacement as required on disintegration of existing refuges. Care is to be taken to avoid undesirable introductions.
Operational Objective 1.12	Protect vegetation against excessive damage from waterfowl, especially Canada Geese.	1.12.1 Work together with other organisations including the London Waterfowl Network to seek holistic solutions to problems with geese. 1.12.2 Within the Village Marsh, use exclusion fencing and nest destruction (under licence) as required to deter geese.
IDEAL OBJECTIVE 2:	TO MAINTAIN WATER QUALITY IN THE LAKES TO WITHIN PRESCRIBED LIMITS TO MEET AESTHETIC AND ECOLOGICAL REQUIREMENTS	
Operational Objective 2.1	Monitor each week the water quality against target levels given in Appendix 2 (separate volume).	
Operational Objective 2.2	Circulate water in the lake at a rate which appears to maintain water quality within the prescribed limits.	
Operational Objective 2.3	Operate diffusers as required in order to maintain water quality within the prescribed limits.	

Objective Number	Operational Objective	Outline Prescriptions
Operational Objective 2.4	Monitor health of aquatic and emergent plants and replace if necessary to assist in water quality maintenance.	
Operational Objective 2.5	Maintain treatment reed-beds in good working order whilst maximising their wildlife value.	
Operational Objective 2.6	Maintain water inlet channel and grass swales in good operational condition.	
Operational Objective 2.7	Regularly monitor the quality of top-up borehole water.	
Operational Objective 2.9	In case of failure of the borehole source, in conjunction with drought, consider and employ other water sources eg mains, Thames undertaking all necessary pre-treatment and dosing.	
IDEAL OBJECTIVE 3:	TO MAINTAIN TARGET WATER LEVELS IN THE TWO LAKES WITHIN THE PRESCRIBED LIMITS TO BENEFIT HUMAN AMENITY AND TO PROMOTE WILDLIFE VALUE.	
Operational Objective 3.1	Maintenance of outer lake level at 5.2 m.	
Operational Objective 3.2	Maintenance of inner lake level normally between maximum and full exposure of Duck Marsh mud. In a normal year allow lake to draw down gradually between around April and June to a point at which Duck Marsh is fully exposed. Then keep at this level until September; at which point increase level to 75% of maximum by October and maximum by November.	
Operational Objective 3.3	Maintain all water circulation equipment in good working order.	
IDEAL OBJECTIVE 4:	TO MINIMISE HUMAN DISTURBANCE TO WILDLIFE AND HABITATS AS FAR AS POSSIBLE, WHILST PROMOTING CONTROLLED PUBLIC ACCESS TO THE ECOLOGY PARK AND FREE PUBLIC ACCESS TO THE REST OF THE VILLAGE MARSH.	
Operational Objective 4.1	Monitor and regulate visitor use of Ecology Park.	

Objective Number	Operational Objective	Outline Prescriptions
Operational Objective 4.2	Conserve and maintain barriers to unauthorised access of Ecology Park.	4.2.1 Fences, shrubs, control point, channel depth etc. extra fencing as required.
Operational Objective 4.3	Conserve screens between people and wildlife.	
IDEAL OBJECTIVE 5:	TO PROMOTE AND PROTECT THE LONG-TERM AMENITY INCLUDING AESTHETIC, RECREATIONAL, EDUCATIONAL AND RESEARCH BENEFIT FOR THE VISITING PUBLIC, AND NEIGHBOURING RESIDENTS.	
Operational Objective 5.1	As Ideal Objective 1	
Operational Objective 5.2	As Ideal Objective 2	
Operational Objective 5.3	Regular patrol to collect and remove any litter.	5.3.1 Patrol inside Ecology Park. 5.3.2 Patrol remainder of Village Marsh.
Operational Objective 5.4	Rapidly repair any features subject to vandalism/graffiti, and take measures to reduce risk of further vandalism.	
Operational Objective 5.5	Maintain boardwalks, hides, control point and lighting.	
Operational Objective 5.6	Maintain educational boards.	
Operational Objective 5.7	Monitor visitor use and attitudes.	
Operational Objective 5.8	Maintain and strengthen links with interested parties.	
Operational Objective 5.9	Organise educational and promotional events.	
Operational Objective 5.10	Develop and disseminate promotional material for the Village Marsh.	5.10.1 Develop and produce promotional leaflets for the Village Marsh, especially the Ecology Park. 5.10.2 Develop and produce information sheets on habitats, flora, fauna, hydrology, the past history of the peninsula, the River Thames etc. for use by visiting parties. 5.10.3 Disseminate literature to local schools, Universities and other institutions that may be interested in visiting or utilising the Village Marsh.

Objective Number	Operational Objective	Outline Prescriptions
IDEAL OBJECTIVE 6:	TO PROMOTE PUBLIC SAFETY AT ALL TIMES.	
Operational Objective 6.1	Provide and maintain safety equipment in relation to water.	
Operational Objective 6.2	Maintain lighting in functional order.	
Operational Objective 6.3	Ensure warden trained in first aid and full first aid kit available at the control point.	
Operational Objective 6.4	Ensure compliance with all relevant health and safety legislation.	
IDEAL OBJECTIVE 7:	TO UNDERTAKE MONITORING, SURVEY AND RESEARCH AND THE KEEPING OF DETAILED ENVIRONMENTAL AND BIOLOGICAL RECORDS IN ORDER TO FACILITATE THE ACHIEVEMENT OF OTHER MANAGEMENT OBJECTIVES.	
Operational Objective 7.1	Monitor extent and health of all habitats as required for the fulfilment of regular management tasks.	7.1.1 Log all monitoring data onto suitable computer database (eg RECORDER). 7.1.2 Monthly review of implications of survey results for management prescriptions.
Operational Objective 7.2	Monitor and record colonisation and use of Village Marsh by plants.	7.2.1 Annual survey to identify and map all plant species (between May and July).
Operational Objective 7.3	Monitor and record colonisation and use of the Village Marsh by invertebrates.	7.3.1 Survey of invertebrates in water bodies by standardisation kick-sampling every: 2 years with identification of family level: 5 years with identification of species level. 7.3.2 Annual recording of all butterflies and dragonflies seen each summer. 7.3.2 Arrangements for survey of other terrestrial macroinvertebrates as permitted by time and finds by interested skilled third parties.
Operational Objective 7.4	Monitor and record colonisation and use of the Village Marsh by fish.	7.4.1 Visual inspection on regular basis for fish. 7.4.2 Netting or electrofishing every 5 years in association with EA.
Operational Objective 7.5	Monitor and record colonisation and use of the Village Marsh by amphibians.	7.5.1 Annual inspection of ponds by torchlight survey over 3 nights in spring, search for eggs and, if appropriate netting or bottle trapping.
Operational Objective 7.6	Monitor and record colonisation and use of the Village Marsh by reptiles.	7.6.1 Annual visual inspection for basking reptiles. Occasional checks in all refuges in spring and autumn.

PART 3 – ACTION PLAN

Introduction

In this section all project groups are brought together as logical task lists organised by season and year. From this table it is possible to begin to estimate the manpower requirements and costs of management.

To be completed in consultation with approved Estates/Facilities Management Company.

Factors Influencing the Achievement of Ideal Management Objectives

Refer to 'Section A of the Greenwich Peninsula Management Plan' for this evaluation.

PART 4 – PROJECT RECORDS AND REVIEW

Introduction

In this section, monthly maintenance reports and reviews are to be filed.

APPENDIX 1

As-Built Drawing List Covering the Areas

1. AS-BUILT DRAWING LIST COVERING THE AREAS

Table 1.1 - Map Coverage

Name of Plan	Plan Reference Number	Management Library Reference
BASIC LANDFORM		
Finished Levels (NB subsequently altered in places during construction)	AC1790/C/1825 REV 0	
Cross-Sections of Park 1-4	AC1790/C/1470-3 REV A	
Soil Placement. Sheet 1 of 2	AC1790/PLD/1841 REV 0	
FEATURES AND PLANTING		
Ecology Park General Arrangement. Sheet 1 of 3	AC1790/PLD/1823 REV 0	
Ground Cover. Setting Out. Sheet 1 of 3. (Basic Planting Plan)	AC1790/PLD/1837 REV B	
Planting Schedule	AC1790/PLD/2648 and 2649	
Tree Setting Out	AC1790/PLD/1832 REV 0	
WATER CIRCULATION AND OTHER QUALITY MAINTENANCE SYSTEMS		
South Park Lakes Piping and Instrument Diagram	AC1790/C/1461 REV C	
South Park Lakes Flow Diagram (Piping, Hydrological and Hydrogeological)	AC1790/C/1460 REV E	
Channel G.A. and Details (channel and small reedbeds along river wall)	AC1790/C/2659 REV B	
Reed Beds and Channel. General Arrangement	AC1790/C/2651 REV D	