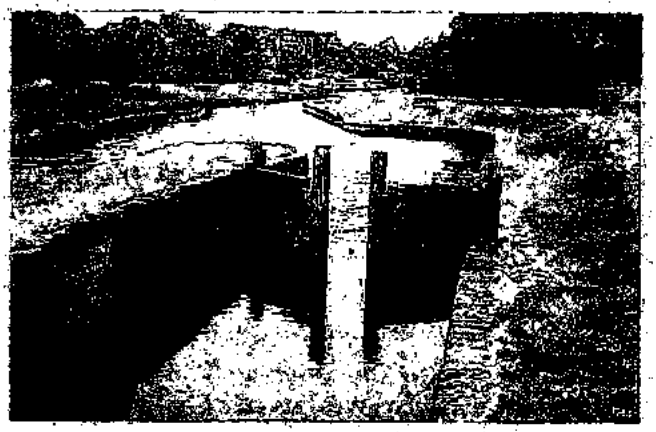
Restoration of the Droitwich Barge and Junction Canals

Final Report

May 2001



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British Waterways

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1.0 EXECUTIVE SUMMARY AND RECOMMENDATIONS

The original commission by the instructing Authorities, Wychavon District Council and Worcestershire County Council to The Waterways Trust and British Waterways required that an analysis be given of the following principal factors relating to the Restoration of the Droitwich Barge and Junction Canals:

1. The feasibility in engineering and environmental terms of the project
2. The principal risks attaching to the project
3. The funding available for the total costs of the project to provide comfort to the two instructing authorities that their commitment of £1m each to the project should continue to be made.
4. The economic, social and environmental benefits that would accrue to the communities of Droitwich and the wider Worcestershire area from the project.

The Project Team has been very fortunate in the assistance given to it by the two instructing authorities and the wider Partnership Group. This has greatly facilitated the level of information and analysis they have been able to undertake which we would hope is properly reflected in this Report.

1.1 Headline Results

1.1.1 Feasibility

Detailed surveys and inspections have provided much needed clarity as to the total project costs. These have included structures inspections, dredging, contamination and level surveys, detailed heritage assessments, water supply and quality analysis and an independent environmental and ecological appraisal of the project.

The total costs of the project (at Q1 2001) are in the order of £9,164,580. This figure includes all fees, mitigation works, marketing and consultation costs. It also includes a contingency percentage of c. 3.5% of total costs.

It does not however include costs for the acquisition of individual properties for the reasons set out in the report.

An initiation percentage of 3.5% per annum should be used to forecast cost increases dependent on start date.

1.1.2 Risks

The principal risks attaching to the Restoration proposals relate to the property acquisitions and funding. To support the negotiations on the property acquisitions, it is suggested preliminary work be started now to commence Compulsory Purchase proceedings. Without this support the costs of restoration could rise substantially to fund unrealistic demands from property owners.

1.1.3 Funding

A detailed funding analysis has been supported by Director and Chief Executive level discussions with the principal funders – Advantage West Midlands, the Heritage Lottery Fund and The Waterways Trust. Support in principle has been given for the

project from this senior level within each of the Funders with recommendations that formal applications now be submitted for consideration.

A draft proposal has been submitted to the Heritage Lottery Fund upon which their advice as to the content of an application is expected. However, as is confirmed within the report, only those elements of the project eligible for Lottery funding will be submitted to the Heritage Lottery fund for consideration.

Discussions with AWM have confirmed that for the project to be considered, the local level strategic partnerships must support the application. We believe this to be the case. The project must also meet the criteria, shortly to be published, which defines the outputs required to deliver the West Midlands Regional Economic Strategy. The benefits accruing from the project, summarised below, will, we believe, assist in the achievement of these targets for Worcestershire.

The Waterways Trust have confirmed their support for the project at Trustee level and discussions are underway in relation to the nature of the support available. This will take the form of direct grant, local fundraising and access to other finance. Several successful models currently exist for other restorations and their application to the Droitwich project is being explored.

The project has been developed to provide a number of discrete mini projects suitable for individual submission to Landfill Tax operators and other corporate sector or charitable trust sponsors. Within the section in the Report on funding more detail is given on the available market in the Landfill, corporate and charitable sectors.

Our belief is therefore, that the balance of funding for the project is available from the sources referred to and that detailed applications should now be prepared for submission.

It is also the belief of both British Waterways and The Waterways Trust that of all the Tranche 2 restorations currently under development (of which there are 6 in total) the Droitwich Canals Restoration is the most likely to succeed within 5 years due to its local support, commitment already secured, technical feasibility and funding availability.

1.1.4 Benefits

The benefits accruing from the project to the communities and economy of Droitwich and the wider Worcestershire sub region include:

- A minimum of 340,000 new visitors each year to Droitwich by Year 5
- additional spend within the local economy of £2.75m per annum
- increase in canalside property values of up to 15%
- new canal based tourism/ recreation employment within Worcestershire of 98 fte jobs
- 380 person years of construction employment
- training and New Deal provision
- new canalside residential and commercial development
- cycling and walking improvements to meet local transport initiatives
- securing and management for public access of a unique local heritage and ecological resource
- water quality improvements
- biodiversity improvements

Further economic, social and environmental benefits, meeting both Worcestershire's and the West Midlands environmental and sustainability targets, are included within the Report at Section 6.0.

1.2 Principal Recommendations

The national demand and resource available for canal based restoration and regeneration schemes exist now as never before. Recognition of the ability these types of projects have to create sustainable economic regeneration whilst also providing a valuable local freely accessible resource is growing.

In the light of both this change in the national perspective and the availability currently of external resources, linked with a deliverable project, it would be the recommendation of both BW and TWT that the project should proceed to the next stage – formal submissions of applications for funding. To do so would require the continuing commitment of the two Authorities to provide their committed contributions of £1m each. This will demonstrate to the external funders the local partnership commitment to the project, the recognition locally of the benefits that will accrue to the local community and economy and provide the essential match funding required for the external funders.

To progress the project the following actions are recommended:

1. The two instructing authorities continue with their financial commitment to the project; this commitment would not be exercised until the balance of the funding is confirmed.
2. The Partnership Group submits applications for HLF, AWM and Landfill Tax funding.
3. The Conservation Plan and Environmental Impact Assessment be developed by the Partnership Group to support the funding applications.
4. The proposed training scheme, using New Deal trainees be formally developed using New Deal and ESF funding (the application for which will need to be submitted mid 2001.)
5. A Canal Development Framework is prepared to identify suitable development sites along the corridor, together with Supplementary Planning Guidance requiring developments to contribute to the implementation works, the completion of which will significantly add value to their site.
6. Proceedings are commenced to acquire CPO powers; these may not need to be brought to fruition but commencement of proceedings and commitment by the Local Authority to their pursuance will greatly assist negotiations.
7. Terms are agreed now with the Droitwich Canals Trust and other sublessees for the surrender of their interests, to be completed once funding has been secured.

John Lancaster
Regional Director
British Waterways

on behalf of British Waterways and The Waterways Trust

2.0 ENGINEERING FEASIBILITY AND IMPLEMENTATION PROPOSALS

2.1 Principal Constraints

The major engineering constraints to the project have been considered in detail within a number of separate reports undertaken by the Partnership Group. In brief they are:

(a) The new canal cut by Body Brook SWS
(b) Sufficient navigation, depth and width at the M5 crossing
(c) Canalising the Salwarpe
(d) The major contamination issues in Netherwich Marina
(e) The water quality issues
(f) Dredging of the Barge Canal – the impact on reed beds and disposal costs
(g) The A449 crossing
(h) Prior to this report the unknown condition of many of the structures

The focus of British Waterways engineering trials and cost proving during this Report has been on clarifying the methods and anticipated cost of these works. The total costs including a breakdown into structures, dredging, water quality and access/ visitor elements are included at Section 2.4.

The information used in developing the costs include:-

The Scott Wilson Kirkpatrick Report of 1994
The Halcrow Cost Plan of 1996
The Halcrow Proving Study of 1999
The Wychavon District Council Cost Estimate Report of 1999
The Water Resources Study of British Waterways 1999

Following the initial Desk Study it became clear that several particular areas of engineering works required more in depth study and development. These were:

1. Individual structures, including locks, bridges, culverts and embankments.
2. Dredging methods and costs
3. Water supply and control

Details of these studies and outcomes are set out below. The water quality issues are discussed in detail at Section 3.2 of the Report. Reedbed creation and mitigation issues are discussed at Section 3.1.2 of the Report.

2.2 Structures Inspections

British Waterways commissioned Halcrows to undertake structural inspections of all the structures along the Canals. These reports were completed in March 2001 and included locks, culverts, bridges and other structures.

The purpose of the inspections was to establish the current condition of the structures and, where necessary, the extent of works required putting them into working order. Any structural maintenance likely to be required over the next 25 years was also recorded in the report and is included within the management and maintenance costs for the project.

The reports take the following form:-

1) Description of structure, including ownership and recent maintenance works.
2) A detailed inspection of the structure including all constituent parts.
3) General comment on the condition of the structure together with any maintenance works undertaken.
4) Conclusions as to the condition, immediate and long term works required.
5) Cost estimates.
6) Detailed photographs of the structure.

Copies of all the reports are available at British Waterways offices.

2.3 Dredging

A full survey of both the Barge and Junction canals has been undertaken by external consultants, Randal Surveys, to give the existing level profile. Cross sections have been taken from this survey and a joint BW/Randal software programme has provided the amount of dredged material to be removed to give the desired channel profiles. The proposed profile following dredging provides a 1.5m depth on the Barge Canal and 1.35m on the Junction Canal. An 11.0m minimum clear channel width is proposed with a navigable channel width of circa 7.0 metres. This allows for the passage of one broad beam and one narrow beam boat. Periodic widening has been included to allow passage of two broad beam craft.

It should be noted that a width and depth restriction is present at the railway tunnel for broad beam boats restricting their access into the main Town Centre area.

As outlined in the Interim Report the principal silt contamination is from mercury, within the town centre area. The source is understood to be from the former brine works in the locale but this cannot be determined.

Very low levels of contamination are present within the Barge Canal. The material dredged from the Barge Canal is suitable for adjoining agricultural disposal.

It is proposed that the contaminated silt be removed from site by a specialist dredging contractor. A restricted working area and method will be required given the mercury contamination with disposal at registered sites. The nearest sites to the dredge location are either Hartlebury or a site near Bromsgrove. It should be noted that although the mercury levels are high the levels are not unprecedented in modern canal restorations where no dredging has been undertaken for a significant number of years.

The existing contamination will remain within the silt if left undisturbed by boat traffic. It is only once boat traffic occurs through the contaminated area that the silt will be disturbed. However it is likely that future changes in the Environmental policy will require clean up of contaminated materials of this nature within urban/populated areas.

The level of decontamination is still to be agreed with the Environment Agency. Their requirements to remove as much contamination as is feasibly possible may require dry dredging as opposed to the proposed wet dredging under the restoration programme. This will entail significant additional costs, anticipated to be in the order of £250,000, to accommodate additional site works to service the dry dredging method.

Along the Barge Canal, where contamination is not an issue, it is proposed that the dredging be undertaken either by British Waterways direct labour or skilled volunteers.

These works would be undertaken over a period of 2 – 3 years, allowing it to both fit in with other programme works and to minimise environmental impact along the heavily reeded sections of the Barge Canal.

Two options have been identified for disposal of this material:-

1) Agricultural disposal to adjoining land in accordance with the ADAS National Procedures and Rates.
2) Free disposal to the Hanbury Road tip. Discussions with the Tip Manager have confirmed they currently require material to remediate the site. Subject to EA approval, the majority of the material from the Barge Canal can be taken to the Hanbury Road tip for this purpose. Dependent upon the amounts available and the quantities required by the tip, which are anticipated to be up to 24,000 tons, this could result in a cost saving on the project of circa £300,000.

This material is required within the next three years which again may impact both upon the dredging programme and the amount of material that can be disposed of in this way.

2.3.2 Dredging costs

Total dredging costs are as follows:

Material removed by contract

Dredging highly contaminated material to be undertaken by specialist contract at a budget cost of £270,000.

Material removed by Direct Labour

The balance of material through the Junction Canal, where levels of contamination are lower and the Barge Canal where material can be taken to adjoining land or local tip, as detailed, to be undertaken by Direct Labour. The costs of this dredging are estimated at £750,000.

2.4 Water Supply

As detailed in the Interim Report, tests were undertaken in the school half term week in October 2000 to ascertain whether 12 megalitres per day, to serve the assumed peak demand, could be met without additional bypass works on the Worcester & Birmingham Canal.

The tests were run over a single week with 10-12 hours per day working time (as opposed to the 24 hours per day once the canal reopens).

The tests proved that, for the demand levels forecast, water could be supplied from the existing resources in the Birmingham area, using Tardebigge and Bittell Reservoirs as 'battery' supplies. This assumes no major additional demand is required for other restoration or supply schemes from the Birmingham water this resource, which will obviously impact on this.

Based on Environment Agency flood and drought forecasts, the tests also show that the peak demand can be supplied without restriction 3 out of every 4 years.

Restrictions, in terms of either restricted hours of movement, or passage, should be expected for 1 out of every 4 years at times of peak demand. It should be noted however that these times of peak demand are at most 3-4 weeks in any one calendar year (in high summer) and records for the adjoining Worcester and Birmingham Canal have shown no major drought/supply founded restrictions to have occurred within the last ten years.

Any restrictions will be further ameliorated by gate and paddle sealing works, leakage control, telemetry improvements and greater customer awareness/education.

The test also considered areas of risk in the supply route. Some mitigation and facilitation works will be required through the Tardebigge Flight which will include some minor bank protection and raising works, together with telemetry and additional water control points. A sum of £100,000 has been included within the overall project costs for these works.

Further discussions will be required with the Environment Agency to obtain their agreement to the above proposition.

2.5 Costs Plan

Total costs for the project are nine million, one hundred and sixty four thousand five hundred and eighty pounds. (£9,164,580.00)

These costs are at Quarter 1 2001 and will obviously require updating through the usual construction indices dependent upon the start date of the works.

A full cost plan and cashflow is included at Appendix 1C

All figures exclude VAT.

The cost plan includes the following:

1. Details of the proposed procurement method i.e.

- Engineering contract
- Direct labour
- Skilled volunteers
- Volunteers

2. Costs for each element of work and any anticipated maintenance costs for the following 25 years.

The principal cost items are:-

Junction contract	£3,431,250
A449 contract	£1,300,000
Dredging	£1,019,420
Lock refurbishments	£743,090
Mitigation works	£337,024
Towpath and access works	£159,900
Team and professional fees	£800,000 (9%)

Other costs are also included within the overall project estimate. A contingency allowance of 3.5% of total costs is included within these figures.

The principal reasons for an increase over the previous cost estimate are:-

1) Dredging costs (no significant provisions made previously) – Total £1,019,240
2) Project team fees and other fees – now included at £650,000 and £150,000 respectively.
3) Mitigation works included at £337,024

2.6 Project Implementation Team

Previous cost plans have assumed professional fees for the design and delivery of the works at 15% of the total capital costs of the project. The Project Team considers that the most cost efficient route would be the direct employment by the project of a Delivery team. This team will include management, design and supervision staff who will be responsible for delivery of the works on site, together with supervision of volunteers.

The Team comprises:

1) Project Manager – The Project Leader and Champion. It is anticipated that this would be a project management professional with technical experience of managing major projects. They would have staff management responsibility for other members of the project team and would be responsible for securing the funding and setting the programme for the restoration.
2) Project Engineer – responsible for dealing with the engineering design and procurement of the major engineering works, all Health and Safety & CDM matters. They would also develop the programme of works for the direct labour and skilled volunteers on site.
3) Site Supervisor – with technical experience they will be responsible for dealing with on site contract management, supervision of direct labour, new deal and skilled volunteers. They would report to the Project Engineer and be responsible for ensuring that Health & Safety and CDM requirements were met on the ground.
4) Project Officer – their remit would be to deal with all non-engineering elements of the project including marketing, interpretation, signs, events, local corporate and charitable sponsorship, volunteer management and development, education etc.
5) Project Administrator – responsible for day to day administration of the financial elements of the overall project, providing monthly reports to the Restoration Partnership and submitting the claims for funding from external parties.

This team would be employed during the currency of the project (anticipated to be circa 4 years) with total costs at circa £650,000. These costs include National Insurance, Pension, expenses and company car costs where appropriate.

It is proposed that this team be based either on site at the Droitwich Canal in premises to be identified or alternatively at the local Waterway Office at Lapworth in Warwickshire

2.7 Other Professional Fees

An additional allowance for other professional (non engineering contract) fees also needs to be made. These will cover:-

1) Ecological and landscape works
2) Heritage recording and archaeological recording
3) Property acquisition costs
4) Legal fees incurred in the property acquisitions and other licence acquisitions to facilitate the work.
5) Cost of preparing an Environmental Impact Assessment.

These fees have been included at a total cost of £150,000 within the project costs.

The use of this route represents a cost saving of circa £1m on a 15% fee budget of £9 million project cost. It needs to be borne in mind that even if a professional team were to be procured externally at a cost of circa 15% the project would still need to bear the costs of a Project Manager, Project Officer and Project Administrator together with the additional non-engineering contract fees.

2.8 Procurement routes

The procurement routes set out in the Interim Report, namely contract, direct labour and skilled volunteers, are still proposed to be used for implementation of the restoration programme.

The Cost Plan details at Appendix 1C the proposed procurement routes for each element of work and the costs attributed to these work elements reflect the procurement method.

2.8.1 Contract

Major contracts will be let externally for the five principal engineering projects, namely:-

1) The A449 crossing (through a Design & Build contract to a DoT approved contractor.)
2) The new canal cut on the Junction Canal, to the rear of the properties on Hanbury Road and canalisation of the Salwarpe.
3) New bridges where required e.g. by the rugby club and by Lock 7 on the Barge Canal.
4) Dredging of contaminated material.
5) Water bypass system (if required)

2.8.2 Direct labour

The balance of the works will either be undertaken by a dedicated team of craftsmen employed by the restoring body or volunteers. The Direct Labour element would be trained professionals, part of whose role will be to supervise and mentor new trainees through either New Deal, volunteer or other training schemes.

They would undertake the principal piling, non-contaminated dredging, lock and culvert repairs or restorations, towpath and access creation and mitigation works involved in the restoration.

This team could comprise anything up to 10 or 15 people employed for the project duration together with volunteers and trainees.

This route would lengthen the restoration timetable but with the following benefits:-

1) Opportunities for training local people
2) Capitalising on volunteer input
3) Creating excellent local goodwill and publicity with new projects continuously starting
4) Local business involvement by sponsoring individual projects
5) Effective local relationships by continuity of the staff
6) Anticipated cost reduction overall
7) Environmental and ecological advantages in lengthening the timetable for restoration
8) Effective management and supervision of existing and new volunteer groups
9) Opportunities to incorporate volunteer – both skilled and unskilled – work within the programme.

It is anticipated that the lengthsmen employed following restoration will be drawn from this pool of staff.

2.8.3 Volunteers

Proposals for volunteer involvement are detailed separately in this Report at 5.0.

3.0 CONSERVATION PLAN

This section of the Report considers in detail the environmental, ecological and heritage impacts and benefits of the project.

It includes assessments of:

3.1 – Ecology and Nature Conservation, including species protection and reedbed enhancement and mitigation works.

3.2 – Water quality issues

3.3 – Heritage Assessment

3.4 – Environmental Impact Assessment

3.1 Ecology and Nature Conservation Issues

3.1.1 Protected species

The following species have been considered in detail with a summary of the draft Conservation Plan recommendations being included at 3.1.1.9

3.1.1.1 Badger

The Worcestershire Wildlife Consultancy (WWC) survey of 1999 found evidence of activity at two setts alongside the Barge Canal. It is considered unlikely that the works necessary to restore the navigation will constitute 'disturbance' to these setts within the meaning of the Protection of Badgers Act 1992 and thus require licensing by the appropriate authority (English Nature or MAFF). However, further surveys should be undertaken prior to the works commencing to ensure that no new issues relating to badgers have arisen in the meantime. This work has been built and costed into the programme.

3.1.1.2 Bats

A limited survey was undertaken by WWC / Worcestershire Bat Group in 1999. This identified the Droitwich (Barge) Canal and its immediately adjacent land as a very important feeding area for a number of bat species. It is not considered that the proposed restoration will compromise this situation significantly as most of the features important to bats will be retained and new areas of valuable foraging habitat will be created.

The 1999 survey identified a suitable bat roost site in a tree on the offside bank near Salwarpe and noted that buildings in the vicinity of Porter's Mill had potential to contain roosts. Where works involve management of trees or structures with the potential to support bat roosts a precautionary approach should be adopted and a survey undertaken in advance to ensure that no problems arise. This work has been built and costed into the programme.

Depending on final design solutions there may also be opportunities to create new roost sites for bats, e.g. by installing bat bricks in the new tunnel under the A449.

3.1.1.3 Birds

The 1999 survey demonstrated the canal corridor to be valuable for a good range of breeding birds, notably the Reed Warbler. The planned reedbed creation would cater for the requirements of this species.

None of the birds recorded as breeding within the canal corridor are 'Schedule 1' species whose nests are afforded special protection. Therefore, the only constraint arising from the presence of breeding birds is with respect to the timing of works, which must be planned to avoid disturbance. This is particularly important now that the Countryside & Rights of Way Act 2000 has created a new offence of **reckless** disturbance (previously, under the Wildlife & Countryside Act 1981, the **intent** to disturb had to be proved, rendering prosecution far less likely). This restriction has been built into the proposed restoration programme.

3.1.1.4 Great-crested Newt

The WWC survey of 1999 found a population of Great-created Newts in the Junction Canal, to the west of lock 3. The significance of this is that Great-crested Newts are a European protected species under the provisions of the Conservation (Natural Habitats, etc.) Regulations 1994 and any development which affects them must be licensed by DETR. The DETR must be satisfied on three conditions:

1. They may grant a licence to "*preserve public health or public safety or other imperative reasons of overriding public interest including those of a social or economic nature and beneficial consequences of primary importance for the environment*". The social and economic benefits associated with the restoration are such that a good case can be made to satisfy this condition.
2. They must be satisfied "*that there is no satisfactory alternative*". The restoration of the Junction Canal cannot proceed without impacting upon the existing Great-crested Newt habitat.
3. They must be satisfied that the action proposed "*will not be detrimental to the maintenance of the population of the species concerned at a favourable conservation status in their natural range*". In order to meet this condition it will be necessary to create appropriate amounts of suitable freshwater breeding habitat and terrestrial foraging habitat within close proximity of the existing Great-crested Newt colony.

The costs of both a survey to establish the current size/distribution of the population and an allowance to find appropriate mitigation enhancement measures on adjoining land has been costed into the restoration.

3.1.1.5 Otter

The WWC survey found evidence of Otter activity throughout the canal corridor except on the Junction Canal (but including the Body Brook Marsh SWS, identified as a potential breeding site). The restoration will have some impact upon Otter habitat, notably the loss of scrub on the towpath bank, but the planned mitigation / enhancement projects will more than compensate for this.

The potential impact upon Otters of the new cut through Body Brook Marsh SWS will require particularly careful consideration. A comprehensive survey is required to provide an up to date picture of the way Otters make use of this site so that

appropriate mitigation can be developed. Costs for the survey are included in the restoration. The sum of £15000 has also been allowed in the cost estimates for mitigation at this site (see also 2.1 below).

3.1.1.6 Reptiles

Two species of reptile are found within the canal corridor, Slow-worm and Grass Snake. Both are protected in respect of killing, injury or sale, but their habitats are not specifically protected, unlike those of the Great-crested Newt.

Slow-worms are terrestrial animals whose occurrence within the canal corridor is rather restricted. The restoration is unlikely to have a significant impact upon them except perhaps where off-line developments occur in association with it. The potential impacts of these should be appraised on a case by case basis.

Grass Snakes, however, are associated with aquatic habitats as much as terrestrial ones and are common within the canal corridor. Awareness of their probable presence and their protected status needs to be maintained throughout the restoration but it is not thought likely that specific mitigation or protection measures will be required for them, except perhaps in the case of associated off-line developments which should be subject to specific environmental appraisal.

3.1.1.7 Water Vole

The WWC survey of 1999 found only one current location for this species, in a ditch alongside the Junction Canal. However, it suggested that Water Voles may be more widespread along the Canals but had been overlooked due to the difficulty of surveying in dense reedbed habitats. A detailed survey should therefore be undertaken.

The results of this survey will determine the precise mitigation that will be required for Water Voles. However, the restoration need not be detrimental to Water Voles, as has been demonstrated on other canals, notably the Kennet & Avon. Indeed, it may be that the restoration will be beneficial to Water Voles by restoring the link between the Junction and Barge Canals, thereby increasing habitat connectivity, and creating new areas of wetland habitat on adjoining land.

Adherence to the following principles will maximise the opportunities to conserve Water Voles and their habitats:

- Retain extensive reed fringes and soft banks, as planned.
- Phase the works over several years, as planned.
- Dredging during winter, when Water Voles' activity levels are low. This is planned into the programme.

It is considered that changes to habitat as a result of the restoration will not be as significant a factor as prediction from Mink in determining the future status of Water Voles on the Canals. It is understood that Mink control measures are being considered on the Worcester & Birmingham Canal and these should be extended to the Droitwich Canals in the event of the planned survey indicating that this would be desirable.

Over and above these general principles, Water Voles' burrows are protected under the Wildlife & Countryside Act and can be disturbed or destroyed as a result of an

otherwise lawful operation only after consultation with English Nature and appropriate mitigation. Two elements of the restoration have the potential to disturb or destroy burrows:

- The new cut on the Junction Canal. The proposed line of this passes through the location where Water Voles were recorded during the 1999 survey; thus it is probable that burrows will be destroyed as a result. The sum of £5000 has been allowed in the cost estimates for mitigation works arising from this (see also 2.1 below).

- Raising water levels on some pounds. This has the potential to permanently flood existing burrows in the event of these being present, possibly necessitating trapping / temporary removal of resident Water Voles (as has occurred on the K & A restoration). The need, if any, for these works will become apparent after the completion of the detailed Water Vole survey.

3.1.1.8 Other species issues

Whilst not specifically protected, the halophytic plants and salt-tolerant invertebrates found within the Barge Canal and its associated watercourses are a distinctive and valuable feature which should be conserved.

The Conservation Panel report (1999) recommended an extension of the ditch system at King George Playing Fields to benefit halophytic plants, particularly Wild Celery. The Linacre site may offer better potential in this respect. This will be considered as part of the conservation plan restoration and management programme.

The presence of salt-tolerant plants and animals is dependent upon the saline influence from the Salwarpe continuing to enter the Barge Canal.

3.1.1.9 Summary of recommendations re protected species (in order of priority)

Species	Action required	Timescale	Cost estimate
Great-crested Newt	1. Survey to establish distribution / status of population on Junction Canal. 2. Develop new habitat on site at Hanbury Wharf in light of results of survey and requirements of DETR.	Spring 2001 As per WAS recommend-ations.	£2000 £50,000
Water Vole	1. Undertake comprehensive survey to establish current distribution / status of Water Voles within the canal corridor. 2. Develop appropriate mitigation measures in consultation with English Nature.	Spring / Summer 2001 Initiate once full survey data available.	£2500
Otter	1. Establish status of Otter within Body Brook Marsh SWS. 2. Develop appropriate mitigation measures in consultation with English Nature.	Spring / Summer 2001 Initiate once survey data available and line / design of new cut finalised.	£1500
Bats	Investigate possible roost sites well in advance of any works which might effect them in order to allow time for resolution of any licensing / mitigation issues.	Ideally Spring / Summer 2001 in order to ID any potential problems at an early stage.	£750
Badger	Check for setts well in advance of any works which might disturb them in order to allow time for resolution of any licensing issues.	At least 12 months in advance of any works in vicinity of setts.	£500
Birds	Time works to avoid any possibility of impacts upon nesting birds.	Mid-March – mid-August covers principal bird nesting season. April – July is peak season.	
Reptiles	Consider whether specialist survey / advice needed when planning off line developments.	At early planning stage.	

£57,250

3.1.2 Channel design / mitigation issues

3.1.2.1 Junction Canal new cut

Detailed designs have not been worked up yet but they will include provision of offside margins with soft bank protection, suitable for use by Water Voles that are known to be present in the area.

The impacts of the new cut upon Water Voles, Otters and the Body Brook Marsh SWS in general will need to be mitigated by additional areas of habitat creation. £15000 has been allowed in the cost estimates for mitigation associated with Body Brook Marsh, with additional sums for works specific to Otters and Water Voles.

3.1.2.2 Wetland habitat along old canal bed, Hanbury Road

Water will be diverted from the Body Brook into the old line of the Junction Canal alongside Hanbury Road, giving the opportunity to enhance the existing wetland habitat within the old cut. £8000 has been allowed for these works in the cost estimates.

3.1.2.3 River Salwarpe

The canalised section of the Salwarpe will require hard bank protection but it is proposed that this will not be visible at water level, as reeds will be established in planting troughs at the margins of both banks.

There is some existing wetland habitat of value in the vicinity of the Salwarpe / Body Brook which should be conserved / enhanced, requiring careful planning and implementation of the works in this area. This should be done in conjunction with the creation of a pool / riffle sequence on the Salwarpe upstream of the Body Brook confluence. The costs of this have been built into the estimates for the works to allow navigation on the river.

3.1.2.4 Channel profile arising from dredging of Barge Canal

The dredge profile proposed for the Barge Canal typically will allow retention of a 1m wide reed fringe on the towpath bank and a 3.5m wide reed fringe on the offside, i.e. a significant area of the existing in-channel resource of reed will remain in situ (see 2.5 below). The methodology for achieving the proposed profile will require careful consideration, in order to prevent excessive slumping of the reed retained at the margins.

3.1.3 Reedbeds

BW has calculated that 2.5ha of the existing 6.8ha of reedbed within the channel will be lost as a result of the restoration, of which 2ha is attributable to dredging (assuming a 7m wide navigable channel) and 0.5ha to water level rises (of 1000mm between lock 7 & the A449 and 1400mm between locks 4 – 3).

As a consequence of the projected losses 2.5ha of new reedbed should be created in advance of the main restoration works commencing, in order to ensure that the new habitat is available prior to existing reedbeds being lost. Creation of additional areas

of reedbed would make a positive contribution towards the Worcestershire Biodiversity Action Plan's target of creating 60ha of new reedbed in the county by 2010.

BW commissioned the Wetlands Advisory Service (WAS) of the Wildfowl and Wetlands Trust to investigate the feasibility of establishing reedbeds at four sites:

1. Ombersley Way (SO 882627)
2. Porter's Mill Bridge (SO 857603)
3. Mildenham Mill (SO 849604)
4. Salwarpe (SO 877623).

WAS's report on their feasibility study is attached as an appendix to this report. In summary, they regard Porter's Mill Bridge (site 2) as the only site with low suitability for reedbed creation. Reedbed creation is technically feasible on the other three sites, although all have a combination of positive and negative attributes in this respect as summarised in the table on p28 of the WAS report. They conclude that Mildenham Mill is in a good location to receive reed dredged from the canal, whilst creating an area of 2.5ha of new reedbed as mitigation in advance of the restoration could be derived from reedbed creation at Ombersley Way or Salwarpe or a combination of these two sites (although in order to achieve the figure of 2.5ha if only one site is used the projected area of the reedbeds will need to be moved nearer to the River Salwarpe).

British Waterways favours reedbed creation at Ombersley Way rather than Salwarpe on the grounds that the access for construction at Ombersley Way is so much better than at the Salwarpe site.

It is recommended that the Ombersley Way site should be investigated further with a view to establishing a reedbed on it at least one season prior to dredging commencing on the Barge Canal. The costs of achieving this are estimated at £74,000, assuming that spoil can be landscaped on site. They rise to £130,000 in the event of spoil having to be removed to landfill. The area of reedbed, which could be created on this site, is approximately equal to that which will be lost as a result of dredging to restore navigation. In order to take account of projected losses as a result of water level rises it will be necessary to increase the area of the site on which reedbed is created. There is potential to do this by expanding the created reedbed closer to the River Salwarpe. This will have impacts in terms of increased seepage losses, although these are not so significant here as at the Salwarpe site.

In the event of further investigation finding that the Ombersley Way site is not available for reedbed creation the Salwarpe site will require more detailed consideration as an alternative.

The Mildenham Mill site has been identified as having potential for being the main receptor for reeds dredged from the channel during the restoration. This will enable a significant additional area of reedbed of up to 3ha to be created whilst providing a sustainable means of disposal of dredgings. The estimated costs of this work range from £87,000 - £217,000, depending upon the final option for disposal of spoil.

Whilst the Porter's Mill Bridge site has been identified as having low suitability for reedbed creation it has good potential for enhancement of its existing value through small-scale habitat creation and management, e.g. through the creation of ponds for amphibians and / or salt tolerant plants and invertebrates. £10,000 has been allowed for these works in the cost estimates.

3.1.4 Other issues

3.1.4.1 Towpath boundary hedges

The Conservation Panel report (1999) identified a 500m length downstream of the A449 crossing as requiring reinstatement of the towpath boundary hedge. This work has been costed into the estimates at a rate of £10 per m to include stockproof fencing.

Caution will need to be exercised in the management of existing towpath boundaries. For example, it has been suggested that the mature hawthorn hedge between locks 4 and 5 should be laid but this would be damaging to the nationally scarce longhorn beetle *Anaglyptus mysticus* which is present in this length of hedge and whose larvae require plenty of dead, dry hawthorn. The sort of detailed management prescription, which is required for features such as this, is best worked up as part of the comprehensive Conservation Plan to guide the restoration of the Canals and their subsequent management.

It is proposed that the Project Team works together with both WWT and BCTV to resurvey the hedgerow stock and develop a management and maintenance plan for the towpath boundaries much could form the basis of a Countryside Stewardship application.

3.1.4.2 Recreational use

The impacts of disturbance to wildlife arising from increased recreational use of the canal corridor should be addressed and managed via the development of a Conservation Plan and the Canal Park concept.

3.1.4.3 Future management

Securing long term funding for appropriate management of areas of habitat created offline as mitigation / enhancement is a key issue. The detailed requirements for long-term management can also be addressed via the Conservation Plan and the development of the Country Park concept. These concerns have begun to be addressed in ways such as restricting visitors by car in rural areas, limited hard towpath surfacing in rural areas and the linking of major impact facilities to those existing e.g. Leisure Centre, Vines Park.

It is anticipated that these future management operations and costs would be incorporated within the canals operational management regime, the options for which are explored in 9.0.

3.2 Water Quality Issues

Water quality in the new Junction Canal and Barge Canal will be directly related to the quality of water supplied from the Worcester and Birmingham Canal. Using this water resource gives rise to a number of water quality issues which are caused by mixing the Droitwich Canal (consisting of Worcester and Birmingham Canal water) with the River Severn to the west of Droitwich and also with the River Salwarpe which will form part of the navigation. The Environment Agency have undertaken some simple modelling work to assess the impact of flow from the Barge Canal on the River Severn and also the impact of flow from the Junction Canal on the River Salwarpe. They have concluded that the flow from the Barge Canal to the River Severn is acceptable and

would not cause a significant deterioration in water quality in the river. However, the Environment Agency have also concluded that the flow of water from the Junction Canal to the River Salwarpe, under certain conditions, would cause a significant deterioration in water quality in the river and is, therefore, unacceptable. This issue will need to be addressed before the restoration and operation of the Droitwich Canals can be completed.

Work to improve water quality in the Worcester and Birmingham Canal should therefore begin immediately. This work should run in parallel, as recommended in earlier reports to resolve the water quality issue, with the restoration of the Droitwich Canals. The plans to build the bypass pipeline should be retained until it can be demonstrated that water quality in the Worcester and Birmingham Canal has improved to a level at which there will be no significant impact on the River Salwarpe. If water quality has not improved to the desired level, it may still be possible to abandon the proposed bypass pipeline. This could be achieved by limiting navigation on the newly restored Droitwich Canal when flows are too low in the River Salwarpe. This will ensure that the volume of poorer quality water from the Droitwich Canal flowing into the River Salwarpe will not cause a significant deterioration in water quality. Calculations to determine the volume of water, which can flow into the River Salwarpe, without having a significant impact on water quality, should be carried out. Navigation could then be limited to an appropriate amount of lockage. This could perhaps be varied on a daily basis, depending on the flow in the River Salwarpe.

3.3 Heritage Assessment

As part of the commission to British Waterways and the Waterways Trust a detailed Heritage Assessment has been undertaken. This has involved researching the history of the canal and area, assessing the canal for its importance and considering each structure along the canal in detail for its heritage value.

This information will be particularly vital for the Heritage Lottery Fund application and Landfill Tax applications.

3.3.1 History of the area and Canals

The history of Droitwich is linked to its natural brine springs. The earliest evidence of human activity recovered from the town so far are flint tools dating from the mesolithic period and the first evidence of salt production dates to the late Iron Age. The Romans were undoubtedly attracted to the town by its salt and this was probably the reason for the Town' existence. Significant Roman remains have been found in the vicinity, including a villa complex at Bays Meadow. The area through Vines Park within the centre of Droitwich also has significant archaeological remains, the conservation of which will impact upon the restoration project.

During the medieval period salt production was highly regulated as a town monopoly. Salt rights could only be passed on by inheritance. In the late 17th Century Robert Steynor successfully challenged this monopoly of salt production exercised by the town and won the right to sink a brine well of his own. Salt production was now free from regulation and salt dues and the industry dramatically expanded. Consequently the transportation needs of the town became pressing. In 1703 and 1747 Bills were presented to make the River Salwarpe navigable but these foundered. Pressure for better transportation further increased when in 1727 deep borings were made to expose stronger flows of brine, and salt output soared. It was not until 1767 however

that the Droitwich Council appointed James Brindley to survey a route for the barge canal to link Droitwich with the River Severn that a solution was found.

3.3.2 The Barge Canal

James Brindley had built England's first large scale coal carrying canal, the Bridgewater Canal, for the Duke of Bridgewater, to transport coal from the Duke's mines at Worsley to Manchester. Brindley was considered the country's leading expert on canal construction. The Droitwich Barge Canal Act was passed in 1768 and work began the same year. Three years later in 1771 the canal opened at a cost of £23,500. It was typically a Brindley canal following the contours of the land and was one of only a few canals to be completed in his lifetime.

The Barge canal was five and three quarter miles long running from the River Severn into the heart of Droitwich. During construction Brindley was worried about water loss through the large lock gates so he designed them to be self closing. On each gate the stone quoin was built to slope outwards and downstream so that the weight of the gate pulled it closed. All of the locks on the canal were built with timber (elm) frames. The framing was infilled and faced with bricks. The canal was fed by the river and salt springs so Brindley knew this would mean constant dredging. So in the bed of the canal he dug large pits so that heavily laden barges would push mud along the cut into the pits which would be emptied by horse and cart. Brindley was particularly proud of his efforts on the Droitwich Barge Canal and regarded it as perhaps his most satisfying commission. Although only six miles long it was considered to be a model canal of its time.

3.3.3 Junction Canal

Work on the Droitwich Junction canal to link Droitwich with the Worcester & Birmingham canal to the east began in 1852 and was completed in 1854. The total cost of the canal was £28,000 for the one and three quarter mile length. The engineer of the Worcester & Birmingham canal, R. Boddington was appointed as engineer. It was Boddington whose idea it was to construct the water conserving side ponds along the canal. The canal included six locks to pass narrow boats and a seventh of barge dimensions giving connection to the Barge canal. At the same time the locks of the Barge canal were lengthened to seventy-two feet. The management of the two canals now passed into the hands of a bigger company and for a time the improvements described bought a new lease of life to the canals.

Droitwich's dominance in the salt trade slowly began to decline when in 1828 a new brine source was discovered at Stoke Prior to the north east of the town. By 1890 this source was extracting more salt than Droitwich and by 1922 salt production in Droitwich had ceased. The Birmingham and Gloucester Railway opened in 1841 and the Oxford, Worcester and Wolverhampton Railway in 1851 and competed with the canal to service the salt trade. The last commercial barge used the Barge canal in 1916. Both canals were legally abandoned in 1939.

Between 1938 and the 1960's the line of most of the Junction canal was lost to development and infilling. The Barge canal length has principally retained its route with the exception of the A449 road, which, when built, infilled the connection to the River Severn.

3.3.4 Works since abandonment

Works by the Droitwich Canals Trust and other volunteer groups have helped in both restoring the locks to the Junction Canal and ensuring the towing path along the Barge canal is kept clear. Works to individual lock chambers and gates on the Barge canal have also been undertaken, together with minor repair and restoration works within the Vines Park area.

3.3.5 Heritage Assessment of Structures

As part of this study British Waterways have undertaken a detailed Heritage Survey which has reviewed every structure along the Junction and Barge canal. The survey provides a description, heritage assessment and proposals for future management and maintenance of each structure.

This information is vital to the preparation any bid for heritage related funding and will also form the basis of the heritage elements of the Conservation Plan for the restoration, maintenance and management of the canals.

Included at Appendix 2a is a summary of the structures and their heritage significance.

3.3.6 Impact of the restoration on the canal heritage

Overall it was found that the Droitwich area is unusually rich in archaeological remains of all periods. The area firstly has a rich and long history associated with its salt production. Secondly the presence of brine springs in the vicinity has meant many deposits have remained in a waterlogged condition ensuring their preservation for centuries.

The new canal channel to be cut will link the remaining stretch of the Junction Canal to the River Salwarpe west of the M5 motorway. This is necessary because the western end of the Junction Canal has been built over since its abandonment in 1939. The water supply proposals will also require the restoration of the side ponds adjacent to Locks 1,2,3 on the Junction Canal.

The impact of the construction of a new cut will inevitably have greatest impact on what is remaining below ground level. However because the new cut is some distance from the original line of the Junction Canal it does not encounter any canal related heritage along its path.

The new section of canal could cut anything including prehistoric or Roman routes and medieval frontages. Droitwich includes a probable Saxon minster, a Roman fort, a friary and a number of important civic and religious sites of the Middle Ages. This is because the town was an extremely important centre to trade in salt and therefore attracted much wealth.

The fact there exists such high potential for significant archaeological remains to be found along the new section of canal, means that further archaeological assessment must be undertaken before any work commences. Firstly, it is unlikely that the County Archaeologist would allow work to be carried out without a detailed assessment. In addition an application has been made by the County Council to designate the canal length through Vines Park as a scheduled Ancient Monument. If

↑ a section, not all

↑ what when it was built in the 70's

the area is designated in the foreseeable future any future works will have to adhere to the pre-development recording requirements that the designation demands under law.

British Waterways would insist that best practise be adhered to from the start. An in depth desk top assessment should be budgeted for, to be commissioned in advance of any work, to a brief agreed by the County Archaeologist. The study will include a brief visual survey and possibly an archaeological evaluation (a limited dig,) which may encounter organic remains and could require detailed post excavation works.

The primary impact on the above ground built heritage will be in the form of the water supply proposals. This will focus on the remaining stretch of the Junction Canal and in particular the three locks and associated side ponds. All three side ponds have been modified in the past through repair work so substantial amounts of their original fabric may be lost already. However the remaining hand made bricks should be retained and reused in any restoration or modifications wherever possible. Likewise the original brick bond should be adopted and the original pointing technique applied. Whilst neither the locks nor side ponds are listed they are situated in a Conservation Area and this will ensure that Conservation Area Consent will need to be obtained for any development.

British Waterways would deem that regardless of the statutory protection of the site, every attempt should be made to retain as much of the canal heritage as possible. As a late canal (the majority of the country's canals were built in the late 18th and early 19th Centuries and by the mid 19th Century canal construction was relatively rare) the Junction Canal has considerable significance in terms of the materials and techniques it used in its construction. These should be retained wherever possible.

4.0 CANAL PARK CREATION AND MANAGEMENT

4.1 Canal Park Vision

The vision of the Partnership Group has been agreed as:

"To create and manage a linear Canal Park centred on the Droitwich Canals which will seek to conserve and enhance the natural and built environment and provide a range of informal recreational opportunities for local people and visitors, thereby generating economic benefit and contributing to the well-being of the people of Worcestershire".

The concept plan produced by Worcestershire County Council in 1999 has directed this element of the feasibility study, both in terms of the types of activities proposed along the Canal Park, the marketing and interpretation proposals and the anticipated economic, social and environmental impacts the project will create.

The aim will be to create a comprehensive co-ordinated management of the entire canal corridor. Linked to the Canal Corridor would be attractions based within the wider Droitwich area that would be jointly marketed with the Canals Restoration project. This would have the effect of:

1) creating a larger more marketable visitor attraction
2) reducing pressure on more sensitive parts of the canal park
3) extending the area of economic benefit.

These principles have been adopted both in the development of the marketing and interpretation plan and are reflected in the engineering and access proposals for the restoration. For example, the Report does not propose hard surfacing and creation of intensive facilities along the Barge canal but rather the concentration of large numbers of new visitors within Droitwich town centre and using existing facilities such as the Leisure Centre.

The proposals meet the following criteria:-

1) They do not have an unacceptable impact on the natural or built environment
2) They do not lead to unacceptable disturbance or inconvenience to landowners, farmers, businesses or residents
3) They will be managed to minimise conflict between different activities
4) They are compatible with the overall philosophy of quiet enjoyment of the countryside
5) They will be accessible to people of all abilities and backgrounds.

4.2 Proposed Canal Park Activities

The following activities are likely to be accommodated either within the canal Corridor or nearby:-

Activity	Options	On/Nearby	Considerations
Cruising	Private craft Hired craft Day trips Hotel boats Restaurants	On Nearby (Worcs & B'ham Canal/River Severn)	– Physical carrying capacity of the restored canal. – Number of moorings available.

	Organised trips School trips Trips catering specifically for those with reduced mobility		– Conflict with other users, especially anglers and cyclists. – Need to provide sufficient facilities. – Impact of offline marinas in countryside areas.
Cycling	Private cycling Hire of bicycles Cycling the weekend ring Circular routes which leave the Country park to link into adjoining routes Local commuting Cycling to school/leisure facilities Link into the National Cycle Network	On Nearby – Worcs & B'ham canal, Local cycle routes	– Need for Code of Conduct to accommodate conflict between users – Appropriate surfacing materials to take into account urban and rural requirements – Dispersing activity along the canal – Conflict with anglers and walkers – Wear and tear/maintenance provisions – Promotion to acceptable forms of cycling – Opportunities to limit access/speed
Walking	Short/longer routes Linking into healthy walks Commuting/access to local facilities, schools etc. Circular routes which leave the Country Park Opportunities for short interpretative trails Guided walks Link into Severn Way marketing	On Nearby – Links to Worcs & B'ham canal, Severn Way and local footpath network	– Recreational carrying capacity of busy areas – Ecological carrying capacity – Wear and tear – issues relating to insurance, indemnities, accidents etc. – Conflict with anglers and cyclists – Opportunities to link to events both within and outside the canal corridor
Canoeing	Private craft Hired craft Organised trips School trips Introduction to canoeing Linked to other activities e.g. walking/cycling	On Nearby – River Severn and Worcs & B'ham Canal	– Conflict with other boaters, anglers and walkers – Need to introduce Code of Conduct – Providing appropriate facilities – Events management
Picnicking	Designated areas for	On	– Litter – harmful to

	picnicking Barbecue equipment Furniture Litter collection facilities	Nearby – Worcs & B'ham Canal and Severn Way, other local parks/countryside areas	wildlife – Noise – Fire risk – Visual impact
Visiting attractions	Visits to churches Visits to historic properties Visits to gardens Spa visits Tourism/heritage attractions within Droitwich Historic structures along the canal corridor	On Nearby –adjoining attractions, linked to marketing	– Busy routes to adjoining attractions and along the corridor will require management – Opportunities for themed events, linked to guided walks, open days etc. – Careful signage and promotion – Inclusion within canal corridor marketing strategy
Angling	On line angling Off line angling/fisheries Angling on non canal associated fisheries	On Nearby	– Conflict with boaters, walkers and cyclists. – Potential angling conflict with conservation objectives, especially on the barge canal – Opportunities to provide income from on line and off line angling to support restoration – Association benefits include litter patrols, bailiffing and other low level maintenance activities – Opportunity to zone specific lengths as suitable for angling
Education	School visits Adult education Wild life challenge or similar	On **and nearby**	– Potential conflict with other users – Need for high levels of management resource – Opportunities to link into BW national education programme

			– Opportunities to link into Dragonfly project – Opportunities to link into Worcestershire Education programme
Shopping	Droitwich/Worcester Craft centres	Nearby	– Busy routes may require sensitive management – Careful signage and promotion.

The work undertaken within this Report has followed the guidelines set out in the Concept developed by Worcestershire County Council and agreed by the Partners. We have specifically looked at four main areas and the findings from these are set out in more detail below.

They are:

1) The detailed Canal Park Proposals (including proposed facilities and mooring locations).
2) Development of an identity for the Canal Park concept.
3) The brief for the Interpretation Strategy that will direct on site and print based interpretation for the project.
4) The Marketing Brief for the project.

4.3 Canal Park proposals

Listed below are the proposed canal park proposals in so far as they lie within the physical canal corridor. These works have been costed into the restoration proposals.

Location	Proposals	No. of visitor moorings	No. of long stay moorings	New build proposals
Junction with Worcs & B'ham Canal	Entrance sign	4		
Junction of Worcs & B'ham canal	New marina and fishery/off line marina accommodating between 40-60 boats with associated angling pools			40-60 7
Between Junction and Lock 1	Creation of long stay moorings with services		6	
Newt Pond	Hanbury Locks Gateway Newt Pond from Reservoir car park interpretation visitor moorings circular walk start	3		
Impney Farm area	Creation of long stay moorings on new section of canal.		6	
Sunbury Engineering development site	Creation of summer visitor moorings linked to proposed residential/ Commercial development	4		
Chapel Bridge	Creation of new access from Chapel Bridge onto canal			
Junction of Hanbury Street and Saltway	Provision of directional sign			
Vines Park (Hill End)	Creation of visitor moorings	4		
Netherwich Basin/Vines Park Gateway	Creation of visitor and long term moorings Signage, visitors facilities interpretation/ Museum linked to potential developments 5 separate items	6	20	
Car park serving Vines Park (off Saltway Close)	Improve link from car parking with signing and information to the Canal			
Sports and Leisure Centre by King George's field	Information Centre for Droitwich Canals. Signing/ Interpretation Parking Visitor moorings	10-15	15	
	Events area Long stay moorings New access at Siding Lane Bridge			

Chawson Valley Gateway	Car Park Picnic area Play area Grassland & Woodland planting Reedbed management/ pond creation			
Roman Way	Meadow Woodland planting Reedbed creation			
Salwarpe village	Visitor moorings Woodland walks interpretation Signing New access point	6		
Ladywood Lock	Trip boat mooring Mooring Informal parking for disabled Provision of multi use towpath between Ladywood and Porters Mill Access improvements			
Porters Mill Gateway	Car park Picnic area Interpretation and signing Environmental improvements Visitor moorings Long stay moorings Start of Circular Walk Creation of Canal Office and possible café/holiday cottage within Porters Mill Cottage	5	15	
Mildenham Lock	Creation of a limited number of informal parking spaces Access improvements			
Linacre Bridge	Interpretation			
Hawford Marina Services	Investigate physical and services link to marina with owner			
Junction with River Severn at Hawford Lock	Improved access onto river Sign Link to Severn Way Interpretation			

The above proposals are shown on the plans attached at Appendix 3A

4.4 Project Identity and Branding

External consultants were appointed to develop proposals for a name, logo and signing image for the restoration project.

Following consultation the consultants felt it apparent there were four main elements that must be brought together when creating an identity for the project. These elements are:-

1) Canal restoration and heritage conservation
2) Wildlife conservation
3) Outdoor recreation
4) Economic regeneration

A series of proposals have been developed which need to be considered by the Partnership Group. Once agreement has been reached on the name, logo and signing image for the Restoration Project the results will be fed into the Interpretation and Marketing Plans.

4.5 Proposed Interpretative and Signing Plan

An integral element of the Restoration Project proposal is the need to create a holistic interpretative and signing plan, both incorporating the proposed new facilities along the canal corridor but also the links to the other attractions within the wider area as directed in the Canal Park concept.

A brief has been prepared which requires the production of an interpretation and signing plan for the Droitwich Canals. The interpretative plan needs to fully recognise the historical and environmental importance of the canal corridor and the wider area. There are a number of unique attractions both in heritage and environmental terms, such as the two canals being the earliest and latest to be built in heritage terms and the salt loving plantlife and associated bird and mammal populations which make the canals unique in environmental terms.

The specific aims and objectives of the Brief will be:-

1) To develop an interpretative plan including objectives and themes with the Canal Partnership and suggest appropriate media to communicate these.
2) To provide a comprehensive signing programme that will provide the Canals' range of visitors with the information required to promote their enjoyment and beneficial use of the site and to manage the visitor impact on the local community.
3) To suggest a series of graphic interpretative panels that will enhance the understanding of the canals, explaining their cultural significance (both in heritage and environmental terms) and the role they play in peoples' lives.

An initial budget of £8,000 excluding VAT has been included within the overall project costs. This is expected to cover professional fees and expenses related to the project.

4.6 Marketing Plan

A detailed Marketing Plan Brief has also been prepared linked to the Project Branding and Interpretation Proposals.

The purpose of the brief is to develop a dedicated Marketing Plan for the Droitwich Canals Restoration and Canal Park that outlines action points over a five year period.

The Marketing Plan will:-

1) Identify a clear brand which builds on the existing proposals

2) Position the Droitwich Canals in relation to their local and wider catchment without taking customers from other attractions
3) Develop a range of products which will appeal to the agreed market segments and which will raise awareness of the opportunities for recreation
4) Develop a pricing policy for the moorings, angling and other paid for activities.

The costs of developing this Marketing Plan are anticipated to be £15,000, these costs are included within the overall project costs. This will include all professional fees and disbursements related to the Brief.

5.0 VOLUNTEER INVOLVEMENT

As stated in the Interim Report the volunteer contribution is essential to the project's success. It is proposed that volunteers will be involved at all stages of the project from feasibility through to, following restoration, the long term management and maintenance of the restored canals.

5.1 Current progress

5.1.1 The Droitwich Canals Trust (DCT)

The Droitwich Canals Trust have been extremely helpful in assisting with the Halcrow survey works in terms of lock clearance, dredging and access provision to facilitate the Principal Inspection survey.

In addition, they have also been instrumental in securing the ongoing New Deal and Community support for individual restoration projects.

Several very successful training programmes have now been undertaken by BW's Heritage Skills Centre with DCT members to improve their environmental and heritage standards and it is hoped the outcomes from these training sessions is reflected in the quality of work now being undertaken.

We have also agreed with DCT a work programme that ensures complementarity with the Waterways Recovery Group work programme and again the value to the overall restoration programme once this begins.

5.1.2 Waterways Recovery Group (WRG)

The Waterways Recovery Group, a national organisation of volunteers, has chosen the Droitwich Canals Restoration as a priority project for work camps in 2001. Two camps have already been held at the site, which have been extremely well attended. Again, British Waterways has worked with the Chairman of WRG, Mike Palmer, to develop a programme of works to be undertaken by the WRG volunteers, which will add value to the wider restoration programme. We have also assisted in archaeological and heritage recording of sites prior to works taking place, sourcing materials, providing Health & Safety and risk assessments and supervising works on site.

5.1.3 Inland Waterways Association (IWA) Legacy Grant

DCT, together with WRG, were successful in securing an Inland Waterways Association legacy grant of £100,000 which, together with a volunteer contribution estimated at £68,000, will complete the restoration of Junction Locks 1, 2 and 3. The programme, standards and quality of this work has been developed together with British Waterways and the first work camp took place at the Easter weekend.

5.2 Restoration Works

The proposed Works Programme and Cost Plan, as included at Appendix 1 details the extent to which both skilled and unskilled volunteers will be involved in the restoration process. Using British Waterways training resources at the Hatton Heritage Skills Centre, we are proposing to undertake a programme of heritage and conservation

based training for both WRG and DCT volunteers. A work programme will then be developed along the lines set out in the Programme to provide a substantial programme of works for the volunteers to complete over a 4-5 year timescale.

Works suitable for unskilled volunteers, i.e. those not subject to specific skills training, have also been included in the Programme.

We are proposing that the Project Team employed by the restoration body, together with the lengthsmen to be employed once the canal reopens, will also be responsible for the development of individual work projects and supervision on site for unskilled volunteers. One of the aims of this is to more closely link the volunteers work with the longer term management and maintenance of the canal once restored.

Works in the Programme include:-

Skilled volunteers

a) Works to Junction Canal Locks 1,2,3
b) Dredging the existing channel between Locks 3 & 4
c) Bund formation by new channel
d) Assistance towards towpath creation
e) Assistance towards provision of new car parking and customer facilities
f) Channel creation
g) Environmental works, including placing of coir rolls, reed bed creation and newt pond creation
h) Signage and interpretation improvements

Unskilled volunteers

a) Assisting with lock restorations e.g. minor tailbridge works, painting etc.
b) Interpretation and sign improvements
c) Bridge cleaning and repaints
d) Safety grille improvements
e) Design and provision of nameplates
f) Painting and graffiti removal works
g) Assistance in mitigation works – reed bed and newt pond creation
h) Assistance in estate management

It is proposed that other volunteers sourced through organisations such as the British Trust for Conservation Volunteers (BTCV) can also be used for environmental type works such as access creation and hedgerow/vegetation management. These works will be developed in more detail in the Conservation Plan.

Benefits

The involvement of volunteers not only assists with project development but also with funding (through The Waterways Trust) and ensures a wider cross section of the community is actively involved with the project.

5.3 Involvement following restoration

Volunteers will be actively encouraged to be involved in the longer term with:-

1) Adoption schemes
2) Low level maintenance projects

3) Marketing
4) Events management
5) Education and youth projects
6) Towpath rangers

In the short to medium term it is suggested a "Friends of" group similar to other larger restoration projects be established.

A Volunteer Policy has been developed to help direct the longer term efficient valuable use of volunteers in the Restoration Project, a copy of which is included at Appendix 4.

6.0 ASSESSMENT OF THE ECONOMIC, SOCIAL AND ENVIRONMENTAL BENEFITS OF RESTORING THE DROITWICH CANALS

The case for restoring the Canals extends far beyond the economic benefits of growth and job creation – as important as those are. There is increasing recognition of the role that canals and canal based developments can play in improving the well being of people and communities, and in the way that well managed canals can contribute to landscape quality, by diversity and the conservation of cultural heritage. Canals form a unique living heritage, comprising a mix of historical, cultural, environmental and landscape elements, in and around which a wide range of recreation activities takes place. Although the activities have changed, the way in which the canals operate remains much the same as they did during the Industrial Revolution over 200 years ago.

The development of recreation within the Canal Corridor brings together the community's needs for leisure with an opportunity to experience and understand the historic waterway environment as part of a managed and protected landscape. This package meets the aspirations of Agenda 21 "to balance the need for food and other raw materials, the demand for jobs and homes, the opportunities for recreation and the need to safeguard wildlife and landscape." The link between heritage, environment and accessibility provides a basis to attract the resources that are needed to manage the heritage and look after the environment.

The Government's framework document to British Waterways, 'Waterways For Tomorrow', says:-

"Today, all our waterways are more widely appreciated than ever. As well as their recreational and transport roles the waterways also supply water and have become part of the land drainage system. The system is rich in heritage value and is an important environmental and ecological resource. The waterways stimulate regeneration and are increasingly being used in innovative ways. The system is undergoing a renaissance as more derelict waterways are restored, greater resources are devoted to maintaining the existing system and increased effort is being put into maximising the benefits the waterways offer."

Any assessment of canal restoration and regeneration does therefore need to consider each of these benefits. Research in recent years has succeeded in casting some light on the preferences that people hold for canals and the monetary values they may be willing to place on the benefits of restoration programmes. Visits are made to canals for many activities – boating, fishing, walking, sight seeing, cycling, jogging and photography. Most of these are available free of charge. Yet people obtain real value from their visit, a value they may be willing to pay for, beyond the incidental expenditure they incur in travelling to the location, on buying equipment or on eating and drinking. Work carried out on behalf of British Waterways by Newcastle University using environmental economics techniques found that informal visitors to canal towpaths experienced a real increase in welfare.

Separately, a Bradford University study used environmental economics to place a monetary value on the extent of visitors enjoyment from watching boats pass through the locks at Caen Hill, Devizes on the Kennet & Avon Canal. The study found that 40% of a typical visitor's enjoyment stemmed from the pleasure of seeing boats pass through the lock system. Such monetary valuation however is not easy to produce and is difficult to gather for individual canals. Therefore to measure social and

environmental impacts British Waterways has begun to develop an approach for identifying the outputs and benefits of its work based on sustainability indicators. This work matches similar endeavours underway at a range of organisations including Central Government, Local Authorities and Regional Development Agencies. The rationale behind the indicator approach is that social and environmental outputs can be made explicit and can be monitored in a similar way as economic outputs.

The report produced by British Waterways highlights the economic, social and environmental benefits that restoration of the Droitwich Canals will deliver. It also indicates how these fit with the sustainability indicators identified by the DETR, the Government Office for the West Midlands, and Worcestershire County Council.

Both reports confirm that the reopening of the Droitwich Canals will bring a very wide range of new benefits to the people of Droitwich and Worcestershire and to the county's visitors. Some of these benefits will be economic, with the restoration leading to greater expenditure and more local jobs. There will also be outputs from proposed canalside property developments: houses, leisure facilities and enhanced property values.

Other benefits will be outside the market. There will be social benefits for local communities through the provision of housing on canalside brownfield sites. Of equal importance will be a host of environmental benefits, in terms of natural wildlife, landscape quality and cultural heritage. The restoration offers a chance to both enhance canal habitats and provide important links with the long industrial history of the Droitwich salt workings.

A summary of the benefits accruing from the restoration is included at Appendix 5.

6.1 Tourism Implications of the Project

The Worcestershire Tourism Strategy (produced in draft in August 2000) identified the benefits of tourism, the national, regional and local context and the strengths, weaknesses, opportunities and threats to tourism in the county of Worcestershire.

The strategy identified that tourism generates wealth and creates jobs, promotes entrepreneurship and provides social and environmental benefits whilst supporting local diversity and cultural traditions.

Tourism is the third strongest sector in Worcestershire's economy and consequently the partnership of both Worcestershire County Council and Wychavon District Council have recognised and understood the role Canals Restoration Project can play in boosting this sector.

It contributes to a number of strategic issues identified in the Action Plan. These are:

a) The proposal to develop short breaks holidays. An example is given in the Plan based upon the Severn Way. The Droitwich Canals Park Project provides the only weekend cruising ring in Britain and is also accessible to a number of major towns and cities.

b) The Action Plan developed a number of strategic product themes, one of which is Waterways. Resources within the County are being directed to promoting these strategic themes which include heritage, gardens and waterways.

c) A targeted action is the promotion of filming opportunities within the county. British Waterways have developed a number of close links with several location companies and is currently heavily promoting the facilities, resources and assistance available by British Waterways to location companies along the canals in the Midlands and South West.

d) The Action Plan also calls for the development or promotion of projects that assist in developing locally distinctive images. The Droitwich Canals is specifically mentioned.

e) Opportunities to create and market themed trails with adjoining opportunities to spend en route are also identified as a priority. The trail along the Droitwich Canal with spend being captured both in Droitwich town centre and the villages along the Barge canal should be not be overlooked.

f) The Action Plan also identifies the need to improve sustainability of tourism attractions. Part of this is a reduction of the number of visits made to attractions by car. The strategy promotes boating, walking and cycling holidays and opportunities. The Droitwich Canals restoration project both allows access to other attractions along its route as well as being an attraction in its own right. A large proportion of the proposed visitors will of necessity arrive by boat, on foot or by bicycle and these will form part of the marketing strategy at the outset of the project.

g) The Action Plan also promotes increasing provision for those with limited mobility. British Waterways' partnership with the Fieldfare Trust insists that that all new works and projects be subject to the Access for All criteria established by the Fieldfare Trust.

h) The Action Plan also requires the attraction of external funding to develop projects to compete with other destinations. Again the Droitwich Canals project is specifically mentioned recognising the opportunities for lottery, local authority, corporate and charitable funding opportunities to create a tourism focussed project.

The visitor numbers of 340,000 projected by year 5 will place the Droitwich Canals Park at fifth in the list of most visited attractions in Worcestershire.

7.0 FUNDING STRATEGY

7.1 Summary

Several funding appraisals have already been undertaken on behalf of the Partnership Group which have identified the following sources of funding as being appropriate for the project:

1. Heritage Lottery Fund – the initial application in the mid 1990's was well received by the Fund but was unfortunately rejected due to the impending change at that time in HLF policy on major canal restorations. Since that time their funding policy has been directed more towards the conservation of particular structures of heritage importance and widening both physical and intellectual access to national and local heritage.

2. Regional Development Agency – although Droitwich does not fall within one of Advantage West Midlands Regeneration Zones, the project does provide the type and extent of outputs suitable for RDA funding. Current RDA funds are substantially committed on existing projects but indications have been given that funding availability will be freed up within the next 1-2 years to allow AWM to concentrate on the objectives set out in their Regional Economic Strategy.

3. European Funding – again Droitwich falls outside any assisted area for the purposes of the mainstream European funding regimes. However opportunities do exist for European Social Fund applications to match New Deal programmes to training works on the canal restoration.

4. Landfill Tax – a number of local operators have been approached to establish their initial views as to the eligibility of the project to their funds. The project has been developed in such a way as to allow individual small-scale projects to be the subject of separate funding applications for sources such as Landfill Tax, where mainstream funders usually set a ceiling on project value of £100,000.

5. The Waterways Trust – although a new funder, opportunities do exist for the Trust to both directly grant fund small scale works, to use their resources and charitable status to attract charitable and corporate sector funding and to act as intermediary in financial borrowing schemes top facilitate major projects. All of these routes have been successfully deployed for other major restorations and these are currently being explored with the Trust.

6. Other funding sources – these include opportunities for S106 contributions, Local Transport Plan funding for cycleway and walking strategies, New Opportunities Fund applications and Countryside Stewardship. Further details of these are given below.

7.2 Development of the funding strategy

The project has been developed to provide discrete smaller projects, each of which can be submitted to individual funders. As stated in the Interim Report it will be the added value elements of the project, the Canal Park, job creation and environmental improvements that are likely to prove most attractive to funders.

Accordingly since submission of the Interim Report considerable time and resource has been dedicated to:

- Refining the engineering costs and methods
- Building the heritage case
- Developing the marketing, country park and access/ interpretation proposals
- Developing the economic, social and environmental benefit analysis of the project to support applications for funding.

The funding strategy as outlined in the Interim Report suggested the following mix:

Funder	Amount
Wychavon District Council	£1.0 m
Worcestershire County Council	£1.0 m
Landfill Tax	£1.5 m
Regional Development Agency	£1.0 m
Heritage Lottery Fund	£1.5 m
Europe	£1.5 m
New Deal/ETF	£0.5 m
TWT/Corporate/Charitable/Other	£1.0 m

This assumed total capital costs of £9m.

Detailed investigations have taken place into each of these funding sources followed by discussion at senior level with representatives of the funders to establish the eligibility of the project and likely funding support.

The investigations and discussions that have taken place are detailed below:

7.2.1 Landfill Tax

A number of local operators manage schemes for which several of the discrete elements of the project would be eligible.

The following elements of the project will be submitted to Landfill operators for consideration:

- Visitor facilities
- Reedbed and newt pond creation and access works
- Towpath creation works
- Chawson Valley Gateway scheme
- Decontamination works
- .Creation of vole habs

Operators who would be approached for funding include:

1. Mercia Environment Fund
2. Hanson Environment Fund – (via RSNC)
3. Biffaward – (via RSNC)
4. Tarmac
5. Severn Trent Landfill Tax scheme

The project needs to be registered for Entrust approval to allow access to landfill funding.

7.2.2 Regional Development Agency

The project meets many of the criteria and outputs anticipated to form the basis of Regional Indicators to be met to deliver Advantage West Midlands Regional Economic Strategy. The detailed indicators are still awaited from AWM, having only within the last 2 weeks been agreed by AWM's Board.

The project does not fall within the six Regeneration Zones supported by AWM; the local officer advises therefore for the project to be successful it needs to be supported by the local strategic partnership. Further discussions have been held with both the Chief Executive and Chairman of AWM, both of whom support the principle of canal based regeneration and have requested the project be formally submitted to be considered against their output criteria.

The economic, social and community benefits the project will deliver, as detailed in 6.0 above, fits well with the Regional Economic Strategy Pillars and cross cutting themes.

It is recommended that the project be presented formally to the Local Strategic Partnership to secure their support prior to a formal submission for funding in financial year 2002/03 to AWM. Funding support will be requested over a 4 year period.

Although the total project should be presented to AWM for funding, it is anticipated that only certain elements are likely to meet their criteria. These will be:

- Decontamination works – major dredging and site clearance
- A449 crossing works
- Environmental and access improvements

7.2.3 Heritage Lottery Fund

The project meets many of the Fund's criteria which have been revised since the original application made in the mid 1990's.

These include:

- Repair and enhancement of heritage of local, regional or national significance
- Improving physical access to and understanding of the heritage
- Protection and enhancement of biodiversity and local landscape character
- Using the heritage asset to create economic opportunity for local communities

The benefits outlined in 6.0 above meet many of these criteria. The national status given to the restoration proposal by the Inland Waterways Amenity and Advisory Council, who have classified the project as High Priority, will also considerably aid the HLF decision process.

An outline proposal has therefore been made to the Fund, which includes a request for support for the following elements of the project:

- Restoration of specific heritage structures along the Junction and Barge Canals
- biodiversity enhancement and landscape character improvements
- Interpretation and education projects linked to the Country Park
- Access improvements

- Sustainable visitor facilities along the Country Park corridor
- Restoration of small scale original features such as bollards, mileage posts, etc.

Formal advice on the outline application is still awaited.

7.2.4 European funding

The project does not fall within any European assisted areas. Opportunities may exist for inclusion of elements of the project within a transnational Interreg programme but to date a suitable programme has not been located. Further discussion will continue with both Worcestershire's and British Waterways' European partners to establish the opportunities for funding through Interreg.

The main proposal for European funding is likely to be accessed through the ESF programme, linked to the New Deal training programme. The development of the project implementation plan has identified those projects suitable for Skilled Volunteers or supervised New Deal trainees. The restoration project has been the subject of New Deal projects for some time and has proved to be both a suitable training opportunity for New Deal clients and valuable to the overall restoration programme.

An application for ESF funding is currently being considered by the Worcestershire Partnership with this project being included in these discussions.

7.2.5 The Waterways Trust

Although only recently formed the Trust offers a number of potential funding routes to the project. These are explored in more detail below:

Direct Grant aid - Within 12 to 18 months the Trust anticipates through its own direct fundraising projects to be in a position to distribute funds to environmental and ecological enhancement projects, several of which have been specifically separately developed within the Project.

Corporate fundraising - A Brief has been developed for the Factary Consultancy to identify companies and wealthy individuals within Worcestershire who have the capacity for being major supporters of the project.

Individuals living in Worcestershire with the minimum net wealth prescribed and having strong corporate connections number over 600. Several specific individuals have been identified who have strong business connection to Droitwich and still reside in the area. Research would be undertaken into their key corporate interests, trusteeships of grant making trusts and particular philanthropic interests.

Once the project receives the approval to proceed the Trust would prepare a strategy for approaching these individuals to ascertain the level of their interest in the project; this would more clearly determine the opportunities and likely level of support available for corporate fundraising.

The Trust's advice is that support from these sources can often be in the form of contributions in kind, which in a project requiring considerable material resource can be extremely valuable.

The work that has also been undertaken by the Partnership Group in developing local business support will also be extremely valuable to the Trust in this process.

Charitable fundraising - A detailed analysis has been undertaken of the local charitable sector availability. A number of local charities exist with specific interest in both the Worcestershire or West Midlands area and in the areas of focus covered by the project.

Once approval has been given to the project proceeding the Trust would commence discussions with these potential funders to establish the likely level of interest and process for applications.

It should be noted that only The Waterways Trust is eligible for these types of funds.

Financial borrowings - The Trust have been able to provide considerable support to several major restoration projects through access to funding not available to either Local Authorities or British Waterways. This could well assist particularly in the area of property acquisitions that are required to be made, where the disposal values are anticipated to be in excess of the purchase costs once the scheme is complete.

Discussions as to the usefulness of this source of finance to the Project are ongoing.

7.2.6 Other funding sources

These include:

Countryside Stewardship Grants – focussed towards access and maintenance plan work. The Conservation Plan proposals in terms of environmental enhancement will form the basis of this application.

S106 opportunities – these have been explored in more detail in Section 8.0 but represent a considerable opportunity to share in the value accruing to the private sector in their development of canalside sites whose values have been significantly improved due to the existence of the scheme.

Local Transport Plans – the access and cycleway improvements proposed as part of the project would be eligible for funding thorough the Local Transport Plan. Discussions are still to take place with the relevant officers within the County to establish the opportunities this source of funding may represent but initial discussions some time ago confirmed the restored Canals' ability to contribute to local sustainable transport objectives.

New Deal – this funding would link through to the ESF funding proposed above.

7.3 Recommendations

British Waterways has many years' experience and success in submitting funding applications and managing projects funded through European, Lottery and Landfill Tax sources. There is a general acceptance in today's external funding regime that a single funding source is unlikely to be sufficient to fund major projects. Both Government and funders' policy dictates that a variety of sources be pursued both to reduce reliance on a single funder and to ensure each particular fund has maximum impact. This has been the process adopted throughout development of the funding strategy, which, for the reasons outlined above, provides the optimum chance of success.

The discussions that have taken place to date give the Project Team confidence that external funding is available to support the commitments already made by the Local Authorities and allow the project to be delivered. These discussions have allowed a clearer understanding of the individual funds that may be available for the project and as a consequence the table below sets out the revised expectations.

Funder	**Amount**
Wychavon District Council	**£1.0 m**
Worcestershire County Council	**£1.0 m**
Landfill Tax	**£1.0 m**
Regional Development Agency	**£2.0 m**
Heritage Lottery Fund	**£2.0 m**
New Deal/ETF	**£0.5 m**
TWT/Corporate/Charitable/Other	**£1.5 m**

The project can only now be further advanced by the development of individual funding applications to the principal funders outlined above.

The following timetable is suggested:

Heritage Lottery Fund	First stage application Jun 2001 Second Stage application Oct 2001 Decision expected April 2002
Advantage West Midlands	Outline application for funding in Yrs 2002/03 onwards Summer 2001 Funding decisions anticipated Spring 2002
ESF	Applications Summer 2001 for start in Spring 2002
Charitable sector applications	Summer 2001 onwards
Corporate sponsorship	Initial approaches – Summer 2001 Formal applications 2002 onwards
Countryside Stewardship	Development of Management Plan 2001 Submission to MAFF Spring 2002

8.0 PROPERTY ISSUES

8.1 General Progress

Low profile discussions have continued with some of the principal landowners along the route. It became clear to the Project Team early in the process that the ongoing discussions with these landowners over a number of years had only served to restrict their ability to deal with their property and increase perceptions of value. Several of the major landowners along the Junction Canal route have now appointed the same agent Mr. E. Mews, who by acting for several adjoining landowners feels their negotiating position has been strengthened.

The position taken by the Project Team throughout this commission has been that existing market values only would be paid and that it is unrealistic for the owners to expect any hope value to be paid for their properties.

Where accommodation rights/bridges or accesses are required to facilitate the scheme then the cost of these have been included within the capital costs of the project.

Some additional areas of land are required to create the mitigation reedbeds. The principal pre works mitigation site is, we understand, in the ownership of the Local Authority, Wychavon District Council. Negotiations would therefore need to take place as to the dedication of this area of land within the playing fields at King George's' Leisure Centre to the restoration.

The balance of the land required for mitigation is currently in quasi-agricultural use and a sum of £20,000 has been included for the acquisition of this area. A low value sum has been included as it is anticipated the works both to construct the reedbed and the canal restoration works will have value for the landowner to the balance of his ownership.

8.2 Summary of the principal property issues

What has become clear, for principally the reasons outlined in 8.1, is that the need for CPO proceedings to be commenced is paramount. An initial Committee resolution by Wychavon District Council together with an exploration of the costs of CPO proceedings would help, the Project Team feels, bring the parties to the table in a more reasonable manner. The costs of continuing CPO proceedings through to their conclusion (which may include the need for a Transport and Works Act Order,) could add significant cost (up to £75,000) to the project and delay the implementation programme by up to 18 months. However the costs incurred in such a process would easily be outweighed by the additional financial demands likely from the landowners should the recourse to CPO powers not be available.

8.3 Individual properties - Barge Canal

8.3.1 Bridge over canal adjacent to Lock 7 –the costs for the replacement of this bridge have been included in the project

8.3.2 A449 crossing – legal fees for the grant of rights through the A449 structure have been included within the project.

8.3.3 Mill House – land to east of A449. Negotiations need to take place with the owner of Mill House for the return of the land, which has been encroached and fenced. British Waterways has many years' experience in dealing with such encroachment issues that can usually be resolved once the initial solicitors' letters have been exchanged.

8.3.4 Mitigation land by Linacre Bridge – The Half Noose Angling Club have indicated that a maintenance agreement may be available for the construction of off line mitigation reedbeds. Although Worcestershire Wildlife Trust feel this may not be a suitable arrangement for the provision of mitigation, it is something that British Waterways would consider as being capable of being dealt with in a formally binding agreement between the parties.

8.3.5 Land between the Canal and River Salwarpe (in the ownership of Mr Baylis) – The surrender of this land should be completed to facilitate the off line mitigation if required.

8.3.6 Porter's Mill Cottage – Lock 5. The lock structure at Lock 5 has been surveyed and the costs of repair estimated at circa £87,000. This will have a significant effect on the value of the property. Once the canal has been reopened and the lock repair liability has been removed from the freehold title, it is the Project Team's view that the purchase costs of the property will be met by its resale value. A small area of the property is suggested to be retained to provide customer facilities or operational staff accommodation.

An informal approach by Mr Walton of Ladywood Lock Cottage has confirmed that Mrs Smith would consider a disposal of her property subject to suitable alternative accommodation being found.

8.3.7 Land by King George's Playing Fields – this area of land has been identified as the most suitable for pre-works mitigation measures. It is understood this land is within the ownership of Wychavon District Council and discussions would need to take place with Property Services to identify how the land could be brought into the restoration scheme.

8.3.9 Netherwich Basin area – the principal land ownership within this area, again falls to Wychavon District Council but is subject to a lease to Droitwich Canals Trust. Experience from other canal restoration and regeneration schemes has proven that the value of this ownership is likely to rise substantially once the project proceeds. Significant Section 106 obligations could be reasonably placed on this development to contribute to the cost of visitor and access improvements within Netherwich Basin. The scheme prepared by the Civic Society, which is currently the subject of discussion with the Local Authority, has merit in its proposal for a mixed use development making best use of its canalside location. The Project Team has already received several approaches from local and national developers expressing an interest in developing schemes for this site.

The preparation of a Canal Development Framework as proposed in the principal recommendations to the Report would both set the quality and proposed uses of this development, identify the Section 106 contributions that could be made and help to raise both the profile of the restoration and this particular property in the wider market place.

The Project Team would also propose that adjoining land and property, currently in private ownership, also be acquired as part of a separate

commercial development to assemble a larger site with greater impact on the overall scheme.

8.4 Individual properties - Junction Canal

8.4.1 Sunbury Engineering - discussions that were taking place between Sunbury Engineering, the adjoining landowners, the Land Rover Garage and prospective developers appear to have faltered. Again the Project Team would recommend acquisition of both of these sites to create a larger development opportunity canalside once the restoration completes. The interest being shown by developers currently in sites adjoining the proposed restoration would provide both significant and sufficient value to acquire the existing interests and again provide for Section 106 contributions to the river re-alignment and towpath creation.

As with the properties adjoining Netherwich Basin, this should be undertaken as a separate commercial venture.

8.4.2 Excel Logistics/Texaco/Codev Homes/Persimmon Homes - the above minor acquisitions can proceed subject to the costs of the disposing parties being met. Legal costs for these acquisitions have been included within the overall project costs.

8.4.3 Impey Farm Development - the planning consents for the site requires that the land required for the canal will be transferred into the ownership of Wychavon District Council when the development proceeds. An access road and bridge into the scheme will need to be constricted at the appropriate level heights.

If the opportunity exists, further contributions should be sought from the developers for this site that may be as simple as constructing the river channel once their machinery and labour are on site. If this cannot be secured through additional Section 106 contributions then the Project Team would suggest a separate arrangement with the developers of this site for their contractors to undertake this element of the works.

8.4.4. Length of New Cut on the Junction Canal - The owners of the Littlebrook, Raintree and Chapel House properties are now all represented by Mr. E. Mews. Whilst the owners of Littlebrook and Chapel House have confirmed their willingness to dispose of the land required to permit the restoration, the owner of Raintree is still resistant to the project.

It is for these three properties in particular that the ability to progress CPO proceedings would be most valuable.

It is the Project Team's view that, particularly in relation to Raintree, the construction of the canal, improved access around the site and the construction of the proposed noise bund by the M5 will add value to the property once the works are completed. Again an opportunity exists for a separate commercial arrangement to acquire this property, facilitate the restoration works and then disposes following completion of the works at a value equivalent or greater than the purchase price. The access and storage compound areas that would be made available to the project by an acquisition of the property during construction works would have a significant impact upon the costs of this section of work. The area affected could then be properly reinstated, with

simultaneous small-scale minor improvements to the general property being undertaken prior to resale.

8.4.5. Rugby Club and Westfield Farm - land take requirements here are minimal and it is not anticipated any problems will exist with regard to these acquisitions.

8.4.6. Worcestershire County Council Yard - this site is essential to the Junction Canal works proceeding both in that it provides a secure working compound for the lock restorations and length of new cut. Following completion of these works it will also provide the site for the Great Crested Newt relocation pond.

9.0 Proposed Management Regime following Restoration

9.1 Options

A number of options exist for the long term management and maintenance of the Canals and Country Park once restored.

A decision on the preferred option will need to be taken prior to the restoration commencing, as this will dictate the principal promoter of the scheme, to whom properties will be transferred and for whom responsibility for obtaining the necessary EIA and English Nature Consents will rest.

All of the options assume surrender of the Droitwich Canals Trust lease to provide sufficient property interest to the Promoter/Manager of the scheme to properly and efficiently manage the canals once restored.

The options include:

Option 1

Wychavon District Council, as the majority landowner completes the acquisitions of the balance of the route. They could choose to operate the canal as a standalone navigation but to do so would require the promotion of navigation rights for their Authority.

Option 2

Similarly Worcestershire County Council could act as the main promoter and operate the canal in isolation.

It is understood that neither Authority have navigation rights currently.

Option 3

The Waterways Trust (TWT) could acquire the freehold of the land required, from both the two Authorities and that land in private ownership. They then contract with BW for delivery of the restoration project. Once the works are complete TWT either lease or contract with British Waterways for the management and maintenance of the restored canals and country park on terms to be agreed.

This arrangement has been put in place on the major restoration projects of the Rochdale Canal and Ribble Link between The Waterways Trust and British Waterways.

Option 4

Wychavon District Council/Worcestershire County Council contract with British Waterways/TWT for the delivery of the restoration project. The promoting authorities then either lease or contract with a third party to manage the restored Canal and Country Park. This third party could be a Canal Trust or existing Navigation Trust, several of which exist in the locality.

There are issues relating to the long term liabilities and abilities of this type of organisation to manage a fully restored navigation. These will need to be explored further should this option be adopted.

9.2 Recommended Option for the purposes of the Report

Option 3 - Proposed management regime (BW)

For the purposes of the Report, set out below is the proposed management regime that would be undertaken by British Waterways should agreement be reached that the restored canal forms part of BW's national canal and river network management following restoration.

It should be noted that within the remit of this Report, investigations have not been entered into as to the potential arrangements that could be put in place should a third party assume the management and maintenance of the restored canal.

Under Option 3 the landowners would transfer their freehold ownerships to The Waterways Trust who would then contract with British Waterways the management and maintenance of the Canals within their operational waterway management regime.

9.3 Existing BW management structure

Since 1989 BW has been a locally managed and directed organisation with central services, advice and policy direction deriving from either regional (Tamworth, Staffordshire) or national (Watford) offices.

BW are a non profit making Government funded (DETR) body with a statutory remit for the conservation and promotion of the national canal and river network. We currently manage over 2000 miles of network throughout England, Scotland and Wales.

The restored canal would be managed from the BW Lapworth Office, which currently has responsibility for management of the Worcester & Birmingham Canal between Birmingham and Worcester, the North and South Stratford Canals and the Grand Union Canal from Birmingham to Napton Junction. The waterway supports the following functions:

a. Operational 'day to day' management
b. Customer Interface and service
c. Local office finance and administration
d. Local engineering staff – responsible for Health and Safety and inspections
e. Project development and management
f. Canal based marketing
g. Patrol Officer – responsible for mooring and license evasion, Bye law offences and anti-social behaviour
h. Waterway supervisor – responsible for direct management of lengthsmen and development of their work programme
i. Lengthsmen and multi skilled operatives – based on the ground with day to day maintenance and operational duties

The Droitwich Canal would be directly managed by the Waterway Supervisor for the Worcester & Birmingham Canal and integrated into the operational management of this canal. As the restored Droitwich Canals would be fed by the water supply from

the Worcester & Birmingham Canal, using Bittell and Tardebigge Reservoirs as battery feeds, management of the restored Droitwich Canals needs to be integrated into the management of the wider canal network.

9.4 Proposed new staff for management of the restored canals

Following discussion with the project partners, the following new staff is proposed:-

1) Three lengthsmen – based upon the canal with the following key responsibilities:-
   - Maintenance
   - Repair
   - Renewal
   - Operation and inspection of structures and environs along the canal corridor
   - Improvement of the maintenance and operation of the waterway through the adoption of Best Practices
   - First line response to emergencies by either attending personally or calling for assistance
   - First line customer care
   - Water level monitoring and water control
   - Responsibility for a defined area of the waterway, with its associated structures, which may include administrative duties
   - Management of volunteers (skilled or unskilled) or New Deal teams working within their canal length

   They will be expected to have the following skills and knowledge:-
   - Understanding of Health & Safety issues
   - Understanding of environmental and heritage issues
   - Good communication skills
   - Customer care skills
   - Boat handling skills
   - Work experience in a waterway, construction, leisure or tourism or horticultural environment

2) Project Officer

   It is proposed that a Project Officer be permanently employed on a part time basis (three days per week) with responsibility for the development and promotion of the Canals' marketing, events and volunteer strategies.

   Their principal responsibilities would include:-
   - Marketing and promotion of the restored canal and country park
   - Administration and development of mooring and angling facilities
   - Control of third party moorings to generate additional income
   - Provision of an efficient enquiry, complaint and information service
   - Management and development of environmental improvements and recreational facilities along the canal and country park
   - Development and management of the corporate signage strategy
   - Undertake and review customer survey initiatives, process monitoring and market research
   - Prepare interpretation action plans for leisure, tourism and education that will optimise income, awareness and use of the waterway

- Prepare, plan and implement a waterway events programme
- Identify, develop and maintain links with educational services and local residents to promote both water safety and the value of the restored canals and country park as a resource

The following skills and knowledge will be required:-

- Track record in successful project management
- Commercial awareness
- Financial awareness
- Negotiation skills
- Presentation skills
- Understanding of Health & Safety issues
- Five years experience in leisure/environmental discipline

9.5 Annual operating costs

The following annual revenue costs are anticipated following restoration:

	Material costs	Contract costs	Labour costs
3 Lengthsmen to maintain Canal Corridor including visitor facilities and volunteer supervision *£14K p.p. for all general maintenance* N.I. and Pension costs			£42,000 £14,000
Project Officer – *events, volunteers, promotion, moorings* N.I. Pension costs, expenses			£12,000 £4,000
Project Officer – *annual marketing and events budget*	£5,000		
Staff office costs	£2,500		
Empty rubbish bins		£3,200	
Sign Maintenance	£400		
Lock Gate Maintenance *Assume refit all sets every 8-10 years*			£1,500
Maintenance of Kubota Mowers		£1,000	
Clean/maintain Sanitary facilities		£2,400	
Weed spraying to locks/public areas		£1,800	
Lock gate painting	£200		
Minor Towpath Repairs	£1,800		
Paddle Gear Maintenance	£500		
Litter/Floating rubbish removal *Total Canal Length*	£200	£1,200	
Vegetation Management *Upkeep as per management plan*		£2,000	
Length inspections *Monthly*			
Water Control – Storm/drought conditions			£600
Out of hours call/outs *Customer calls e.g. Fallen trees, inoperable locks etc.*			£1,000
Totals	£12,100	£11,600	£73,600
Total Per Annum £97,300			

9.6 Annual Income

Whilst it is difficult to be precise in the prediction of anticipated income levels deriving from the restored canals, it is the Project Team's view that the new moorings to be created will generate sufficient annual income to cover revenue costs.

Further sources of income would have to be found to fund major maintenance costs within the 25 year maintenance programme. Potential sources include angling, trip boat licence income, off line marinas, surface water discharges and maintenance agreements. Should the option 3 management regime be pursued it would be both BW and TWT's requirement that sufficient income creation opportunities be included within a Canal Development Framework to facilitate new income sources to meet increasing revenue costs.

10.0 ANALYSIS OF MAJOR PROJECT RISKS

In preparing the work programme and budget estimates for the Canal Restoration Project British Waterways has undertaken a risk assessment with regard to the planning, implementation, sustainability of the project. This risk assessment assumes that project delivery Option 3 is adopted.

In broad terms, the table below indicates the main risk areas identified through the project programme and funding. Should the option of TWT/BW restoring and managing the canal be taken up then BW would use their significant experience gained over a number of major projects involving many funding sources in management of the project. Examples of projects with which BW/TWT have been involved include the £78 Millennium Link project in Scotland, the £29million Kennet & Avon Canal restoration project in the South West and the Renaissance infrastructure improvement programme for the West Midlands canals (£9million).

These projects have been funded through a variety of sources, including lottery distributors, European funding, local and central government agencies and the private sector.

Risk Element	Factor	Financial Effect	Management
Change in Personnel	Low	None	The proposal is to retain a core project team incorporating project manager, project engineer and work supervisor. This format has been used successfully on other major restoration and construction projects. The spread of knowledge and experience throughout the project team ensures that total risk to the project is low. In addition the wider expertise available in British Waterways helps to mitigate the risk of change in personnel should this occur.
Need for statutory consents	High	High – an increase in the obligations arising from additional EA requirements or a severe EIA assessment would require both revision of the programme, re-costing and re-profiling of HLF and other contributions.	Ensure continued negotiation with relevant bodies. Investigate the rights and responsibilities of the restoration promoter with regard to EIA and EA approval and options for appeals against conditions placed by the regulating bodies.
Change in costs	Medium	If capital costs increase by 10% above the contingency level this would involve	A significant amount of work has been undertaken in the development of the overall project costs. Included are consideration for contingency allowances, options for disposal of

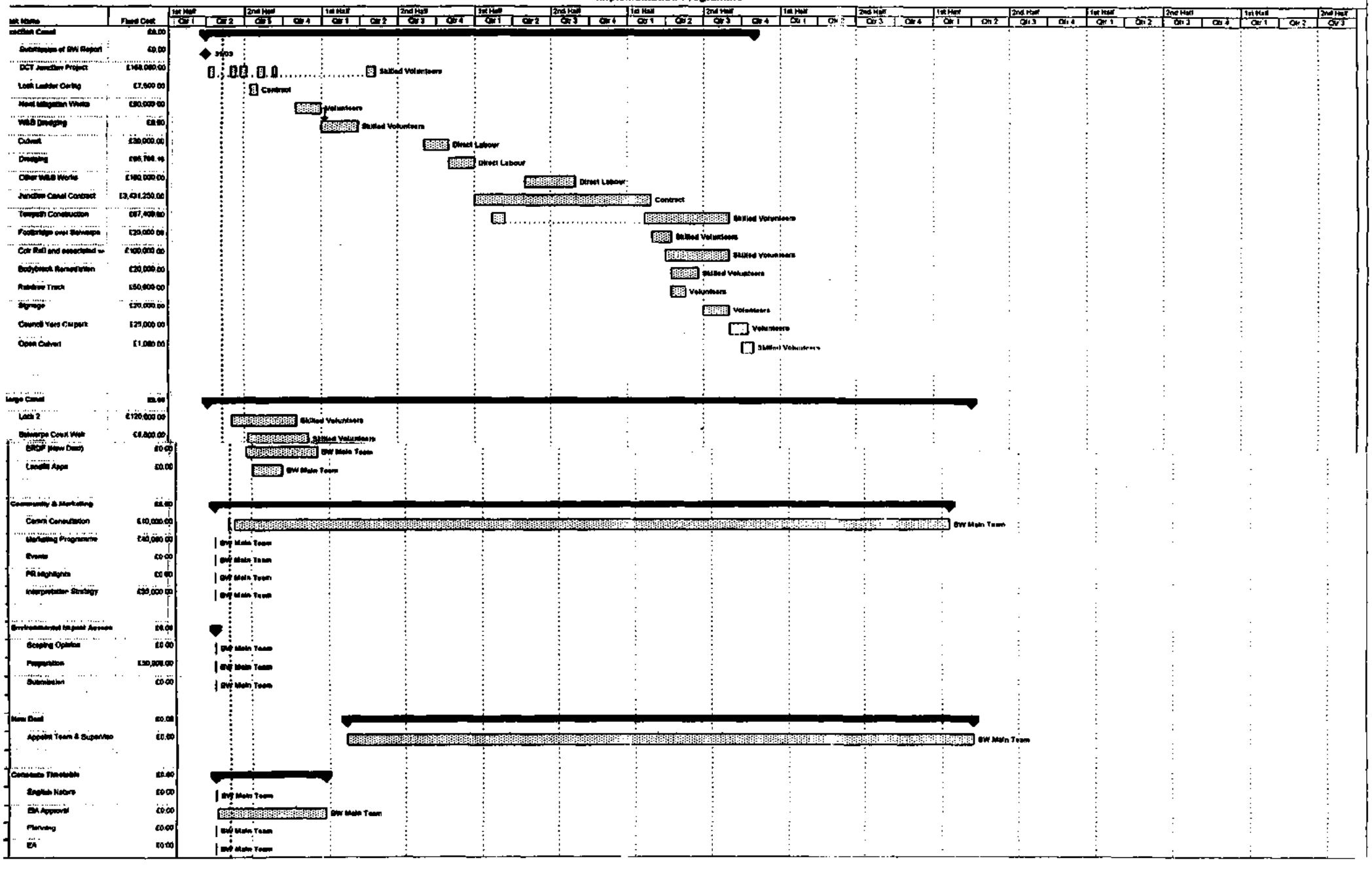
		additional costs of £900,000 over the programme period.	dredging and options for water supply and water quality issues. These will be further developed as the project progresses to reduce the cost risk attaching to the project.
Reduction in external funds	Medium	Reduction of funds requested will have serious financial implementation implications. It may also extend the programme period for restoration.	The Partnership Group would need to consider which elements of the restoration project could be deleted. To mitigate against this risk detailed funding applications are to be submitted to several major funders, including HLF, AWM, ESF, NOF and other minor funding sources e.g. Countryside Stewardship, Voluntary Sector, Private sector, charitable sector. This will help spread the risk accruing from reduction in external funds from one funder.
Delay in refurbishment	Low	None – although a delay in the programme would delay the visitor and other economic targets being met as proposed. A significant delay would also impact on the total restoration costs which are forecast to increase at the rate of 3% per annum.	The variety of implementation routes allows flexibility in the project programme. However, certain elements of the work are essential in the overall programme e.g. the initial reedbed mitigation work, need for EIA approval and EA approval and the securing of tipping rights.
Project administration breakdown	Low	Limited	Effective procedures are already in place within British Waterways and practised over a number of years for a range of projects of varying sizes for all manner of external contracts and funding sources. Resources are already committed within BW for the effective financial administration of externally funded projects and again our track record proves our ability to deliver this. Detailed British Waterways internal and external audit procedures will need to be met at all times. All externally funded projects are subject to detailed external audit.

Weakness in Project Management	Low	Additional financial costs may occur if the project budget or programme are not tightly controlled.	The project will be able to call upon this substantial financial and project management resources within British Waterways. The project will also be overseen by a British Waterways management systems which have considerable experience in managing major construction and externally funded projects of this nature.

APPENDIX 1A

Project Programme & Cash flow

Droitwich Canals Restoration
Implementation Programme



APPENDIX 1B

Costs Analysis

ROITWICH INDIVIDUAL PROJECT COSTS Appendix 1B

MPLEMENTATION PROPOSALS

roject ref	Project details	Comments	Timing	Contract	Dir Lab	Skill vol	Vols	Costs		Totals		Comments
	Barge Lock											
1	new gates - top	gate costs			X	X		£	56,000			
	new gates - bottom	3 men *2 wks						£	8,000			
		lorry *2 days								£	56,000	
1a	Poss extra set of gates reqd dependent on leve	As above								£	56,000	
	Lock Landings							£	7,500	£	7,500	
2	Barge Lock											
	minor repairs to lock walls incl pointing, veg cl	part skilled/vols				X		£	1,000	£	1,000	1k for mats/exp
3	bridge at tail end of Barge Lock						X					
	repaint, greasing and clean down							£	2,400	£	2,400	1k for mats/exp
	Pontoons							£	7,500	£	7,500	
	Moorings							£	2,000	£	2,000	
4	Swingbridge - scheduled for 20 Feb	Complete by DCT										
5	Undercutting at soft edge				X							
	50m piling at Vines Pk entrance							£	7,000	£	7,000	not critical
5	Interpretation Vines Park						X	£	15,000	£	15,000	High profile
	Outfalls 23, 19 &18 privately owned											
6	Crossways Way swingbridge						X					
	clean and repaint							£	2,200	£	2,200	1k for mats/exp
7	Ricketts La Bridge											
	repaired by DCT											
8	Upwych Pit											
	safety grille on open shaft and interp'n	Disabled arts project					X	£	2,000	£	2,000	Mats and exp
9	Fox Alley swingbridge											
	clean and repaint						X	£	2,000	£	2,000	1k for mats/exp
	Footpath upgrade											
10	Marina											
	120m light piling req'd where dredged	Piling by DL			X			£	9,000	£	9,000	incl piling, lab and brick c
	lab costs c£80per m incl brick capping	Capping by WRG				X						
11	Hampton Rd wharf											
	decontam and piling by developer											

2	Netherwich Bridge										
	name plates in trad design					X	£	500	£	500	vols erect
3	Railway bridge										
	street lighting extension	LA works	X								
	paint railings	vols				X	£	500	£	500	
	graffiti removal	contract	X				£	500	£	500	
	Rubbing Strip replacement						£	2,000	£	2,000	
4	Railway bridge gateway										
	School arts project						£	2,000	£	2,000	mats/exp
	lighting and Ultramac	contract	X				£	10,000	£	10,000	
	painting Armco tunnel cladding	vols				X	£	2,000	£	2,000	mats/exp
5	Towpath Rway Br to Valley Way						£	25,000	£	25,000	
	1250m £52pm contract										
	£24pm vols				X						
	high quality high usage area										
	2.0m TP										
	SBM mats £8500										
	subbase £8500										
	timber edges £5000										
	plant etc £4000										
	Total mats costs £24000 - no lab costs										
	Mooring Site						£	36,000	£	36,000	
	Upgrade Steps										
							£	16,000	£	16,000	
6	Piling Salwarpe Rd Br to overflow weir										
	120m - piling labour and bricks	D Lab		X			£	9,000	£	9,000	
	Capping by volunteers	Vols			X						
7	Overflow										
	Cleaning, fencing with handrails, grille	D Lab and vols		X	X		£	15,000	£	15,000	
8	Towpath surface Valley Way to Roman Way Bridge										
	1500m as before	Vols			X		£	30,000	£	30,000	
9	Slope stability Valley Way Br										
	heavy piling/ crib walling	D Lab		X			£	23,000	£	23,000	
0	Valley Way br and overflow	D Lab and vols		X	X		£	3,000	£	3,000	
	clean and replace weir crest										
	Car Park Upgrade & Access						£	5,000	£	5,000	

321	Ombersley way bridge									
	light piling 150m *£55pm		X			£	9,000	£	9,000	
	graffiti removal					£	520	£	520	
	Ombersley Way Mitigation		X	X	X	£	129,024	£	129,024	
	Water Feed to Mitigation					£	7,500	£	7,500	
	Chawson Valley Gateway					£	71,500	£	71,500	
322	Overflow by Salwarpe Crt Br									
	improved by WRG									
	safety rails	vols			X	£	5,000			
	let off sluice for water control	D Lab	X			£	3,500			
								£	8,500	
323	Salwarpe Court Bridge									PI not done
	awaiting PI for Halcrows									
	checking accommodation rights									
324	Enamel bridge plates on each bridge				X	£	150	£	150	
325	Slope stability before Salwarpe Bridge	MC to confirm.				£	30,000	£	30,000	
		check age of adjoining redbrick property								
		if younger than canal no liability								
	Access improvements at St Micheals Ch					£	4,000	£	4,000	
326	Salwarpe Bridge	works required but public road bridge.								
		nothing required for operation canal.								
	Informal Parking					£	3,000	£	3,000	
	Visitor Moorings					£	24,000	£	24,000	
327	Slopes stability on towpath side widen towing	100m x £55 p/m	X			£	6,000	£	6,000	
		check ownership of retaining wall								
		100m piling x £1.8L8 piles								
328	Hill End Culvert	PI		X		£	500	£	500	
329	Hill End Bridge Swing Footbridge - shell only no deck or beams									
	AR checking accommodation rights									
	if no accommodation rights exists leave.									
	£45,000 if full restoration.									
330	Hill End Embankment to Lock 1	100m light piling/coir rolls	X			£	6,000	£	6,000	

Lock 1 - Bill Walton's Cottage								
New top gates		X		£	9,500			
bottom gates - possible new gates required or new head and beams.		X		£	28,000			
lock ladders - ladder and hire of cutter, scaffolding and make good repairs		X		£	2,500			
Repoint upper paddle chamber				£	1,500			
plastic paddles on top gates.		X		£	2,635			
Lock Landings			X	£	10,000			
construct support sockets in each lock - grooves already exist.		X		£	6,000	£	60,135	
Car Park at Ladywood Lock		X		£	87,500	£	87,500	
Visitor Moorings				£	36,000	£	36,000	
Towpath between Locks 1 & 2			X	£	500	£	500	
Tarmac contribution of Toptrec								
Lock 2 - fully operational								
works required								
strengthening and painting gates			X	£	5,000			
new paddles and support sockets			X	£	2,635			
alteration of paddle gear			X	£	1,400			
lock ladder			X	£	2,500			
re-point and grout			X	£	2,500			
Lock Landings				£	10,000			
construct support sockets in each lock - grooves already exist.		X		£	6,000	£	30,035	Gates to be replaced withi
Circular Weir - dome grille required brick paving around dome			X	£	2,000	£	2,000	
information board				nil				
Bridges over lock tails								
anti-slip surfacing to bridge			X	£	3,000	£	3,000	
Lock 3 - footboards,	lock gearing - confirm most appro	X	X					
plastic paddles, support sockets,								
lock ladder and gate strengthening				£	8,435			
refit gates				£	1,000			
Veg removal				£	500			
anti-slip surfacing to bridge			X	£	3,000			
re-point and grout			X	£	2,500			
re-point culvert		X		£	2,000			
Lock Landings				£	10,000			
construct support sockets in each lock - grooves already exist.		X		£	6,000			
						£	33,435	
Martinbrooke Colvert	PI 12.5k + 25%			£	15,625	£	15,625	

39	Lock 4									
	top and bottom gates		X		£	29,000				
	Gate & fixing collars				£	4,000				
	Top end ground paddles				£	2,635				
	Cill timbers				£	4,000				
	Veg clearance				£	500				
	ladder		X		£	2,500				
	chamber repairs		X	X	£	8,600				
	lock landings				£	10,000				
	Anti-slip to Br				£	3,000				
40							£	64,235	Poss £10k in next 5 years	
	Hedge laying between locks 4 & 5			X	£	6,000				
41	BTCV/WWT survey required.						£	6,000		
42	Lock 4 & 5									
	towpath repairs for whole of barge canal incl access creation			X	£	34,000				
							£	34,000		
43	Porter's Mill Lock - Lock 5									
	top and bottom gates		X		£	29,000				
	Gate & fixing collars		X		£	4,000				
	Top end ground paddles		X		£	4,000				
	Cill timbers				£	4,000				
	Veg clearance				£	1,750				
	ladder				£	2,500				
	Reface both walls				£	25,000				
	grouting				£	5,000				
	lock landings				£	10,000				
	Works to lower quoins				£	2,000				
							£	87,250		
44	Cutting Stabilisation between locks 5 & 6	X			£	23,000	£	23,000		
45	Overflow Structure by Porter's Mill - clear and complete works		X	X	£	5,000				
							£	5,000		
46	Mitigation Works between Locks 5 & 6		X	X						
47	Lock 6 - Mildenham Lock									
	top and bottom gates		X	X	£	29,000				
	Gate & fixing collars		X	X	£	4,000				
	Top end ground paddles		X	X	£	4,000				
	Cill timbers		X	X	£	2,000				
	Veg clearance		X	X	£	1,500				
	ladder		X	X	£	2,500				
	Repointing		X	X	£	1,500				
	Lock landings				£	10,000				
	Replace brick & stonework		X	X	£	2,000				
							£	56,500		

Car Park at Mildenham Lock		X	X					
Mitigation works		X	X	X	£	150,000		
Water feed to mitigation					£	7,500		
							£	157,500
Overflow at Linacre								
check on site. possible new overflow required		X	X		£	30,000		
							£	30,000
Linacre Bridge - good condition								
Towpath leveling wrorks between Linacre Bridgeand A449			X		£	3,000	£	3,000
A449 Crossing Contract including access steps	X				£	1,300,000		
							£	1,300,000
Channel Works behind Hawford School between A499 and Lock 7		X	X					
digging out to original profile								
WRG works - reforming and earth works					£	70,000		
spoil removal					£	35,000		
							£	105,000
Lock 7								
desilting required. PI awaited								
gates, lock ladders, support/paddles		X	X		£	120,000		
							£	120,000
Accommodation Bridge by Lock 7								
need to review requirements with farmer								
possible use one of abondoned swing bridges?	X	X	X		£	50,000		
							£	50,000
Lock 8 - River Lock								
gates, paddles, lcoks, lock chamber repairs etc.		X	X					
final PI report awaited					£	86,000		
							£	86,000
Entrance Lock from River, form channel and wing walls. Incl gateway fea	X	X			£	53,000		
							£	53,000
Channel between locks 7 & 8								
estimate of material required to be removed.		X	X					
Lock Ladder Coring	X				£	20,000	£	20,000
Dredging					£	953,632	£	953,632
Junction Canal								
Locks 1, 2, 3								
majority of works will be undertaken by WRG		X	X	X	£	168,000		
signs and car parking to be undertaken							£	168,000

	Dredge existing channel between locks 3 & 4 relocation of reeds wet dredge possible use of waterway dredger? direct labour would need training (2 days)		X	X			
	Lock 4						
	New lock including gates etc.	X	X		£ 350,000	£ 350,000	
	Mitigation pond for gt crested newts		X	X	£50,000	£50,000	
	New bridge to Rugby Club	X			£80,000	£80,000	
	New Channel Lk4-5 Skilled vols with spoil to form bund	X	X	X	£50,000	£50,000	
	Towpath 320m long			X	£ 28,800	£ 28,800	
	New Culvert Lk4-5 Dir Lab		X		£30,000	£30,000	
	New car park Council Yard and facs		X	X	£25,000	£25,000	
	Opening existing culvert across yard skilled vols	X	X		£1000	£1000	
	New Lock No 5	X	X		£ 350,000	£ 350,000	
	Body Brook Inlet Structure	X			£ 15,000	£ 15,000	
	Track to field r/o Raintree - bridge			X	£ 50,000	£ 50,000	
	Channel - Lock 5-6	X	X	X	£ 108,000	£ 108,000	
	Towpath Lock 5-6 120m towpath			X	£ 11,000	£ 11,000	
	Mitigation works for fields with springs	X	X		£ 15,000	£ 15,000	
	New Lock 6	X	X		£ 350,000	£ 350,000	
	New accommodation bridge to land r/o Lock 6	X			£ 50,000	£ 50,000	
	Water bypass system	X			£ 250,000	£ 250,000	
	Channel Lock 6-M5 Channel creation	X	X	X	£ 108,000	£ 108,000	

Channel Lock 6-M5				X				
Towpath 120m					£	11,000	£	11,000
Swan Pool culvert								
extend outlet to new canal structure		X	X		£	15,000		
and form inlet structure							£	15,000
Accommodation track	skilled vols/ DL		X	X	£	2,000		
5m wide 80m long to access canal from							£	2,000
Hanbury Rd								
M5 Crossing								
Drdge and clean out		X	X		£	10,000		
							£	10,000
M5 Crossing								
New twoapth, emergency signs, fenders		X	X	X	£	25,000		
							£	25,000
M5 to Corbetts Bridge								
Channel creation	Skilled vols?		X	X	£	36,000		
							£	36,000
M5 to Corbetts Bridge	Skilled vols			X				
Towpath creation 40m				X	£	3,600	£	3,600
New bridge to Impney Farm								
to be provided by developer								
Body Brook remediation								
trickle feed and environmental works			X	X	£	20,000		
Skilled vols?							£	20,000
Corbetts Br to Lock 7		X	X	X				
Channel creation 120m					£	108,000		
Poss skilled vols in part?							£	108,000
New towpath				X				
120m					£	11,000	£	11,000
New Lock 7		X	X	X	£	350,000		
							£	350,000
New Weir to River Salwarpe								
To allow navigation			X	X	£	35,000		
							£	35,000
New footbridge over Salwarpe								
Still required as part of scheme?					£	20,000	£	20,000
Dredge to form new river channel		X	X	X	£	206,250		
5m wide 500m long 1.5m deep @55pcm							£	206,250

	Heavy section piling2x500mx£600pm	X				£	640,000			
37	Capping 2x500x£40pm capping/ waling							£	640,000	
38	Coir rolls and other environmental works		X		X	£	50,000			
								£	50,000	
	Forming new river channel to rear of Texaco to Sunbury Eng Exc and lining of channel 100m x2 @£600pm piling +100x£350m	X				£	410,000			
39	dredge and line							£	410,000	
40	Coir rolls and other environmental works		X		X	£	50,000			
								£	50,000	
	General signage Junction Canal				X	£	20,000			
								£	20,000	
	Lock Ladder Coring							£	7,500	
	Dredging		X		X	£	65,788	£	65,788	
	Environmental Imapct					£	50,000.00	£	50,000.00	
	Consultation					£	10,000.00	£	10,000.00	
	Marketing					£	40,000.00	£	40,000.00	
	Team Fees					£	650,000.00	£	650,000.00	
	Other Fees					£	150,000.00	£	150,000.00	
	Interpretation				X			£	40,000.00	
	Water Control on W&B		X					£	100,000.00	
	Grand Total							**£**	**9,164,580**	

APPENDIX 2A

Heritage Assessment Summary

APPENDIX 2A

HERITAGE ASSESSMENT SUMMARY

Name of structure/item	High heritage value	Locally important
Accommodation bridge at junction of the Junction Canal and Worcester & Birmingham canal		√
Canal wall at Westfields Farm accommodation bridge, Droitwich Junction Canal	√	√
Lock No. 1, Droitwich Junction Canal	√	√
Bye-weir and side pond associated with Lock No, 1, Droitwich Junction Canal	√	√
Lock No. 2, Droitwich Junction Canal	√	√
Bye-weir and side pond associated with Lock No, 2, Droitwich Junction Canal		√
Lock No. 3 with associated by-weir and side pond, Droitwich Junction Canal	√	√
Former path of the Droitwich Junction Canal	√	√
B4090 road bridge over River Salwarpe		
Lock at junction where Barge Canal meets River Salwarpe, Droitwich Barge Canal		√
Swing bridge over lock where Barge Canal meets River Salwarpe,, Droitwich Barge Canal	√	√
Canal wall through Vines Park, Droitwich Barge Canal		√
Swing bridge adjacent to Upwich brine well in Vines Park, Droitwich Barge Canal	√	√
Upwich brine well in Vines Park, Droitwich Barge Canal	√	√
Site of former swing bridge in Vines Park, Droitwich Barge Canal	√	√
Swing bridge in Vines Park, Droitwich Barge Canal	√	√
Canal basin west of Vines Park, Droitwich Barge Canal	√	√
Mooring posts west of canal basin, Droitwich Barge Canal		√
Road bridge to east of railway over Droitwich Barge Canal		
Concrete canal tunnel built through railway embankment, Droitwich Barge Canal		
Railway bridge over Droitwich Barge Canal	√	√
Road bridge to west of railway over Droitwich Barge Canal		
Overflow weir, Droitwich Barge Canal		√
Overflow weir to west of road bridge on north side of canal, Droitwich Barge Canal		√
Footbridge over Droitwich Barge Canal		
Sidling Road Bridge, Droitwich Barge Canal		√
Valley Way footbridge over Droitwich Barge Canal		
Ombersley Way road bridge and widening of canal, Droitwich Barge Canal		√
Roman Way road bridge over Droitwich Barge Canal		
Side weir and overflow to north of canal, west of Roman Way bridge, Droitwich Barge Canal	√	√
Disused swing bridge to east of Salwarpe village, Droitwich Barge Canal	√	√
Salwarpe Embankment, Droitwich Barge Canal	√	√
Salwarpe village and cutting, Droitwich Barge Canal	√	√
Salwarpe Bridge, Droitwich Barge Canal ** Rare example	√	√
Boundary wall c. quarter of a mile west of Salwarpe Bridge,	√	√

Droitwich Barge Canal		
Disused swing bridge c. 1 mile west of Salwarpe Bridge, Droitwich Barge Canal	√	√
Lock No. 1, Droitwich Barge Canal		√
Road bridge at Lock 1, Droitwich Barge Canal		√
Box weir at Lock No. 1, Droitwich Barge Canal		√
Lock No. 2, Droitwich Barge Canal		√
Lock No. 3, Droitwich Barge Canal		√
Lock No. 4, Droitwich Barge Canal		√
Remnants of brick paving west of Lock 4, Droitwich Barge Canal		√
Lock No. 5, Droitwich Barge Canal		√
Accommodation bridge over canal at Porter's Mill, Droitwich Barge Canal	√	√
Side weir and overflow to west of Porter's Mill Bridge, Droitwich Barge Canal	√	√
Mildenham Lock No. 6, Droitwich Barge Canal	√	√
Mildenham Bridge, Droitwich Barge Canal	√	√
Linacre Bridge, Droitwich Barge Canal	√	√
Lock No. 7, Droitwich Barge Canal		√
Hawford Lock No. 8, Droitwich Barge Canal		√

APPENDIX 2B

Wetlands Advisory Service Report

Confidential

Droitwich Canals:
Wetland Creation Project

Interim Report to British Waterways

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1.0 Introduction

British Waterways is currently undertaking a feasibility study into the restoration of the Droitwich Canals (Droitwich Junction Canal and Droitwich Barge Canal). The Droitwich Canal contains approximately 6.8 ha of reedbed. The restoration plans will involve the removal of substantial areas of Common Reed from the channel to make it navigable, affecting approximately 2.5 ha of reedbed, a priority UK BAP habitat.

In consultation with Worcestershire Wildlife Trust, British Waterways are proposing to re-create a similar area of reedbed in compensation for that which will be lost and a further area of reedbed to enhance the existing ecological resource. A number of potentially feasible sites close to the Droitwich Canals have been identified, and WWT Wetlands Advisory Service were approached in December 2000 to look at the feasibility of wetland creation on those proposed sites; to assess the current value of each site, identify constraints, and produce costed design options to meet British Waterways' objectives.

In addition, the restoration is also likely to impact upon a population of Great Crested Newts at Hanbury Warf for which mitigation measures will be required because of their protected status.

There are five sites: Ombersley Way, Salwarpe, Porter's Mill Bridge, Mildenham Mill and the Great Crested Newt site.

Table 1. The study areas

Site	Grid reference	Approx size	Current land-use
Ombersley Way	SO 882627	3.9 ha	Playing field
Salwarpe	SO 877623	6.3 ha	Agricultural land with existing small *Phragmites* reedbed
Porter's Mill Bridge	SO 857603	3.4 ha	Abandoned agricultural land with some existing reedswamp
Mildenham Mill	SO 849604	5.6 ha	'Abandoned' agricultural land
Amphibian (GCN) site adj. Droitwich Rugby Club	SO 916631	1.6 ha	Abandoned storage depot

The first four sites all lie between the Droitwich Barge Canal and the River Salwarpe. The Amphibian site is on the course of the derelict Droitwich Junction Canal.

2.0 Methodology

2.1 Desk study

2.1.1 Ownership

Ombersley Way - leased to Leisure Trust by Wychavon District Council.
Salwarpe - Mr Davis, Churchfield Farm.
Porter's Mill Bridge - Wychavon District Council, leased to Droitwich Canal Trust.
Mildenham Mill - Half Noose Angling Club.
Great Crested Newt site - County Council owned.

2.1.2 Literature review

Literature consulted included:

- Droitwich Canal, Ecological Survey Stage 2 Draft Document 1999.
- Droitwich Canal survey – assessing status of the Common Reed. August 2000. Unpublished Report. British Waterways.
- Droitwich Canal Restoration Conservation Panel – Final Report. No date. Unpublished Report.
- Biodiversity Action Plan for Worcestershire. 1999. Worcestershire Biodiversity Partnership.
- Landmark information. Report on Droitwich Canal. September 2000. Envirocheck.

The literature was reviewed for observations on any of the proposed sites. Also noted were observations about reedbeds on the canal and their associated species, to assist with assessing the quality of the reedbed habitat, and the conditions that should be re-created.

2.1.3 Consultation

The following organisations have been consulted:

- Environment Agency
- English Nature
- Worcestershire Wildlife Trust
- Department of Environment Transport and the Regions
- Severn Trent Water

2.2 Fieldwork

2.2.1 Phase 1 study

Each site was surveyed for existing botanical/habitat interest. The surveys were carried out on 11 and 12 January 2001. Obviously this is a far from ideal time of year to carry out habitat surveys, many plant species are not visible, and the quality of habitats for invertebrates such as butterflies and dragonflies is difficult to assess.

2.2.2 *Existing reedbed habitat*

A visit was made on 25 January 2001 to assess the existing reedbed habitat in the canal and to assess access requirements and other constraints on the five sites.

2.2.3 *Topography*

A topographical survey was carried out between 8 and 12 January 2001.

2.2.4 *Hydrology and Soils*

Field visits to assess the hydrology and soils were carried out on 11 and 12 January 2001.

3.0 Results

3.1 Desk study

3.1.1 *Literature*

Ecological survey:

Botanical data

The botanical information is difficult to interpret without the accompanying annotated map, target notes from the map will be checked before the final report.

Faunal data

- Otters

  The survey confirmed information that Otters are using the canal and the River Salwarpe regularly. The extensive reedbeds on the canal provide cover.

- Water Voles

  Mink appear to be affecting the population of Water Voles on the canal. Signs of recent activity were found at GR SO918632, which is close to the Great Crested Newt site, and along the River Salwarpe.

  It was felt that the dense cover in the reeded areas of the canal channel might support more Water Voles than the survey suggests, especially as, due to hazardous conditions, not all the canal was surveyed.

- Amphibians

  The Junction Canal stretch had records for Common Frog, Common Toad, Smooth Newt and, most importantly, Great Crested Newt.

- Birds

  There is a good population of Reed Warblers (80-100 singing males) using the canal reedbeds for nesting. The invertebrate survey also mentioned Reed Buntings nesting in the reedbeds. Reed Buntings are a Priority Species with a UK Species Action Plan.

- Invertebrate surveys

  Some of the more open reedbed areas of the canal supported an excellent range of common and local aquatic invertebrates. The pool on the Porter's Mill Bridge site also supports an exceilent range of aquatic invertebrates including two nationally scarce scavenger water beetles and a large population of three-spined sticklebacks (predators of newt eggs and tadpoles). The pool on the Great Crested Newt site is of considerable interest, supporting a very rich community of aquatic invertebrates including the very local Four-spotted Chaser *Libellula quadrimaculata*, which was observed egg-laying in the pond. Over 100 Great Crested Newt tadpoles were netted in 15 minutes in this pond, with over 200 Smooth Newt tadpoles.

  This survey noted that the stretch of canal adjacent to the housing estate at Chawson (near Ombersley Way site) appeared polluted, and that the aquatic invertebrate interest had declined since a previous survey 15 years ago.

  The survey noted a number of salt-tolerant invertebrates from Porter's Mill Bridge eastwards.

The survey as whole concluded that the Droitwich Canal corridor supports a varied and complex assemblage of habitats, suitable for a diverse range of fauna and flora, and that the canal is of high ecological value in a local and possibly a regional context.

Droitwich Canal survey – assessing status of the Common Reed

This survey only noted the area of Common Reed within the canal channel. Reed Warblers were seen in the reedbed. The total area of reed between the Barge Canal junction with the River Severn and the end of the Junction Canal was 6.8 hectares.

Droitwich Canal Restoration Conservation Panel – Final Report

This report summarised issues arising from restoration; biological, archaeological and recreational and identifies mitigation tasks.

Biodiversity Action Plan for Worcestershire:

Habitat Action Plans

The directly relevant habitat actions plans are for Reedbeds and Canals (other wetland habitats with action plans are fen and marsh, lowland wet grassland, wet woodland, open water [ponds and lakes] and rivers and streams).

The Reedbed action plan states that the total resource in Worcestershire is 26 ha on more than 20 sites. Objectives of the action plan include; To ensure the survival of all reedbeds above 0.5 ha, To maintain and enhance the extent and quality of existing reedbeds with priority given to those holding UK biodiversity Action Plan Priority Species & Red Data Book species, To ensure all sites above 2 ha are managed primarily for their nature conservation interest, To create an additional 60 ha of wet reedbed, two of which to be between 10-20 ha, giving priority to areas near to existing reedbed and wetland systems.

The Canals action plan notes that disused or little used canals often support highly diverse assemblages of plants and animals. The Droitwich Canal, which is a Special Wildlife Site, supports frequent channel-wide reedbeds of County significance. Where the canal runs close to the River Salwarpe the value of the canal corridor is enhanced. The reedbeds provide breeding habitat for many pairs of Reed Warblers as well as waterfowl and a range of invertebrates including several species of dragonflies and damselflies. Otters are known to use the canal close to where it joins the River Severn.

Species Action Plans

Directly relevant species include Otter, Water Vole and Great Crested Newt. These three species are also UK Priority Species, protected by the Wildlife & Countryside Act.

The Worcestershire BAP states that Otters are now present on all of the county's major watercourses with the middle Severn an apparent stronghold. Current factors affecting the species include degraded bankside features – on many river stretches there is a lack of dense emergent vegetation, scrub and trees suitable for holts which are all required for resting and breeding, and loss of extensive wetlands associated with rivers which are required for breeding including reedbeds, grazing marsh and wet woodland.

The Water Vole was abundant in Worcestershire in the 1970s. The situation in the 90s was much more localised. A survey to establish the extent of the decline and sites of importance is a high priority. Current factors affecting Water Vole include habitat degradation, population fragmentation and fluctuations in water level.

The Great Crested Newt has been found in over 50% of all ponds in Worcestershire with many regionally important meta-populations throughout the county. Current factors affecting the species include loss and damage of pond breeding sites, and loss and damage to terrestrial habitats, and the introduction of fish and domestic waterfowl. The introduction of fish, especially stickleback, can eliminate a Great Crested Newt population from a pond over a period of several years.

Landmark search information

Most of the pollution occurrences are relatively minor one-off incidents (Appendix I). There is no canal water quality data in the Landmark information.

3.2 Consultation

3.2.1 Environment Agency

The Environment Agency have been consulted in relation to:

Conservation and recreation

Viv Geen (Shrewsbury Office) would like to see proposals as they develop.

Fisheries

Have been contacted indirectly.

Flood defence and development control

Natalie Calvert and Andrew Cook (Shrewsbury Office) were contacted and subsequently met on 31 January to discuss flood storage issues. Practically all of the Mildenham Mill and Porter's Mill Bridge sites lie within the floodplain, a significant portion of the Salwarpe and Ombersley Way sites lie above the flood plain and the GCN site is entirely outside the floodplain. The EA are unwilling to accept any loss of flood storage in areas inside the floodplain and usually impose strict regulations regarding the moving of spoil within it (usually spoil can be moved within the same 500 mm contour and not further than 250 m). Any created wetlands permanently holding water will result in a loss of flood storage, which must be compensated by taking extracted spoil outside the floodplain. At this point we are taking loss of flood storage to equal the volume of permanent water created, though we are still awaiting written confirmation from the EA on this and other points.

Water quality;

The River Salwarpe adjacent to four of the five study areas has been graded as GQA grade C (fairly good quality) in 1999 under the Environment Agency's General Quality Assessment (GQA) Scheme. The nearest watercourse to the Great Crested Newt site is Body Brook, which is not classified under the scheme.

Paul Williams (Kidderminster Office) was contacted regarding water quality and provided the data contained in Table 2 below. The Body Brook, which runs into the R. Salwarpe above Droitwich, appears to be of good water quality having low mean values for BOD, ammonia and suspended solids though it does have an elevated value for nitrate.

The quality of the R. Salwarpe is poorer relative to that of the Body Brook especially upstream at Upton Warren; in particular, it is highly eutrophic with elevated levels of nitrate and phosphates.

Table 2. Water quality of the Droitwich Canals and surrounding water bodies

	BOD_5 (ATU) $mg.l^{-1}$	Ammonia $mg.l^{-1}$	Dissolved Oxygen $mg.l^{-1}$	TON $mg.l^{-1}$ as N	Ortho-Phosphate $mg.l^{-1}$	Suspended solids $mg.l^{-1}$	Chloride $mg.l^{-1}$	Conductivity $\mu S.cm^{-1}$
Body Brook	1.45 (2.25)	0.13 (0.25)	10.1 (8.6)	7.1	0.15	13	1,751	6,172
R. Salwarpe (Upton Warren)	4.55 (7.22)	0.38 (0.75)	9.7 (7.5)	14.8	4.11	32	77	805
R. Salwarpe (Chapel Bridge)	2.62 (3.78)	0.15 (0.30)	11.1 (2.1)	12.1	2.90	19	501	2,298
Worcester Birmingham Canal	4.67 (7.84)	0.07 (0.14)	9.5 (5.1)	2.6	0.18	43	68	574
Droitwich Canal (Hampton Rd, Droitwich)	7.04 (13.12)	0.17 (0.32)	13.4 (4.4)	9.23	2.20	21	993	3,157
Droitwich Canal (Salwarpe village)	6.20 (11.28)	0.20 (0.44)	10.5 (6.3)	3.90	1.55	13	1,768	4,942

Mean values are given with 90%ile (BOD/Ammonia) and 10%ile (DO) in parentheses

Data source; Williams, P. (1998) *Droitwich Canal restoration proposal, assessment of possible effects to Water Quality.* Environment Agency Internal Report.

The Droitwich Canal is similar in nutrient status to the R. Salwarpe but its water quality is affected by a combination of high nutrient levels (high algal productivity) and static water, leading at times to moderately high BOD levels and low dissolved oxygen concentrations (Salwarpe village; mean DO 10.5 $mg.l^{-1}$, 10%ile 6.3 $mg.l^{-1}$, n=47).

Measurements of salinity vary between the water bodies; currently the Droitwich Canals have some of the highest salinities as demonstrated by high levels of chloride and conductivities, the Worcester Birmingham Canal has the lowest salinity.

Groundwater abstraction

Alistair Hawe (Shrewsbury Office) was contacted; there are no major obstacles to using groundwater as a source to supply the created reedbeds, a minor aquifer runs under all the sites.

Surface water abstraction

Leslie Warby (Kidderminster Office) was contacted; there are no problems in theory to abstracting water from the River Salwarpe though the EA will need to be contacted with detailed plans if we want to proceed.

Discharge consents

Julia Clark (Shrewsbury Office) was consulted; if the created wetlands were to have an outfall that only operated during winter (due to rainfall) then it is unlikely that the outflow will need a consent to discharge. If the wetlands were to be fed from the canal continuously then the issue becomes less clear and appears to depend on the reedbeds actually affecting the water quality of the water abstracted from the canal as it flows through them. If they do then the reedbeds will to be classed as treatment wetlands and a discharge consent may apply. The EA have requested, and been sent, more information regarding the project so that they can give a considered opinion.

Waste licensing

Richard Hadley (Kidderminster Office) was consulted over a variety of waste licensing issues.

The excavation and landscaping of spoil within a site (taken to be defined by a boundary feature; fence, wall or hedge) will probably not need to be controlled under The Waste Management Licensing Regulations.

Spoil moved from one site and disposed on another will be subject to Waste Management Licensing Regulations. It is possible that the activities can be exempt under Paragraph 19(4), Regulation 17 of The Waste Management Licensing Regulations (1994) by using the deposited spoil to provide a recreational facility. It is likely that a Nature Reserve with public access would be an acceptable recreational facility.

Material arising from excavations that is moved from the site and stockpiled off site prior to being carted away will also be subject to Waste Management Licensing Regulations.

If none of the above conditions apply a waste license could be applied for but will be costly and time-consuming, leaving the last option of taking the spoil away. Some preliminary investigations have revealed that there is a demand for topsoil locally; Mark Beasley (Jack Moody Ltd, 01922 417548) was contacted through a local waste exchange and would be willing to haul away topsoil, free of charge, from a stockpile adjacent to road access. They would also consider doing the same for subsoil depending on the local demand at the time.

The EA have been formally approached for comment on the concept plans.

3.2.2 English Nature

Both Peter Holmes and David Heaver (Three Counties Team) have been consulted regarding the proposed project; all Great Crested Newt licenses are handled by DETR with respect to developments. Otherwise they feel that they already have had an opportunity to comment on the proposed restoration scheme.

3.2.3 *Worcestershire Wildlife Trust*

Andy Graham (Rivers and Otters Project Officer) was met for a site visit. Worcestershire Wildlife Trust is against the loss of a significant area of reed from the canal but, given that, welcome the effort to mitigate for any areas of reedbed lost and also to create additional habitats.

3.2.4 *Department of Environment Transport and the Regions*

Ken Windsor (Bristol Office) was contacted, DETR license the translocation of Great Crested Newts as a result of development; this issue will be discussed later.

3.2.5 *Severn Trent Water*

Bill Walton was consulted in relation to the pipe identified running beneath the Salwarpe site in the topographic survey. The pipe has been identified by Severn Trent as a mains sewer, ideally they would like to see 5 m margin left on either side to allow for maintenance if the need should arise. Given the aims of this project they are prepared to look at proposals that involves wetland creation over the sewer but will need to see more detail. Severn Trent also expressed concern over the possibility of increased amounts of water infiltrating their sewer if wetlands were to be created, though in reality ground water levels on this site are already higher than the sewer (see section 3.4.3)

3.3 Fieldwork – Phase 1 study

3.3.1 *Site 1 (Map 4)*
Ombersley Way

Overall impression

Football pitch between canal and river, some woodland.

Vegetation

Football pitch: standard amenity grasses mix with Perennial Rye-grass *Lolium perenne*, Red Fescue *Festuca rubra*, Creeping Bent *Agrostis stolonifera* etc.

Between the field and river is mixed woodland, probably planted (Ash *Fraxinus excelsior*, Sycamore *Acer pseudoplatanus*, Alder *Alnus glutinosa*, Oak *Quercus* spp.). Around the fringes of the woodland, there is an understorey of Common Reed *Phragmites australis*. Other species include Bramble *Rubus fruticosus*, Common Nettle *Urtica dioica*, common Marsh-bedstraw *Galium palustre*, willowherbs *Chamerion angustifolium*/*Epilobium* spp., Ground-ivy *Glechoma hederacea*, Wood Avens *Geum urbanum*, Lords-and-Ladies *Arum maculatum*, Cow Parsley *Anthriscus sylvestris*.

There is some marginal/bankside Reed along the river.

The boundary to the canal is Blackthorn *Prunus spinosa* scrub and rough grassland with Bramble and the occasional tree – Oak, Wych elm *Ulmus glabra* and Sycamore. Good small bird habitat.

The boundary to the ditch and to the river is rough grassland with Lesser Burdock *Arctium minus*, docks *Rumex* spp, Reed, Nettles, Common Mallow *Malva sylvestris* with the occasional small tree.

The ditch was very shaded and had little/no vegetation.

Landform
From the canal towpath there is a relatively steep bank down about 1.0 m then the field drops slightly from the canal towards the river (1.5 m).

The river level was around 1.5-2.0 m down from the site level. The banks were steep and eroding in places.

The ditch at the north-eastern boundary was ~ 1.0 m down from the level of the field.

Water features/Flooding/Wetness
The river had over-topped recently (flattened vegetation and debris) and there was a lot of debris in riverbank trees but the flooding did not go very far into the woodland/rough grassland. The woodland was dry underfoot, including the reed areas. The football pitch showed no sign of recent flooding and was surprisingly dry underfoot (drained?).

Animals/Birds
Moorhen on river.

Disturbance
Dog-walkers all around the field, particularly along the river bank from the bridge that Ombersley Way runs over.

3.3.2 Site 4 (Map 3)
Salwarpe

Overall impression
Agricultural grassland (not over-improved) sloping down from the canal to river, and then flat. The field contains a small area of reed on the sloping ground.

Vegetation
Most of the field is cut and grazed (sheep and also deer) rough grassland, with Cock's-foot *Dactylis glomerata*, Creeping Bent, Perennial Rye-grass, Creeping Buttercup *Ranunculus repens*, Clover *Trifolium* spp. etc. There are isolated oak trees at either end of the field.

Willows either side of the river need re-pollarding.

The reedbed has areas where reed is dominant but also areas containing Greater and Lesser Pond-sedge *Carex riparia* and *C. acutiformis* (dominant in some parts), some Reedmace *Typha latifolia* and a little Common Club-rush *Schoenoplectus lacustris*. There is also some Reed Canary-grass *Phalaris arundinacaea*. A few small pools with Common Duckweed *Lemna minor* but most surface water appears in footsteps, deer slots etc. The reedbed is fringed by Hard Rush *Juncus inflexus* and there is a little Soft Rush *J. effusus*.

West of the reedbed and above it (south) are some tall, uncut grass areas.

The boundary to the river, and to the stream at the western edge is rough grassland with a little thorn scrub at the eastern end.

The boundary to the canal is rough grassland/scrub/hedge to towpath.

Landform
The field slopes down steeply from the canal, approximately half-way and is then flat until the river.

Water features/Flooding/Wetness
The reedbed is not in the lowest, wet part of the field, but up the slope towards the canal. The area of grassland above the reedbed is interrupted in one place by a wet flush – probably this is the canal bank leaking and feeding the reedbed? (No halophytic vegetation was seen in this flush.)

The lowest, wet part of the field did not contain any reed.

There was a small pond in the south-west corner of the field, which had also been flooded from the river recently. There was also a small area where the river had overtopped at the western end.

Animals/Birds
Snipe in the reedbed
Fieldfares/Redwings on the lower part of the field.

Disturbance
The hedge limits disturbance from the towpath.

Sewage pipeline through the field. Two concrete inspection hatchways. Currently flooded out, one hatchway has a small area of previously flooded (flattened and possible indication of sewage fungus on vegetation) near it.

3.3.3 Site 2 (Map 2)
Porter's Mill Bridge

Overall impression
Bitty site, mainly vegetated with rough grassland and tall-herb including some reed. Pond.

Vegetation
The site is dominated by tall-herb vegetation (willowherbs, Hogweed *Heracleum sphondylium*, Creeping Thistle *Cirsium arvense*, some reed with an understorey of nettles and grasses), and coarse, tussocky grasses that dominate along the riverbank. There is some rough scrub and/or trees, particularly where the canal towpath and river are close together. Generally, the site is open to the river apart from some small areas of Blackthorn scrub. This area probably provides habitat good for small mammals and small birds and thus good for birds of prey.

The first compartment (moving from north to south) contains an area of reed that has some Greater Pond-sedge underneath.

The second compartment (largest area) is uniform rough grassland. The main area of reed is along the south-western edge of this compartment, to the north-western edge is some scrub and tall herb.

The third compartment contains the pond, marginal vegetation includes Greater Pond-sedge and Yellow Flag *Iris pseudacorus*. A small area between the north-eastern corner of the pond and the river had been planted with small trees (just about same height as tree guard), to the west of the pond is an area with lots of Wild Teasel *Dipsacus fullonum*, some Reed and Reed Canary-grass and further north-west denser reed.

No sign of any grazing/management except for some cut wood adjacent to towpath and the planted trees.

Landform
Difficult to see due to tall vegetation and the way the site breaks up but looked to be higher at the canal side, falling to the river.

Water features/Flooding/Wetness
The site was dry underfoot. The river had overtopped and flooded the site a little at the northern end.

Pond – shaded by scrub and trees on west side – mostly Blackthorn.

Animals/Birds
Robin. A pair of buzzards above canal, Sparrowhawk around.

Disturbance
Walkers on towpath.

3.3.4 Site 3 (Map 1)
Mildenham Mill

Overall impression
Long, narrow, agriculturally neglected field, low-lying and damp.

Vegetation
The low-lying part of the field is dominated by coarse, tussocky grasses including Cock's-foot, False Oat-grass *Arrhenatherum elatius*, Rough Meadow-grass *Poa trivialis* and Tufted Hair-grass *Deschampsia cespitosa* (last fairly localised), with lots of Creeping Buttercup, some Meadow Buttercup *Ranunculus acris*, docks and Common Sorrel *Rumex acetosa*.

The bank sloping up on the river side of the field is dominated by tall-herb and rough grasses including Lesser Burdock, Reed Canary-grass, Teasel, willowherbs, docks, Creeping Thistle, and Mugwort *Artemisia vulgaris*. This area makes up an excellent resource for seed-eating birds. This strip varies in width, up to 15-20 m wide in places.

The ditch towards the northern end of the field contains Greater Pond-sedge.

There is the occasional small tree on river bank (some with mistletoe), including young Alder and some thorn scrub.

Between the field boundary (fence) and the canal towpath was an area of rough vegetation including Hogweed, Creeping Thistle and dry Reed.

Landform
There is an old trackway into the field from the canal bridge, which is significantly above the level of the field.

The field appears level across most of its width, then rises towards the river side of the field before dropping steeply off to the river. A ditch cuts off the top part of the field.

The area between the field boundary and the towpath was generally level but the top third included a ditch (dry) with a bund either side.

Water features/Flooding/Wetness
The entire field had been flooded recently, in some areas a lot of silt had been deposited and all the vegetation was very muddy.

There were some very shallow grips, which appear to run the length of the field in the centre.

The central part of the field was wet underfoot, and there was a small area of open water (lowest part of the field?), in this area Creeping Bent dominated.

The ditch had shallow water in it, it is probably only winter flooded and did not connect with the river.

Animals/Birds
Flock of goldfinches feeding on seeds.

Disturbance
Walkers/dog-walkers on the towpath, and anglers on the other side of the river (fishing lake development).

3.3.5 Site 5 (Map 5)
Amphibian site

For the purposes of this report, this site was divided into four areas, 1 and 2 east of the roadway and 3 and 4 to the west.

Area 1: The area containing the pond. The terrestrial area is dominated by ruderal species – Great Mullein *Verbascum thapsis*, Evening-primrose *Oenothera* spp, docks, thistles, Creeping Buttercup and a little Soft Rush and St John's Wort *Hypericum perforatum*. There is some thin soil over rubble and hardcore.

Reed largely dominates the pond. Hard Rush and Reedmace, with some submerged Creeping Bent, fringe the open water area. The sides are steep, the vertical bank on the south side 1+m.

Area 1 slopes up towards the centre.

Piled against the eastern boundary fence are some sleepers (old lock gate?) that appear suitable as amphibian hibernacula.

A ditch approx. 1.0 m deep, bounds Area 1, which has a little surface water, some Great Willowherb *Epilobium hirsutum*, Lesser Pond-sedge, Creeping Buttercup, Hard Rush and a little Reed.

Area 2: North of area 1. This area is again thin soil on rubble/hardcore with ruderal vegetation. Hard Rush dominates much of the area, also willowherbs, Nettles, and Cow Parsley. This area appears lower than Area 1.

Area 3: This area is a yard for a decontamination/salvage company. The area is dominated by a hardcore surface, and there is a portacabin and brick building. On the north boundary is a ditch/stream

with standing water at the eastern end (which goes under the road and joins up with the ditch in Area 1) and flowing water at the western end into a larger stream. There is a ~5 m strip of rough/ruderal vegetation on the south boundary of the ditch. The ditch is very overgrown.

Area 4: This area is north of the ditch. The area divides into two; the furthest north part slopes up to the Rugby Club boundary (flailed hedge) and is a remnant of a pasture field with rough grassland. No sign of grazing but it has been cut. Some of the lower part is surface wet. There is a waymarked footpath running through this area. Moving south there is a break of slope marked by a mature Oak tree and south of this the vegetation is more ruderal and disturbed with Hard Rush, Creeping Buttercup, Creeping Thistle and docks with a little Mullein and Evening-primrose.

Site comparisons

The Ombersley Way site had low biodiversity interest and the only interest in Salwarpe was the existing reedbed area. Porter's Mill Bridge had some interest due to the unmanaged nature of the habitat, which is an increasingly rare resource and is good for small mammals in particular. It may also be floristically rich and good for nectar and pollen-feeders, and the pond is a valuable asset. Mildenham Mill is a moderately valuable area of damp grassland, including some tussocks of *Deschampsia cespitosa*, adding some surface splashing during spring would increase its value to wetland birds in particular. At the Amphibian site the only real interest was the pond itself.

Wetland creation on the sites should be carried out to enhance any existing value that the sites contain, as well as replacing the reedbed habitat that will be lost on the canal.

3.4 Site inspection

3.4.1 Existing reedbed habitat

The existing reedbed habitat within the canal is for the most part, wet, mono-dominant reedbed. As part of the restoration plans British Waterways will be leaving a substantial amount of reedbed as a wide fringe up to 3 m wide, usually on the off-side of the canal. Even so there are areas, such as the impoundment above Porter's Mill Bridge where the current water level of the canal has dropped and reed has colonised the whole width. Restoration of this area will involve the loss of all the reed in the point although some shallow reed fringe can be re-created as part of the restoration works.

The current estimates from British Waterways suggest that about 2.5 ha of the total reedbed resource will be lost directly through the restoration. In addition, there will also be some effect upon the wildlife value of the remaining off-side reedbed fringe. By increasing the edge to habitat area ratio the value of the habitat is lessened. Disturbance within the canal channel will certainly increase as boats begin to use the canal again, and towpath use may also increase; this will all inevitably have some effect, particularly on breeding reedbed passerines such as Reed Bunting and Reed Warbler.

There are two ways disturbance may reduce the value of the reedbed to birds. There may be an effect – which is an observed response to a disturbance. In these circumstances, birds may be able to use

alternative sites during periods of high disturbance at the original site without any negative effects. Alternatively an impact implies a reduction in body condition, productivity or survival. This depends largely on the availability of alternative sites and the energetic costs of this. Impacts are generally most pronounced when birds are under energetic stress, for example, during extremely cold weather, during migration or during the breeding season. At these times birds are close to their energetic survival threshold.

It is impossible to predict the effect or impact of disturbance on the Droitwich Canal. However, the wider the reed fringe the less the effect will be. We would suggest a minimum width of 3 m to maintain sufficient habitat for breeding birds.

3.4.2 Site access

The sites were inspected to identify major constraints in terms of access for machinery and for removing spoil off site.

3.4.2.1 Ombersley Way

The site is easily accessed via Ombersley Way

3.4.2.2 Salwarpe

Access to the site is through Salwarpe village, across the river, over a field then back across the river on a girder bridge (10 t). The load capacity of the girder bridge will need to be confirmed and may have serious consequences for access. Removal of large amounts of spoil from this site will be difficult and probably unpopular with local residents.

3.4.23 Porter's Mill Bridge

Access to the site is very difficult and will involve installing a temporary bridge across the R. Salwarpe, the removal of spoil from this site would be impractical.

3.4.2.4 Mildenham Mill

Access to the site is over fields to a canal bridge (15-20 t), there may be a haul road already in existence leading up to the canal. Alternatively, a temporary bridge could be installed across the R. Salwarpe which would allow access to land owned by a local fishing concern, there is good access from there onto a nearby road.

3.5 Soils, geology and drainage

3.5.1 Introduction

The soils on the five sites were assessed largely on the basis of an auger survey to sampling depths of approximately 1.0 m. A smaller number of samples were taken to 2.0 m depth to check the nature of the deeper soil layers.

The soils on all the sites were river alluvial deposits and were classified by the Soil Survey of England and Wales as belonging to the Compton Soil Series. This was confirmed during the survey, although as would be expected, there were some variations between sites, particularly on the Ombersley Way site. These variations will be identified in the discussions for each site. All the soils were clayey in nature and relatively high ground water tables were present at the time of the survey.

The underlying geology is Keuper Marl, which has a dominant influence on both the alluvial and neighbouring soils. Whimple 3 Series soils formed on drift material overlying the Keuper border the flood plain soils on all sides. Worcester Series soils formed directly on the Keuper Marl are also common within the catchment of the river (River Salwarpe) and the area of the canal. Horizontal beds of rock salt up to 6 m thick have been identified in bore holes within the Keuper Marl north and east of Droitwich and these could well be the source of the higher salt levels within the canal and Salwarpe River water.

The Compton Series soils are reddish brown, stone-free, clayey alluvial soils. The upper horizon is dark brown with a silty clay/clay texture. Soil structure is moderately developed in the B horizon below, tending to become weaker and coarser with depth. At greater depths there is little structure development, the soil being largely unconsolidated and hydraulic conductivities in these deeper layers can be expected to be very low. Soil density is relatively low and very high organic matter or peaty surface layers are sometimes found in depression areas.

The neighbouring Whimple 3 and Worcester Series soils bordering the flood plain are usually fine silty/clayey in texture, reddish in colour and much denser than the Compton soils. A feature in some of these soils is the presence of pebbly material comprising of Bunter quartzites and medium and coarse sand particles within the clay. Due to their high density and poor structure, particularly in the B horizon, their permeability is low. Permeability tends to increase with depth below the B horizon.

Soil hydraulic conductivity measurements were made on the Salwarpe and Mildenham Mill sites, these being representative of the subsoils found on all sites in critical areas. The hydraulic conductivity was determined using the single auger hole technique, with auger holes installed to a depth of 1.25 m approximately.

3.5.2 Ombersley Way

The soil within the top 1.0m of most of the playing field area was clayey in texture and contained numerous small gritty pebbles some 2-3 mm in diameter. The soil was very compact with a particularly strong layer in places at depths of 0.5-0.6 m. This is indicative of a Whimple 3 Series soil. The topsoil varied very locally and it is most probable that this was due to some infill in places for surface levelling during the construction of the playing field.

The soil bordering the river area was stone free and conformed closely to the more typical Compton series soil profile. The riverbank profile indicated a uniform depth of clay extending to below river level,

a depth of some 1.75-3.0 m depending upon the surface elevation relative to the river. This Compton series soil occupied some 20% of the site.

Any excess surface water on this site could be drained directly to the river or to the open ditch separating the playing fields. The playing field to the east was some 1.0 m lower than the site under investigation.

Although larger auger holes were not installed on the playing field itself for hydraulic conductivity measurement or to identify actual water table depths, augered soil in the vicinity of the canal was particularly moist at a depth of approximately 0.5-0.6 m, indicative of a saturated condition. Soil wetness was not so obvious within the playing field area itself, but this was most likely due to the degree of soil compaction present.

The Compton Series soil on this site was very similar to that on the Mildenham Mill site where hydraulic conductivity measurements were made.

A reedbed development on this site would not have any significant impact on the surrounding area though it is likely there will be a need for a ditch between the reedbed and the road, to control the surface wetness for visitors. The area between the reedbed and the ditch will then be effectively a wet grassland area.

The more typical Compton stone free soil bordering the river would be most suitable for building bunds and earthworks.

3.5.3 Salwarpe

Soils on this site were silty clay/clay in texture throughout and the clay extended to augering depth (2.0 m). The soil below depths of about 1.5 m was largely unconsolidated and very soft to auger. Water tables were high, being at the surface in the vicinity of the existing reedbed, and there was a small hydraulic gradient across the site, water levels falling towards the river. Considerable seepage appeared to be occurring from the high level canal and it was this seepage, which was supporting the reedbed on the slope and causing the surface flush on the flat alluvial plain.

During augering for hydraulic conductivity measurement, water inflow into the 100 mm diameter auger holes was relatively slow to an auger depth of approximately 0.7-0.8 m, after which on two of the four test holes, water entered more rapidly. There was a distinct change in soil structure in these two cases, the soil tending towards a finer structure at depth. This change was reflected in the results of the hydraulic conductivity measurements themselves. The structure change on the other two auger holes at these depths, although present, was not so marked.

The hydraulic conductivity measurement results were as follows:

- Sites with finer structured soil at depth 0.8 and 1.0 $m.day^{-1}$

- Sites with poorer structured soil at depth — 0.5 and 0.5 $m.day^{-1}$
- Average hydraulic conductivity — 0.7 $m.day^{-1}$

The B horizon on this soil in the 0.3 and 0.6 m depth range has the lowest hydraulic conductivity within the top 1.25 m, its value being lower than the measured values above.

Augering to 2.0 m depth identified an increasingly unconsolidated soil, which would have a very low hydraulic conductivity due to lack of structure and the more dispersed state of the clay.

Excess water from this site could drain readily to the river system and reedbed development would not impact on the neighbouring areas to the east and west.

The subsoil in the depth range 0.3 - 0.7 m would be very satisfactory for use in the construction of bunds and other earthwork structures.

The presence of the sewer through the site may have implications for reedbed development. The water tables surrounding the sewer were at or close to the surface at the time of the survey, suggesting that such water levels do not interfere with the functioning of the sewage system. Providing, therefore, some means were available to allow access to the sewer access points for inspection, reedbed development with its associated surface water should be still feasible.

3.5.4 Mildenham Mill and Porter's Mill Bridge

These sites are considered together since their soils and situations proved to be very similar. Hydraulic conductivity measurements were made on the Mildenham Mill site.

The soils were silty clay/clay in texture and with the exception of one deep augering, the stoneless clay extended to 2.0 m depth. Unconsolidated clay was found at depth as on the Salwarpe site. On one 2.0 m deep boring, some stone was encountered mixed within the clay at a depth of approximately 1.8 m. This may be indicative of either the presence of a gravelly patch at depth, or just a very local isolated stony area.

Ground water tables were high on these sites, being of the order of 200 – 250 mm below the surface in the central sections.

During augering for the hydraulic conductivity tests, unlike the Salwarpe site, there were no sudden changes in the rate of water ingress into the auger holes as augering depth increased, any change being only a slight increase.

The hydraulic conductivity test results were as follows:

- Individual auger holes 0.31, 0.33, and 0.38 m.day^{-1}
- Average hydraulic conductivity 0.35 m.day^{-1}

The lowest hydraulic conductivity in the top 1.25 m of this soil profile will be in the B horizon, but it is only likely to be slightly smaller than the measured values above. The unconsolidated clay at greater depths would have a very low hydraulic conductivity.

Excess water could drain readily from these sites directly into the river. With the exception of the northernmost end of the Porter's Mill Bridge site, reedbed development would have no impact on the neighbouring areas. Any possible impact on the agricultural grassland at the northern end of the Porter's Mill Bridge site could be easily avoided by suitable bunding and opening up a ditch to the river.

The subsoil in the depth range 0.3 – 0.6 m would be very satisfactory for the construction of bunds and other earthwork structures.

3.5.5 Amphibian site

The surface soils are varied on this site, but the subsoils conform to the Compton Series soils. Adjacent to the hard standing area across the road to the east, there is 'made-up' ground, comprising a mixture of soil, stone and brick-bats. This area contains a small pond, containing reed. The made-up area is approximately 0.5-0.75 m higher than the hard standing.

The central lower-lying area to the north of the hard-standing comprises of a surface peat layer, which varies in thickness between 100 and 350 mm, the deepest section being in the lowest central area. A Compton type clayey soil lies below this peat.

The higher area bordering the rugby ground is a straight Compton type soil, similar to that on the Mildenham Mill site.

The whole area drains to the open ditch on the western boundary, which is approximately 1.5 m deeper than the lowest land surface. The made-up area appears to drain into the peat area through a culvert under the road, but neither the entrance to nor exit from such a possible culvert were directly visible.

Whilst the soils within the lowest peaty area would be satisfactory for reedbed, raising water levels in that location could have serious consequences for gravity drainage from the agricultural grassland field to the east. Special subsurface drainage provisions would be needed to pipe drainage water from this field through the reedbed directly to the open ditch

3.5.6 Climate data

The following climatic data is taken from MAFF Technical Bulletin 34, Climate and Drainage, for a mean annual rainfall of 660 mm and a mean annual evapo-transpiration of 508 mm.

Moisture deficits *(excess of evapo-transpiration over rainfall during the summer periods)*

The maximum moisture deficits occur towards the end of August, these and the June and July deficits are of the following magnitudes:

	June	July	August
Wet summer (lower quartile value)	51	69	52 mm
Average summer (median value)	68	91	85 mm
Dry summer (higher quartile value)	89	109	113 mm

The above moisture deficit values are for agricultural grassland, where water shortages occur reducing evapo-transpiration losses to below potential rates. They, therefore, require adjustment for wet grassland and reedbed, which transpire under continually moist or flooded surface conditions, at rates close to the potential and greater. Appropriate working values, based upon the end of August deficits, for wet grassland, open water and reedbed will be as follows:

Habitat	Moisture deficit (mm)		
	Wet summer	Average summer	Dry summer
Wet grassland	54	120	202
Open water	67	150	252
Reedbed	70	160	270

The reedbed deficit at the end of June in a dry summer will be approximately 180 mm.

End of field capacity (evapo-transpiration starts to exceed rainfall)

Early year (earlier quartile)	Mar 23
Average year (median)	Apr 12
Late year (later quartile)	May 4

Excess winter rainfall (following a dry summer)

	Agricultural grassland (mm)	Reedbed (mm)
Dry winter (lower quartile)	120	-37
Average year (median)	200	43
Wet winter (higher quartile)	275	118

3.5.7 Hydrology of the sites and seepage estimates

On all sites, with the exception of the Amphibian site, water will tend to seep from the neighbouring higher-level canal system into the flood plain reedbed area. Within the flood plain, water levels in the reedbed will be held above surface level and seepage will occur towards the river where water levels will be much lower.

Seepage quantities from the reedbed into the river will be dependent upon the following:

- hydraulic properties of the soils
- head difference between the water level in the reedbed and that in river
- distance from the edge of the reedbed to the river

The more permeable the soils, the greater the head difference and the shorter the distance, the greater the seepage loss to be expected

Options exist for the choice of distance between the edge of the reedbed and the river, and hence to provide design information on potential seepage losses for different distances, estimates have been made for a range of distances for the two soil situations identified, the more permeable Salwarpe soil and the less permeable Mildenham Mill type soil. The estimates are made on the basis that if gravelly or stony layers are present at depth, they are local and hence have little or no influence on water seepage.

Parameters used in seepage estimates:

Hydraulic conductivity

Salwarpe soil	0.7 $m.day^{-1}$
Mildenham Mill soil	0.35 $m.day^{-1}$

Layer of very low hydraulic conductivity (less than 10% of the layers above), 2.5 m below soil surface

Head difference between water levels in reedbed and river 1.5 m

This head difference is an average one to identify orders of magnitude; the actual difference will vary as the water levels in the river and within the reedbed change throughout the year and between years.

Seepage estimates *($m^3.day^{-1}$ per 100 m length of river)*

Soil	Distance from reedbed edge to river (m)		
	10	20	40
Salwarpe	18.5	9.0	4.5
Mildenham Mill and other sites	9.0	4.5	2.5

3.5.8 Water Requirements

Water will be lost from the reedbed through evapo-transpiration and through seepage to the river system and these losses will need to be replenished to sustain the reedbed. Whilst some replenishment

will come from rainfall, the climatic data indicate that this will be insufficient to even satisfy the evapo-transpiration need. Further water supplementation will, therefore, be needed from the canal system.

The total supplementary water requirement will be the sum of the outstanding moisture deficit and the seepage losses to the river.

Moisture deficit

The system must be capable of meeting water requirements in dry years and hence it is appropriate to design the system on the 'dry summer' (higher quartile) moisture deficit value of 270 mm; 2700 – 3000 m^3 / hectare of reedbed /year.

Seepage losses

The seepage quantities will be dependent upon the chosen distance between the reedbed edge and the river; these will be similar to those estimated in the section above.

3.5.9 Site suitability for reedbed

The seepage estimates made, indicate that seepage losses could be very significant, particularly in situations where the reedbed edge would be close to the river. The farther the reedbed edge is set back from the river, the lower the seepage, but the smaller the reedbed area achievable. The area of reedbed achievable relative to the length of boundary with the river and hence the magnitude of seepage losses is, therefore, one useful criterion for assessing site suitability.

The potential distances from the river systems for reedbed development vary both between and within sites, the Salwarpe and Ombersley Way sites offering the greatest distances. Distances on the Mildenham Mill and Porter's Mill Bridge sites are more variable with only one small area on Porter's Mill Bridge being greater than approximately 100 m. The higher hydraulic conductivity on the Salwarpe site would tend to offset the distance advantage it has over the Mildenham Mill site.

The Ombersley Way site is potentially the most efficient from a water need/reedbed area viewpoint but surface levels are variable and the loss of a sports field may not be the most popular with the local community.

Site selection and the distance between the reedbed and the river chosen, will also be influenced by the availability of water within the canal system. If the quantities available are relatively high, minimising seepage losses may not be so critical.

Potential development sites

Developing the Ombersley Way, Salwarpe, Mildenham Mill and Porter's Mill Bridge sites, with a distance of approximately 20 m between the reedbed edge and the river, would enable the establishment of approximately 8 ha of reedbed.

The supplemental water requirement for this development would be as follows:

Ombersley Way

260 m river/ditch length	Reedbed 20 m from river/ditch	Reedbed area 2.0 ha
160 m seepage length parallel to road		
Seepage loss:		
To river/ditch, head difference between water levels in reedbed and river/ditch: 2.5 m.	14.5 m^3/day	5500 m^3/year
To shallow ditch between reedbed and road some 20 m from reedbed, with head difference between water levels in reedbed and ditch of 0.5 m	3 m^3/day	1000 m^3/year
Total seepage loss	17.5 m^3/day	6,500 m^3/year
Moisture deficit		5,500 m^3/year
Total water requirement		12,000 m^3/year

Salwarpe

450 m river/ditch length	Reedbed 20 m from river/ditch	Reedbed area 2.5 ha
Seepage loss:		
To river, head difference between water levels in reedbed and river: 1.5 m.	40 m^3/day	15,000 m^3/year
Moisture deficit		7,000 m^3/year
Total water requirement		22,000 m^3/year

Porter's Mill Bridge

220 m river/ditch length	Reedbed 20 m from river/ditch	Reedbed area 1.0 ha
Seepage loss:		
To river, head difference between water levels in reedbed and river: 1.5 m.	10 m^3/day	3,500 m^3/year
Moisture deficit		3,000 m^3/year
Total water requirement		8,000 m^3/year

Mildenham Mill

600 m river/ditch length	Reedbed 20 m from river/ditch	Reedbed area 3.0 ha
Seepage loss:		
To river, head difference between water levels in reedbed and river: 1.5 m.	27 m^3/day	10,000 m^3/year
Moisture deficit		8,500 m^3/year
Total water requirement		18,500 m^3/year

The total water requirement for all four sites would be of the order of 60,000 m^3/year in a dry year. This water would need to be supplied from the canal system in a dry year, since the excess rain water available for top-up following a dry summer is either zero or very small (43 mm), except in the case of a very wet winter (118 mm), (see excess rainfall values in Climate Data section).

The critical months for water supply will be May and June, when the evapo-transpiration and hence moisture deficits will be greatest. The total deficit within all four reedbeds at the end of June in a dry year will be approximately 24,000 m^3. Approximations for the total monthly deficits during May and June will be 11,000 m^3 and 17,000 m^3 respectively. Seepage losses each month can be considered to be similar during the summer months.

The estimated supplemental water requirement to be taken from the canal in the critical month of June during a dry summer for all four sites will be as follows:

Moisture deficit	17,000 m^3
Seepage losses (30 day period)	3,000 m^3
	Total 20,000 m^3 or 660 $m^3.dy^{-1}$ (7.6 $l.s^{-1}$)

3.5.10 Seepage losses from amphibian site

Seepage from this site will be from the central lower lying area into the ditch bordering the site. The approximate seepage length is 40-50 m and the seepage characteristics of the soil are similar to the Mildenham site.

Bunding some 20 m away from the ditch in a reedbed situation would induce seepage losses into the ditch of approximately 250 m^3/day. With lateral seepage this could increase to a total of approximately 500-600 m^3/day. The reedbed ares would be approximately 0.5 ha and hence the water requirement to satisfy the moisture deficit in a dry summer would be approximately 1000 m^3.

3.5.11 Possibility of more permeable soil layers below 2.0 m

The identification of some stone mixed in with the clayey soil at depth in one of the deeper borings within the Mildenham Mill site, raises the possibility that gravel/gravelly areas may be present within this

river alluvial system, which could have an influence on the magnitude of seepage losses from the reedbed into the river.

Without information from extensive borings to depths in excess of 2.0 m, it is not possible to confirm or otherwise the actual presence of gravel beneath these clayey soils. The geology, nature of the river catchment and the neighbouring soils do, however, allow some inferences to be made concerning the possibility of extensive areas of gravel being present.

The geological material underlying the river catchment is the Permo-Triassic reddish mudstone and the clayey Worcester Series soils are formed directly from it. The slightly more prevalent clayey Whimple 3 Series soils are derived from drift material that overlies the mudstones and it is probable that much of this drift is also derived from the mudstones. Sediment entering the river system is, therefore, unlikely to be carrying a significant stone/gravel load.

The influence of any gravel band on seepage from the reedbed will be dependent upon the rate at which water can move downwards into the gravel. This rate will be severely restricted due to the very low permeability of the lower unconsolidated clayey layers.

The inferences from this assessment are that gravelly layers are not likely to be very extensive and that where bands may be present, the very slowly permeable lower clayey layers will restrict the influence of the gravel on seepage losses.

If, as part of the reedbed development programme deeper meres were likely to be created, checks would need to be made before construction to ensure no deeper gravelly type layers were present on the proposed sites. Connecting direct with any subsurface gravel that was also connected to the river system would induce very considerable seepage losses.

4.0 Candidate site evaluation

The candidate sites are compared in Table 3 and are discussed below.

4.1 Ombersley Way

Practically, Ombersley Way will be the easiest to construct on; the underlying geology poses no problems, there is good access and all spoil can be landscaped on-site. In terms of potential wildlife value, reedbed development on this site does not rank particularly high as the site is near to Droitwich and is already used by local residents for dog walking. Vandalism also poses a potential problem.

Table 3. Candidate site comparisons

	Ombersley Way	Salwarpe	Porter's Mill	Mildenham Mill
Size of area ha	3.9	6.3	3.4	5.6
Area of reedbed possible*	2.0	2.4	<1.0	3.2
Existing wildlife value	Little in proposed area	Slight, some reedbed	Good small mammal habitat, pond, areas of reed	Areas of wet grassland, some reed
Disturbance	High	Moderate	Low	Low
Existing recreational value	High	None	Moderate (Fishing syndicate)	Low
Aesthetic potential	Low, reedbeds will need terracing	High	Moderate	High
Potential educational value	High	Moderate	Low	Low
Potential wildlife value	Low	Moderate	High	High
Water losses	Moderate	High	Low (but see area of reedbed possible)	Moderate
Habitat fragmentation	High (fairly isolated)	Moderate	Low	Low
Potential cost of maintenance	High (vandalism)	Low	Moderate (poor access)	Moderate (siltation rate expected to be high)
Flood storage issues	Able to move spoil easily out of floodplain	Able to move spoil out of floodplain	Very difficult to move spoil out of floodplain	Removal of spoil possible but may be expensive
Construction issues	Few, site may contain field drains	Strength of bridge, stability of created spoil mounds, presence of main sewer running through proposed reedbed area.	See below	See below
Access for construction	Good	Difficult – access through Salwarpe village across R. Salwarpe through field then across 10t girder bridge. Removal of spoil unlikely.	Extremely difficult, removal of spoil unlikely	Moderately difficult – access either across field to 20t canal bridge or via temporary bridge over R. Salwarpe.
Other plus points	Good chance to inform local people about the canal restoration project and the importance of wetland habitats.	Canal higher than reedbed, good opportunity for bird hides plus boardwalks	Existing site already has "potential" which could be enhance through small-scale habitat creation and management	Largest possible area of reedbed of all candidate sites.
Other negative points	Disturbed, potential for vandalism, loss of playing field may be unpopular and lead to long term PR issues.	Potential for some disturbance	Large-scale wetland creation unfeasible owing to long thin shape of the site.	Area floods from R. Severn
Overall suitability	**Moderate**	**High**	**Low**	**High**

On the positive side there is the opportunity to provide opportunities for low-key access to the reedbeds via paths and possibly boardwalks. Visitors could be informed about the site (and the wider restoration scheme) via some interpretation. Given the proximity to Droitwich this site will attract people who are unlikely to visit nature reserves.

4.2 Salwarpe

The Salwarpe site has good potential for reedbed construction, the site will be less disturbed than Ombersley Way enhancing its potential conservation value. A reedbed will fit into the surrounding landscape and would be overlooked from the canal offering good opportunities for the creation of hides and possibly access via boardwalks.

The soils present at Salwarpe are the most permeable of all areas investigated but do not pose an insurmountable problem. More concerning is the need to mound excavated spoil out of the floodplain, given the slope of the proposed area at Salwarpe this will need careful thought and advice from an engineer. Access to the site and the ability to take material off site may pose problems.

4.3 Porter's Mill Bridge

The shape of the area means that reedbed construction on this site will be difficult. Although the soils present on site are similar to Mildenham Mill and Ombersley Way the length of site will mean that considerable water losses to the river are to be expected if the whole area were to be developed. Access is difficult and will involve a temporary crossing over the R. Salwarpe and the need for a haul road over fields to the nearest road.

The site already has some ecological value in the habitats already present and would greatly benefit from an appropriate management plan. This site also has the potential to be enhanced for amphibia, with the creation of a network of ponds, though the current use of the existing pond by a fishing syndicate will need to be re-assessed.

4.4 Mildenham Mill

A large area of reedbed is feasible here, the largest of all the candidate sites. Mildenham Mill is currently the least disturbed site; reedbed creation here is likely to produce the most ecological benefits and fit well into the landscape. For the same reason it would be worthwhile restricting public access to this site should reedbed creation go ahead.

On the negative side there are significant issues relating to flood storage, there are no areas on site that are above the floodplain and may be used to receive excavated spoil. Material will have to be taken off site for disposal, which may have significant cost implications. There are also issues relating to waste licensing that will have to be overcome.

4.5 Great Crested Newt site

As part of the restoration plans, it is anticipated that a new stretch of canal will be dug through the middle of the site resulting in the loss of the pond.

The main issue related to the existing pond is one of habitat fragmentation. Great Crested Newts are relatively long-lived and breed repeatedly throughout their lives (juveniles returning to water to breed within 2 or three years of emergence and adults living upwards of eight years). This population ecology allows populations to buffer losses during the crucial larval stage when larvae are vulnerable to a range of mortality factors, including early pond desiccation, poor water quality, fungal infection linked to cool weather, or predation by fish. During a catastrophic year for recruitment caused, for example, by heavy fish predation or early desiccation, the population of adults will survive and be available for recruitment the following year.

However, if the catastrophic breeding seasons persist for several years the population will decline and may become extinct. Young newts disperse widely from the emergent pond and new pond sites are colonised rapidly, with even adults not showing a high degree of pond fidelity from year to year. In this way meta-populations of newts exist over a home range covering clusters of ponds. Recruitment into the meta-population can therefore occur even if some ponds within the range become unsuitable for an extended period. Similarly, recolonisation of a pond where newts have previously died out (but where conditions have improved) or of new ponds also becomes possible. The crucial elements for colonisation or re-colonisation are:

- Presence of source ponds within newt ranges
- Appropriate terrestrial habitat linking the ponds (this could be scrub, long grass or hedgerows)
- Absence of migratory barriers (this could include short mown grass, roads or hard surfaces, buildings, walls or even wide and deep water bodies, particularly those with steep or vertical bank profiles)

Experiments on the home range of newts suggest that ponds up to 300 m distance from a source pond can become readily colonised within one year if linked by suitable habitat. Ponds between 30 - 100 m distant are probably more favoured. Favoured terrestrial habitat appears to be mature woodland, but other habitats, including scrub, long grass or hedgerows will be used, together with physical structures such as log or stone piles. The extent of terrestrial habitat needed around the pond is difficult to estimate. In one study over half of the population of newts over-wintered in an areas more than 120 m from the main breeding pond, although this will depend to some extent on habitat quality, particularly cover of vegetation or structures. In mitigation projects an area of radius 250 m centred on each breeding pond has been proposed for management as terrestrial habitat, but this type of area is rarely achieved in practice. English Nature recommend that one hectare of good habitat will sustain up to 250 adult newts; less than 0.5 ha is unlikely to sustain a viable population. Recent research also suggests that newts favour specific routes from ponds which tend to be the most suitable habitat and that these large areas may not be necessary to maintain a viable population in all cases.

In terms of the newt ponds themselves, newts favour larger, well-established ponds that have plenty of weed cover but are devoid of fish. Pools in old quarries, sand pits and ditches are utilised and sometimes canals, although fish populations here often exclude the species. The specific characteristics of individual ponds can be summarised as:

- Water body size and shape: no specific requirements although Great Crested Newts are associated with larger ponds – say 100 m². A varied and irregular shoreline should be used.
- Maximum depth of c. 1.5 m with shoreline gradients of c. 1:10 over at least 50% of the shoreline to provide large areas of shallow water
- Abundant submerged aquatic plants (50-75% cover) and some emergent species for screening and shelter, but the pond should not be allowed to become dominated by dense emergent stands
- Open aspects to the south aspect of the pond to allow water temperatures to be maximised. Some overhanging trees on the north side can provide food for newts.
- Ability to manipulate water levels – ponds should be allowed to dry up in autumn and early winter but maintained at a constant level between March and August.
- Surrounding areas of marshy, damp ground, some areas of open mud and bare ground and dense vegetation (rough grassland and scrub) linking to migratory corridors, hibernation areas, or other ponds.
- Careful pond and habitat management, preventing tree and shrub domination in areas immediately adjacent to ponds (summer) and preventing over abundance of both submerged and emergent species in the pond (winter).
- Avoidance of water contamination or use of water of low quality.

4.5.1 Implications for the Hanbury Road site

The population ecology and habitat preferences of the Great Crested Newt outlined above have a number of implications for the Hanbury Road site.

Current situation

The main identified breeding pond and adjacent ditch at the site appears to be supporting a good population of newts. Hanbury Road and the road to the adjacent rugby football club are likely to act as migratory barriers to emergent newts. The immediate area of the derelict ground around the pond is approximately 2,500 m² which is only 25% of that recommended for a population of 250 adults and below that required for a viable population. The crucial assessment will be the access of the newts to good hibernation habitat and dispersal (or re-colonisation) potential. The habitat immediately around the ponds appears to be suitable with good vegetation cover and large areas of rubble and hideaways for hibernation, although food abundance may not be optimal. The still and vegetated water of the derelict canal channel will also most certainly provide a migratory corridor and possibly an alternative breeding site at the current time. The density of fish populations in this section, however, is unknown. The adjacent field hedgerow will also be an important terrestrial corridor, although the area of suitable

habitat and alternative ponds to which this may allow access requires further investigation. The heavily grazed fields to the east are not optimal for newt migration or habitation, but this will be dependent on management in August when most newts are leaving the ponds.

Future situation

The exact configuration and design of the canal at the Hanbury Road site has not been decided. However, on the assumption that the canal will utilise the existing course of the channel, a number of significant impacts will be expected:

- Loss of the main breeding pond.
- Disruption or loss of the 2,500 m^2 of terrestrial habitat adjacent to the pond.
- Loss or disruption to the alternative derelict canal breeding sites.
- Loss or disruption of the canal side hedgerows/scrub and long grassland due to re-instatement of tow paths.

It is unlikely that, due to its landform and presence of predatory fish populations, the re-instated channel will provide suitable breeding or juvenile dispersal habitat. The existing hedgerows and associated tall grassland and scrub may also be reduced or lost during construction, hence impacting on this migratory link. With the migratory barriers generated by the Hanbury road, the Rugby Football Club road and the new canal channel, it is difficult to see an *in-situ* solution, which would maintain population viability. The requirement for a series of ponds between 30 and 50 metres distant surrounded and linked by suitable terrestrial habitat and hibernation sites of at least one hectare (assuming a population lower than 250 adults) would not be possible given these constraints.

In these cases, the only alternative is to provide a mitigation plan involving *ex-situ* mitigation; the capture and translocation of newts to a new suitable site designed with the individual pond and pond cluster parameters described above. Translocation work on the Great Crested Newt can be successful, but most projects have not been comprehensively monitored to establish if self-sustaining populations can be achieved. Due to concerns of translocated species being placed in environments of existing populations, newly created pond clusters would be favoured for mitigation rather than utilisation of existing pond sites.

It is essential that the population size and distribution of the Great Crested Newt population on the site is established, together with an assessment of newt dispersal corridors and links to other suitable habitat. The breeding assessment will need to be carried out shortly (starting in March) if comprehensive data is to be provided. Further advice on mitigation can be provided once plans for the re-instatement and the population dynamics of the existing population are better known.

A license to translocate Great Crested Newts will need to be issued by DETR (see Appendix 11). Licences will only be issued if DETR are satisfied that there is no satisfactory alternative and the action authorised will not be detrimental to the maintenance of the population of Great Crested Newts at a

favourable conservation status in their natural range. DETR aim to determine applications within 25 working days. Before a license can be issued details of both the receiving site and the current population size will need to be known. A method statement needs to be included with the licence application; this will include a proposed work programme. A copy of full planning permission also needs to be included.

4.6 Conclusions

In order to mitigate for loss of habitat arising from the canal restoration it is proposed that an equivalent area of habitat of 2.5 ha be created prior to major restoration works commencing. Such an area could be derived from a combination of reedbed creation at Ombersley Way and Salwarpe or possibly by extending the area of reed created on either of these two sites by either bringing the created reedbeds nearer to the river or, on the Salwarpe site, considering reedbed creation on the line of the main sewer. Wetlands situated nearer the river will lose significantly more water through seepage losses, especially Salwarpe.

We conclude that the constraints at Porter's Mill Bridge preclude large-scale habitat creation leaving Mildenham Mill as the only other possible reedbed area. Mildenham Mill is in a good location to receive reed removed from the canal and if developed will provide up to 3 ha of reedbed habitat.

Bearing this in mind we have prepared costs for Ombersley Way, Salwarpe and Mildenham Mill along the lines discussed above.

5.0 Cost of construction

5.1 Ombersley Way

It is proposed to create three parallel reedbeds to minimise the amount of overburden generated owing to the gradient on this site, Figure 1.

In each compartment we have estimated the area of three main features: ditches and pools, which will be excavated deeper (1.0 m below final water level) and reedbed area which will be formed into ridge and furrow and will have an average final level of 300 mm below final water level.

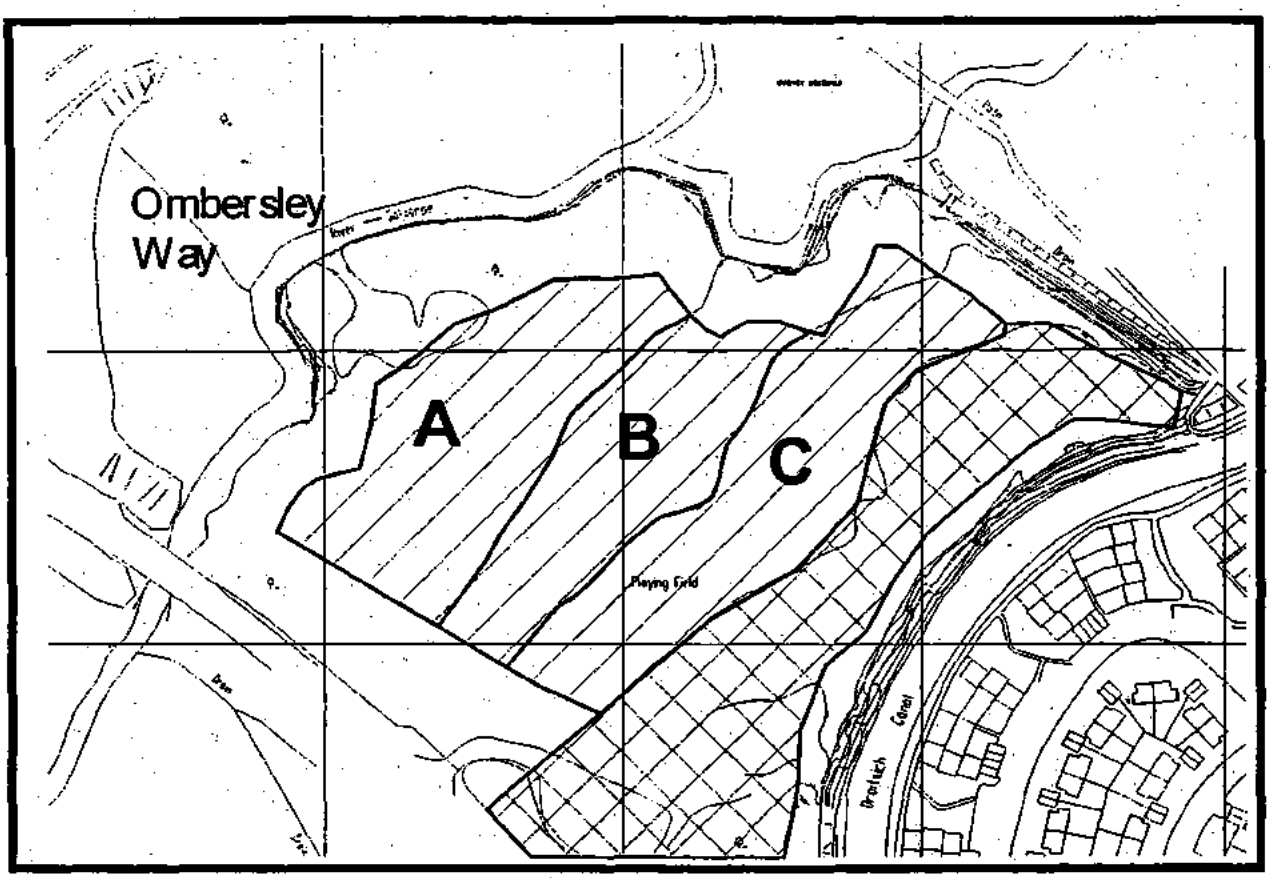

Figure 1

a) Area

Reedbed compartment	Water level (m) AOD	Ditch length m	Ditch area m^2	Pool area m^2	Reedbed area m^2	Total area m^2
A	24.5	340	1,700	250	5,350	7,300
B	25.0	250	1,250	200	3,850	5,300
C	25.5	430	2,150	250	5,550	7,950
Total		1,020	5,100	700	14,750	20,550

b) Volumes

Reedbed compartment	Water level (m) AOD	Ditch volume m^3	Pool volume m^3	Reedbed volume m^3	Total volume m^3	Overburden volume m^3
A	24.5	1,700	250	1,605	3,555	1,824
B	25.0	1,250	200	1,155	2,605	1,321
C	25.5	2,150	250	1,665	4,065	1,980
Total		5,100	700	4,425	10,225	5,125

Option A *Spoil landscaped on site*		
Spoil re-profiling		
Total volume of spoil		10,225 m^3
Allow for bulking (50%)		15,337.5 m^3
Convert to tonnes @ 1.5t per m^3 *		23,000 tonnes (approx.)
Assume 2 x 20t 360° excavators plus 4 x 7t Hydrema loaders working at approx. 216 t/hour total		106 hours haul time (2.5 weeks)
Allow for additional machines (1 x 20t 360° excavator plus 1 x bulldozer) shaping spoil heap during excavation plus one week final shaping with 20t excavator		106 hours x 2 + 44 hours
Costs per vehicle (with driver)		
Hydrema (4 x 106 hours)	£17/hour *	£7,208
20t 360° excavator (3 x 106 hours)	£35/hour	£11,130
20t 360° excavator (1 x 44 hours)	£35/hour	£1,540
Bulldozer (1 x 106 hours)	£30/ hour	£3,180
Sub total		£23,058
Additional costs		
Overheads	25% of plant hire*	£5,764
Internal water control structures	2 @ £500	£1,000
Inlet / outlet structures and pipework	2 @ £2,000	£4,000
Total ground works		£33,822
Total including contingency (10%)	A	£37,204
Planting costs		
Supply and plant 25% of total area with 125 mm pot grown reed of local provenance @ 5 plugs/m^2	25,688 plugs @ £0.50/plug	£12,843

Installation of protective fencing around newly planted areas	2.055ha @ £3,000/ha.	£6,165
Lock up (1 week)	£200/week	£200
Welfare facilities (1 week)	£150/week	£150
Total planting	B	£19,358
Overburden		
Total volume of overburden		5,125 m^3
Allow for bulking (50%)		7,688 m^3
Convert to tonnes @ 1.9t per m^3 *		11,500 tonnes
Assume 2 x 20t 360° excavators plus 4x 7t Hydrema loaders working at approx. 216 t/hour		54 hours haul time (7 days)
Allow for additional machines (1 x 20t 360° excavator plus 1 x bulldozer) shaping spoil heap during excavation plus one week final shaping with 20t excavator		54 hours x 2 + 44 hours
Costs per vehicle (with driver)		
Hydrema (4 x 54 hours)	£17/hour *	£3,672
20t 360° excavator (3 x 54 hours)	£35/hour	£5,670
20t 360° excavator (1 x 44 hours)	£35/hour	£1,540
Bulldozer (1 x 54 hours)	£30/hour	£1,620
Sub total		£12,502
Additional costs		
Overheads	25% of plant hire*	£3,125
Total ground works		£15,627
Total including contingency (10%)	C	£17,190

Total costs (A+B+C) £73,752

Inclusions: contingency, overburden.

Exclusions: haul roads (if needed), security fencing, planting / seeding of non-reed areas.

** Note: Figures provided by British Waterways, volume to weight ratio of 1.5 may be exceeded if excavated soils are saturated.*

Option B *Excavated spoil taken to nearby tip (haulage costs only)*	
Spoil re-profiling	
Total volume of spoil	10,225 m^3
Allow for bulking (50%)	15,337.5 m^3

Convert to tonnes @ 1.5t per m^3 *		23,000 tonnes (approx.)
Assume 2 x 20t 360° excavators plus 4 x 7t Hydrema loaders working at approx. 216 t/hour total		106 hours haul time (2.5 weeks)
Allow for additional machines (2 x 20t 360° excavator plus 1xbulldozer) stripping plus shaping spoil heap and loading onto tippers.		106 hours x 3
Costs per vehicle (with driver)		
Hydrema (4 x 106 hours)	£17/hour *	£7,208
20t 360° excavator (4 x 106 hours)	£35/hour	£14,840
Bulldozer (1 x 106 hours)	£30/hour	£3,180
Sub total		£25,228
Additional costs		
Overheads	25% of plant hire*	£6,307
Internal water control structures	2 @ £500	£1,000
Inlet / outlet structures and pipework	2 @ £2,000	£4,000
Total ground works		£36,535
Total including contingency (10%)	A	£40,188
Planting costs		
Supply and plant 25% of total area with 125 mm pot grown reed of local provenance @ 5 plugs/m^2	25,688 plugs @ £0.50/plug	£12,843
Installation of protective fencing around newly planted areas	2.055ha @ £3,000/ha.	£6,165
Lock up (1 week)	£200/week	£200
Welfare facilities (1 week)	£150/week	£150
Total planting	B	£19,358
Overburden		
Total volume of overburden		5,125 m^3
Allow for bulking (50%)		7,688 m^3
Convert to tonnes @ 1.5t per m^3 *		11,500 tonnes
Assume 2x20t 360° excavators plus 4 x 7t Hydrema loaders working at approx. 216 t/hour		54 hours haul time (7 days)
Allow for additional machines (2 x 20t 360° excavator plus 1xbulldozer) stripping plus shaping spoil heap and loading onto tippers.		54 hours x 3
Costs per vehicle (with driver)		
Hydrema (4 x 54 hours)	£17/hour *	£3,672
20t 360° excavator (4 x 54 hours)	£35/hour	£7,560
Bulldozer (1 x 54 hours)	£30/hour	£1,620

Sub total		£12,852
Additional costs		
Overheads	25% of plant hire*	£3,213
Total ground works		£16,065
Total including contingency (10%)	C	£17,671
Haulage costs		
Total volume of spoil		15,350 m^3
Allow for bulking (50%)		23,025 m^3
Convert to tonnes @ 1.5t per m^3 *		34,538 tonnes
Transport to site not exceeding 5 kilometres away	£1.50 per tonne	£51,807
Total	D	£51,807

Total costs (A+B+C+D) £129,024

Inclusions: contingency, overburden.

Exclusions: haul roads (if needed), security fencing, planting / seeding of non-reed areas.

* *Note: Figures provided by British Waterways, volume to weight ratio of 1.5 may be exceeded if excavated soils are saturated.*

5.2 Salwarpe

It is proposed to create four reedbed compartments to eliminate the necessity of moving excess overburden around the site, Figure 2.

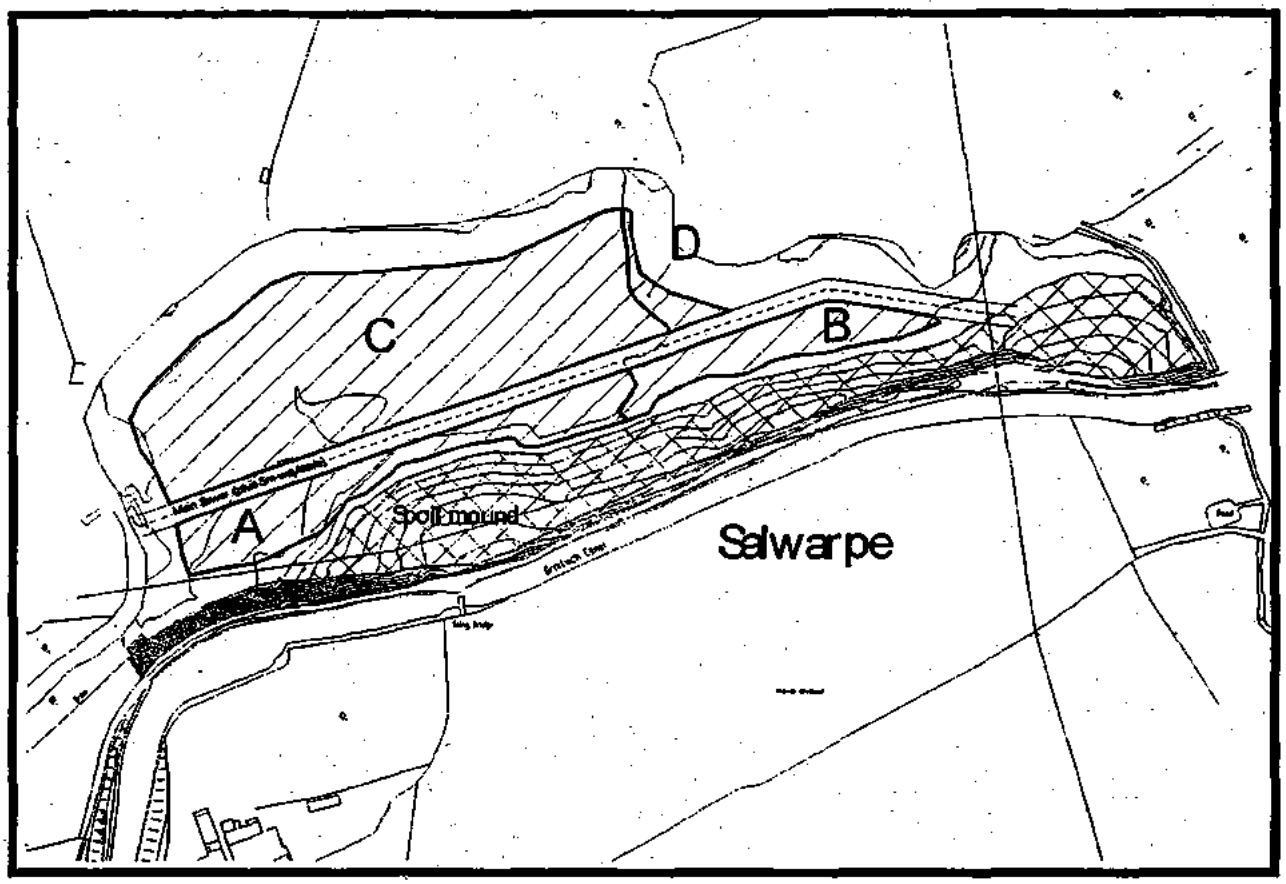

Figure 2

In each compartment we have estimated the area of three main features: ditches and pools, which will be excavated deeper (1.0 m below final water level) and reedbed area which will be formed into ridge and furrow and will have an average final level of 300 mm below final water level.

a) Area

Reedbed compartment	Water level (m) AOD	Ditch length m	Ditch area m^2	Pool area m^2	Reedbed area m^2	Total area m^2
A	23.1	180	900	0	3,400	4,300
B	23.1	80	400	0	2,100	2,500
C	23.5	900	3,600	600	11,950	16,150

D	23.5	20	100	0	550	650
Total		1,180	5,000	600	18,000	23,600

b) Volumes

Reedbed compartment	Water level (m) AOD	Ditch volume m^3	Pool volume m^3	Reedbed volume m^3	Total volume m^3
A	23.1	900	0	1,020	1,920
B	23.1	400	0	630	1,030
C	23.5	3,600	600	3,585	7,785
D	23.5	100	0	165	265
Total		5,000	600	5,400	11,000

Spoil re-profiling		
Total volume of spoil		11,000 m^3
Allow for bulking (50%)		16,500 m^3
Convert to tonnes @ 1.5t per m^3 *		24,750 tonnes approx.
Assume 2 x 20t 360° excavators plus 4 x 7t Hydrema loaders working at approx. 180 t/hour total		137 hours increased to 156 hours haul time to allow for complexity of deposition site (3.5 weeks)
Allow for additional machines (1 x 20t 360° excavator plus 1 x bulldozer) shaping spoil heap during excavation plus two weeks final shaping with 20t excavator		156 hours x 2 plus 88 hours
Costs per vehicle (with driver)		
Hydrema (4 x 156 hours)	£17/hour *	£10,608
20t 360° excavator (3 x 156 hours)	£35/hour	£16,380
20t 360° excavator (1 x 88 hours)	£35/hour	£3,080
Bulldozer (1 x 156 hours)	£30/hour	£4,680
Sub total		£34,748
Additional costs		
Overheads	25% of plant hire*	£8,687
Internal water control structures	4 @ £500	£2,000
Inlet / outlet structures and pipework	2 @ £2,000	£4,000
Total ground works		£49,435
Total including contingency (10%)	A	£54,378
Planting		

Supply and plant 25% of total area with 125 mm pot grown reed of local provenance @ 5 plugs/m²	29,500 plugs @ £0.50/plug	£14,750
Installation of protective fencing around newly planted areas	1.485ha @ £3,000/ha.	£7,080
Lock up (1 week)	£200/week	£200
Welfare facilities (1 week)	£150/week	£150
Total planting	B	£22,180

Total costs (A+B) £76,558

Inclusions; contingency.

Exclusions: land purchase cost, haul roads (if needed), security fencing, planting / seeding of non-reed areas, need for bank stabilisation, temporary bridge (20t capacity) across Salwarpe if existing bridge too weak (or alternatively the use of lighter plant).

Notes:
1) A temporary bridge (15 m span) will cost at least £7,000 to hire and will also require some site preparation (bridge footings, haul road) which will involve extra machine time and associated site costs.

2) If slope of designated spoil deposition area is too great then there will need to be some stabilisation of the landscaped features which may add up to £25,000 to the costs.

* *Figures provided by British Waterways, volume to weight ratio of 1.5 may be exceeded if excavated soils are saturated.*

5.3 Mildenham Mill

It is proposed to create three reedbed compartments to eliminate the necessity of moving excess overburden around the site, Figure 3.

In each compartment we have estimated the area of three main features: ditches and pools, which will be excavated deeper (1.0 m below final water level) and reedbed area which will be formed into ridge and furrow.

In contrast to the previous two sites Mildenham Mill is in a good location to receive reed extracted from the canal as part of the restoration. We suggest two techniques are used:

1) Focussed digging of rhizome turfs from the canal bed using a excavator with a bucket that can cut turfs of at least 1 m x 1 m and digging them into the prepared reedbed surface, using the same machine, at c. 150 turfs/ha.

2) Spreading of rhizome-rich soil. In this technique, the rhizome-rich sediment of the canal could be loosely excavated, transported to the prepared beds and spread at a depth of c. 200 mm (the site has been specifically deepened by an extra 100 mm to accommodate this). This technique would be used over 30% of the site.

For our calculations we have assumed that compartments A & C have the rhizome-rich spoil and that B will receive reed turves.

Extra care will be needed for handling reed turves and rhizomes to avoid excessive mortality:

- Turves must be kept upright with no compaction (i.e. no stacking).
- Work to be carried out in winter (November – February).
- Donor sites should be moist, but not saturated. Ideally water levels should be raised after spreading which means previously laid areas must be sprayed with water if rainfall insufficient.
- Rhizome-rich spoil should not be allowed to dry out at any time.
- Care should be taken to minimise the manipulation of turfs.
- Ecological supervision is essential to decide location and to ensure correct handling and placement – whole areas can be lost if incorrectly carried out.

a) Area

Reedbed compartment	Water level (m) AOD	Ditch length m	Ditch area m^2	Pool area m^2	Reedbed area m^2	Total area m^2
A	15.1	200	1,000	600	7,550	9,150
B	14.8	600	3,000	600	13,100	16,700
C	14.7	150	750	200	5,050	6,000
Total		950	4,750	1,400	25,700	31,850

b) Volumes

Reedbed compartment	Water level (m) AOD	Ditch volume m^3	Pool volume m^3	Average reedbed depth mm	Reedbed volume m^3	Total volume m^3
A	15.1	1,000	600	400	3,020	4,620
B	14.8	3,000	600	300	3,930	8,840
C	14.7	750	200	400	2,020	2,970
Total		4,750	1,400		8,970	15,120

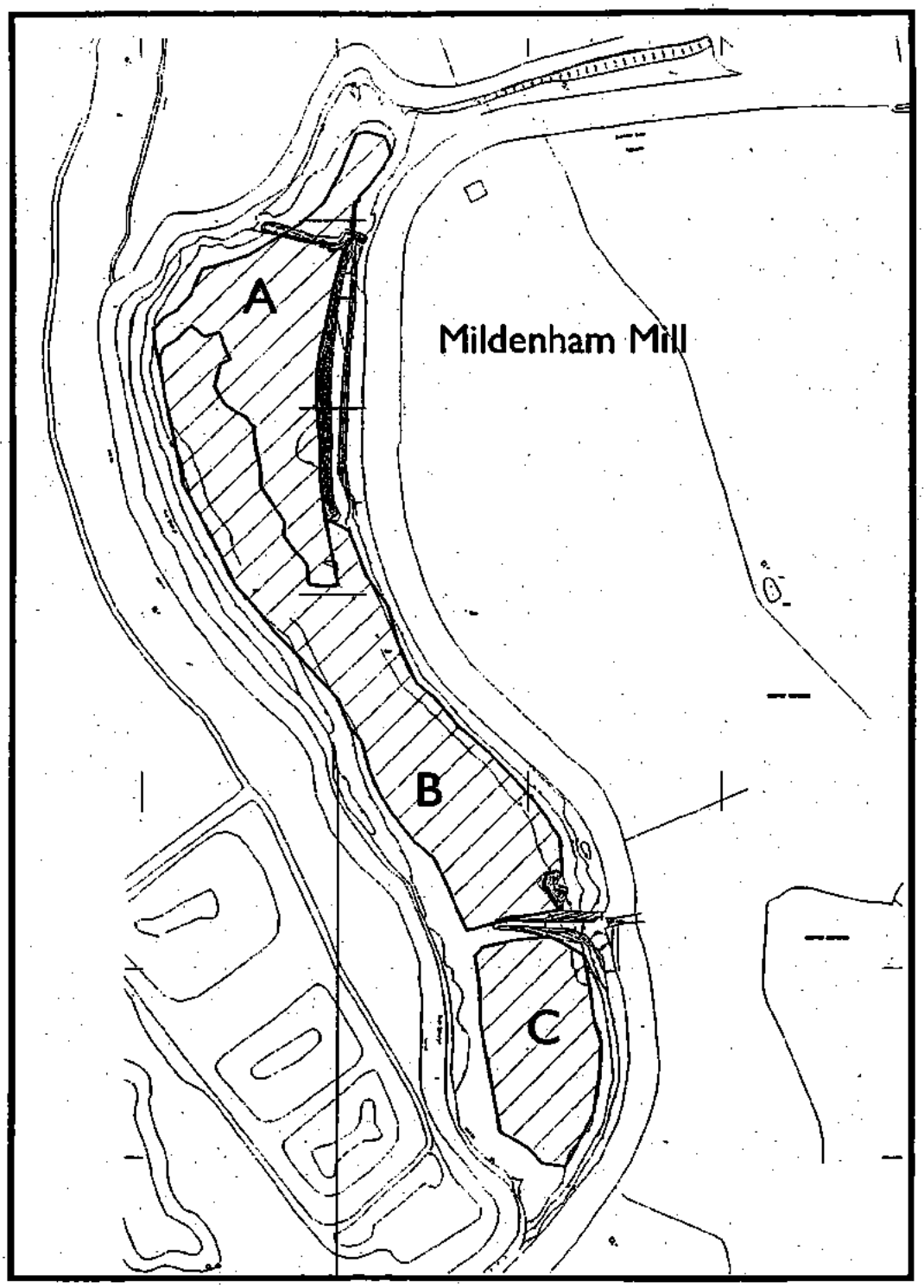

Figure 3

Option A *Spoil transported over canal bridge to adjacent field. Average haul distance is taken as no more than 1,800 m (900 m away). Spoil deposited in a feature of 1.5 m average height.*		
Spoil re-profiling		
Total volume of spoil		15,120 m^3
Allow for bulking (50%)		22,680 m^3
Convert to tonnes @ 1.5t per m^3 *		34,020 tonnes approx.
Assume 2 x 20t 360° excavators plus 6 x 7t Hydrema loaders working at approx. 210 t /hour total		162 hours haul (3.5 weeks)
Allow for additional machines (1 x bulldozer) for stripping		162 hours
Costs per vehicle (with driver)		
Hydrema (6 x 162 hours)	£17/hour *	£16,524
20t 360° excavator (2 x 162 hours)	£35/hour	£11,340
Bulldozer (1 x 162 hours)	£30/ hour	£4,860
Sub total		£32,724
Additional costs		
Overheads	25% of plant hire*	£8,181
Internal water control structures	2 @ £500	£1,000
Inlet / outlet structures and pipework	2 @ £2,000	£4,000
Total ground works		£45,905
Total including contingency (10%)	A	£50,495
Deposition of spoil in field plus re-landscaping		
Land take for spoil		1.6 ha
Total volume of topsoil to strip and stockpile (250 mm deep)		4,000 m^3
Allow for bulking (30%)		5,200 m^3
Convert to tonnes @ 1.5t per m^3 *		7,800 tonnes approx.
Assume 1 x 20t 360° excavators plus 2 x 7t Hydrema loaders working at approx. 108 t/hour total plus Bulldozer working at 108 t/hour.		36 hours (4.5 days)
Add same as above to allow for replacing topsoil		72 hours (9 days) total
Costs per vehicle (with driver)		
Hydrema (2 x 72 hours)	£17/hour *	£2,448
20t 360° excavator (1 x 72 hours)	£35/hour	£2,520
Bulldozer (1 x 72 hours)	£30/ hour	£2,160
Sub total		£7,128

Additional costs		
Overheads	25% of plant hire*	£1,782
Total deposition of spoil / landscaping		£8,910
Total including contingency (10%)		£9,801
Farmer's costs (estimate £2,500/ha.), total land effected 1.6 ha plus 0.4 ha haul road = 2 ha.		£5,000
Total costs	B	£14,801
Reed turf translocation		
Area of reed for turves (compartment B)		1.31 ha
Number of reed turves to be imported		197
Allow for 4 turves dug (or unloaded), transported and placed per hour.		49 hours (6.5 days)
Costs per vehicle (with driver)		
20t excavator (2 x 49 hours)	£35/hour	£3,430
2t dumper, low ground pressure (2 x 49 hours)	£16/hour	£1,568
Sub total		£4,998
Additional costs		
Ecological supervision (5.5 days)	£250/day	£1,625
Overheads	25% of plant hire*	£1,249
Total reed turf translocation		£7,872
Total including contingency (10%)	C	£8,659
Rhizome-rich spoil		
Area for rhizome-rich spoil (compartments A & C)		1.26 ha
Volume; assume 60% of area spread with spoil (7,600 m^2) @ 200 mm depth		1,520 m^3
Allow for bulking 30%		1,976 m^3
Convert to tonnes @ 1.5t per m^3 *		2,964 tonnes
Assume one excavator digging/loading and one spreading plus 2 x 5t dumper trucks delivering 40 tonnes/hour (smaller dumpers important to reduce rhizome compaction).		74 hours
Costs per vehicle (with driver)		
20t excavator (2 x 74 hours)	£35/hour	£5,180

2 x 5t dumper (2 x 74 hours)	£18/hour	£2,664
Sub total		£7,844
Additional costs		
Ecological supervision (9 days)	£250/day	£2,250
Overheads	25% of plant hire*	£1,961
Total rhizome translocation		£12,055
Total including contingency (10%)	D	£13,260

Total costs (A+B+C+D) £87,215

Inclusions: contingency, farmers compensation

Exclusions: haul roads (if needed), security fencing, planting of reed, preparation and seeding of spoil deposition area.

Notes:
1) The Environment Agency will need to agree this project qualifies as an exemption with regards to waste licensing.

* *Figures provided by British Waterways, volume to weight ratio of 1.5 may be exceeded if excavated soils are saturated.*

Option B
Spoil transported over temporary installed bridge to fishing club. Average haul distance is taken as no more than 1,000 m (500 m away). Spoil deposited in a feature of 1.5 m average height.

Spoil re-profiling		
Total volume of spoil		15,120 m^3
Allow for bulking (50%)		22,680 m^3
Convert to tonnes @ 1.5t per m^3*		34,020 tonnes
Assume 2 x 20t 360° excavators plus 4 x 7t Hydrema loaders working at approx. 180 t/hour		189 hours haul (4.5 weeks)
Allow for additional machines (1 x bulldozer) for stripping		189 hours
Costs per vehicle (with driver)		
Hydrema (4 x 189 hours)	£17/hour *	£12,852
20t 360° excavator (2 x 189 hours)	£35/hour	£13,230
Bulldozer (1 x 189 hours)	£30/ hour	£5,670
Sub total		£31,752
Additional costs		

Overheads	25% of plant hire*	£7,938
Internal water control structures	2 @ £500	£1,000
Inlet / outlet structures and pipework	2 @ £2,000	£4,000
Temporary bridge (20t capacity), hire, delivery and erection.	6 weeks	£20,000
Preparation of bridge footings		£1,500
Total ground works		**£66,190**
Total including contingency (10%)	A	£72,809
Deposition of spoil in field plus re-landscaping		
Land take for spoil		1.6 ha
Total volume of topsoil to strip and stockpile (250 mm deep)		4,000 m^3
Allow for bulking (30%)		5,200 m^3
Convert to tonnes @ 1.5t per m^3 *		7,800 tonnes approx.
Assume 1 x 20t 360° excavators plus 2 x 7t Hydrema loaders working at approx. 108 t/hour total plus Bulldozer working at 108 t/hour.		36 hours (4.5 days)
Add same as above to allow for replacing topsoil		72 hours (9 days) total
Costs per vehicle (with driver)		
Hydrema (2 x 72 hours)	£17/hour *	£2,448
20t 360° excavator (1 x 72 hours)	£35/hour	£2,520
Bulldozer (1 x 72 hours)	£30/ hour	£2,160
Sub total		**£7,128**
Additional costs		
Overheads	25% of plant hire*	£1,782
Total deposition of spoil / landscaping		**£8,910**
Total including contingency (10%)	B	£9,801
Reed turf translocation		
Area of reed for turves (compartment B)		1.31 ha
Number of reed turves to be imported		197
Allow for 4 turves dug (or unloaded), transported and placed per hour.		49 hours (6.5 days)
Costs per vehicle (with driver)		
20t excavator (2 x 49 hours)	£35/hour	£3,430
2t dumper, low ground pressure (2 x 49 hours)	£16/hour	£1,568
Sub total		**£4,998**

Additional costs		
Ecological supervision (5.5 days)	£250/day	£1,625
Overheads	25% of plant hire*	£1,249
Total reed turf translocation		**£7,872**
Total including contingency (10%)	**C**	**£8,659**
Rhizome-rich spoil		
Area for rhizome-rich spoil (compartments A & C)		1.26 ha
Volume; assume 60% of area spread with spoil (7,600 m²) @ 200 mm depth		1,520 m³
Allow for bulking 30%		1,976 m³
Convert to tonnes @ 1.5t per m³*		2,964 tonnes
Assume one excavator digging/loading and one spreading plus 2 x 5 ton dumper trucks delivering 40 tonnes/hour (smaller dumpers important to reduce rhizome compaction).		74 hours
Costs per vehicle (with driver)		
20t excavator (2 x 74 hours)	£35/hour	£5,180
2 x 5t dumper (2 x 74 hours)	£18/hour	£2,664
Sub total		**£7,844**
Additional costs		
Ecological supervision (9 days)	£250/day	£2,250
Overheads	25% of plant hire*	£1,961
Total rhizome translocation		**£12,055**
Total including contingency (10%)	**D**	**£13,260**

Total costs (A+B+C+D) £104,529

Inclusions: contingency,

Exclusions: land purchase, haul roads (if needed), security fencing, planting of reed, preparation and seeding of spoil deposition area, fishing club compensation.

Notes:
1) The Environment Agency will need to agree this project qualifies as an exemption with regards to waste licensing.

* *Figures provided by British Waterways, volume to weight ratio of 1.5 may be exceeded if excavated soils are saturated.*

Option C *Spoil transported over temporary installed bridge to fishing club and stockpiled. Average haul distance is taken as no more than 1,000 m (500 m away). Spoil taken by licensed hauler to landfill site no more than 13 km away.*		
Spoil re-profiling		
Total volume of spoil		15,120 m^3
Allow for bulking (50%)		22,680 m^3
Convert to tonnes @ 1.5t per m^3 *		34,020 tonnes
Assume 2 x 20t 360° excavators plus 4 x 7t Hydrema loaders working at approx. 180 t/hour		189 hours haul (4.5 weeks)
Allow for additional machines (2 x 20t 360° excavator plus 1 x bulldozer) stripping plus shaping spoil heap and loading onto tippers		189 hours
Costs per vehicle (with driver)		
Hydrema (4 x 189 hours)	£17/hour *	£12,852
20t 360° excavator (4 x 189 hours)	£35/hour	£26,460
Bulldozer (1 x 189 hours)	£30/ hour	£5,670
Sub total		**£44,982**
Additional costs		
Overheads	25% of plant hire*	£11,245
Internal water control structures	2 @ £500	£1,000
Inlet / outlet structures and pipework	2 @ £2,000	£4,000
Temporary bridge (20t capacity), hire, delivery and erection.	6 weeks	£20,000
Preparation of bridge footings		£1,500
Total ground works		**£82,727**
Total including contingency (10%)	**A**	**£90,999**
Carriage of spoil to landfill		
Total volume of topsoil (top 150 mm)		4,778 m^3
Total volume of subsoil (below 200 mm)		10,342 m^3
Allow for bulking (50%)		15,513 m^3
Convert to tonnes @ 1.5t per m^3		23,270 tonnes
Cart excavated spoil to tip		
Tipping costs !	£2.50/tonne	£58,175
Landfill Tax	£2/tonne	£46,540

Total costs	B	£104,715
Reed turf translocation		
Area of reed for turves (compartment B)		1.31 ha
Number of reed turves to be imported		197
Allow for 4 turves dug (or unloaded), transported and placed per hour.		49 hours (6.5 days)
Costs per vehicle (with driver)		
20t excavator (2 x 49 hours)	£35/hour	£3,430
2t dumper, low ground pressure (2 x 49 hours)	£16/hour	£1,568
Sub total		£4,998
Additional costs		
Ecological supervision (5.5 days)	£250/day	£1,625
Overheads	25% of plant hire*	£1,249
Total reed turf translocation		£7,872
Total including contingency (10%)	C	£8,659
Rhizome-rich spoil		
Area for rhizome-rich spoil (compartments A & C)		1.26 ha
Volume; assume 60% of area spread with spoil (7,600 m^2) @ 200 mm depth		1,520 m^3
Allow for bulking 30%		1,976 m^3
Convert to tonnes @ 1.5t per m^3 *		2,964 tonnes
Assume one excavator digging/loading and one spreading plus 2 x 5 ton dumper trucks delivering 40 tonnes/hour (smaller dumpers important to reduce rhizome compaction).		74 hours
Costs per vehicle (with driver)		
20t excavator (2 x 74 hours)	£35/hour	£5,180
2 x 5t dumper (2 x 74 hours)	£18/hour	£2,664
Sub total		£7,844
Additional costs		
Ecological supervision (9 days)	£250/day	£2,250
Overheads	25% of plant hire*	£1,961
Total rhizome translocation		£12,055

Total including contingency (10%)	D	£13,260

Total costs (A+B+C+D) £217,633

Inclusions: contingency.

Exclusions: land purchase, haul roads (if needed), security fencing, planting of reed, preparation and seeding of spoil deposition area, fishing club compensation.

* *Note: Figures provided by British Waterways, volume to weight ratio of 1.5 may be exceeded if excavated soils are saturated.*

1 *Haulage costs provided by Brian Hill Plant Hire Ltd (01384) 76890 (contact Stewart Hickman)*

Appendix 1 Landmark information

Site	Pollution incidents	Water abstraction	Others	Information from old maps
Ombersley Way	27/11/96 Sewage pumping station – crude sewage in watercourse created a category 3 in watercourse – caused by electrical failure. NGR 388300 262900 (21)			1889 map shows a dotted line with Und. through the field, also there 1905, and 1930 (the last two without any annotation) but not 1938. A drain across the field up to and including 1970. Next map 1979 the proposed route of Ombersley way is shown and the drain is not. 1988 map it becomes a Playing Field and the trees have appeared (Ombersley Way still a proposed route).
Between Ombersley Way and Salwarpe	24/5/98 Misc-natural created a category 3 in Canal caused by low dissolved oxygen. NGR 388360 262520 (31)		Landfill site, licence lapsed, excavated materials, silt/ dredgings may be salt contaminated. NGR 388200 262500 (52)	
Salwarpe	21/6/96 Misc-natural created a category 3 in Canal caused by low dissolved oxygen. Map and GR show next to river but details say Canal the Receiving Water. NGR 387900 262400 (20)		Many BGS boreholes	The field has stayed the same.
Between Salwarpe and Porter's Mill Bridge	5/7/99 Diesel created a category 3 in Canal caused by weather. NGR 387600 262000 (35)		Landfill Site: Very Small <10,000 tonnes/year, operational as far as is known NGR 386700 261500 (50)	
	6/6/97 Misc-natural created a category 3 in Canal caused by low dissolved oxygen. NGR 387500 262000 (27)			
	12/6/96 Misc-natural created a category 3 in Canal caused by weather. NGR 387420 261990 (19)			

Site	Pollution incidents	Water abstraction	Others	Information from old maps
	18/6/98 Leaking underground pipe – crude sewage caused a category 3 in a watercourse. NGR 387400 262000 (30)			
	19/4/98 Pig slurry to watercourse, poor operational practical, category 2. NGR 386890 261290 (26)			
	27/11/97 Private sewage– septic tank effluent to Canal – poor operational practice, category 3. NGR 386870 261190 (25)			
	9/2/98 Pig slurry to watercourse (feeding canal?) land runoff – category 3. NGR 386600 260680 (23)			
	23/4/99 Sewage Treatment Works – misc and foam to River, category 3. NGR 386050 260400 (32)			
	7/5/98 Misc-natural pollution affected fish in the Canal, category 3. NGR 386190 260430 (29)			
Porter's Mill Bridge		From River: Droitwich Canal Trust for WLM, 6819 daily 1022850 yearly NGR385800 260200 (44)		Where the pond is on Porter's Mill Bridge looks to have always been a water feature, at least since 1905 – some maps shown connected to River 1905-54, and then onwards looks isolated.
Porter's Mill Bridge to Mildenham Mill	27/6/99 Cattle slurry to watercourse, category 2. NGR 385400 260700 (24)			1888, Mildenham Mill and Porter's Mill (?corn) shown till 1930, next map is 1954 Mildenham (disused) and Porter's Mill not mentioned.

Site	Pollution incidents	Water abstraction	Others	Information from old maps
Mildenham Mill		From River: T Smith (angling club?) for WLM, 1296 daily 9000 yearly NGR 385070 260670 (49)		Field has stayed the same.
Between Ombersley Way and Amphibian site	4/2/99 Burst rising main – crude sewage to watercourse created a category 3. NGR 388800 263700 (34)			Sewage Farm to north (north of the Leisure Centre) from the beginning 1888 up to and including 1938.
Amphibian site			Within Adopted Green Belt	Canal going through it up to and including 1964. 1967 map it becomes a County Council Yard.

(2) – Map ID number on Landmark data
Category 2 – significant, Category 3 - minor

Appendix II Copy of a DETR guidance for European protected species and an application form for a Great Crested Newt licence in respect of development.

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EUROPEAN PROTECTED SPECIES : GUIDANCE NOTE

This leaflet provides an introduction to the subject for developers and land managers and is not to be used as a substitute for professional, ecological or legal advice on individual cases.

This leaflet aims to inform people involved in developing land **in England** on which European protected species are likely to be present about the legal protection afforded to these plants and animals. It explains procedures for licensing certain operations affecting the species below.

European protected species

Animals

Bats, Horseshoe (all species)
Bats, Typical (all species)
Common Otter
Dolphins, porpoises and whales (all species)
Dormouse
Great Crested Newt (or warty)
Large Blue Butterfly
Marine Turtles
Natterjack Toad
Sand Lizard
Smooth Snake
Sturgeon
Wild Cat

Plants

Creeping Marshwort
Early Gentian
Fen Orchid
Floating-leaved water Plantain
Killarney Fern
Lady's Slipper
Shore Dock
Slender Naiad
Yellow Marsh Saxifrage

Legal protection of European Protected Species

The species above are protected under the Conservation (Natural Habitats, &c.) Regulations 1994 which implements the EC Directive 92/43/EEC in the United Kingdom and it is an offence, with certain exceptions, to;

1. deliberately capture or kill any **wild animal of a European Protected Species;**
2. deliberately disturb any such animal;
3. deliberately take or destroy eggs of any such wild animal;
4. damage or destroy a breeding site or resting place of such a wild animal;
5. deliberately pick, collect, cut, uproot or destroy a **wild plant of a European protected species;**
6. keep, transport, sell or exchange, or offer for sale or exchange, any live or dead wild animal or plant of a European protected species, or any part of, or anything derived from

such a wild animal or plant.

It is advisable to check as early as possible whether European protected species are present on potential sites for development - ideally before the land is bought.

Developers need to be aware of the implications of encountering European protected species on potential development sites. If a development is likely to result in disturbance or killing of a European protected species, damage to its habitat or any of the other activities listed above, then a licence will usually be required. An understanding of the legislation, processes for obtaining licences and ideal procedures at the initial stages of development is likely to help ensure that the nature conservation considerations are fully addressed, particularly if considered at the early stages of the planning process. Finding European protected species on a development site at a later stage could result in delays whilst a licence is sought or even offences being committed.

Note: In this context, "development" should be interpreted broadly to include plans or projects such as the carrying out of building, engineering, mining or other operations, on, over, or under land, or the material change in use of any buildings or other land. This would also include the demolition of buildings, rebuilding, structural alterations of, or additions to, buildings.

The Planning System and Nature Conservation

Many European protected species licence applications relate to developments which are subject to planning permission. Guidance on the consideration that local planning authorities should give to nature conservation interest is contained in Planning Policy Guidance 9 on Nature Conservation. This states, *the presence of a protected species is a material consideration when a local planning authority is considering a development proposal which, if carried out, would be likely to result in harm to the species or the habitat. Local authorities should consult English Nature before granting planning permission. The local planning authority should consider attaching appropriate planning conditions or entering into planning obligations under which the developer would take steps to secure the protection of the species*. English Nature local teams will advise local planning authorities on their policies for European protected species and also any conservation implications of individual planning decisions which affect European protected species.

Mitigation proposals may be significant when considering the impact of planning applications upon European protected species. Reducing the impact or providing alternative habitat within or near to the development site may enable the favourable conservation status of the species concerned to be maintained. It is the developer's responsibility to produce a mitigation plan, normally through a suitable consultant. It is not English Nature's role to produce mitigation proposals on behalf of developers, though it can advise Local Planning Authorities of their suitability and give general advice to developers.

Licences:

Licences derogating from the protection afforded to European protected species can be granted for a number of specified reasons. Several of these reasons are outlined below:

"Survey" licences (English Nature)

Once a site is identified as a potential development site it is recommended that a survey of the site is carried out, particularly if European protected species are likely to be present. Licences may be granted by English Nature for scientific purposes to disturb or capture species in order to carry out a scientific survey. Licences may not be required for all survey work; they will be required only if the work is likely to cause disturbance or require taking or capture of the species concerned.

Where licences are issued for scientific purposes it is important that the data collected are used to increase scientific knowledge to fulfil the purpose of the licence. It is a condition of any such English Nature licence that a report of all the work carried out by the licensee is submitted to English Nature once the licence has expired. English Nature may pass on this summary data to third parties.

Licences will only be issued to applicants who are able to demonstrate that they have a suitable amount of expertise in survey techniques relevant to the case. The quality of the survey, however, is the responsibility of the licensee.

After a survey has taken place professional advice should be sought to assess the implications of any development proposal upon the European protected species.

"Conservation" licences (English Nature)

Conservation licences are not considered for the rescue of European protected species from development sites. Licences for conservation can be issued by English Nature to protect a population which is under threat because of natural degradation of its habitat. Licences will be considered for actions with the sole purpose of improving the habitat or conservation status of the species for which the licence is sought.

"Development" licences (DETR)

Developments which compromise the protection afforded to the European protected species under the provisions of the Conservation (Natural Habitats, &c.) Regulations 1994 will almost invariably require a licence to do so lawfully. All such applications will be considered by DETR. Three tests must be satisfied before DETR can issue a licence to permit otherwise prohibited acts:

1. Regulation 44(2)(e) states that licences may be granted by DETR to *"preserve public health or public safety or other imperative reasons of overriding public interest including those of a social or economic nature and beneficial consequences of primary importance for the environment."*

2. Regulation 44(3)(a) states that a licence may not be granted unless DETR is satisfied *"that there is no satisfactory alternative"*.

3. Regulation 44(3)(b) states that a licence cannot be issued unless DETR is satisfied that the action proposed *"will not be detrimental to the maintenance of the population of the species concerned at a favourable conservation status in their natural range"*.

A detailed application form is available from DETR. Each application is determined on its merits. In order to meet the tests, the Department generally expects the planning position to be fully resolved. This is usually necessary in order to provide all the information required to determine whether there is any satisfactory alternative, and that the work is of overriding public interest.

Developments that require planning permission:

This category includes the majority of applications. Where a licence application relates to a development that requires planning permission it is necessary for the Department to seek information from the local planning authority (or other planning authority which granted planning permission) in order to consider whether the first two tests above are met.

The Department will write to local planning authorities to request a copy of the relevant report to the Planning Committee on a planning application and the minutes of the meeting at which the application was decided. A determination on **the first two tests** will be made on the basis of the information provided by the planning authority, assuming it is sufficient for these purposes. If you wish to speed the determination of your licence application then the Department requests that these documents be submitted with the application.

Developments that do not require planning permission:

If specific planning permission is not required for the development then the licence will be determined on the basis of the information supplied by the applicant. In these circumstances, the Department requests that you provide more detailed information on the proposed development, the purpose of the development and the legal basis under which it may take place (e.g. the development or associated activity may result from a statutory requirement under other legislation or be permitted under a Permitted Development Order).

To assist in considering **the third test** above, the Department will seek advice from the Government's statutory nature conservation adviser, English Nature. Its role is to assess whether it is satisfied that the action authorised will not be detrimental to the maintenance of the population of the species concerned at a favourable conservation status in their natural range. The applicant will need to provide a detailed proposal of all the mitigation work that they plan to carry out which will affect European protected species. The requirements for this proposal are

given in the annex of the licence application form. English Nature will base their advice on whether the proposed mitigation work is sufficient to maintain the conservation status of the species concerned.

Licence applications and enquiries should be directed to DETR. English Nature will not enter into correspondence over applications direct with the applicant. It takes time for licence applications to be determined and applications should be made as early as possible.

DETR licensing decisions

The Department will endeavour to issue decisions on licence applications within 10 working days of receipt of all the necessary information from both the planning authority and English Nature. English Nature are asked to supply their report to DETR in 15 working days. Generally, an applicant should expect the whole process to take around 25 working days, although some contentious applications may take longer to resolve.

If a developer is not granted a licence this *could* mean that proceeding with the development *even with planning permission* will result in illegal acts against European protected species or their habitat.

Informative Note: Bats

If you wish to undertake any work within a dwelling house which may affect bats then you should seek advice from English Nature. English Nature will be able to advise on how best to undertake the work and whether a licence application is required.

Where to seek further information:

Contact **English Nature** for details or applications regarding scientific, survey or conservation licences;

Licensing Service
English Nature
Northminster House
Peterborough PE1 1UA Telephone: (01733) 455136 Fax: (01733) 455147

Contact **DETR** for details or applications regarding licences for preserving public health or public safety or other imperative reasons of overriding public interest including those of a social or economic nature and beneficial consequences of primary importance for the environment.

Licensing Manager
Department of the Environment Transport and the Regions
Room 902
Tollgate House

Houlton Street
Bristol BS2 9DJ Telephone: (0117) 987 8291 Fax: (0117) 987 8182

(September 2000)

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APPLICATION FOR A GREAT CRESTED NEWT LICENCE IN RESPECT OF DEVELOPMENT

NOTES FOR GUIDANCE *Please read the following notes carefully before completing this form.*

i. This application form is for people wishing to capture, disturb and/or relocate Great Crested Newts in relation to development work.

ii. Licences can be granted under Regulation 44(2)(e) of the Conservation (Natural Habitats, &c.) Regulations 1994, for the purpose of **preserving public health or public safety or other imperative reasons of overriding public interest including those of a social or economic nature and beneficial consequences of primary importance for the environment**, to allow people to carry out activities which would otherwise be illegal. Applicants must be able to demonstrate that they have a suitable amount of expertise to achieve the objectives of the proposed work.

iii. Under the Conservation (Natural Habitats &c.) Regulations 1994 licences can only be issued if DETR are satisfied that:

- there is no satisfactory alternative and
- the action authorised will not be detrimental to the maintenance of the population of Great Crested Newts at a favourable conservation status in their natural range.

iv. All sections of this application form must be completed in full unless otherwise stated: failure to provide adequate information will delay the processing of your application. We aim to determine applications within 25 working days. English Nature and the Local Planning Authority are given 15 working days to fulfil our request for information (see note vi).

v. Before a licence can be issued we expect an appropriate survey to have been carried out. This is to ensure that the proposed work is based on accurate information. Results of that survey will need to be enclosed with this application.

vi. If you wish to speed the processing of your application **you should supply 2 copies of the application and Method Statement**, together with a copy of the planning consent, the report to the Planning Committee and the report/minutes of the meeting when permission was granted by the Committee.

vii. Details of licences issued, including names and addresses of licensees, will be stored and processed on a computer database. The information will be used by DETR solely to undertake licensing functions.

viii. You will need to include a Method Statement including a proposed work programme. It should be noted that the Method Statement will be appended to any licence granted. As part of the licence it may be supplied in response to specific requests for information under the Environmental Information Regulations 1992 and any future open government legislation.

PART A Personal Details and Experience

All questions relate to the person who will be the named licensee if a licence is granted under the Conservation (Natural Habitats &c.) Regulations 1994. That person should complete and sign this form. Please complete this form in **BLOCK CAPITALS** and black ink or type.
(* delete as applicable)

1. Your name: (Mr / Mrs / Ms / Miss / Dr / other*)

2. Name of Company (if appropriate)

3. Address

4. Telephone number _____ Fax number _____

E-mail (if applicable) _____

5. Have you held a licence issued by English Nature or DETR within the last 3 years? YES/NO *

If 'YES'
a) Please give your last licence number _____

6. You will need to enclose written references (originals only, not photocopies) from two people who can vouch for your suitability for this type of work unless you have held a Great Crested Newt licence in which you were responsible for a similar work programme in the last three years.. At least one of these should have held a Great Crested Newt licence within the last three years. We may contact these referees to verify their statements that you enclose.
Tick the relevant circle:

O I enclose two written references. – **Please go on to Question 7**

O I have held a similar Great Crested Newt licence within the last three years. – **Please go on to Question 8.**

7. Please give brief details below of your experience and qualifications of working with Great Crested Newts and how it relates to the proposed work programme.

8. An **accredited agent** is a suitably qualified person who is able to carry out work under a licence without the personal supervision of the licensee. To carry out work they must be in possession of a letter signed by the licensee appointing him or her as an accredited agent of the licensee for the purpose of the licence. At all times the licensee is fully responsible for all the work carried out under licence.

An **assistant** is employed by a licensee or his or her agent to work under their direct personal supervision at all times.

a). Do you propose to employ accredited agents? YES/NO *

If 'YES', please state what work they will be carrying out and how they will be trained. Please give their full name where known.

b). Do you employ assistants YES/NO *

PART B Summary of work programme

This part of the form requests a summary of the proposed work programme. Please answer all questions. A more detailed method statement must also be submitted in support of the application as detailed in the annex to this form which will be attached to the licence.

9. Please specify the site name, county and the administrative area and full grid reference of all sites involved with this application.

10. Explain the reasons why it is necessary to carry out the proposed work, including a brief description of the proposed development. If the development is not subject to planning permission then provide details of its purpose and the legal basis under which it may take place, (attach an additional page, if necessary).

11. State the type of methods proposed i.e. fencing, pitfall trapping (only give full details of how these methods will be carried out in the method statement as specified in the annex to this form). Please complete the table below to indicate the methods you propose to use and the activity involved and the time period that you propose to use each method.

Activity to be licensed				Method	Time Period	
Capture	Disturb	Obstruct access	Destruction of breeding site or resting place		From	To

12. Indicate the number and life-stage of animals that will be affected. We will need to see the results of the survey and the methods used to obtain the survey results in a separate method statement as described in the annex to this form.

13. How will you maintain an equivalent population at or near site. More details should be given in the method statement in the annex to this form.

14. Please complete the following table as a brief summary of your work which affects the species.

Number of ponds to be lost:	
Number of ponds to be created:	
Number of ponds to be restored:	
Area of terrestrial habitat to be lost:	
Area of terrestrial habitat to be created:	
Area of terrestrial habitat to be restored:	

PART C Enclosures and Declaration

Enclosures: Failure to provide adequate information will delay the processing of your application.

Please tick to indicate that you have enclosed the following documents in support of this application.

O A copy of the full planning permission - **MUST BE INCLUDED.**

O Written authority from owner / occupier to permit entry to any employees or representatives of DETR and English Nature for the purpose of monitoring or inspecting the work - **MUST BE INCLUDED.**

O Written authority from owner / occupier stating that you are acting on their behalf - **MUST BE INCLUDED.**

O A **Method Statement** describing the proposed work under each of the headings given in the annex to this form - **MUST BE INCLUDED**

O Two references must be enclosed if you have not had a similar Great Crested Newt licence in the last three years (see Question 6).

WARNING: DETR can modify or revoke at any time any licence that may be issued. Any licence that is issued is likely to revoked immediately if it is discovered that false or incorrect information had been provided on this form or any part of the enclosures which resulted in the issue of a licence.

Declaration

Applicants should note that is an offence under Regulation 46 of the Conservation (Natural Habitats &c.) Regulations to knowingly or recklessly provide false information in order to obtain a licence.

- I understand that failure to comply with any conditions included on any licence granted in respect of this application may constitute an offence.
- I have read the notes for guidance on this form.
- I declare that the particulars given in this application and accompanying documents are correct to the best of my knowledge and belief, and I apply for a licence in accordance with these particulars.

Signed ..... Date .....

Now send your completed form, method statement and the enclosures requested, to:

The Licensing Officer,
The Department of the Environment, Transport and the Regions,
Room 902, Tollgate House,
Houlton Street, Bristol, BS2 9DJ.

Rev. 14/11/2000

ANNEX Method Statement – to be attached to the licence. (Please use this format)

To accompany this application we require a method statement which clearly describes how the proposed work will be carried out. We will also need information regarding the methods used and results of the survey upon which the work programme is based. **All method statements must contain the following information.**

1. Rationale for the proposed work

Explain the background and why there is a need to carry out the proposed work and state what alternative solutions have been considered and why they have been discounted.

2. Work schedule

Provide a work schedule for all the proposed work including the length of time that methods will be used. Also include detail of when any relevant development will commence and the expected timetable of works.

3. Survey information

Give details of the survey undertaken to identify the location and indicate the level of the Great Crested Newt population. State when the survey was carried out, methods used, weather conditions and results and the name of the surveyor who undertook the work. Please ensure that the results of the survey can be interpreted in relation to the map of the site. As a result of the survey, please describe the population of the site involved in relation to the local or regional status of the species, if known.

4. Maintenance of the favourable conservation status

Explain how you will maintain an equivalent population at or near the site. This may include habitat creation or restoration or appropriate exclusion.

5. Methodology

Explain fully all the methods you propose for capture and transfer of animals and receptor site preparation. Give details of how and where on the site they will be used and what you propose to achieve from these actions. Please use the following headings:

a) Capture methods, effort and timing
b) Exclusion methods (if appropriate)
c) Habitat creation and/or restoration

6. Post development habitat management and maintenance

If equipment is to be left on site explain how this will be monitored and maintained as appropriate. Explain how the site will be managed and maintained after the work has occurred to ensure that the objectives are achieved in the long term.

7. Population monitoring

Give details regarding how you will monitor the populations after development. It is Important that all work is monitored to ensure that the desired conservation benefits are achieved. This enables future decisions to be better informed.

8. Consultation

If you have consulted with anyone in English Nature please give the name, date and all relevant details stating whether the consultation was verbally or by letter. Attaching copies of any written consultations will assist us in processing your application.

9. Map(s) – Preferably A4 or A3

Include an appropriately scaled map of all sites involved which shows site locations relative to the nearest street or town. This map, or an additional larger scale map if necessary, should also show:

- Details of both the donor and receptor site if translocation is proposed.
- Details of all ponds and surrounding habitats.
- All proposed disturbance or destruction of habitats on the site if occurring.
- Location of proposed methods i.e. amphibian fencing, area of trapping.

Severn Trent Water

SEVERN TRENT WATER Ltd
Sugarbrook Depot
Stoke Pound
Bromsgrove B60 3AU

Tel 01527 573590
Fax 01527 573581

Direct Line 01527 573501

Contact Bill Walton
Your Ref WFW/884/Gen
Our Ref

15 March 2001

Wetlands Advisory Service
The Wildfowl & Wetlands Trust
Slimbridge
Glos.
GL2 7BT
F.A.O. Mr M Millet

Dear Mr Millet,

Formation of Wetland

I refer to your fax dated 12 March 2001 concerning the above.

The present access to the sewers in question is across field, to enable the manhole covers to be lifted, thereby gaining access to the sewer itself.

Ideally, the easement strip, as shown on the attached sewer record, should be accessible along its length. However, as a minimum, I would be prepared to consider a track way that may not follow the line of the sewer, but still gives vehicle access to each manhole.

Please find attached details of the sewer, including depths, which I have provided for your information only.

If you require any further information please contact me on the direct dial number shown above.

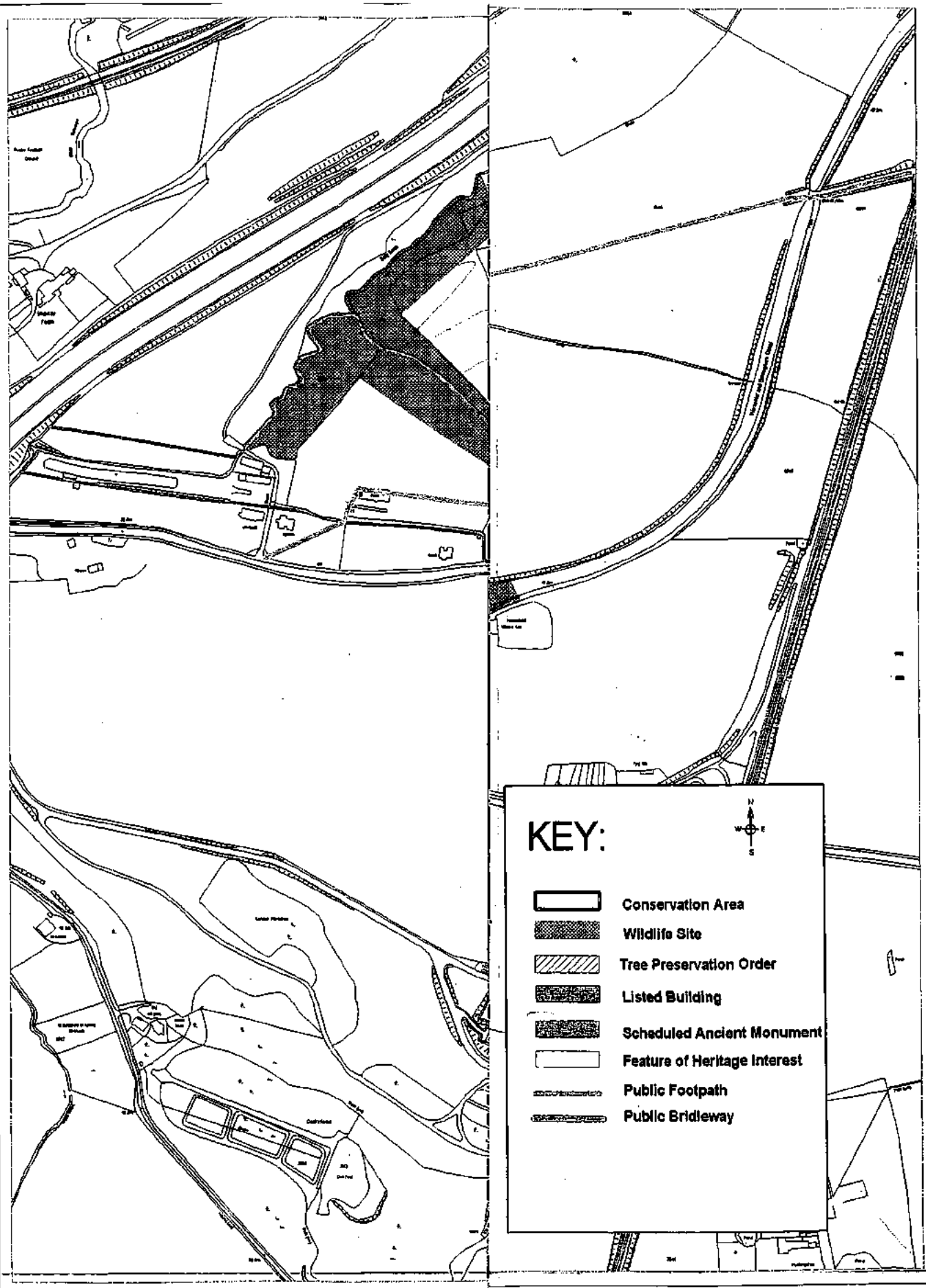
Yours sincerely

W F Walton
Assistant Manager, Networks Control

Appendix III Copies of responses to consultation.

APPENDIX 3

Canal Park proposals maps



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ATE: 16th October 2000

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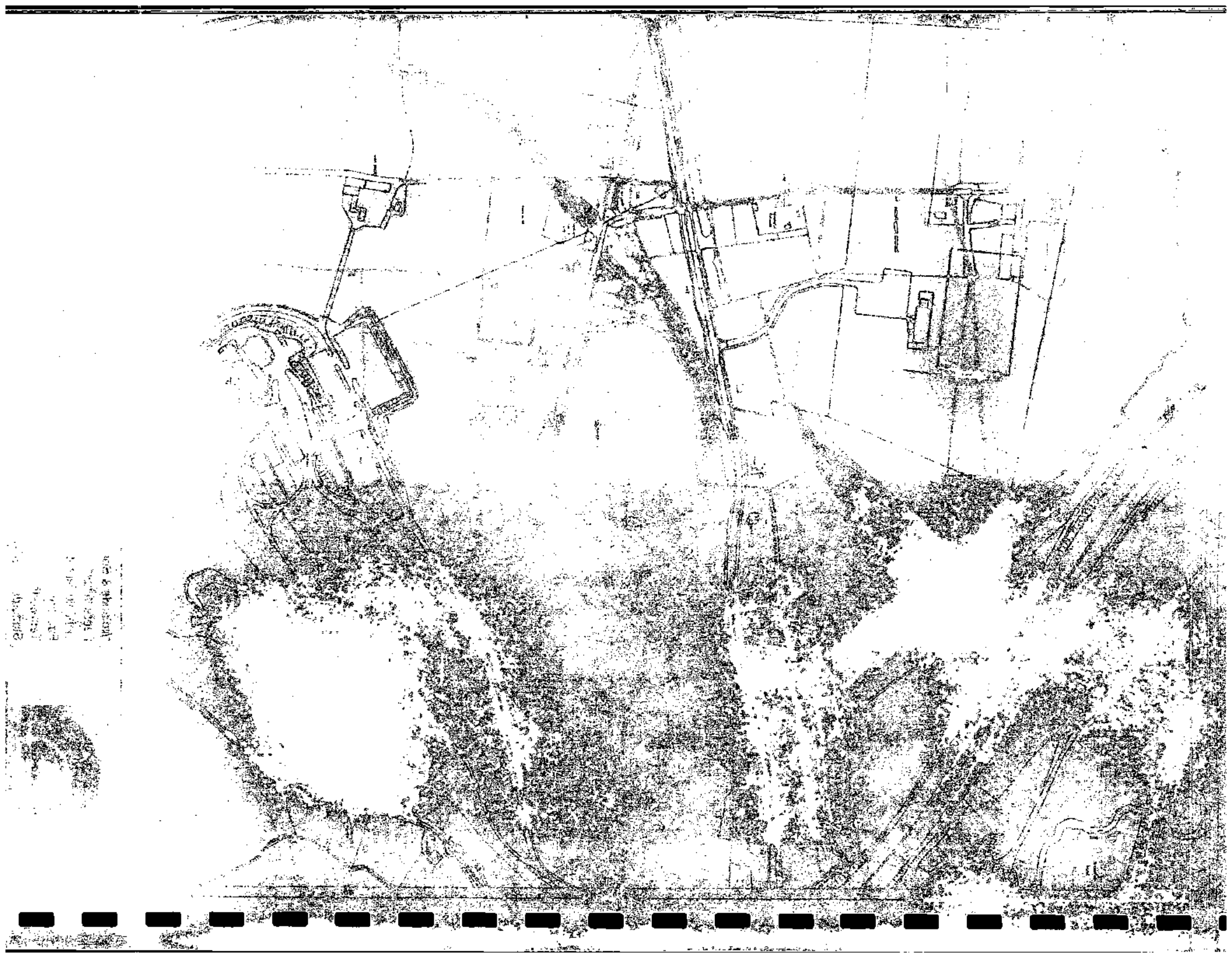

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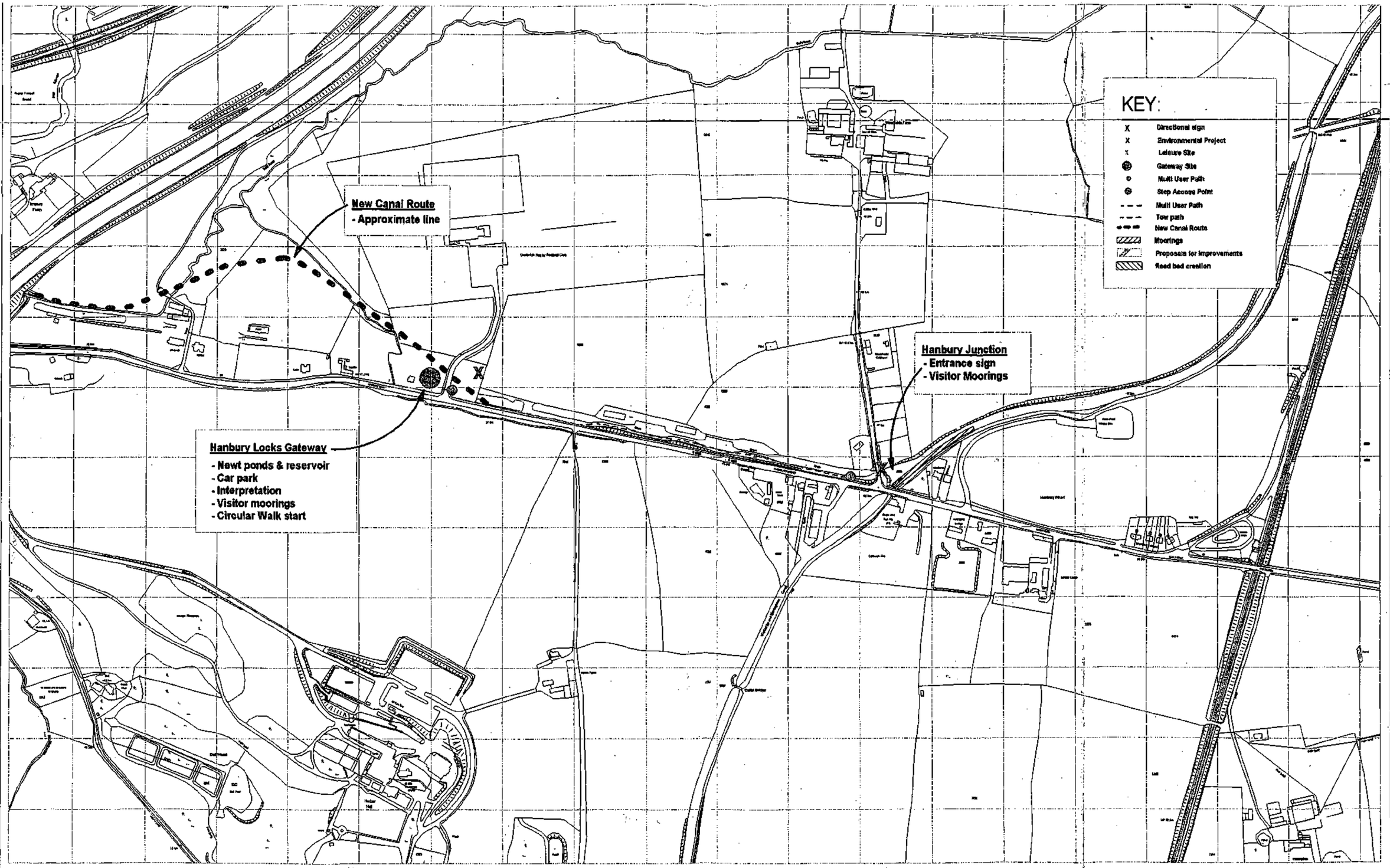
TITLE: Droitwich Canal 1 - Statutory and non-statutory designations

SCALE: 1:5000 NAME: M McCullough DATE: 16th October 2000

PROJECT: DEPARTMENT: Commercial DRAWING No:



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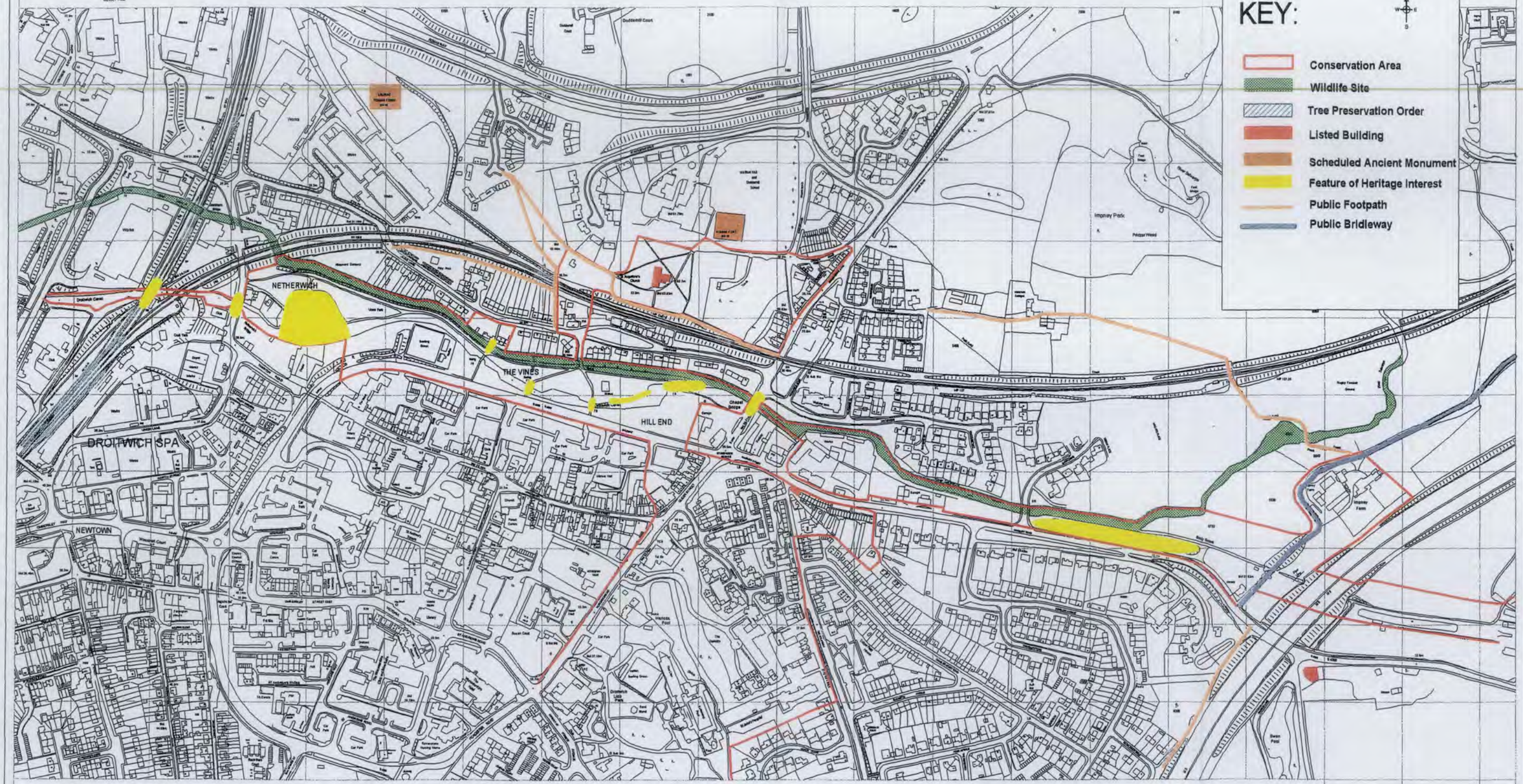
TITLE: Droitwich Canal 1- Country Park Proposals; DRAFT

SCALE: 1:5000 NAME: M McCullough DATE: 1st October 2000

PROJECT: DEPARTMENT: Commercial DRAWING No:



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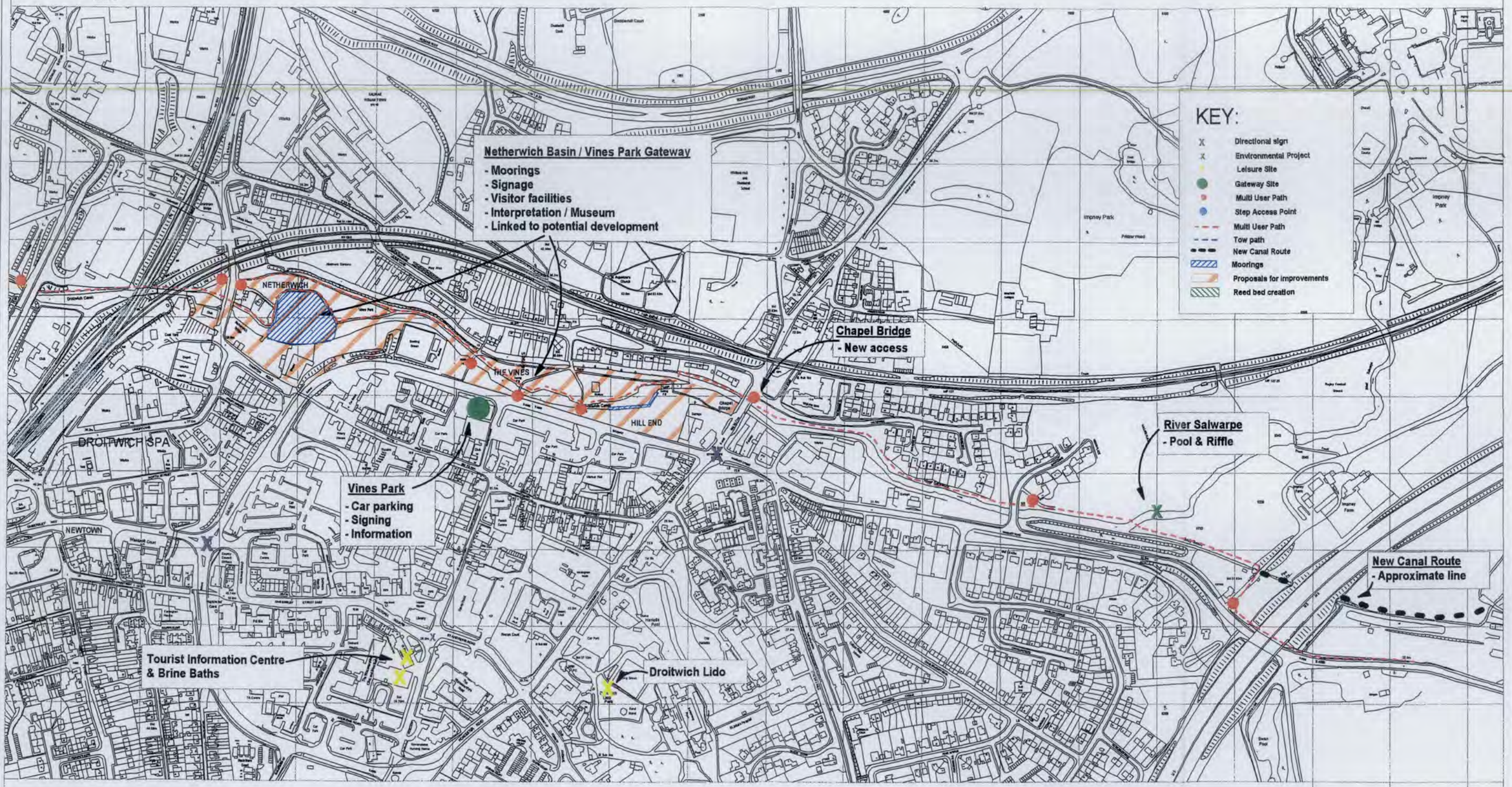
TITLE: Droitwich Canal 2 - Statutory and non-statutory designations

SCALE: 1:5000 NAME: M McCullough DATE: 16th October 2000

PROJECT: DEPARTMENT: Commercial DRAWING No:



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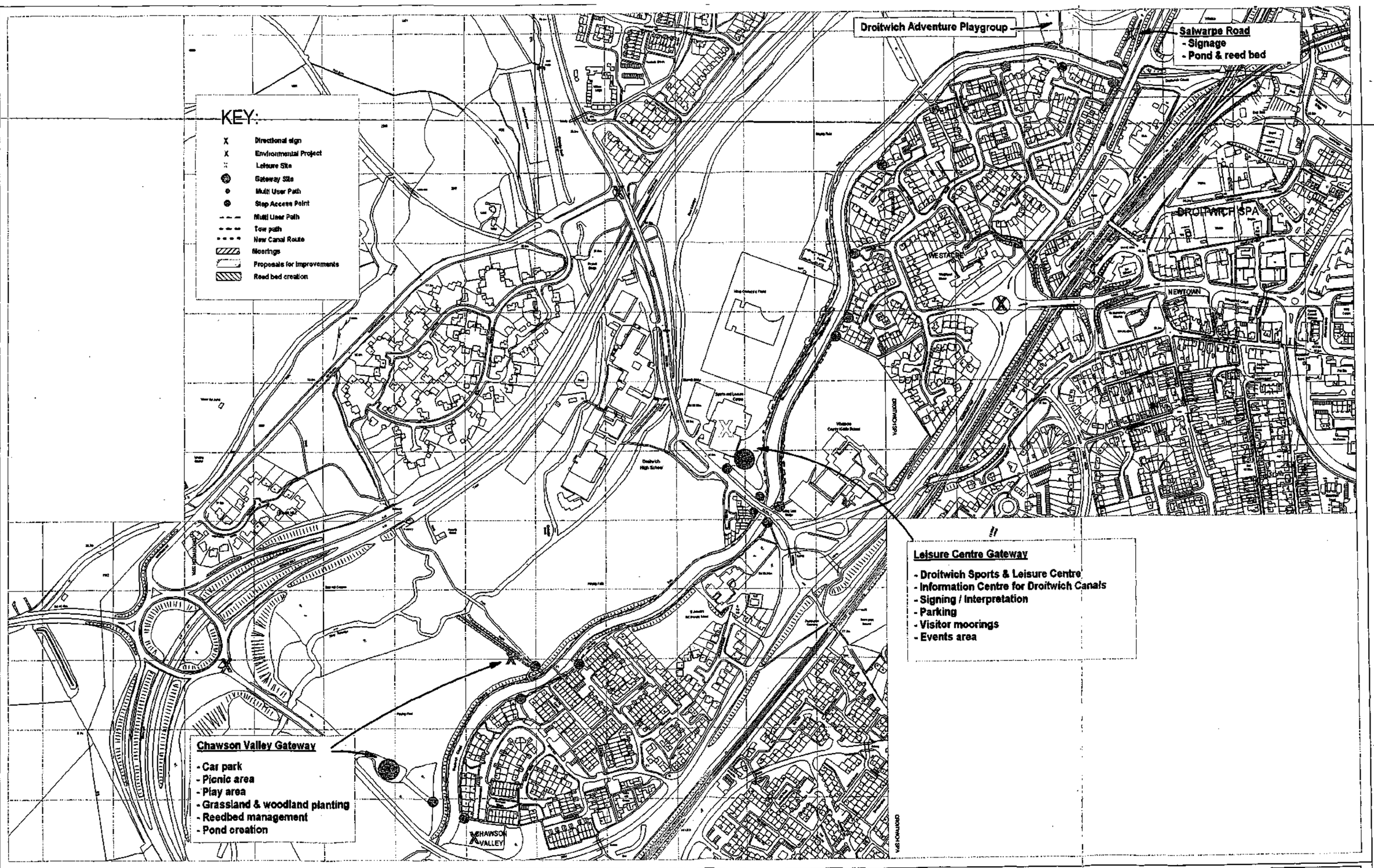
TITLE: Droitwich Canal 2 - Country Park Proposals; DRAFT

SCALE: 1:5000 NAME: M McCullough DATE: 1st October 2000

PROJECT: DEPARTMENT: Commercial DRAWING No:



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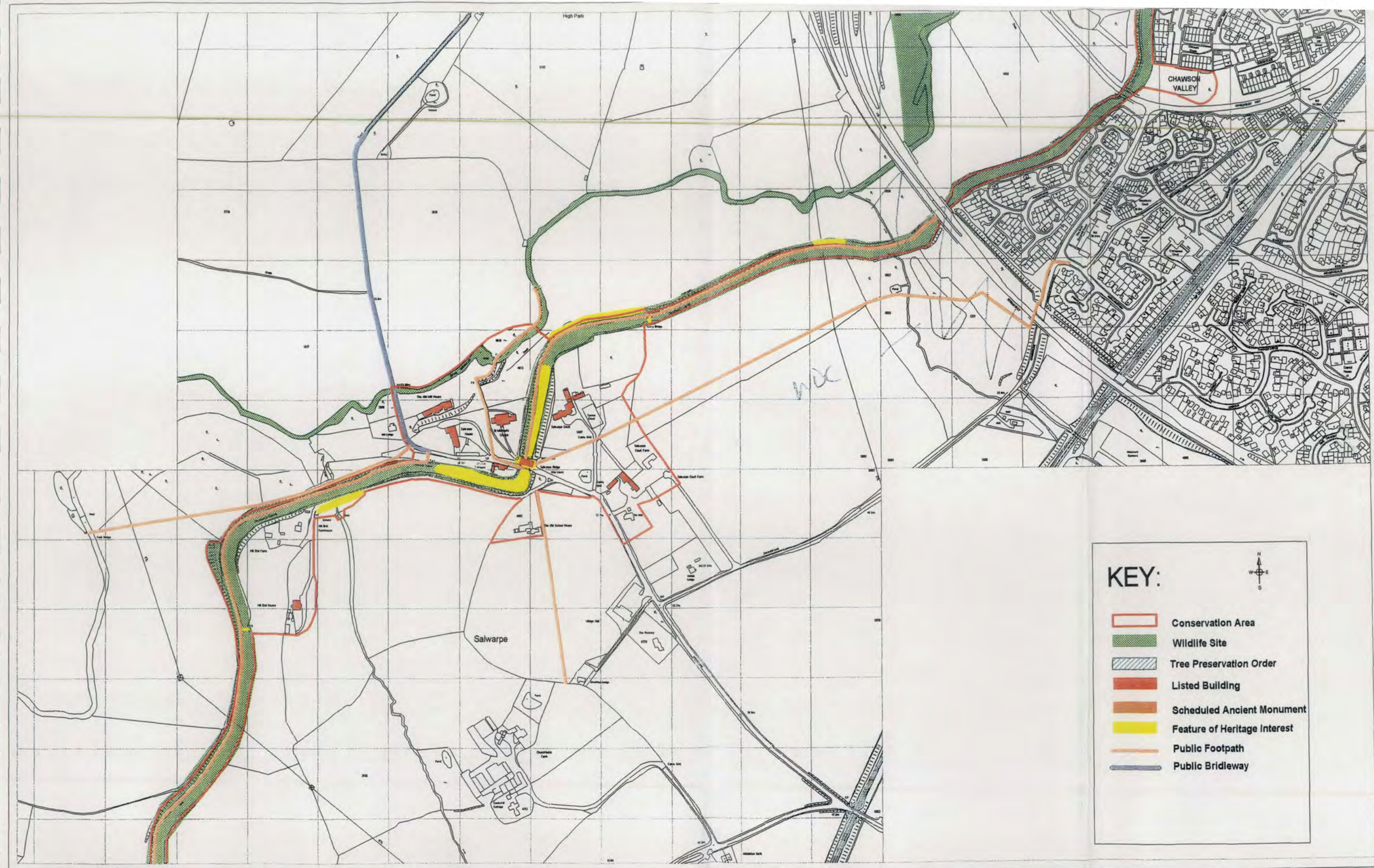
SCALE: 1:5000 NAME: M McCullough DATE: 1st October 2000

PROJECT: DEPARTMENT: Commercial DRAWING No:



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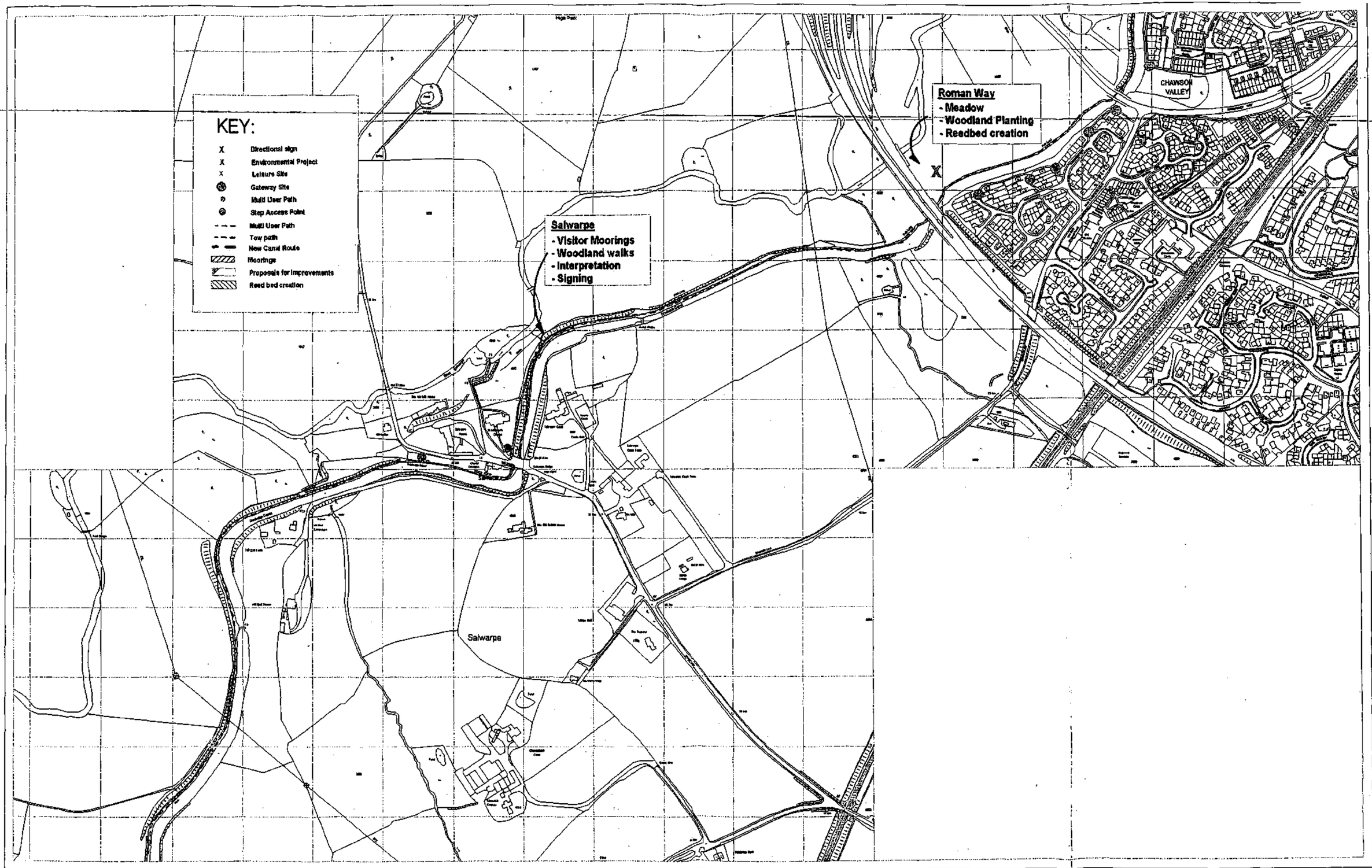
TITLE: Droitwich Canal 4 - Statutory and non-statutory designations

SCALE: 1:5000 NAME: M McCullough DATE: 16th October 2000

PROJECT: DEPARTMENT: Commercial DRAWING No:



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TITLE: Droitwich Canal 4 - Country Park Proposals; DRAFT

SCALE: 1:5000 NAME: M McCullough DATE: 1st October 2000

PROJECT: DEPARTMENT: Commercial DRAWING No:

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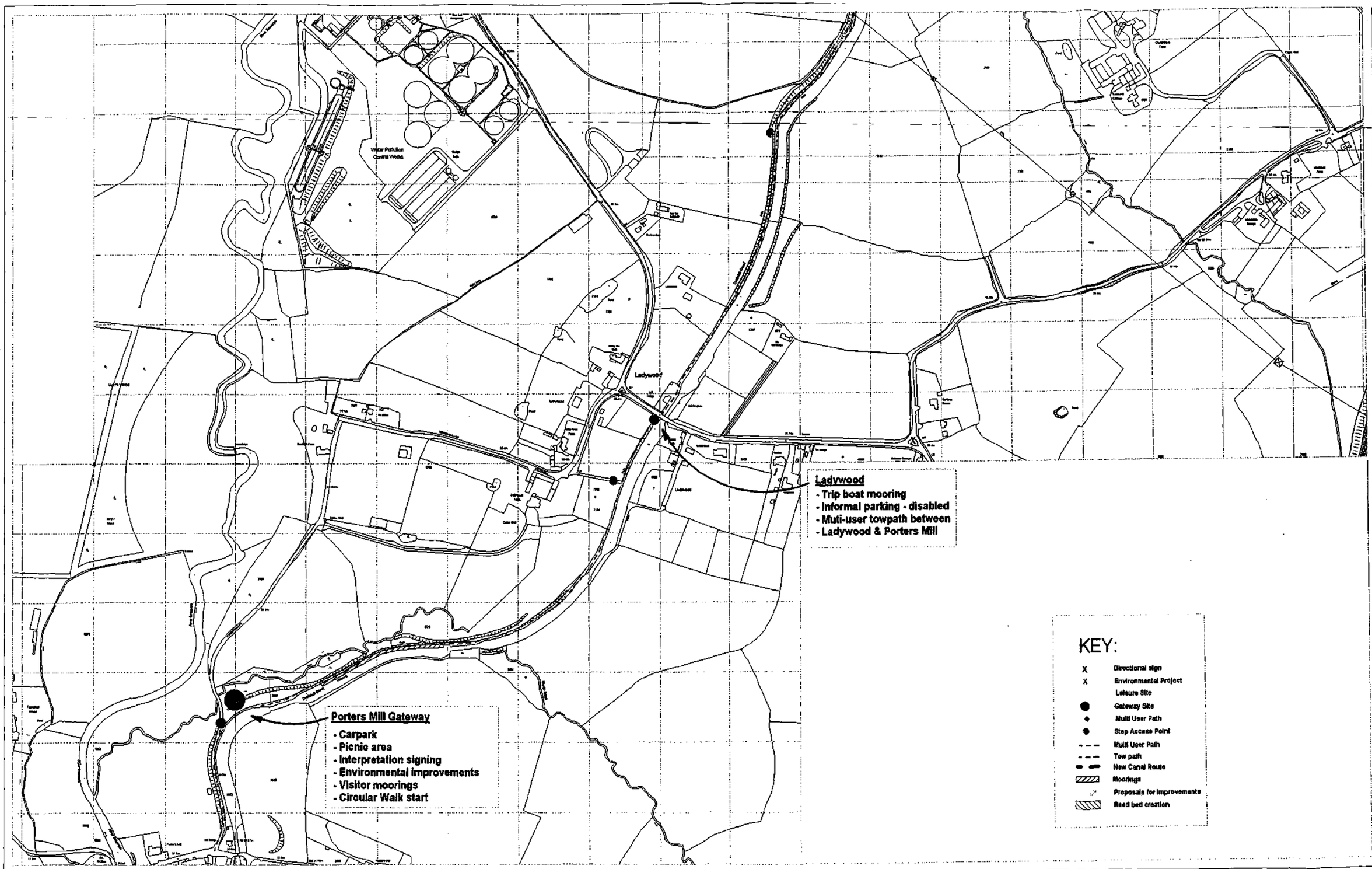
TITLE: Droitwich Canal 5 - Statutory and non-statutory designations

SCALE: 1:5000 NAME: M McCullough DATE: 16th October 2000

PROJECT: DEPARTMENT: Commercial DRAWING No:



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Tel. 01827 252000 Fax 01827 288071

TITLE: Droitwich Canal 5 - Country Park Proposals; DRAFT

SCALE: 1:5000 NAME: M McCullough DATE: 1st October 2000

PROJECT: DEPARTMENT: Commercial

DRAWING No:

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TITLE: Droitwich Canal 6 - Statutory and non-statutory designations

SCALE: 1:5500 NAME: M McCullough DATE: 16/10/2000

PROJECT: DEPARTMENT: Commercial DRAWING No:

Mildenham Lock
- Informal parking

Linacre
- Reed bed creation
- Interpretation

Linacre Bridge
- Interpretation

Porters Mill
- Reed bed creation

Hawford Marina Services

Droitwich Canal Entrance
- Sign
- New access to river

KEY:

- Directional sign
- Environmental Project
- Leisure Site
- Gateway Site
- Multi User Path
- Step Access Point
- Multi User Path
- Tow path
- New Canal Route
- Moorings
- Proposals for Improvements
- Reed bed creation

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Staffordshire B78 3QZ

TITLE: Droitwich Canal 6 - Country Park Proposals; DRAFT

SCALE: NB 1:5500 NAME: M McCullough DATE: 1st October 2000

PROJECT: DEPARTMENT: Commercial DRAWING No:

APPENDIX 4

Proposed Volunteer Policy

British Waterways

Droitwich Canals Volunteer Policy

This policy assumes that British Waterways will be managing the restoration and management of the Droitwich Canals on behalf of the Waterways Trust.

1. Vision

Volunteers will be actively encouraged to play a major role in the completion of the restoration and in the management of the long-term future of the Droitwich Canals.

2. Principles

Volunteers have played an essential and valuable role in the restoration of the Droitwich Canals.

British Waterways will work closely with the existing volunteer organisations, the Droitwich Canal Trust and the Waterway Recovery Group to achieve the restoration of the canals.

Individual volunteers will work on behalf of British Waterways as Towpath Rangers.

To ensure that the opportunity to volunteer is open to all there should not be any cost to the volunteer for participating.

British Waterways does not aim to involve volunteers to replace paid members of staff or existing organisations.

British Waterways will ensure volunteers are properly integrated into the organisation.

British Waterways will ensure appropriate training is provided.

3. Guidelines

For existing organisations :

- Volunteers working for other organisations (e.g. DCT, WRG, BTCV) will adhere to British Waterways policy whilst working on site and will come under the supervision of project's site supervisor.
- A Volunteer Agreement will be produced establishing what is required by all organisations.

For Towpath Rangers :

- As volunteers will be representing British Waterways, appropriate induction and training is required as well as an understanding of the legal issues surrounding volunteering.

- A Volunteering Agreement will be produced establishing what is required and agreed by both parties.

- No documentation will be intended to imply contracts of employment.

4. Recruitment

Volunteers will be recruited to undertaken identified real tasks that provide added value to the Droitwich Canals, and are identified and defined (by task description, method statement etc).

Volunteers will be selected using procedures that will be appropriate to the nature of work to be undertaken. If, for example, a high degree of responsibility is required, a more formal approach may be required.

5. Training and Induction

All volunteers will be given an induction into British Waterways appropriate to the area of work undertaken.

A Volunteer Agreement will be issued to ensure both parties are clear about involvement.

Training appropriate to the task set will be given, either provided by British Waterways or an external organisation. The Waterway Trust also proposes to be a provider of training for work competencies. This will provide a qualification that will be industry wide.

6. Expenses

Optionally expenses can be claimed to cover:

- Reasonable travel to and from place of volunteering
- Reasonable travel undertaken in course of volunteering
- Reasonable postage and telephone costs
- Protective clothing and other essential equipment (This will be an exceptional expense as clothing and equipment will be supplied from British Waterways' stores).

Only actual expenses will be paid and evidence of expenditure (receipts) will be required and authorisation prior to incurring.

7. Legal Issues

All volunteers working on behalf of and for British Waterways as defined in the "Volunteer Agreement" will be insured.

If the volunteer tasks include working with vulnerable clients such as children this will require British Waterways to employ a more formal process in the recruitment of volunteers.

8. Health and Safety

All volunteers will be covered by British Waterways Health & Safety Policy.

9. Equal Opportunities

British Waterways operates an equal opportunities policy which also applies to volunteer requirement.

10. Support and Management

Volunteers will be encouraged to "air" problems and give feedback. Supervision and management will be provided as appropriate to encourage, motivate and support.

APPENDIX 5

Summary of Economic, Social and Environmental Benefits of restoring the Droitwich Canals

APPENDIX 5

A summary of the Economic, Social and Environmental benefits of the Canals Restoration Project

Economic Benefits: *Five years after restoration*

Objective Source	Sustainability Objective	Canal Restoration Benefit	Output – defined and measurable
DETR	Investment in physical assets	Canal infrastructure	12km of new navigable waterway 12km of towpath restored/improved
		New walking/cycling routes (other than towpath)	
		New boating facilities	New marina Moorings 158 (100 permanent 30 temporary 28 commercial) Other boating facilities boatyard
		Other recreation/leisure facilities	One new fishery
		New non-residential property	Leisure/public use floor space Industrial floor space Office floor space Canal yard 2275 sq m Retail floor space Commercial floor space
		New residential property	Detailed figures to be confirmed once schemes develop
	Investment flows	Flows into local economy	Other public funds attracted to restoration based development Private funds attracted to restoration based developments
DETR	Growth in canal-based tourism and recreation economy	Additional visitor days	340,000 per year to Droitwich Canals
		New tourism and recreational spending	£2.5m p.a. within Droitwich Canals corridor £282,000 p.a. along other Worcestershire canals
		New activity in commercial boating market	100 permanent private boats based on canal 20 hire boats, 5 day boats, 2 trip boats, 1 restaurant boat
DETR	Generation of new employment	New canal-based tourism/recreation employment	87 fte jobs within Droitwich Canals corridor 11 fte jobs along other canals in Worcestershire
		New permanent jobs excl. jobs from canal-	17 within potential Canal Basin development

		based tourism/recreation	
			220 person years on potential canal restoration
		Temporary construction employment	160 person years on potential canal-side property Development

WCC DETR GOWM	Developing skills and training	Employment training opportunities	Numbers trained in specialist skills Numbers trained in obtaining qualifications Number training weeks Young people benefiting from personal/social development projects Students involved in collaborative projects

WCC DETR GOWM	Promoting vitality in local economy	New business start ups	Canal based business established/expanded
		Local sourcing	Local bids received for restoration projects
		Improved local business attitudes	% local business saying Droitwich canals are good for trade

WCC = Worcester County Council
DETR= DETR central government indicators
GOWM = Government Office West Midlands (Advantage West Midlands involved)

Social Benefits: *Five years after restoration*

Objective Source	Sustainability Objective	Canal Restoration Benefit	Output
WCC DETR GOWM	Shaping our surroundings	Re-use of previously developed land	Housing stock developed
		Re-vitalised town centre	Commercial/retail/leisure development within half mile of existing town centre
		Enhanced canal environment	% local community using canal at least once a month % feeling happy to use canal % believing canal environment is attractive/safe/has improved % feeling proud of local canal % feeling safe at night around canal % feeling canal is safe sub-division of results by disadvantaged group Litter count: amount of litter dredged out

WCC DETR	Better recreation and health	Increase in local visitor days	100,000 visitor days per year to Droitwich Canals

		Visitors by type	Boating/Canoes/Angling/Cycling/Walking % saying restoration has enhanced their recreational opportunities
WCC DETR	Access	Improved access to canal-based recreation and leisure	Disability access to towpaths and other facilities
WCC DETR	Community involvement	Opportunities for volunteer involvement	Volunteer days on canal restoration Voluntary organisations supported by restoration funds Community groups supported by restoration funds
		New community facilities	New base for Droitwich Canals Trust Local museum Local meeting space/exhibition area
		More and better community events	Community events held Numbers attending community events Services/facilities offered by community/volunteer groups
		Improved community attitudes	% believing canals "belong" to local community Number of people attending consultation events % believing they were able to express a view about the restoration project % believing they know what is "going on" on the canals % saying they are interested/concerned in how canal develops % believing they have the opportunity to participate in restoration activities
		Opportunities for locally based education	Community based education opportunities
WCC DETR GOWM	Improve choice in travel	Improved town centre cycle and pedestrian links Access to recreation opportunities close to homes	Cycle/pedestrian use of new paths in Droitwich Links with 'Safe routes to School' Number of leisure trips with/without car

WCC = Worcester County Council
DETR= DETR central government indicators
GOWM = Government Office West Midlands (Advantage West Midlands involved)

Environment Benefits: *Five years after restoration*

Objective Source	Sustainability Objective	Canal restoration benefit	Output
DETR	Landscape protection and enhancement	Better understanding of canal landscape	Production of landscape character assessment
		Improved landscape features	Hedgerows?? Soft/hard banks??
		Training in countryside skills	Person days of training
WCC DETR	Wildlife protection and enhancement	Greater extent of semi-natural habitats	Xx sq m of reedbed creation
		Higher populations of indicator species	Xx incidence of voles etc.
		Better management of waterway environment	Management plans in place Canal BAP completed
		Partnerships with environmental organisations	Number of partners worked with
DETR	Heritage protection and enhancement	Better understanding of canal heritage	Heritage assessment completed
		Better protection for heritage features	Listed structures/SAMs restored/removed from threat
		Training in heritage skills	Person days of training
		Archaeological opportunities during restoration	Rescue archaeology undertaken at key sites
DETR	Freshwater	Improved water quality	Chemical composition Nutrient content Ecological quality 'Good status' as defined by Water Framework Directive Water quality of Salwarpe maintained
		Water control	Water loss Water abstraction
DETR	Reduce contaminated waste in the environment	Removal of hazardous waste	Mercury levels
DETR	Improving resource efficiency	Greater re-use, recycling and recovery of waste	Management of waste arising from renovation

WCC = Worcester County Council
DETR= DETR central government indicators
GOWM = Government Office West Midlands (Advantage West Midlands involved)