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INTEGRATED ESTATES MANAGEMENT IN THE UK - VALUATION OF CONSERVATION AND RECREATION BENEFITS

CASE STUDY: UNITED KINGDOM

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FOREWORD

This report was contributed as a national case study to an OECD project on the Applied Evaluation of Biodiversity, being carried out by the Working Group on the Economic Aspects of Biodiversity. It does not necessarily reflect the views of individual OECD Member countries or of the OECD Secretariat. It is published under the responsibility of the Secretary General.

TABLE OF CONTENTS

INTEGRATED ESTATES MANAGEMENT – VALUATION OF CONSERVATION AND RECREATION BENEFITS

by

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Executive Summary

This is the summary of a study that developed an appraisal system to aid the Environment Agency's estate managers determine which recreation and nature conservation measures should justifiably be implemented on their estates. The appraisal system was used to estimate the cost-effectiveness of various options for the four case study farms on the Environment Agency's Beckingham Marshes estate. This highlighted a number of possible measures that could cost-effectively achieve significant improvements in nature conservation on specific farms on the estate (e.g. improved hedgerow management).

Ecosystem or species studied included:

- Hedgerows
- Woodlands
- Ponds
- Ditches
- Unimproved grassland

Valuation Method(s) used: included estimation of the costs of the agricultural improvement options. The study developed a novel systematic assessment and scoring system for measuring the benefits of the nature conservation improvements, in terms of an index based on their effects on the quantity of specific assets (e.g. hedgerows), their quality and how well they are managed in comparison with best practice guidelines. These are then used to indicate the cost-effectiveness of options. Benefits transfer was used to derive valuations of benefits of recreation enhancement options.

Main lessons learned: The appraisal system worked well to assess objectively and systematically the cost-effectiveness of various nature conservation enhancement options at individual farms on the estate.

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This still leaves the $64k question of how much overall budget an estate manager should spend on the nature conservation improvements. It would not be worthwhile to carry out a Stated Preference survey to inform this since the (transaction) costs of such surveys would be much too high in comparison with the estate managers' tight total budgets available for the nature improvement measures.

The draft system does not appear to work quite so well for recreation on account of difficulties in specifying the options and estimating the visitor numbers for them.

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1. General description

The Environment Agency owns or leases over 15,000 hectares of largely agricultural land throughout England and Wales. Most of this land is held for flood defence purposes.

The Agency's estate managers have the task of managing income generation from the Agency's estates whilst ensuring that the Agency's statutory duties, aims and objectives are met. Agency estate managers must therefore take account of a wide range of environmental, social and economic factors in both the day to day management of a given estate and the longer-term management of land and budgets.

To assist in this decision making process, the Agency is developing sustainable integrated management systems, involving better environmental practice and balancing the maximum environmental improvements, which the Agency can encourage the tenants to achieve, with their costs.

Accordingly this study aimed to develop and demonstrate an appraisal system for assessing possible measures to enhance recreation and nature conservation at the Agency's estates, and possibly to other Estates. The system could act as both a management tool for determining which options were worthwhile; and also provide objective measures of environmental performance on estates that could be viewed alongside financial performance.

The appraisal system was trialed and refined in a case study at the Agency's Beckingham Marshes estate, which is a controlled flood plain on the river Trent. This case study focused on appraising the costs and benefits of a number of possible nature conservation and recreation opportunities that the estate manager had identified on the basis of a Site Management Plan for the Beckingham Marshes estate.

In the following text, sections two, three and five relate mainly to the application of the system to the case study and section four describes the appraisal system in general and the results from applying the system to the case study.

2. Identification of underlying causes of biodiversity loss

The pressures on biodiversity arise primarily from the past agricultural practices on the estate (e.g. removal or deterioration of hedges). This study focussed on the biodiversity contained within a set of natural conservation "assets" (see section 4) which are found on or around agricultural land, and the potential for enhancing the quality and quantity of these assets. There are a number of barriers to enhancing the ecological value of these assets, which include the following:

- Impact on the net income of existing farm businesses (e.g. foregone crop outputs or extra costs).

- Planning requirements – There are a variety of consents which may be required should measures to enhance the ecological value of site be undertaken. Examples of this include:

  - consent from the National Grid should there be potential for trees to interfere with power lines;

  - land drainage consent; or

  - consent from utilities companies to excavate near underground pipelines.

- Farmers are concerned that they may be subject to increased restrictions and regulation concerning conservation features, which they may have helped to create or enhance. For instance an area may be designated as a Site of Special Scientific Interest (SSSI) which could impose costs on the farmer. However there is also a possibility that the CAP reforms might create opportunities for support payments, for sites with greater conservation value and assets.

3. Impacts on ecosystem

The ecological survey and Site Management Plan (SMP) undertaken for the Beckingham estate concluded that the agricultural land on the estate currently has limited wildlife interest. The conservation value of the land was assessed under the following categories:

- **Diversity** - The estate as a whole supports a moderate diversity of both habitats and species, and given the size of the site this diversity is much lower than would be expected.

- **Naturalness -** This attempts to reflect the degree to which a site or feature within a site has been modified by human influence. Most of the Beckingham Marshes Estate has been manipulated to a high degree for agriculture, particularly with long term drainage of the land.

- **Rarity -** No habitats within the estate were considered rare or uncommon at a county level, although the dense willow margins of the left bank of the Trent are of local interest.

- **Fragility -** This is a reflection of the extent to which a site or any habitats or species might be subject to change through the effects of either natural processes or external events. Many of the semi-natural habitats within the site are quite small and likely to be fragile, particularly the semi-improved grassland in the SE corner of the site.

- **Typicalness -** This assessed whether a site or habitat is considered a good example of its particular type and is of most use when assessing long established plant communities. The site supports a moderate range of habitats typical to the River Trent. It contains a poor to moderate range of species.

- **Recorded history -** A recent survey has been carried out of the ecology of the site but no other regular or systematic recording or the wildlife interest of the site is known to have been undertaken.

- **Position in an ecological unit -** Conservation value is increased when a site is close to other semi-natural habitats. The wider landscape around the site is generally agricultural and therefore poorly connected. However there are a couple of SSSI sites that make the site more interesting.

- **Potential value -** As a large site, the potential value is high.

The largest semi-natural habitats were found to be outside the agricultural estate, however the wildlife interest of these is also limited. The survey and management plan concluded that, from a conservation perspective, the value of the site lies in its potential.

4. Appraisal of Impacts of options on the environment, economy and welfare

The financial resources available for the Agency's estate manager for environmental improvements are severely constrained. Therefore the many options in the SMP have to be carefully appraised to ensure best value for money from the Agency's actions. Moreover, it is essential that the appraisal system for achieving this is accordingly streamlined and simplified and can only amount to a small proportion of the total budget for environmental improvement measures at each estate.

4.1 Nature conservation Benefits

The study developed a novel scoring-based system for measuring the benefits of the nature conservation improvements in terms of their effect on the quantity of specific assets (e.g. hedgerows, ponds), their quality and how well they are managed in comparison with best practice - as set out in a RSPB manual[3]. Box 1 presents the various conservation assets included in the system and their components of value.

The scores for each component are multiplied by weights and summed to give a total for each category of asset. The score for each category of asset is then multiplied by the another set of weights for the relative importance of each asset and summed to give an overall score for the nature conservation enhancements on the farm.

Table 1 presents these weights showing the relative importance for nature conservation of each category of asset and the components. These weights were based on in-depth investigations with experts from English Nature using a documented procedure.

The cost of the proposed works is divided by the weighted unit improvement scores (for the conservation improvements) to give the costs required to achieve a unit increase in conservation benefits. It should then be possible to identify which improvement options generate the greatest conservation returns per unit of expenditure. Where an estate comprises more than one farm holding, this type of calculation should indicate on which farm the greatest returns could be achieved.

3 Andrews, J. & Measures, M. (1994) Farming and Wildlife: A Practical Management Handbook, Sandy: Royal Society for the Protection of Birds (RSPB).

Box 1 **Categories and nature conservation assets and components of value**

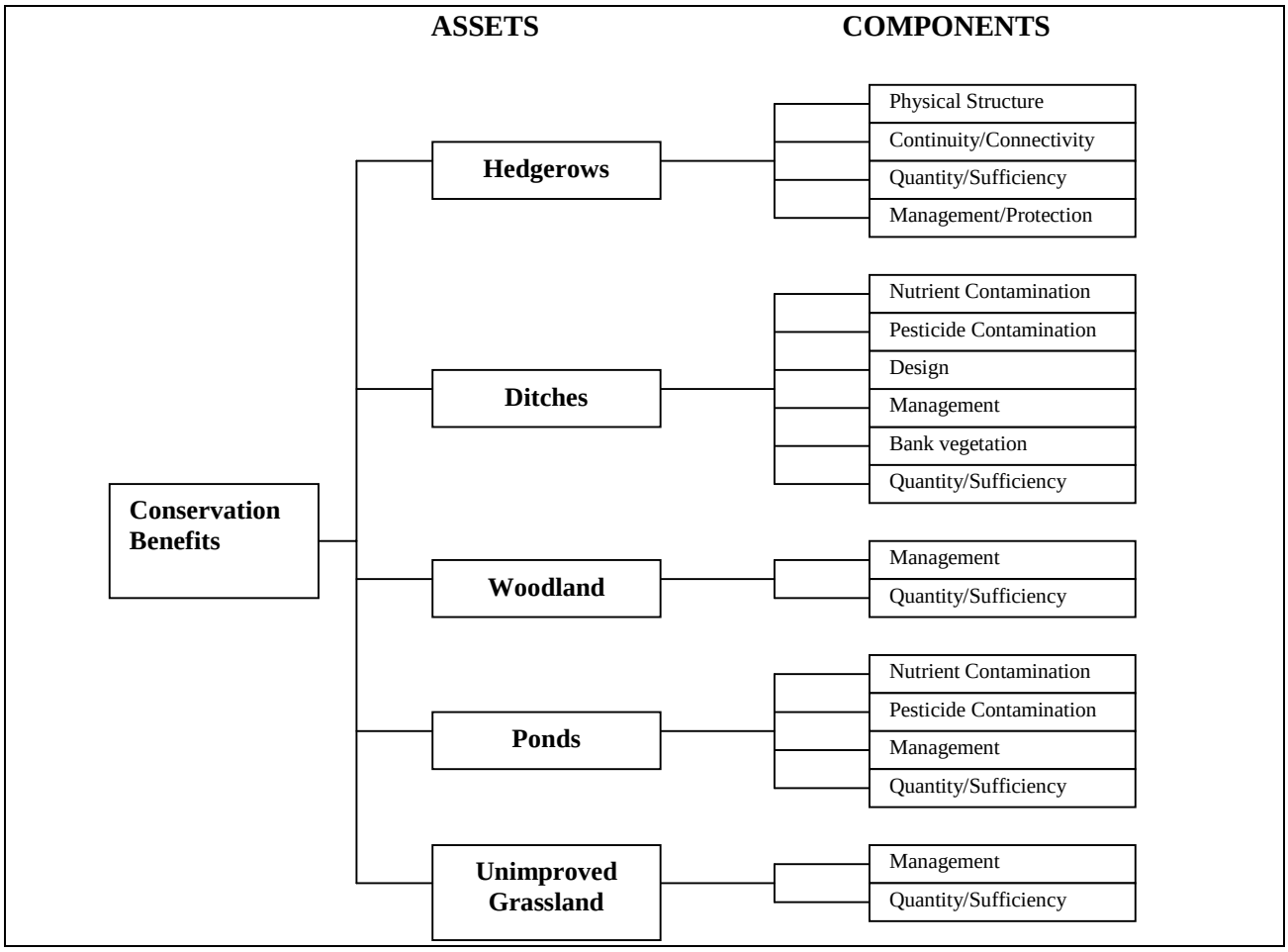
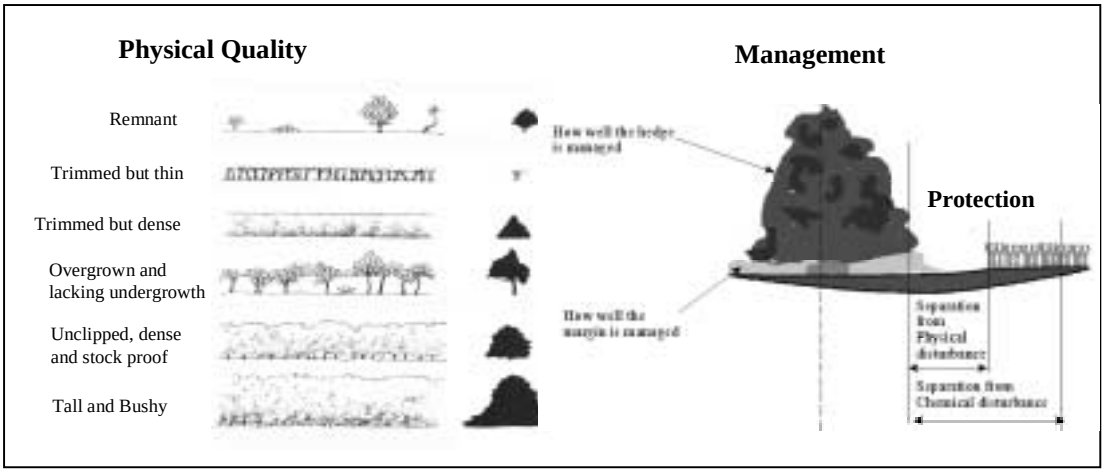


Table 1 **Weighting factors for Conservation Components and Assets**

Conservation Asset	**Component**	**Relative component weighting factor**	**Relative asset weighting factor**
Hedgerows	Quality of Structure	0.40	0.16
	Management	0.32	
	Continuity/Connectivity	0.12	
	Quantity/Sufficiency	0.15	
Ditches	Nutrient Contamination	0.36	0.14
	Pesticide Contamination	0.06	
	Design	0.21	
	Management	0.28	
	Banks	0.03	
	Quantity/Sufficiency	0.06	
Woodlands	Management	0.625	0.26
	Quantity	0.375	
Ponds	Nutrient Contamination	0.40	0.14
	Pesticide Contamination	0.26	
	Management	0.11	
	Quantity/Sufficiency	0.23	
Unimproved Grassland	Management	0.77	0.29
	Quantity/Sufficiency	0.23	

Box 2 shows how the nature conservation quality of hedgerows was assessed.

Box 2. **Indicators of Nature Conservation Quality of Hedgerows**



4.2 Recreation

A methodology was applied to calculate the monetary value of enhancements to recreational facilities on the estate. The first and the most difficult stage is to estimate the number of visitors or change in the number of visitors to the site if the measures were carried out. The available estimation techniques range from simple estimates made by the manager, supported by discussions with the relevant local groups through to relatively complex measure for calculating visitor numbers based on the the probable attractiveness of the site, the location of similar sites and the proximity of large populations of likely visitors. The latter include the "sphere of influence technique" or a method utilising Geographical Information Systems.

For valuation purposes, the system distinguishes between 'formal' and 'informal' recreation. Formal recreation can usually be characterised by the user paying a fee to participate (e.g. an entrance fee). This enables the provider of the recreation facility to capture some or all of the benefits for the users. Examples of formal recreation include angling, shooting or horse riding. Generally all those types of recreation that do not fall into the 'formal' category are classified as 'informal' and include walking, picnicking or dog walking. A survey of the literature showed that the value of such informal recreation is between £0.70 - £1.80 per person per visit.

The annual sum of recreation benefits are summed over the expected life of the asset to provide a total recreation value for the measure over a relevant time period and then discount using standard discounting techniques.

The discounted monetary benefits for recreational improvements of proposed works (i.e. present value benefits) can be compared with the discounted costs of the proposed works (i.e. present value costs). This analysis can then be used to determine which measures are worth pursuing (i.e. where the recreation benefits exceed their costs).

The appraisal only covers the out of pocket costs for the Agency and farmers in implementing the options (e.g. costs of creating and maintaining footpaths, foregone crop output). They do not include

impacts on the welfare of the farmers (e.g. from vandals). Therefore, in their discussions with the farmers, the estate managers will need to use estimates given by the appraisal for the excess of benefits over costs for the option as an upper estimate of what they might be willing to pay to induce farmers to implement the option. This negotiation should of course consider ways of reducing these adverse welfare impacts and whether the establishment of more settled informal recreation might reduce the problems faced by farmers (e.g. from vandalism, litter etc).

5. Results for Beckingham Marshes case study

5.1 Conservation

The appraisal system was used to estimate the cost-effectiveness of the various options for the four farms on the estate. This highlights a number of possible measures that could cost-effectively achieve significant improvements in nature conservation on specific farms on the estate. These include, in particular, improved hedgerow management and extra hedge creation and pond creation. The conservation proposals for one farm could potentially yield a three-fold increase in its conservation performance and value.

Table 3 presents the cost-effectiveness of options for improving various types of assets at each of the four farms. Table 2 summarises these findings. The figure for cost effectiveness was divided by a standard unit area or length, for each asset under consideration, to compare the different conservation assets. However it should be noted that this can result in an element of double counting as the quantity of the asset is already accounted for by the concept of "sufficiency". This needs to be examined further if "equivalent" standard areas are used.

Table 2 **Cost per Weighted Improvement Score per Unit Area (£)**

Holding	Hedgerow (per 100 m)	Ditches (per 100 m)	Woodlands (per ha)	Ponds (per 10 m diameter)	Grassland (per ha)
Relative Performance - Costs Without grants (Costs with grants shown in brackets)					
Smithson	-0.12 (-0.16)	n/a	5.54 (5.39)	4.28 (3.82)	n/a
Barton	0.34 (0.17)	6.38 (2.61)	n/a	n/a	13.4 (5.70)
Clark	0.89 (0.81)	2.42 (1.04)	n/a	1.98 (1.79)	5.21 (5.03)
Proudley	-0.40 (-0.41)	n/a	6.12 (5.96)	3.06 (2.76)	n/a

5.2 Recreation

The Beckingham estate is used for informal recreation by nearby residents. It is within walking distance of the nearby villages and the town of Gainsborough, where there is a shortage of open green space. The proposals would considerably enhance the recreation opportunities on the estate for these residents by, for example, creating circular walks.

The number of additional visitors who might be attracted by the recreation enhancements was based on estimates of residents living within about 1.5km of the estate, though this factor is difficult to estimate. The appraisal looked at a number of different options and suggested that overall the benefits of the recreation measures could exceed the out of pocket costs to create and maintain the footpaths and cycleways.

6. Design of policy responses based on valuation results

The case study has enabled the Agency's estate manager to identify a number of specific environmental enhancement options that are worth pursuing in discussions with the farmers and other stakeholders concerned (see Section 4 above).

The Estate manager is now consulting with the farmers to obtain their support for the improvements. The tenants may be willing to contribute towards the improvement by doing some of the work themselves, such as tree or hedge planting, at quiet times of the year. Incentives may be needed to encourage the farmers to take part, which could be achieved through reductions in rent or payment for the work. The Agency Estate's manager will also take steps to inform the tenants of conservation measures where the financial benefits to the farmer are greater than their costs.

It is essential that the appraisal system is compatible with other systems so as to streamline and economise on time required for appraisals and submissions under the various systems. Therefore an analysis will be carried out to look at how it fits in with systems used by the Ministry of Agriculture, Food and Fisheries (MAFF) and the Countryside Stewardship Scheme (CSS). A study of how closely the conservation appraisal could fit the definitions of biodiversity contained within regional Biodiversity Action Plans (BAPs) is also required.

The Environment Agency's estate manager, in partnership with tenant farmers, has already planted new trees, hedges and wildflower grass mixes on small areas of non-productive land to improve local habitats and the visual aspect of the Estate. One of the farmers has been successful in obtaining funding from the Countryside Stewardship Scheme to implement wetland scrapes, hedge planting and improved public access.

7. Policy relevant conclusions

7.1 Transferability of the experience

Conservation

English Nature developed the set of "expert weights" specifically for Beckingham. These weights may not be transferable to other areas of the country and other estates. The two main reasons for this are firstly that other areas in the UK may have significantly different characteristics and abundance of landscape features and secondly people living in different areas of the country may value environmental assets in different ways. Therefore various sets of weights for different types of estates in different areas will be needed.

This work should focus on identifying the key factors that the English Nature experts considered in deriving the weights for Beckingham and seeing how these factors and the site characteristics in other estates differ from those at Beckingham and then adjusting the weights accordingly. These adjusted weights may need to be validated in particularly difficult cases where the adjusted weights might be doubtful. But it will be prohibitively expensive and unfeasible to derive individual weights for each

individual estate - just as it is prohibitively expensive to carry out Stated Preference surveys for each estate given the estate managers' limited budgets.

It may also be necessary to examine whether landscape features are adequately covered in the present characterisation of natural habitat assets for other sites. If they are not, then are there any ways in which such omitted features could be readily included in the appraisal or should these features be included in the list of other environmental impacts, which cannot feasibly be covered at this stage in the appraisal of each individual estate

Recreation

The values for general informal recreation visits are probably sufficiently accurate for use in the appraisals at this stage. However, the next phase refining study should also seek any available valuations of the extra recreation benefits from the sort of nature conservation improvements that could be realised on the Agency's estates (e.g. creating ponds or enhancing hedgerows). Later, perhaps when the appraisal system has been well established and is subsequently evaluated and reviewed, it will be necessary to update and refine the available valuations for recreation benefits and their transferability to site characteristics of the Agency's estates.

Other Environmental Impacts

This case study has focused on nature conservation and recreation benefits. However, agricultural estates also have many important environmental impacts on water quality, and water resources, flooding and wastes management that are of particular concern to the Environment Agency. Consequently it will be important to extend the appraisal systems to cover these other important environmental impacts.

As part of the Agency's joint project with the RICS, RPA also carried out a case study on 'Farm and land management', which covered the following categories of environmental impacts[4]:

Environmental Protection and Natural Resources Management

- Resources Management covering:

  i) soil management,

  ii) soil erosion and compaction,

  iii) cultivation management,

  iv) water resource management and irrigation.

- Energy efficiency issues on the farm, including renewable energy sources, and the use of reclaimed building materials on the farm.

- Measures relating to the application of fertilisers, slurry etc.

4. RPA April 2000, RICS Comprehensive Project Evaluation: Farm and Land Management Case Study Report.

- Pest Control – relating to the use of pesticides for crop protection.

- Waste Management –how waste oils, plastics wastes, paper and card packaging and pesticide containers are disposed of.

- 'Noise'.

Aesthetics

- 'Amenity' which is the visual impact on the landscape and aesthetic appeal of the farm.

- 'Heritage' applies to the management of any sites of heritage interest, buried archaeological features and other designated buildings, monuments or sites.

Infrastructure

- This impact category is primarily concerned with minimisation of interference with traffic flows, etc outside the farm.

Completing a farm audit to cover the above factors would require some direct involvement by the individual farmers - probably amounting to about 1 person day. The system applied in the Beckinhgam case study could be completed independently by the Agency's estate managers.

Consequently, in the initial stages of the application of the appraisal system, we currently propose that the Agency's tenants should be required to apply good practice regarding the above other environmental protection and resource management issues. But we would encourage estate managers to consider the environmental impacts regarding 'best practice' measures going beyond good practice on these issues. Moreover, we suggest that the Agency keeps under review systems for appraising these other important environmental impacts and expands the appraisal system to incorporate these other environmental impacts as soon as possible.

7.2 Lessons learned and issues

The case study has shown that the appraisal system has worked well to assess objectively and systematically the cost-effectiveness of various nature conservation enhancement options at individual farms on the estate. The draft system does not appear to work quite so well for recreation on account of difficulties in specifying the options and estimating the visitor numbers for them.

The draft appraisal system was discussed in depth at a workshop in December 2000 attended by estate managers at the Agency and other major landowners as well as expert reviewers, who welcomed the development of this appraisal system. The system has been revised in the light of their comments.

It is now proposed to extend the appraisal system to other environmental impacts and commission a follow up study to address these issues, refine the appraisal system and then trial it at selected Agency estates. This system would then be finalised into a practical tool that estate managers could readily apply at all of the Agency's agricultural estates and also perhaps its other land holdings. It is hoped that the experience of this case study could also promote the development of such or similar

appraisal systems to achieve environmental improvements at other estates (e.g. MOD, Forest Enterprise, National Trust, Duchy of Cornwall, Water companies etc).

Table 3 Farm Scale Improvements and relative cost effectiveness

	Asset	When	Length/ Area	Unweighted Score	Weight	Weighted Score	Benefit	Cost No Aid £	£/unit benefit/ unit length	Cost With Aid £	£ with aid/ unit benefit/ unit length*
Smithson	Hedges	Before After	8826 m 9476 m	30 51	16	480 816	336	-3 963	-0.12	-5 189	-0.16
	Ditches	Before After	5798 m 5798 m	59 59	14	826 826	0	0	n/a	0	n/a
	Woodlands	Before After	2.0 ha 13.0 ha	20 50	26	520 1300	780	56 169	5.54	54 612	5.39
	Ponds	Before After	0.0 m 100.0 m	0 78	14	0 1092	1092	46 711	4.28	41 758	3.82
	Grassland	Before After	9.8 ha 9.8 ha	42 42	29	1218 1218	0	0	n/a	0	n/a
	Aggregate	Before After				3044 5252		98 917		91 181	
Barton	Hedges	Before After	2591 m 3877 m	22 45	16	352 720	368	4 805	0.34	2 379	0.17
	Ditches	Before After	3876 m 3876 m	58 60	14	812 840	28	6 923	6.38	2 837	2.61
	Woodlands	Before After	1.0 ha 1.0 ha	22 22	26	572 572	0	0	n/a	0	n/a
	Ponds	Before After	0.0 m 0.0 m	0 0	14	0 0	0	0	n/a	0	n/a
	Grassland	Before After	0.0 ha 0.3 ha	0 53	29	0 1590	1590	5 983	13.44	2 452	5.70
	Aggregate	Before After				1736 3669		17 711		7 668	

	Asset	When	Length/ Area	Unweighted Score	Weight	Weighted Score	Benefit	Cost No Aid £	£/unit benefit/ unit length	Cost With Aid £	£ with aid/ unit benefit/ unit length*
Clark	Hedges	Before After	1331 m 1331 m	38 74	16	608 1184	576	6 820	0.89	6 189	0.81
	Ditches	Before After	1473 m 1473 m	59 75	14	826 1050	224	7 994	2.42	3 433	1.04
	Woodlands	Before After	0.0 ha 0.0 ha	0 0	26	0 0	0	0	n/a	0	n/a
	Ponds	Before After	0.0 m 10.9 m	0 100	14	0 1400	1400	3 029	1.98	2 736	1.79
	Grassland	Before After	0.0 ha 5.0 ha	0 73	29	0 2117	2117	57 006	5.21	53 278	5.03
	Aggregate	Before After				1434 5824		74 849		65 636	
Proudley	Hedges	Before After	4665 m 4748 m	33 54	16	528 864	336	-6 389	-0.40	-6 546	-0.41
	Ditches	Before After	4066 m 4066 m	61 61	14	854 854	0	0	n/a	0	n/a
	Woodlands	Before After	1.8 ha 2.8 ha	22 46	26	572 1196	624	10 502	6.12	10 219	5.96
	Ponds	Before After	0.0 m 10.0 m	0 66	14	0 924	924	2 830	3.06	2 547	2.76
	Grassland	Before After	21.0 ha 21.0 ha	58 58	29	1740 1740	0	0	n/a	0	n/a
	Aggregate	Before After				3694 5578		6 943		6 220	
Notes: * Unit lengths used in calculations are as follows: 100 m of hedgerow; 100 m of ditches; ha of woodland; 10m of pond diameter; and ha of grassland											