

# Preparation and presentation of habitat replacement cost estimates

Using examples of the restoration and creation of coastal and  
floodplain grazing marsh, reedbeds and lagoons

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and floodplain grazing marsh, reedbeds and lagoons

Peter Shepherd  
Baker Shepherd Gillespie  
and  
David Harley  
Royal Society for the Protection of Birds

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## Executive summary

Despite the policy basis for habitat replacement where there is going to be an unavoidable loss, no standard approach to the preparation and presentation of habitat replacement costs has been developed. Consequently, English Nature in collaboration with MAFF commissioned this report with the objectives of:

(a) developing a general framework for the compilation and presentation of habitat replacement cost estimates, to encourage the recording of all costs associated with habitat replacement, to enhance clarity of understanding and transferability of estimates to different site locations, and

(b) to research available estimates for three habitat types (coastal and floodplain grazing marsh, reedbed and coastal lagoon) and present these in the preferred format (see boxes 1 and 2 at the end of this summary). The framework is provisional and further application will be needed for the costing procedure to be refined.

The report sets out, firstly, a process that is useful to follow in developing cost estimates. Secondly, it shows a way of presenting the estimates. Finally, it provides some estimates from a few real case studies.

The report is based on data gathered from case studies of the restoration and creation of the three habitat types and published descriptions of habitat creation and restoration. It proposes a framework for preparing and presenting habitat replacement costs that can be used for future costing of habitat replacement projects.

For the purposes of this report, habitat replacement is taken to include schemes involving either (a) restoration of existing degraded habitat; or (b) through the creation of entirely new habitat. Some replacement projects may employ both restoration and creation depending on the circumstances of a particular site.

The case studies presented in this report are schemes managed by the RSPB, English Nature and the Industry and Nature Conservation Association (INCA). The data provided by these case studies provides a guide to the potential cost of replacing coastal and floodplain grazing marsh, reedbeds and lagoons.

Land purchase costs are the single largest cost element in the case studies of coastal grazing marsh accounting for between 80 and 85% of the overall cost. However, these costings do not cover the more complex habitat restoration schemes. For reedbeds and lagoons, however, land purchase costs are a less significant cost element with a maximum of only 45% of the total cost in one case study (Lodmoor reedbed), and only 4% in the case of the ICI Brinefields lagoon. Consequently, significant savings or increased expenditure will occur depending on the price of the land on which a replacement scheme is planned and the habitat type being replaced.

A comparison of the cost per hectare excluding land purchase costs shows that reedbed and lagoons are significantly more expensive to replace per hectare than coastal grazing marsh. It also shows that the range of costs for grazing marsh is small (£350 between highest and lowest case study) compared to reedbed (£4900) and coastal lagoon (£53000), although the lagoon case studies are illustrating the extreme ends of potential costs.

A comparison of the cost per hectare (standard costs) of the coastal grazing marsh habitat excluding land purchase costs shows that Northward Hill (£890/ha) was the cheapest with Exe Estuary (£1144/ha) and Nene Washes (£1241/ha) incurring very similar costs.

A comparison of the cost per hectare (standard costs) of the reedbed habitat excluding land purchase costs shows that the costs range from £2800/ha on the Lodmoor reserve to £7682/ha on the Mersehead reserve. The Stodmarsh (£4541/ha) and Plas Bog reserve (£5045/ha) cost similar amounts.

A comparison of the cost per hectare (standard costs) of the coastal lagoon habitat, excluding land purchase costs, shows that the Salthouse lagoon was significantly cheaper (£4200/ha) compared to the ICI Brinefields lagoon (£57000/ha). The reasons for the difference relate to the much higher site construction, site supervision and project management costs at the ICI site.

All the case studies were attempting to achieve relatively simple replacement objectives. They do not include works aimed at developing species-rich floodplain grassland, or developing a rich invertebrate fauna in reedbed. Some future habitat replacement schemes may require the establishment of a species-rich grass sward or the transfer of plants, invertebrates and other fauna. Consequently, where there are more complex nature conservation objectives (i.e. birds, invertebrates and plants) or where broader environmental objectives are set, the cost of a scheme is likely to be higher than that presented in the case studies.

While it may be appropriate to transfer the overall costs from these case studies to other sites, it is preferable where feasible to look at the level of individual cost elements and consider what elements (and, possibly costs per element) need to change to fit a particular situation.



**Box 1 - Proposed costings format**

<b>Column 1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>
<b>Cost category/element</b>	<b>Year</b>	<b>Unit</b>	<b>No. of units</b>	<b>Cost/unit (£)</b>	<b>(Total cost (£)</b>	<b>Cost type</b>
<b>1. Setting objectives</b>						
Cost elements						
Sub-Total						
<b>2. Land acquisition</b>						
Cost elements						
Sub-Total						
<b>3. Planning, assessment and design</b>						
Cost elements						
SubTotal						
<b>4. Implementation</b>						
Cost elements						
Sub-total						
<b>5. Monitoring</b>						
Cost elements						
Sub-Total						
<b>6. Additional Costs</b>						
Cost elements						
<b>7. Income</b>						
Sub-Total						
Total Cost						
Cost/hectare						

**Box 2 - Recommended presentation format**

1. PROJECT TITLE:
2. RATIONALE FOR HABITAT REPLACEMENT (refer to section 4.1.1)
3. PROJECT DESCRIPTION (refer to section 4.1.2)
4. REPLACEMENT OBJECTIVES (refer to section 4.1.3)
5. HABITAT REPLACEMENT COSTS:
  - 5.1 Basis of Cost Data (refer to section 4.2.1)**
    - (a) Sources of cost data
    - (b) The base price year
    - (c) An indication of whether the costs include or exclude VAT
    - (d) The basis for rounding of figures.
    - (e) Use of actual and standard costs
    - (f) Time scales: Establishment, Aftercare and Monitoring
    - (g) Agricultural subsidies
  - 5.2 Cost Table(s) (refer to 4.2.2)**
  - Table Notes
  - Summary Tables
  - 5.3 Assessment of the reliability of cost data (refer to 4.3)**



# 1. Introduction

## 1.1 Valuing Environmental Assets

The valuation of environmental assets and, in particular features of nature conservation importance, has caused a great deal of debate among economists and environmentalists. English Nature and other organisations have been concerned that the true value of environmental assets has, to date, been ignored or given insufficient weight in investment appraisal. Concern has also been expressed that some of the proposed monetary valuation methodologies, in particular contingent valuation, have significant drawbacks. For instance, there is a degree of consensus amongst practitioners that contingent valuation is difficult to apply with certainty to non-use values relating to biodiversity.

A variety of alternatives to monetary valuation are currently being developed to take account of nature conservation in appraisals. The principal alternatives are multi-criteria analysis and descriptive evaluations of environmental costs and benefits. Whilst English Nature supports these approaches, it also recognises that they have problems and limitations. One method of monetary valuation is the 'shadow project' or habitat replacement cost (HRC) method. It attempts to value an environmental asset by calculating the cost of replacing that asset should it be lost. It must be noted, however, that HRC is not a true valuation method. It assesses value in terms of the financial cost of replacement rather than reflecting the value of the habitat itself (which may differ significantly from the replacement cost).

It is recognised by English Nature that habitat replacement costs will probably only represent a lower bound estimate of value in many cases. Consideration may also need to be given to other environmental assets, capital and functions that it may not be possible to replace, and therefore cost in terms of a habitat replacement scheme (CAG Consultants & Land Use Consultants, 1997). It will, therefore probably be necessary to use the data derived from HRC methods alongside other information relating to qualitative and quantitative estimates of value. Determining what is of value and why, will be an important part of the process of setting objectives and could be linked to wider considerations of environmental capital and services (section 3.1).

## 1.2 The role of Habitat Replacement

Environmental scientists have expressed concerns about both the principle and the technical feasibility of habitat replacement (Parker, 1995 and Gilbert and Anderson, 1998). The technical feasibility of replacing habitats has long been recognised as a problem. In the UK Biodiversity Action Plan (HM Government, 1994), the issue of habitat replaceability is described as follows:

*“While some simple habitats, particularly those populated by mobile species which are good colonisers, have some potential for re-creation, the majority of terrestrial habitats are the result of complex events spanning many centuries which defy re-creation over decades. Therefore the priority must be to sustain the best examples of native habitats where they have survived rather than attempting to move or re-create them elsewhere when their present location is inconvenient because of immediate development proposals”*

Research into the technical replaceability of habitats has identified historical continuity, time scale and spatial context as important considerations when assessing the technical difficulties of habitat replacement (Gillespie & Shepherd, 1995 and Shepherd & Gillespie, 1996).



For those habitats and schemes where there are significant technical difficulties there will be a correspondingly high risk of failure (i.e. not achieving the objectives of replacement). There is a gradient of technical feasibility (or risk of failure) from habitats widely seen as being completely irreplaceable (e.g. ancient woodland, intact lowland raised mires) to those where an acceptable replacement for certain site or habitat features can be achieved to a certain degree. Even for comparatively simple habitats, however, it should be recognised that any replacement scheme will have an element of risk associated with it and that the replacement habitat will not be able to replace all the features, species and niches that are going to be lost. For example, for most replacement schemes there will be a loss of naturalness and historical continuity and a change in the spatial context of the habitat (i.e. its physical location and its position with regard to other habitats).

Due to the uncertainty and risk associated with habitat replacement it should be seen as an option of last resort where there will *be an unavoidable loss*. In addition, to reduce uncertainty and risk of failure, environmental scientists advocate a precautionary approach to replacement schemes. In particular, it is advocated that, wherever practicable, the replacement site should be established and meeting its objectives before the existing site is lost (Buckley, 1995).

Consequently, where there is going to be an unavoidable loss habitat replacement is recognised as having a role. In policy terms the principle of taking compensatory measures, which could include habitat replacement, is embodied in Article 6 of the EC Directive on the Conservation of Natural Habitats and Wild Fauna and Flora, paragraph 4 of which, states:

*“If, in spite of a negative assessment of the implications for the site and in the absence of alternative solutions, a plan or project must nevertheless be carried out for imperative reasons of overriding public interest, including those of a social or economic nature, the Member State shall take all compensatory measures necessary to ensure the overall coherence of Natura 2000 is protected.”*

The potential role of HRC in investment appraisal is acknowledged in HM Treasury’s guidelines on appraisal and evaluation (HM Treasury, 1997). Pearce and Moran (1996) also state that there is a theoretical basis for using HRC methods *where it is accepted that there is a commitment that lost habitats must be replaced*. In other words, in such cases where there is a clear policy objective, the analysis becomes one of cost-effectiveness (minimise cost to achieve a given objective) as opposed to cost-benefit. In this context HRC is considered to have a role, provided the differences between what is to be lost and what it is being replaced by are clearly stated (see section 3.1 on objectives).

## 2. The study

An increasing number of attempts are being made throughout the UK to restore degraded habitats and to create or start the process of creating a wide range of new wildlife habitats to replace past losses. Few of these studies have been specifically designed to replace a particular site of known interest. Most have been undertaken to enhance the existing habitat resource and to contribute in general to specified objectives in strategies and plans such as national and local Habitat Action Plans. They provide valuable information on the technical feasibility of replacing habitats and the methods and approaches by which this can be achieved. *No standard approach, however, to the preparation and presentation of Habitat Replacement Costs has been developed, that demonstrates transparency of data sources, and evaluates robustness and transferability of data between different replacement schemes.* As a result the costs presented for different schemes vary in how the data are presented and in the completeness of the cost data included.

Existing and future policy requirements and higher standards of environmental compensation are likely to result in more habitat replacement schemes being undertaken, especially in the coastal environment. English Nature considers that HRC methods can have a role alongside other appraisal techniques in cost benefit analysis, where there is a clear commitment to replace any habitats lost, and where replacement of the key features of interest is technically feasible. Consequently, English Nature commissioned this report with the objectives of:

- a. developing a general framework for the compilation and presentation of habitat replacement cost (HRC) estimates, to encourage the recording of all costs associated with habitat replacement, to enhance clarity of understanding and transferability of estimates to different site locations, and
- b. to research available estimates for a single habitat (coastal and floodplain grazing marsh) and present these in the preferred format.

The study concentrates on coastal and floodplain grazing marsh of the coastal zone of England for the following reasons.

- a. Predicted changes in sea levels are likely to result in significant unavoidable changes in coastal habitats and in particular coastal grazing marsh as a result of managed coastal realignment for coastal flood defence purposes.
- b. Many coastal habitats are subject to European conservation designations; so there is an acknowledged policy need for compensatory action and as such a greater justification for the use of the HRC methods.
- c. There are a relatively small number of coastal zone habitat types that are likely to be consistently affected by flood and coastal defence projects. Therefore an HRC exercise based on a small number of habitat types can still be useful.
- d. MAFF are currently revising their Project Appraisal Guidance Notes for flood and coastal defence projects and the potential role of HRC for valuing environmental assets, within CBA, is likely to be included.

- e. Where there is likely to be an unavoidable loss of habitat due to coastal realignment, the Government's flood and coastal defence strategy may need to include options for replacing internationally designated habitats.

This report is based on data gathered from case studies of the restoration and creation of coastal and floodplain grazing marsh, reedbeds and coastal lagoons and published descriptions of habitat creation and restoration. Case study data were collected through questionnaires and telephone interviews. The RSPB and English Nature identified a series of examples of lowland wet grassland, reedbed and lagoon restoration and creation. Key personnel were contacted by telephone and if appropriate sent a questionnaire. The data derived from the questionnaires are presented in the selected case studies in section 5. The case studies were selected to represent typical approaches to wet grassland restoration and creation. In addition examples were chosen for which a high level of detailed cost data were available.

This report proposes a framework for preparing and presenting habitat replacement costs that can be used for future costing of habitat replacement projects. The framework is provisional and further application will be needed for the costing procedure to be refined.

The data provided by the limited number of case studies provides a guide to the potential cost of replacing coastal and floodplain grazing marsh, reedbed and lagoon habitats.

## **2.1 Definitions of Habitat Restoration and Creation**

For the purposes of this report, habitat replacement is taken to include schemes involving either (a) restoration of existing degraded habitat; or (b) through the creation of entirely new habitat. Some replacement projects may employ both restoration and creation depending on the circumstances of a particular site.

For the purposes of this study and with particular reference to the three habitat types, restoration and creation are defined below.

### **2.1.1 Restoration**

Restoration is the work to enhance the existing quality of a former site of one of the three habitat types that supports degraded examples of these habitats.

Restoration of coastal and floodplain grazing marsh can involve the re-wetting of an existing agricultural grassland that has been drained and the grass sward agriculturally improved, or the re-establishment of traditional management on an area of neglected grassland. Such sites may retain some ecological interest in the form of field drains or small wet areas that are still used by wading birds for feeding. The nature of the existing interest and its importance may need to be taken into account when setting the objectives for a habitat replacement scheme.

Restoration of reedbeds and coastal lagoons may involve the re-wetting of an existing area that has been partly drained, or the re-establishment of management on an area of neglected reedbed. Such sites may retain some ecological interest, the nature of which, and its importance may need to be taken into account when setting the objectives for a habitat replacement scheme.

### 2.1.2 Creation

Creation is the establishment of the three habitat types on land from which the habitats have been completely removed or have not previously existed.

Creation of coastal and floodplain grazing marsh is likely to involve the creation of wet grassland on arable farmland.

In both restoration and creation schemes it is assumed that the replacement site is of previously low ecological value. In reality, however, there is likely to be a point when the proposed restoration of an existing degraded habitat will not appear to provide a full and acceptable replacement for the loss of an area of pristine habitat. This will be to a great extent a matter of judgement and will be determined by the extent and quality of the existing degraded habitat at the replacement site and the proposed extent and quality of the replacement scheme.

In the case studies of restoration to coastal grazing marsh presented in this report there is a clear benefit of the replacement through restoration as the existing well drained grassland, although still a grassland habitat, is of low ecological value compared to the wet grassland that will replace it. On the other hand the examples of reedbed restoration do not appear as clear cut as these sites support existing, albeit degraded reedbed habitat that does have an existing ecological value. In these case studies restoration may appear to be less of a gain or compensation for loss and more like mitigation. In these cases the increase in the size of the target habitat on the replacement site and to a lesser extent the improvement of the quality of the existing habitat are the factors that would need to be considered to determine if the restoration could be seen as an adequate habitat replacement scheme. This is an important issue when considering habitat replacement proposals and one that may be more significant for some habitats than it is for others as illustrated by the cases studies for coastal grazing marsh and reedbed.



### **3. Preparing cost data for a habitat replacement scheme**

This section aims to provide a framework for the preparation of habitat replacement cost data. To illustrate the variety of considerations that may need to be made when preparing habitat replacement costs, coastal and floodplain grazing marsh has been used throughout as an example. The general framework can therefore be used for other habitats, although it may be necessary to consider other cost elements specific to other habitat types. Generally, however, the main cost categories can be used as a generic framework for costing any habitat replacement scheme.

Published guidance on the creation, restoration and management of wet grassland and reedbeds (Hawke and Jose, 1995 and RSPB, EN and ITE, 1997) and the responses to the questionnaires completed as part of this study suggest that habitat replacement projects can be divided into six broad cost categories. These are: setting objectives, land acquisition, planning, assessment and design Implementation, monitoring, and additional costs. The cost of managing a replacement habitat (maintenance costs) are not included in the Habitat Replacement Cost. There can be a grey area between maintenance costs and those associated with habitat replacement work. In particular, there can be confusion between what is aftercare for the habitat replacement and what is on-going maintenance (see section 3.4.2)

Each category will comprise separate cost elements. These cost elements will vary depending on the habitat type being replaced, the characteristics of the replacement site, the objectives of the replacement and how the replacement scheme is delivered. For example, some elements will be comprised principally of staff or volunteer costs and others will have a high proportion of contractor or specialist costs.

The costs associated with each category of a habitat replacement scheme are discussed below with particular reference to coastal and floodplain grazing marsh.

#### **3.1 Setting Objectives**

Setting objectives for any habitat restoration or creation scheme requires careful consideration as the objectives will influence any feasibility assessment and be used to determine the success of the replacement scheme. If the objectives are not achieved remedial work beyond that included in the original habitat replacement costing may need to be undertaken (section 3.6.3).

When planning a habitat replacement there will be a known conservation loss of key features (habitats and species) of interest. The objectives for the replacement scheme will, consequently, largely be determined by the interest that is to be lost and the technical feasibility of replacing this interest. It is recognised that a replacement will not be able to replicate an existing site or habitat, but it will be important to identify and attempt to replace the most important features. Setting objectives under these circumstances is different and potentially harder to achieve than determining the maximum interest that could be developed on a particular site or planning a scheme that will contribute in general terms to broader objectives of a local or national Habitat Action Plan.

There is no standard approach to setting objectives for habitat and restoration schemes. The objectives, however, should as far as possible, be measurable and set within a clear time framework. As far as possible the objectives should be specific about the features of interest that need to be replaced. For example, for over wintering birds on coastal grazing marsh the objectives

should try to specify the average number of individuals for key species over a given time period. For habitats the objectives should try to specify the area and characteristics of the habitat types that need to be replaced.

The objectives will influence the costing process, as they will determine the area of the replacement site, the works required to meet the objectives and the time frame within which the objectives should be met.

The costs of objective setting are likely to arise mainly through the use of staff time, although in some cases advice may be sought from external organisations and individuals. Consultation may generate costs, but these are likely to be small compared to staff time and the overall cost of a replacement project.

Although one of the primary policy objectives that is likely to drive habitat replacement projects is compensation for losses or damage to internationally designated nature conservation sites, replacement objectives may also need to consider broader environmental benefits. In particular, a habitat replacement scheme may need to include within its objectives the replacement of particular functions such as flood defence, recreation and nutrient recycling.

This broader assessment of the environmental benefits of a site may affect the feasibility of a proposed replacement scheme and the cost. It considers wider functions of habitats and land-use that may affect the decision where to locate replacement and the works needed to replace the lost functions, if they are still required in the changing environment of sea level rise. None of the case studies presented in section 5 considered wider environmental benefits or functions within their objective setting.

To be able to determine the relative importance of the broader functions of the three habitat types these various functions need to be identified (Constanza, 1998). The list presented below is an example of the range of environmental functions that may be associated with a habitat, but in particular, wet grassland. It includes all goods and services provided directly and indirectly to man; the contribution to the maintenance of 'life support systems'; and 'non-use' values (e.g. the value people put on the existence of biodiversity irrespective of use). The list excludes 'unsustainable' use such as commercial-scale minerals and fossil fuel extraction.

### **Environmental functions of wet grassland sites**

Biological diversity	They provide a range of habitats for a good diversity of species and consequently contribute to national and global biodiversity.
Genetic resources	They support a wide variety of species and consequently contribute to the genetic resources within and without species.
Water regulation	They play a role in water regulation supply and control. They can act as water storage areas within river catchments, assisting in flood control. Other functions include provision of water for agricultural, industrial or domestic use (abstractions) and transportation, groundwater/aquifer recharge and maintenance of river flow and water supply.

Water purification	They can contribute to improvements in water quality through natural purification functions, and by reducing the area of land under intensive agricultural production.
Soils	They can provide benefits from sediment storage during times of flood which help maintain fertility and nutrient cycling.
Biological control	They are managed less intensively than other arable agricultural systems and support a diversity of insects and other pollinating and predatory invertebrate species. As such they will contribute to local biological control mechanisms.
Farming systems	They are part of an agricultural system and as such support food production by providing fodder (fuel and energy) for livestock. Farming itself has a cultural role as part of traditional and current land-use.
Education	Many are open to the public as nature reserves and provide opportunities for a wide range of educational benefits, from scientific research to personal learning.
Recreation	The habitats and associated river systems provide opportunities for a variety of recreational uses including walking, birdwatching, 'in-stream' recreation (e.g. canoeing), recreational fishing, and wildfowling/shooting.
Cultural use	They provide opportunities for non-commercial uses covering aesthetic, spiritual, historic and artistic inspiration.

This broader approach to determining what is important and why when setting objectives for a habitat replacement scheme is linked to a new approach to delivering sustainability being developed by English Nature and other environmental agencies in England (CAG Consultants & Land Use Consultants, 1997). This approach sets out a methodology with six steps: (a) defining the purpose, (b) defining the character, (c) the identification of environmental attributes and services, (d) evaluation, (e) management implications and (f) monitoring. Considering the wider environmental functions of wet grasslands fulfils part of this approach.

### **3.2 Land Acquisition**

Most habitat replacement schemes are likely to require the purchase of land, although some schemes may be developed through agreement with an existing landowner. It is also possible that land may be donated at no cost.

The land required for a habitat replacement scheme may not be the same area as the site that is to be lost. In many cases a larger area may be needed to ensure the objectives set for the habitat replacement are met and the value of the asset to be lost is properly replaced or compensated. Consideration may also need to be given to the potential requirement of acquiring an interest in adjacent land to provide control over external factors that may affect the successful implementation of a habitat replacement scheme. This could include control over water supply, flooding of adjacent land and prevention of disturbance from undesirable adjacent land use.



Control over external factors may also be achieved through agreement or by additional land purchase.

### **3.2.1 Land prices**

It is difficult to provide standard estimates for land acquisition because each replacement project is likely to be unique. The price per hectare will vary on the current land-use, the revenue generated from it and the willingness of the owner to sell. It is possible, however, to obtain average sale values for each year, for different land-use and grades of land that will provide a guide to the likely land purchase cost. Alternatively a land valuation can be undertaken for a specific site, which is likely to require the services of a surveyor.

### **3.2.2 Legal and other costs**

As well as the purchase price of a site, the acquisition cost will also involve legal and other professional fees. The cost of these elements will vary depending on the complexity of ownership and legal circumstances surrounding a particular piece of land and the implementing organisation. All personnel costs associated with liaison and project supervision should also be included in the costing.

## **3.3 Planning, Assessment and Design**

### **3.3.1 Legal and planning considerations**

A habitat replacement scheme will need to take account of a number of legal and planning considerations. In the case of coastal and floodplain grazing marsh, for example, these may include some or all of the following factors (RSPB, 1997).

- Possible water abstraction licences, land drainage consents, discharge consents.
- Diversion or temporary closure of public rights of way
- Planning consents - landscape, drainage of area etc.
- Disposal and/or sale of spoil or minerals
- Archaeological searches
- Statutory and non statutory designations
- Pipelines and cables etc.

The costs are primarily related to staff time needed to make applications, attend meetings and liaise with relevant authorities. They may also include specific specialist surveys (e.g. archaeology). These costs will vary depending on the legal and planning circumstances of the individual site and the operating methods of the implementing organisation.

### **3.3.2 Technical feasibility assessment**

The feasibility of achieving the objectives of the habitat replacement scheme will need to be assessed. Assessment may include consideration of the location and size of the site and its existing and potential ecological interest. For the three habitat types considered in this report a hydrological assessment will usually need to be undertaken as water supply, quality and control are vital for these particular habitats. A number of issues relating to hydrology may need to be considered including catchment area, soils, topography, rainfall, water supply, requirements of

other users within the catchment, water management and impacts on adjacent land (RSPB *et al.*, 1997).

The habitat replacement cost may therefore have to include costs for hydrological, topographical and ecological surveys as part of the assessment process. Depending on how the replacement scheme is implemented, contractors or in-house staff may undertake these. In addition other data gathering and office-based analysis may be required.

### **3.3 3 Design proposals and management plan**

Following the setting of objectives and the feasibility assessment, project proposals and site designs will need to be prepared together with an establishment and long term management plan.

The costs associated with this part of the habitat replacement costing are likely to be mainly staff time and report and design production costs. Depending on how the replacement scheme is implemented, contractors or in-house staff may undertake these aspects of the scheme. Time may also be needed to work up tender documentation for potential contractors.

## **3.4 Implementation**

### **3.4.1 Habitat and site construction**

Site construction and establishment costs for the three habitats considered in this report may include some or all of the following areas of work depending on the objectives of the scheme and the circumstances at the replacement site.

#### ***a. Water Management***

Modification of drainage patterns or infrastructure construction and establishment work may include removal or relocation of flood banks, installation of water control devices, ditch construction and restoration and removal of under drainage. Care should be taken with some works not to double count those costs (e.g. flood bank construction) that may have to be undertaken regardless of the habitat replacement proposals, as they form part of an overall flood defence scheme.

Water management works are likely to be largely undertaken by contractors and standard costs should be available to assist the costing process.

#### ***b. Vegetation establishment and management***

In the case of wet grassland and reedbed habitat creation on sites where there is no vegetation will usually involve work that ranges from nutrient stripping and sowing to encouraging natural regeneration. Vegetation establishment is also likely to require aftercare management to control invasive weeds such as thistles or ragwort in the case of grassland. These costs should be included as aftercare costs.

Where there is already vegetation, restoration management may be aimed at enhancing the diversity of the community to benefit plants, birds or invertebrates depending on the objectives of the replacement scheme. In specific cases there may be a need to manage the vegetation for a

particular animals species. For example, in lowland wet grassland to increase food supply for a particular bird species (e.g. geese) there may be a need to enhance the productivity of the grass sward rather than its diversity.

For both restoration and creation any costs associated with vegetation management during the aftercare period should be included as aftercare costs. These management activities, however, are also likely to generate revenue, which should be included in the replacement costing as income (section 3.7).

**c. *Species and habitat translocation***

For some sites where the key interest is associated with a particular species or an assemblage of species there may be a role for species and habitat translocation between the site that is to be lost and the replacement habitat. This is only likely to be required, however, for sedentary species with poor powers of dispersal or where a particular habitat cannot be readily replaced, for example, the dead wood habitat associated with ancient willow pollards. Translocation may also be the best option in these circumstances for the conservation of a species protected by wildlife legislation.

**d. *Site infrastructure***

The extent and nature of site infrastructure will vary from site to site, but is likely to include fencing, gates, water control structures, surfaced tracks and any buildings that may be necessary for the establishment of the habitat (e.g. pump house). Buildings such as interpretative centres or bird hides should not normally be included in the replacement cost calculation for flood and coastal defence schemes.

The costs associated with these works are likely to comprise contractor fees, material costs and staff and volunteer costs depending on the organisation implementing the scheme.

**e. *Site supervision and other costs***

Estimation of habitat replacement costs will usually require quotations or calculations based on standard costs for the construction of features, boundaries, gates and other site infrastructure with subsequent aftercare. The HRC costing, however, should also include the cost of site supervision for the agency or organisation undertaking the habitat replacement. Other costs associated with habitat construction that should be considered include training costs for site staff and volunteers, the possible use of volunteers to implement certain elements of the scheme and the provision of health and safety and other equipment to site staff.

### **3.4.2 Aftercare costs**

A fixed period of aftercare should be identified and all costs and revenue associated with the establishment of the habitat during this period should be included in the habitat replacement cost. Once the defined aftercare period has finished all costs and revenue are associated with site maintenance and not habitat replacement.

For some actions such as tree planting (if appropriate to the objectives), grass establishment and infrastructure there are widely accepted standard aftercare periods to ensure that establishment is achieved. During the aftercare period weed problems associated with vegetation establishment

can be managed to ensure the basic habitat requirement is met. The need for aftercare for these types of cost elements should be included in the costing. The cost may fall to a contractor or aftercare may be undertaken by the organisation implementing the habitat replacement scheme.

The actions to be included in the aftercare programme and the aftercare period should be clearly stated. For example, for some cost elements such as grazing, a decision will need to be made as to when grazing should be considered to be part of the establishment of the grass sward and when it is part of the aftercare once established. If it is included in aftercare then the revenue generated by letting the grazing needs to be subtracted from the cost of replacing the habitat.

### **3.5 Monitoring**

The extent, nature and period of time over which monitoring is required will be determined primarily by the objectives of the habitat replacement. Site monitoring as included in the habitat replacement cost should only involve the monitoring necessary to determine whether the objectives of replacement have been met, and to what standard. A fixed period of monitoring should be described in the habitat replacement cost to avoid monitoring becoming an open-ended process.

The objectives will guide determination of which aspects of the site should be monitored, and the time period over which monitoring should take place. For example, the objective of a habitat replacement may be to construct a site that supports internationally important numbers of wintering wildfowl within 10 years. In this case the monitoring costs of replacement should allow for bird counts and appropriate analysis over a 10 year period at sufficient frequency to determine whether the objective has been achieved.

### **3.6 Additional costs**

#### **3.6.1 Project management costs**

The method by which a replacement project is managed will affect the overall cost. To date most habitat replacement schemes have been managed by statutory or non-statutory environmental organisations. Most replacement projects will be planned and implemented over a number of years and need to be properly managed. The costs associated with project management can potentially be a significant proportion of overall costs and must be included in the replacement costing.

The costs are likely to include staff costs, office and general operating costs. Care should be taken not to double count some costs as a proportion of the staff costs will be allocated to other cost elements such as supervision of site works. Where this is the case the percentage of staff costs not included in specific cost elements should be included under project management.

Where a replacement scheme is the only responsibility of a project management team all management costs should be included in the costing. Where the habitat replacement is part of the work of an existing office or project management team a proportion of the overall project management costs will need to be included in the costing.

### **3.6.2 Foregone revenue**

Costs associated with a habitat replacement scheme may include opportunity costs in the form of foregone revenue, but only where the scheme does not involve land purchase, otherwise there would be double counting. Foregone revenue represents the reduction in revenue as a result of the scheme. An example would be the reduction in farm income due to replacement of arable crops with grassland systems. If the land for replacement has been purchased then opportunity costs in the form of foregone revenue should not be included in the replacement cost.

Strictly speaking, an opportunity cost approach could also be used for other categories of costs, such as labour, but this would add complexity and reduce clarity.

### **3.6.3 Contingency costs**

Contingency costs are those associated with potential events or circumstances that will incur further expenditure that is not expected. Such situations are all likely to require remedial action of some description, but they may also incur financial penalties in the form of compensation payments to adjacent landowners. This may require additional purchase of land (see 3.2). Contingency costs do not include basic repairs to site infrastructure and equipment or management required to ensure a habitat is properly established (e.g. control of weeds). These should be included in the aftercare costs. They do include replacement of failed plantings or compensation claims, for example, loss of crops resulting from flooding of adjacent land.

Calculating a suitable contingency cost will be difficult. It is proposed, however, that a contingency figure should be included within the replacement costing. For some habitats where there are low levels of technical difficulties and where there is a high degree of certainty within the feasibility assessment the likely need for remedial action will be reduced and a lower contingency cost can be included in the replacement cost.

It is suggested that a simple approach may be to include a nominal contingency cost that is a percentage of the total cost of replacement. This percentage will be higher for some habitat types than for others and requires further analysis of examples of habitat restoration and creation.

## **3.7 Income**

The costing exercise should also include potential income; for example, one-off income arising from the sale of top soil, or minerals. This income should be set against the cost of the replacement scheme.

Revenue generated from grazing or the sale of hay during the aftercare period should also be included as income or negative cost because during the aftercare period these management procedures should be considered to be part of the site establishment process and not site maintenance. Income generated beyond the specified aftercare period should not be included in the calculation of the cost of the replacement project.

## **3.8 Grants**

Income in the form of grants will be relevant in some cases, for example if the scheme is carried out by a non-governmental organisation. For statutory bodies grants will not be relevant.

## **4. Presenting costs for a habitat replacement scheme**

It is proposed that the presentation of habitat replacement scheme costs should include the following information where a scheme will be implemented. Some of the information presented below will not be required if the calculation of replacement cost is being undertaken for inclusion in a cost benefit analysis.

### **4.1 Project Background and Rationale**

#### **4.1.1 Rationale for habitat replacement**

For future reference a short statement should be made on why the habitat replacement scheme is necessary. Where appropriate it should refer to the relevant policy basis and identify the contribution the scheme will make to local or national Biodiversity Action Plans.

#### **4.1.2 Project Description**

The habitat replacement scheme should be described briefly indicating the area and nature of the replacement habitat. It should provide a statement on the technical replaceability of the key habitat features including an assessment of difficulties faced by the replacement scheme. The description should also include an indication of the extent of habitat creation and habitat restoration as defined in this report.

The description should also include an outline of how the project will be supervised and implemented. The number and grade of staff allocated to the habitat replacement scheme and their likely time involvement should be described. The general requirements of office facilities and running costs should also be described.

#### **4.1.3 Replacement objectives**

The objectives for the replacement scheme should be described and related back to the interest of the site that is to be lost. The objectives should set clear measurable targets and provide a time frame within which they will be achieved. The objectives should be specific. The statement on objectives should also include a description of the limits there are on replacing the asset to be lost and a realistic and cautious assessment of the likelihood of success.

### **4.2 Presentation of habitat replacement costs**

The cost data should be presented under the broad headings proposed in section 3 of this report i.e. setting objectives, land acquisition, planning, assessment and design implementation, monitoring and additional costs.

#### 4.2.1 Basis of cost data used

The cost data presented in the costing should be supported by the provision of the following information.

- a. *Sources of cost data*
- b. *The base price year*
- c. *An indication of whether the costs include or exclude VAT*
- d. *The basis for any rounding of figures in the cost tables*

Costs should be rounded to a level that is appropriate to the robustness of the data.

- e. *Distinguish between actual costs and standard costs (Cost type)*

Standard and actual costs provide different perspectives to the costs. They can cover either one or all of the following circumstances: (a) they enable the price base to be adjusted; (b) they enable an average cost to be used where either no cost data are available or the actual cost is atypical; and (c) provide a true economic cost of donated land or volunteer labour. In relation to (b) and (c) above, Notes should be provided with the detailed cost table to explain the basis of the costing.

All the types of cost, both standard and actual should be indicated in the detailed cost table in column 7 (see box 1). Actual means the actual costs incurred, zero (or low) costs if the land or machinery is donated or if the labour is voluntary. Standard costs reflect typical costs that would be incurred on a commercial, 'arms-length' basis using today's prices. Standard costs for machinery or labour can be derived on a national or regional basis. For machinery they can reflect the full costs of average-age machinery, rather than the actual cost of new or old machinery used (which may distort the costings). For labour they can also reflect typical costs, rather than actual costs which may be distorted by local circumstances. Actual costs for labour may vary from £80 to £130/day (1998 prices), standard costs for labour, however, may be £100/day (the figure used in the case studies).

This approach is discussed further elsewhere in relation to heathland costings (RSPB, 1996). For comparing costs at different sites and for presenting costs to be used at other sites, standard costs are most useful. Actual costs may also provide useful information, and should be presented where possible.

- f. *Timescale*

This should include the time up to the end of the aftercare period for the establishment works and time up to the end of the monitoring period for monitoring when the success of the replacement will be judged against the objectives.

**g. Agricultural subsidies**

In the presentation of costs, particularly land purchase and opportunity costs, it should be made clear whether effects of agricultural (and other) subsidies are included or excluded. For some purposes, such as cost benefit analysis, such subsidies should be excluded from the analysis. This is because CBA tries to look at 'true' costs and benefits to society as a whole, and subsidies represent a distortion of these costs or benefits (caused by government intervention). To exclude subsidies, land purchase costs and/or opportunity costs should be reduced. Both land prices (i.e. capitalisation) and agricultural revenues are artificially inflated by agricultural subsidies. Guidance on capitalisation is given in Project Appraisal Guidance Notes (MAFF, 1993).

**4.2.2 Presentation of costs tables**

Within each category of work there should be a minimum level of elemental breakdown of cost, which using wet grassland as an example is described in section 3 of this report. The cost tables should show the type and number of units, the cost per unit and the total cost. There should also be a sub-total presented for each cost category. These sub-totals should also be presented in a summary cost table. A proposed format for the main tables are presented in Box 1.

<b>Box 1 - Proposed costings format</b>						
<b>Column 1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>
<b>Cost category/element</b>	<b>Year</b>	<b>Unit</b>	<b>No. of units</b>	<b>Cost/unit (£)</b>	<b>(Total cost (£))</b>	<b>Cost type</b>
<b>1. Setting objectives</b>						
Cost elements						
Sub-Total						
<b>2. Land acquisition</b>						
Cost elements						
Sub-Total						
<b>3. Planning, assessment and design</b>						
Cost elements						
SubTotal						
<b>4. Implementation</b>						
Cost elements						
Sub-total						
<b>5. Monitoring</b>						
Cost elements						
Sub-Total						
<b>6. Additional Costs</b>						
Cost elements						
<b>7. Income</b>						
Sub-Total						
Total Cost						
Cost/hectare						



### 4.3 Assessment of reliability of costs

An assessment of the reliability of costs should be made for the habitat replacement project, as a whole, and for each category/item of cost, where possible.

The reliability of cost estimates for each stage of a particular scheme will vary because of the unpredictable nature of planning and implementing a habitat replacement scheme. For example, costs for undertaking the construction of a certain length of ditch or earth bund are likely to be estimated to a high degree of confidence because a quotation can be obtained from a contractor and there are standard costs available for these types of works.

The likely cost of planning, aftercare and remedial work, however, will depend to a great extent on the circumstances of the site, how it responds to construction work, whether any unforeseen problems arise following construction and the ease with which the objectives of the scheme are achieved. The cost estimates for these elements of the replacement scheme are less reliable and could be greatly affected by unforeseen events. This problem of uncertainty applies whether standard or actual costs are used although it may apply less to standard costs, because certain sources of data variability have been removed.

The reliability of the cost data should be presented in a range of percentage terms where possible. For example, a reliable cost estimate for clearing a certain length of a ditch could be presented as a unit cost of £2/metre plus or minus 10%.

### 4.4 Recommended presentation format

A format for the overall presentation of habitat replacement costs is proposed in Box 2. All sections should be completed when presenting cost estimates for a proposed replacement. Some sections may not be needed for CBA.

#### **Box 2 - Recommended presentation format**

1. PROJECT TITLE:
2. RATIONALE FOR HABITAT REPLACEMENT (refer to section 4.1.1)
3. PROJECT DESCRIPTION (refer to section 4.1.2)
4. REPLACEMENT OBJECTIVES (refer to section 4.1.3)
5. HABITAT REPLACEMENT COSTS:

#### **5.1 Basis of Cost Data (refer to section 4.2.1)**

- (a) Sources of cost data
- (b) The base price year
- (c) An indication of whether the costs include or exclude VAT
- (d) The basis for rounding of figures.
- (e) Use of actual and standard costs
- (f) Time scales: Establishment, Aftercare and Monitoring
- (g) Agricultural subsidies

#### **5.2 Cost Table(s) (refer to 4.2.2)**

Table Notes

Summary Tables

#### **5.3 Assessment of the reliability of cost data (refer to 4.3)**

## 5. Case studies

The presentation of these case studies does not fully reflect the process of habitat replacement because none have been undertaken to specifically replace a known site or area of habitat that has been lost. There are a number of gaps in the data presented in the case studies as costs have not been recorded for various stages or cost elements in the proposed framework for preparing and presenting costs. Where this is the case an attempt has been made to provide an estimate of the cost where ever possible. The case studies have been selected to try and represent a range of different objectives and circumstances for each particular habitat type.

**For the purposes of this report, actual and standard costs have been presented separated for each case study. Under the proposed presentation format, however, only a single table would be presented with the different types of cost (actual and standard) indicated. The differences between standard and actual costs are as follows:**

- a. The standard cost of labour is the same for all case studies and is a typical cost of employing wardens. The standard costs assume that no voluntary labour is used.
- b. Where specific standard costs are not available (as with most cost categories) they are derived from actual costs by increasing them to take account of inflation between the year they were incurred and current (1998) prices. Inflation is measured by the GDP deflator - see below. The costs are subsequently rounded.

GDP deflator table

Financial year	GDP deflator index (95/96 = 100)	Multiply data for the corresponding financial year by this factor to obtain 1998/99 prices
90/91	84.1	1.29
91/92	89.5	1.21
92/93	93.2	1.16
93/94	95.9	1.13
94/95	97.6	1.11
95/96	100.0	1.08
96/97	102.8	1.05
97/98	105.3	1.03
98/99	108.2	1.00

The majority of the figures presented in the standard cost table are derived from actual cost using the GDP deflator table to bring all costs up to the same base price. Staff costs have been based on standard daily rates and other costs such as volunteer labour are also based on standard rates.

The standard costs and the summary tables for the standard costs are presented in the main body of the report. Actual costs and summary tables are presented in Appendix 1.

## 5.1 Coastal grazing marsh and floodplain grassland

Three case studies of coastal grazing marsh and floodplain grassland creation and restoration are described below in the proposed format for presenting HRC data.

### 5.1.1 Case study one – Northward Hill

**1. Project title: Northward Hill (RSPB reserve)**

**2. Rationale for habitat replacement**

As this case study is not a replacement project the rationale for the replacement is not related to any specific site that was lost. The creation and restoration of lowland wet grassland on this site contributes to local and national Habitat Action Plan objectives.

**3. Project description**

Northward Hill reserve comprises the ancient oakwood and scrub woodland of the original Northward Hill, a large area of former arable lowland that is being converted back to wet grassland and a substantial area of untouched coastal grazing marsh. The reserve is situated east of Gravesend at the centre of one of the largest parts of the North Kent Marshes Environmentally Sensitive Area, much of which was drained and ploughed in the 1960's (RSPB, 1998).

This project involved the restoration and creation of wet grassland including 173 hectares converted from arable farmland and 32 hectares restored from unmanaged former grazing marsh.

The technical replaceability of wet grassland may be constrained by a number of factors. These include low rainfall, limited water availability for summer flooding, the existence of a very extensive land drain system (often unmapped) and the need to avoid back-flooding adjacent land (RSPB 1997). Consequently, management has proceeded cautiously.

The creation of wet grassland has been achieved through removal of land drains, raising of water levels, re-construction of ditches and the re-establishment of grassland on arable land by re-seeding and natural regeneration.

The work has been planned and supervised by RSPB staff responsible for the management of the remainder of the reserve, supported by other RSPB staff within the local and national offices of the organisation. Contractors have been used to undertake certain works including surveys and construction work and volunteers and site staff have also implemented some works. It has not proved possible other than for specific tasks to identify the number, grade and time spent by RSPB staff.

***Northward Hill (contd. )***

**4. Replacement objectives**

*“The creation of a lowland wet grassland site of national importance for breeding/wintering waterfowl within 10 years”*. Although this objective does not specify any numbers or species of birds the assessment of a site of national importance for breeding/wintering waterfowl can be readily measured against the selection thresholds set out in the guidance on the selection of Biological SSSIs. (Nature Conservancy Council, 1989). This is a simple objective it does not consider wider environmental services specifically or other aspects of the biological importance of lowland wet grasslands. No costs are available for the setting of the objectives.

**5. Habitat replacement costs**

**5.1 Basis of Cost Data**

***a. Sources of costs data***

Most data used in the case study is based on actual costs provided by the warden for Northward Hill reserve.

***b. The base price year***

The base price year for each cost element is shown in column two of the cost tables. For actual costs this ranges from 1990 to 1998, although the majority of costs are based on 1990 to 1993. All standard costs are for the year 1998/99.

***c. VAT***

All the costs exclude VAT.

***d. Rounding of figures***

Figures in the summary tables are rounded to the nearest £100 (totals) and £1 (costs per ha).

***e. Actual and Standard costs***

The actual costs are those provided by the RSPB. The standard costs are generally derived from the actual costs using the GDP deflator index. Some standard costs are based on estimates of staff time used multiplied by a standard daily rate for staff.

***f. Time scales***

No specific aftercare time scale was established at the outset. Having discussed the work with the RSPB warden, however, a 3 year aftercare period has been used. The monitoring time scale is set at 10 years by the objectives of the project.

***g. Agricultural subsidies***

Land prices and opportunity costs are not adjusted for agricultural subsidies.

*Northward Hill (contd.)*

**5.2 Cost Tables**

The standard costs are presented in Table 1.1. Actual costs are presented in Appendix 1.

**5.2.1 Table Notes**

**Note 1:** There are no cost data available for the establishment of the objectives of the scheme.

**Note 2:** Land purchase costs are approximate. They reflect typical land values for arable and neglected grassland in the area at the time of purchase. The costs given in the standard table reflect inflation since purchase, but also broadly reflect the increase in land prices shown in indices for England in Nix (1998).

**Note 3:** On the basis of a sample of RSPB purchases, land valuation, legal and professional fees (excluding in-house costs) are estimated at 2% of land purchase prices for purchases exceeding £40,000 (a higher percentage would apply to smaller purchases or large purchases made up of a number of smaller purchases).

**Note 4:** No separate data are available for the production of site designs. It is assumed that the costs are included with those presented for project management.

**Note 5:** The cost of topping weeds across the reserve has been based on 1998 costs of £13/ha using reserve staff. The total figure given is the cost of topping over the 5 year aftercare period.

**Note 6:** The total cost given is for 10 years of annual monitoring as specified in the objectives.

**Note 7:** The project management costs have been estimated because data were not available. The estimate is based on the annual cost for a single full time 'project officer' (in reality this 'post' will be comprised of time inputs from a number of different staff). The wage and overhead costs for this post is estimated at £20,000 a year at 1998 prices. The actual figure has been revised to reflect the cost in the early 1990s. It is assumed that 10% of this figure is already accounted for in the other cost elements. Consequently 90% of the cost is shown under this cost element. Office and general operating costs are estimated to be £5,000/year

The total cost for both figures is based on the assumption that site establishment and aftercare primarily occurred over a three year period.

**Note 8:** The costs given for income from sheep grazing are based on the 1998 figure (no others were available). The total cost is based on an income of £38/yr/ha over 200 ha over an assumed 3 year aftercare period. The use of sheep to graze the sward has been included as part of the aftercare management cost for the first three years as it is assumed that grazing was essential for the establishment of the sward.

### *Northward Hill (contd.)*

**Note 9:** Opportunity costs are not applicable because land purchase costs are included. However, for information, the opportunity cost of converting from arable to grazing would be about £500/ha in 1990 prices (ie average gross margin for winter barley or wheat of £530/ha at the time (Nix, 1990) less an estimated income from sheep grazing of £30/ha.

**Note 10:** In the standard cost table all staff labour cost has been assumed to be £100/day which is equivalent to approximately £20,000/year.

**Note 11:** It is assumed that grants are available during the construction and aftercare period (three years).

#### **5.2.2 Summary tables**

The standard costs are summarised in Table 1.2 and the actual costs are summarised in Appendix 1.

#### **5.3 Reliability of cost data**

The data on habitat and site construction, land price and monitoring are based on actual costs. The data on overall project management and other mainly staff time costs are based on annual wage costs and estimates of time taken.

**Table 1.1 Northward Hill - Standard costs**

	<b>Year</b>	<b>Unit</b>	<b>No. of units</b>	<b>Cost/unit (£)</b>	<b>Total Cost (£)</b>
<b>1. Setting objectives</b>					
No data (Note 1)		no data	no data	no data	no data
Sub-total (category 1 costs)					<i>No data</i>
<b>2. Land acquisition</b>					
Land purchase - arable (Note 2)	98/99	ha	173	4838	836888
Land purchase - neglected grazing (Note 2)	98/99	ha	32	1806	57792
Land valuation and professional fees (Note 3)	98/99				<b>17894</b>
Sub-total (category 2 costs)					<b>912573</b>
<b>3. Planning, assessment and design</b>					
<b>3.1 Legal and Planning</b>					
Planning - obtain EA permissions (staff time)	98/99	Days	16	100	1600
Planning - obtain EA permissions (licences)	98/99	Variations	4	700	2800
<b>3.2 Technical feasibility</b>					
Planning - hydrological survey	98/99	Report	1	1097	1097

	Year	Unit	No. of units	Cost/unit (£)	Total Cost (£)
<b>3.3 Design proposals and management plan</b>					
Site design preparation (Note 4)	98/99	no data	no data	no data	no data
Planning - Management Plan	98/99	Plan	1	2580	2580
Sub-total (category 3 costs)					<b>6077</b>
<b>4. Implementation</b>					
<b>4.1 (a) Water management</b>					
Removal of land drains (contractor)	98/99	Metres	400	12	4640
Dam/sluice construction (contractor)	98/99	Sluice	15	194	2906
Culvert repair/replacement (contractor)	98/99	Culvert	15	93	1392
Field edge bund construction (contractor)	98/99	metres	2000	1.50	2997
Construction of new ditches (contractor)	98/99	metres	1000	7	6960
Restoration of infilled ditches (contractor)	98/99	metres	300	7	2088
Reprofiling of old ditches (contractor)	98/99	metres	9000	0.81	7308
Scrape construction	98/99	scrape (2ha)	1	4640	4640
Pump purchase (materials)	98/99	pump	4	1664	6655
Sub-total 4.1 (a) costs					<b>39586</b>
<b>4.1 (b) Grassland management</b>					
Purchase of seed (agricultural mix @ 30Kg/ha)	98/99	ha	58	46	2689
Re-seeding - cultivation and sowing (contractor)	98/99	ha	58	103	5948
Natural regeneration - topping weeds (contractor)	98/99	ha	59	19	1142
Sub-total 4.1 (b) costs					<b>9779</b>
<b>4.1 (c) Species and habitat translocation</b>		none undertaken			
<b>4.1 (d) Site Infrastructure (Note 10)</b>					
Stock fencing (materials)	98/99	metres	6000	1.21	7260
Stock fencing (labour - warden )	98/99	days	30	100	3000
Gates installation	98/99	gate	40	100	4000
Gates (labour - warden)	98/99	days	40	100	4000
Sub-total 4.1 (d) costs					<b>18260</b>
<b>4.1 (e) Site supervision and general costs</b>					
Gates (labour - warden)	98/99	days	10	100	1000
Stock fencing (labour - warden)	98/99	days	7	100	700
Equipment – tractor	98/99	-	-	-	30250
Sub-total 4.1 (e) costs					<b>31950</b>

	Year	Unit	No. of units	Cost/unit (£)	Total Cost (£)
<b>4.2 Aftercare</b>					
Disc harrowing spoil (reserve staff)	98/99	metres	12300	0.12	1427
Thistle/weed control - spraying	98/99	ha	100	24	2436
Thistle/weed control - topping (Note 5)	98/99	ha	150	13	600
Sub-total 4.4 aftercare costs					<b>9863</b>
Sub-total (category 4 costs)					<b>109437</b>
<b>5. Monitoring</b>					
Monitoring - bird counts (Note 6)	98/99	survey	-	-	18150
Monitoring - Vegetation (1 in 5 years)	98/99	Survey	2	972	1944
Sub-total (category 5 costs)					<b>20094</b>
<b>6. Additional costs</b>					
<b>6.1 Project management costs (Note 7)</b>					
Staff costs	98/99	yr	3	18000	54000
Office and operating costs	98/99	yr	3	5000	15000
<b>6.2 Opportunity cost (foregone revenue) (Note 9)</b>	98/99		not applicable		
<b>6.3 Contingency cost</b>					
Compensation for flooding	98/99	one off payment			1000
Sub-total (category 6 costs)					<b>70,000</b>
<b>Total cost</b>					<b>1117707</b>
<b>7. Income</b>					
Aftercare - sheep grazing (3 years aftercare) (Note 8)	98/99	ha	600	38	-22800
<b>Total cost (net of income)</b>					<b>1094907</b>
<b>Cost/hectare (205 ha)</b>					<b>5341</b>
<b>8. Other income (Grants)</b>					
Grant - Environment Agency	?	one-off payment		-	-4176
Grant - ESA (Note 11)	98/99			-	-101100
Sub-total (category 8 costs)					-104700



**Table 1.2 Summary of standard costs**

Cost category/element		Standard Cost (£000)	Cost/ha	% of total cost
1.	Setting objectives	No data	No data	No data
2.	Land purchase	912.5	4451	82%
3.	Planning assessment and design	4.5	30	1%
4.1	Habitat construction – water management	39.5	193	4%
4.1	Habitat construction – grassland management	9.7	48	1%
4.1	Site construction	18.2	89	2%
4.1	Site supervision and general costs	31.9	156	3%
4.2	Aftercare	11.1	48	1%
5.	Monitoring	20.0	98	2%
6.	Project management/additional costs	70.0	341	6%
<b>Total Cost</b>		<b>1118</b>	<b>5453</b>	
7.	Income	-22.8		
<b>Total Cost (net of income)</b>		<b>1095</b>	<b>5342</b>	

**Note:** All data are in 1998 prices, excluding VAT. Total costs do not take account of any income from grants, but do include income from grazing during the aftercare period of 3 years.

## 5.1.2 Case study two - Nene Washes

### 1. Project title: Nene Washes (RSPB Reserve)

### 2. Rationale for habitat replacement

As this case study is not a replacement project the rationale for the replacement is not related to any specific site that was lost. The creation and restoration of lowland wet grassland on this site contributes to local and national Habitat Action Plan objectives.

### 3. Project description

This small project is part of the wider policy of the Nene Washes Nature Reserve in Cambridgeshire to enhance the wet grassland habitat. The area before restoration was arable farmland for approximately 30 years. In 1990 oats were grown on the site and a self-sown oat crop in 1991 was cut for silage. The project requires the re-establishment of a grass sward and the reopening of former ditches together with the construction of new pools and scrapes. The bulk of the work has been undertaken in-house by RSPB reserve staff.

The technical replaceability of wet grassland may be constrained by a number of factors. These include low rainfall, limited water availability for summer flooding, the existence of a very extensive land drain system (often unmapped) and the need to avoid back-flooding adjacent land (RSPB 1997). Consequently, management has proceeded cautiously.

The creation of wet grassland has been achieved through removal of land drains, raising of water levels, re-construction of ditches and an irrigation system and the re-establishment of grassland on arable land by re-seeding and natural regeneration.

The work has been planned, and supervised by RSPB staff responsible for the management of the remainder of the reserve supported by other RSPB staff within the local and national offices of the organisation. Contractors have been used to undertake certain works including surveys and construction work and volunteers and site staff have also implemented some works. It has not proved possible other than for specific tasks to identify the number, grade and time spent by RSPB staff.

### 4. Replacement objectives

*“To restore the area to wet grassland (no NVC community specified) with pools.”*

This objective is part of a wider policy to enhance this habitat on the Nene Washes Nature Reserve. It does not set any species targets and has a very simple habitat objective. This simple objective does not consider wider environmental services specifically or other aspects of the biological importance of lowland wet grasslands. No costs are available for the setting of the objectives.

*Nene Washes (contd.)*

**5. Habitat replacement costs**

**5.1 Basis of Cost Data**

*a. Sources of costs data*

All data used in the case study is based on actual costs provided by the warden.

*b. The base price year*

The base price year for each cost element is shown in column two of the cost tables. For actual costs this ranges from 1990 to 1998, although the majority of costs are based on 1990 to 1993. All standard costs are expressed for the year 1998/99.

*c. VAT*

All the costs exclude VAT.

*d. Rounding of figures*

Figures in the summary tables are rounded to the nearest £100 (total units) and £1 (costs per ha).

*e. Actual and Standard costs*

The actual costs are those provided by the RSPB. The standard costs are generally derived from the actual costs using the GDP deflator index. Some of these are based on estimates of staff time used multiplied by a standard daily rate for staff.

*f. Time scales*

No specific aftercare time scale was established at the outset. Having discussed the work with the warden, however, a 3 year aftercare period has been used.

The monitoring time scale is set at 10 years by the objectives of the project.

*g. Agricultural subsidies*

Land prices and opportunity costs are not adjusted for agricultural subsidies.

**5.2 Cost Tables**

The actual costs are presented in Appendix 1. Standard costs are presented in Table 2.1.

**5.2.1 Table Notes**

**Note 1:** The cost is based on a sowing rate of 183 Kg of seed.

**Note 2:** Machinery costs are not included in this case as it is part of an extension to an existing site.

**Note 3:** There is already a management plan in place for the nature reserve of which this work is part.

**Note 4:** No additional staff or running costs are incurred in this case study to those already shown as this is a small extension to an existing reserve.

**Table 2.1 Nene Washes - standard costs**

	Year	Unit	No. of units	Cost/unit (£)	Total Cost (£)
<b>1. Setting objectives</b>					
No data					no data
Sub-total (category 1 costs)					<i>no data</i>
<b>2. Land acquisition</b>					
Land purchase - arable	98/99	ha	12.4	6830	84698
Land valuation and professional fees (Note 5)					1694
Sub-total (category 2 costs)					<b>86392</b>
<b>3. Planning, assessment and design</b>					
<b>3.1 Legal and Planning</b>					
Planning permission - staff time (RSPB warden)	98/99	days	20	100	2000
Planning permission - application cost	98/99	application	1	666	666
<b>3.2 Technical feasibility</b>					
Planning - levels survey	98/99	survey	1	1573	1573
<b>3.3 Design proposals and management plan</b>					
not applicable (Note 3)					
Sub-total (category 3 costs)					<b>4239</b>
<b>4. Implementation</b>					
<b>4.1 (a) Water management</b>					
Ditch widening and spoil removal	98/99	metres	1100	1.6	1740
Scrape and pool construction	98/99	no data	no data	no data	2900
Sub-total 4.1 (a) costs					<b>4640</b>
<b>4.1 (b) Grassland management</b>					
Reseeding (ploughing and drilling)	98/99	ha	12.4	84	1044
Reseeding (seed) (Note 1)	98/99	ha	12.4	41	510
Sub-total 4.1 (b) costs					<b>1554</b>
<b>4.1 (c) Species and habitat translocation</b>					
<b>4.1 (d) Site Infrastructure</b>					
Stock fencing (materials)	98/99	metres	1800	1.0	1740
Stock fencing (labour - RSPB staff)	98/99	days	35	100	3500
Sub-total 4.1 (d) costs					<b>5240</b>
<b>4.1 (e) Site supervision and other costs (Note 2)</b>					
not applicable work done in -house					
<b>4.2 Aftercare</b>					
Spraying weeds	98/99	ha	12.4	35	437
Sub-total 4.2 aftercare costs					<b>437</b>
Sub-total (category 4 costs)					<b>11871</b>

	Year	Unit	No. of units	Cost/unit (£)	Total Cost (£)
<b>5. Monitoring</b>					
None undertaken		none undertaken			
<b>6. Additional costs</b>					
<i>6.1 Project management costs (Note 4)</i>					
<i>6.2 Opportunity cost (foregone revenue)</i>					
<i>6.3 Contingency cost</i>		none incurred			
Sub-total (category 6 costs)					<i>0</i>
<b>Total Cost</b>					<b>102501</b>
<b>7. Income</b>					
Annual grazing/grass cutting - income	98/99	ha	12.4	-65	-2418
<b>Total Cost (net of income)</b>					<b>100083</b>
<i>Cost/hectare (12.4 ha)</i>					<b>8071</b>
<b>8. Other Income (Grants)</b>					
Grants - Countryside Stewardship 97-2001 (Note 6)	98/99	ha	12.4	-280	-10416

**Table 2.2 Summary of standard costs**

Cost stage/element	Standard Cost (£000)	Cost/ha	% of total cost
1. Setting objectives	No data	No data	No data
2. Land purchase	86.3	6967	83
3. Planning assessment and design	4.2	339	4
4.1 Habitat construction – water management	4.6	374	5
4.1 Habitat construction – grassland establishment	1.5	125	2
4.1 Site construction	5.2	419	5
4.1 Site supervision and general costs	Note 2		
4.2 Aftercare	0.4	35	1
6.1 Project management costs	Note 4		
<b>Total cost</b>	<b>102.5</b>	<b>8266</b>	
7. Income – aftercare grazing income	-2.4	-	-
<b>Total Cost (net of income)</b>	<b>100.0</b>	<b>8071</b>	

Note: All data are in 1998 prices, excluding VAT. Total costs do not take account of any income from grants, but do include income from grazing during the aftercare period of 3 years.

### 5.1.3 Case study three - Exe Estuary

#### 1. Project title: Exe Estuary (RSPB Reserve)

#### 2. Rationale for habitat replacement

As this case study is not a replacement project the rationale for the replacement is not related to any specific site that was lost. The creation and restoration of lowland wet grassland on this site contributes to local and national Habitat Action Plan objectives.

#### 3. Project description

The Exe Estuary Reserve near Exmouth in Devon has been created by the restoration work of the RSPB. It is comprised predominantly of lowland wet grassland, although there are small areas of former railway sidings and willow carr. The reserve has grown in size since 1984 when it comprised 3 fields. Between 1989 and 1992 up to 200 acres were added to the reserve. It currently supports nationally important numbers of several overwintering and passage birds, in particular, Black tailed Godwit.

The technical replaceability of wet grassland may be constrained by a number of factors. These include low rainfall, limited water availability for summer flooding, the existence of a very extensive land drain system (often unmapped) and the need to avoid back-flooding adjacent land (RSPB 1997). The reserve is part of a flood storage and flood alleviation overflow area. The watercourse is main river. These factors have constrained the range of work that could be achieved on the site. The creation of wet grassland has been achieved through removal of drainage, raising of water levels and there-construction of ditches. No grassland re-establishment was required.

The work has been undertaken in-house by RSPB reserve staff and through contractors. All the work has been restoration of wet grassland from drained and intensively managed agricultural grassland.

#### 4. Replacement objectives

- a. The reduction of the intensity of agricultural management
- b. The increase in area of water present in winter/spring.
- c. The reinstatement of former wetland features, in particular old ditches
- d. The control of disturbing recreation

These objectives do not set any species targets and are comprised of very simple habitat objectives. They do not consider wider environmental services specifically or other aspects of the biological importance of lowland wet grasslands. No specific costs are available for the setting of the objectives.

*Exe Estuary (contd.)*

**5. Habitat replacement costs**

**5.1 Basis of Cost Data**

*a. Sources of costs data*

All data used in the case study is based on actual costs provided by the warden.

*b. The base price year*

The base price year for each cost element is shown in column two of the cost tables. For actual costs this ranges from 1990 to 1998, although the majority of costs are based on 1990 to 1993. All standard costs are expressed for the year 1998/99.

*c. VAT*

All the costs exclude VAT.

*d. Rounding of figures*

Figures in the summary tables are rounded to the nearest £100 (total units) and £1 (costs per ha).

*e. Actual and Standard costs*

The actual costs are those provided by the RSPB. The standard costs are generally derived from the actual costs using the GDP deflator index. Some of these are based on estimates of staff time used multiplied by a standard daily rate for staff.

*f. Time scales*

No specific aftercare time scale was established at the outset. Having discussed the work with the warden, however, a 3 year aftercare period has been used.

The monitoring time scale is set at 10 years by the objectives of the project.

*g. Agricultural subsidies*

Land prices and opportunity costs are not adjusted for agricultural subsidies.

**5.2 Cost Tables**

The actual costs are presented in Appendix 1 and the standard costs in Table 3.1.

**5.2.1 Table Notes**

**Note 1:** The cost includes the removal of spoil from site by the contractor.

**Note 2:** The cost includes 36 scrapes and pools covering an area of 2.6 ha in total.

**Note 3:** Includes supervision of contractors by wardening staff costed at £10/hr for all ditching, sluice and pool construction. There are no machinery costs as the reserve staff rely on tenant farmers and contractors to provide machinery.

***Exe Estuary (contd.)***

**Note 4:** The area available for grazing varies each year. The figure given is an average. It is based on £6000/yr for three years.

**Note 5:** Land purchase price is an average figure with per hectare costs ranging between £2500 and £6000. This variation is partly due to the attitude of the landowners selling the land.

**Note 6:** Consent costs or water control structures are shown separately. The cost presented is based on staff time needed to submit planning applications, to respond to questions and time spent chasing the relevant authorities to ensure the applications are successfully progressed.

**Note 7:** The staff costs for the reserve are based on 1 full time warden and a 3 month contract staff post. The total cost is estimated to be £25,000/yr in 1998 prices. 90% of this is a figure of £22,500. Actual costs are reduced to take account of 1994/95 prices.

**Note 8:** No aftercare period was set. The annual maintenance cost, however, for fence repairs, ditching work, pool maintenance and water control maintenance and repairs is estimated to be between £7000 and £8000.

**Note 9:** On the basis of a sample of RSPB purchases, land valuation, legal and professional fees (excluding in-house costs) are estimated at 2% of land purchase prices for purchases exceeding £40,000 (a higher percentage would apply to smaller purchases or large purchases made up of a number of smaller purchases).

**Note 10:** This covers management payments in 1997 and 1998 and three years payments for subsequent aftercare.

***5.2.2 Summary Tables***

The actual costs are summarised in Appendix 1 and the standard costs are summarised in Table 3.2.

**5.3 Reliability of cost data**

The data on habitat and site construction, land price and monitoring are based on actual costs provided by the site warden. The data on overall project management and other mainly staff time costs are based on annual wage costs and estimates of time taken.



**Table 3.1 Exe Estuary Reserve - standard costs**

	Year	Unit	No. of units	Cost/unit	Total Cost (£)
<b>1. Setting objectives</b>					
No data		no data	no data	no data	
<b>Sub-total (category 1 cost)</b>					<i>no data</i>
<b>2. Land acquisition</b>					
Land purchase - intensive grazing (Note 5)	98/99	ha	125	5160	645000
Land valuation and professional fees (Note 9)					12900
<b>Sub-total (category 2 cost)</b>					657900
<b>3. Planning, assessment and design</b>					
<b>3.1 Legal and Planning</b>					
EA consent costs	98/99	-	-	-	2193
Planning and obtaining EA permissions (Note 6)	98/99	days	53	97	5160
<b>3.2 Technical feasibility</b>					
Planning - archaeological search	98/99	survey	1	791	791
Planning – hydrological and topographical survey	98/99	survey	1	2825	2825
<b>3.3 Design proposals and management plan</b>					
Site design preparation	included under section 3.1				
Planning - Management Plan	-	plan	1	2000	2000
<b>Sub-total (category 3 cost)</b>					12969
<b>4. Implementation</b>					
<b>4.1 (a) Water management</b>					
Sluice and water control infrastructure - materials	98/99	sluice	36	93	3330
Dam/sluiice construction (contractor)	98/99	sluice	36	154	5550
Fencing to protect sluice structures - materials	98/99	fencing unit	26	85	2220
Fencing to protect sluice structures - labour	98/99		no data	no data	
Restoration of infilled ditches (contractor) (Note 1)	98/99	m	1400	10	13320
Scrape and pool construction (contractor) (Note 2)	98/99	ha	2.6	8538	22200
<b>Sub-total 4.1 (a) costs</b>					46620
<b>4.1 (b) Grassland management</b>					
No costs incurred as site was already grassland		no cost	no cost	no cost	no cost
<b>4.1 (c) Species and habitat translocation</b>					
<b>4.1 (d) Site Infrastructure</b>					
Stock fencing (materials)	98/99	m	3000	2.22	6660
Stock fencing (labour )	98/99	no data	no data	no data	

	Year	Unit	No. of units	Cost/unit	Total Cost (£)
Sub-total 4.1 (d) costs					6660
<b>4.1 (e) Site supervision and other costs</b>					
Warden staff supervision of contractors (Note 3)	98/99	days	121	100	12100
Sub-total 4.1 (e) costs					12100
<b>4.2 Aftercare (Note 8)</b>	no aftercare period has been set				
Sub-total (category 4 cost)					64047
<b>5. Monitoring</b>					
Hydrological survey (10 years)	98/99	survey	1	500	5000
Monitoring - bird counts (10 years)	98/99	survey	1	1500	15000
Sub-total (category 5 cost)					20000
<b>6. Additional costs</b>					
<b>6.1 Project management costs</b>					
Staff costs (90% of total cost) (Note 7)	98/99				67,500
Office and operating costs	98/99				15,000
<b>6.2 Opportunity cost (foregone revenue)</b>	none incurred				
<b>6.3 Contingency cost</b>	none incurred				
Sub-total (category 6 cost) (including income)					82500
<b>Total Cost</b>					<b>838749</b>
<b>7. Income</b>					
Annual grazing/grass cutting - income (Note 4)	98/99	year	3	-6000	-18000
<b>Total Cost (net of income)</b>					<b>820749</b>
<b>Cost/hectare (125 ha)</b>					<b>6566</b>
<b>8. Other Income (Grants)</b>					
Grants - Environment Agency	98/99				-8,325
Grants - English Nature	98/99				-8,325
Grants - Countryside Stewardship – Capital (Note 10)	98/99				-4,500
Grants - Countryside Stewardship - annual payment (Note 10)	98/99				-35,700
Grants - European Union Project income	98/99				-16,200
Sub-total (category 8 costs)					-73,050

**Table 3.2 Summary of standard costs**

Cost stage/element		Standard Cost (£000)	Cost/ha	% of total cost
1.	Setting objectives	No data	No data	No data
2.	Land purchase	657.0	5263	80
3.	Planning assessment and design	12.9	104	2
4.1	Habitat construction – water management	46.6	373	6
4.1	Site construction	6.6	53	1
4.1	Site supervision and general costs	12.1	97	1
4.2	Aftercare	Note 8		
5.	Monitoring	20.0	160	2
6.	Project management/additional costs	82.5	660	10
<b>Total cost</b>		<b>839</b>	<b>6700</b>	
7.	Income	-18		
<b>Total cost (net of income)</b>		<b>821</b>	<b>6566</b>	

**Note:** All data are in 1998 prices, excluding VAT. Total costs do not take account of any income from grants, but do include income from grazing during the aftercare period of 3 years.

#### 5.1.4 Discussion

**The three case studies presented represent typical restoration and creation projects of lowland wet grassland. They concentrate, however, on schemes aimed at providing new habitat for over wintering and breeding birds and do not include replacement of other features of botanical and faunal interest. Consequently, the costings should be treated with some caution if a replacement scheme is being planned that includes attempts to replace features of interest other than that of bird communities.**

The data in the case studies, however, do provide a guide to the minimum cost of restoring or creating the basic structural and management framework of the lowland wet grassland habitat and for creating suitable conditions for over wintering and breeding birds.

The Northward Hill and Exe Estuary case studies are similar in terms of the methods used to restore and create lowland wet grassland habitat. They are both large sites and have been developed in former coastal grazing marsh areas. These schemes have also been implemented in a similar manner through local offices and site wardens of the RSPB. The main difference between the two schemes is that Northward Hill has been developed on predominantly arable land, whereas the Exe Estuary reserve has been developed on existing, but well drained permanent grassland.

The Nene Washes is an example of a lowland wet grassland restoration scheme in an inland floodplain (flood storage) location. It differs from Northward Hill and the Exe Estuary primarily in the area of lowland wet grassland restored and because it is a small extension to an existing larger reserve. In addition, data for a number of areas of work were not available and some costs were not incurred because of the connection to an existing lowland wet grassland site.

The single most significant cost associated with the case studies is the land purchase cost, which accounts for between 80 and 83% of the overall cost of each of the case study. Consequently, significant savings or increased expenditure will occur depending on the price of the land on which a replacement scheme is planned.

A comparison of the cost per hectare of the three schemes excluding land purchase costs at 1998 prices (standard costs) shows that Northward Hill (£891/ha) was the least expensive. The difference between Northward Hill and the Exe Estuary (£1303/ha) is primarily due to them having the same level of project management costs, but that the Exe Estuary is 80 hectares smaller than Northward Hill.

Nene Washes is very similar to Exe Estuary in cost at £1104/ha. This is despite a number of cost elements not being relevant to this case study that were incurred at Northward Hill and the Exe Estuary (e.g. project management costs). Nene Washes also has higher construction and planning and design costs than the other two case studies.

A comparison of the cost per hectare of just the implementation phase (section 4 in cost tables) of the case studies shows that Northward Hill (£533/ha) and Exe Estuary (£512/ha) have very similar costs. Nene Washes, however, is almost twice as expensive at £957/ha. The main cost difference between Nene Washes and the other two case studies is the much higher site construction costs. Why these are so much higher (10 times more in the case of the Exe Estuary) is not clear.

Although the case studies provide general guidance on the cost of creating or restoring lowland wet grassland, it should be recognised in all the case studies the 'real' cost per hectare may be higher than that presented. This is because several areas of cost such as the cost of setting objectives or the cost of professional fees associated with planning were not available for inclusion in this report.

Each case study has been delivered through local offices of the RSPB. In the case of Northward Hill and the Nene Washes this has been achieved by extensions of existing reserves. The Exe Estuary site is an entirely new nature reserve. It has not, however, attracted the range of capital expenditure on machinery etc. that might have been expected for such an entirely new reserve as the RSPB have relied on contractors and tenant farmers for major site management works. This approach may not be possible in other circumstances and some replacement projects may require expenditure on machinery and even grazing stock. Clearly in this situation the cost of a scheme will increase compared to the case studies.

One of the higher cost elements within the case studies has been the cost of project management. This cost for the case studies ranges from 6 to 10% of the overall cost (including land purchase). It is likely, however, that this may be an under estimate, as the data provided on project supervision were based on very broad figures. The mechanism by which a replacement scheme is delivered may therefore have a significant impact on the overall costs. Regardless of how a scheme is delivered, it is likely that project management will be required that will require significant staff time and office and support facilities over a number of years.

The case studies presented in this report were attempting to achieve relatively simple replacement objectives. They do not include works aimed at developing species-rich floodplain grassland, or developing a rich invertebrate fauna, other than through general habitat enhancement and creation. Some habitat replacement schemes may require the establishment of a species-rich grass sward or the transfer of plants, invertebrates and other fauna from the site to be lost to the replacement site.

Consequently, where there are more complex nature conservation objectives (i.e. birds, invertebrates and plants) or where broader environmental objectives are set the cost of a scheme is likely to be higher than that presented in the case studies. For example, a typical cost of creating a wildflower meadow from arable land in agri-environment schemes is between £220 and £280/ha. This cost is likely to be much higher if the replacement scheme requires the use of seed collected from the site to be lost. Harvesting wildflower seed in this way can cost between £1000 and £2000/ha (pers. comm. Wildflower seed suppliers). If species and habitat translocation is required for a habitat replacement scheme the cost of this type of work would also be significantly higher than the per hectare costs presented in the case studies.

## 5.2 Reedbeds

Four case studies of reedbed creation and restoration are described below in the proposed format for presenting HRC data.

### 5.2.1 Case study one – Case study one – Plas Bog, Anglesey

#### 1. Project title: Plas Bog (RSPB Reserve)

#### 2. Rationale for habitat replacement

As this case study is not a replacement project the rationale for the replacement is not related to any specific site that was lost. The creation and restoration of reedbed on this site contributes to local and national Habitat Action Plan objectives.

#### 3. Project description

The Plas Bog reserve has been restored by the RSPB from a neglected reedbed that was formally used as a shoot. The reedbed occupies 10 ha of the reserve with the remaining area supporting rough pasture (10 ha).

The work has been undertaken in-house by RSPB reserve staff and through contractors. Restoration work has involved establishing control of water levels and the removal of extensive areas of scrub. Approximately 100% of the area of the reedbed supported reed or other wetland plants when restoration was started.

#### 4. Replacement objectives

*“To restore a neglected and dried out reedbed.”*

This objective does not set any species targets and is a very simple habitat based objective. It does not consider wider environmental services specifically or other aspects of the biological importance of reedbeds.

#### 5. Habitat replacement costs

##### 5.1 Basis of Cost Data

##### *a. Sources of costs data*

All data used in the case study is based on actual costs provided by the site warden.

##### *b. The base price year*

The base price year for each cost element is shown in column two of the cost tables. For actual costs this ranges from 1995 to 1998, although the majority of costs are based on 1995. All standard costs are expressed for the year 1998/99.

***Plas Bog (contd.)***

***c. VAT***

All the costs exclude VAT.

***d. Rounding of figures***

Figures in the summary tables are rounded to the nearest £100.

***e. Actual and Standard costs***

The actual costs are those provided by the RSPB. Some of these are based on estimates of staff time used multiplied by a standard daily rate for staff. The standard cost is £100/day. The other standard costs are derived from the actual costs using the GDP deflator index.

***f. Time scales***

No specific aftercare time scale was established at the outset. A 3-year aftercare period has been used, although some work is on going. The monitoring time scale is set at 5 years.

***g. Agricultural subsidies***

Land prices and opportunity costs are not adjusted for agricultural subsidies.

**5.2 Cost Tables**

The actual costs are presented in Appendix 1 and the standard costs in Table 4.1.

***5.2.1 Table Notes***

**Note 1:** There are no cost data available for the establishment of the objectives of the scheme.

**Note 2:** On the basis of a sample of RSPB purchases, land valuation, legal and professional fees (excluding in-house costs) are estimated at 2% of land purchase prices for purchases exceeding 40K. However, a higher percentage would apply to smaller purchases or large purchases made up of a number of smaller purchases. Consequently, a figure of 4% has been used to estimate professional fees.

**Note 3:** No costs for a site management plan were available.

**Note 4:** The project management costs in section 6.1 have been estimated because data were not available. The estimate is based on the annual cost for half a single full time 'project officer' (in reality this post will be comprised of time inputs from a number of different staff). The wage and overhead costs for this post is estimated at £20,000 a year at 1998 prices. This figure has been revised to reflect 1995 prices. It is assumed that 40% of this figure is already accounted for in the other cost elements and in the contribution to the remainder of the reserve. Consequently 60% of the cost is shown under this cost element. Office and general operating costs are estimated to be £5,000.

The cost for one year is included in this cost element as it is considered that all the establishment works would have been completed in this time frame.

***Plas Bog (contd.)***

**5.2.2 Summary Tables**

The actual costs are summarised in Appendix 1 and the standard costs are summarised in Table 4.2.

**5.3 Reliability of cost data**

The data on habitat and site construction, land price and monitoring are based on actual costs provided by the site warden. The data on overall project management and other mainly staff time costs are based on annual salary costs.

**Table 4.1. Plas Bog Reedbed - Standard costs**

	Year	Unit	No. of units	Cost/unit (£)	Total Cost (£)
<b>1. Setting objectives</b>					
No data (Note 1)		no data	no data	no data	no data
Sub-total (category 1 costs)					<i>no data</i>
<b>2. Land acquisition</b>					
Land purchase	98/99	ha	10	1943	19430
Legal and professional fees (Note 2)	98/99				780
Sub-total (category 2 costs)					<b>20210</b>
<b>3. Planning, assessment and design</b>					
<b>3.1 Legal and Planning</b>	not applicable				
<b>3.2 Technical feasibility</b>					
Hydrology survey	98/99	study	1	3000	3000
<b>3.3 Design proposals and management plan</b>					
Site design preparation	98/99	days	15	100	1500
Planning - Management Plan (Note 3)	98/99				
Sub-total (category 3 costs)					<b>4130</b>
<b>4. Implementation</b>					
<b>4.1 (a) Water management</b>					
Install sluice	98/99	sluice	1	320	320
Sub-total 4.1 (a) costs					<b>320</b>
<b>4.1 (b) Excavation and construction</b>					
Construct bank with clay core	98/99	m	700	11	7550
Dig new pools and ditches	98/99	hours	77	18	1420
Additional bund	98/99	m	400	7	2720
Sub-total 4.1 (b) costs					<b>11690</b>
<b>4.1 (c) Species and habitat management</b>					
Scrub removal	98/99	ha	2	3440	6880



	Year	Unit	No. of units	Cost/unit (£)	Total Cost (£)
Sub-total 4.1(c)					6880
<b>4.1 (d) Site Infrastructure</b>					
Sub-total 4.1 (d) costs	none undertaken				
<b>4.1 (e) Site supervision and other costs</b>					
Site supervision - senior warden	98/99	days	40	100	4000
Sub-total 4.1 (e) costs					4000
<b>4.2 Aftercare</b>	none undertaken				
General management	98/99				3330
Sub-total (category 4 costs)					26220
<b>5. Monitoring</b>					
Water level monitoring	98/99				3090
Sub-total (category 5 costs)					3090
<b>6. Additional costs</b>					
<b>6.1 Project management costs</b>					
Staff costs (60% of total) (Note 4)	98/99				12000
Office and operating costs	98/99				5000
<b>6.2 Opportunity cost (foregone revenue)</b>					
<b>6.3 Contingency cost</b>					
Sub-total (category 6 costs)					17000
<b>Total Cost</b>					70650
<b>7. Income</b>		none			
Total Cost (net of income)					70650
<b>Cost/hectare (10 ha)</b>					7065
<b>8. Other income (Grants)</b>					
EA grant for capital work					18,000

**Table 4.2 Summary of standard costs**

Cost stage/element	Standard Cost (£000)	Cost/ha	% of total cost
1. Setting objectives	No data	No data	No data
2. Land purchase	20.2	2020	29
3. Planning assessment and design	4.1	410	6
4.1 Habitat construction – water management	0.32	31	1
4.1 Site construction	11.6	116	16
4.1 Species management	6.8	680	10
4.1 Site supervision and general costs	4.0	400	6
4.2 Aftercare	3.3	330	5
5. Monitoring	3.0	310	4

Cost stage/element	Standard Cost (£000)	Cost/ha	% of total cost
6. Project management/additional costs	17.0	1690	24
<b>Total cost</b>	<b>70.6</b>	<b>7065</b>	
7. Income	0		
<b>Total cost (net of income)</b>	<b>70.6</b>		

**Note:** All data are in 1998 prices, excluding VAT. Income does not include grants.

## 5.2.2 Case study two - Lodmoor Reedbed

### 1. Project title: Lodmoor Reedbed (RSPB Reserve)

### 2. Rationale for habitat replacement

As this case study is not a replacement project the rationale for the replacement is not related to any specific site that was lost. The restoration of reedbed, however, does contribute to local and national Habitat Action Plan objectives and the RSPB's action plan for reedbeds.

### 3. Project description

The Lodmoor Reserve is a SSSI near to Weymouth in Devon. It is leased from the local authority on a peppercorn rent. The total area of the reserve leased from the council is 65 ha. Work at the Lodmoor reserve has involved the restoration of 12 ha of existing reedbed and the creation of an additional 13 ha in response to changing salinity within the coastal grazing marsh because of the failure of the coastal defences.

A bund has been constructed across the site to retain freshwater in the upper part of the reserve. This has allowed water to be retained on the existing reedbed and the flooding of 13 ha of grazing marsh for the creation of a new reedbed. The development of the new reedbed will occur through natural colonisation by reed from the field ditches.

The work has been undertaken in-house by RSPB reserve staff and through contractors. It has involved the construction of bunds, the re-profiling of ditches the excavation of pools and the installation of weirs and sluices.

### 4. Replacement objectives

*"To improve the quality and increase the area of reedbed with reference to the RSPB Habitat Action Plan".*

This objective does not set any species targets and is a simple habitat based objective. It does not consider wider environmental services specifically or other aspects of the biological importance of reedbeds, although it does refer to the RSPB Habitat Action Plan against which more specific targets could be measured. In particular the presence of target species such as bittern, reed warbler and sedge warbler will be used to judge the success of the project.

### 5. Habitat replacement costs

#### 5.1 Basis of Cost Data

##### *a. Sources of costs data*

All data used in the case study is based on actual costs provided by the site warden.

##### *b. The base price year*

The base price year for each cost element is shown in column two of the cost tables. For actual costs this is the year 1998/99.

## ***Lodmoor (contd.)***

### ***c. VAT***

All the costs exclude VAT.

### ***d. Rounding of figures***

Figures in the summary tables are rounded to the nearest £100.

### ***e. Actual and Standard costs***

The actual costs are those provided by the RSPB. Some of these are based on estimates of staff time used multiplied by a standard daily rate. Standard cost is £100/day.

### ***f. Time scales***

No specific aftercare time scale was established at the outset. A 3-year aftercare period has been used, although some work is on going. The monitoring time scale is set at 5 years.

### ***g. Agricultural subsidies***

Land prices and opportunity costs are not adjusted for agricultural subsidies.

## **5.2 Cost Tables**

The actual costs are presented in Appendix 1 and the standard costs in Table 5.1.

### ***5.2.1 Table Notes***

**Note 1:** There are no cost data available for the establishment of the objectives of the scheme.

**Note 2:** The site is leased on a peppercorn rent from the local council. For standard costs only, purchase costs are estimated. Legal and professional fees are included as 4%.

**Note 3:** The cost provided is a proportion of the cost for finalising the management plan for the whole reserve of which the reedbed is only part.

**Note 4:** The total cost provided is based on 3 years of monitoring.

**Note 5:** The project management costs in section 6.1 have been estimated because data were not available. The estimate is based on the annual cost for half a single full time 'project officer' (in reality this post will be comprised of time inputs from a number of different staff). The wage and overhead costs for this post is estimated at £20,000 a year at 1998 prices. It is assumed that 40% of this figure is already accounted for in the other cost elements or in the contribution to managing the rest of the reserve. Consequently 60% of the cost is shown under this cost element. Office and general operating costs are estimated to be £5,000. The project management costs only cover one year as the majority of the work was completed in this time frame.

### 5.2.2 Summary Tables

The actual costs are summarised in Appendix 1 and the standard costs are summarised in Table 5.2

### 5.3 Reliability of cost data

The data on habitat and site construction, land price and monitoring are based on actual costs provided by the site warden. The data on overall project management and other mainly staff time costs are based on annual salary costs.

**Table 5.1 Lodmoor Reedbed - Standard costs**

	Year	Unit	No. of units	Cost/unit (£)	Total Cost (£)
<b>1. Setting objectives</b>					
No data (Note 1)					
Sub-total (category 1 costs)					<i>no data</i>
<b>2. Land acquisition</b>					
Land purchase (Note 2)	1998/99	ha	25	2000	52000
Sub-total (category 2 costs)					<b>52000</b>
<b>3. Planning, assessment and design</b>					
<b>3.1 Legal and Planning</b>					
Planning permission fees	98/99				1000
<b>3.2 Technical feasibility</b>					
Flood risk study	98/99	study	1	1900	1900
Substrate and hydrology survey	98/99	study	1	600	600
<b>3.3 Design proposals and management plan</b>					
Site design preparation	98/99				1100
Planning - Management Plan (Note 3)	98/99				460
Staff costs with design and planning	98/99				940
Sub-total (category 3 costs)					<b>6000</b>
<b>4. Implementation</b>					
<b>4.1 (a) Water management</b>					
Regrade ditches	98/99	m3	1150	4.3	4950
Steel pile weir sluices	98/99	sluice	2	4000	8000
Culverts	98/99	culvert	3	67	200
Sub-total 4.1 (a) costs					<b>13150</b>

	Year	Unit	No. of units	Cost/unit (£)	Total Cost (£)
<b>4.1 (b) Excavation and construction</b>					
Strip bund footprint	98/99	m3	730	0.8	560
Excavation of bund trench	98/99	m3	1095	0.8	840
Fill trench with clay	98/99	m3	1095	4.3	4710
Build and profile bund	98/99	m3	2555	4	10990
Dig pools and profile	98/99	m3	400	2.5	1000
Sub-total 4.1 (b) costs					<b>18100</b>
<b>4.1 (c) Species and habitat management</b>		none	undertaken		
<b>4.1 (d) Site Infrastructure</b>					
Raise public cycle path	98/99				6000
Sub-total 4.1 (d) costs					<b>6000</b>
<b>4.1 (e) Site supervision and other costs</b>					
Site supervision - engineer	98/99	days	5	200	1000
Site supervision - staff time	98/99	days	30	100	3000
Sub-total 4.1 (e) costs					<b>4000</b>
<b>4.2 Aftercare</b>		none	undertaken		
Sub-total (category 4 costs)					<b>41250</b>
<b>5. Monitoring</b>					
Monitoring birds and water levels (Note 4)	98/99	days	10/yr	100	3000
Sub-total (category 5 costs)					<b>3000</b>
<b>6. Additional costs</b>					
<b>6.1 Project management costs</b>					
Staff costs (60% of total) (Note 5)	98/99				12000
Office and operating costs	98/99				5000
<b>6.2 Opportunity cost (foregone revenue)</b>					
Loss of grazing income (3 years)	98/99	ha	12.5	20	750
<b>6.3 Contingency cost</b>		not applicable			
Sub-total (category 6 costs)					<b>17750</b>
<b>Total Cost</b>					<b>120000</b>
<b>7. Income</b>		none			
Total Cost (net of income)					<b>120000</b>
<b>Cost/hectare (25 ha)</b>					<b>4800</b>
<b>8. Other income (Grants)</b>					
Grant - landfill tax					37000

**Table 5.2 Summary of standard costs**

Cost stage/element		Standard Cost (£000)	Cost/ha	% of total cost
1.	Setting objectives	No data	No data	No data
2.	Land purchase	52.0	2000	42
3.	Planning assessment and design	6.0	240	5
4.1	Habitat construction – water management	13.1	520	11
4.1	Site construction	18.1	680	14
4.1	Site infrastructure	6.0	240	5
4.1	Site supervision and general costs	4.0	160	3
5.	Monitoring	3.0	120	3
6.	Project management/additional costs	17.8	708	15
<b>Total cost</b>		<b>120.0</b>	<b>4800</b>	
7.	Income	0		
<b>Total cost (net of income)</b>		<b>120.0</b>		

**Note:** All data are in 1998 prices, excluding VAT. Income does not include grants.

### 5.2.3 Case study three - Mersehead Reedbed

#### 1. Project title: Mersehead Reedbed (RSPB Reserve)

#### 2. Rationale for habitat replacement

As this case study is not a replacement project the rationale for the replacement is not related to any specific site that was lost. The creation of reedbed on this site contributes to local and national Habitat Action Plan objectives.

#### 3. Project description

The creation of the Mersehead reserve in Dumfriesshire began in 1994 and is ongoing. The site is comprised of lowland wet grassland, mudflats, saltmarsh and reedbed. The grassland and reedbed habitats have been created from intensively managed arable farmland. This case study considers the reedbed area, alone which occupies 20 ha of the site.

The work has been undertaken in-house by RSPB reserve staff and through contractors. All the work has been the creation of reed bed from drained and intensively managed arable farmland.

#### 4. Replacement objectives

*“To create a reedbed that will support breeding bittern”*

This objective has a clear species and habitat objective. It does not consider wider environmental services specifically or other aspects of the biological importance of reedbeds.

#### 5. Habitat replacement costs

##### 5.1 Basis of Cost Data

###### *a. Sources of costs data*

All data used in the case study is based on actual costs provided by the site warden.

###### *b. The base price year*

The base price year for each cost element is shown in column two of the cost tables. For actual costs this ranges from 1994 to 1998. All standard costs are expressed for the year 1998/99.

###### *c. VAT*

All the costs exclude VAT.

###### *d. Rounding of figures*

Figures in the summary tables are rounded to the nearest £100.



## ***Mersehead Reserve (contd.)***

### ***e. Actual and Standard costs***

The actual costs are those provided by the RSPB. Some of these are based on estimates of staff time used multiplied by a standard daily rate for staff. A standard of £100/day is used. The other standard costs are derived from the actual costs using the GDP deflator index.

### ***f. Time scales***

No specific aftercare time scale was established at the outset. Following discussion with the site warden, however, a 3-year aftercare period has been used, although some work is on-going over a 10-year period. The monitoring time scale is set at 10 years to reflect the time over which the reedbed will be established and the long-term objective of attracting bittern to the site.

### ***g. Agricultural subsidies***

Land prices and opportunity costs are not adjusted for agricultural subsidies.

## **5.2 Cost Tables**

The actual costs are presented in Appendix 1 and the standard costs in Table 6.1.

### ***5.2.1 Table Notes***

**Note 1:** There are no cost data available for the establishment of the objectives of the scheme.

**Note 2:** On the basis of a sample of RSPB purchases, land valuation, legal and professional fees (excluding in-house costs) are estimated at 2% of land purchase prices for purchases exceeding 40K. However, a higher percentage would apply to smaller purchases or large purchases made up of a number of smaller purchases. Consequently, a figure of 4% has been used to estimate professional fees.

**Note 3:** As part of a larger site it is not possible to provide an actual cost for the production of a management plan. A standard cost of £2000 has been used.

**Note 4:** There has been no need for water management. Water empties into the site from an adjacent ditch by gravity. A simple sluice allows water into the site, but no data were provided for the cost of this item. A standard cost at 1998/99 prices adjusted to reflect 1995 prices is included. There are no abstraction fees and the volume of water held on the site is below the minimum amount to bring the site under the Reservoirs Act.

**Note 5:** The costs include the purchase price of the Hymac excavator and staff time to operate the machine.

**Note 6:** Reed has been grown from seed in a polytunnel on the reserve. The cost includes equipment such as butyl liners, seed trays and compost. Reed growing and planting will continue for 10 years consequently the annual cost has been multiplied by 10.

### ***Mersehead Reserve (contd.)***

**Note 7:** The cost is the time taken by volunteers to tend the seed trays in the polytunnel. Full time staff costs would be higher and has been used to calculate standard costs. Reed growing and planting will continue for 10 years consequently the annual cost has been multiplied by 10.

**Note 8:** The planting cost is based on an annual working party of volunteers. The cost would be higher for full time staff or contractors which have been used to calculate standard costs. Reed growing and planting will continue for 10 years consequently the annual cost has been multiplied by 10.

**Note 9:** The cost of supervising the planting of reed is based on 2 staff for 2 days each year over a 10-year period.

**Note 10:** Aftercare costs are based on a 3-year period as the work involves the maintenance of structures installed at the start of the project.

**Note 11:** Monitoring costs will continue for 10 years consequently the annual cost has been multiplied by 10.

**Note 12:** The project management costs in section 6.1 have been estimated because data were not available. The estimate is based on the annual cost for half a single full time 'project officer' (in reality this post will be comprised of time inputs from a number of different staff). The wage and overhead costs for this post is estimated at £20,000 a year at 1998 prices. This figure has been revised to reflect 1995 prices. It is assumed that 40% of this figure is already accounted for in the other cost elements or is accounted for in the management of other areas of the reserve. Consequently 60% of the cost is shown under this cost element. Office and general operating costs are estimated to be £5,000. The costs for 3 years are provided to reflect the principal establishment period.

#### ***5.2.2 Summary Tables***

Actual costs are summarised in Appendix 1 and Standard costs in Table 6.2.

### **5.3 Reliability of cost data**

The data on habitat and site construction, land price and monitoring are based on actual costs provided by the site warden. The data on overall project management and other mainly staff time costs are based on annual salary costs.

**Table 6.1 Mersehead Reedbed - Standard costs**

	Year	Unit	No. of units	Cost/unit (£)	Total Cost (£)
<b>1. Setting objectives</b>					
No data (Note 1)		no data	no data	no data	no data
Sub-total (category 1 costs)					no data
<b>2. Land acquisition</b>					
Land purchase	98/99	ha	12	1920	23,310
Legal and professional fees (Note 2)	98/99				930
Sub-total (category 2 costs)					<b>24,240</b>
<b>3. Planning, assessment and design</b>					
<b>3.1 Legal and Planning</b>	98/99	sluice	1	316.35	320
<b>3.2 Technical feasibility</b>					
Hydrological survey	98/99	survey	1	2220	2220
<b>3.3 Design proposals and management plan</b>					
Site design preparation	98/99	days	2	100	220
Planning - Management Plan (Note 3)	98/99	Plan	1	2000	2000
Sub-total (category 3 costs)					<b>4760</b>
<b>4. Implementation</b>					
<b>4.1 (a) Water management (Note 4)</b>	98/99	sluice	1	320	320
<b>4.1 (b) Excavation and construction</b>					
Construct bund (Note 5)	98/99	m	2000	5.3	10550
Sub-total 4.1 (b) costs					<b>10870</b>
<b>4.1 (c) Species and habitat management</b>					
Seed growing equipment (Note 6)	98/99				4800
Staff time (Note 7)	98/99	days	24/yr	100	24000
Planting (Note 8)	98/99	days	20/yr	100	20000
Sub-total 4.1 (c) costs					<b>48800</b>
<b>4.1 (d) Site Infrastructure</b>		none	undertaken		
<b>4.1 (e) Site supervision and other costs</b>					
Supervision of planting (Note 9)	98/99	days	4/yr	100	4000
Sub-total 4.1 (e) costs					<b>4000</b>
<b>4.2 Aftercare (Note 10)</b>					
Bund maintenance	98/99				2000
Water level control	98/99				1000
Sub-total 4.2 costs					<b>3000</b>
Sub-total (category 4 costs)	98/99				<b>66670</b>
<b>5. Monitoring</b>					
Water level and bird monitoring (Note 11)	98/99	survey	1/yr	777	7770
Sub-total (category 5 costs)					<b>7770</b>

	Year	Unit	No. of units	Cost/unit (£)	Total Cost (£)
<b>6. Additional costs</b>					
<b>6.1 Project management costs</b>					
Staff costs (Note 12)	98/99				36000
Office operating costs	98/99				15000
<b>6.2 Opportunity cost (foregone revenue)</b>					
Loss of grazing income (3 years)	98/99	ha	20	390	23400
<b>6.3 Contingency cost</b>		not	applicable		
Sub-Total (category 6 costs)					<b>74400</b>
<b>Total Cost</b>					<b>177840</b>
<b>7. Income</b>		none			
Total Cost (net of income)					<b>177840</b>
<b>Cost/hectare (20 ha)</b>					<b>8892</b>
<b>8. Other income (Grants)</b>					
Habitat Scheme (10 yrs)	95/96	ha	20	260/yr	52000

**Table 6.2 Summary of standard costs**

Cost stage/element	Standard Cost (£000)	Cost/ha	% of total cost
1. Setting objectives	No data	No data	No data
2. Land purchase	24.2	1210	14
3. Planning assessment and design	4.7	235	3
4.1 Habitat construction – water management	0.32	16	1
4.1 Site construction	10.8	540	6
4.1 Species management	48.8	2440	27
4.1 Site supervision and general costs	4.0	200	2
4.2 Aftercare	3.0	150	2
5. Monitoring	7.7	385	4
6. Project management/additional costs	74.4	3720	42
<b>Total cost</b>	<b>177.8</b>	<b>8892</b>	
7. Income	0		
<b>Total cost (net of income)</b>	<b>177.8</b>		

**Note:** All data are in 1998 prices, excluding VAT. Income does not include grants.

## 5.2.4 Case study four - Stodmarsh National Nature Reserve

### 1. Project title: Stodmarsh NNR

### 2. Rationale for habitat replacement

As this case study is not a replacement project the rationale for the replacement is not related to any specific site that was lost. The creation of reedbed on this site contributes to local and national Habitat Action Plan objectives.

### 3. Project description

This is a creation project. The site was originally a drained floodplain on the River Great Stour in Kent. Mining subsidence from the nearby Chislet Colliery led to water-logging and the development of marsh. Reed colonised the wetter areas from the adjacent river and ditches. This project allowed an additional clay bund to be constructed in 1985 to enable water level control over an area of approximately 30 hectares. The ditch network within the site was not considered to be good enough to encourage breeding bittern and in 1994/95 work began on re-profiling ditches and constructing lakes and new ditches. The new area of reedbed will complement the existing 49 hectares within the site that is 166 hectares in total.

### 4. Replacement objectives

*To manage and enhance the wildlife value of the site. To improve the ditches as a feeding habitat for bitterns (Hawke and Jose, 1996).*

### 5. Habitat replacement costs

#### 5.1 Basis of Cost Data

##### *a. Sources of costs data*

All data used in the case study is based on actual costs provided by the site warden.

##### *b. The base price year*

The base price year for each cost element is shown in column two of the cost tables. For actual costs this ranges from 1995 to 1998. All standard costs are expressed for the year 1998/99.

##### *c. VAT*

All the costs exclude VAT.

##### *d. Rounding of figures*

Figures in the summary tables are rounded to the nearest £100.

##### *e. Actual and Standard costs*

The actual costs are those provided by English Nature. Some of these are based on estimates of staff time used multiplied by a standard daily rate for staff. A standard of £100/day is used. The other standard costs are derived from the actual costs using the GDP deflator index.

***Stodmarsh (contd.)***

***f. Time scales***

No specific aftercare time scale was established at the outset. A 3-year aftercare period has been used, although some work is on-going over a 10-year period. The monitoring time scale is set at 10 years to reflect the time over which the reedbed will be established.

***g. Agricultural subsidies***

Land prices and opportunity costs are not adjusted for agricultural subsidies.

**5.2 Cost Tables**

The actual costs are presented in Appendix 1 and the standard costs in Table 7.1.

**5.2.1 Table Notes**

**Note 1:** There are no cost data available for the establishment of the objectives of the scheme.

**Note 2:** On the basis of a sample of similar RSPB purchases, land valuation, legal and professional fees (excluding in-house costs) are estimated at 2% of land purchase prices for purchases exceeding 40K.

**Note 3:** The costs for this work include 9000 metres of ditch re-profiling and digging bays, digging new ditches and bunding work (4 kilometres), putting in 21 culverts, 3 dams, 10 water level pipes, planting reed, constructing scrapes and extending a lake.

**Note 4:** The cost of planting reed could not be separated from other contractor costs and is included under water management costs.

**Note 5:** There are no cost data available for the aftercare work.

**Note 6:** Monitoring costs will continue for 10 years. Consequently the annual cost has been multiplied by 10. The aerial photography is assumed to be undertaken every 3 years thus the figure has been multiplied by 3 to cover the 10 year period. The bird and water level monitoring costs are based on data for a similar site at Mersehead. No actual data were available.

**5.2.2 Summary Tables**

The actual costs are summarised in Appendix 1 and the standard costs are summarised in Table 7.2.

**5.3 Reliability of cost data**

The data on habitat and site construction, land price and monitoring are based on actual costs provided by the site warden. The data on overall project management and other mainly staff time costs are based on annual salary costs.

**Table 7.1 Stodmarsh NNR - Standard costs**

	Year	Unit	No. of units	Cost/unit (£)	Total Cost (£)
<b>1. Setting objectives</b>					
No data (Note 1)		no data	no data	no data	no data
Sub-total (category 1 costs)					<b>no data</b>
<b>2. Land acquisition</b>					
Land purchase	98/99	ha	30	3143	94,284
Legal and professional fees (2% of total) (Note 2)	98/99				1,886
Sub-total (category 2 costs)	98/99				<b>96,170</b>
<b>3. Planning, assessment and design</b>					
<b>3.1 Legal and Planning</b>					
Planning application (change of land use)	98/99	application	1	605	605
Impoundment licence + adverts	98/99	licence	1	548	548
Abstraction licence + adverts	98/99	licence	1	548	548
Site manager time on planning	98/99	days	5	163	815
<b>3.2 Technical feasibility</b>					
Levelling survey	98/99	survey	1	1080	1080
Aerial survey	98/99	survey	1	1333	1333
Invertebrate survey	98/99	survey	1	540	540
Flora survey	98/99	survey	1	562	562
<b>3.3 Design proposals and management plan</b>					
Site design preparation	98/99	days	15	163	2446
Planning – Management Plan	98/99	plan	1	2192	2192
Sub-total (category 3 costs)	98/99				<b>10668</b>
<b>4. Implementation</b>					
<b>4.1 (a) Water management</b>					
Construct wooden stop board sluice	98/99	sluice	1	3478	3478
Install main flap valve in main water supply	98/99	valve	1	2160	2160
Plastic pipes 400mm, flap valves etc - materials	98/99	materials	-	-	4697
3 yr ditching, bunding and reed planting (Note 3)	98/99	-	-	-	26730
Ditch digging and re-profiling etc. (2000m)	98/99	metre	2000	1.5	3090
Repair drop board sluice to assist water supply	98/99	sluice	-	-	6156
Sub-total 4.1 (a) costs	98/99				<b>46310</b>
<b>4.1 (b) Excavation and construction</b>					
Lake excavation (2500m <sup>3</sup> ) & bunding (400m)	98/99	lake	1	5040	5040
Lake excavation (6000m <sup>3</sup> ) & bunding (925m)	98/99	lake	1	12768	12768
Lake excavation (5000m <sup>3</sup> ) transport & dump spoil	98/99	lake	1	12390	12390

	<b>Year</b>	<b>Unit</b>	<b>No. of units</b>	<b>Cost/unit (£)</b>	<b>Total Cost (£)</b>
Bank construction	98/99	bank	-	-	10185
Sub-total 4.1 (b) costs	98/99				<b>40383</b>
<b>4.1 (c) Species and habitat management (Note 4)</b>					
<b>4.1 (d) Site Infrastructure</b>					
Fencing for cattle/gates for public etc.	98/99	materials	-	-	2781
Sub-total 4.1 (d) costs	98/99				<b>2781</b>
<b>4.1 (e) Site supervision and other costs</b>					
Estate worker	98/99	days	70	74	5145
Ecological supervision - Chief scientist team	98/99	days	2	187	374
Bund to prevent flooding adjacent land (300m)	98/99	metres	300	1	284
Installation of pipe to cope with flooding	98/99	pipe	1	494	494
Ecological supervision - conservation officer	98/99	days	2	137	273
Sub-total 4.1 (e) costs	98/99				<b>6569</b>
<b>4.2 Aftercare (Note 5)</b>					
Sub-total (category 4 costs)	98/99				<b>96043</b>
<b>5. Monitoring (Note 6)</b>					
Bird and water level monitoring	98/99	survey	1	500	5000
Aerial survey	98/99	survey	3	1174	3523
Sub-total (category 5 costs)					<b>8523</b>
<b>6. Additional costs</b>					
<b>6.1 Project management costs</b>					
Site manager - project management	98/99	days	100	159	15855
<b>6.2 Opportunity cost (foregone revenue)</b>					
Loss of grazing income (over 3 years)	98/99				4980
<b>6.3 Contingency cost</b>					
Sub-Total (category 6 costs)	98/99				<b>20835</b>
<b>Total Cost</b>	98/99				<b>232239</b>
<b>7. Income</b>					none
Total Cost (net of income)					<b>2322390</b>
<b>Cost/hectare (30 ha)</b>	98/99				<b>7741</b>
<b>8. Other income (Grants)</b>					
Heritage Lottery Grant for land purchase					130,000



**Table 7.2 Summary of standard costs**

<b>Cost stage/element</b>		<b>Standard Cost (£000)</b>	<b>Cost/ha</b>	<b>% of total cost</b>
1.	Setting objectives	no data	no data	no data
2.	Land purchase	96.2	3200	41
3.	Planning assessment and design	10.7	356	5
4.1	Habitat construction – water management	46.3	1543	20
4.1	Site construction	43.2	1439	19
4.1	Species management	-	-	-
4.1	Site supervision and general costs	6.6	220	3
4.2	Aftercare	-	-	-
5.	Monitoring	8.5	283	4
6.	Project management/additional costs	20.8	693	9
<b>Total cost</b>		<b>232.3</b>	<b>7741</b>	
7.	Income	-		
<b>Total cost (net of income)</b>		<b>232.3</b>		

**Note:** All data are in 1998 prices, excluding VAT. Income does not include grants.

### 5.2.5 Discussion

The four case studies represent restoration of an existing, but degraded reedbed (Plas Bog), restoration of a neglected reedbed and creation by natural colonisation (Lodmoor), creation of a reedbed from arable land (Mersehead) and creation of new reedbed within an existing site (Stodmarsh). As such they broadly represent the range of approaches that could be taken to replacing a reedbed habitat. Although reedbed creation is represented in the case studies for Mersehead and Stodmarsh, none, however, represent a reedbed creation scheme entirely from scratch that requires the full range of methods that can and have been used to create reedbeds. Consequently the cost/ha of these schemes should be treated with caution if a replacement scheme does require this level of input.

The different approaches to reedbed creation and restoration adopted in the case studies are reflected in the cost/ha of each project. The Mersehead reserve is the most expensive with a standard cost of £8900/ha (rounded figure) and this is despite a cheaper land purchase cost/ha than the three other case studies. Stodmarsh is the next most expensive with a standard cost of £7700/ha (rounded figure). Plas Bog reserve is the next most expensive with a standard cost of £7000/ha (rounded figure). The Lodmoor reserve is the cheapest with a standard cost £4800/ha (this is with an assumed land purchase cost of £2000/ha).

Although the total costs vary from site to site the proportion of the costs in each case study in percentage terms are similar. For example, for Plas Bog 33% of the total cost are incurred by the physical management/construction of the reserve. This figure is 36% for Lodmoor, 38% for Mersehead and 42% for Stodmarsh. The costs themselves, however, are different which reflects the different scale and methods used in the case studies. The cost/ha for the physical management/construction of the reserve for Stodmarsh is £3202/ha, Mersehead is £3196/ha, for Lodmoor it is £1600/ha and for Plas Bog it is £1227/ha. The higher cost for the Mersehead reserve is the high cost (£2440/ha) of planting reed whilst for Stodmarsh it is due to the physical construction costs of excavating lakes and ditches and constructing bunds. These costs are not incurred to the same degree at Plas Bog because it is a restoration project and the creation at Lodmoor relies on natural regeneration. Future replacement schemes for reedbed are likely to require creation of sites as most of the major reedbed sites will soon have been restored (pers. com. A. Brown, English Nature).

**Although the case studies provide general guidance on the cost of creating or restoring reedbed, it should be recognised in all the case studies the 'real' cost per hectare may be higher than that presented. This is because several areas of cost such as the cost of setting objectives or the cost of professional fees associated with planning were not available for inclusion in this report.**

Greater costs may also be incurred in circumstances different from those described in the case studies by the need to adopt alternative approaches to habitat replacement. For example, none of the case studies have used planting of reeds supplied on a commercial basis and this may greatly affect the costing of a habitat replacement project. The commercial supply and planting of pot grown reed is estimated to be between £5,000 and £6,000/ha (this figure is based on a 1995 estimate of £5,000/ha provided by the Wildfowl and Wetlands Trust). If this approach had been adopted at Mersehead, for example, even to plant up 15 ha of the 20 ha, the commercial cost could have been as high as £90,000 compared to the £49,000 calculated in the standard costs for the case study. However, this method tends not to be used now as easier methods of propagation

have been developed. If a replacement project required the same degree of site construction as that at Stodmarsh and extensive reed planting then the cost per hectare could be significantly higher than either Stodmarsh or Mersehead.

Land purchase cost has not been as significant a cost element as for other habitat types, in particular, wet grassland. For the Plas Bog and Mersehead cases studies the percentage of the total cost is particularly low comprising 29% and 14% respectively of the total cost. For the Lodmoor reserve, which even if purchased at £2000/ha, then land purchase would have been 45% of the total cost and at Stodmarsh land purchase costs comprised 41% of the total cost. These percentages are significantly lower than the proportion of the total cost incurred for the coastal and floodplain grazing marsh case studies where land purchase costs made up 80 to 83 % of the total cost. The lower percentage may reflect the relatively lower value of land that is either already wet and therefore unproductive compared to the value of arable or improved grazing land and/or the higher costs of converting such land to reedbed compared to wet grassland.

The project management costs for the case studies have ranged from 10% (Stodmarsh) to 28% (Mersehead). These costs vary in the proportion of the total cost due to the scale of works required compared to basic project management costs that are principally staff costs and the different ways the case studies were delivered. The mechanism by which a replacement scheme is delivered may have a significant impact on the overall costs. Whatever way a scheme is delivered, it is likely that project management will be needed that will require significant staff time and office and support facilities over a number of years.

**The case studies presented in this report were attempting to achieve relatively simple replacement objectives. For example, they do not include works aimed at developing species-rich invertebrate assemblages, other than through general habitat enhancement and creation. Some habitat replacement schemes may require the translocation of a particular species or community of plant, invertebrate or other fauna from the site to be lost to the replacement site. This requirement could incur significant trapping, husbandry, engineering and aftercare and monitoring costs. Consequently, where there are more complex nature conservation objectives (i.e. birds, invertebrates and plants) or where broader environmental objectives are set, the cost of a scheme is likely to be higher than that presented in the case studies. If species and habitat translocation is required for a habitat replacement scheme the cost of this type of work would also be significantly higher than the per hectare costs presented in the case studies.**

## 5.3 Coastal lagoons

Two case studies of coastal lagoon creation are described below in the proposed format for presenting HRC data.

### 5.3.1 Case study one - ICI Brinefields Lagoon

#### 1. Project title: ICI Brinefields Lagoon (INCA)

#### 2. Rationale for habitat replacement

As this case study is not a replacement project the rationale for the replacement is not related to any specific site that was lost. The creation of a coastal lagoon on this site contributes to local and national Habitat Action Plan objectives.

#### 3. Project description

This project involved the creation of a 1.4 ha lagoon in grassland beneath which there was brine extraction. The site is within an industrial complex adjoining the Teesmouth and Cleveland Coast SPA and Ramsar site. The hydrological issues associated with the project are complex owing to the use of the area as a brinefield and because of the need to achieve the appropriate water supply and salinity requirements.

The project management has involved: assembling the financial package; obtaining statutory consents and approvals; negotiations with the industrial landowner; commissioning design and site supervision to include (CDM) Regulations; engineering and industrial safety; and obtaining tenders and letting contracts.

The creation of a lagoon has been achieved through the excavation and disposal of spoil and the installation of a culvert through the sea wall to provide a water supply and drainage. The Industry and Nature Conservation Association (INCA) in conjunction with local industry and English Nature, have planned the work. INCA have provided site supervision.

The creation of a coastal lagoon may be constrained by a number of factors, especially if a particular degree of salinity is part of the objective of the creation project. Other problems may include control of water supply and quality. If the appropriate conditions are not achieved the desired invertebrate or bird communities may not be achieved.

#### 4. Replacement objectives

The success of the creation project has been judged on the area of water body created and the achievement of the design specification in terms of depth and gradient. The lagoon has been designed specifically for invertebrate communities and for birds.

***ICI Brinefields Lagoon (contd.)***

**5. Habitat replacement costs**

**5.1 Basis of Cost Data**

***a. Sources of costs data***

All data used in the case study is based on actual costs provided by INCA.

***b. The base price year***

The base price year for each cost element is shown in column two of the cost tables. For actual costs this is 1998/99.

***c. VAT***

All the costs exclude VAT.

***d. Rounding of figures***

Figures in the summary tables are rounded to the nearest £100

***e. Actual and Standard costs***

The actual costs are those provided by INCA. Some of these are based on estimates of staff time used multiplied by a standard daily rate for staff. The standard costs in this case study are the same as the actual costs as the data is from the year 1998/99 and voluntary labour costs have not been used, except for labour costs (@£100/day).

***f. Time scales***

No specific aftercare time scale was established at the outset. A 3-year aftercare period has been used to calculate this cost element.

***g. Agricultural subsidies***

Not relevant for this case study

**5.2 Cost Tables**

The actual costs are presented in Appendix 1 and the standard costs in Table 8.1.

***5.2.1 Table Notes***

**Note 1:** There are no cost data available for the establishment of the objectives of the scheme.

**Note 2:** Land purchase costs are approximate and based on an estimate of the value of the land provided by INCA plus 4% for legal and professional fees.

**Note 3:** No costs for a site management plan were available.

**Note 4:** As the site is within an industrial complex specific health and safety training was required for staff.

### **ICI Brinefields Lagoon (contd.)**

**Note 5:** Birds are monitored on site, but this is part of the WeBS monitoring scheme for the whole of the SPA and Ramsar site. The work is undertaken by volunteers and no cost is provided.

**Note 6:** Water level monitoring was undertaken for 3 months to ensure the valve through the sea wall was set at an appropriate level to achieve the desired water levels and tidal influence.

**Note 7:** This is the total cost of managing the project by INCA. It is not possible to break the total figure down, but it is principally staff costs.

**Note 8:** It is unknown what the actual grazing income from the site is, but it will be small compared to the total cost of the project.

#### **5.2.2 Summary Tables**

The actual costs are summarised in Appendix 1 and the standard costs are summarised in Table 8.2.

#### **5.3 Reliability of cost data**

The data on habitat and site construction, land price and monitoring are based on actual costs provided by INCA. INCA bases the data on detailed project recording of expenditure.

**Table 8.1 ICI Brinefields - Standard costs**

	<b>Year</b>	<b>Unit</b>	<b>No. of units</b>	<b>Cost/unit (£)</b>	<b>Total Cost (£)</b>
<b>1. Setting objectives</b>					
No data (Note 1)		no data	no data	no data	no data
Sub-total (category 1 costs)					<i>no data</i>
<b>2. Land acquisition</b>					
Land purchase - grazing (Note 2)	98/99	ha	1.4	2500	3640
Sub-total (category 2 costs)					<b>3640</b>
<b>3. Planning, assessment and design</b>					
<b>3.1 Legal and Planning</b>					
Feasibility study and funding submission	98/99				5810
<b>3.3 Design proposals and management plan</b>					
Site design preparation	98/99				1400
Planning – Management Plan (Note 3)		no	data		no data
Sub-total (category 3 costs)					<b>7210</b>
<b>4. Implementation</b>					
<b>4.1 (a) Water management</b>					
Culvert construction	98/99	culvert	1	4500	4500
Sub-total 4.1 (a) costs					<b>4500</b>

	Year	Unit	No. of units	Cost/unit (£)	Total Cost (£)
<b>4.1 (b) Excavation</b>					
Excavation of spoil and disposal	98/99	m3	20000	2.2	44000
Island construction	98/99	island	1	2000	2000
Sub-total 4.1 (b) costs					<b>46000</b>
<b>4.1 (c) Species and habitat translocations</b>	none undertaken				
<b>4.1 (d) Site Infrastructure</b>					
Gabion construction	98/99	gabion	unknown	unknown	700
Sub-total 4.1 (d) costs					<b>700</b>
<b>4.1 (e) Site supervision and other costs</b>					
Site supervision	98/99	days	80	100	8000
Safety supervision (Note 4)	98/99				6240
Sub-total 4.1 (e) costs					<b>14,240</b>
<b>4.2 Aftercare</b>	none undertaken				
Checking water levels	98/99	hr	30	33.3	1000
Sub-total 4.2 costs					<b>1000</b>
Sub-total (category 4 costs)					<b>66440</b>
<b>5. Monitoring</b>					
Monitoring	none undertaken				
Birds (Note 5)					
Invertebrates	98/99	survey	annual/ 3 yrs	1000/yr	3000
Sub-total (category 5 costs)					<b>3000</b>
<b>6. Additional costs</b>					
<b>6.1 Project management costs</b>					
Staff costs (Note 7)	98/99	days	32	100	3200
<b>6.2 Opportunity cost (foregone revenue)</b>					
Loss of grazing income (Note 8)	98/99				
<b>6.3 Contingency cost</b>	not applicable				
Sub-total (category 6 costs)					<b>3200</b>
<b>Total Cost</b>					<b>83490</b>
<b>7. Income (Negative Cost)</b>	not applicable				
Total Cost (net of income)					<b>83490</b>
<b>Cost/hectare (1.4 ha)</b>					<b>59636</b>
<b>8. Other income (Grants)</b>					
Grant - English Nature					25000
Grant - Landfill Tax					84000
Sub total (category 8 costs)					<b>109,000</b>

**Table 8.2 Summary of standard costs**

Cost stage/element		Standard Cost (£000)	Cost/ha	% of total cost
1.	Setting objectives	No data	No data	No data
2.	Land purchase	3.6	2600	4
3.	Planning assessment and design	7.2	5100	9
4.1	Habitat construction – water management	4.5	3200	5
4.1	Site construction	46.7	33400	56
4.1	Site supervision and general costs	14.2	10100	17
4.2	Aftercare	1.0	700	1
5.	Monitoring	3.0	2100	4
6.	Project management/additional costs	3.2	2300	4
<b>Total Cost</b>		<b>83.4</b>	<b>59600</b>	
7.	Income	0		
<b>Total Cost (net of income)</b>		<b>83.4</b>		

**Note:** All data are in 1998 prices, excluding VAT. Income does not include grants.



### 5.3.2 Case study two - Salthouse Lagoon

#### 1. Project title: Salthouse Lagoon (English Nature)

#### 2. Rationale for habitat replacement

As this case study is not a replacement project the rationale for the replacement is not related to any specific site that was lost. The creation of a coastal lagoon on this site contributes to local and national Habitat Action Plan objectives.

#### 3. Project description

The creation of a coastal lagoon may be constrained by a number of factors especially if a particular degree of salinity is part of the objective of the creation project. Other problems may include control of water supply and quality.

The creation of the lagoon has been achieved through the excavation and disposal of spoil and the construction of bunds and sluices.

The work has been planned and supervised by English Nature staff, who are also responsible for the management of the remainder of the reserve. Contractors have been used to undertake certain works such as construction work and volunteers and site staff have also implemented some works.

#### 4. Replacement objectives

*"To create a permanent saline lagoon and to enhance associated ditch systems".*

This objective does not set any species targets and has a very simple habitat objective. This objective does not consider wider environmental services specifically or other aspects of the biological importance of coastal lagoons.

#### 5. Habitat replacement costs

##### 5.1 Basis of Cost Data

###### *a. Sources of costs data*

All data used in the case study is based on actual costs provided by English Nature.

###### *b. The base price year*

The base price year for each cost element is shown in column two of the cost tables. For actual costs this is 1997.

###### *c. VAT*

All the costs exclude VAT.

###### *(d) Rounding of figures*

Figures in the summary tables are rounded to the nearest £100.

## ***Salthouse Lagoon (contd.)***

### ***e. Actual and Standard costs***

The actual costs are those provided by English Nature. Some of these are based on estimates of staff time used multiplied by a standard daily rate for staff. Standard costs for staff are £100/day. The other standard costs are derived from the actual costs using the GDP deflator index.

### ***f. Time scales***

No specific aftercare time scale was established at the outset. A 3-year aftercare period has been used to calculate this cost element.

### ***g. Agricultural subsidies***

Not relevant.

## **5.2 Cost Tables**

The actual costs are summarised in Appendix 1 and standard costs are summarised in Table 9.1.

### **5.2.1 Table Notes**

**Note 1:** There are no cost data available for the establishment of the objectives of the scheme.

**Note 2:** No costs for a site management plan were available.

**Note 3:** The cost of wardening as been calculated for a 3-year period.

**Note 4:** The cost of monitoring breeding birds is calculated on a 3 year monitoring period for the project.

**Note 5:** The loss of income resulting from removal of the area from Countryside Stewardship is based on the foregone revenue over a 3-year period.

**Note 6:** Land purchase figures were not available. The cost has been estimated on a cost of £2500/ha plus 4% for legal and professional fees.

### **5.2.2 Summary Tables**

The actual costs are presented in Appendix 3 and the standard costs in Table 9.2.

## **5.3 Reliability of cost data**

The data on habitat and site construction, land price and monitoring are based on actual costs provided by English Nature. The data on overall project management etc. are mainly staff time costs, based on annual salary costs.

**Table 9.1 Salthouse Lagoon - Standard costs**

	Year	Unit	No. of units	Cost/unit (£)	Total Cost (£)
<b>1. Setting objectives</b>					
No data (Note 1)		no data	no data	no data	no data
Sub-total (category 1 costs)					<i>no data</i>
<b>2. Land acquisition</b>					
Land purchase (Note 6)		ha	1.5	2500	3900
Sub-total (category 2 costs)					<b>3900</b>
<b>3. Planning, assessment and design</b>					
<b>3.1 Legal and Planning</b>		not applicable			no data
<b>3.2 Technical feasibility</b>		not applicable			no data
<b>3.3 Design proposals and management plan</b>					
Site design preparation	98/99	days	2	100	200
Planning – Management Plan (Note 2)		not available			no data
Sub-total (category 3 costs)					<b>200</b>
<b>4. Implementation</b>					
<b>4.1 (a) Water management</b>					
Construction of bunds and sluices	98/99	Bund/sluice	8	103	820
Sub-total 4.1 (a) costs					<b>820</b>
<b>4.1 (b) Excavation</b>					
Excavation of spoil and disposal	98/99	ha	1.5	1800	2700
Sub-total 4.1 (b) costs					<b>2700</b>
<b>4.1 (c) Species and habitat translocations</b>		none undertaken			
<b>4.1 (d) Site Infrastructure</b>		none undertaken			
<b>4.1 (e) Site supervision and other costs</b>					
Site supervision	98/99	days	8	100	800
Sub-total 4.1 (e) costs					<b>800</b>
<b>4.2 Aftercare</b>		none	undertaken		
Wardening to reduce disturbance (Note 3)	98/99				360
Sub-total 4.2 aftercare costs					<b>360</b>
Sub-total (category 4 costs)					<b>4680</b>
<b>5. Monitoring</b>					
Monitoring - breeding bird survey (Note 4)	98/99	days	2	100	600
Sub-total (category 5 costs)					<b>600</b>
<b>6. Additional costs</b>					
<b>6.1 Project management costs</b>					
Staff costs	98/99	days	3	100	300
<b>6.2 Opportunity cost (foregone revenue)</b>					
Loss of Countryside Stewardship income (Note 5)	98/99				320

	Year	Unit	No. of units	Cost/unit (£)	Total Cost (£)
<b>6.3 Contingency cost</b>	not applicable				
Sub-total (category 6 costs)					<b>620</b>
<b>Total Cost</b>					<b>10,000</b>
<b>7. Income</b>		none			
Total Cost (net of income)					<b>10,000</b>
<b>Cost/hectare (1.5 ha)</b>					<b>6666</b>
<b>8. Other income (Grants)</b>					
Grant – English Nature					4600

**Table 9.2 Summary of standard costs**

Cost stage/element	Standard Cost (£000)	Cost/ha	% of total cost
1. Setting objectives	No data	No data	No data
2. Land purchase	3.9	2500	37
3. Planning assessment and design	0.20	130	2
4.1 Habitat construction – water management	0.82	530	8
4.1 Site construction	2.7	1800	27
4.1 Site supervision and general costs	0.8	530	8
5. Monitoring	0.36	267	4
4.2 Aftercare	0.6	400	6
6.1 Project management costs	0.62	413	6
<b>Total cost</b>	<b>10</b>	<b>6700</b>	
7. Income – aftercare grazing income	0		
<b>Total Cost (net of income)</b>	<b>10</b>		

**Note:** All data are in 1998 prices, excluding VAT. Income does not include grants.

### 5.3.3 Discussion

There are not many examples of the creation of coastal lagoons and those that were reviewed as part of this study have been created largely in an opportunistic manner (e.g. on the back of coastal defence works or as part of larger site management). All of the examples considered also had relatively simple creation objectives ranging from creating a water body to creating a lagoon to benefit birds. Only the lagoon at the ICI Brinefields had the specific objective of enhancing invertebrate populations and a population of a rare beetle. If a replacement project is required to replace very specific conditions in a lagoon such as a particular level of salinity then the technical feasibility may become more difficult and costs may increase particularly in the aftercare, contingency and monitoring cost elements.

The two case studies presented are very different in their costs/ha with the ICI Brinefield project (£59600/ha) costing approximately ten times as much to create compared to the lagoon at Salthouse (£6700/ha). The large differences in cost/ha mainly arise from the higher cost of three

elements of the work undertaken. These are excavating and disposing of spoil at the ICI Brinefields (£36600/ha - 16 times more expensive than Salthouse), the site supervision costs arising from the work being undertaken in an industrial complex (£10100/ha - 19 times higher) and the project management costs (£2300/ha – 6 times higher).

The difference in cost between the two case studies may also be partly a function of the ICI Brinefields lagoon being created in a situated where none previously existed, whereas the Salthouse lagoon has been created in a system where lagoons already occur. As a result there may be a greater need for more detailed planning and design input for the ICI Brinefields lagoon.

The construction and supervision costs for the ICI Brinefields project accounts for 78% of the total standard costs whereas the figure for the Salthouse lagoon is only 43%. The largest cost element for the Salthouse lagoon using the standard costs was the land purchase, which comprised 37% of the total expenditure.

The two case studies indicate that the bulk of the costs of a lagoon habitat creation scheme (between 71% and 76%) will arise from the land purchase, construction and site supervision cost elements. Depending on the nature of each project the relative proportions of these costs will vary. The next highest element of cost will be project management and planning and design. The construction and site supervision costs will require close scrutiny, but it should be possible to obtain reliable cost estimates for these aspects of a creation project.

The costs presented in the case studies should be treated with caution. The costs incurred to create the lagoon in the ICI Brinefields project are unusual because of the circumstances in which the lagoon was created and because compared to the Salthouse lagoon it was planned designed and constructed from scratch. The cost of the Salthouse lagoon on the other hand is considered to be more typical with land purchase being the largest proportion of the overall cost. It is also likely to be at the lower end of the scale as data for a number of cost elements could be determined within this study.

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## **Appendix 1 – Actual costs tables**



## Coastal grazing marshes – actual costs

**Table 1.3 Northward Hill - Actual costs**

	Year	Unit	No. of units	Cost/unit (£)	Total Cost (£)
<b>1. Setting objectives</b>					
No data (Note 1)		no data	no data	no data	no data
Sub-total (category 1 costs)					<i>no data</i>
<b>2. Land acquisition</b>					
Land purchase - arable (Note 2)	90/91	ha	173	3750	648750
Land purchase - neglected grazing (Note 2)	90/91	ha	32	1400	44800
Land valuation and professional fees (Note 3)	90/91				13871
Sub-total (category 2 costs)					<b>707421</b>
<b>3. Planning, assessment and design</b>					
<b>3.1 Legal and Planning</b>					
Planning - obtain EA permissions (staff time)	90-94	Days	16	100	1600
Planning – obtain EA permissions (licenses)	90-94	Variations	4	600	2400
<b>3.2 Technical feasibility</b>					
Planning - hydrological survey	"	Report	1	850	850
<b>3.3 Design proposals and management plan</b>					
Site design preparation (Note 4)	"	no data	no data	no data	no data
Planning - Management Plan	"	Plan	1	2000	2000
Sub-total (category 3 costs)					<b>6850</b>
<b>4. Implementation</b>					
<b>4.1 (a) Water management</b>					
Removal of land drains (contractor)	91-93	metres	400	10	4000
Dam/sluice construction (contractor)	91-93	sluice	15	167	2500
Culvert repair/replacement (contractor)	91-93	culvert	15	80	1200
Field edge bund construction (contractor)	94/95	metres	2000	1.35	2700
Construction of new ditches (contractor)	91-93	metres	1000	6	6000
Restoration of infilled ditches (contractor)	91-93	metres	300	6	1800
Reprofiling of old ditches (contractor)	91-93	metres	9000	0.7	6300
Scrape construction (contractor)	91-93	scrape (2ha)	1	4000	4000
Pump purchase (materials)	91/92	pump	4	1375	5500
Sub-total 4.1 (a) costs					<b>34000</b>
<b>4.1 (b) Grassland management</b>					
Purchase of seed (agricultural mix @ 30Kg/ha)	91/92	ha	58	38	2222
Re-seeding - cultivation and sowing (contractor)	91/92	ha	58	85	4916
Natural regeneration - topping weeds (contractor)	91/92	ha	59	16	943
Sub-total 4.1 (b) costs					<b>8080</b>
<b>4.1 (c) Species and habitat translocations</b>		none	undertaken		

	Year	Unit	No. of units	Cost/unit (£)	Total Cost (£)
<b>4.1 (d) Site Infrastructure</b>					
Stock fencing (materials)	91/92	metres	6000	1	6000
Stock fencing (labour - volunteers)	91/92	days	30	46	1380
Gates installation (materials)	91/92	gate	40	125	5000
Gates (labour - volunteers)	91/92	days	40	46	1840
Sub-total 4.1 (d) costs					<b>14220</b>
<b>4.1 (e) Site supervision and other costs</b>					
Stock fencing (labour - warden)	91/92	days	7	75	525
Gates (labour - warden)	91/92	days	10	75	750
Equipment – tractor	91/92	-	-	-	25000
Sub-total 4.1 (e) costs					<b>26275</b>
<b>4.2 Aftercare</b>					
Disc harrowing spoil (reserve staff)		metres	12300	0.1	1230
Thistle/weed control - spraying	92/93	ha	100	21	2100
Thistle/weed control - topping (Note 5)	98/99	ha	150	13	6000
Sub-total 4.2 aftercare costs					<b>9330</b>
Sub-total (category 4 costs)					<b>91905</b>
<b>5. Monitoring</b>					
Monitoring - bird counts (Note 6)	95/96	Survey	10	1500	15000
Monitoring - Vegetation (1 in 5 years)	95/96	Survey	2	900	1800
Sub-total (category 5 costs)					<b>16800</b>
<b>6. Additional costs</b>					
<b>6.1 Project management costs (Note 7)</b>					
Staff costs (90% of total cost)	91-93	yr	3	14400	43200
Office and operating costs	91093	yr	3	4000	12000
<b>6.2 Opportunity cost (foregone revenue) (Note 9)</b>					
<b>6.3 Contingency cost</b>					
Compensation for flooding			one-off	Payment	1000
Sub-total (category 6 costs)					<b>56200</b>
<b>Total Cost</b>					<b>879176</b>
<b>7. Income</b>					
Aftercare - sheep grazing (3 years aftercare) (Note 8)	98-99	ha	600	38	-22800
<b>Total Cost (net of income)</b>					<b>856376</b>
<b>Cost/hectare (205 ha)</b>					<b>4177</b>
<b>8. Other income (Grants)</b>					
Grant - Environment Agency		one-off	payment		-3600
Grant – ESA (Note 11)	98/99				-101100
Sub-total (category 8 costs)					<b>-104700</b>

**Table 1.4 Summary of actual costs**

Cost stage/element	Standard Cost (£000)	Cost/ha	% of total cost
Cost category/element	Actual Cost £000's	Cost/ha	% of total cost
1. Setting objectives	No data	No data	No data
2. Land purchase	707.4	3450	80%
3. Planning assessment and design	6.8	33	1%
4.1 Habitat construction – water management	34.0	166	4%
4.1 Habitat construction – grassland management	8.0	39	1%
4.1 Site construction	14.2	69	2%
4.1 Site supervision and general costs	26.2	128	3%
4.2 Aftercare	9.3	45	1%
5. Monitoring	16.8	82	2%
6. Project management/additional costs	56.2	274	6%
<b>Total Cost</b>	<b>879</b>	<b>4288</b>	
7. Income	-22.8		
<b>Total Cost (net of income)</b>	<b>856</b>	<b>4177</b>	

**Note:** All data are in actual prices (i.e. mainly 1991-93 prices), excluding VAT. Total costs do not take account of any income from grants, but do include income from grazing during the aftercare period of 3 years (6.4).

**Table 2.3 Nene Washes - Actual costs**

	Year	Unit	No. of units	Cost/unit (£)	Total Cost (£)
	Year	Unit	No. of units	Cost/unit (£)	Total Cost (£)
<b>1. Setting objectives</b>					
No data					no data
Sub-total (category 1 costs)					<i>no data</i>
<b>2. Land acquisition</b>					
Land purchase - arable (Note 7)	91/92	ha	12.4	5645	69998
Land valuation and professional fees (Note 5)					1400
Sub-total (category 2 costs)					<b>71398</b>
<b>3. Planning, assessment and design</b>					
<b>3.1 Legal and Planning</b>					
Planning permission - staff time (RSPB warden)	91/92	days	20	110	2200
Planning permission - application cost	91/92	application	1	550	550
<b>3.2 Technical feasibility</b>					
Planning – levels survey	91/92	survey	1	1300	1300

	Year	Unit	No. of units	Cost/unit (£)	Total Cost (£)
<b>3.3 Design proposals and management plan</b>					
not applicable (Note 3)					
Sub-total (category 3 costs)					<b>4050</b>
<b>4. Implementation</b>					
<b>4.1 (a) Water management</b>					
Ditch widening and spoil removal	92/93	metres	1100	1.4	1500
Scrape and pool construction	92/93	?	?		2500
Sub-total 4.1 (a) costs					<b>4000</b>
<b>4.1 (b) Grassland management</b>					
Reseeding (ploughing and drilling)	92/93	ha	12.4	73	900
Reseeding (seed) (Note 1)	92/93	ha	12.4	35	440
Sub-total 4.1 (b) costs					<b>1340</b>
<b>4.1 (c) Species and habitat translocations</b>	none undertaken				
<b>4.1 (d) Site Infrastructure</b>					
Stock fencing (materials)	92/93	metres	1800	0.8	1500
Stock fencing (labour - RSPB staff)	92/93	days	35	110	3850
Sub-total 4.1 (d) costs					<b>5350</b>
<b>4.1 (e) Site supervision and other costs (Note 2)</b>					
not applicable work done in –house					
<b>4.2 Aftercare</b>					
Spraying weeds	92/93	ha	12.4	30	377
Sub-total 4.2 aftercare costs					<b>377</b>
Sub-total (category 4 costs)					<b>11067</b>
<b>5. Monitoring</b>					
None undertaken					
<b>6. Additional costs</b>					
<b>6.1 Project management costs (Note 4)</b>					
<b>6.2 Opportunity cost (foregone revenue)</b>	not applicable				
<b>6.3 Contingency cost</b>	none incurred				
Sub-total (category 6 costs)					<b>0</b>
<b>Total Cost</b>					<b>86515</b>
<b>7. Income</b>					
Annual grazing/grass cutting - income	98/99	ha	12.4	-65	-2418
<b>Total Cost (net of income)</b>					<b>84097</b>
<b>Cost/hectare (12.4 ha)</b>					<b>6782</b>
<b>8. Other Income (Grants)</b>					
Grants – Countryside Stewardship 97-2001 (Note 6)	98/99	ha	12.4	280	-10416

**Table 2.4 Summary of actual costs**

Cost stage/element	Standard Cost (£000)	Cost/ha	% of total cost
1. Setting objectives	No data	No data	No data
2. Land purchase	71.4	5758	83
3. Planning assessment and design	4.0	327	5
4.1 Habitat construction – water management	4.0	322	5
4.1 Habitat construction – grassland establishment	1.3	108	2
4.1 Site construction	5.3	431	6
4.1 Site supervision and general costs	Note 2		
4.2 Aftercare	0.4	30	1
6.1 Project management costs	Note 4		
<b>Total Cost</b>	<b>86.5</b>	<b>6977</b>	
7. Income – aftercare grazing income	-2.4	-	-
<b>Total Cost (net of income)</b>	<b>84</b>	<b>6782</b>	

**Note:** All data are in actual prices (i.e. mainly 1991-93 prices), excluding VAT. Total costs do not take account of any income from grants, but do include income from grazing during the aftercare period of 3 years (6.4).

**Table 3.3 Exe Estuary Reserve - Actual costs**

	Year	Unit	No. of units	Cost/unit (£)	Total Cost (£)
<b>1. Setting objectives</b>					
No data		no data	no data	no data	
Sub-total (category 1 costs)					<i>no data</i>
<b>2. Land acquisition</b>					
Land purchase - intensive grazing (Note 5)	89-91	ha	125	4000	500000
Land valuation and professional fees (Note 9)					10,000
Sub-total (category 2 costs)					<b>510000</b>
<b>3. Planning, assessment and design</b>					
<b>3.1 Legal and Planning</b>					
EA consent costs	85-91	-	-	-	1700
Planning and obtaining EA permissions (Note 6)	85-91	days	53	75	4000
<b>3.2 Technical feasibility</b>					
Planning – archaeological search	93/94	survey	1	700	700
Planning – hydrological and topographical survey	93/94	survey	1	2500	2500

	Year	Unit	No. of units	Cost/unit (£)	Total Cost (£)
<b>3.3 Design proposals and management plan</b>					
Site design preparation		included	under	section 3.1	
Planning – Management Plan	-	plan	1	2000	2000
Sub-total (category 3 costs)					<b>10900</b>
<b>4. Implementation</b>					
<b>4.1 (a) Water management</b>					
Sluice and water control infrastructure – materials	94/95	sluice	36	83	3000
Dam/sluice construction (contractor)	94/95	sluice	36	139	5000
Fencing to protect sluice structures – materials	94/95	fencing unit	26	77	2000
Fencing to protect sluice structures – labour	94/95		no data	no data	
Restoration of infilled ditches (contractor) (Note 1)	94/95	m	1400	9	12000
Scrape and pool construction (contractor) (Note 2)	94/95	ha	2.6	7692	20000
Sub-total 4.1 (a) costs					<b>42000</b>
<b>4.1 (b) Grassland management</b>					
No costs incurred as site was already grassland		no cost	no cost	no cost	no cost
<b>4.1 (c) Species and habitat translocation</b>					
		none	incurred		
<b>4.1 (d) Site Infrastructure</b>					
Stock fencing (materials)	94/95	m	3000	2	6000
Stock fencing (labour )	94/95	no data	no data	no data	
Sub-total 4.1 (d) costs					<b>6000</b>
<b>4.1 (e) Site supervision and other costs</b>					
Warden staff supervision of contractors (Note 3)	94/95	days	121	80	9700
Sub-total 4.1 (e) costs					<b>9700</b>
<b>4.2 Aftercare (Note 8)</b>					
Disc harrowing spoil (reserve staff)		no	aftercare		
Sub-total (category 4 costs)					<b>57700</b>
<b>5. Monitoring</b>					
Hydrological survey (10 years)	98/99	survey	1	500	5000
Monitoring - bird counts (10 years)	98/99	survey	1	1500	15000
Sub-total (category 5 costs)					<b>20000</b>
<b>6. Additional costs</b>					
<b>6.1 Project management costs</b>					
Staff costs (90% of total cost) (Note 7)	94/95				61,000
Office and operating costs	94/95				13,500
<b>6.2 Opportunity cost (foregone revenue)</b>					
		none	incurred		

	Year	Unit	No. of units	Cost/unit (£)	Total Cost (£)
<b>6.3 Contingency cost</b>		none	incurred		
Sub-total (category 6 costs) (including income)					<b>74,500</b>
<b>Total Cost</b>					<b>673100</b>
<b>7. Income</b>					
Annual grazing/grass cutting - income (Note 4)	98/99	year	3	-6000	-18000
<b>Total Cost (net of income)</b>					<b>655100</b>
<b>Cost/hectare (125 ha)</b>					<b>5241</b>
<b>8. Other Income (Grants)</b>					
Grants - Environment Agency	94/95				-7,500
Grants - English Nature	94-96				-7,500
Grants - Countryside Stewardship – Capital	97-99				-4,500
Grants - Countryside Stewardship - annual payment (Note 10)	annual				-35,700
Grants - European Union Project income	95				-15,000
Sub-total (category 8 costs)					-70,200

**Table 3.4 Summary of actual costs**

Cost stage/element	Standard Cost (£000)	Cost/ha	% of total cost
Cost stage/element	Actual Cost (£000)	Cost/ha	% of total cost
1. Setting objectives	No data	No data	No data
2. Land purchase	510.0	4080	78
3. Planning assessment and design	10.9	87	2
4.1 Habitat construction – water management	42.0	336	6
4.1 Site construction	6.0	48	1
4.1 Site supervision and general costs	9.7	78	1
4.2 Aftercare	Note 8		
5. Monitoring	20.0	160	3
6. Project management/additional costs	74.5	508	14
<b>Total Cost</b>	<b>673</b>	<b>5384</b>	
7. Income	-18		
<b>Total Cost (net of income)</b>	<b>655</b>	<b>5241</b>	

**Note:** All data are in actual prices (i.e. mainly 1991-93 prices), excluding VAT. Total costs do not take account of any income from grants, but do include income from grazing during the aftercare period of 3 years (6.4).

## Reedbed – Actual costs

	Year	Unit	No. of units	Cost/unit (£)	Total Cost (£)
<b>1. Setting objectives</b>					
No data (Note 1)		no data	no data	no data	
Sub-total (category 1 costs)					<i>no data</i>
<b>2. Land acquisition</b>					
Land purchase	95	ha	10	1750	17500
Legal and professional fees (Note 2)					700
Sub-total (category 2 costs)					<b>18200</b>
<b>3. Planning, assessment and design</b>					
<b>3.1 Legal and Planning</b>		not	applicable		
<b>3.2 Technical feasibility</b>					
Hydrology survey	98	study	1	3000	3000
<b>3.3 Design proposals and management plan</b>					
Site design preparation	98	days	15	75	1130
Planning - Management Plan (Note 3)	98				
Sub-total (category 3 costs)					<b>4130</b>
<b>4. Implementation</b>					
<b>4.1 (a) Water management</b>					
Install sluice	95	sluice	1	290	290
Sub-total 4.1 (a) costs					<b>290</b>
<b>4.1 (b) Excavation and construction</b>					
Construct bank with clay core	95	m	700	10	6800
Dig new pools and ditches	95	hours	77	17	1280
Additional bund	95	m	400	6	2450
Sub-total 4.1 (b) costs					<b>10530</b>
<b>4.1 (c) Species and habitat management</b>					
Scrub removal	95	ha	2	3100	6200
Sub-total 4.1(c)					<b>6200</b>
<b>4.1 (d) Site Infrastructure</b>					
Sub-total 4.1 (d) costs		none	undertaken		
<b>4.1 (e) Site supervision and other costs</b>					
Site supervision - senior warden	95	days	40	56	2240
Sub-total 4.1 (e) costs					<b>2240</b>
<b>4.2 Aftercare</b>		none	undertaken		
General management					<b>3000</b>
Sub-total (category 4 costs)					<b>22260</b>
<b>5. Monitoring</b>					
Water level monitoring	97				3000
Sub-total (category 5 costs)					<b>3000</b>



	Year	Unit	No. of units	Cost/unit (£)	Total Cost (£)
<b>6. Additional costs</b>					
<b>6.1 Project management costs</b>					
Staff costs (60% of total) (Note 4)	95				11100
Office and operating costs	95				4500
<b>6.2 Opportunity cost (foregone revenue)</b>					
<b>6.3 Contingency cost</b>		not	applicable		
Sub-total (category 6 costs)					<b>15600</b>
<b>Total Cost</b>					<b>63190</b>
<b>7. Income (Negative Cost)</b>		none			
Total Cost (net of income)					<b>63190</b>
<b>Cost/hectare (10 ha)</b>					<b>6310</b>
<b>8. Other income (Grants)</b>					
EA grant for capital work					18,000

**Table 4.4 Summary of actual costs**

Cost stage/element	Standard Cost (£000)	Cost/ha	% of total cost
1. Setting objectives	No data	No data	No data
2. Land purchase	18.2	1820	29
3. Planning assessment and design	4.1	410	6
4.1 Habitat construction – water management	0.29	29	1
4.1 Site construction	10.5	1053	17
4.1 Species management	6.2	620	10
4.1 Site supervision and general costs	2.2	220	3
4.2 Aftercare	3.0	300	5
5. Monitoring	3.0	300	5
6. Project management/additional costs	15.3	1560	24
<b>Total Cost</b>	<b>63.1</b>	<b>6310</b>	
<b>7. Income</b>	0		
<b>Total Cost (net of income)</b>	<b>63.1</b>		

**Note:** All data are in actual prices (94/95 prices), excluding VAT. Income does not include grants.

**Table 5.3 Lodmoor Reedbed - Actual costs**

	Year	Unit	No. of units	Cost/unit (£)	Total Cost (£)
<b>1. Setting objectives</b>					
No data (Note 1)		no data	no data	no data	
Sub-total (category 1 costs)					<i>no data</i>
<b>2. Land acquisition</b>					
Land purchase (Note 2)		not	applicable		
Sub-total (category 2 costs)					<i>no data</i>
<b>3. Planning, assessment and design</b>					
<b>3.1 Legal and Planning</b>					
Planning permission fees					1000
<b>3.2 Technical feasibility</b>					
Flood risk study	98	study	1	1900	1900
Substrate and hydrology survey	98	study	1	600	600
<b>3.3 Design proposals and management plan</b>					
Site design preparation	98				1100
Planning - Management Plan (Note 3)	98				460
Staff costs with design and planning	98				940
Sub-total (category 3 costs)					<b>6000</b>
<b>4. Implementation</b>					
<b>4.1 (a) Water management</b>					
Re-grade ditches	98	m3	1150	4.3	4950
Steel pile weir sluices	98	sluice	2	4000	8000
Culverts	98	culvert	3	67	200
Sub-total 4.1 (a) costs					<b>13150</b>
<b>4.1 (b) Excavation and construction</b>					
Strip bund footprint	98	m3	730	0.8	560
Excavation of bund trench	98	m3	1095	0.8	840
Fill trench with clay	98	m3	1095	4.3	4710
Build and profile bund	98	m3	2555	4	10990
Dig pools and profile	98	m3	400	2.5	1000
Sub-total 4.1 (b) costs					<b>18,000</b>
<b>4.1 (c) Species and habitat management</b>		none	undertaken		
<b>4.1 (d) Site Infrastructure</b>					
Raise public cycle path					6000
Sub-total 4.1 (d) costs					<b>6000</b>
<b>4.1 (e) Site supervision and other costs</b>					
Site supervision - engineer	98	days	5	200	1000
Site supervision - staff time	98	days	30	56	1680
Sub-total 4.1 (e) costs					<b>2680</b>

	Year	Unit	No. of units	Cost/unit (£)	Total Cost (£)
<b>4.2 Aftercare</b>		none	undertaken		
Sub-total (category 4 costs)					<b>39830</b>
<b>5. Monitoring</b>					
Monitoring birds and water levels (Note 4)	98	days	10/yr	56	1680
Sub-total (category 5 costs)					<b>1680</b>
<b>6. Additional costs</b>					
<b>6.1 Project management costs</b>					
Staff costs (60% of total) (Note 5)	98				12000
Office and operating costs	98				5000
<b>6.2 Opportunity cost (foregone revenue)</b>					
Loss of grazing income (3 years)	98	ha	12.5	20	750
<b>6.3 Contingency cost</b>		not	applicable		
Sub-total (category 6 costs)					<b>17750</b>
<b>Total Cost</b>					<b>65260</b>
<b>7. Income</b>		none			
Total Cost (net of income)					<b>65260</b>
<b>Cost/hectare (25 ha)</b>					<b>2610</b>
<b>8. Other income (Grants)</b>					
Grant – landfill tax					37000

**Table 5.4 Summary of actual costs**

Cost stage/element	Standard Cost (£000)	Cost/ha	% of total cost
Cost stage/element	Actual Cost (£000)	Cost/ha £	% of total cost
1. Setting objectives	No data	No data	No data
2. Land purchase	0.0	-	0
3. Planning assessment and design	6.0	240	9
4.1 Habitat construction – water management	13.1	520	20
4.1 Site construction	18.0	680	26
4.1 Site infrastructure	6.0	240	9
4.1 Site supervision and general costs	2.7	108	4
5. Monitoring	1.7	68	3
6. Project management/additional costs	17.8	712	27
<b>Total Cost</b>	<b>65.2</b>	<b>2610</b>	
7. Income	0		
<b>Total Cost (net of income)</b>	<b>65.2</b>		

**Note:** All data are in actual prices excluding VAT. Income does not include grants.

**Table 6.3 Mersehead Reedbed - Actual costs**

	Year	Unit	No. of units	Cost/unit (£)	Total Cost (£)
<b>1. Setting objectives</b>					
No data (Note 1)		no data	no data	no data	no data
Sub-total (category 1 costs)					<b>no data</b>
<b>2. Land acquisition</b>					
Land purchase	95	ha	12	1730	21000
Legal and professional fees (Note 2)	95				840
Sub-total (category 2 costs)					<b>21,840</b>
<b>3. Planning, assessment and design</b>					
<b>3.1 Legal and Planning</b>	95	sluice	1	290	290
<b>3.2 Technical feasibility</b>					
Hydrological survey	95	survey	1	2000	2000
<b>3.3 Design proposals and management plan</b>					
Site design preparation	96	days	2	100	200
Planning – Management Plan (Note 3)	98	Plan	1	2000	2000
Sub-total (category 3 costs)					<b>4490</b>
<b>4. Implementation</b>					
<b>4.1 (a) Water management (Note 4)</b>	95	sluice	1	290	290
<b>4.1 (b) Excavation and construction</b>					
Construct bund (Note 5)	95	m	2000	4.8	9500
Sub-total 4.1 (b) costs					<b>9790</b>
<b>4.1 (c) Species and habitat management</b>					
Seed growing equipment (Note 6)	95				4320
Staff time (Note 7)	95	days	24/yr	10	2400
Planting (Note 8)	95	days	20/yr	10	2000
Sub-total 4.1 (c) costs					<b>8720</b>
<b>4.1 (d) Site Infrastructure</b>		none undertaken			no data
<b>4.1 (e) Site supervision and other costs</b>					
Supervision of planting (Note 9)	95	days	4/yr	50	2000
Sub-total 4.1 (e) costs					<b>2000</b>
<b>4.2 Aftercare (Note 10)</b>					
Bund maintenance	95				1800
Water level control	95				900
Sub-total 4.2 costs					<b>2700</b>
Sub-total (category 4 costs)	95				<b>23210</b>
<b>5. Monitoring</b>					
Water level and bird monitoring (Note 11)	95	survey	1/yr	700	7000
Sub-total (category 5 costs)					<b>7000</b>

	Year	Unit	No. of units	Cost/unit (£)	Total Cost (£)
<b>6. Additional costs</b>					
<b>6.1 Project management costs</b>					
Staff costs (Note 12)					32430
Office operating costs					13510
<b>6.2 Opportunity cost (foregone revenue)</b>					
Loss of grazing income (3 years)	95	ha	20	350	21000
<b>6.3 Contingency cost</b>	not applicable				
Sub-Total (category 6 costs)					<b>66940</b>
<b>Total Cost</b>					<b>123480</b>
<b>7. Income</b>		none			
Total Cost (net of income)					<b>123480</b>
<b>Cost/hectare (20 ha)</b>					<b>6174</b>
<b>8. Other income (Grants)</b>					
Habitat Scheme (10 yrs)	95	ha	20	260/yr	52,000

**Table 6.4 Summary of actual costs**

Cost stage/element	Standard Cost (£000)	Cost/ha	% of total cost
1. Setting objectives	No data	No data	No data
2. Land purchase	21.8	1070	17
3. Planning assessment and design	4.4	210	3
4.1 Habitat construction – water management	0.29	14	1
4.1 Site construction	9.7	475	8
4.1 Species management	8.7	435	7
4.1 Site supervision and general costs	2.0	100	2
4.2 Aftercare	2.7	135	2
5. Monitoring	7.0	350	5
6. Project management/additional costs	66.9	3345	54
<b>Total Cost</b>	<b>123.4</b>	<b>6174</b>	
7. Income	0		
<b>Total Cost (net of income)</b>	<b>123.4</b>		

**Note:** All data are in actual prices (i.e. mainly 1994/95 prices), excluding VAT. Income does not include grants.

**Table 7.3 Stodmarsh NNR - Actual costs**

	Year	Unit	No. of units	Cost/unit (£)	Total Cost (£)
<b>1. Setting objectives</b>					
No data (Note 1)		no data	no data	no data	no data
Sub-total (category 1 costs)					<b>no data</b>
<b>2. Land acquisition</b>					
Land purchase	95/96	ha	30	2910	87,300
Legal and professional fees (2% of total) (Note 2)	95/96				1,746
Sub-total (category 2 costs)	95/96				<b>89,046</b>
<b>3. Planning, assessment and design</b>					
<b>3.1 Legal and Planning</b>					
Planning application (change of land use)	95/96	application	1	560	560
Impoundment licence + adverts	95/96	licence	1	507	507
Abstraction licence + adverts	95/96	licence	1	507	507
Site manager time on planning	95/96	days	5	151	755
<b>3.2 Technical feasibility</b>					
Levelling survey	95/96	survey	1	1000	1000
Aerial survey	95/96	survey	1	1234	1234
Invertebrate survey	95/96	survey	1	500	500
Flora survey	95/96	survey	1	520	520
<b>3.3 Design proposals and management plan</b>					
Site design preparation	95/96	days	15	151	2265
Planning – Management Plan	95/96	plan	1	2030	2030
Sub-total (category 3 costs)	95/96				<b>9878</b>
<b>4. Implementation</b>					
<b>4.1 (a) Water management</b>					
Construct wooden stop board sluice	95/96	sluice	1	3220	3220
Install main flap valve in main water supply	95/96	valve	1	2000	2000
Plastic pipes 400mm, flap valves etc – materials	97/98	materials	-	-	4560
3 yr ditching, bunding and reed planting (Note 3)	95/96	-	-	-	24750
Ditch digging and re-profiling etc. (2000m)	97/98	metre	2000	1.5	3000
Repair drop board sluice to assist water supply	95/96	sluice	-	-	5700
Sub-total 4.1 (a) costs					<b>43230</b>
<b>4.1 (b) Excavation and construction</b>					
Lake excavation (2500m <sup>3</sup> ) & bunding (400m)	96/97	lake	1	4800	4800
Lake excavation (6000m <sup>3</sup> ) & bunding (925m)	96/97	lake	1	12160	12160
Lake excavation (5000m <sup>3</sup> ) transport & dump spoil	96/97	lake	1	11800	11800

	Year	Unit	No. of units	Cost/unit (£)	Total Cost (£)
Bank construction	96/97	bank	-	-	9700
Sub-total 4.1 (b) costs					<b>38460</b>
<b>4.1 (c) Species and habitat management (Note 4)</b>					
<b>4.1 (d) Site Infrastructure</b>					
Fencing for cattle/gates for public etc.	97/98	materials	-	-	2700
Sub-total 4.1 (d) costs					<b>2700</b>
<b>4.1 (e) Site supervision and other costs</b>					
Estate worker	95-98	days	70	70	4900
Ecological supervision – Chief scientist team	95-98	days	2	178	356
Bund to prevent flooding adjacent land (300m)	95/96	metres	300	0.9	270
Installation of pipe to cope with flooding	95/96	pipe	1	470	470
Ecological supervision – conservation officer	95-98	days	2	130	260
Sub-total 4.1 (e) costs					<b>6256</b>
<b>4.2 Aftercare (Note 5)</b>	none undertaken				
Sub-total (category 4 costs)					<b>90646</b>
<b>5. Monitoring (Note 6)</b>					
Bird and water level monitoring	95-98	survey	1	500	5000
Aerial survey	95-98	survey	3	1140	3420
Sub-total (category 5 costs)					<b>£8,420</b>
<b>6. Additional costs</b>					
<b>6.1 Project management costs</b>					
Site manager – project management		days	100	151	15100
<b>6.2 Opportunity cost (foregone revenue)</b>					
Loss of grazing income (over 3 years)					4980
<b>6.3 Contingency cost</b>					
Sub-Total (category 6 costs)					<b>20080</b>
<b>Total Cost</b>					<b>218070</b>
<b>7. Income</b>					none
Total Cost (net of income)					<b>218070</b>
<b>Cost/hectare (30 ha)</b>					<b>7269</b>
<b>Other income (Grants)</b>					
Heritage Lottery Grant for land purchase					130,000

**Table 7.4 Summary of actual costs**

Cost stage/element		Standard Cost (£000)	Cost/ha	% of total cost
1.	Setting objectives	no data	no data	no data
2.	Land purchase	89.0	2966	40
3.	Planning assessment and design	9.9	330	4
4.1	Habitat construction – water management	43.2	1440	19
4.1	Site construction	41.2	1372	19
4.1	Species management	-	-	-
4.1	Site supervision and general costs	6.3	210	2
4.2	Aftercare	-	-	-
5.	Monitoring	8.4	280	3
6.	Project management/additional costs	20.0	666	9
<b>Total Cost</b>		<b>218.0</b>	<b>7269</b>	
7.	Income	-		
<b>Total Cost (net of income)</b>		<b>218.0</b>		

**Note:** All data are in actual prices (i.e. mainly 1994/95 prices), excluding VAT. Income does not include grants.



## Coastal Lagoons - Actual costs

**Table 8.3 Brinefields - Actual costs**

	Year	Unit	No. of units	Cost/unit (£)	Total Cost (£)
<b>1. Setting objectives</b>					
No data (Note 1)		no data	no data	no data	no data
Sub-total (category 1 costs)					<i>no data</i>
<b>2. Land acquisition</b>					
Land purchase - grazing (Note 2)	98	ha	1.4	2500	3500
Sub-total (category 2 costs)					<b>3500</b>
<b>3. Planning, assessment and design</b>					
<b>3.1 Legal and Planning</b>					
Feasibility study and funding submission	98				5810
<b>3.3 Design proposals and management plan</b>					
Site design preparation	98				1400
Planning - Management Plan (Note 3)		no data			no data
Sub-total (category 3 costs)					<b>7210</b>
<b>4. Implementation</b>					
<b>4.1 (a) Water management</b>					
Culvert construction	98	culvert	1	4500	4500
Sub-total 4.1 (a) costs					<b>4500</b>
<b>4.1 (b) Excavation</b>					
Excavation of spoil and disposal	98	m3	20000	2.2	44000
Island construction	98	island	1	2000	2000
Sub-total 4.1 (b) costs					<b>46000</b>
<b>4.1 (c) Species and habitat translocations</b>	none undertaken				
<b>4.1 (d) Site Infrastructure</b>					
Gabion construction	98	gabion	unknown	unknown	700
Sub-total 4.1 (d) costs					<b>700</b>
<b>4.1 (e) Site supervision and other costs</b>					
Site supervision	98	days	80	200	16000
Safety supervision (Note 4)	98				6240
Sub-total 4.1 (e) costs					<b>22240</b>
<b>4.2 Aftercare</b>	none undertaken				
Checking water levels	98	hr	30	33.3	1000
Sub-total 4.2 costs					<b>1000</b>
Sub-total (category 4 costs)					<b>74440</b>
<b>5. Monitoring</b>					
Monitoring	none undertaken				
Birds (Note 5)					

	Year	Unit	No. of units	Cost/unit (£)	Total Cost (£)
Invertebrates	98	survey	annual/3 yrs	1000/yr	3000
Sub-total (category 5 costs)					3000
<b>6. Additional costs</b>					
<b>6.1 Project management costs</b>					
Staff costs (Note 7)	98	days	32	250	8000
<b>6.2 Opportunity cost (foregone revenue)</b>					
Loss of grazing income (Note 8)	98				
<b>6.3 Contingency cost</b>		not	applicable		no data
Sub-total (category 6 costs)					8000
<b>Total Cost</b>					<b>96150</b>
<b>7. Income</b>	not applicable				
Total Cost (net of income)					96150
<b>Cost/hectare (1.4 ha)</b>					<b>68679</b>
<b>8. Other income (Grants)</b>					
Grant - English Nature					25000
Grant - Landfill Tax					84000
Sub-total (category 8 costs)					109,000

**Table 8.4 Summary of actual costs**

Cost stage/element	Standard Cost (£000)	Cost/ha	% of total cost
1. Setting objectives	No data	No data	No data
2. Land purchase	3.5	2500	4
3. Planning assessment and design	7.2	5100	7
4.1 Habitat construction – water management	4.5	3200	5
4.1 Site construction	46.7	33400	49
4.1 Site supervision and general costs	22.2	15900	23
4.2 Aftercare	1.0	700	1
5. Monitoring	3.0	2100	3
6. Project management/additional costs	8.0	5700	8
<b>Total Cost</b>	<b>96.1</b>	<b>68700</b>	
7. Income	0		
<b>Total Cost (net of income)</b>	<b>96.1</b>		

**Note:** All data are in actual prices excluding VAT. Income does not include grants.



	Year	Unit	No. of units	Cost/unit (£)	Total Cost (£)
<b>6.2 Opportunity cost (foregone revenue)</b>					
Loss of Countryside Stewardship income (Note 5)	97				320
<b>6.3 Contingency cost</b>		not	applicable		no data
Sub-total (category 6 costs)					<b>680</b>
<b>Total Cost</b>					<b>9710</b>
<b>7. Income</b>		none			
Total Cost (net of income)					<b>9710</b>
<b>Cost/hectare (1.5 ha)</b>					<b>6473</b>
<b>8. Other income (Grants)</b>					
Grant - English Nature					4600

**Table 9.4 Summary of actual costs**

Cost stage/element	Standard Cost (£000)	Cost/ha	% of total cost
1. Setting objectives	No data	No data	No data
2. Land purchase	3.9	2500	38
3. Planning assessment and design	0.24	130	2
4.1 Habitat construction – water management	0.8	530	8
4.1 Site construction	2.6	1730	27
4.1 Site supervision and general costs	0.64	400	6
4.2 Aftercare	0.35	270	4
5. Monitoring	0.48	330	5
6.1 Project management costs	0.68	470	7
<b>Total Cost</b>	<b>9.7</b>	<b>6500</b>	
7. Income	0		
<b>Total Cost (net of income)</b>	<b>9.7</b>		

**Note:** All data are in actual prices (i.e. mainly 1997 prices), excluding VAT. Income does not include grants.