

Environment Agency

Strategic Appraisal Report

Supporting Report 4

**Fens Waterways Link: Connecting
the Cathedral Cities**

DRAFT - For Consultation

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Document History

JOB NUMBER: 5014831			DOCUMENT REF: Strategic Appraisal Report v7.doc			
Revision	Purpose and Description	Originated	Checked	Reviewed	Authorised	Date
V1	Draft for internal review	Caroline Frost	James Tradewell	Nathan Richardson	Nathan Richardson	30.06 2003
V2	Draft for internal review	Caroline Frost	James Tradewell	Nathan Richardson	Nathan Richardson	09.09.03
V3	Draft for internal review	Caroline Frost	James Tradewell	Nathan Richardson	Nathan Richardson	12.09.03
V4	Draft for internal review	Caroline Frost	James Tradewell	Nathan Richardson	Nathan Richardson	16.09.03
V5	Draft for client review	Caroline Frost	James Tradewell	Nathan Richardson	Nathan Richardson	24.09.03
V6	Revised draft for client review	Caroline Frost	James Tradewell	Nathan Richardson	Nathan Richardson	6.11.03
V7	Draft for Consultation	Caroline Frost	James Tradewell	Nathan Richardson	Nathan Richardson	6.5.04

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GLOSSARY OF TERMS

Term	Meaning / Definition
AMP	Asset Management Programme
Biodiversity	The total variety of life on earth. This includes diversity within species, between species and ecosystems.
BAP	Biodiversity Action Plan. Produced by United Kingdom in response to 1992 Earth Summit. Purpose of the BAP is to focus resources to conserve and enhance biodiversity by means of local partnerships, taking account of national and local priorities.
BMWP	Biological Monitoring Working Party. A methodology for assessing water quality based on macro-invertebrate communities.
Competent Authority	Any minister, government department, public or statutory undertaker, public body or person holding a public office that exercises legislative powers.
CEWP	Coastal and Estuarine Working Party. A historical summary of the quality of estuarine waters based on points awarded for biological, aesthetic and water quality. Will be overtaken by coastal/estuarine GQA.
Countryside Stewardship Award	DEFRA funding for farmers and landowners to improve the natural beauty and diversity of the countryside.
CWS	County Wildlife Site. A wildlife site of countywide importance.
DEFRA	Department for Environment Food and Rural Affairs. Government Department responsible for the protection and improvement of the rural, urban, marine and global environment and integration of these aims with other policies across Government and internationally.
Agency or EA	Environment Agency
EC Directive	Legislation issued by the European Union that is binding on Member States in terms of the results to be achieved. It leaves to Member States the choice of methods.
EIP	Examination in Public
ESA	Environmentally Sensitive Area. Land use scheme promoted by RDS, which offers incentives to encourage farmers to adopt agricultural practices which would safeguard and enhance parts of the country of particularly high landscape, wildlife or historic value
European Site	A classified SPA, designated SAC, candidate SAC (England only) or a site hosting a priority species in respect of which Article 5 of the Habitats Directive applies.
Favourable conservation status	A range of conditions for a natural habitat or species at which a sum of the influences acting upon that habitat or species are not adversely affecting its distribution, abundance, structure or function throughout the EU in the long term.
Floodplain	This includes all land adjacent to a watercourse over which water flows or would flow but for flood defences in times of flood.
FWRSG	Fens Waterways Regeneration Strategy Group. A sub-group of the Fens Tourism Group which specifically looks at waterways within the Fens area.
GQA	General Quality Assessment. Provides a means of assessing and reporting environmental water quality in a nationally consistent and objective way.
GVZ	Groundwater Vulnerability Zone

Habitat	The place in which a plant or animal lives.
Habitats Directive	The abbreviated term for Council Directive 92/43/EEC of 21 May 1992 on the Conservation of Natural Habitats and Wild Fauna and Flora. It is the aim of the Directive to promote the conservation of certain habitats and species within the European Union.
IDB	Internal Drainage Board. Authorities responsible for dealing with land drainage within a district. They are primarily concerned with agricultural land drainage but also may be involved with water supply to their district for agricultural purposes.
IPC	Integrated Pollution Control. An approach to pollution control in the UK that recognises the need to look at the environment as a whole, so that solutions to particular pollution problems take account of potential effects upon all environmental data.
IPPC	Integrated Pollution Prevention Control. Integrated Pollution Prevention and Control. Designed to prevent, reduce and eliminate pollution at source through the prudent use of natural resources. It is intended to help industrial operators move towards greater environmental sustainability.
ITWP	Integrated Transport White Paper. Government policy on waterways published in 1998.
LEAPs	Local Environment Agency Action Plans. A catchment based plan produced by the Environment Agency to draw together the responsibilities of the Agency and to set out a common vision for the management of the environment as a whole.
LIFE	Lotic-invertebrate Index of Flow Evaluation. A method linking qualitative and semi-quantitative change in riverine benthic macro-invertebrate communities to prevailing flow regimes.
LNR	Local Nature Reserve. Nature reserves established and usually managed, by District/Borough Councils. Local Authorities are empowered to designate such sites under the National Parks & Access to the Countryside Act 1949.
LPA	Local Planning Authority. Government authority responsible for local planning issues.
Main River	The watercourse shown on the statutory "Main River Maps" held by the Agency and DEFRA. The Agency has permissive powers to carry out works of maintenance and improvement on these rivers.
Natura 2000	The European network of protected sites established under the Birds Directive and Habitats Directive.
NNR	National Nature Reserve. National Nature Reserves are places established to protect the most important areas of wildlife habitat and geological formations in Britain, and as places for scientific research.
NVZ	Nitrate Vulnerable Zone. An area where nitrate concentrations in sources of drinking water exceed, or are at risk of exceeding the limit of 50 mg/l set down in the 1991 EC Drinking Water Directive. Compulsory and uncompensated agricultural measures were introduced in December 1998 to ensure reduction in these levels.
Permissive Powers	Powers which confer on the Agency the right (but not the duty) to do things.
PPG	Pollution Prevention Guidance. Guidance produced by the Environment Agency to help prevent pollution.
PPG*	Planning Policy Guidance Note. Guidance Notes produced by the government to aid local authorities on planning issues.
Ramsar	Designated under the International Convention on Wetlands of International Importance especially as Waterfowl Habitat (the Ramsar Convention).

RAS	Radioactive Substance. A substance defined as radioactive under the Radioactive Substances Regulations.
RCS	River Corridor Survey. A map-based system of surveying 500m lengths of a river. It provides information about the location of habitats and plant assemblages within river channels, margins, banks and corridor.
RPG	Regional Planning Guidance. Guidance produced by regional government in relation to planning issues.
RDA	Regional Development Association. Regional body that sets and implements agendas for improving the prosperity of the region by focussing on social, economic and physical regeneration.
RDS	Rural Development Service. Promotes, delivers and manages the England Rural Development Programme on behalf of DEFRA.
SAC	Special Area of Conservation. Areas designated under the EC Habitats Directive. Sites are considered to be of international importance for key habitats and species.
SAM	Scheduled Ancient Monument. The key sites nationally for archaeology, designated by the Secretary of State for National Heritage, through English Heritage.
SCI	Site of Conservation Interest. A site, which in the biogeographic region to which it belongs, contributes significantly to the maintenance or restoration at a favourable conservation status of a habitat or species scheduled in the EU Habitats (and Species) Directive.
SEA	Strategic Environmental Assessment. EIA applied at the programme, plan or policy level to ensure that environmental implications are identified prior to their implementation so that they can be modified to avoid or minimise the adverse environmental effects.
SNCI	Sites of Nature Conservation Interest
SPA	Special Protection Area. Areas designated under the EC Birds Directive. Sites are considered to be of international importance for key habitats and species
SSSI	Site of Special Scientific Interest. A site given a statutory designation by English Nature because it is particularly important, on account of its nature conservation value.
SWOT	Strengths Weaknesses Opportunities Threats. SWOT Analysis is a method of identifying the Strengths and Weaknesses, and of examining the Opportunities and Threat to a project.

Non-Technical Summary

Background

In 1997, as part of a millennium project initiative, a new navigation ring through the cathedral cities of eastern England was proposed by the Fens Waterways Regeneration Strategy Group (FWRSG). This is a partnership of a number of local authorities, funding agencies, waterways groups and the Environment Agency.

Two pre-feasibility studies were undertaken by Bullen Consultants Ltd looking at the areas to the north and south of Peterborough. These studies reported in summer 2000. They investigated a number of alternative routes for the navigation link and identified a preferred route based on technical, economic and environmental criteria. This preferred route includes a combination of the use of existing navigable waterway, restoration of currently un-navigable waterway and the construction of some new waterway (e.g. to connect the Welland and the Nene). This route forms the focus of current work, however, it is recognised that there will be parts of the proposed link where further alternatives need to be considered for technical, environmental or economic reasons.

To take forward the project, funding has been obtained from the FWRSG partners and from the two relevant Development Agencies. Part of this funding has been used to commission Atkins to assist in progressing the initiative. This work has included the development of an **Implementation Plan** that sets out the challenges faced, and the opportunities open to the initiative, and identifies an appropriate implementation strategy. It has included a number of complimentary elements which are investigating engineering issues, navigational demand, water balance issues, architectural design, re-generation potential and planning links. One of these elements is a **Strategic Appraisal** of environmental issues which has been undertaken broadly in line with emerging Environment Agency guidance and forthcoming UK legislation on strategic environmental assessment (SEA) of plans and programmes. This report documents the output from this appraisal.

The Strategic Appraisal of Environmental Issues

Main Features of the Baseline Environment

A high level description of the baseline environment along the whole route is provided in the Strategic Appraisal (Section 2) based on data received from the Environment Agency, consultees and wider literature. The main features of the baseline environment include:

- ◆ The limited extent of existing navigation facilities;
- ◆ The heavy existing use of a number of the watercourses for fishing;
- ◆ The generally rural nature of the area with limited public access in some areas;
- ◆ The presence of a number of nationally and internationally important nature conservation sites and areas of heritage value and archaeological importance;
- ◆ The large number of water abstractions and the limited water availability;
- ◆ The low lying nature of the region and the land drainage and flood risk management requirements this brings; and
- ◆ The lack of landscape variety along the route.

It is evident from the review of the baseline environmental that there are strong nature conservation and heritage/water management themes across the study area. Opportunities

should be sought to build upon these themes as important features characterising the Fens Waterways Link.

Consultation

An extensive consultation exercise was undertaken in May 2003 involving over 450 individuals and organisations. An Environmental Scoping Report and/or leaflet was sent to consultees. A website was developed with information about the project and a facility to download documents. In addition, a series of meetings were held with key stakeholders. The consultation process is ongoing and has contributed to the Strategic Appraisal. Responses from consultees are summarised in Section 3.

Summary of Impacts

There are a wide range of significant beneficial impacts that the initiative could deliver and these are presented in Section 5. The Strategic Objectives developed as part of this project, and presented to consultees in the Environmental Scoping Report in May 2003, neatly summarise the significant potential benefits of realising the Fens Waterways Link. They will be used to assess the projects that are progressed as part of the Fens Waterways Link initiative.

Topic	Strategic Objectives
Regeneration	<ul style="list-style-type: none"> • Act as catalyst for economic and social renewal. • Increase development value and the opportunity for investment. • Focus and bring together regeneration opportunities. • Generate long term economic activity and opportunities for employment. • Promote social inclusion and quality of life.
Sport and Recreation	<ul style="list-style-type: none"> • Provide an important sport and recreation resource. • Contribute to the health and well-being of society. • Form corridors linking urban areas to the countryside. • Promote accessibility to all members of society. • Create a new fishery of national importance.
Tourism	<ul style="list-style-type: none"> • Act as a tourism asset in its own right. • Provide a link between existing and new attractions. • Support the holiday industry through water-based activities. • Enhance the environment and attract increased visitor activity.
Heritage, Culture and the Natural Environment	<ul style="list-style-type: none"> • Form a unique heritage, cultural, educational, landscape and environmental asset. • Provide access to a wide array of important historic buildings and structures. • Contribute to the diversity of the natural environment by sustaining and enhancing habitats and supporting rare species. • Contribute to achieving biodiversity targets, incorporating sustainability principles at all stages of the project • Contribute to open space provision. • Provide a resource for water supply, water transfer and land drainage. • Protect and enhance water quality and contribute to flood risk management.
Transport	<ul style="list-style-type: none"> • Contribute to integrated transport objectives. • Provide transport routes on a local and regional scale. • Act as a waterborne transport corridor for people and freight. • Form important cycling, walking and public access corridors.

Adapted and developed from 'Planning a Future for the Inland Waterways: A Good Practice Guide' Inland Waterways Amenity Advisory Council. December 2001.

However, to progress the link there will also be significant environmental challenges which will need to be addressed as project elements are progressed. These include:

- ◆ Ensuring that any adverse impacts on key species and habitats are avoided or mitigated to acceptable levels;
- ◆ Avoiding any adverse impacts on water quality and flood risk or any derogation of existing water uses such as water supply and fishing;
- ◆ Ensuring that any associated developments are appropriate to the landscape character of the area; and
- ◆ Protecting features of heritage or archaeological interest.

It is important to emphasise that for the vast majority of the adverse impacts identified in this appraisal it should be possible to significantly reduce their significance through the development of appropriate mitigation measures. What is evident is that the project does present some very significant opportunities for environmental benefit and enhancement and that realising these opportunities should be a fundamental consideration in any of the work elements that develop out of the Fens Waterways Initiative.

Environmental Permissions and Consents

A brief review of the key environmental permissions and consents that will be required to progress the Fens Waterways Link has been undertaken (Section 6). In addition to the requirements for Environmental Impact Assessments (EIA) of specific projects to obtain planning consent there is also likely to be a need for formal EIA of any water storage reservoirs or for inter-basin water transfers. Other water related consents include abstraction and impoundment licences, discharge and land drainage consents. Flood risk assessments will also be required for any development work in the floodplain.

Any works that may impact on nationally important nature conservation sites (e.g. Sites of Special Scientific Interest) will require English Nature consent. Where internationally important sites are concerned (e.g. Special Protection Areas, Special Areas of Conservation) an Appropriate Assessment of potential impacts on their features and site integrity will be necessary.

Recommendations

A number of recommendations have been identified during the Strategic Appraisal. These are summarised below:

1 - Use of the Strategic Objectives

It is anticipated that the Fens Waterways Link will be progressed as a series of individual but linked projects aimed at meeting the wider, generic aspirations of the overarching Fens Waterway Link initiative. It is important that any works undertaken under the umbrella of the Fens Waterways Link are in accord with the aspirations and objectives of the initiative.

It is recommended that any projects that arise from the Fens Waterways Link initiative should be assessed against the agreed Strategic Objectives. To aid in this assessment it is further recommended that a series of more specific Indicators are derived from the Strategic Objectives and agreed by the project partners.

2 - Continued Consultation and Stakeholder Involvement

General Consultation and Awareness

Having successfully launched the Fens Waterways Link to stakeholders it is imperative that the momentum is not lost and that the project maintains interest.

It is recommended that the Implementation Plan and the Strategic Appraisal should be made available and a new leaflet produced to include a summary what is happening next. The website should also be updated. In terms of the local communities along the

route of the link it is recommended that a series of local meetings/exhibitions are organised to raise awareness and identify aspirations and concerns. An updated version of the Communication Plan should be drafted to ensure this is undertaken in a planned manner.

Landowners

To date no landowners have been contacted along the proposed route of the Fens Waterways Link. This is an important omission particularly in areas where new navigations are proposed (e.g. around Peterborough). Landowner details are being obtained through the Land Registry.

It is recommended that a series of face to face meetings are held with key landowners to raise awareness of the scheme and to identify opportunities and constraints.

Local Authorities

Although an initial review of the relevant planning authority documents was undertaken as part of the preparation of the Implementation Plan the level of interaction with planning departments during the project to date has been limited and is something that needs to be addressed in the next phase of the project.

It is recommended that planning authorities are asked to nominate a key individual for future liaison and that face to face meetings should be held with the nominated people.

Links with Other Initiatives

During the Strategic Appraisal and the associated consultation exercise, the Project Team has been made aware of several other relevant initiatives in the region. These include the Great Fen Project near Peterborough, the Boston Haven Strategy Study, the Lower Witham Flood Management Strategy Review, and the River Nar navigation proposals near King's Lynn.

During the consultation, opportunities were suggested for extending the route to link in with other waterways in the area. It was suggested that a spur should be provided into Market Deeping, which was once navigable. It was also suggested that the route be extended to include the River Lark up to Mildenhall. The route could also be linked up to the Nar Navigation at King's Lynn.

It is recommended that links with these projects are maintained and opportunities sought to work in synergy with them.

Consultation Database

As part of the consultation exercise an MS Excel spreadsheet was used to record consultee contact details (largely taken from the relevant LEAP consultation lists), what they had been sent and when and whether they had responded and how. The database has been managed by a single point of contact and has proved a useful tool. If it is developed and maintained it will be of increasing use as the Fens Waterways Link is implemented.

It is recommended that the existing Excel spreadsheet is converted into a fully functional MS Access database and that it is maintained and used as a central record of consultation and public participation as the Fens Waterways Link progresses.

3 - Obtaining Environmental Permissions and Consents

It is anticipated that the Fens Waterways Link will be progressed as a series of individual but linked projects. As a consequence of this there will be a need to undertake a series of individual environmental studies (e.g. EIA) and to obtain a range of environmental permissions and consents at the specific project level (see Section 6). In addition, these projects and the supporting studies and permissions may well be progressed by a range of

organisations. There is therefore a need to ensure that this work is undertaken in a coherent and co-ordinated manner, and within the framework of the Fens Waterways Link. This is essential to ensure that the wider aspirations and strategic objectives of the initiative are retained and properly incorporated into individual projects and that the involvement of stakeholders and decision makers on individual projects is within an understanding of the wider context of the Fens Waterways Link.

It is recommended that this can best be achieved by nominating a core environmental team to have a role in scoping, supporting and reviewing environmental work falling within the wider project umbrella.

4 - Data Collation and Management

A wide range of high level data sets have been obtained and reviewed by Atkins as part of this project. During the project we have also been made aware of a significant number of additional, generally more detailed data-sets that could be available. A significant amount of effort can be expended by stakeholders and project promoters obtaining and using environmental data-sets.

It is recommended that environmental data-sets obtained through this and any follow on projects are held centrally and maintained by a core environmental team. These data-sets should be available to individual projects progressed as part of the Fens Waterways Link.

5 – Investigating Potential Impacts on Internationally Important Habitats

The preferred route of the link has the potential to either directly, or indirectly, impact on a number of internationally important nature conservation sites (e.g. The Ouse Washes, The Nene Washes). Any significant impact that affects the features for which these sites were designated or the overall integrity of these sites is likely to prevent the relevant part of the scheme progressing.

It is therefore recommended that more detailed discussions with English Nature are undertaken and an initial investigation into the potential for significant impacts on these sites is progressed. In particular, it is recommended that there is a need to investigate the potential effects of navigation on the spined loach.

1 Introduction

Under the Environment Act 1995 the Environment Agency's general environmental and sustainability duties require that it must undertake environmental appraisal of its works and activities. As part of the progression of the Fens Waterways Link the project partners have commissioned the preparation of an Strategic Appraisal which aims to evaluate and anticipate the consequences of decisions taken prior to the project stage of the Fens Waterways Link. This appraisal forms one of several supporting documents for the Implementation Plan for the Fens Waterways Link. Other supporting documents have been produced that consider engineering, navigation, economics, planning and water balance issues.

1.1 Background to the Fens Waterways Link Project

In 1997, as part of a millennium project initiative, a new navigation ring (the Fens Waterways Link) through the cathedral cities of eastern England was proposed by the Fens Waterways Regeneration Strategy Group (FWRSG) a sub-group of Fens Tourism.

The idea behind the Fens Waterways Link is to provide a navigation between Boston, Lincolnshire and Ely, Cambridgeshire in the Fens area and join this system to the rest of the UK. Through the construction of new channels, and the renewal of existing systems, an entirely new navigational ring will be formed. The proposed route will negate the use of a number of tidal waters which presently are a restriction on the existing waterways. In addition to realising navigation benefits, the projects objectives include working to bring a range of other benefits to the region as listed in Section 4.

To take forward the initiative the FWRSG commissioned two pre-feasibility studies which reported in summer 2000:

- ◆ *Fens Tourism Group, Earith to Ramsey Link, Final Report, Bullens, 99L100/003/C, July 2000; and*
- ◆ *Fens Tourism Group, River Witham to River Nene Link, (Boston to Peterborough), Final Report, Bullens, 99L100/006/B, August 2000.*

These Phase 1 reports confirmed the feasibility of the project and, after considering a number of alternative route options, identified a preferred route for further investigation.

To take forward the project, funding was sought from the FWRSG partners and from the East of England Development Agency, the East Midlands Development Agency, and the European Regional Development Fund. Part of this funding has been used to commission Atkins (in February 2003) to undertake the second phase of the project. The aim of Phase 2 is to develop an Implementation Plan, such that the project can be promoted locally, regionally and nationally and appropriate further funding can be obtained. A **Strategic Appraisal** was also commissioned both as a high level assessment of the potential environmental implications of the project and to develop a set of strategic objective against which projects arising from the initiative can be assessed. This report has been produced as an output of that process (see Section 1.2).

The proposed new waterway would begin in Boston in Lincolnshire and end near St Ives on the Great Ouse in Cambridgeshire. Through the construction of new channels, and the renewal of existing systems, an entirely new navigational ring will be formed. The resultant new ring will link the cathedral cities of Lincoln, Peterborough and Ely. It will create approximately 87km of extra navigable waterways on the Fens and make a further 160km more accessible.

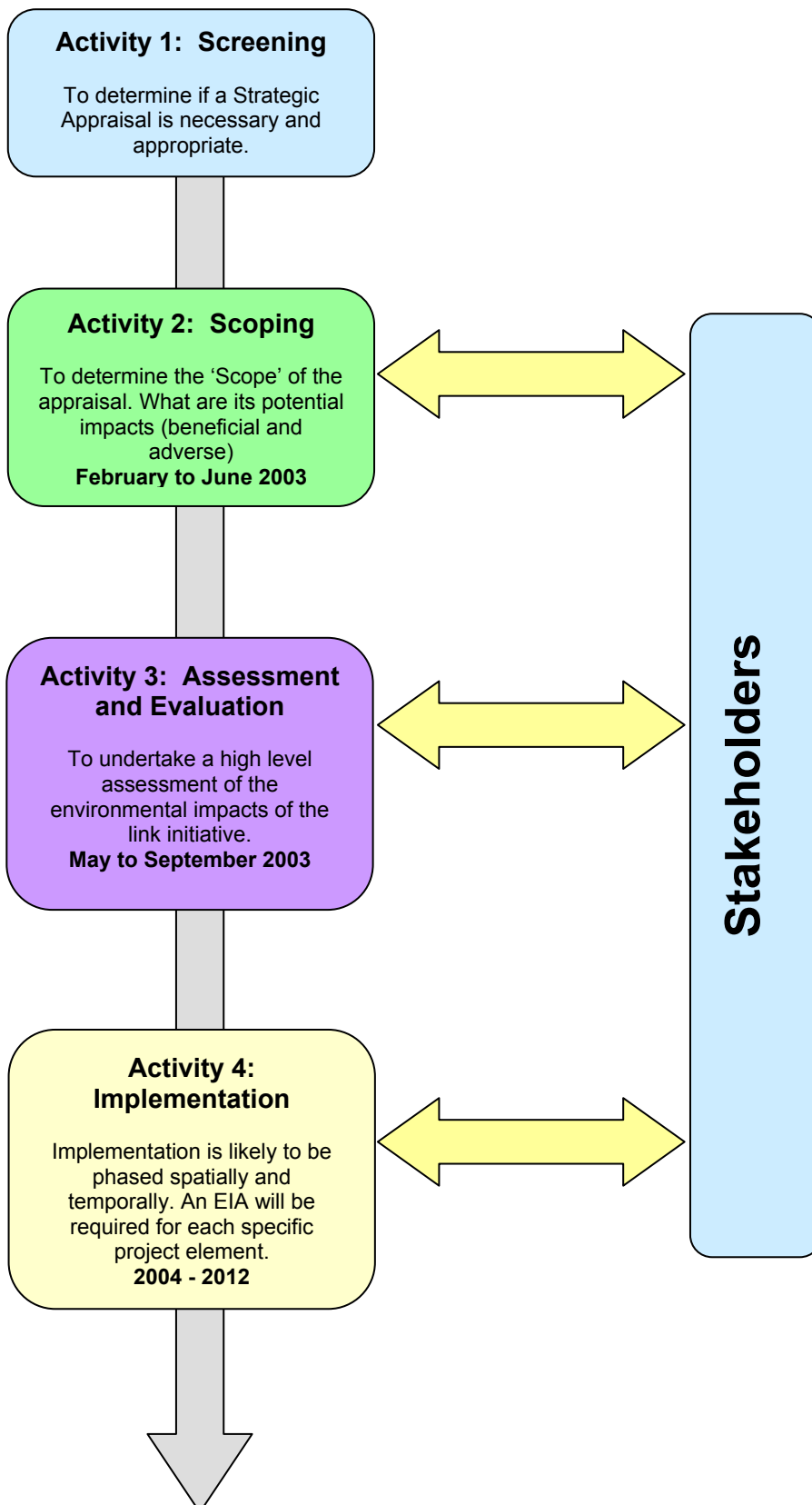
The proposed route will seek to avoid the navigation of tidal waters near Denver, Surfleet and Boston which can pose difficulties to inexperienced boaters. The proposed route will connect the navigations of the Trent, Fossdyke and Witham with the Nene which in turn connects to the Ouse, Middle Levels and the Grand Union Canal to Nottingham.

1.2 Purpose of This Document

As highlighted above, Atkins was commissioned in February 2003 to prepare the Implementation Plan and to undertake a Strategic Appraisal. During the Scoping Stage of the appraisal (see Activity 2 in Schematic 1) effort was focussed on collecting and collating readily available data held by the Project Partners and in undertaking an initial assessment of its engineering and environmental implications. As an output of this phase an Environmental Scoping Report was prepared together with a project leaflet and a website. These tools were used to consult stakeholders between May and August 2003.

Following the Scoping Stage the information obtained from consultees was reviewed, evaluated and a high level assessment of the potential impacts of the project undertaken (see Activity 3 in Schematic 1). This **Strategic Appraisal Report** is the output of this work.

Schematic 1 The Project Process



It should be noted that this report is not an Environmental Statement or formal Strategic Environmental Assessment report (in line with forthcoming legislation) and it has not been prepared to support a specific planning or licence application. Rather it provides a high level overview of the environmental issues pertinent to the Fens Waterways Link focussing on a route defined at the outset of the study. As described in Section 6 further more detailed and focused Environmental Impact Assessment studies will be required at the project specific stage as the initiative progresses.

As part of the development of the Implementation Plan and in parallel with this report (Supporting Report No. 4) a series of other specialist reports have been prepared as follows:

Supporting Report No.1 – Navigation
Supporting Report No.2 – Economics
Supporting Report No.3 – Engineering
Supporting Report No.4 – Environment
Supporting Report No.5 – Water Resources
Supporting Report No.6 – Planning
Supporting Report No.7 – Land Ownership

1.3 Options Considered Previously

Two previous studies (Bullen Consultants Limited, 2000a and b) considered a range of alternative route options for the Fens Waterways Link (see Figure 1.1a and 1.1b). The reports considered routes between Boston and Peterborough and the second, routes between Earith and Ramsey. After consideration of technical, economic and environmental factors a preferred route was identified in these studies. The Scoping Report issued as part of this Strategic Appraisal consulted stakeholders on this preferred route. The do nothing/do minimum scenario would maintain the current status quo of the waterways in the Fens and thus has not been assessed as the project is not a necessity but an enhancement opportunity.

1.3.1 Boston to Peterborough

For the section between Boston and Peterborough (Figure 1.1a) which runs from the River Witham to the River Nene three main routes were considered by Bullens (with four variations on the third route).

The restoration of the South Forty Foot Drain into a navigable waterway is common to all the routes in the section between Boston and Peterborough. South of the Drain the three alternative routes investigated all start at Guthram Gowt (NGR TF173 225) and end at Padholme Pumping Station (NGR TL239 139) to create a link between the River Glen and the River Nene.

A SWOT analysis was conducted by Bullens and technical, planning, environmental and economic factors were considered. The study concluded that the preferred route would be that which involved restoration of the South Forty Foot combined with the Brown Route between the Glen and the Nene. From Guthram Gowt on the River Glen the preferred route follows the Glen to downstream of the River Welland at Surfleet Seas End. The Welland is then followed upstream to Peakirk, around the Peakirk sluices and southwards using a new waterway along the Car Dyke to join the River Nene at Padholme Pumping Station.

The Bullen report (Bullens, 2000a) states that this preferred route offers the greatest opportunity for increased economic activity although it requires three new lock structures at Guthram Gowt, Peakirk Pumping Station and Padholme Pumping Station. This route was considered by Bullens to lead to fewer difficulties than the other routes for existing flood defence arrangements, water resources interests and it uses and restores existing navigation routes between Guthram Gowt and Peakirk.

1.3.2 Earith to Ramsey Link

The second report by Bullen Consultants (2000b) considers navigation routes between Earith (on the Great Ouse System) and Ramsey (on the Middle Level System) and includes the possibility of constructing a new link to create a circular route between the two locations (Figure 1.1b). Three options were proposed for the creation of the “circular” route. Two of the options rely totally on the use of existing waterways; whilst the third option involves partial use of some existing waterways and creation of a new waterway between Earith and Chatteris. A SWOT analysis was conducted in the report for this section and technical, planning, environmental and economic factors were considered.

The first option is to return from Ramsey via the High Lode, the Forty Foot, and the Old Bedford River to rejoin the existing route at Denver; then to use the existing route to Earith. The second option is to return from Ramsey to Welches Dam Lock (as in Option 1), but to then use either the New Bedford River (via an aqueduct) or the Old Bedford River direct to Earith. The third (preferred) option was to return from Ramsey via part of the Forty Foot with a new waterway constructed between Chatteris and Earith linked to the Ouse via a short length of the Old Bedford. The Bullens report concludes that the first two options are likely to be environmentally unacceptable as they would require using part or all of the Old Bedford River which would cause unacceptable degradation to the integrity of the European site. The report proposes the third option as the preferred route offering the best environmental and economic benefits.

1.4 Current Preferred Route and Main Engineering Challenges

The preferred route taken from the previous work forms the focus of the current project and is shown in Figure 1.2. However, it is recognised that, in a number of key areas, a range of alternatives still need to be considered and thus there is some degree of flexibility in the preferred route. The consultation and scoping report concentrated on the previously preferred route, however during consultation two sections of the route were identified as particularly problematic. Firstly, English Heritage highlighted the use of Car Dyke as unacceptable due to its nationally important heritage status and thus an alternative has been proposed using Kennulph’s Drain and Cats Water Drain (Section 1.4.1). Secondly, the Middle Level Commissioners have indicated that the use of Cranbrook Drain and Twenty Foot Drain/Fenton’s Lode as a navigation is unacceptable to them in terms of flood defence, water resources and conservation issues. An alternative, first considered in the Bullens report, using the Old Bedford River up to Welches Dam and then the Forty Foot/Vermuyden’s Drain has been proposed. These alternatives have been considered in this report but, to date, consultation has not been carried out on these new proposals.

1.4.1 The Engineering Challenges and Options

The route begins in Boston and runs from here (on the River Witham System) to Peterborough (on the River Nene system) (Figure 1.3a). This part of the route involves restoring the South Forty Foot Drain to become a navigable waterway, and the creation of a new navigable link from the River Glen, at the southern end of the South Forty Foot, to the River Nene at Peterborough.

The major engineering constraints along this part of the route are at Padholme Pumping Station, Fulney Lock, Surfleet Sluices, Guthram Gowt and at Black Sluice in Boston. These challenges are described below. Most can be overcome using engineering solutions or by progressing an alternative local option. The most significant challenge will be met trying to improve navigation at Surfleet Sluices and the refurbishment of Black Sluice in Boston back into a sea lock structure.

Black Sluice at the northern end of the South Forty Foot marks the end of this watercourse and there is currently no means of accessing the River Witham. The Black Sluice is a tidal sluice structure with no facilities for allowing boat navigation through it. Therefore three options have been proposed. The first option involves the construction of a sea-going lock with sluice gates and modification of the approach to the existing sluice gates. The second option involves leaving the Black Sluice in its current position on the South Forty Foot Drain and building a new Grand Sluice on the Witham just upstream of the South Forty Foot outfall, then creating a new fluvial link between the Witham and the South Forty Foot. This would make the Witham upstream of the barrage fluvial allowing easier navigation from the South Forty Foot into the River Witham. The Third option involves using the existing North Forty Foot Drain to link the South Forty Foot to the Witham.

Guthram Gowt marks the point at which the River Glen runs closest to the junction of the South Forty Foot Drain. Presently there is no means of leaving the Glen and accessing the South Forty Foot Drain. A double lock structure would be required here to maintain water levels on the River Glen. A new section would be required linking the two watercourses which could follow the route of a small local drain. A new bypass channel would also be required around Black Hole Drove Pumping Station on the South Forty Foot.

The tidal section of the route near the confluence of the River Welland and River Glen is notoriously difficult to navigate and limits boat numbers, timing of movements and the accessibility of waterways to novices. A number of options to address this have been considered. The first option proposed is to create a new tidal lock structure at Surfleet Sluices. The second option is to abandon the tidal River Welland between Fulney Lock and Surfleet Sluices and create a new link from the Welland into the Vernatt's Drain. The Vernatt's Drain can then be used to access the River Glen. Vernatt's Drain is currently non-navigable and the responsibility of Welland and Deepings IDB. This option involves the construction of a sluice gate structure in the River Welland just downstream of Fulney Lock and Marsh Road Sluice. A new sluice gate would make the Welland upstream of the structure fluvial thus removing the tidal navigation constraints associated with Fulney Lock. Two new lock systems would be required, the first from the River Welland into Vernatt's Drain and the second lock system from Vernatt's Drain into the River Glen. This option will require a detailed feasibility study to demonstrate to the IDB its technical feasibility and to prove there will be no detriment to the existing drainage system.

The original preferred route from Padholme Pumping Station around the eastern side of Peterborough using the Car Dyke has been reconsidered as this watercourse is a Scheduled Ancient Monument and its use as a navigation would not be permitted by English Heritage. The presence of several large roads and industrial sites also makes this route technically difficult, physically unattractive to the boater and expensive to construct. An alternative route has been proposed further to the east of Peterborough. The route leaves the River Nene at Padholme Pumping Station where a new lock would be required. A section of new canal would be required from Padholme Pumping Station to Cats Water Drain which would follow the route of an existing drainage ditch that flows through a series of agricultural fields and near to the Flag Fen Bronze Age museum. The route then follows Cats Water Drain in a northerly direction, going beneath the A47 near Eye to Nene Terrace. Then, to enable the Cats Water Drain to be linked into the River Welland, a new build section of canal will be required linking the Cats Water Drain with the existing Kennulph's Drain at Kennulph's Farm. This section of new watercourse will run to the south of Nene Terrace. The route then follows Kennulph's Drain to Postland Pumping Station through which access can be gained into the River Welland via a drainage ditch through Crowland High Wash. From this drainage ditch a new lock structure would be required into the River Welland.

South of Peterborough the preferred route is circular in nature and passes through Earith, Ely, Littleport, Denver Sluice, Outwell, Upwell, March, Chatteris and finally terminates back at Earith (Figure 1.3b). This loop is approximately 88km long.

The major engineering constraints along this part of the route are experienced at Hermitage Lock, the Denver Sluice complex, Salters Lode, Fenton Lode and at the connection between navigations at Earith and near Chatteris. All these constraints will need further examination and consideration of local alternative options. There is potential for a high profile technical solution at Denver which could represent a 'show piece' attraction on the route.

Most of this circular route follows existing navigable watercourses. However, there are alternative options linking Earith to Chatteris. The original preferred route taken from the Bullens study involved a new waterway linking Cranbrook Drain to Fenton's Lode and Twenty Foot Drain. However, during consultation the Middle Level Commissioners stated that the use of Cranbrook Drain and Fenton's Lode/Twenty Foot Drain would be unacceptable due to issues with flood defence, water resources and conservation. Therefore another of the Bullens proposed alternative routes has been included in this study. This route continues down the Vermuyden's Drain/Forty Foot Drain to Welches Dam Pumping Station. Here there are then two ways of getting into the Old Bedford River. The first involves an aqueduct structure and the second a lock structure. The route then continues down the Old Bedford River to Earith. It is, however, recognised that there are significant potential environmental issues with this part of the route that will need further investigation.

1.5 Planning Context

The relevant authorities along the route have been identified and are listed in Table 1.1 and shown in Figure 1.4. The development and transport plans for these authorities have been considered and summarised below.

1.5.1 Local Authorities

The local authorities along the proposed Fens Waterways Link route are detailed in Table 1.1 below, as is the status of the relevant development plan, or plans for that authority.

Table 1.1 Relevant Local Planning Authorities and Development Plan Status

Planning Authority	Date Development Plan Adopted	Local Plan Review – Current Schedule
Lincolnshire County Council	Structure Plan - 1981	Deposit draft 1998, notice of intention to adopt Nov 2000. Issues regarding accessibility and housing allocation have held adoption up. Currently working to interim document "Policies proposed for adoption November 2000"
Boston Borough Council	Local Plan – 1999	Issues paper 2000, deposit draft due winter 2002/03, strategic flood risk & urban capacity studies due summer 2002
South Holland District Council	Local Plan – 1998	Deposit draft 2001
South Kesteven District Council	April 1995	1st Deposit draft – 2002
North Kesteven District Council	Feb 1996	1st Deposit draft – 2002
Peterborough City Council (Unitary Authority)	Structure plan – joint with Cambridgeshire CC - adopted 1995	Deposit draft April 2002, EIP November 2002 (see Cambridgeshire CC)
	Local plan – Peterborough City Council Local Plan adopted 1996 plus part Huntingdonshire Local Plan 1995	2nd deposit March 2002
Cambridgeshire County Council	Structure Plan 1995	Deposit draft April 2002, EIP November 2002 (Cambridgeshire CC Website)
Huntingdonshire District Council	Adopted 1995 (Hunts DC website 1995 plan)	Local Plan Alteration 2002 (Hunts DC Local Plan page)
Fenland District Council	Adopted 1993	1st Deposit draft due autumn 2003
East Cambridgeshire District Council	Adopted 2000 (ECDC 2000 plan (large))	Begin review 2003
South Cambridgeshire District Council	Adopted 1993	Response to Inspector's report on consultation Dec 2002 (SCDC website)
Norfolk County Council	Adopted 1999	Adopted (NCC SP)
King's Lynn and West Norfolk Borough Council	Adopted 1998	First of 2 review issues papers published in 2001.

The proposals for the new navigation are generally supported by development plans and local transport plan policies. The relevant policies can be broken down into four key areas which are summarised below.

1.5.1.1 Tourism, Economy and Recreation

A number of development plans contain policies that actively promote water based recreation or the use of watercourses for recreational purposes. The development plans and the local transport plans both promote increased walking and cycling or increased access to the countryside – the latter being policies that could be supported by the inclusion in the proposals of waterside towpaths.

The local transport plans also support the increased use of waterways to transport freight. It is possible that a better linked network of waterways such as that proposed could stimulate the increased use of water based transport for non perishable, bulk goods such as household waste or aggregates.

It is considered that the proposal will generally assist in promoting tourism in the area with local authorities in Lincolnshire referring to other, similar waterways that they wish to see utilised to increase tourism such as the River Witham. It is considered that the proposal will assist in the aspiration of the Cambridgeshire authorities that tourism development be more dispersed within the county, especially to the north, rather than being concentrated around Cambridge itself. However ancillary development such as marinas may be resisted on the Great Ouse section of the proposed route. Ancillary development may also be resisted along other sections of the route outside main settlements, especially in the Fens area.

The preferred route passes through Chatteris and March which are identified in the Cambridgeshire and Peterborough structure plan as having weak economies.

1.5.1.2 Protection of the Natural and Heritage Environments

There are a number of general policies that refer to the protection of the natural environment and to the enhancement and protection of areas designated for nature conservation and of historic landscape and visual amenity, the protection of high grade agricultural land, and the protection of statutorily protected species.

The development plans all contain policies which seek to protect historic features such as designated Scheduled Ancient Monuments (SAMs) and archaeological areas. There is also a presumption in PPG16 that SAMs and nationally important archaeological sites and their settings should be preserved. There are likely to be requirements along those sections of the route which are expanded or new watercourses for justification of works which will affect SAMs or important archaeological sites.

1.5.1.3 Flood Protection and Water Quality

Most development plans contain policies stating that proposals should not affect the quality of watercourses and fisheries, nor should they intensify the flood risk or affect the flood protection function of the watercourses. The support of the Environment Agency is likely to be required to reassure local planning authorities that the proposals will not increase flood risk in the area.

1.5.1.4 Site Specific Policies

There are currently no development proposals contained within the development plans that will affect the preferred routes, although Car Dyke on the eastern fringe of Peterborough forms the boundary to some development areas.

There may be issues related to the safeguarding of the proposed route in connection with proposals to improve transport infrastructure to the east of Peterborough and in the Boston area.

Specific parts of the route may be affected by statutory designations. This has occurred at Car Dyke which is a Scheduled Ancient Monument and has led to an alternative route along Cats Water Drain being pursued. The route may also be affected where it passes very close to areas designated as sites of nature conservation interest such as along the Old Bedford River near Earith.

1.5.1.5 Summary

From the development policy documents it is considered that, with good design, taking account of the existing landscape and nature conservation issues, the proposals are likely to be generally supported throughout the route, particularly for their potential to increase tourism in the areas. However, the areas around Peterborough and the Ouse Washes where statutory nature conservation and heritage designations occur have affected the proposed route or design of the proposal.

1.5.2 National Policy

Government policy on waterways stems from the Integrated Transport White Paper (ITWP) published by the government in 1998 and a follow up document Waterways for Tomorrow published in 2000. This policy feeds into planning policy guidance notes (PPGs) which in turn, informs development plans and decisions on specific planning applications.

1.5.2.1 Integrated Transport White Paper (ITWP)

The ITWP identified waterways as a means of moving goods sustainably and assisting in reducing the volume of freight travelling by road. The ITWP also acknowledges that inland waterways have an important role to play in providing leisure and tourism opportunities and can provide a catalyst for urban and rural regeneration. It stated that local authorities in their development plans will be expected to consider opportunities for new development which are served by waterways.

1.5.2.2 Waterways for Tomorrow

This document provides more detail of government policy on waterways. It identifies a number of areas where navigable waterways can contribute such as:

- ◆ Leisure and recreation - almost all the waterways system is used for leisure. This includes boating, angling and water sports. Towpaths and other waterside paths provide local and long distance walking and cycle routes, access to the countryside and opportunities for informal recreation.
- ◆ Freight - the inland waterways still carry some freight but only a small amount in national terms. Most freight traffic is found on the tidal inland

waterways. On the non-tidal system, freight carrying survives on only a few waterways, mainly river navigations, and the Manchester Ship Canal.

- ◆ Water supply and drainage - the waterways provide both a source of water and a means of supply. They also play a significant land drainage role. Many canals have become an integral part of the land drainage system and some take storm-water discharges from roads.
- ◆ Heritage and the natural environment - the waterways system is rich in historic buildings and examples of innovative civil engineering. It is also an important environmental and ecological resource providing wildlife corridors and habitats for several species listed as national priorities under the UK Biodiversity Action Plan.
- ◆ Regeneration - the waterways provide an important catalyst for urban and rural regeneration. The improvement and restoration of waterways is enhancing the environment and bringing life back to deprived areas.
- ◆ Innovation - the waterways are increasingly being used in innovative ways. Towpaths are being used as routes for telecommunications cables, and proposals for water transfer using canals are being developed.

According to “Waterways for Tomorrow”, the government sees inland waterways as an important asset for future generations to enjoy and is keen to see them maintained and developed in a sustainable way so that they fulfil their social, economic and environmental potential. The government wants to ensure that the many benefits and opportunities they provide are used to the full.

2 Environmental Baseline

2.1 Introduction

The purpose of this section is to provide a high level description of the existing environment in the vicinity of the proposed route and, where necessary (e.g. water quality impacts), this is expanded to take account of additional downstream receptors. The baseline environment has been established on the collation and review of existing information obtained from consultees and through literature search and review. The majority of the data has been provided by the Environment Agency and various internet sites have also been used. The sources of the information used are detailed in the references section at the end of this report. No new environmental field surveys of the study area have been undertaken at this stage. Specific gaps in the data have been highlighted and recommendations made for obtaining further information as project elements progress (Appendix F).

For each component of the existing environment the route has been divided into two sections, the first from Boston to Peterborough and the second from Peterborough to Ely.

2.2 Human Beings

2.2.1 Boston to Peterborough

The section of the route from Boston to Peterborough passes close to the towns of Boston, Spalding and the city of Peterborough. Population figures (2001) for these settlements are shown in Table 2.1. There are also numerous smaller settlements in the area alongside the proposed route.

Table 2.1 Boston to Peterborough - Population Centres

Settlement	Approximate Population
Boston	55,750
Peterborough	156,000
Spalding	22,000

Peterborough is a centre for manufacturing and engineering. Industry is diverse ranging from general engineering and processing to high technology manufacturing. Manufacturing has been in some decline, but it still provides a significant level of employment within the area.

In Peterborough development is influenced by the Peterborough Local Plan, 1996. This makes provision for an estimated 72,500 more dwellings by 2006, an increase of 2,600 during the period 1996 to 2006. The approach is to focus new growth in and around the built up area of Peterborough whilst at the same time making provision for relatively modest growth in some of the larger settlements in the rural areas. One of the key components is the development of 5,200 dwellings in the form of a new township, on the former brick pits to the south of Peterborough, known as the Southern Township and locally as Hampton.

In Lincolnshire, the key principles guiding development, as set out in the Structure Plan, are, amongst others, sustainable development and safeguarding natural

resources. The Structure Plan identifies 'Defined Towns' where the majority of the County's housing allocation of 66,900 should be accommodated by the year 2011. However none of these towns are near to the proposed route except Boston. The majority of industrial and commercial provision will also be within these towns to ensure that development does not take place on greenfield sites.

In the Fens, rural industry has traditionally had a heavy reliance on agriculture, both through agricultural businesses in primary production, through secondary activity (for example food processing) and through ancillary businesses providing services to farmers and growers. However this has resulted in a relatively low per capita income and population density in the area. Farmers have always needed to be flexible to meet changing market demands and public attitudes are becoming increasingly important, however the industry is still continuing to shed labour through structural changes. As the area is centred on the main agricultural land uses and has developed an economy with a high dependence on agriculture the Fens qualify for special support under UK and European rural development programmes. The aim of such programmes is to broaden the Fens' economic base to be less dependent on primary agriculture. The ability of farmers to diversify and derive income from alternative enterprises helps maintain the viability of agricultural units. Such diversification schemes in the Fens have included farm livery stables, farmhouse bed and breakfast, farm shops, fishing lakes, golf course development, go-kart racing and war games.

In this section of the study area there are a number of existing water-based recreational facilities including the sailing facilities at Boston and the rowing lake and Ferry Meadows Country Park at Peterborough. There are a number of historic clay pits south of Peterborough, Kings Dyke is one of such and as an unusually long water body it is periodically used for water skiing. Gildenburgh Water near Whittlesey is a commercial scuba diving centre.

Land based recreational activities associated with waterways in the area include walking, cycling, horse-riding and angling. There is the Brown Fen Waterway Trail which is a circular route approximately 107km long starting from Boston and including Spalding and Crowland. The route follows part of the South Forty Foot Drain, the River Glen and River Welland. There are several existing and planned cycling paths which form part of the National Cycle Network, the Peterborough Green Wheel and several existing and planned long distance horse riding routes; these generally radiate outwards from Peterborough. There are numerous angling clubs in this section and the North Bank of the River Nene (just downstream of Peterborough) is heavily used by match fishermen as the river is of uniform character and easy to access. There are also a number of gravel pits with trout and coarse fishing in the Peterborough area.

In terms of navigation, sections of the proposed route on the River Welland from Deeping St James to Spalding and on the River Glen between South Forty Foot Drain and the River Welland are existing navigable channels, although poorly used. Existing navigation facilities are shown in Figure 2.1a. There are no existing facilities on the South Forty Foot Drain which is currently un-navigable. There are mooring facilities on the River Glen at Pinchbeck and at Seas End Sluice and on the Welland upstream of Spalding where there is also a slipway. There are no other facilities along this section of the proposed route other than on the Nene through Peterborough where there are 6 locations for mooring and 1 slipway.

Other waterways in the area that provide boating opportunities include the Witham Navigable Drains, Kyme Eau and River Sleas and the restored section of the

Grantham Canal in the Vale of Belvoir at Woolsthorpe. Navigation rights may not have been established on some of these watercourses. Establishing the South Forty Foot as a navigable channel will link the southern part of the route to these existing waterways in the north of Lincolnshire via Boston, thereby extending the navigation network in the area.

On the River Nene pleasure boating is the main recreational activity, particularly during the summer months. The Nene is a major navigation route for boaters wishing to access both the Middle Level Drain system in the Fens and the Grand Union Canal at Northampton, with 38 locks and numerous associated weir structures. Approximately 1200 boat owners hold licences for the Nene and the Gold Licence system allows boats to travel from the British Waterways administered canal system on to the River Nene. Creating a new navigation channel around Peterborough linking the River Nene to the River Welland will extend the navigation network. In 1937 a tidal lock and sluice at the Dog-in-a-Doublet below Peterborough was constructed which removed the tidal element from the Peterborough Nene and has enabled regular recreational use of the fenland stretch of the Nene almost to Wisbech. In recent years proposals to extend the Navigation to Wisbech or beyond have been considered. There is scope to integrate the Fens Waterways Link with such schemes in the future.

There are several existing tourist attractions along the preferred route including the Boston and a recently built visitors centre at Boston Grand Sluice; Spalding Tropical Forest; Springfields Park and Ayscoughfee Hall and Gardens at Spalding. Various attractions near Peterborough include Flag Fen (an important archaeological site); Peterborough Cathedral; the Nene Washes; Nene Valley Railway and Ferry Meadows Country Park.

2.2.2 Peterborough to Boston

The section of the route from Peterborough to Ely passes close to the towns of Chatteris, March, Earith and the city of Ely. Population figures (2001) for these settlements are shown in Table 2.2. There are also numerous smaller settlements in the area along the proposed route.

Table 2.2 Peterborough to Ely - Population Centres

Settlement	Approximate Population
Chatteris	8,000
Earith	1,750
Ely	15,000
March	18,000

March is a centre for the food industry where there are numerous firms which handle and pack fruit and vegetables for the fresh and frozen markets. March and the other market town of Chatteris were identified in the late 1990's for future housing development with 1270 dwellings proposed for Chatteris and 1735 proposed for March. The Ely Local Plan also identifies areas of the city for residential development, some of which lies between the eastern edge of the city and the A10 Ely by-pass.

As highlighted in Section 2.2.1, the economy of the Fens area is heavily reliant upon agriculture, however with changes in the industry there has been a significant effect on the local economy. Consequently parts of the area were designated as part of the Fens Objective 5b area in 1994 by the European Union. This initiative aims to promote alternative rural development such as access and recreation, environmental enhancements, farm shops etc.

In this section of the study area the proposed route is currently an existing navigable waterway. Consequently, there are existing navigation facilities in the area as shown in Figure 2.1b and it already attracts tourists because of the existing navigable waterways. There are moorings and a slipway at March and three mooring locations at Denver at the bottom of the Ouse Washes. Moving clockwise around the circular route there are 6 moorings and a hook-up point between Denver and Ely and a further 4 within Ely along with 2 slipways and a hook-up point. Between Ely and Earith there are 10 mooring locations, 3 hook-ups and 2 slipways. At Earith there are a further 4 mooring sites and 1 slipway. Further upstream on the Great River Ouse through St Ives and Huntingdon there are numerous mooring locations and several slip ways and hook-ups. There are no existing facilities through Chatteris to March.

The navigable watercourses are used extensively by motor-powered craft and there are over 3,000 boats registered on the Great Ouse with popular marinas at Ely and Littleport on the Ely Ouse, and Hermitage and Twenty Pence on the Old West River. The Tidal River provides an important link between the Ely Ouse at Denver and the west of Ouse navigation on the Well Creek and Old Bedford River. This short section of river is probably the busiest in the tidal Great Ouse with over a thousand crossings per year. Problems with siltation in the Tidal River have created some problems for boaters. The Denver complex is used by boaters. Improvement works over recent years have resulted in additional moorings and reinstatement of bank revetments at the site. There are display boards at the site that in addition to providing navigation information also trace the history and current water management practices in the Washes, the Middle Level System and associated watercourses.

There are a number of active canoe clubs in Cambridgeshire and Norfolk but their use of the waters within this area is relatively small. Informal canoe use also takes place throughout the navigable sections of the rivers in the area. Sailing is limited due to the number of bridges over watercourses. Rowing occurs on the Ely Ouse at Ely. Speed restrictions mean that water skiing and jet skiing are illegal on navigable rivers. The Mepal Outdoor Centre operates as a charitable trust and is open to the public. An 8 hectare water filled pit is used for sailing, canoeing and windsurfing mainly by youth groups and those with disabilities. The centre also can accommodate residential courses. Other pits nearby managed by Chatteris Aqua Sports offer water skiing and personal watercraft activities.

Other recreational activities in the area include walking, cycling, horse riding, bird watching and angling. There are three wildfowling clubs who own and hire out areas of the Ouse washes, the largest being the Fenland Wildfowlers. A small number of other individuals have access to the land and operate day-ticket shoots. There are a few bridleways that allow horse riding and cycling in the area. During winter, deliberate flooding of fields allows the traditional sport of ice skating to be preformed; this activity is performed on Well Creek when conditions allow. There are also microlight and gliding clubs nearby.

There are a significant number of public footpaths on the floodbanks, used by ramblers and dog walkers. There is also a long distance footpath in the area, the Fens Rivers Way, that links Cambridge with Kings Lynn. This follows the course of the River Cam and the River Great Ouse passing through Ely, Littleport and Denver. There is also a second trail called the Black Fen Waterway Trail which is a circular route and includes the settlements of March, Chatteris, Sutton, Stretham, Ely, Littleport, Downham Market, Outwell and Upwell. Part of the route follows the River Nene (Old Course) and the River Great Ouse, which form part of the Fens Waterways Link.

The watercourses in this section from Peterborough to Ely have been popular coarse fishing venues for many decades. The majority of the rivers and drains within the area are actively fished and all major watercourses are let to angling clubs. Free fishing is available on the Well Creek at its downstream end and a small section of the Old Nene at March. There are a number of match fishing venues in the area and some waters regularly attract up to 100 anglers for a weekend match, notably the national pike championships which are annually held on the Forty Foot and Sixteen Foot Drains. The number of pleasure anglers is difficult to quantify because of the large area, however, it is thought numbers are relatively few as a decline has been noted in the popularity of the system since its heyday in the 1970s when many anglers travelled from the Midlands and Yorkshire to fish. The number of still waters in the area is relatively small. There are coarse fishery complexes at Mepal and Earith that have developed from gravel pits. Individual Stillwater fisheries are located near watercourses across the area, for example, to the south of the Twenty Foot River and to the west of the Old Bedford River. Eel fishing is the only commercial fishing activity within the area.

There are several existing tourist attractions along the route including: Denver Sluice; the Ouse Washes including the Wildfowl and Wetland Trust Visitors Centre at Welney; Ely Cathedral; Ely Museum and Oliver Cromwell's House in Ely.

2.3 Flora and Fauna

Woodland cover in the Fens is very sparse, with the majority of trees found lining roads, villages and shelterbelts. Marshes, swamps and fens add a distinct character to the area and provide outstanding habitats such as fen, meadow and neutral and improved grasslands.

Important clusters of ancient woodlands are found on the fen edge. These have plant specialities such as crested cow wheat, oxlip and wild service tree. They also harbour valuable populations of fungi and invertebrates such as the black hairstreak butterfly as well as important breeding populations of woodland birds including woodcock and nightingale. Unimproved neutral meadows and pastures on drier soils are found scattered sparsely through the area, but where they do occur, they are very important wildlife features. These support scarce and uncommon plants such as green winged orchids and sulphur clover. The calcareous nature of the Boulder Clay on some sites provides conditions for species more characteristic of chalky soils such as dropwort and pyramidal orchid.

In recent years changing farming practices have increased the area of grassland lost to arable crops. This has reduced the diversity of habitats within the Fens by increasing the amount of arable land, and has subsequently led to the reduction in livestock numbers in the area. The Fens also offer the potential for the development of new wetlands to compensate for historical losses and losses along the East Anglian coastline.

The watercourse system in the Fens is principally managed for land drainage and flood defence purposes. Most of the man-made watercourses are, therefore, trapezoidal in cross section. The drain depths range between 2-3m water depth over a silty substrate. Most rivers have embankments due to drains being within the floodplain. The management of ditches, dykes, banks and embankments for flood protection in the area has, in many cases, led to a reduction in aquatic and marginal vegetation and biodiversity.

A section of the route, at the western end of the Nene Washes and part of the Old Bedford River/Counter Drain passes through the Bedfordshire and Cambridgeshire Claylands. Here river valleys with wet grasslands and other riparian habitats are distinctive features in the area. Unimproved flood meadows are often characterised by great burnet and meadow foxtail with a rich flora that includes snakes head fritillary and southern marsh-orchid. Flooded pits and reservoirs are landscape features used by waders including redshank, snipe and lapwing and the brick pits around Peterborough support Europe's largest population of the rare great crested newt.

2.3.1 Peterborough to Boston

2.3.1.1 Designated Sites

In the section from Boston to Peterborough there are several statutory conservation sites alongside or near to the proposed route; these are listed in Table 2.3 and shown in Figure 2.2a.

Table 2.3 Boston to Peterborough - Statutory Conservation Sites

Site Name	Conservation Designations	Grid Reference	Type of site
Horbling Fen	SSSI	TF 154 353	Geological
Baston & Thurlby Fens (includes part of R. Glen & Counter Drain)	SSSI & CWS	TF 130 167 & TF 124 166	Biological
Cowbit Wash	SSSI	TF 240 191	Geological
Deeping Gravel Pits	SSSI	TF 180 082	Biological
Eye Gravel Pits	SSSI	TL 231 036	Geological
Dogsthorpe Star Pit	SSSI, CWS	TF 213 025	Biological
Nene Washes	SSSI, SAC, SPA, Ramsar	TL 200977 to TF 395 029	Biological
Surfleet Lows	SSSI, CWS	TF 252 285	Biological

The Nene Washes SAC, SPA, Ramsar Site, SSSI

The Nene Washes are an important conservation site within the area. They are bounded to the north by the canalised River Nene and to the south by Morton's Leam. The original route passes along the eastern edge of the Nene Washes and the alternative route to the east of Peterborough would enter the River Nene which borders the Nene Washes and forms part of the designated area. The Nene Washes are an embanked area of approximately 1450 ha of agricultural land (largely wet grassland) which can provide storage of up to 20 million cubic metres of flood water. The area is seasonally flooded and provides an important area of flooded grassland. The site is classified as a cSAC, SPA, a SSSI and a Ramsar site. Part of the Washes are owned and managed as a RSPB nature reserve.

The Nene Washes are of international nature conservation importance and designated as a Special Protection Area (SPA) under Article 4 of the European Union's Directive on the conservation of wild birds (EC/79/409 as modified) ('the Birds Directive'). The site qualifies under Article 4.1 of the Birds Directive by supporting populations of European importance of the following migratory species:

- ◆ ruff *Philomachus pugnax* (during the breeding season and over winter);
- ◆ spotted crake *Porzana porzana* (during the breeding season); and
- ◆ bewick's swan *Cygnus columbianus bewickii* (over winter).

This site also qualifies under Article 4.2 of the Birds Directive by supporting populations of European importance of the following migratory species:

- ◆ black-tailed godwit *Limosa limosa limosa* (during the breeding season);
- ◆ pintail *Anas acuta* (over winter); and
- ◆ shoveler *Anas clypeata* (over winter).

The area qualifies under Article 4.2 of the Birds Directive (79/409/EEC) by regularly supporting at least 20,000 waterfowl.

In addition, the Nene Washes is designated under the Ramsar convention. This designation recognises the importance of the site for waterbirds and the biological/ecological features of interest.

The Nene Washes is also designated under the Conservation of Natural Habitats & c Directive (92/43/EEC) known as the Habitats Directive as a candidate Special Area of Conservation (cSAC). The designation reflects the presence of Spined Loach *Cobitis taenia* which is an Annex II species. Moreton's Leam, a large drainage channel running along the southern flank of the Nene Washes, contains the highest recorded density of this species in the UK. The site is additionally notable for the diversity of plant and associated animal life within its network of dykes. In the ditch system of the Nene Washes a wide variety of aquatic plants are found including nationally scarce species, such as fringed water lily, marsh dock and narrow leaved water plantain. In the marshes, ditches and old meanders, sedges and rushes are common with a mix of herbs such as marsh marigold, ragged robin, wild angelica and gypsywort. The washlands are used for the seasonal uptake of floodwaters and, traditionally, for cattle grazing in the summer months. The mosaic of rough grassland and wet pasture provide a variety of sward structure and herbs of importance respectively for bird nesting habitat and feeding.

SSSIs

The Sites of Special Scientific Interest (SSSI) that are very close or adjacent to the route from Boston to Peterborough include:

- ◆ Cowbit Wash, which is an important geological site for the study of Flandrian sea level changes;
- ◆ Deeping Gravel Pits SSSI is adjacent to the River Welland and is a particularly important ornithological site with a heronry of national importance; and
- ◆ Dogsthorpe Star Pits SSSI is adjacent to the Car Dyke, to the east of Peterborough, and is noted for its rich invertebrate fauna; particularly water beetles.

SSSIs are notified under Section 28 of the Wildlife and Countryside Act 1981 (as amended). For sites near to the route the site citations can be found in Appendix A. These statutory sites are designated to protect areas important for their flora and fauna, geological or physiographical features. English Nature must be consulted before any development proposals, which are in or likely to affect an SSSI, can be granted planning permission by the planning authority. In addition, owners and/or occupiers of a SSSI are given a list of Potentially Damaging Operations, which must not be undertaken on the site without the permission of English Nature.

Other Designated Sites

Areas of nature conservation interest are not confined to the statutorily designated sites. The Lincolnshire Trust for Nature Conservation and Lincolnshire County Council identify and designate other sites of ecological or geological interest as County Wildlife Sites (CWS), Local Nature Reserves (LNR) or Sites of Nature Conservation Interest (SNCI). There are no National Nature Reserves (NNR), Local Nature Reserves (LNR) or Ancient Woodland along the route or nearby. Table 2.4 lists some of the SNCI's and Trust Reserves in Lincolnshire that are near to the route.

Table 2.4 Boston to Peterborough – Non- Statutory Sites of Conservation Interest near the Route in Lincolnshire

Site Name	Conservation Designations	Grid Reference
The Poachers Pit (Boston)	SNCI	TF313435
Skirbeck Quarter Brick Pit	SNCI	TF316419
The Yews Trust Reserve	Trust Reserve	TF219345
Quadrang Brick Pits	SNCI	TF214327
West Thorpe Pit	Trust Reserve	TF221312
Boston Road Brick Pits	SNCI	TF247318
Guthram Pit	SNCI	TF170226
Guthram Gowt	SNCI	TF174208 TF193240
Tongue End Pit	SNCI	TF155189
Pinchbeck South Fen Slupe	SNCI	TF174225 TF199244
Surfleet Reedbed	CWS	TF 266 289
Baptist Cemetery	CWS	TF 312 434
Crowland Ponds	CWS	TF 229 107
Eye Green	CWS	TF 213 034
Stanground Wash	CWS	TL 208 975
Stanground Newt Ponds	CWS	TL 202 961
Lattersey	CWS	TL 282 966

Several wetland habitats have been created relatively recently by human activity, including gravel pits, brick pits and canals. These wetland areas are generally attractive to wildlife, especially wildfowl, and help to provide some habitat compensation for lost fenland. Such sites designated as SNCIs include: Skirbeck Quarter Brick Pit, Quadrang Brick Pits, West Thorpe Pit, Boston Road Brick Pits and Tongue End Pit. The creation of these areas of open water is important for migrating, wintering and breeding birds along with insect species such as dragonflies and damselflies. The extraction of clay for brick making, to the south of Peterborough, has led to areas of open water being created in this vicinity such as at Stanground Gullet. Along with the gravel workings, these areas of open water provide extensive semi-natural habitats. Areas of reedbeds and wet grassland communities, which in most cases have naturally recolonised areas following the cessation of work, fringe many of the pits. Important former brick pits include

Dogsthorpe Star Pit SSSI with its very important assemblage of aquatic beetles, and Orton Pit SSSI with its largest known population of great crested newts in the UK (the site has been identified as a proposed SAC).

There are also several Cambridgeshire County Wildlife Sites (CWS) in the section from Peterborough to Ely. Cats Water Drain is designated as one such site from Flag Fen up to Bar Pasture Farm. Near to Cats Water Drain is Eyebury Road Pits another CWS. At the southern end of Cats Water Drain to the west of this watercourse is Adderley and Storey's Bar Road Drains which are designated as a CWS. At Padholme Pumping Station on the River Nene to the east of the drainage ditch linking the Nene with Cats Water Drain is Northey Gravel Pits, also a CWS.

2.3.1.2 Other Ecological Features

It is known that several species of birds protected under Schedule 1, Part 1 of the Wildlife & Countryside Act 1981 frequent the South Forty Foot Drain. These include Green Sandpiper, Kingfisher and Barn Owl. Operation Riverside Link is a 20 year project to create prey-rich grassland corridors, farm to farm and county to county using riverbank networks and aims to restore Barn Owl populations in line with recommendations of the Species Biodiversity Action Plan. Nest boxes are installed at 1km intervals on the banks and on adjacent farmland. The project began in 1988 on the South Forty Foot Drain and to date 552km of habitat corridor involving 1500 boxes have been created. A continuous corridor currently stretches from the River Hull, Humber, Aire and Calder Canal, Trent, South Forty Foot Drain and River Glen. There are 47 barn owl boxes on the South Forty Foot Drain and their use is extensive but subject to seasonal variation.

Badgers are also active within the spoil banks of the South Forty Foot Drain. Otters have also been seen along this watercourse in the last 5 years but the reports are unverified. Water voles can be expected anywhere along the South Forty Foot and its tributaries. Bats use the South Forty Foot Drain for feeding and any suitable trees and bridges can be expected to be used as roosts. Water voles were found along Car Dyke and in two locations on the River Glen during a survey in 1999. Otter presence is highly possible on the River Welland and spraints were found during the 1999 survey.

Spined Loach are also likely to be present in some or all of the watercourses along the route. Although not protected under the Wildlife & Countryside Act (as amended by the Countryside & Rights of Way Act 2000), they are listed on Annex II of the Habitats Directive and should be taken into account under the Environment Agency's general duty to further conservation.

The rivers in the South Forty Foot catchment contain coarse fish populations with high fish biomass. This reflects the rich lowland nature of the watercourses which generally provide ideal conditions for the growth and survival of juvenile coarse fish because of their ponded nature in summer months. A large number of roach and common bream dominate the population. Fish populations suffer during periods of high flow, as the trapezoidal channel offers few features behind which fish can shelter, leading to many fish being swept or pumped out into tidal lengths where they perish. During the winter months the low winter levels maintained in many watercourses affect fish in the lowland systems. Low winter levels also impose additional stress on other freshwater organisms. This practice can cause fish populations to congregate in very high densities in any available deep areas such as those locations where pumped water is discharged into the South Forty Foot.

The total coarse fish biomass is generally higher, in the downstream stretches of the South Forty Foot Drain above the confluence with Heckington Eau and at the confluence with New Hammond Beck where a biomass of class A has been recorded. Fish Biomass is lowest in the upstream section of the catchment.

There are also aquatic invertebrate species of high conservation interest in the area, for example Lesser diving beetle (*Agabus undulates*) and Cased caddisfly (*Ceraclea senilis*) are found in the Whittlesey Counter Drain.

2.3.2 Peterborough to Ely

2.3.2.1 Designated Sites

In the section from Peterborough to Ely there are several statutory conservation sites alongside or near to the proposed route, these are listed in Table 2.5 and shown in Figure 2.2b.

Table 2.5 Peterborough to Ely - Designated Conservation Sites

Site Name	Conservation Designations	Grid Reference	Type of site
Berry Fen	SSSI	TL 378 745	Biological
Upware North Pit	SSSI	TL 544 728	Biological
Upware Bridge Pit North	SSSI	TL 543 725	Geological
Upware South Pit	SSSI	TL 539 709	Geological
Cam Washes	SSSI	TL 538 725 & TL 530 692	Biological
Roswell Pits	SSSI, CWS	TL 550 805 to TL 555 811	Geological
Chettisham Meadows	SSSI	TL 541 830	Biological
Ouse Washes	SSSI, SAC, SPA, Ramsar	TL 393 747 to TL 571 987	Biological and Geological

The Ouse Washes

The preferred route passes along the Old Bedford River which forms part of the Ouse Washes. The Ouse Washes were created in the 17th century to provide storage of floodwater from the Bedford Ouse catchment, so preventing the surrounding Middle and South Levels from flooding. Whilst the levels have become productive arable farmland, the cycle of winter storage of floodwaters from the river and traditional summer grazing by cattle, as well as hay production, have given rise to a mosaic of rough grassland and wet pasture. With a diverse and rich aquatic fauna and flora within the associated watercourses and the Washes are now a site of high conservation value. The Ouse Washes extends for 32km from the village of Earith in the south to Denver in the north and are bounded by the two rivers: the Old Bedford/Counter Drain constructed in 1637; and the Hundred Foot River/ New Bedford River constructed in 1651. The South Level and Middle Level Barrier Banks form defences to the surrounding farmland, enclosing an area of 2403 ha.

The Ouse Washes is of international nature conservation importance and is designated as a SPA under Article 4 of the Birds Directive from the Old West River at Earith to where the River Delph discharges into the Hundred Foot River at Welmore Lake Sluice. It does extend north to include the areas around Denver Sluice or Salters Lode. The site is bounded on the west by the Counter Drain and on the east by the New Bedford/Hundred Foot River. The site qualifies under

Article 4.1 of the Birds Directive by supporting populations of European importance of the following migratory species:

- ◆ Ruff *Philomachus pugnax* (during the breeding season and over winter);
- ◆ Spotted Crake *Porzana porzana* (during the breeding season);
- ◆ Bewick's Swan *Cygnus columbianus bewickii* (over winter);
- ◆ Hen Harrier *Circus cyaneus* (over winter); and
- ◆ Whooper Swan *Cygnus cygnus* (over winter).

This site also qualifies under Article 4.2 of the Birds Directive by supporting populations of European importance of the following migratory species:

- ◆ Black-tailed Godwit *Limosa limosa limosa* (during the breeding season);
- ◆ Black-tailed Godwit *Limosa limosa islandica* (over winter);
- ◆ Shoveler *Anas clypeata* (during the breeding season and over winter);
- ◆ Gadwall *Anas strepera* (during the breeding season and over winter);
- ◆ Pintail *Anas acuta* (over winter);
- ◆ Pochard *Aythya ferina* (over winter); and
- ◆ Wigeon *Anas Penelope*.

The area qualifies under Article 4.2 of the Directive (79/409/EEC) by regularly supporting at least 20,000 waterfowl. The Ouse Washes are also listed under the Government ratified Ramsar convention of 1972 in view of its international importance as a wetland habitat.

The Ouse Washes is also designated under the Conservation of Natural Habitats &c Directive (92/43/EEC) known as the Habitats Directive as a cSAC. The designation reflects the presence of Spined Loach *Cobitis taenia* which is an Annex II species. Within the designation, the Counter Drain/Old Bedford River is particularly important for this species and a healthy population is known to occur here.

The Wash

Downstream of much of the proposed route is The Wash, the largest estuarine system in the UK, which is of international nature conservation importance. It is fed by the rivers Witham, Welland, Nene and Great Ouse and could potentially be affected by any changes that occur in these catchments. The Wash comprises very extensive saltmarshes, major intertidal banks of sand and mud, shallow waters and deep channels. The intertidal flats have a rich invertebrate fauna and colonising beds of Glasswort *Salicornia* spp. which are important food sources for the large numbers of waterbirds dependent on the site. The sheltered nature of The Wash creates suitable breeding conditions for shellfish, principally Mussel *Mytilus edulis*, Cockle *Cardium edule* and shrimps. These are important food sources for some waterbirds such as Oystercatchers *Haematopus ostralegus*. The Wash is of outstanding importance for a large number of geese, ducks and waders, both in spring and autumn migration periods, as well as through the winter.

The Wash is designated as a SPA under Article 4 of the Birds Directive. The site qualifies under Article 4.1 of the Birds Directive by supporting populations of European importance of the following migratory species:

- ◆ Common Tern *Sterna hirundo* (during the breeding season);
- ◆ Little Tern *Sterna albifrons* (during the breeding season);
- ◆ Marsh Harrier *Circus aeruginosus* (during the breeding season);

- ◆ Avocet *Recurvirostra avosetta* (over winter);
- ◆ Bar-tailed Godwit *Limosa lapponica* (over winter);
- ◆ Golden Plover *Pluvialis apricaria* (over winter); and
- ◆ Whooper Swan *Cygnus cygnus* (over winter).

This site also qualifies under Article 4.2 of the Birds Directive (79/409/EEC) by supporting populations of European importance of the following migratory species:

- ◆ Ringed Plover *Charadrius hiaticula* (on passage);
- ◆ Sanderling *Calidris alba* (on passage);
- ◆ Black-tailed Godwit *Limosa limosa islandica* (over winter);
- ◆ Curlew *Numenius arquata* (over winter);
- ◆ Dark-bellied Brent Goose *Branta bernicla bernicla* (over winter);
- ◆ Dunlin *Calidris alpina alpina* (over winter);
- ◆ Grey Plover *Pluvialis squatarola* (over winter);
- ◆ Knot *Calidris canutus* (over winter);
- ◆ Oystercatcher *Haematopus ostralegus* (over winter);
- ◆ Pink-footed Goose *Anser brachyrhynchus* (over winter);
- ◆ Pintail *Anas acuta* (over winter);
- ◆ Redshank *Tringa totanus* (over winter);
- ◆ Shelduck *Tadorna tadorna* (over winter); and
- ◆ Turnstone *Arenaria interpres* (over winter).

The area qualifies under Article 4.2 of the Birds Directive (79/409/EEC) by regularly supporting at least 20,000 waterfowl. The Wash is also listed under the Government ratified Ramsar convention of 1972 in view of its international importance as a wetland habitat.

The whole area is of exceptional biological interest and the Wash and North Norfolk Coast is also designated as a cSAC for the following Habitats Directive Annex I habitats:

- ◆ Sandbanks which are slightly covered by sea water all the time;
- ◆ Mudflats and sandflats not covered by seawater at low tide;
- ◆ Large shallow inlets and bays;
- ◆ Reefs;
- ◆ Salicornia and other annuals colonising mud and sand;
- ◆ Atlantic salt meadows (*Glaucio-Puccinellietalia maritima*);
- ◆ Mediterranean and thermo-Atlantic halophilous scrubs (*Sarcocornetea fruticosi*);
- ◆ Coastal lagoons.

The site is also designated for the presence of the following Habitats Directive Annex II species:

- ◆ Common Seal *Phoca vitulina*
- ◆ Otter *Lutra lutra*

SSSIs

The SSSIs that are close to the route include Berry Fen SSSI at the southern end of the Ouse Washes. This site has a washland habitat of ornithological value and the Bewick's swan numbers reach nationally significant levels. Also close to the route is Upware North Pit SSSI. Here the freshwater habitats hold one of the only two native British localities for the water germander *Teucrium scordium*, a plant listed in the British Red Data Book. SSSI citations for sites along the route are

detailed in Appendix A. In this section of the route there are no NNRs, LNRs or Ancient Woodlands along the route or nearby. Several of the SSSIs along the route have additional CWS status and these are labelled in Table 2.5.

Other Designated Sites

In Cambridgeshire all rivers, excluding Lodes, are also County Wildlife Sites (CWS). In this section there are also several CWS adjacent or near to the route. The River Lark which enters the River Great Ouse downstream of Ely is a CWS and around Ely there are several sites including Angel Drove Drains, Ely Beet Pits and Roswell Pits and surrounding area. The River Great Ouse is also itself a CWS from the Little Great Ouse confluence to St Ives. There are several drainage systems that connect to the route which are CWS including the Haddenham Engine/Adventurer's Head drainage system that drains into the Great Ouse downstream of Earith. The Old Bedford Low Bank Drain is a CWS and runs along the Old Bedford River downstream of the confluence with Cranbrook Drain. Other CWS near the route include Earith Gravel Pits which are close to the Old Bedford River and Twenty Pence Pit near to the River Great Ouse.

2.3.2.2 Other Ecological Features

Many of the drains within the Middle Level System support a good coarse fish stock and all the drains surveyed in 1993/94 had a fishery Biomass Class (which ranges from A-Excellent to D-Poor) of either "Excellent" or "Good". Roach are the dominant species with occasional shoals of large common bream. These waters and those of the Ely Ouse are also noted for specimen pike and zander. Although there are many pumped drains in the area, fish movement is relatively unimpeded throughout much of the system. The Old Bedford/Counterdrain, Old Bedford/Delph and Hundred Foot River are good coarse fisheries (Biomass Class B). The Hundred Foot River also supports some brackish water species such as smelt and flounder. The Ely Ouse River is a major coarse fishery and supports a good Class B fish population. The Old West River is a smaller watercourse dominated by small fish. Here the population is limited by the canal-type habitat of the river. Angling can be affected by weed growth in the summer.

Otters have also been identified during the Cambridgeshire Otter Survey of March 2002 at various locations on the Great River Ouse including Ely, Littleport and Denver. Otters have been increasing on the Ely Ouse since the 1996/7 survey. They have also been found on the River Nene and River Welland. Water voles have been surveyed in Norfolk in 1997 and were found on the River Ouse at its confluence with the River Little Ouse and the River Wissey as well as at Ten Mile Bank. Evidence of water voles has also been found at Earith.

2.4 Air and Climate

Air quality is generally good across the region due to its rural nature. Nitrogen dioxide is the region's highest single greenhouse gas contribution, which is produced from the burning of fossil fuels. Higher concentrations of nitrogen oxides have been recorded in built up areas and along roads.

The absence of heavy industry and high density population centres in this rural region results in good air quality. The main sources of pollution to the atmosphere are from road transport and industry. The Wash Ports, including Boston and King's Lynn have, in recent years, significantly increased the amount of cargo they

handle. Consequently this has also led to an increase in traffic movement and accompanying emissions to air.

The climate in this area is typical of East Anglia with very little variation in the average monthly rainfall throughout the year. The annual average rainfall is 550mm. In the summer, evaporation exceeds rainfall and the area has very little natural excess water resources. The historic trend in rainfall indicates very dry periods in recent years.

The Fens are under increasing threat from sea-level rise and increased severity and incidence of winter rainfall that results from climate change. The risk of flooding is increasing, so maintenance of the Fens in their current state will require an increase in resources as the climate becomes wetter at certain times of the year and sea levels continue to rise.

Current predictions suggest that for every 1°C increase in mean annual temperature, the current agriculture belt will shift 300km north in Europe (Parry, 1990). Changes in climate could lead to farmers being less successful at growing high yields of water demanding crops. If predictions are accurate, changing rainfall patterns could reduce the availability of water in the summer months for irrigation. This makes the production of high yields of good quality crops more difficult. The change in crops grown will be dependent upon the success of plant breeders to evolve new varieties of crops. In the future, alternative crops such as maize and sunflowers may become more common. Recent winters have shown a tendency to be milder. This has reduced the mortality of certain pest species that have impacted upon crops the following summer. Research also suggests that there will be an increasing frequency of stormy weather capable of eroding any bare soils, particularly on hillsides, resulting in a degradation of soil quality.

The area's water resources are also vulnerable to climate change, as a large proportion of its rivers are groundwater fed. The UK Climate Impacts Programme (UKCIP) scenarios (April 2002) predict change in annual precipitation to be within natural variability by 2020, but up to a 10% decrease by 2050 and up to a 20% decrease in summer precipitation by 2020 under the low emissions scenario.

2.5 Landscape and Visual Amenity

Most of the route lies within the Fens. For the last 500 years people have influenced this lowland landscape. The land has been changed through modifying the rivers and draining the floodplains for agriculture, housing and other development. As a result of the drainage and engineering works, the land is an average of one metre below sea level as far as 30 miles inland.

2.5.1 Boston to Peterborough

Under the Countryside Agency's classification of landscape, wildlife and natural features, the whole of the route from Boston to Peterborough is within the Fens, except for a small section along the east side of Peterborough which skirts the edge of the Bedfordshire and Cambridgeshire Claylands.

2.5.1.1 *The Fens*

The Fens cover a large area of Cambridgeshire, Lincolnshire, Norfolk and Suffolk that drains slowly towards the Wash, its boundaries typically drawn along a series of catchwater drains, dykes and canalised rivers. All the Fens have artificial water courses essential to drainage. These canalised features run in straight lines for miles and are bounded by high embankments built to contain the watercourses from lower adjacent fields, exerting a strong influence in the landscape. However this can mean that whilst travelling along these embanked watercourses there is little to see from the waterway. Canals and dykes from the Roman period are still present in some places such as Car Dyke. The area is a low-lying, level terrain which rarely reaches 10 m above sea level, except for fen 'islands' such as the Isle of Ely. This produces a landscape of open panoramas and expansive skies where changing weather patterns have a significant effect on the area's visual character. Although the Fens can first appear uniform there are marked variations and graduations from one area to another. The 'settled Fens' that lie between King's Lynn and Boston have an ancient, more intimate character that contrasts with the straight lines and strong colours of the drained 'peaty Fens'. Here the only relief to the flat landscape is provided by the drainage ditches and raised embankments. Further contrast is found in the nineteenth century drained Great Fen of south east Lincolnshire and in the more recently drained marshes encircling the Wash itself.

The land is predominantly cultivated with little natural or semi-natural habitat remaining. Rich soils and varied intensive agricultural use emphasise the scale and geometry of the land and produce strong seasonal colour changes within the landscape. Woodland cover is very sparse with the majority of trees found lining roads, villages and shelterbelts. Marshes, swamps and fens add a distinct character to the area and provide outstanding habitats such as swamps, fen meadow and neutral and improved grasslands. The older irregular pattern of medium sized fields in the 'settled Fens' contrasts with the larger rectangular fields. Both areas provide important habitats for the grey partridge and corn bunting. The area also has a rich archaeological resource that includes medieval, Roman and important prehistoric sites. Buildings ranging from impressive cathedrals such as Ely to large, imposing agricultural and industrial structures which, together with raised land, telegraph poles and overhead lines, exert a strong influence on the area. Large scale, flat and open landscape with long views and huge skies dominate the area.

2.5.1.2 *The Bedfordshire and Cambridgeshire Claylands*

The Bedfordshire and Cambridgeshire Claylands lie between the Fens and the Chilterns. The area has a gently undulating relief with plateaux, divided by broad, shallow valleys and characterised by arable cultivation. Woodland cover is generally sparse, resulting in an open landscape, although there are some plantations within the river valleys and small ancient woodlands scattered infrequently on the plateaux. The majority of the arable claylands are sparsely populated. Small villages nestle in the valleys while isolated hamlets and farmsteads are widely dispersed. The settlement pattern tends to follow road and rail corridors and building materials are diverse, including brick, thatch and stone. Extensive, ranging arable farmlands now dominate the landscape. The field pattern is medium to large in scale and enclosed by sparse and intermittent trimmed hawthorn hedgerows. Important clusters of ancient woodlands are found on the fen edge. Unimproved neutral meadows and pastures on drier soils are found scattered sparsely through the area, but where they do occur, they are very important wildlife features as considered in Section 2.2. The calcareous nature of

the Boulder Clay on some sites provides conditions for species more characteristic of chalky soils. Many of the grasslands have ridge and furrow patterning, a characteristic historical feature of this part of the country.

2.5.2 Peterborough to Ely

The section from Peterborough to Ely is also within the Fens character area except for a small section of the Old Bedford River/Counter Drain near Earith. This section is just within the Bedfordshire and Cambridgeshire Claylands.

2.6 Water

2.6.1 Boston to Peterborough

2.6.1.1 Flood Management

The route in this area is all classified as Main River except for a 2.6km stretch of the South Forty Foot Drain towards the River Glen which is controlled by Black Sluice Internal Drainage Board. The whole of the route in this section from Boston to Peterborough is within the 100 year indicative fluvial floodplain. This however does not take into account any flood defences that may be present.

During times of extreme flows, navigation can be made very difficult or impossible. During the high flows of Easter 1998, the Nene Navigation was closed for a number of weeks after the flood event for safety reasons. Significant damage can be inflicted on structures along navigations during high flows. Following the Easter 1998 flood, extensive shoaling occurred at a number of locations which reduced navigation depths.

There are distinct types of drainage in the area. Where rivers reach lower lying land and their bed gradient diminishes, many are contained in man made embankments constructed to reduce the frequency of flooding. These are known as High Level Carriers and in turn they receive water from the network of lowland drains maintained by Internal Drainage Boards (IDB). These systems are designed and built to carry flood flows and to provide storage of floodwater during periods when discharge is not possible (because of "tide lock" conditions). The South Forty Foot Drain is such an example. Figure 1.3a shows the river systems in the section from Boston to Peterborough.

The Black Sluice catchment covers a total surface area of approximately 650km², of which approximately 350km² is below the 5m contour. The South Forty Foot Drain has a number of tributaries feeding into it and the board operates 22 pumping stations which discharge into the South Forty Foot Drain. There are gravity sluices at many of the Board's pumping stations which are used to drain water in both the summer and winter periods. The depth of water retained in the main river section from Boston to Black Hole Drove varies from less than 300mm at the southern end to at least 1.0m AOD at the northern end. The water is retained at a level of approximately 0.3m AOD during the summer period and - 0.0m AOD during the winter months.

The South Forty Foot Drain discharges into the Haven at Boston via a gravity tidal outfall and a 60m³/s pumping station, known as Black Sluice Pumping Station, during times of tide lock, to prevent flooding. High flows sometimes cause flushing out of fish populations to tidal lengths. Saline intrusion is a problem in the lower reaches of the South Forty Foot, especially during low flows, due to leakage around and through the tidal doors at Boston. This can lead to water quality that is unusable for crop irrigation.

The river system of the Black Sluice catchment has 110km of flood embankments protecting mainly residential properties, farms, and agricultural land. There have been issues identified on the South Forty Foot in relation to the existing flood defences, such as seepage, bank erosion, bank settlement, flood levels, bank stability, siltation and a general deterioration of the conditions of the bank. These issues have been investigated and solutions proposed by the Environment Agency as part of their Black Sluice Strategic Study for the next 50 years (2003). The major flood events in the catchment have been in November 1968, April and December 1998 and March 1999. The March 1999 event led to a breach of the right bank just downstream of Black Hole Drove pumping station that caused minor flooding to agricultural land. Flood defence standards within the catchment are variable, ranging from less than 1 in 5 years to greater than 1 in 100.

Downstream of Peterborough, as the Nene crosses the low lying Fens, defences are provided by raised earth embankments which have been set back from the edge of the main river channel to provide flood storage during periods of tidelock. This defence has been supplemented by the construction of the Nene Washes that act as a flood storage reservoir when high flows cannot be discharged to tide. Local Internal Drainage Boards maintain a network of drains to control water levels across the low lying area of land, which discharge to the tidal Nene by either pump, or gravity when tidal conditions permit. Between the Dog-in-a-Doublet Sluice and Guys Head, the River Nene is tidal and defences against flooding are provided by earth embankments strengthened by stone, placed to minimise erosion.

The Environment Agency are currently progressing a strategic study into flood management options for Boston Haven and it important that the two 'projects' are considered together.

2.6.1.2 *Water Quality*

To classify the chemical and biological quality of watercourses, the Environment Agency uses the General Quality Assessment (GQA) classification. This method classifies the water quality of rivers and canals by allocating one of six Grades (A to F) to each stretch of river using the same, strictly defined procedures. Grade A represents water of very good quality and Grade F represents water of bad quality. Further details of the GQA classification scheme can be found in Appendix B.

Chemical GQA for the year 2000 is shown in Figure 2.3a. The South Forty Foot Drain between Boston and the River Glen is Grade B at its northern end and Grade C at its southern end. Where the route passes along the River Glen it is Grade C and along the Welland Grade B. The Folly River Drain is Grade E. Water quality is affected south of Peterborough due to discharges from Flag Fen Sewage Treatment Works (STW), which can adversely affect water quality in the Counter Drain and Tidal Nene. In the late 1990s, sampling revealed significant peaks in Lindane (HCH) concentrations in the Counter Drain downstream of Flag Fen STW. Lindane is a chemical historically used by both the agricultural and industrial sectors as a pesticide. However the use of Lindane has been restricted

in recent years by government legislation (e.g. EC Dangerous Substances Directive (76/464/EEC)). The contamination was entering the Counter Drain via the sewerage system in Peterborough and Flag Fen STW, but the source within Peterborough is not known.

The use of fertilisers and herbicides in agricultural activity influences surface water quality, enriching it with nutrients and encouraging its eutrophic state. It also impacts on land drainage by increasing the growth of “cott” (e.g. blanket weed), in some watercourses, including the South Forty Foot, and affects underlying groundwater by increasing nitrate concentrations.

Biological GQA for the year 2000 is shown in Figure 2.3b. The South Forty Foot Drain between Boston and the River Glen is Grade b at its northern end and Grade a at its southern end. Biological water quality on the South Forty Foot decreases downstream towards Boston where the water is adversely affected by saline intrusion. A number of small watercourses and ditches within the catchment of the South Forty Foot suffer from localised pollution from inadequate village sewage disposal systems, leading to problems of odour and appearance; an example of this is at Swaton. Where the route passes along the River Glen and the River Welland, water quality is Grade b and along Folly River Drain, Grade c. To the south of Peterborough, the route includes the Kings Dike which is Grade a, then downstream of Whittlesey the Whittlesey Dyke, which is Grade c. The watercourses in the area around Peterborough can be affected by effluent from Peterborough STW, which results in reduced water quality.

There are numerous consented discharges along the route, particularly at Pinchbeck on the River Glen and around Spalding, Peterborough and Whittlesey. There are 13 discharges from Anglian Water Services Ltd sewage treatment works in the Black Sluice system and 12 private sewage discharges. There are also various industrial discharges in the downstream section of the South Forty Foot Drain, which affect water quality. Water quality is also reduced by intermittent discharges from storm overflows throughout the length of the route.

2.6.1.3 *Water Resources*

Water resources issues relating to the project are discussed in detail as a separate supporting document to the Implementation Plan (Supporting Report No. 5).

There are dozens of abstraction licences along the route; most are concentrated south of Peterborough, as shown in Figure 2.3c. The majority of the licences are for agricultural use and particularly spray irrigation; however there are some abstraction licences for public water supply. These are mostly found to the north-west of Peterborough and to the west of the South Forty Foot Drain. Towards Boston, groundwater from the limestone aquifers is the major source of water for public water supplies and is abstracted from boreholes operated by Anglian Water Services Ltd.

Natural losses of water from watercourses occur due to evaporation and seepage from embanked rivers. These losses can be substantial in very hot weather and were estimated at approximately 25 Ml/day for the stretch of the Nene from Orton to Dog-in-a-Doublet during the hot summer of 1995. During periods of low flow, navigation of the river can become difficult. During low flows there is more sediment deposited due to the reduced velocity of the river. Over time this can build up and seriously constrain the channel. Siltation can impact on both the tidal and freshwater sections of the River Nene, hindering the navigation use of the river.

The Environment Agency has a statutory obligation to maintain the Navigation for boat users. It affects both the fluvial and tidal lengths of the Nene, and requires periodic dredging by the Agency.

2.6.2 Peterborough to Ely

2.6.2.1 Flood Management

Most of the route in this section is within the 100 year indicative fluvial floodplain, except for a small section around March and Ely. As acknowledged above this does not take into account any flood defences that may be present. It is likely that there are existing flood defences along much of the route due to the low lying nature of the land and previous flood events in the area.

The catchments in the section from Peterborough to Ely are predominantly below sea level. Consequently, water movement is principally governed by whether the catchment is under high flow or low flow conditions. The area to the west of the Ouse Washes is known as the Middle Level. The Middle Level Drains (which includes the River Nene (Old Course) and the Forty Foot Drain) under high flow conditions flow into the Middle Level Main Drain in the north east, which is then pumped into the River Great Ouse near Kings Lynn by St Germans Pumping Station, or discharged into the Tidal River via Well Creek Sluice. Figure 1.3b shows the hydrology of the area.

In the summer months, water is retained in the Middle Level drainage system for irrigation purposes and local water is supplemented by transfers from other catchments. The Environment Agency holds an abstraction licence which allows the transfer of water from the River Great Ouse at Earith Sluice into the Old Bedford/Delph. This can then be re-abtracted near Welches Dam and transferred into the Forty Foot Drain. Due to navigation constraints on the River Great Ouse, which require Earith levels to be maintained above 2.13m AOD, the transfer rarely takes place. The Middle Level Commissioners have powers under the 1848 Middle Level Act to take water from the River Nene at Stanground for the purposes of maintaining a depth of water in specified sections of the Middle Level section. An abstraction licence is not required and the volume abstracted is restricted by the structure of the lock. During the summer, the Old Bedford/Counterdrain can receive water from the Tidal River through the Old Bedford Lock near Salters Lode. The transfer can only take place at high tide provided the salinity is below an agreed threshold. Many other raw water transfers occur via slackers, which are valve-controlled siphons between the river and drain, and these are operated by the IDBs. Under the forthcoming Water Bill these activities are likely to require an abstraction licence.

The drainage area of the Cranbrook Drain and Old Bedford/Counterdrain catchments covers about 105km². The IDB pump excess field drain water into the Old Bedford/Counterdrain which then feeds by gravity into the Tidal River or is pumped at Welches Dam into the Old Bedford/Delph. Often during summer, water is transferred by gravity into the Old Bedford/Counterdrain at Salters Lode and transferred via slackers into drainage ditches for irrigation use.

The movement of water in the Old Bedford/Delph, the Hundred Foot River/New Bedford River and the Ouse Washes is governed by five control structures (Figure 2.4a):

- ◆ Earith Sluice, which allows water from the Great Ouse into the Old Bedford/Delph, however this sluice is closed during summer months;
- ◆ Hermitage Lock which allows a small flow from the Great Ouse into the Old West River;
- ◆ Welches Dam which pumps water into the Old Bedford/Delph from the Old Bedford/Counterdrain;
- ◆ Welmore Lake Sluice which controls the outflow from the Ouse Washes; and
- ◆ Old Bedford Sluice which allows flow from the Tidal River into the Old Bedford/Counterdrain.

In addition, the movement of water between the Hundred Foot River and the South Level is determined by IDB pumping and slacker control. The total local sub-catchment area is only 111km² but the main river system conveys water from a catchment upstream of Earith which is 3056km² in size. The flows passing Earith average about 17.0m³/s, with mean annual flood flows of 124m³/s. The Hundred Foot River is also influenced by tidal fluctuations. The Old West River, which is the former course of the River Great Ouse, has no natural catchment; therefore, levels can become low during periods of dry weather.

As levels in the Old Bedford/Delph increase, water flows over its right bank onto the Ouse Washes. The lowest washes start at about 0.7m AOD and by 1.7m AOD most of the Ouse Washes are flooded. Therefore the Ouse Washes can be considered a large raised reservoir. Levels above 2.35m AOD flood the Welney Road, causing significant disruption to local traffic. Floodwater flows northwards along the Ouse Washes and discharges through the tidal flap at Welmore Lake Sluice when levels in the Old Bedford/Delph exceed those in the Hundred Foot River. As levels in the Old Bedford/Delph drop, water drains off the Ouse Washes, initially on a broad front, and then through the internal ditch system. In spring it is often difficult to discharge water through Welmore Lake Sluice at levels below 1.3m AOD and temporary pumps are then used to remove the remaining flood water and attain the desired summer level of 0.5m AOD. There are approximately 140km of ditches within the Ouse Washes. The main functions of the internal ditches are; to act as wet fences, to provide drinking water for cattle and to maintain high summer water tables. However, the ditches also have an important role to play in the drainage of flood water. During summer, ditch water levels drop through evaporation and seepage and the ditches have to be replenished using water from the Hundred Foot River. This water enters the Ouse Washes through seventeen slackers in the Cradge Bank. Because of the tidal nature of the Hundred Foot River, water can only be obtained on seven days out of fourteen. Water from the slackers enters the Cradge Ditch and is then directed into internal ditches using a variety of water control structures. The ditches are filled to approximately field level. The majority of the internal ditches have polypropylene pipes at their bottom ends, which are positioned so as to prevent excess water flowing from the ditches into the Old Bedford/Delph during summer. However, levels in the Old Bedford/Delph have been observed to rise within the tidal cycle. The source of the water affecting levels has not been identified.

The eastern section of the River Great Ouse is Main River from Earith to Denver. Where the route follows the Forty Foot Drain and the River Nene (Old Course) between Chatteris and Denver these watercourses are non-Main River. The Internal Drainage Boards (IDBs) are responsible for the non-main watercourses

(including acting as the navigation authority) and the Environment Agency for Main River.

2.6.2.2 *Water Quality*

Water quality is greatly influenced by human activities within the area. Most of the watercourses are man-made pumped drains that are extensively used as sources for spray irrigation. Maintaining water quality suitable for spray irrigation is vital to the intensive farming in the area. Fisheries, amenity and conservation are equally important uses which are dependent on suitable water quality. Water quality is affected by prolific algal growth, which is encouraged by a plentiful supply of nutrients and the slow flowing nature of the watercourses. Extensive duckweed cover is a common feature of many drains and this affects oxygen concentrations by shading algae and other submerged plants. Water draining from the Ouse Washes can be of poor quality and can have a significant effect on the quality of the Old Bedford/Delph. Drainage of the fenland has resulted in shrinkage of the peat soils and affects leaching of minerals, such as iron, which causes localised differences in background water quality. Other factors potentially impacting on water quality are abstraction, irrigation and aquatic weed control methods.

Water transfer in the region helps maintain navigation levels and prevent deterioration in water quality. The transfer of water from other catchments influences water quality and is particularly important where water is transferred from the tidal River Great Ouse as this water may be saline which is unsuitable for spray irrigation. The Ely Ouse to Essex Transfer Scheme transfers water from the Ely Ouse catchment into Essex watercourses where it is used for Public Water Supply. Under this scheme water is diverted at Denver from the Ely Ouse River into the Cut Off Channel and is subsequently pumped from the Cut Off Channel at Blackdyke, through tunnels and pipelines, and into Essex watercourses to augment the supply of public water supply reservoirs there. The transfer from the Ely Ouse at Denver is limited by a minimum flow requirement to the Tidal River Ouse. The initial view of the Environment Agency is that the navigation proposals do not appear to adversely affect the operation of the Ely Ouse Essex Transfer Scheme. However, it should be noted that if water destined for the Ely Ouse Essex transfer is used, then the impact on meeting the demands in Essex must be taken into consideration.

Chemical GQA for the year 2000 is shown in Figure 2.4b. The chemical GQA along the Old Bedford/Counter Drain is Grade C. Along the Forty Foot Drain from Welches Dam to just upstream of the Sixteen Foot Drain confluence, water quality is Grade E but improves to Grade D upstream of this point. The River Nene (Old Course) has a chemical GQA of Grade D except for a small section between March and Upwell which is Grade C. On the eastern section between Earith and Denver on the River Great Ouse the chemical GQA ranges from Grade B to D. The upper and lower sections of the proposed route on this river are Grade C. A Grade D section occurs where Cottenham Lode joins the River Great Ouse and the watercourse is designated as Grade B downstream of the confluence with the River Cam to the confluence with the River Lark at which point the GQA returns to Grade D.

Biological GQA for the year 2000 is shown in Figure 2.4c. On the western side of the circular route from Earith, the Old Bedford River/Counter Drain is Grade a. The Forty Foot Drain from Welches Dam to the River Nene (Old Course) is also Grade a. The River Nene (Old Course) is Grade b from the confluence with the Forty Foot Drain until Whittlesey Dyke enters the watercourse at Floods Ferry.

From here to March the River Nene (Old Course) is Grade c. Downstream of March to Popham's Eau is Grade a and from the confluence with Popham's Eau to Denver the River Nene (Old Course) and then Well Creek is Grade b. The eastern side of the loop comprises of the River Great Ouse from Earith to Denver. This section of the route along this watercourse varies from Grade a to c. At Earith the River Great Ouse is Grade c until its confluence with Willingham Lode, after which it is Grade a for about 3 kilometres to where Engine Drain enters the River Great Ouse at Smithey Fen Engine Pumping Station. After this point the biological GQA decreases to Grade b. An improvement to grade a is then seen where the A10 road crosses the river. The river remains Grade a until Soham Lode enters the Great River Ouse after which it decreases to Grade b. The quality improves again to Grade a where the Little Great Ouse joins the River Great Ouse and this grade is maintained until Denver.

There are numerous locations where discharges are consented, mainly concentrated at the settlements of March, Chatteris, Littleport and Ely. Along the route there are Sewage discharges by Anglian water Services of between 100 and 999m³/d dry water flow (DWF) at Chatteris, March and Littleport and discharges of 1000 to 9999m³/d at Benwick on the River Nene (Old Course), Somersham at the top of the Cranbrook Drain which flows into the Old Bedford River/Counter Drain and at Ely on the Ely Ouse. Chatteris Sewage Treatment works discharges into the Nightlayers Drain, which is then pumped into the Forty Foot Drain (Vermuyden's Drain). March STW discharges into the Twenty Foot River which flows into the Forty Foot Drain. Water quality has been an issue in the past on Cranbrook Drain due to discharges from Somersham STW. This was due to be improved during the 1995-2000 AMP period. Some of the sewage treatment works in the area have a significant local impact on the river ecosystem, although the chemical quality of the watercourses remains suitable for agricultural abstraction.

Industrial discharges also affect local water quality. The largest discharge in the area is from a potato processing factory in Whittlesey, which discharges treated effluent into King's Dyke via a former brickworks pit. This discharge is for cooling water from the site. March Landfill has a consent to discharge site drainage to a tributary of the Twenty Foot River. Leachate from the site is discharged to the foul sewer. At Whittlesey, Hanson Brick Limited discharge liquid into the King's Dyke which arises from the watering of clay, green and fired bricks and also from contaminated surface water runoff.

2.6.2.3 *Water Resources*

Water resources issues relating to the project are discussed in detail as a separate supporting document to the Implementation Plan (Supporting Report No.5).

There are hundreds of abstraction licences along the route, most of which are for agricultural purposes, particularly spray irrigation. The water is abstracted, in most cases, directly from low level dykes and drains which are sourced from the main drains and rivers such as the River Nene, the Forty Foot Drain, River Great Ouse via the Old Bedford/Delph, the Tidal Ouse, Well Creek and the Hundred Foot River. (Figure 2.4d). There are a handful of abstraction licences for public water supply near St Ives and to the west of Newmarket. There are also a handful of licences classified as industrial use. Most are for vegetable washing and/or food processing. Several are for concrete manufacture, brick manufacture and sand and gravel washing plants.

2.7 Land Use

2.7.1 Boston to Peterborough

Land use in the vicinity of the Black Sluice catchment is predominantly rural, with extensive areas of high quality agricultural land. The majority of land is under intensive arable production of crops including wheat, potatoes, sugar beet, rape and green vegetables. Other land uses within the catchment include land drainage, transport infrastructure and residential and retail uses in towns and villages.

Agricultural land is graded by the Department for Environment Food and Rural Affairs (DEFRA) according to long-term limitations imposed by physical and chemical characteristics. Under the Agricultural Land Classification scheme land is graded from 1 to 5 (with Grade 1 being the highest quality land). The route from Boston to Peterborough is mostly through Grade 1 and 2 agricultural land as shown in Figure 2.5a. Land alongside the South Forty Foot Drain is mainly Grade 2, but the Glen and Welland around Spalding is Grade 1. The Welland from Spalding to Peterborough is Grade 2. Land to the north and east of Peterborough is mainly Grade 3 or non-agricultural but some Grade 2 is found to the north of the Nene Washes.

The peats and silts of the Fenlands are particularly rich and are valuable for market garden crops and bulbs. Soil type and relief are important factors influencing the distribution of farm types across the area. There are few limitations for cropping on the fertile Fenland soils so farming in the Fen Basin is dominated by high value horticultural crops and vegetables.

Mineral extraction is also an important industry within the area. There are well established brick industries in Peterborough and Whittlesey from the working of clay in the area. Mineral extraction of fluvial deposits of sand and gravel occurs in the river valleys and this distribution also increases their commercial attractiveness. The Nene Valley gravels are of a particularly good quality and give a high yield per hectare. Refractory minerals are also extracted. These consist of fine silica sands and clays, often known locally as ganister. Their distribution in the area is limited to the vicinity of Peterborough, where they occur in close association with limestone and ironstone deposits.

There are several landfill sites in the section from Boston to Peterborough which may have an impact upon water quality. For example there are closed landfill sites containing inert material located at the rear of Hessle Avenue and Bath Garden area, Boston and at Screddington. Closed landfill sites containing non-inert material are located at Star Fen, Heckington and Sykemouth Drive, Swineshead.

There are Radioactive Substance (RAS) sites at Boston and an Integrated Pollution Prevention Control (IPPC) site at Spalding. Most RAS, IPPC and Integrated Pollution Control (IPC) sites in this section are located around Peterborough. The IPC sites are for ceramic production and combustion processes.

2.7.2 Peterborough to Ely

The majority of the area is peat fenland and is recognised as comprising some of the most fertile and productive agricultural soils in Britain. The existing navigable section of the circular route mainly goes through Grade 1 land with sections of Grade 2 around March, Littleport and Ely (Figure 2.5b). Small sections of the route run through Grade 3. These are in the south-eastern parts and at the top of the Ouse Washes near Earith.

The dominant farm type in the area of the route between Peterborough and Ely is general cropping with some areas near Ely, March and Huntingdon being cereal farming. There are also areas of horticulture near March and to the north of Huntingdon.

The extraction of materials such as sand, gravel and limestone from quarries and mines is important to the local economy. Extracted materials include important drift geology, aggregate, mineral resources, which are used in the construction industry, such as sand and gravel, together with solid geology mineral resources used in the process industries, such as clay for brick making. These are worked in the area by means of open cast extraction. Sand and gravel extraction account for the bulk of production.

Many types of excavation have been used in the past as the main waste disposal route via landfill. Sites used include clay pits, road construction borrow pits and gravel quarries. The main operational landfill sites for household, commercial and industrial waste are located at March, Somersham and Grunty Fen near Ely. There are also transfer stations and scrapyards which are mostly concentrated around Chatteris and March. There are 2 RAS sites: one at Ely and another in a rural location between March and the Ouse Washes. There are 2 IPC sites for combustion processes at Sutton and between Earith and Chatteris.

2.8 Cultural Heritage, Archaeology and Material Assets

The historic landscape and heritage assets of the environment include features of the countryside such as hedges, walls, ditches, meadows or archaeological features such as forts and bridges.

The area is rich in archaeological history, including medieval, Roman and prehistoric sites. The Fenland area is particularly rich in treasures, including bridges, deserted villages and buried artefacts. Over time, fluctuating sea levels have resulted in varying amounts of deposition, which has led to the high quality preservation of archaeological remains. Alongside the artefacts, palaeo-environmental remains are also numerous and very well preserved. This can help piece together the evolution of the Fens through thousands of years. Some sites are protected or managed for their historic interest and can also be valuable to wildlife.

Rivers, lakes, wetlands and alluvium-covered areas can be important in terms of archaeology because of the types of site preserved and the possibility of anaerobic conditions permitting the preservation of organic materials. Archaeological remains in these environments are possibly the least well documented. Remains preserved in these areas are among the best protected in the country. Water levels are critical to the preservation of archaeological material such as timber. An increase

in water levels may result in erosion whilst a decrease may lead to the destruction of previously water-logged deposits.

The intensive cultivation of the Fens can also affect the archaeological resource. Cultivation can lead to the peat soils being broken up, drying out and soil being eroded by the wind. In time this can lead to whole landscapes, not exposed since the Bronze Age, being uncovered. The majority of archaeology in the area is non-scheduled and vulnerable to destruction, especially by farmers unaware of the sites' sensitivity.

Particular attention must be given to water associated sites affected by ground water levels and any operational works within the channels. Appendix C has extracts from English Heritage Record of Scheduled Monuments for selected sites.

2.8.1 Boston to Peterborough

In the section from Boston to Peterborough there are several Scheduled Ancient Monuments (SAM) close to the proposed route. These are detailed in Table 2.6 and shown on Figure 2.6a. As highlighted above there are also many other archaeological sites along the route that currently do not have SAM designation but may be of interest and significance.

Table 2.6 Boston to Peterborough – Scheduled Ancient Monuments

Site Number	Site Name/Description
20812	Roman settlement and drove at Fen Farm
20814	Roman settlement by Fen Road, South of Poplar Farm
31614	Decoy Pond 350m South of Aslackby Decoy Farm
20816	Moated site of monastic grange with adjacent earthworks at Rigbolt House
20818	Moated site of Newhall Grange
33131	Wykeham Chapel: a moated monastic grange and retreat house
22613	Ruins and site of Crowland Abbey
LI56	Kenulph's Stone
PE213	St Vincent's Cross
20802	Roman field system and drove at Pote Hole Farm
20803	Iron Age and roman settlement at Bar Pastures
PE218	Section of Car Dyke between Fen Bridge and White Post Road
PE219	Section of Car Dyke 420m long north of church
27189	Horsehill Fort: a Civil War fieldwork.

The area is extremely rich in archaeological remains, ranging from prehistoric to post-medieval features. Remains include wooden trackways at Fiskerton, a wooden coffin at Deeping St James and a whole Bronze Age barrow cemetery at Catley Abbey.

2.8.2 Peterborough to Ely

In the section between Peterborough and Ely there are also a number of SAMs. These are detailed in Table 2.7 and Figure 2.6b.

Table 2.7 Peterborough to Ely – Scheduled Ancient Monuments near to the route

Site Number	Site Name/Description
32436	Heavy anti-aircraft gunsite on Lippitts Hill, 370m northwest of Springfield Farm.
27188	The March Sconce: a Civil War fieldwork, 250m southwest of Eastwood burial

	ground.
30563	Moated site and associated earthworks enclosures 190m south-east of Denver Hall.
33363	Three Bowl Barrows 450m and 570m east of New England, part of the Haddenham Round Barrow Cemetery.
33366	Two Bowl Barrows 370m and 505m south of New England, part of the Haddenham Round Barrow Cemetery.
33376	Bowl Barrow 450m east of Shelford Farm.
27105	The Bulwark: a Civil War fieldwork and World War II gun emplacement, 150m north of Earith Bridge.
33271	Moated site 90m northwest of moat house
33371	Round barrow 690m south-southwest of Stocking Drove Farm.
27109	Worlick Moated site and fishponds.
21473	Five bowl barrows, 100m north of Waypost Farm: part of a Barrow Cemetery south of Ramsey Forty Foot.
20807	Two bowl barrows, 320m north-northwest of Waypost Farm: part of a Barrow Cemetery south of Ramsey Forty Foot.

There are also many other archaeological sites along the route that currently do not have SAM designation but may be of interest and significance.

2.9 Traffic and Transport

2.9.1 Boston to Peterborough

There are several major roads which cross the route, namely the A17, A52, A151, A16 and A47. The A1121 also runs adjacent to the route for about 7 kilometres as it runs westwards from Boston and the A151 also runs alongside the River Glen. The route south of Peterborough is crossed by the A605. Access to the South Forty Foot Drain is poor but there are several other minor roads and unclassified roads that cross or run adjacent to the route.

The East Coast Main Line serves Peterborough and provides easy rail access to London and the North East. There are regional rail connections from Peterborough to Spalding.

2.9.2 Peterborough to Ely

There are several major roads that cross the route, including the A141, A1101, A1122, A142 and A1123. The A10 also crosses the route and runs adjacent to it for a small section near Littleport. There are also many other minor and unclassified roads that run across or adjacent to the route.

There are regional rail connections from Peterborough to March, Ely and Cambridge.

2.10 Soil, Geology and Hydrogeology

Soils are an essential component of the terrestrial ecosystem, forming and evolving over a long period of time. They have a complex structure, consisting of minerals, dead and decaying organic matter, and living organisms. Changing agricultural practices have reduced the amount of organic material in the soils. Organic matter is essential to enable the continued development of soil structure. Organic matter can regulate the movement of pollutants and contaminants in the soil and can also play an important role in the cycling and storage of nutrients and water. The national average figure for organic material in the surface layers of soils

is about 6%. The organic material content of soils can be below 4% in counties with intensive agricultural activities such as Cambridgeshire and Lincolnshire.

Soils provide a natural habitat for flora and fauna, preserve an archaeological record and have the ability to filter and buffer potential water pollutants. They are used in the production of food and timber and as a source of raw materials such as peat.

2.10.1 Boston to Peterborough

2.10.1.1 Soils

Glacial and glaciofluvial processes have been responsible for the scouring of the Fen Basin and the area now occupied by the Wash. Glacial sands and clays were deposited across the area, forming a shallow basin in which peat and marine clays accumulated. It is these peat and clay deposits that have largely given the area its distinctive character. Isolated outcrops of Jurassic and Cretaceous clay at the inner margins of the area have resulted in elevated areas such as the Isle of Ely. The Upper Jurassic clays and limestones are rich in fossils and are of particular geological interest. With the subsequent change in sea levels since the last ice age and reclamation of land from the sea from Roman times, the balance of habitats and settlements found within the area have altered. Soils over the central and coastal fens are fertile, stoneless calcareous silty soils while those associated with inland fens consist of dark, friable fen peat.

Brick and gravel pits in the area are of special geological interest, especially for their exposures of clays and fossil rich limestones. There are several sites along the route which have been designated as SSSIs for their geological features. Horbling Fen SSSI is important as it represents the extreme landward extension of Wash VI clastic sediments, recording the largest Flandrian sea-level rise in the area. It holds considerable potential for future research into recent marine transgressions in the region and correlating inferred sea level changes with local archaeological finds.

The soils in the Nene Valley have formed over the last 10,000 years (the end of the last Ice Age) and are of different ages. In the valleys, the soils developed on the river alluvium are younger as they have had less time to mature. Other soils, such as those on wooded valley tops, have been allowed to mature over thousands of years and therefore show a well developed soil profile.

The following description of the soil types found in the area is based on the Soil Survey of England and Wales (1983). The Fen area is largely composed of the Wisbech, Wallasea and Downholland Soil Association. These soils are deep stoneless humose clayey/silt soils, calcareous in places. Due to their physical properties these soils are at risk from wind erosion. Around Peterborough the soil types differ significantly with a higher proportion of clayey soils, such as the Denchworth, Evesham and Hanslope Soil Associations. These tend to be less permeable and seasonally waterlogged. Where some of these soils occur there tends to be an increased chance of slope instability following heavy rainfall.

To the east of Peterborough the soils overlying the Jurassic Limestone are Elmton 1 and Sherborne Soil Associations. The soils are characteristically shallow, well drained, brashy soils. The soils tend to be slowly permeable calcareous clayey soils. The soil is most vulnerable during periods of dry weather in the spring when the soils have been prepared for a spring crop such as sugar beet.

Areas of peaty soils in the Fens are vulnerable through desiccation and oxidation when the structure is broken down and the light material can be dispersed by the wind. As peat wastage continues the surface organic layer shrinks and the mineral sub-soil (with much lower levels of organic matter) becomes incorporated into the 'plough layer', forming 'skirt soils'. As agricultural use continues, the skirt topsoils becomes increasingly depleted of organic matter. In time this could lead to a local deterioration of land quality.

Changes in land drainage can result in the best and most versatile agricultural land being degraded. In the Fens, the Grade 1 status of the land is dependent on the effective management of the water regime. The poorer grade land is generally found on alluvial soils in the valley bottoms. They are of a much lower quality and less flexible in the range of crops that may be grown. These soils are normally associated with wet meadows and pasture land. In the past areas such as these have been subjected to intensive drainage and their soils modified.

2.10.1.2 Geology and Hydrogeology

The only aquifer of importance is the Lincolnshire Limestone, which is an important source of groundwater for public water supply and irrigation in the area. However, its contribution to surface water is limited during summer months. To the east of the South Forty Foot Drain water in the limestone aquifer is saline and not usable.

Sections of the route along the Welland, between Spalding and Peterborough, sections of the Folly River Drain and sections of Cats Water Drain pass through a Groundwater Vulnerability Zone (GVZ) as classified by the Environment Agency. Figure 2.7a shows the groundwater vulnerability zones in the area highlighting areas overlying major and minor aquifers.

There are a number of designated Nitrate Vulnerable Zones (NVZ) in area. This scheme intends to reduce the nitrate levels in soils through changes to farming practice, and thus reduce the excess nitrate leached to the water environment following crop uptake. The NVZ scheme is compulsory and is governed by the Action Programme for Nitrate Vulnerable Zones (England and Wales) Regulations 1998. This scheme must be followed by farmers in the designated areas (as from December 1998), where agricultural nitrate concentrations exceed or are at risk of exceeding the 50mg/l limit set in the EC Surface Water Abstraction Directive. The rules laid down in relation to this scheme are linked to the MAFF 'Code of Good Agricultural Practice for the Protection of Water'. For example farmers must limit applications of organic manure and inorganic fertilisers to levels consistent with the net nitrogen requirement of the crop after allowance for nitrogen from residues in the soil and other sources.

Areas of the region are classified as Nitrate Vulnerable Zones (NVZ). The South Forty Foot Drain, from the A17 road upstream to the River Glen, passes through a surface water NVZ. The River Glen borders an NVZ and the River Welland from Spalding to Peterborough passes through or borders an NVZ. Sections of Cat's Water Drain also pass through an NVZ. The route south of Peterborough also goes through an NVZ.

2.10.2 Peterborough to Boston

2.10.2.1 Soils

Agriculture in the Fens has been sustained by drainage of the organically rich peat soils. These peat soils are central to the prosperity of farming in the fens, but their remaining extent and quality have reduced as a consequence of intensive use. Drainage and cultivation have caused the peat to waste away over time owing to a combination of shrinkage and oxidation. This wastage is in the order of 1cm per year, which leads to falling land levels and a gradual progression from peat through organic “skirt” to mineral soils. The soil changes are gradual and it takes over 100 years for a wasted peat soil to finally become a mineral soil typical of arable land found elsewhere in Eastern England. Ultimately the quality of fenland soils will be governed by the underlying material, which may therefore form either silt or clay based soil. These gradual soil changes are inevitable and will lead to problems with moisture retention, workability, a reduction in the range of crops that can be grown and a greater need for irrigation. Consequently local downgrading of the Agricultural Land Classification (ALC) is likely to occur.

2.10.2.2 Geology and Hydrogeology

The solid geology in the section from Peterborough to Ely consists of Oxford Clay on the west, Ampthill Clay in the middle sections, which includes most of the Ouse Washes and then Kimmeridge Clay and Lower Greensand in the east of the area. Most of the area’s solid geology is overlain by a variety of drift deposits. At the western edge of the area, Till overlies the Oxford Clay. This includes the King’s Dyke, Whittlesey Dyke, part of the River Nene (Old Course) and part of the Forty Foot Drain to the west of Chatteris. The Till consists of chalky Boulder Clay and may include gravel, sand and clay layers. The Fenland area is covered by extensive drift deposits which include unconsolidated peats, clays, silts, sands and gravels. These deposits were laid down in the Quaternary Period by the shifting location of estuarine and inter-tidal areas during glacial periods. Some deposits are derived from river processes and are located along the courses of the River Ouse, the Old Bedford River and the River Nene while others are derived from deposition in lacustrine (lake) environments.

The solid formations are found at the surface over only a small proportion of the area. Near Somersham there are outcrops of Oxford Clay and Ampthill Clay. Warboys Clay Pit is a geological SSSI where these formations outcrop. Kimmeridge Clay and Ampthill Clay outcrop at the surface between Ely and Hundred Foot River, near here is Roswell Pits a geological SSSI noted for its rich reptile fauna in the Kimmeridge Clay. Just west of Ely there is also a small outcrop of Lower Greensand.

There are some large areas of mineral extraction, which are generally associated with gravelly drift deposits, many of which have villages located on them. Old quarries and brick pits, in the Gault Clay, Kimmeridge Clay, Corallian and Oxford Clay to the north of the area have been/are being used for the land filling of wastes.

Most of the area was carved out of soft clays by marine and fluvial processes. The whole fenland area has been occupied more than once by the sea. The combination of geology and physical processes has given rise to this low-lying area with its relief rarely reaching 10m above sea level.

There are GVZs around March, Ely and Chatteris as shown in Figure 2.7b. The section from Ely to Earith and the new section pass in and out of the groundwater vulnerability zones in these locations.

The whole of the route between Peterborough and Ely is within a surface water Nitrate Vulnerable Zone except for a short section between Outwell and Denver.

2.11 Summary of Main Features of the Existing Environment

The high level review of the existing environment presented above has identified a number of key features of the environment along the route. These include:

- ◆ The limited extent of existing navigation facilities;
- ◆ The heavy existing use of a number of the watercourses for fishing;
- ◆ The generally rural nature of the area with limited access in some areas;
- ◆ The presence of a number of nationally and internationally important nature conservation sites and areas of heritage interest and archaeological importance;
- ◆ The large number of water abstractions and the limited water availability within the eastern region;
- ◆ The low lying nature of the region and the land drainage requirements this brings; and
- ◆ The lack of landscape variety along the route.

It is evident from the review of the baseline environmental that there are strong nature conservation and heritage/water management themes across the study area. Opportunities should be sought to build upon these themes as important features characterising the Fens Waterways Link.

3 Consultation

In order to identify the key environmental issues, constraints and enhancement opportunities, a consultation exercise was undertaken. The aim of this was to establish consultee's interests and concerns, obtain their views on the Strategic Objectives (see Section 4) and establish what data is available for the study area. Consultees included the 'statutory' stakeholders such as the local authorities, Environment Agency, English Nature, English Heritage and the Countryside Agency together with over 450 other consultees.

The consultation exercise was initiated on the 30th May 2003 and the formal consultation period finished on the 31st August 2003.

The methods used for consultation included:

- ◆ Scoping Report;
- ◆ Project Leaflet;
- ◆ Meetings; and
- ◆ Project website.

The Project Leaflet was sent to all consultees and was distributed at a number of local navigation events in the region. A copy of the leaflet is presented in Appendix D. In addition, the Scoping Report was sent to the 'statutory' stakeholders and those, such as navigation interests, that would have a high level of interest in the proposals. A website was also developed which contained the Scoping Report and other project information. All consultees were directed to this as a source of further information and as an additional means of responding to the consultation. A consultation reply slip was also sent out with all the Scoping Reports and all the posted leaflets.

Although written communication was the main method of consultation a series of meetings were also held with local authorities, drainage authorities, English Nature, English Heritage and the Countryside Agency.

A summary of consultation responses is presented in Tables 3.1 and 3.2 and each response received, together with brief meeting notes is presented in Appendix E (separately bound). Particular issues raised in the consultation exercise are addressed in Section 5. In summary the main opportunities were seen to be:

- ◆ Enhancement of recreation activities, e.g. angling, navigation, walking, horse riding, cycling;
- ◆ Environmental enhancements; and
- ◆ Regeneration and tourism opportunities.

The main challenges faced by the project were seen to be:

- ◆ Funding and
- ◆ Communication between organisations

During the consultation two sections of the route were identified as problematic. English Heritage highlighted the use of Car Dyke SAM as unacceptable and thus an alternative has been proposed using Kennulph's Drain and Cats Water Drain (Section 1.4.1). The Middle Level Commissioners indicated that the use of Cranbrook Drain and Twenty Foot Drain/Fenton's Lode as a navigation is unacceptable in terms of flood defence, water resources and conservation issues. An alternative, first considered in the Bullens report, using the Old Bedford River up to Welches Dam and then the Forty Foot/Vermuyden's Drain has consequently also been investigated. It should be noted that these two alternatives have been considered in this report, but to date consultation has not been carried out on these new alternative sections of the route.

Further consultation is planned as the Fens Waterways Link is progressed. In the first instance this Strategic Appraisal report will be issued and available to consultees during summer 2004 for comment prior to being finalised. The website will be updated and a further, revised leaflet prepared.

Table 3.1 – Summary of Written ‘Statutory’ Stakeholder Consultee Responses

Name of Organisation	Summary of Responses
Boston Borough Council	<ul style="list-style-type: none"> Increased leisure opportunities and regeneration
Cambridgeshire County Council	<ul style="list-style-type: none"> Want to increase length of bridleways and have access to both banks Soft surfaces should be used Disabled access should be provided for Route should not break existing rights of way and aim to reinstate currently disrupted ones During construction access routes should not use high-speed roads Sufficient space should be provided for maintenance work Canoe access should be encouraged An environmental statement should be produced Landscape assessments will be required for new structures which will have a negative impact
Cambridgeshire County Council (County Archaeologist)	<ul style="list-style-type: none"> Advises the project may have an adverse impact on archaeological remains
Countryside Agency (East Midlands)	<ul style="list-style-type: none"> See opportunities for landscape character enhancement, increased access and rural diversification Promotion of local produce, sensitive and sustainable rural tourism opportunities Challenges seen as funding and partnership working The route should be guided by the outcome of a landscape character assessment
East Cambridgeshire District Council	<ul style="list-style-type: none"> See opportunities to develop tourism and boating holidays Environmental impact must be minimised
English Heritage	<ul style="list-style-type: none"> No written response received. (meeting held - Appendix E)
English Nature	<ul style="list-style-type: none"> Objectives should include a commitment to achieving biodiversity targets and incorporating sustainability principles at all stages of the project An appropriate assessment will be required for any European designated conservation sites
Environment Agency (Central area)	<ul style="list-style-type: none"> Flood Risk Assessments will need to be undertaken Land drainage consent will be required from the Environment Agency for any works in accordance with the Water Resources Act 1991 and Land Drainage Byelaws The ecological impact of the proposed new stretches of watercourse should be assessed and opportunities explored for habitat improvement/creation An appropriate assessment will be required to determine if there would be an adverse effect on the integrity of European conservation sites. Authorisation for the proposal should only be given after having ascertained that it will not adversely affect the integrity of these sites (subject to considerations of overriding public interest) The impact of the proposal on the SSSIs should also be assessed Any development at Denver should maintain the integrity of the controlled (measured) releases through the sluice system The proposal does not appear to affect the Ely Ouse Essex Transfer Scheme, however if water destined for this transfer is used the impacts upon demands in Essex should be considered Summer levels in the Middle Level system depend on transfers from the Nene at Stanground in order to maintain navigation and irrigation needs An abstraction licence may be required from the agency for the abstraction of water from any inland water or underground strata An impounding licence may be required for the impounding of any watercourse, ditch or stream. This is dependent on water resources availability and may not be granted The development must not affect any water features including licensed and unlicensed abstractions. Consideration should be given to changes in legislation
Environment Agency (Northern area)	<ul style="list-style-type: none"> Embanked channels with artificially raised water levels can experience significant water losses in dry summer periods, creating more channels like these could lead to more losses Increased boat traffic through tidal sluices will increase the loss of freshwater to tides Boat wash may cause turbidity which may affect ecology and fisheries No development should result in a net loss of public access to the riverside Fish stocking will be required to create fisheries Alien/invasive species may be a problem Flood defence and navigation maintenance budgets need to be established at an early stage
Fenland District Council	<ul style="list-style-type: none"> The council would welcome any facilities, public art, walkways, cycle routes etc in particular for Whittlesey, Benwick and Chatteris The link will need to be taken into account in the Council's Replacement Local Plan so that its corridor is protected
Huntingdonshire District Council	<ul style="list-style-type: none"> Alternatives should be considered more and the no action option investigated The scale of potential impacts should be investigated Socio-economic impacts should be considered
King's Lynn & West Norfolk Borough Council	<ul style="list-style-type: none"> No response received
Lincolnshire County Council	<ul style="list-style-type: none"> No response received
South Holland District Council	<ul style="list-style-type: none"> Interests and opportunities in increasing tourism, recreation and regeneration The navigation could link in with other projects such as the development at Springfields

Table 3.2 – Summary of Other Written Consultee Responses Received

Name of Organisation	Summary of Responses
Anglian Water Services Ltd	<ul style="list-style-type: none"> Potential for the link to help develop water resources and water transfer in the region Water resources will need to be secured to maintain levels in the navigation and for lockage Climate changes also needs to be considered with regard to water resources in the future
Association of Nene River Clubs	<ul style="list-style-type: none"> Particularly interested in the Welland to Nene Link
Barge Association	<ul style="list-style-type: none"> Improving access between the Fenland waterways and the main UK waterways network for broad-beam craft will provide major benefits to owners of such craft The DBA supports in general the comments of the Inland Waterways Association The channel should be at least 1.7m deep to allow for craft with a draft of 1.3m and the width of the fairway should be twice the gauge beam to allow craft of full gauge beam to pass each other in most places Minimising tidal lengths should be an objective for the project, particularly at Boston and on the Welland at Spalding
Black Sluice Internal Drainage Board	<ul style="list-style-type: none"> The section of the South Forty Foot drain from Black Hole Drove Pumping Station to the River Glen is maintained by Black Sluice Internal Drainage Board The board operates 22 pumping stations that pump directly into the South Forty Foot The raising of water levels in the summer or winter would be unacceptable for navigation unless suitable compensation was forthcoming to cover increased drainage costs A lock would be needed at Black Hole Drove Pumping Station to allow boats to pass Restoring the lock at Black Sluice could be difficult and use of the North Forty Foot Drain could be used instead
British Horse Society	<ul style="list-style-type: none"> Access for horse riding and multi-user trails should be provided Project provides opportunity for new bridleways to be created and would like to see the new route created as a public bridleway.
British Trust For Conservation Volunteers (BTCV)	<ul style="list-style-type: none"> Involvement of local communities is important and that could help with long-term maintenance through voluntary work
British Trust for Ornithology	<ul style="list-style-type: none"> No views on planning issues Can offer ornithological expertise
British Waterways (BW)	<ul style="list-style-type: none"> BW are navigation authority on the River Witham, Fosdyke, River Trent and Grand Union Canal which may be affected by the FWL BW is a partner in the Lincolnshire Waterways Partnership which aims to extend and improve the waterways network in the county BW see opportunities for economic and environmental gains. Major challenges seen as funding, water resources and spoil disposal
Cambridgeshire Canoeing Association	<ul style="list-style-type: none"> Access to the water for canoeists should be increased and the possibility of circular trips created
Chatteris Parish Council	<ul style="list-style-type: none"> Angling is currently the only major recreation activity on the waterway so the council would welcome an increase in leisure Better access is required as banks can be too steep Access for disabled anglers, young people, canoes and rowing boats should be increased
Chatteris Town Council	<ul style="list-style-type: none"> Angling is important on the South Forty Foot Improved access to rivers to allow use by canoes and rowing, disabled and young anglers
Clean Rivers Trust	<ul style="list-style-type: none"> Acidity of watercourses could be a challenge
Colne Parish Council	<ul style="list-style-type: none"> Interested in recreation Sees major challenges as timescales and land ownership
Coopers Angling Club (Ely)	<ul style="list-style-type: none"> Angling declining so most revenue is currently from boaters Natural looking waterway should be created that are low maintenance Durable angling pegs, mooring with opposite bank for nature conservation and parking at strategic points should be provided
Country Land & Business Association	<ul style="list-style-type: none"> Sustainability should be incorporated into the project Link could stimulate regeneration and offer opportunities for diversification The phasing of facilities needs to be considered The project should link in with other initiatives Landowners should be consulted and be in agreement with any proposals The CLA oppose compulsory action
Cowbit Parish Council	<ul style="list-style-type: none"> Challenges seen as low bridges and type of traffic
Campaign for the Protection of Rural England (Cambridgeshire)	<ul style="list-style-type: none"> Concerned that development should be restricted to urban areas and rural countryside preserved Aim of land drainage should not be detrimental to wildlife sites Major challenges seen as funding and preventing inappropriate commercial developments
Campaign for the Protection of Rural England (Norfolk)	<ul style="list-style-type: none"> Interested in developing navigation on the River Nar
Crowland Parish Council	<ul style="list-style-type: none"> Would like to see promotion of the River Welland for recreation and tourism. Would like additional facilities for river users in the Crowland area.
Earith Parish Council	<ul style="list-style-type: none"> Interests are recreational and environmental
East Anglian Waterways Association Ltd	<ul style="list-style-type: none"> Particularly interested in R Glen and R Welland Opportunities for recreation, tourism and regeneration Suggested alternative route round Peterborough using new route to avoid Car Dyke New section near Earith should be an add-on due to problems that may be encountered
East of England Tourist Board	<ul style="list-style-type: none"> Interested in tourism sees opportunities in this area
Elm Parish Council	<ul style="list-style-type: none"> No comments
Ely Group of Internal Drainage Boards	<ul style="list-style-type: none"> Interested in land drainage and finance of works

Name of Organisation	Summary of Responses
Fenland Water Ski Club	<ul style="list-style-type: none"> No comments
Fens Tourism	<ul style="list-style-type: none"> No comments
Farming and Wildlife Advisory Group (FWAG)	<ul style="list-style-type: none"> No comments
Hartford Marina Ltd	<ul style="list-style-type: none"> No comments
Hawk & Owl Trust	<ul style="list-style-type: none"> This project could be linked to the Agency's Riverside Link project which involves installing barn owl boxes on waterways and includes the River Glen and South Forty Foot
Heart of England Tourist Board	<ul style="list-style-type: none"> Challenges seen as construction issues and achieving high quality access including for the disabled with appropriate signage
Inland Waterways Association	<ul style="list-style-type: none"> IWA concerned over the listings of possible but unlikely adverse consequences that are listed Agree that efforts should be made to avoid or mitigate any adverse consequences Any adverse impacts mentioned should be not be raised unless it can be proven there is a real risk
Lincoln City Council	<ul style="list-style-type: none"> Interested in regeneration particularly around the Brayford Pool area of Lincoln but most of project is outside their city boundary
Loveys Marina	<ul style="list-style-type: none"> The project will provide opportunities for tourism and regeneration
Member of the Public	<ul style="list-style-type: none"> Would like to see a route to west of Peterborough More fishing pegs needed, interpretation boards and towpaths should be provided
Member of the Public	<ul style="list-style-type: none"> Will provide opportunities for regeneration needed in Whittlesey Habitats should be preserved and created Opportunity exists at the footbridge over "Bower" at Manor Filed, Whittlesey to improve habitat
Member of the Public	<ul style="list-style-type: none"> The South Forty Foot is very narrow and has low water levels A lock would be needed from the River Glen to the South Forty Foot Views of river banks are not attractive to boaters Recreational activities may disturb wildlife in the Glen river corridor
Member of the Public	<ul style="list-style-type: none"> The South Forty Foot has no interest and poor access
Member of the Public	<ul style="list-style-type: none"> The project will provide benefits to spur regeneration in Market Deeping which was once navigable
Middle Level Commissioners	<ul style="list-style-type: none"> Water resources in the Stanground area need to be considered Opposition to the use of Cranbrook/Counter Drain system as this drain is important for flood defence and has high leakage Use of Fenton Lode/Fillenhams Drain would be unacceptable as it is an important flood defence channel and downstream of the pumping station in Chatteris the ground is unstable Water quality in the upper reaches of the Counter Drain are an issue
National Association of Boat Owners (NABO)	<ul style="list-style-type: none"> Adequate boat overnight stops needed Improvement of nature, waterside and regeneration of waterside villages needed Waterways should be suitable for wide beam boats and the draft should be at least 3.5metres
National Farmers' Union (Peterborough and District)	<ul style="list-style-type: none"> Water should be retained for agriculture The project should not adversely effect landowners and land drainage
Nene Park Trust	<ul style="list-style-type: none"> No comments
National Farmers Union (NFU)	<ul style="list-style-type: none"> The NFU supports the project and feels it could help support the farm diversification schemes that could result Farming in the fens is highly sensitive to the way water is managed Many abstraction licences already have restrictions when river levels are low and irrigators must not face further restrictions because water levels must be high for navigation The drainage and flood defence mechanisms in the fens must not be unbalanced A new navigation channel could create opportunities such as the creation of winter storage reservoirs Access will be a major issue and there could be conflicts between access on intensively farmed land and habitats
Norfolk County Council	<ul style="list-style-type: none"> Successful regeneration is likely to lead to an increase in demand for infrastructure Existing recreational facilities should be linked into the route and use of footpaths made The fens rivers way is a long distance footpath There is scope for the project to expand into Norfolk Horse riding is an expanding recreational activity and should be catered for
Otter Trust	<ul style="list-style-type: none"> Otter friendly watercourses are required There are otters on most of the watercourses along the route so disturbance should be minimised particularly during construction Boating activity may affect otter populations There are opportunities for conservation enhancements
Ouse Valley River Club	<ul style="list-style-type: none"> The organisation is interested in opportunities for motor boating
Peterborough City Council	<ul style="list-style-type: none"> Gains within Peterborough should be allied to work with the city centre master plan
Peterborough Yacht Club	<ul style="list-style-type: none"> Support the creation of new waterways to explore
Pinchbeck Parish Council	<ul style="list-style-type: none"> Concerned about the Ship Inn at Pinchbeck who were previously promised a landing stage
Pointon & Sempringham Parish Council	<ul style="list-style-type: none"> No Comments
Ramblers Association	<ul style="list-style-type: none"> Interests in improving access and promoting integrated transport and freight Recent figures show that walkers spend £5billion in England every year which generates 170-230K jobs
Ramblers' Association (Cambridgeshire)	<ul style="list-style-type: none"> No comments

Name of Organisation	Summary of Responses
Soham Angling Club	<ul style="list-style-type: none"> Would like route to be extended up the River Lark to Mildenhall Opportunities for angling should be created
Somersham Parish Council	<ul style="list-style-type: none"> Project provides opportunities for short commercial transport routes, particularly between Earith and Needingworth
Southery & District Internal Drainage Board	<ul style="list-style-type: none"> Interested in impacts on water levels and land drainage
Sport England East	<ul style="list-style-type: none"> Project will create opportunities for recreation and sport.
Sport England East Midlands	<ul style="list-style-type: none"> Interested in gains for recreation and sport
St. Neots Marina	<ul style="list-style-type: none"> No comments
Stanground Councillor	<ul style="list-style-type: none"> Flooding occurs in Stanground especially at the fire station due to flows from Stanground Lode
Stanground Boating Association	<ul style="list-style-type: none"> Supports project as it will increase visitor numbers in the area
Stretham Engine Trust	<ul style="list-style-type: none"> Footpaths should be created, public transport improved and visitor number increased to Strentham Old Engine
Sustrans	<ul style="list-style-type: none"> Interests in access by cycle and foot and links to the national cycle network New cycle routes should be created Need to create opportunities in recreation, conservation and interpretation/information Large revenues are available from sustainable tourism such as cycling
Sustrans (East of England)	<ul style="list-style-type: none"> There is a national cycle route that goes close to route which may be possible to link up to
Upwell with Delph Constituency	<ul style="list-style-type: none"> Interested in getting more boats through Upwell/Outwell
Welland and Deepings Internal Drainage Board	<ul style="list-style-type: none"> No comments
Welland Yacht Club	<ul style="list-style-type: none"> Spalding is not boat-friendly Sea lock operations are limited The river through Spalding is silted and cluttered with debris On the seaward side there are non public moorings
Welney Angling Club	<ul style="list-style-type: none"> A route via Old Bedford- Salters Lode- New Bedford would improve angling
Whittlesey Town Council	<ul style="list-style-type: none"> No comments
Wimblington Parish Council	<ul style="list-style-type: none"> Fens are an important part of the community and education is needed to emphasise this Sectors of the public must not be excluded due to the cost of using facilities and not knowing where to get information from
Woodlands Trust	<ul style="list-style-type: none"> Ancient woodland should be protected New native woodland and biodiversity woodland should be increased

4 Environmental Objectives

4.1 Objectives of the Project

The main strategic objective of the Fens Waterways Link scheme is to provide a navigable link in the Fens area and to link this system to the wider UK navigation network.

There are various other strategic objectives which could be fulfilled via this project as listed in Table 4.1 below. These objectives have been adapted and developed from 'Planning a Future for the Inland Waterways: A Good Practice Guide' Inland Waterways Amenity Advisory Council, December 2001 and were included in the consultation exercise undertaken in Spring/Summer 2003.

It is proposed that the strategic objectives listed in Table 4.1 are used as a benchmark against which any future projects under the umbrella of the Fens Waterways Link initiative can be assessed. To aid in this process it is recommended that a series of more specific indicators are derived from the Strategic Objectives and agreed by the project partners.

Table 4.1 Strategic Objectives for the Fens Waterways Link Project

Topic	Strategic Objective
Regeneration	<ul style="list-style-type: none"> ◆ Act as catalyst for economic and social renewal. ◆ Increase development value and the opportunity for investment. ◆ Focus and bring together regeneration opportunities. ◆ Generate long term economic activity and opportunities for employment. ◆ Promote social inclusion and quality of life.
Sport and Recreation	<ul style="list-style-type: none"> ◆ Provide an important sport and recreation resource. ◆ Contribute to the health and well-being of society. ◆ Form corridors linking urban areas to the countryside. ◆ Promote accessibility to all members of society. ◆ Create a new fishery of national importance.
Tourism	<ul style="list-style-type: none"> ◆ Act as a tourism asset in its own right. ◆ Provide a link between existing and new attractions. ◆ Support the holiday industry through water-based activities. ◆ Enhance the environment and attract increased visitor activity.
Heritage, Culture and the Natural Environment	<ul style="list-style-type: none"> ◆ Form a unique heritage, cultural, educational, landscape and environmental asset. ◆ Provide access to a wide array of important historic buildings and structures. ◆ Contribute to the diversity of the natural environment by sustaining and enhancing habitats and supporting rare species. ◆ Contribute to achieving biodiversity targets and incorporating sustainability principles at all stages of the project. ◆ Contribute to open space provision. ◆ Provide a resource for water supply, water transfer and land drainage. ◆ Protect and enhance water quality and contribute to flood risk management.
Transport	<ul style="list-style-type: none"> ◆ Contribute to integrated transport objectives. ◆ Provide transport routes on a local and regional scale. ◆ Act as a waterborne transport corridor for people and freight. ◆ Form important cycling, walking and public access corridors.

5 Strategic Appraisal of Environmental Issues

5.1 Introduction

This section of the report outlines the main environmental issues that have been identified to date. These issues have been identified through consultation, literature review and professional judgement.

For each environmental receptor (e.g. water, flora and fauna) an overview of the generic environmental issues pertinent to a navigation project is presented. Tables are included which list the main generic impacts. These tables have been expanded and adapted from the Environment Agency's Scoping Guidelines on the Environmental Impact Assessment (EIA) of projects. In addition, more specific comments are also provided based on the responses to the consultation exercise and on the literature and data review.

5.2 Human Beings

5.2.1 Generic Impacts

Creating this new waterway through the construction of new channels and the renewal of some existing systems will constitute a major development in its own right. The scheme will have significant impacts on the area it passes through, both as a result of its physical presence and the visitors attracted to it. Table 5.1 highlights some of the generic impacts upon human beings that may result from the project.

Table 5.1 Generic Impacts on Human Beings

Potential Receptors of Impact	Activities and Potential Impacts	
	Construction Phase	Operational Phase
Socioeconomic	<ul style="list-style-type: none"> Creation of employment opportunities Temporary direct land-take Temporary closure of roads and footpaths 	<ul style="list-style-type: none"> Change in land use Benefits from local tourism and amenity use through increased trade opportunities Regeneration opportunities
Health and Safety	<ul style="list-style-type: none"> Risk of injury on unsecured sites 	<ul style="list-style-type: none"> Risk to life and property from change in flood regime Improved navigational safety particularly in tidal reaches
Amenity	<ul style="list-style-type: none"> Temporary/permanent loss of amenity value Reduction in angling quality Adverse visual impact Closure of roads and/or footpaths Better quality of the environment 	<ul style="list-style-type: none"> Change in angling quality Permanent disruption of pedestrian access Improvements in access to riverbanks for users eg. walkers and anglers Creation of new footpaths, bridleways and cycle routes Improvement in recreational and amenity resource Increased tourist and amenity use

Potential Receptors of Impact	Activities and Potential Impacts	
	Construction Phase	Operational Phase
		◆ Improved navigation
Nuisance	<ul style="list-style-type: none"> ◆ Construction noise ◆ Dust ◆ Closure of roads and footpaths 	

Construction of the navigation and associated facilities may cause temporary disturbance and disruption to local residents, businesses and users of the area. This may be due to noise or dust emanating from the construction sites or by the closure of roads or footpaths while construction work is undertaken. The works may result in a temporary loss of amenity for water users and existing facilities may be made inaccessible for a time. Where rights of way need to be disrupted during construction, alternative routes should be provided which do not involve excessive diversions or the use of high-speed roads. New navigation facilities may permanently disrupt existing pedestrian access to water, reduce the length of bank available for angling and other water based activities in the vicinity along the route. Maintenance regimes for waterways can affect rights of ways. Therefore slubbings should not be deposited on Rights of Way so sufficient space should be provided to permit maintenance along the route without affecting the Rights of Way.

The new navigation will provide an important recreational and amenity resource in both rural and urban areas of the Fens and provide a corridor linking urban and rural areas. Such development may bring positive benefits to boating enthusiasts, anglers, ramblers, horse riders, nature conservation interests and local residents. For example, the waterway in places passes close to the proposed national cycle network and there may be opportunities to link the two together. In some areas there is currently little use of the waterways and any increase in leisure use would be welcomed by the local councils. To increase leisure use, the design of the waterways environment needs to be carefully considered. For example, better access to the banks and banks with a shallower gradient would allow access for the use of canoes and rowing boats. Access should also be provided for disabled persons and where barriers are required, gates rather than stiles should be used. The waterway should be actively promoted so that the local community is aware of the recreational facilities in their area. To attract horse riders, quiet roads, multi-user trails and accommodation with horse and rider facilities should be provided, creating tourism and leisure opportunities.

Cambridgeshire County Council would like to see an increase in waterways access, which the Fens Waterways Link could help provide. Access routes along waterways can provide an important starting point and work is already underway to raise the status of selected footpaths along waterways from footpath to bridleway status. For any new waterway there should be access along at least one bank and preferably both banks and these should be designated as bridleways. On existing stretches of waterway, consideration should be given to upgrading the status from footpath to bridleway. This may require negotiation with landowners and funds for the creation costs and bridleway furniture. Bridleway access allows access by horses and is therefore preferable to cycleway status, which does not. Surfaces should be selected appropriate to both horses and cycles. Hard sealed surfaces are not favoured unless provided in parallel with softer surfaces for equine use. It would be beneficial to link the new route into the Cambridgeshire Access Network, which in the absence of bridges may require access on both banks. Potential impacts on landowners through disturbance will need to be considered.

Creation of the Link should not break existing rights of way and not preclude raising the status of current footpaths to bridleways in the future. At Somersham

High Fen the route crosses ROW 206/7 on the line of the old railway and here a bridge will be required. Past route severance should be addressed, together with anomalies in the network where possible.

The waterway will prove beneficial to the local tourist economy, particularly in rural areas with weaker economies. Although in some areas the new waterway may cause short-term restrictions on the navigable use of the existing waterways, the end product is likely to provide considerable positive benefits to navigation, providing that the necessary associated facilities such as mooring points and utility services are available.

As well as the navigation there are additional structures used in navigation such as moorings and jetties, which involve construction work both in and adjacent to water. The presence of structures such as these on the river channels presents a health and safety risk to members of the public who deliberately or inadvertently enter the watercourse. The design of the structures can help to minimise potential risks. There may be a need to designate specific areas for certain recreational activities and a speed limit should be imposed on navigation craft for health and safety reasons. The removal of the need to navigate difficult tidal reaches will reduce health and safety risks and encourage use of the navigation network by novice boaters.

During construction of any navigation and associated structures, plant will be needed on site. Site compounds will be necessary for the safe storage of equipment and locations for these should be carefully selected to cause minimum disturbance. The site compounds should also be kept safe and tidy and be as small and as visually unobtrusive as possible. During any construction periods that may be required, access to the land adjacent to the route should be maintained for landowners and those with a right of access if possible. However, as the Construction (Design and Management) Regulations 1994 will apply to any construction this may not be feasible, due to health and safety constraints associated with the presence of heavy plant. The health and safety implications of unauthorised access onto any part of the scheme during construction by members of the public may present a particular problem in some areas, such as around Peterborough. Appropriate measures should be taken to prevent unauthorised access such as the provision of signage to inform the public of risks on site.

The nature and magnitude of impacts for human beings will be related to the choice of preferred route, appropriateness of design, timing and duration of construction operations and the type of construction works being undertaken. Appropriate mitigation measures should be used where possible to minimise the effects of any works. It may be necessary to time works to avoid particular periods, for example the school summer holidays, existing boating periods, and to restrict operations to normal working hours. The timing of works will be important not only to minimise disruption to local residents and current users of the watercourses but also to minimise the impact upon the tourism in the area. The waterway will provide opportunities that can raise awareness, skills levels and confidence of local communities near the waterway through training events, activity days etc. Local groups could also be established to assist with maintenance and recreational activities, enabling local communities to be involved in the waterway.

5.2.2 Specific Impacts

There are numerous bridges along the route of various heights. It is proposed that all bridges which have headroom of less than 1.2 metres should be replaced or refurbished to provide headroom of 2.4 metres to avoid navigation constraints. There are bridges along almost every watercourse that this will apply to. An example is the Creek Farm Bridge on Well Creek, which will need to be replaced or redesigned to allow for suitable headroom for navigation. This bridge also has piers within the main channel that pose restrictions to navigation. Another example is "Low Bridge" on the Forty Foot Drain which has a clearance of 1.7m. Where bridges will need to be constructed, replaced or refurbished, disruption will be caused to the local users, through short-term loss of use, noise and visual intrusion during the works, however these will be temporary in nature.

During construction of locks there will also be an impact upon the local population through visual intrusion, noise and in some instances a temporary loss of existing facilities. New locks are likely at several locations along the route including Guthram Gowt to allow passage from the River Glen into the South Forty Foot and around Black Hole Drove Pumping Station on the South Forty Foot, due to a difference in water levels on either side of the pumping station. Existing locks such as Hermitage Lock at Earith, Salters Lode Lock, Fulney Lock near Spalding and Surfleet Sluices will need to be refurbished to cope with an increase in boat numbers.

The creation of new navigable waterways will bring boaters and other users of the waterways into areas where there were previously none. For example, the South Forty Foot Drain will be a new section of navigable waterway and to link the Kings Dyke to Cats Water Drain near Peterborough will require a new section of waterway. In these areas, while the creation of a waterway may enhance the visual quality of the local landscape and increase property prices, there could be some intrusion of privacy for properties very close to the waterway.

The waterway will provide opportunities for regeneration. For example, a developer is proposing a development of mixed housing and commercial properties centred on a marina near Boston which will utilise the South Forty Foot Drain once it is navigable. The waterway could also be linked into the Springfields development area in Spalding and the planned regeneration of the south bank of the Nene in Peterborough.

5.3 Flora and Fauna

5.3.1 Generic Impacts

There is potential for a wide range of impacts on the flora and fauna present along the proposed route. The main generic impacts have been summarised in Table 5.2.

Table 5.2 Generic Impacts on Flora and Fauna

Potential Receptors of Impact	Activities and Potential Impacts	
	Construction Phase	Operational Phase
Aquatic Ecology	<p>Use of vehicles and machinery</p> <ul style="list-style-type: none"> ◆ Destruction of benthic invertebrates and plants in locality of dredging <p>Widening/deepening of waterway</p> <ul style="list-style-type: none"> ◆ Direct land-take resulting in disturbance or destruction of riparian and aquatic habitat <p>Dredging</p> <ul style="list-style-type: none"> ◆ Reduction in plant growth due to increased turbidity ◆ Damage to existing benthic and emergent habitats ◆ Interruption of fish spawning ◆ Change in species composition and displacement of sensitive species ◆ Loss of conservation value ◆ Reduction in ecological diversity ◆ Change in water quality and water levels <p>Vegetation management</p> <ul style="list-style-type: none"> ◆ Loss of feeding and breeding habitats ◆ Loss of conservation value ◆ Leakage or spillage of herbicides may damage aquatic habitat ◆ Loss or change of habitat. <p>Construction of navigation structures</p> <ul style="list-style-type: none"> ◆ Destruction of marginal and aquatic habitats ◆ Reduction in photosynthesis of plants and algae ◆ Smothering of benthic organisms (molluscs, dragonflies etc) ◆ Change in aquatic community ◆ Possible reduction in ecological diversity ◆ Changes in water quality and water levels 	<p>Navigation works</p> <ul style="list-style-type: none"> ◆ Possible opportunities for habitat creation <p>Restoration of canal</p> <ul style="list-style-type: none"> ◆ Possible opportunities for habitat creation ◆ Changes in water quality ◆ Changes in water levels ◆ Effect of boat wash causing silt disturbance and turbidity and impacting on benthic ecology and fisheries ◆ Noise disturbance to wildlife from members of the public
Terrestrial Ecology	<p>Use of vehicles and machinery</p> <ul style="list-style-type: none"> ◆ Felling of trees ◆ Trimming or lopping of tree branches ◆ Change in species composition and displacement of sensitive species <p>Widening or deepening of waterway</p> <ul style="list-style-type: none"> ◆ Direct land-take resulting in disturbance or destruction of terrestrial habitat ◆ Loss of conservation value ◆ Change in terrestrial community ◆ Change in water quality and water levels <p>Spoil disposal on site</p> <ul style="list-style-type: none"> ◆ Destruction of terrestrial habitat <p>Vegetation management</p> <ul style="list-style-type: none"> ◆ Use of indiscriminate herbicide will result in the destruction of all vegetation ◆ Leakage or spillage of herbicides may damage terrestrial vegetation ◆ Vegetation disposal in situ may suppress floral diversity by encouraging rank species 	<p>Navigation works</p> <ul style="list-style-type: none"> ◆ Opportunity for the creation of new habitats ◆ Disturbance to wildlife ◆ Damage to habitats and wildlife through boat wash ◆ Changes in water quality and water levels <p>Canal restoration</p> <ul style="list-style-type: none"> ◆ Opportunity for the creation of new habitats ◆ Disturbance to wildlife ◆ Damage to habitats and wildlife through boat wash ◆ Changes in water quality and water levels

Potential Receptors of Impact	Activities and Potential Impacts	
	Construction Phase	Operational Phase
	<ul style="list-style-type: none"> ◆ Burning of vegetation may cause localised destruction of terrestrial habitat ◆ Changes in water quality and water levels <p>Construction of navigation structures</p> <ul style="list-style-type: none"> ◆ Direct land-take resulting in disturbance or destruction of terrestrial habitat ◆ Loss of mature trees ◆ Loss of breeding or feeding sites ◆ Reduction in shade at margins of watercourse ◆ Disruption in movement of small mammals ◆ Changes in water quality and water levels 	

The construction of any structure in an existing watercourse, such as mooring facilities, access ramps, or jetties will result in direct impacts on marginal and aquatic habitats and species. The creation of navigation facilities may also affect nearby terrestrial and riparian habitats and flora. This may include the loss of mature trees and other vegetation that act as breeding or feeding sites for wildlife, including birds and provide shade to the margins of a water body, and may cause the disturbance or loss of insects mammals and birds. The loss of mature trees and other vegetation which offer shade to the waterway may increase water temperature. However excessive tree growth can create too much shade, reducing the reed fringe, which protects the banks from erosion for wind waves or boat wash and provides diverse habitat. Selective tree felling carried out in accordance with best practice would improve biodiversity of the reed fringe, reduce obstructions to navigation and improve the waterscape. Trees may also be damaged by comprehensive trimming and lopping of branches to allow access or their roots broken by heavy machinery, while wet dredgings dumped on roots may lead to tree death. It is possible that new man-made structures adjacent to or in surface waters could disrupt movement of small mammals. Further work will be needed to identify the presence and abundance of protected species such as badgers, otters and water voles along the Fens Waterways Link route as individual project elements progress. The welfare of wildlife should be considered, for example otters should be considered in relation to water quality, food stocks, disturbance and bank side habitat. The watercourses should be made to attract wildlife. For example, there should be no unnecessary piling or vertical walls to allow easier access for otters when entering and leaving the watercourse and to maintain burrowing habitat for water voles.

There are a range of impacts that may result from in-channel alterations to create a navigable channel. These may affect water quality and water levels which could have a detrimental effect on any nearby designated conservation sites. Material re-suspended by excavations may reduce photosynthesis by rooted plants or algae by attenuation of sunlight, although these will be short-term impacts. Deposition of sediment may smother benthic organisms and cause change in an aquatic community favouring organisms adapted to a depositing environment. In the longer term, change in the substrata of a river bed may result in a reduction of ecological diversity and loss of fish spawning gravels or plant cover. In these cases dredging could provide ecological benefit. The potential loss of natural marginal habitats such as riverbanks or wetlands may result from the construction of navigation structures and an increase in disturbance, especially where

improvements lead to the new use of a previously defunct watercourse. In addition, boat wash may cause erosion and the loss of marginal vegetation. To prevent this speed restrictions should be imposed.

Increased water turbidity, decreased levels of dissolved oxygen and the re-suspension of material may be associated with dredging activities. This may disturb or displace aquatic flora and fauna adjacent to any working site. Fish spawning may be interrupted and fish eggs or juveniles damaged by sediment excavation or material deposition. Increased suspended sediments during dredging operations may cause direct damage to fish gills and cause suffocation. Suspended sediment may also reduce light penetration in water and coat vegetation, thereby reducing photosynthesis and plant growth at canal margins. The potential ecological impacts of dredging depend on the techniques used. If the hard bed of a waterway is unbroken by dredging then plants recover quickly; if the bed is removed, but silt accumulates, plants may invade. However, if the substratum of a waterway is unstable following dredging and there is no associated sediment deposition, then vegetation will return only very slowly. Some sediments may contain pollutants locked up within them which may be released during any works within the channel that may disturb them. Turbidity can also be created by boat wash and will have an impact upon ecology and fisheries.

Heavily silted waterways may contain emergent vegetation such as reeds and rushes that provide a valuable habitat for invertebrates, amphibians, small mammals, fish and waterfowl. Dredging, weed clearance or herbicide use will remove this shelter and food resource for wildlife. Aquatic or marginal plants of high conservation value could be lost. However, dredging can be done in ways that retain the reed fringe which is the main habitat for invertebrates and amphibians etc. The magnitude and significance of the impact of dredging on aquatic wildlife will depend on the timing of such actions in relation to growth and reproductive seasons.

Spoil disposal is a major component of dredging operations and may pose serious environmental problems as such material may be contaminated. If spoil is dumped adjacent to the waterway, potential impacts include complete destruction of terrestrial habitat, loss of visual amenity, long-term sediment input to the waterway and bank instability. If spoil is removed to another site, its transport may cause considerable noise and dust impacts to local residents. Spoil transport may also cause impacts at the receiving site, which should be investigated in an assessment of such proposals.

Where a herbicide is used for bank side clearance in restoration and construction works, indiscriminate spraying is likely to kill all vegetation within the working area, including rare species, those of value as a wildlife food or nesting resource and those acting to stabilise a canal bank. Leakage, spillage and careless disposal of empty containers may also cause harm to terrestrial vegetation and, if herbicide should enter surface waters, to the aquatic environment. Any herbicide used should be an approved product. Herbicide use within a watercourse can only be undertaken with prior approval of the Environment Agency and must meet best practice standards.

Where the project involves the transfer of water between catchments this poses a risk of the transfer of invasive plants such as Japanese Knotweed, animals such as the Zander together with fish parasites. There is also the potential for alien/invasive species to be transferred via bilge water or the hulls of boats. The presence of the above in the donor and recipient catchments needs to be identified.

The waterway will attract visitors and open up areas that are currently inaccessible. Whilst in some areas this may be desirable, there may be locations along the route which would be sensitive to increased disturbance. Therefore to minimise potential impacts upon sensitive areas they should be identified at an early stage and a strategy for managing access developed. There may be some general disturbance to wildlife along the river bank created by the noise from members of the public from increased use of tow paths, picnic sites etc.

The development of navigation facilities offers a major opportunity for habitat creation and/or enhancement in, and adjacent to, the water environment. The scheme should incorporate and realise opportunities for enhancements which would contribute towards Biodiversity Action Plan (BAP)/Habitat Action Plan (HAP) targets. For example Operation Riverside Link which aims to increase numbers of Barn Owls could be extended to from the River Glen through the region along the route of the proposed waterway. The Hawk & Owl Trust have calculated that 60km of the proposed route could be targeted for wildlife enhancement using nesting boxes coupled with sustainable habitat management of riverbanks, which would achieve approximately 25-30 extra breeding pairs of Barn Owls within 3 years in this part of the fens. This would contribute in a major way to the conservation of this species. There may also be potential for sensitively linking the new waterway with existing conservation features to provide additional enhancement and benefit. Opportunities for beneficial impacts for aquatic ecology that arise directly as a result of this development scheme should be explored as at each individual project level as the scheme progresses. To enable the new sections of waterway to become viable fisheries, substantial fish stocking may be required. Opportunities should also be explored for new native woodland creation, increasing biodiversity woodland and increasing access to woodlands in the area.

5.3.2 Specific Impacts

English Nature has advised that, due to the European status of the Ouse Washes and the Nene Washes, an appropriate assessment in accordance with Regulation 48 of the Conservation (Natural Habitats) Regulations 1994, should be undertaken prior to the commencement of works in these areas. The purpose of this assessment is to determine whether the works have the potential to have a significant effect on the features for which the site was designated and on the overall integrity of the key features of the sites, either directly or indirectly, alone or in combination with other plans or projects. This is particularly relevant to the section of the proposed route that will utilise part of the Old Bedford River/Counter Drain, which is designated as a cSAC due to the population of spined loach it supports. Although sections of the Old Bedford River are already designated as navigation, using these watercourses as part of the route for the Fens Waterways Link will increase boat numbers and may affect the spined loach. The potential for this and its implications for the scheme should be investigated further as a priority.

It has been identified that dredging will be necessary along several stretches of watercourses that form the route. These are principally on the River Ouse between Twenty Pence Marina and Hermitage Lock and the approach to Denver Sluice. On Well Creek between Nordelph and Salters Lode, between Ashline Lock and near Stanground Lock on Kings Dyke. Sections of the South Forty Foot may also need to be dredged to make them navigable. In these sections the generic impacts described above associated with dredging will need to be considered.

Widening is also proposed at several locations along with other channel improvements such as deepening. Widening will be necessary at the drainage

ditch that receives water from Padholme Pumping Station and along the length of Cat's Water Drain and Kennulph's Drain. At the drainage channel beneath Gull Road where the channel goes into culvert this will need widening and deepening. Sections of Car Dyke would also need to be widened if this route was chosen, along with the North Forty Foot if this was chosen as a link from the South Forty Foot into the River Witham. These stretches will experience the impacts associated with widening and channel improvement works as described above.

Other than the internationally important sites there are few other nationally important conservation sites adjacent to the watercourses; however a couple do occur, namely Deeping Gravel Pits SSSI and Dogsthorpe Star Pits SSSI in this section of the route. There may be some impact upon these sites if work is required in the watercourse adjacent to them. There may also be some impacts after the creation of the waterways if these sites are linked to the navigation, through spillages of engine fuel for example that may lead to a decrease of water quality. Water levels may also be changed which could impact upon these sites.

Some of the watercourses which form the route are themselves designated conservation sites. For example the River Glen is part of Baston & Thurlby Fen which is a SSSI and CWS. Sections of the River Glen will need to be widened as mentioned above which may impact upon the site.

There are also areas where ecological enhancements may be possible, or where the route could be linked into other initiatives in the area. One such initiative is the Great Fen Project. This project involves restoring over 3,000 hectares of farmland to fenland habitat situated between Huntingdon and Peterborough. This will be achieved by connecting and enlarging two existing vitally important National Nature Reserves; Woodwalton Fen and Holme Fen. The project will combine nature conservation, tourism, education and local access. It could also play a strategic role by storing winter water for the protection of the Middle Level System and the homes, farms and businesses that depend on the system. The project is a Partnership project run by English Nature, the Wildlife Trust, Huntingdonshire District Council and the Environment Agency. The last stage of the project will see infrastructure developed such as visitor centres, boat moorings and cycle paths. The sheer size of the resulting reserve will ensure the future of this internationally important site. It will also provide an attraction for tourists from abroad. Access to the site is being carefully considered and access provisions aim to reduce the need for car journeys. Visiting by boat is one way to achieve this. The Fens are accessible by boat from many other parts of the country. There is enormous opportunity created by linking this project into the Fens Waterways Link for tourism and recreation, economics and conservation. Woodwalton Fen and Holme Fen are already linked to the navigation network and the Fens Waterways Link via the River Nene (Old Course), New Dyke, Bevills Leam and Great Raveley Drain which provide access to the Great Fens area.

Another opportunity for a linkage is at Needingworth Fen near Earith which, as sand and gravel extraction ends, is gradually being restored by the RSPB into a nationally important reed-bed habitat.

There will also be many other locations along the route where habitat enhancements could be made linked in to achievement of national and county biodiversity targets. These opportunities should be investigated at the individual project stage.

5.4 Air and Climate

5.4.1 Generic Impacts

Table 5.3 lists some likely impacts associated with navigation projects.

Table 5.3 Generic Impacts on Air and Climate

Potential Receptors of Impact	Activities and Potential Impacts	
	Construction Phase	Operational Phase
Local Air Quality	Use of vehicles and machinery ♦ Dust Dredging ♦ Dust from construction works Spoil disposal off site ♦ Dust Vegetation management ♦ Smoke from burning of vegetation	Exhaust emissions from water craft

During construction works, local air quality may decline somewhat as a result of on- and off-site dust created by construction works. Off-site disposal of spoil from dredging may generate additional dust. During the construction period, machinery may generate unpleasant exhaust fumes and during operation, diesel-powered boats may also generate unpleasant exhaust fumes, but these should only affect the immediate area and be temporary.

The impact of the proposed works on noise levels will primarily be related to construction activities. Efficient equipment should be used to minimise noise and activities should be restricted to normal working hours. Noise receptors will be site specific, potentially requiring different constraints to be imposed on work activities.

The impact of construction vibration on the surrounding environment could range from nuisance to surrounding residents and businesses to structural damage to existing buildings or geological features. Further investigations will be required to establish any risk and the need for mitigation. The impacts of vibration will be affected by:

- ♦ Ground conditions, as these will affect the transmission of vibrations; and
- ♦ The location of pipe runs and built structures, including residential properties and the existing flood defences.

Suitable working practices will have to be determined during further stages of the project, through consultation with residents, businesses and the local authorities. However, with appropriate mitigation measures, any impacts are likely to be minimal.

When the navigation is operational the increase in boat numbers may lead to an increase in exhaust fumes from craft. These fumes may be unpleasant in the local environment but will be temporary and localised in nature. There are good designs available for all boat types that cause minimal nuisance and these should be used wherever possible. The impact of these boat fumes is most likely to be a small proportion of the fumes emitted by vehicles travelling to and from sites on the navigation, as an increase in visitors to the area is likely to result in increase road transport. The use of electric watercraft is also increasing.

The implications for the project of climate change will need to be considered, particularly in terms of water availability and flood management. The Water Industry in the region is likely to see the link as potentially playing a major part in the optimisation of water resources to meet growth in demand from regional development and to deal with the effect of climate change on the availability of water resources. This is discussed further in the Water Balance supporting document to the Implementation Plan (Supporting Report No.5).

5.4.2 Specific Impacts

It is currently not known which areas along the route will experience the most significant increase in boat numbers. Therefore it is not possible to suggest which areas will see an impact in air quality due to exhaust fumes from the boat traffic and waterways users arriving by car. The location of navigation hubs has not yet been determined although it is thought that large hubs will be situated at the major towns, for example at Ely, Chatteris and Spalding.

5.5 Landscape and Visual Amenity

5.5.1 Generic Impacts

The visual impact of the project may be the most immediately prominent environmental impact and the most easily identifiable by the public. Consequently, careful consideration should be given to any works and any designs should be sympathetic to the existing local environment. Table 5.4 lists various impacts that may be associated with the proposed project.

Table 5.4 Generic Impacts on Landscape and Visual Amenity

Potential Receptors of Impact	Activities and Potential Impacts	
	Construction Phase	Operational Phase
Landscape	<p>Use of vehicles and machinery</p> <ul style="list-style-type: none"> ♦ Visual impact ♦ Temporary reduction in landscape quality <p>Dredging</p> <ul style="list-style-type: none"> ♦ Visual impact ♦ Temporary reduction in quality of landscape <p>Widening or deepening of waterway</p> <ul style="list-style-type: none"> ♦ Visual impacts ♦ Reduction in landscape quality ♦ Direct land take (temporary or permanent) <p>Spoil disposal on site</p> <ul style="list-style-type: none"> ♦ Loss of visual amenity ♦ Damage to riparian habitat <p>Vegetation management</p> <ul style="list-style-type: none"> ♦ Visual impacts ♦ Damage to riparian habitat <p>Construction of navigation structures</p> <ul style="list-style-type: none"> ♦ Change to the landscape character by the addition of non-natural structural elements ♦ Direct land-take (temporary/permanent) 	<p>Navigation works</p> <ul style="list-style-type: none"> ♦ Change in landscape character and visual amenity <p>Restoration of canal</p> <ul style="list-style-type: none"> ♦ Change in landscape character and visual amenity

Short-term impacts on the landscape and visual amenity along the route may occur during construction, associated with the presence of site compounds, plant and materials. Construction activities may also affect the appearance of the site immediately post-construction. The level of disturbance will vary from site to site, depending upon individual characteristics and receptors. Many activities involved in navigation works and canal restoration, such as dredging, spoil disposal, creation of facilities and vegetation cutting may potentially result in an adverse short-term visual impact on the landscape.

Depending upon the nature of the existing environment, any works along the route could significantly change the appearance of the landscape, particularly where new sections of navigation are proposed or new facilities are developed (e.g. bridges, marinas, moorings, new structures). New structures such as bridges or moorings will be prominent in the flat open landscape of the fens and will need to be designed sensitively. There may be opportunities to improve landscape quality, for example, in degraded urban environments, and the navigation could provide a visual attraction within the landscape. Residents, landowners and local authorities in the vicinity of the route will need to be informed and involved in design decisions as the project progresses. This will be important to ensure that any concerns they may have can be addressed.

The disposal of spoil and material excavated to create new sections of navigable waterway will change the landscape in the areas where the material is deposited. These areas could provide opportunities to enhance the local topography and could provide new habitat area.

5.5.2 Specific Impacts

Visual impacts will occur wherever works are carried out. Some will be of a temporary nature, however, where new structures are created these will be of a permanent nature. New locks, dredging and channel widening are needed at various locations and several example locations have been listed in Section 5.2.2. Probably the largest visual impact will occur in the areas where new navigable waterways are proposed. This will be between the Kings Dyke and Cat's Water Drain and between Cat's Water Drain and Kennulphs Drain to the south of Nene Terrace. Where the route utilises existing watercourses that are currently non-navigable there will be a visual impact as well, such as along Cats Water Drain.

There are opportunities to create new, regionally significant landscape features, for example at Denver where a high level aqueduct is being considered to improve navigation connections between the Middle Level and the Ouse system.

5.6 Water

There are many aspects of the water environment, such as water resources, flooding and water quality that need to be considered as part of the project. The sections and tables below highlight the many and varied impacts that may occur.

5.6.1 Generic Impacts: Water Resources (see also Supporting Report No.5)

Widening or deepening of any waterway and the subsequent need to maintain a water level for navigation and allow water movement through locks will have implications on local and regional water resources, particularly in an area where water availability, and its efficient use, is a major challenge (see Table 5.5).

Long lengths of embanked channel with artificially raised water level are notable for being subject to significant losses in dry summer periods. Water is lost to evaporation and leakage/seepage through river banks. The extension of this type of channel for navigation will increase the summer losses. Increased boat traffic through tidal sluices may also increase the loss of freshwater to the tide. However, boating itself is generally a non-consumptive use of water and additional supplies will only be needed if more water is lost to the tidal rivers than at present or if water levels in some channels are raised, increasing loss rates. New locks could incorporate back-pumping facilities which will be useful to recycle back upstream water used in lock movements. Where abstraction from surface or groundwater is used to 'top-up' the navigation this may cause reduction of flow in local rivers or changes in groundwater levels which in turn may impact on surface features. Other users of the water resources in the region need to be considered such as agriculture and the environment. The large number of surface and groundwater abstractions across the study area is evident from Section 2. The area is heavily reliant upon agriculture which in turn is dependent upon water availability and so the effects of the scheme on abstraction licence holders and the licensed quantity of water in the area need to be considered. Many abstraction licences will already have conditions that impose restrictions when river levels fall below a particular threshold.

The creation of a navigation link will potentially allow water to be transferred from one river catchment to another and the system itself could be used to deliberately move water around the region at certain times of the year for water resource management benefit (see Supporting Report No.5)

Dewatering activities associated with excavations needed for the route may lower groundwater levels locally and may derogate nearby domestic and licensed groundwater sources and other water features. These should be located and agreements reached with all users of these supplies for their protection during dewatering. Certain private water supplies do not require a licence. The locations of such private domestic sources should be identified through liaison with the appropriate Local District Council who will hold details for the register required by the Private Water Supplies Regulations 1992 on private water supplies. Such activities are likely to need to be licensed as a result of the new Water Bill.

5.6.2 Specific Impacts: Water Resources

The creation of the waterway may lead to the transfer of water between catchments. For example this may occur between the Glen and South Forty Foot Drain as a lock will be needed or a bypass channel to allow movement between the two watercourses. The route will also connect the Witham catchment to the South Forty Foot Drain either through Boston or via the North Forty Foot. The Environment Agency have stated that if the South Forty Foot is connected directly to the River Witham upstream of Grand Sluice, there will be an impact on the Trent-Witham-Ancholme Transfer Scheme. This transfer scheme allows water to be abstracted from the River Trent and pumped into the River Witham and River

Ancholme to supplement abstractions in Lincolnshire and north east Nottinghamshire. Water resources in the Lower Witham are fully committed in periods of low flows and high demand. The Black Sluice IDB would be unhappy with any proposal to raise winter or summer water levels for navigation unless suitable compensation was forthcoming to cover increased drainage costs.

Around Peterborough the creation of a navigation will link the Welland catchment to the Nene either via Car Dyke or Cats Water Drain. A viable and sustainable source of water needs to be found and secured for the new navigation. The Middle Level Commissioners raised concerns during the consultation over the Stanground water resources intake into the Middle Level system. The navigation must not affect this current intake.

The Middle Level Commissioners and Boards have objected to the Earith to Ramsey link as it does not safeguard or places at risk, flood defence, water resources and conservation issues. The Sutton and Mepal IDB on those grounds have objected to the use of Cranbrook/Counter Drain system. The Warboys, Somersham and Pidley IDB also oppose the use of Fenton's Lode/Fillenham's Drain as part of the route as this watercourse is a vitally important flood defence channel.

5.6.3 Generic Impacts: Flooding

Where moorings, jetties or slipways project into the channel of a watercourse, they may impede water flow and create an increased risk of flooding. Mooring of craft at such facilities is likely to impede river flow still further. Moorings, jetties or slipways and the consequent presence of craft may also impede river channel maintenance operations. Raised water levels for navigation may also increase flood risk through reduced in-channel storage capacity. Flood flows on navigable rivers can also pose hazards to boaters and secure stillwater areas should be provided to allow craft to take refuge during flood flows.

Other facilities, such as car parks and toilets, will need to be provided along the route and the impact of these should be examined once locations are determined. Where extensive hard standings are created their potential impacts on flood risk should be determined. Where appropriate, such areas should be constructed of permeable materials and discharge of rainwater should be through a sustainable drainage system to prevent additional runoff from these areas entering the watercourses during times of high flow.

New structures on land associated with navigation facilities may reduce the flood storage capacity of the floodplain and impede the lateral and downward flow of water within it. Similarly, spoil from excavations or landscaping around the new navigation development may involve raising ground levels which could reduce flood storage capacity. In some situations it may be possible for the new waterway to act as a positive aid to the downstream movement of flood water.

Water level management will be a particular issue in the Fens due to the low lying nature of the land. The drainage mechanisms in the area must not be unbalanced, for example by keeping winter water flows artificially high for navigation, as this may increase the flood risk to surrounding land.

The navigation will provide opportunities to create fenland and wet grassland which could function as flood storage areas. These could have socio economic

and environmental benefits through providing visitor attractions and supporting locally produced food.

Table 5.5 lists impacts in terms of water resources, flooding and river morphology that may be associated with the proposed project.

Table 5.5 Generic Impacts on River Morphology, Water Resources and Flooding

Potential Receptors of Impact	Activities and Potential Impacts	
	Construction Phase	Operational Phase
Groundwater Resources	<p>Widening or deepening of waterway</p> <ul style="list-style-type: none"> ◆ Abstraction of groundwater may change groundwater level 	
Surface Water Hydrology and Channel Morphology	<p>NB. If further maintenance is needed, impacts will be similar, but perhaps on a smaller scale, to those listed in the construction column.</p> <p>Use of vehicles and machinery</p> <ul style="list-style-type: none"> ◆ Compaction of topsoil may alter surface water drainage <p>Widening/deepening of waterway</p> <ul style="list-style-type: none"> ◆ Increased demands on local water resources ◆ Abstraction of surface water may cause reduction of flow in local rivers <p>Dredging</p> <ul style="list-style-type: none"> ◆ Redistribution of sediments. Possible change to downstream pool-riffle sequence, bed slope or channel width ◆ Lowering of river bed level. Possible channel adjustment up and downstream, bank instability and loss of pool-riffle sequence ◆ Possible re-suspension of contaminated sediments ◆ Change in channel morphology and loss of morphological variability <p>Spoil disposal on site</p> <ul style="list-style-type: none"> ◆ Change in surface water runoff ◆ Bank instability <p>Construction of navigation structures</p> <ul style="list-style-type: none"> ◆ Excavation of foundation trenches and disposal of soil may lead to an increase in sediment deposition and turbidity 	<p>Navigation works</p> <ul style="list-style-type: none"> ◆ Navigation structures may impede water flow and create an increased risk of flooding ◆ Permanent mooring facilities may impact on flooding regimes <p>Spoil disposal on site</p> <ul style="list-style-type: none"> ◆ Spoil disposal that raises ground level may affect flood storage capacity <p>Use of navigation facilities</p> <ul style="list-style-type: none"> ◆ Mooring of craft at navigation structures may impede water flow ◆ Navigation structures and craft may impede future river channel maintenance operations ◆ Structures on land may obstruct flood storage capacity and impede the lateral and downward flow of water in a floodplain <p>Restoration of canal</p> <ul style="list-style-type: none"> ◆ Reduced floodplain capacity if a raised bund has been created or extended ◆ Improved downstream movement of flood water, except where retained by locks <p>Water transfer opportunities</p> <ul style="list-style-type: none"> ◆ The navigation may enable water transfers across the region

5.6.4 Specific Impacts: Flooding

Virtually all the proposed route is in the 1 in 100 year indicative floodplain and is at risk from either or both fluvial and coastal flooding. Flood risk assessments in accordance with Planning Policy Guidance Note 25 will be required for much of the

development of the proposed link together with new sections of the actual link itself. Where new canal is excavated from the floodplain (e.g. east of Peterborough) or where existing sections are widened, careful consideration will need to be given as to whether the excavated material can be deposited in the floodplain.

The majority of the watercourses affected by the proposals perform some kind of flood storage or defence role and it is essential that these functions are not compromised (e.g. through increases in water levels).

Many structures will be required along the route to enable it to become navigable. Locks will need to be constructed and several locations have been mentioned in Section 5.2.2. Any new locks or other structures should not affect the flood defences in the area. New moorings and navigation facilities will need to be provided at various locations, for example along the South Forty Foot Drain; these must not impede flood flows.

5.6.5 Generic Impacts: Water Quality

There is an inherent risk during any construction activities of surface water and groundwater contamination. The deliberate or accidental discharge of polluting material into controlled waters is an offence under the Water Resource Act 1991 if undertaken without consent and could lead to major adverse impacts without mitigation. However, the risk of contamination can be significantly reduced by the adoption of good working practices and strict adherence to the Environment Agency's Pollution Prevention Guidelines. Table 5.6 lists impacts on water quality that may be associated with the proposed project.

A short-term reduction in water quality is likely during construction of moorings or jetties due to an increased water turbidity and sediment load from excavations. Machinery used in construction on land can cause compaction of topsoil which may interfere with land drainage. Excavation of foundation trenches and subsequent disposal of soil may result in washing of loose material into nearby watercourses, causing an increase in turbidity and deposition of sediments.

Dredging will be necessary along part of the route and, as discussed earlier in Section 5.3, this will cause silt disturbance that may result in increased water turbidity. Where dredged material consists of organic silts or plant debris, de-oxygenation of the water may occur. Sediments from waterways within industrial areas may be contaminated with heavy metals, oil or other organic pollutants. The re-suspension of this material can cause short-term deterioration in water quality within a waterway. Fine particulates or dissolved pollutants may be carried into other water channels. The "first flush" of water through a newly-restored system that contained sediments is likely to be especially polluting. In the longer term, the removal of contaminated and organic sediments should lead to an improvement in water quality.

Water pollution may arise directly from navigation facilities designed for boat mooring, fuelling or maintenance, by leakage of chemicals or an accident within the development. Navigation activity associated with such developments may also contaminate the water environment through the release of oil, fuel or chemicals, particularly from outboard motors and submerged exhaust emissions. However the release of such contaminants from craft is reduced by the requirements and inspection of craft for the Boat Safety Scheme Certificate without which most navigation authorities will not issue a navigation licence. Rubbish may be discarded by users of the waterway, so litter bins should be provided on the bank

side along the route and at mooring facilities. Improved access to the waterways may increase the incidence of fly tipping by members of the public.

Table 5.6 Generic Impacts on Water Quality

Potential Receptors of Impact	Activities and Potential Impacts	
	Construction Phase	Operational Phase
Surface Water Quality	<p>Use of vehicles and machinery</p> <ul style="list-style-type: none"> ◆ Pollutant leakage into waterway <p>Widening or deepening of waterway</p> <p>Dredging</p> <ul style="list-style-type: none"> ◆ Disturbance of sediments. Increased turbidity, decreased photosynthesis, reduction in oxygenation of water ◆ Dredging of organic silts and/or plant debris may result in deoxygenation ◆ Re-suspension of trapped contaminated sediments. Risk to water quality ◆ Fine particulates or dissolved pollutants may be carried into other water channels <p>Repair or renewal of canal infrastructure</p> <ul style="list-style-type: none"> ◆ Risk of materials, such as cement or paint, entering surface waters and causing localised pollution <p>Vegetation management</p> <ul style="list-style-type: none"> ◆ Vegetation disposal in waterway may cause physical obstruction, the vegetation may decompose causing deoxygenation, algal blooms may occur ◆ Vegetation disposal on adjacent land may lead to decomposing material entering the watercourse through runoff, causing de-oxygenation <p>Construction of navigation structures</p> <ul style="list-style-type: none"> ◆ Increased water turbidity ◆ Increased sediment load 	<p>Use of navigation facilities</p> <ul style="list-style-type: none"> ◆ Risk of water pollution from leakage of chemicals from facilities designed for boat fuelling and/or maintenance ◆ Risk of release of oil, fuel or chemicals from outboard motors and submerged exhaust emissions ◆ Risk of sewage effluent entering surface waters, may result in further eutrophication, growth of algae and “sewage fungus”, deoxygenation <p>Restoration of canal</p> <ul style="list-style-type: none"> ◆ Removal contaminated and organic sediments may lead to an improvement in water quality long term <p>Use of canal environment</p> <ul style="list-style-type: none"> ◆ Risk of release of oil, fuel or chemicals from craft ◆ Boat wash leads to erosion and creation of sediments

The release of sewage from inland craft is banned; all inland craft have holding tanks and discharge at appropriately placed facilities. However, accidental discharges may still occur. The high organic content of such effluent can cause localised eutrophication of water, with strong growth of algae and “sewage fungus”. Its high biochemical oxygen demand can result in local de-oxygenation of a watercourse. It is probable that such contamination will be detrimental to water colour and result in an offensive odour. Any effluent associated with navigation facilities and activities may also contain detergent or other harmful chemicals that will adversely affect water quality. The risk to water quality from detergents entering the water can be minimised by educating people to use the environmentally friendly brands that are available. These detrimental impacts on water quality would concern recreational users of an area.

Activities such as waterway wall repairs, lock gate renewal and tow path surfacing may involve the use of cement, paint, tarmac etc. These substances are highly polluting and could cause localised contamination if they are allowed to enter a watercourse.

Disposal of aquatic or bank side vegetation after cutting is likely to cause some adverse impact. If they are dumped into a waterway they may act as a physical obstruction to water flow and also, in decomposition, cause de-oxygenation of the water. The nutrient content of such cuttings may increase the likelihood of algal blooms occurring, with consequent adverse impacts on water quality. If bank side vegetation cuttings are left in-situ, they may suppress floral diversity by encouraging rank species. Also, surface water runoff may carry decomposing material to a watercourse and cause enrichment and de-oxygenation. If vegetation cuttings are burnt this may cause air pollution, nuisance to human beings and localised destruction of marginal and riparian species and/or habitat.

The Fens Waterways Link will involve the transfer of water between catchments. This will involve the mixing of water of differing quality and may result in water quality changes in the recipient catchments and may also pose the risk of the transfer of pollution.

5.6.6 Specific Impacts: Water Quality

In the vicinity of the major navigation hubs that are proposed there will be an increased risk of pollutants entering the watercourses. This could be from refuelling, sewage and contaminated runoff from any hard standing areas. The location of navigation hubs has not yet been determined but will most likely be within the main urban areas along the route, such as Ely, Boston, Peterborough, Chatteris and Spalding.

There will also be a risk of pollution to water from any works that occur in or adjacent to the channel such as the construction of new locks or heightening of bridges. The location of new locks and bridges has been mentioned above.

Where vegetation is known to occur within the channel this can have an effect upon water quality. There are problems known along the South Forty Foot Drain where excessive vegetation growth leads to problems associated with eutrophication.

The difference in water quality between catchments may have an impact where catchments are to be connected. Examples of which catchments may be linked have been mentioned above.

There may be sites, either ecological or archaeological, that may be susceptible to changes in water quality such as a change in pH. For example, a change in the water quality near Flag Fen may lead to the degradation of artefacts in the area.

5.7 Land Use

5.7.1 Generic Impacts

The construction of a new navigation and associated facilities may require land-take directly adjacent to the water body. This may include agricultural land, natural habitats or sites of environmental or archaeological interest. The land-take may be

temporary, for the duration of the works, or permanent as in the case of a new tow path. The loss of land could have an impact upon local agriculture and landowners. However, the construction of tourism assets will create benefits to the local community and provide opportunities for the local economy. The navigation will also attract waterside development such as housing, which can attract premium prices due to its location. The navigation will also aid regeneration, particularly in areas with weaker economies.

5.7.2 Specific Impacts

Where sections will need widening land take will be required, which will involve a change in land use. This may occur, for example, at the drainage ditch that receives water from Padholme Pumping Station. At the drainage channel beneath Gull Road, where the channel goes into culvert, this will need widening and deepening. Sections of the North Forty Foot would need widening if this was chosen as a link from the South Forty Foot into the River Witham. Cat's Water Drain would also need major channel works for it to become navigable.

Where new navigable channels will be created, a change in land use will also be experienced. This will include the new section between Kings Dyke and Cats Water Drain near Peterborough.

The creation of a new navigation may initiate changes in the land use adjacent to the navigation. Residential or commercial development may be attracted to the waterside areas. For example a developer is proposing a development of houses and commercial properties adjacent to the South Forty Foot near Boston with marina facilities which will link in with the Fens Waterways Link.

5.8 Cultural Heritage, Archaeology and Material Assets

5.8.1 Generic Impacts

The works associated with constructing a new navigation could disturb sites of archaeological interest, especially in areas where archaeological deposits have already been discovered or are likely such as Car Dyke near Peterborough. Here sediment records are also of ecological interest. Where intrusive groundworks are required then archaeological deposits may be destroyed or disturbed and mitigation measures should be implemented. Table 5.7 below identifies some of the likely impacts.

Table 5.7 Generic Impacts on Cultural Heritage, Archaeology and Material Assets

Potential Receptors of Impact	Activities and Potential Impacts	
	Construction Phase	Operational Phase
Architectural and Archaeological Heritage	<ul style="list-style-type: none"> ◆ Direct land-take ◆ Risk of damage and loss during construction 	<ul style="list-style-type: none"> ◆ Improvements to historic and archaeological heritage by preservation of structures, interpretation facilities and re-use

The risks associated with construction activities on archaeological interests must be carefully considered, in continued consultation with the relevant county archaeologists. Potential impacts and appropriate mitigation measures will be determined on an area by area basis once more detailed information is considered

and sensitive areas have been identified. Further surveys and specialist investigations may be required to ensure that works do not have an adverse impact on archaeological remains. The creation of a new navigation may provide opportunities for archaeological exploration along the route and enable existing archaeological features to be made more accessible to the public.

5.8.2 Specific Impacts

There are many areas of potential archaeological interest along the route, however the locations where the route passes close to sites designated as SAMs include Car Dyke, Bowl Barrows near Earith and Kenulph's Stone next to the River Welland. Car Dyke is an important archaeological feature in the landscape. Currently there are no visitor facilities or interpretation boards, however English Heritage would welcome the opportunity to open up the site to members of the public. However, they have also indicated that they would not favour its use as a navigation.

There are also existing features along the route which are of interest to visitors, for example: Stretham Old Engine, a great beam pumping engine dating from 1831, near Stretham; the Prickwillow Drainage Engine Museum near Ely; and Denver Windmill, at Denver. In the section from Boston to Peterborough, sites of cultural heritage and of interest to visitors include: Pinchbeck Engine and Land Drainage Museum; Ayscoughfee Hall and Gardens at Spalding; and Crowland Abbey at Crowland on the River Welland. Many of the existing archaeological and cultural heritage features adjacent to the route are adjacent to sections that are existing navigable waterways.

5.9 Traffic and Transport

5.9.1 Generic Impacts

Once constructed the new navigation will attract visitors and increase traffic in certain areas associated with the route, which will impact on local communities. The navigation may therefore ultimately require an upgrade in the existing local road network and possibly new infrastructure in some areas. Careful consideration will need to be given as to how the public will access the route.

During construction there may be disruption to traffic in the local area. Traffic control measures and diversion routes, if necessary, will have to be agreed with the local authorities. Vehicle access to some areas may be restricted during construction works. The routes taken by construction vehicles may have to be agreed with the local authorities prior to construction, to ensure that disruption is minimised.

The navigation will provide opportunities for water transport such as water taxis for people and also provide opportunities for waterborne freight movement and commercial transport.

5.9.2 Specific Impacts

The location of the major navigation hubs is likely to be near the main urban centres such as Ely, Chatteris, Peterborough, Spalding and Boston. In these areas there will be an increase in traffic.

Several bridges need to be heightened, which may result in disruption to traffic currently using them. Locations identified for bridge heightening include Arch Road Bridge in the centre of Outwell and Fen Bridge between Peterborough and Spalding. New bridges will also need constructing and, for example, where the watercourses currently are in culvert they will need to be made into open watercourse with bridges over for access. Such locations include where the route follows a drainage channel that goes in culvert underneath Storey Bar Road and Gull Road between Peterborough and Spalding. Sections along Car Dyke are also in culvert, for example under the A47 and White Post Road, and where the route crosses the A47 the route of the road may need to be changed as well. At Guthram Gowt a new bridge will be needed to carry the A151 over the navigation.

5.10 Soil, Geology and Hydrogeology

5.10.1 Generic Impacts

Construction activities may result in the release of potentially contaminated sediments into the wider environment. Appropriate mitigation measures will have to be developed, prior to construction, to ensure that material will not adversely affect the water quality of the receiving watercourse during construction. Table 5.8 shows some likely impacts.

Table 5.8 Generic Impacts on Soil, Geology and Hydrogeology

Potential Receptors of Impact	Activities and Potential Impacts	
	Construction Phase	Operational Phase
Soils	Use of vehicles and machinery <ul style="list-style-type: none"> ◆ Compaction ◆ Erosion ◆ Bank instability Dredging <ul style="list-style-type: none"> ◆ Erosion of exposed soil ◆ Removal or alteration of soils on site Spoil disposal on site <ul style="list-style-type: none"> ◆ Alteration of soil characteristics 	Use of facilities <ul style="list-style-type: none"> ◆ Erosion

The dewatering of the sites during construction may affect groundwater levels in the surrounding area. The impacts of this on adjacent residential/commercial properties and surrounding structures will have to be assessed once information on soil permeability is obtained.

5.10.2 Specific Impacts

Sections of the Old West River suffer badly from erosion due to the soft nature of the soils; for example, bank erosion is known to occur near Stretham Ferry Bridge. It may be necessary to impose speed limits to decrease the rate of erosion. In several locations siltation occurs including at Denver Sluice, on Well Creek between Nordelph and Salters Lode and along the South Forty Foot Drain.

5.11 Use of Natural Resources

The materials used in construction of the navigation should be from sustainable sources with local material used wherever possible. Energy and water efficient technologies should also be used wherever possible and could be a feature of the project. The source of the materials should be considered, for example, any wood

used should be from appropriate sustainable sources. The power needed at hook ups and at any navigation facilities could be provided for by wind power or solar power.

5.12 Summary of Impacts

The potential benefits of the Fens Waterways Link are described above and summarised within the Strategic Objectives.

Topic	Potential Strategic Objective
Regeneration	<ul style="list-style-type: none"> ◆ Act as catalyst for economic and social renewal. ◆ Increase development value and the opportunity for investment. ◆ Focus and bring together regeneration opportunities. ◆ Generate long term economic activity and opportunities for employment. ◆ Promote social inclusion and quality of life.
Sport and Recreation	<ul style="list-style-type: none"> ◆ Provide an important sport and recreation resource. ◆ Contribute to the health and well-being of society. ◆ Form corridors linking urban areas to the countryside. ◆ Promote accessibility to all members of society. ◆ Create a new fishery of national importance.
Tourism	<ul style="list-style-type: none"> ◆ Act as a tourism asset in its own right. ◆ Provide a link between existing and new attractions. ◆ Support the holiday industry through water-based activities. ◆ Enhance the environment and attract increased visitor activity.
Heritage, Culture and the Natural Environment	<ul style="list-style-type: none"> ◆ Form a unique heritage, cultural, educational, landscape and environmental asset. ◆ Provide access to a wide array of important historic buildings and structures. ◆ Contribute to the diversity of the natural environment by sustaining habitats and supporting rare species. ◆ Contribute to achieving biodiversity targets and incorporating sustainability principles at all stages of the project. ◆ Contribute to open space provision. ◆ Provide a resource for water supply, water transfer and land drainage.
Transport	<ul style="list-style-type: none"> ◆ Contribute to integrated transport objectives. ◆ Provide transport routes on a local and regional scale. ◆ Act as a waterborne transport corridor for people and freight. ◆ Form important cycling, walking and public access corridors.

However, to progress the Link it is evident that there will also be significant environmental challenges which will need to be addressed as project elements are progressed. These include:

- ◆ Ensuring that any adverse impacts on key species and habitats are avoided or mitigated to acceptable levels;
- ◆ Avoiding any adverse impacts on water quality or any derogation of existing water uses such as water supply and fishing;
- ◆ Ensuring that any associated developments are appropriate to the landscape character of the area; and
- ◆ Protecting features of heritage or archaeological interest.

It is important to emphasise that for the vast majority of the adverse impacts identified in this Strategic Appraisal it should be possible to greatly reduce their significance through the development of appropriate mitigation measures (see below). What is evident is that the project does present some major opportunities for environmental benefit and enhancement and that realising these opportunities

should be a fundamental consideration in any of the work elements that develop out of the Fens Waterways Initiative.

5.13 Summary of Possible Mitigation Measures

Following the scoping exercise and the identification of potential environmental effects, mitigation measures should be proposed to avoid or reduce potential negative impacts to air, water, land, ecology and humans, or to introduce positive aspects to the development. A primary consideration in impact mitigation must be the design and location of navigation works. The list below summarises the mitigation measures most relevant to navigation works and canal restoration. The list is adapted from the Environment Agency's Scoping Guidelines on the Environmental Impact Assessment (EIA) of projects and has been divided in to mitigation measures for the construction and operational phase.

5.13.1 Mitigating the Impacts of Construction Activities

- ◆ On-site supervision of working practices should follow the appropriate Environment Agency guidelines;
- ◆ Sensitive periods, such as the fish spawning and bird breeding seasons, should be avoided;
- ◆ Sensitive terrestrial habitats and trees should be protected during construction work;
- ◆ Restored canal banks should be designed to minimise erosion and balanced against landscape and ecological objectives through adopting soft approaches to restoration works;
- ◆ Materials similar to those in the surrounding area should be used for construction where possible;
- ◆ Excavation and dredging should be minimised wherever possible;
- ◆ Excavation work should be undertaken at periods of low channel flow to minimise silt disturbance;
- ◆ Downstream siltation should be reduced by construction of a temporary silt and sediment trap;
- ◆ Where sediments are contaminated, spoil should be treated by washing and secondary processing if necessary to remove metals and hydrocarbons before disposal; and
- ◆ Spoil from dredging may have commercial value as fertiliser and it should be disposed of in this manner where possible.

5.13.2 Mitigating the Impacts of the Operational Phase

Although sensitive siting and design of navigation works and canal restoration schemes are the primary means for avoiding or reducing environmental impacts,

further measures can be introduced to minimise impacts. The list below details some of these measures.

- ◆ New moderate or large sized developments intended to provide navigation facilities should be situated, if possible, in riparian or shoreline areas of low conservation and landscape interest. Derelict land or land of low amenity value might be used;
- ◆ Navigation developments should be sited to minimise conflict with other users of the water environment;
- ◆ Consideration should be given to the maintenance or improvement of riverside access in the design of any navigation works;
- ◆ New navigation facilities should be designed sympathetically to blend into the surrounding environment. The use of natural materials and non-uniform shapes may help reduce intrusive visual impact, as can planting of trees or other vegetation;
- ◆ Aquatic and/or riparian habitat creation or enhancement should be incorporated into navigation developments wherever possible. This could involve, for example, the formation of marginal shelves or wetland areas and tree planting along a riverbank;
- ◆ Navigation works associated with mooring, fuelling or maintenance of craft should be designed and operated in accordance with Environment Agency Pollution Prevention Guidelines. Craft at navigation facilities should also follow these guidelines;
- ◆ All boat service areas should have an oil separator installed on the surface water drainage system. This should be regularly inspected and cleaned as required;
- ◆ Adequate provision should be made for oil and fuel storage where this will occur. An impervious base should be created within an oil-tight bund for oil/fuel tanks and drums. There should be no drainage outlet;
- ◆ Land-based sewage disposal facilities should be provided at any long term boat mooring;
- ◆ Moorings should be parallel to the river flow and should be constructed so as not to present a maintenance problem;
- ◆ Where possible, new moorings should be let into the banks of a watercourse to reduce obstruction to flow;
- ◆ Double-berthing should not be introduced where this will result in a significant obstruction of the waterway;
- ◆ Embankments and fences associated with navigation developments should not obstruct floodplain flows;
- ◆ Mature trees and hedgerows should be retained wherever possible. Where vegetation is removed for temporary works this should be replaced with appropriate species of native provenance;

- ◆ Tree surgery should be carried out by a qualified arboriculturalist;
- ◆ Cutting or removal of aquatic or terrestrial vegetation should be timed to minimise disturbance to invertebrates and other wildlife;
- ◆ Where aquatic weeds are cleared, the remains must be collected and removed from the water. Large quantities could be taken to a waste disposal facility or composted on sites of low conservation interest where liquid from decomposition cannot enter a canal or river. Where this is not possible they should be collected in small heaps away from the water environment and either burnt or left to decompose;
- ◆ Herbicides are suitable for vegetation control near water only when no other means is practicable. Only those approved by DEFRA should be used. The use, storage and disposal of herbicides and their containers should be in accordance with the appropriate regulations and Environment Agency requirements;
- ◆ There is a legal requirement to obtain prior approval from the Environment Agency for the use of herbicides in these situations;
- ◆ Herbicides must not be sprayed indiscriminately over canal banks. Directed treatment such as wiping or spotting of unwanted species should be undertaken. Herbicide application must only be carried out by certified operatives;
- ◆ A vegetation and general maintenance programme should be designed and implemented as an integral part of any navigation works;
- ◆ A water level management plan should be designed and implemented for the benefit of wildlife;
- ◆ An appropriate landscaping scheme, including tree planting, should be designed and implemented as an integral part of canal restoration;
- ◆ Areas of natural habitat should be created adjacent to the canal wherever possible;
- ◆ Creation of marginal shelves and bays should be undertaken where possible to assist habitat diversity;
- ◆ Some areas adjacent to a canal could be flooded for wetland creation;
- ◆ Grassy margins should be retained on banksides where possible to provide habitat for wildflowers;
- ◆ Bird and bat boxes can be installed on existing trees and structures. Crevices may be created in canal tunnels for the same purpose; and
- ◆ Fences should be erected at vulnerable locations to reduce dumping of rubbish and debris into the canal.

The mitigation measures listed above should be adhered to wherever possible for this scheme and additional measures investigated and implemented as required.

5.14 Preliminary Consideration of Environmental Impacts for Alternative Options

Following consultation, three sections of the originally preferred route were highlighted as being problematic. As a result, alternatives for these three sections have been proposed. Whilst each of these project elements will need to be subject to their own environmental assessment this section of the Strategic Appraisal briefly compares the current preferred route and original proposed route against the Strategic Objectives outlined in Section 4.1.

5.14.1 River Glen to River Welland Link

The original route proposed that the link should continue down the River Glen past Surfleet Seas End Sluice, at which point the river becomes tidal, and onto the tidal River Welland. However as the downstream stretches of these watercourses are tidal, the window of time for navigation between the two watercourses can be very short and the route is not appropriate for novices. Therefore a route avoiding the tidal stretches of the Glen and Welland has been proposed which uses Vernatts Drain, an IDB watercourse. In assessing both these routes against the strategic objectives the original option would not fulfil the objective to “provide transport routes on a local and regional scale” or “act as a waterborne transport corridor for people and freight” to the same extent as the new proposed option would, due to the tidal restrictions. Therefore it is recommended that the Vernatts Drain option is taken forward as part of the link. Full consultation with Welland and Deepings IDB on this preferred navigation option will be a pre-requisite to progressing this option.

5.14.2 The Use of the Car Dyke for Navigation

The use of the Car Dyke for navigation was deemed unacceptable by English Heritage, as sections of Car Dyke are designated as a Scheduled Ancient Monument. Although using this ancient waterway route as part of the link could be argued to be “forming a unique heritage, cultural, educational, landscape and environmental asset” which is one of the Strategic Objectives of this project, it was felt that its use would damage archaeological artefacts which is unacceptable. Therefore an alternative route using Kennulph’s Drain and Cat’s Water Drain has been proposed. This alternative route involves the creation of a new section of waterway linking these two watercourses which would run south of the village of Nene Terrace. This alternative route would fulfil the objectives of “forming a corridor linking urban areas to the countryside” and is unlikely to lead to the degradation of archaeological artefacts.

5.14.3 The Ramsey to Earith Link

The Middle Level Commissioners and several IDB Boards have objected to the original Earith to Ramsey link as it does not safeguard or places at risk, flood defence, water resources and conservation assets. The Sutton and Mepal IDB on those grounds have objected to the use of Cranbrook/Counter Drain system. The Warboys, Somersham and Pidley IDB also oppose the use of Fenton’s Lode/Fillenham Drain as part of the route as this watercourse is a vitally important flood defence channel. The IDBs in the area feel this option does not contribute to the strategic objective of “providing a resource for water supply, water transfer and land drainage”.

Consequently, an alternative has been considered which involves the use of the Counter Drain/Old Bedford River between Welches Dam and the River Great Ouse at Earith and the entire length of the Forty Foot Drain/Vermuyden's Drain to Welches Dam. This route was originally considered in the Bullens study but was disregarded on environmental grounds. As stated earlier, sections of the Counter Drain/Old Bedford River are already designated as navigations and so using these watercourses has been reconsidered due to the need to create a circular navigable route in the Fens. However, it is recognised that the increased use of these watercourses for navigation may affect the integrity of the features of the Ouse Washes European site and would not therefore contribute to the strategic objective of "contributing to the diversity of the natural environment by sustaining habitats and supporting rare species". Further work is necessary to investigate this issue.

6 Summary of Pertinent Environmental Legislation

6.1 Introduction

This section of the Strategic Appraisal highlights a number of the key pieces of existing environmental legislation that are relevant to the Fens Waterways Link scheme. The list is not meant to be exhaustive but is included as a guide.

6.2 Environmental Impact Assessment

6.2.1 Navigation Works

Developments involving the construction of new navigation works are included in both Schedule 1 and Schedule 2 of the Town and Country Planning (Environmental Impact Assessment)(England and Wales) 1999 (SI 1999 No. 293). Dredging works in a watercourse are also covered under Schedule 2 and may also be subject to SI 1999 No. 1783, The Land Drainage Improvement Works (Environmental Impact Assessment) (England and Wales) Regulations, if carried out by the drainage authority.

The Regulations list applicable thresholds and criteria which apply to Schedule 1 and Schedule 2 developments. If the thresholds are not exceeded, then EIA is not required and so these thresholds and criteria are termed “exclusive criteria”. In cases where the thresholds are exceeded, Schedule 1 developments require an EIA (mandatory) but Schedule 2 developments only require an EIA if the development is likely to have significant effects on the environment by virtue of factors such as its nature, size or location. The exclusive criteria for Schedule 1 developments are taken from the EIA Directive, but those for Schedule 2 developments have been laid down in the UK Regulations, as provided for by the Directive. In addition to the specific criteria and thresholds set out in Schedule 2, all developments listed in Schedule 2 may require an EIA if any part of the development is to be carried out in a sensitive area (e.g. an internationally important nature conservation site)

The former DETR published guidance (referred to in the Scoping Handbook) which helps in the decision on whether, in respect of Schedule 2 projects, impacts are significant and whether EIA should be required. The guidance thus contains “indicative criteria”, although area sensitivity and project-specific issues must be taken into account and the decision is still discretionary. The following criteria apply:

Exclusive criteria

- ◆ Under Paragraph 8(a) of Schedule 1, EIA will be required for inland waterways and ports for inland-waterway traffic which permit the passage of vessels of over 1350 tonnes; and

- ◆ Under Paragraph 10(h) of Schedule 2, EIA may be required for inland waterway construction not included in Schedule 1 if the area of the works exceeds one hectare

Indicative criteria

- ◆ Concerning the construction of inland waterways and canalisation, Annex A, Paragraph A23, of DETR Circular 02/99, Environmental Impact Assessment, states that, "The likelihood of significant impacts is likely to depend primarily on the potential wider impacts on the surrounding hydrology and ecology. EIA is more likely to be required for development of over 2km of canal".

Furthermore, EIA may be required for any change to or extension of such works already authorised, where the change or extension may have significant adverse effects on the environment. Responsibility for determining whether an EIA is required lies initially with the local planning authority.

Whether or not a formal EIA of proposed navigation works is required, the Environment Agency and other statutory consultees and regulators may request environmental information concerning the proposal. An EIA may provide the most appropriate method to collate the necessary information.

6.2.2 Interbasin Water Transfer

Interbasin transfer of water projects are included in Schedule 1 of the Town and Country Planning (Environmental Impact Assessment)(England and Wales) 1999 (SI 1999 No. 293).

Schedule 1 criteria, from the UK Regulations

- ◆ Paragraph 12(a). Works for the transfer of water resources, other than piped drinking water, between river basins where the transfer aims at preventing possible shortages of water and where the amount of water transferred exceeds 100 million cubic metres per year; and
- ◆ Paragraph 12(b). In all other cases, works for the transfer of water resources, other than piped drinking water, between river basins where the multi-annual average flow of the basin abstraction exceeds 2,000 million cubic metres per year and where the amount of water transferred exceeds 5% of the flow.

Schedule 2 Exclusive criteria, from the UK Regulations

- ◆ Paragraph 10(i) for installations of long distance aqueducts where the area of development exceeds 1 hectare; and
- ◆ Paragraph 10(ii) for works for the transfer of water resources between river basins not included in Schedule 1 where the area of the works exceeds 1 hectare.

Schedule 2 Indicative criteria, from the DETR Guidance

- ◆ Paragraph A30. Impacts likely to be significant are those on hydrology and ecology. Developments of this sort can have significant effects on

environments some kilometres distant. This is particularly important for wetland and other sites where the habitat and species are particularly dependent on an aquatic environment. EIA is likely to be required for developments where the area of works exceeds one hectare.

6.2.3 Reservoirs

Dams are included in both Schedule 1 and Schedule 2 of the Town and Country Planning (Environmental Impact Assessment) (England and Wales) 1999 (SI 1999 No. 293).

Exclusive criteria

- ◆ Under Paragraph 15 of Schedule 1, EIA will be required for dams and other installations designed for the holding back or permanent storage of water, where the new or additional amount of water held back or stored exceeds 10 million cubic metres; and
- ◆ Under Paragraph 10(i) of Schedule 2, EIA may be required for dams and other installations designed to hold water or store it on a long term basis (unless included in Schedule 1) if the area of the works exceeds one hectare.

Indicative criteria

- ◆ Concerning dams and other installations designed to hold water or store it on a long-term basis, Annex A, Paragraph A27, of DETR Circular 02/99, Environmental Impact Assessment, states that, "In considering such developments, particular regard should be had to the potential wider impacts to the hydrology and ecology, as well as to the physical scale of the development. EIA is likely to be required for any major new dam (e.g. where the construction site exceeds 20 hectares)".

6.3 Appropriate Assessment

In accordance with Regulation 48 of the Conservation (Natural Habitats) Regulations 1994, an appropriate assessment is necessary if a proposal may affect the integrity of a European site. Advice from English Nature has been sought and it has been determined that an appropriate assessment will be required for the Wash, the Nene Washes and the Ouse Washes. Environmental information will need to be gathered and presented to a competent authority (likely to be either the Environment Agency or the local planning authority) to allow them to undertake an Appropriate Assessment. If this assessment concludes that the works will have a significant impact on the integrity of the site, then the project will not be allowed to progress unless it can be shown to be in the over-riding public interest. It is probable that, depending on exact scale, nature and location of the works, several Appropriate Assessments will need to be made (e.g. for construction works, water transfers). Early and continuing consultation with English Nature is recommended to ensure that the scheme can progress in an acceptable manner.

6.4 Flood Risk Assessment

The Environment Agency has stated that a Flood Risk Assessment, following the procedure set out in Planning Policy Guidance No. 25 (PPG25), will be required for works along the entire proposed route which, by its very nature, lies within the floodplain.

6.5 Other Environmental Permissions and Licences

Certain aspects of navigation works may require prior permissions from the Environment Agency. These may include, for example, land drainage consents, abstraction licences, impounding licences, discharge consents, and waste management licences (especially important where contaminated spoil may be involved). It is considered probable that the Environment Agency will require environmental information (generally to be submitted in the form of an EIA) prior to granting permissions, licences and consents.

6.5.1 Abstractions and Impounding Licenses

All abstractions from inland water or underground strata, except for general agriculture and domestic use less than 20m³/d, requires a licence under the Water Resources Act 1991. An abstraction licence is only issued by the Environment Agency if there is sufficient water available, the need for water is justified, all rights of existing users are protected and the water environment is not unacceptably affected. Abstraction from surface water sources is subject to low level or flow restrictions in order to protect the river and downstream users.

Under the terms of the Water Resources Act 1991, an Impounding Licence may be required from the Agency for the impounding of any watercourse, ditch or stream (e.g. by dam, weir, etc).

As a result of the Water Bill currently in parliament it is likely that dewatering activities and the use of slackers by IDBs to let back water from high level carriers will both require abstraction licences from the Environment Agency.

6.5.2 Land Drainage Consent

Under the terms of the Water Resources Act 1991 and the Land Drainage Byelaws, the prior written consent of the Environment Agency is required for any proposed works or structures in, under, over or within 9 metres of the top/toe of the bank/defence of any main river. There are also Land Drainage Byelaws which apply depending on the activity (i.e. ground raising within the floodplain which will require consent). On ordinary watercourses, consent is only required for any works that would affect the flow. This is to protect people both upstream and downstream from the risk of increased flooding. The byelaw distance of 9m also assists the Agency with preserving access, wherever possible, for staff and equipment carrying out flood defence activities. Any culverting or works affecting the flow of a watercourse requires the prior written consent of the Drainage Authority (Environment Agency/ Internal Drainage Board) under terms of the Land Drainage Act 1991/Water Resources Act 1991. In deciding whether to issue a consent, account is taken whether the proposed works conserve and enhance the environment.

6.5.3 Sites of Special Scientific Interest

Along the route there are a number of Sites of Special Scientific Interest (SSSIs), as notified under Section 28 of the Wildlife and Countryside Act 1981 (as amended by the Countryside and Rights of Way legislation). These statutory sites are designated to protect areas important for their flora and fauna, geological or physiographical features. The potential impacts of the proposals on the SSSIs should be identified and assessed in accordance with Section 28 of the Wildlife and Countryside Act 1981 (as amended by the Countryside Rights of Way Act 2000). English Nature must be consulted before any development proposals which are in or likely to affect a SSSI, are granted planning permission by the planning authority. In addition, owners and or occupiers of a SSSI are given a list of Potentially Damaging Operations, which must not be undertaken on the site without the permission of English Nature.

6.5.4 Heritage Interests

Where heritage interests may be affected by the scheme (e.g. Scheduled Ancient Monuments) the local planning authority will seek approval from English Heritage prior to granting planning permission. Where developments are likely to affect known sites of archaeological significance, the developer may be required to allow for the in-situ preservation of remains before planning permission is granted. Where preservation is not feasible a developer may be asked to carry out a full investigation of the archaeology on site, before any development can take place.

As this is a long term project it should be noted that legislation may change in the future. For example, the Government is currently considering a new Water Bill.

7 Conclusions and Recommendations

7.1 Conclusions

7.1.1 Baseline Environment

A high level description of the baseline environment along the whole route of the Fens Waterways Link has identified the following key features:

- ◆ The limited extent of existing navigation facilities;
- ◆ The heavy existing use of a number of the watercourses for fishing;
- ◆ The generally rural nature of the area with limited public access in some areas;
- ◆ The presence of a number of nationally and internationally important nature conservation sites and areas of heritage value and archaeological importance;
- ◆ The large number of water abstractions and the limited water availability;
- ◆ The low lying nature of the region and the land drainage requirements this brings; and
- ◆ The lack of landscape variety along the route.

It is evident from the review of the baseline environmental that there are strong nature conservation and heritage/water management themes across the study area. Opportunities should be sought to build upon these themes as important features characterising the Fens Waterways Link.

7.1.2 Consultation

An extensive consultation exercise was undertaken in May 2003 involving over 450 individuals and organisations. An Environmental Scoping Report and/or leaflet was sent to consultees. A website was developed with information about the project and a facility to download documents. In addition, a series of meetings were held with key stakeholders.

The consultation process is ongoing and this Strategic Appraisal report will be used as part of that process. Responses from consultees are summarised in Section 3. In summary, the main opportunities are seen to be:

- ◆ Enhancement of recreation activities, e.g. angling, navigation, walking, horse riding, cycling;
- ◆ Environmental enhancements; and
- ◆ Regeneration and tourism opportunities.

The main challenges faced by the project were seen to be:

- ◆ Funding; and
- ◆ Communication between organisations

7.1.3 Summary of Impacts

There are a wide range of significant beneficial impacts that the initiative could deliver and these are presented in Section 5. The Strategic Objectives developed as part of this project, and presented to consultees in the Environmental Scoping Report in May 2003, neatly summarise the significant potential benefits of realising the Fens Waterways Link.

Topic	Strategic Objectives
Regeneration	<ul style="list-style-type: none"> • Act as catalyst for economic and social renewal. • Increase development value and the opportunity for investment. • Focus and bring together regeneration opportunities. • Generate long term economic activity and opportunities for employment. • Promote social inclusion and quality of life.
Sport and Recreation	<ul style="list-style-type: none"> • Provide an important sport and recreation resource. • Contribute to the health and well-being of society. • Form corridors linking urban areas to the countryside. • Promote accessibility to all members of society. • Create a new fishery of national importance.
Tourism	<ul style="list-style-type: none"> • Act as a tourism asset in its own right. • Provide a link between existing and new attractions. • Support the holiday industry through water-based activities. • Enhance the environment and attract increased visitor activity.
Heritage, Culture and the Natural Environment	<ul style="list-style-type: none"> • Form a unique heritage, cultural, educational, landscape and environmental asset. • Provide access to a wide array of important historic buildings and structures. • Contribute to the diversity of the natural environment by sustaining and enhancing habitats and supporting rare species. • Contribute to achieving biodiversity targets, incorporating sustainability principles at all stages of the project • Contribute to open space provision. • Provide a resource for water supply, water transfer and land drainage. • Protect and enhance water quality and contribute to flood risk management.
Transport	<ul style="list-style-type: none"> • Contribute to integrated transport objectives. • Provide transport routes on a local and regional scale. • Act as a waterborne transport corridor for people and freight. • Form important cycling, walking and public access corridors.

Adapted and developed from 'Planning a Future for the Inland Waterways: A Good Practice Guide' Inland Waterways Amenity Advisory Council. December 2001.

However, to progress the link there will also be significant environmental challenges which will need to be addressed as project elements are progressed. These include:

- ◆ Ensuring that any adverse impacts on key species and habitats are avoided or mitigated to acceptable levels;
- ◆ Avoiding any adverse impacts on water quality and flood risk or any derogation of existing water uses such as water supply and fishing;

- ◆ Ensuring that any associated developments are appropriate to the landscape character of the area; and
- ◆ Protecting features of heritage or archaeological interest.

It is important to emphasise that for the vast majority of the adverse impacts identified in this appraisal it should be possible to significantly reduce their significance through the development of appropriate mitigation measures as part of the Environmental Impact Assessment process for individual projects. What is evident is that the project does present some very significant opportunities for environmental benefit and enhancement and that realising these opportunities should be a fundamental consideration in any of the projects and work elements that develop out of the Fens Waterways Initiative.

7.2 Use of the Strategic Objectives

As highlighted above it is anticipated that the Fens Waterways Link will be progressed as a series of individual but linked projects aimed at meeting the wider, generic aspirations and objectives of the overarching Fens Waterway Link initiative. It is important that any works undertaken under the umbrella of the Fens Waterways Link are in accord with the aspirations and objectives of the initiative.

It is recommended that any projects that arise from the Fens Waterways Link initiative should be assessed against the agreed Strategic Objectives. To aid in this assessment it is further recommended that a series of more specific Indicators are derived from the Strategic Objectives and agreed by the project partners.

7.3 Continued Consultation and Stakeholder Involvement

7.3.1 General Consultation and Awareness

An extensive consultation and awareness exercise was initiated in May 2003 involving the use of leaflets, an Scoping Report, a series of meetings with consultees and a dedicated website where comments could be posted and documents downloaded. Over 450 individuals and organisations were included in the exercise and the response rate achieved of around 20% was excellent for a project of this nature.

Having successfully launched the Fens Waterways Link to stakeholders it is imperative that the momentum is not lost and that the project maintains interest.

It is recommended that the Implementation Plan and the Strategic Appraisal should be made available and a new leaflet produced to include a summary what is happening next. The website should also be updated. In terms of the local communities along the route of the link it is recommended that a series of local meetings/exhibitions are organised to raise awareness and identify aspirations and concerns. An updated version of the Communication Plan should be drafted to ensure this is undertaken in a planned manner.

7.3.2 Landowners

To date only a few landowners have been contacted along the proposed route of the Fens Waterways Link. This is an important omission particularly in areas where

new navigations are proposed (e.g. around Peterborough). Landowner details are being obtained through the Land Registry.

It is recommended that a series of face to face meetings are held with key landowners to raise awareness of the scheme and to identify opportunities and constraints.

7.3.3 Local Authorities

Although an initial review of the relevant planning authority documents was undertaken as part of the preparation of the Implementation Plan the level of interaction with planning departments during the project to date has been disappointing and is something that needs to be addressed in the next phase of the project.

It is recommended that planning authorities are asked to nominate a key individual for future liaison and that face to face meetings should be held with the nominated people. The purpose of these meetings will be to raise awareness of the project, discuss the role of the liaison person and to start to ensure that opportunities to secure appropriate planning policies and development zoning are taken.

7.3.4 Links with Other Initiatives

During the Strategic Appraisal and the associated consultation exercise, the Project Team has been made aware of several other relevant initiatives in the region. These include the Great Fen Project near Peterborough, the Boston Haven Strategy Study, the Lower Witham Flood Management Strategy Review, and the River Nar navigation proposals near King's Lynn.

During the consultation, opportunities were suggested for extending the route to link in with other waterways in the area. It was suggested that a spur should be provided into Market Deeping, which was once navigable. It was also suggested that the route be extended to include the River Lark up to Mildenhall. The route could also be linked up to the Nar Navigation at King's Lynn.

It is recommended that links with these projects are maintained and opportunities sought to work in synergy with them.

7.3.5 Consultation Database

As part of the consultation exercise, an MS Excel spreadsheet was used to record consultee contact details (largely taken from the relevant LEAP consultation lists), what they had been sent, when and whether they had responded and how. The database has been managed by a single point of contact and has proved a useful tool. If it is developed and maintained it will be of increasing use as the Fens Waterways Link is implemented.

It is recommended that the existing Excel spreadsheet is converted into a fully functional MS Access database and that it is maintained and used as a central record of consultation and public participation as the Fens Waterways Link progresses.

7.4 Obtaining Environmental Permissions and Consents

It is anticipated that the Fens Waterways Link will be progressed as a series of individual but linked projects. As a consequence of this there will be a need to undertake a series of individual environmental studies (e.g. EIA) and to obtain a range of environmental permissions and consents at the specific project level (see Section 6). In addition, these projects and the supporting studies and permissions may well be progressed by a range of organisations. There is therefore a need to ensure that this work is undertaken in a coherent and co-ordinated manner, and within the framework of the Fens Waterways Link. This is essential to ensure that the wider aspirations and strategic objectives of the initiative are retained and properly incorporated into individual projects and that the involvement of stakeholders and decision makers on individual projects is within an understanding of the wider context of the Fens Waterways Link.

It is recommended that this can best be achieved by nominating a core environmental team to have a role in scoping, supporting and reviewing environmental work falling within the wider project umbrella.

7.5 Data Collation and Management

A wide range of high level data sets have been obtained and reviewed by Atkins as part of this project. During the project we have also been made aware of a significant number of additional, generally more detailed data-sets that could be available. These are described in Appendix F. A significant amount of effort can be expended by stakeholders and project promoters obtaining and using environmental data-sets.

It is recommended that environmental data-sets obtained through this and any follow on projects are held centrally and maintained by a core environmental team. These data-sets should be available to individual projects progressed as part of the Fens Waterways Link.

7.6 Investigating Potential Impacts on Internationally Important Habitats

The preferred route of the link has the potential to either directly, or indirectly, impact on a number of internationally important nature conservation sites (e.g. The Ouse Washes, The Nene Washes). Any significant impact that affects the integrity of these sites is likely to prevent the relevant part of the scheme progressing.

It is therefore recommended that more detailed discussions with English Nature are undertaken and an initial investigation into the potential for significant impacts on these sites is progressed. In particular, it is recommended that there is a need to investigate the potential effects of navigation on the spined loach.

8 References

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9 Appendices

Appendix A: SSSI CITATIONS

Appendix B: GQA CLASSIFICATION SCHEME

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Appendix B: GQA Classification Scheme



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Appendix C: SCHEDULED ANCIENT MONUMENT RECORDS



<i>Appendix D: PROJECT CONSULTATION LEAFLET</i>
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Appendix D: Project Consultation Leaflet



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***Appendix E: CONSULTATION RESPONSES (BOUND
SEPERATELY) AND MEETING NOTES***

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Table E.1. List of Consultees

Organisation Name	Response	Meeting
ADAS Boxworth		
Amateur Rowing Association		
Amber Hill Parish Council		
Anglian Water Services Ltd (x2)	yes	
Association of British Ports (Kings Lynn)		
Association of Nene River Clubs (x2)	yes	
Barge Association	yes	
Benwick Angling Club		
Benwick CP (x2)		
Benwick IDB		
Bicker Parish Council		
Billingborough Parish Council		
Black Sluice Internal Drainage Board	yes	yes
Borough Fen Parish Council		
Boston & District Anglers		
Boston Borough Council (x6)	yes	
Boston Marina		
Boston Motor Yacht Club		
Bourne Town Council		
Brearley Marina		
Bretton Parish Council		
Bridge Boatyard		
British Canoe Union (x8)	yes	
British Gas Eastern (Fens district)		
British Horse Society (x2)	yes (x2)	
British Marine Industrial Federation		
British Sugar PLC		
British Trust For Conservation Volunteers	yes	
British Trust for Ornithology	yes	
British Waterways (x2)	yes	
Buckden Marina		
Butterfly Conservation		
C Fox Boatbuilders		
Cambridge Marine Industries		
Cambridge Motor Boat Club		
Cambridge Water Company		
Cambridgeshire ACRE		
Cambridgeshire and Isle of Ely Federation of Anglers		
Cambridgeshire Canoeing Association	yes	
Cambridgeshire Chamber of Commerce and Industry		
Cambridgeshire Constabulary		
Cambridgeshire Countryside		
Cambridgeshire County Council (x4)	yes (x2)	
Cambridgeshire Wildlife Trust (x2)		yes
Carters Boatyard		
Cawdle Fen IDB		
Chatteris CP (x3)	yes	
Chatteris Town Council	yes	
Chestnut Homes Ltd		yes

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Organisation Name	Response	Meeting
Christchurch CP (x2)		
City of Ely Council		
Clean Rivers Trust	yes	
Colne CP (x2)	yes	
Commercial Boat Oprators Association (COBA)		
Community Council of Lincolnshire		
Confederation of British Industry		
Coopers Angling Club (Ely)	yes	
Cottenham CP (x2)		
Council for British Archaeology		
Country Land & Business Association (x3)	yes	
Countryside Agency (East Midlands)	yes	yes
Countryside Agency (East of England)		yes
Countryside Commission		
Countryside Restoration Trust		
Countryside Stewardship Scheme		
Coveny CP		
Cowbit CP	yes	
CPRE (Cambridgeshire) (x5)	yes (x2)	
Crosshall Marina		
Crowland Abbey		
Crowland Angling Club		
Crowland CP (x3)	yes	
Crown Estates		
Cyclists' Touring Club		
Cyril Elbow Marina		
Daylock Marine		
Deeping St James Angling Club		
Deeping St James CP (x3)		
Deeping St Nicholas CP		
Deeping St. James Angling Club		
Deepings Heritage Group		
DEFRA (x2)		
Denver Cruising Club		
Denver Sailing Club		
Denver, Downham Market, Downham West, Fordham and Hilgay CP		
Doddington and Whisby CP		
Donington-on-Bain Parish Council		
Dow Chemical Company		
Downham & Stow Bardolph IDB		
Dryside IDB (Middle Level Commissioners)		
Dunsby Parish Council		
Earith CP (x2)	yes	
East Anglian Waterways Association Ltd (x2)	yes	
East Cambridgeshire District Council (x2)	yes	
East Highways Division		
East Midlands Development Agency		
East Midlands Federation of Anglers		
East of England Development Agency		

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Organisation Name	Response	Meeting
East of England Tourist Board (x2)	yes	
Elm CP (x3)	yes	
Ely Beet Sports and Social Club		
Ely Group of Internal Drainage Boards	yes	
ENCAMS		
English Heritage (Lincs) (Cambs) (x5)		yes
English Nature (Cambs) (Lincs) (x2)	yes	yes
Environment Agency (Brampton) (x2)	yes	
Environment Agency (Lincoln)	yes	
Essex & Suffolk Water		
Eye Village Council (x10)		
Fenland Association of Anglers		
Fenland Boats		
Fenland District Council (x3)	yes	
Fenland Water Ski Club	yes	
Fenland Wildfowlers Association		
Fens Tourism (x2)	yes	
Fish and Duck Marina		
Fishtoft Parish Council		
Focus Consultants (UK) Ltd.		
Fordham CP		
Forest Heath District Council		
Forestry Authority (x3)		
Four Winds Equestrian Centre		
Fox's Marina/BMIF East		
Frampton Parish Council		
Friends of the Earth		
FWAG (Cambs & Herts) (x4)	yes	
Go East (Government Office for the Eastern Region)		
Gosberton CP (x2)		
Government Office for the East Midlands		
Government Office for the Eastern Region (Go East)		
Great Fen Angling Club		
Great Hale Parish Council		
Great Ouse Boating Association (GOBA) (x4)		
Greater Peterborough Chamber of Commerce		
Greater Peterborough Investment Agency		
Haconby Parish Council		
Haddenham CP		
Haddenham Level IDB		
Hartford Marina Ltd	yes	
Hawk & Owl Trust (x2)	yes	
Heart of England Tourist Board	yes	
Heckington Parish Council		
Helpringham Parish Council		
Hermitage Marina		
Herts & Cambs FWAG		
Hilgay Great West Fen IDB		
Histon & District Angling Society		
Holland Fen with Brothertoft Parish Council		

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Organisation Name	Response	Meeting
Holland Rural Partnership		
Horbling Parish Council		
Hundred Foot Washes IDB		
Huntingdon Angling and FPS		
Huntingdon Boat Club		
Huntingdon Boat Haven		
Huntingdon Canoe Club		
Huntingdon Marina & Leisure		
Huntingdonshire DC (x3)	yes	
Inland Waterways Association (HO) (x9)	yes	
Isleham Angling Society		
Isleham Marina		
Keith Wood Narrowboats		
Kelpie Marina		
Key Ferry		
King's Lynn & West Norfolk BC (x4)		
King's Lynn Angling Association		
King's Lynn Conservancy Board		
King's Lynn Library		
Kirton Parish Council		
L.H. Jones & Son		
Ladus Fen IDB		
Lark Angling and Preservation Society		
Lazy Otter Pub		
Lincoln and District Angling Association		
Lincoln City Council	yes	
Lincolnshire Constabulary		
Lincolnshire County Council (x3)		
Lincolnshire Development		
Lincolnshire Tourism		
Lincolnshire Wildlife Trust		yes
Little Hale Parish Council		
Little Thetford Community Appraisal		
Littleport Angling Club		
Littleport Boat Haven Ltd		
Littleport CP		
Loveys Marina	yes	
Manea CP (x3)		
March & Whittlesey IDB		
March 5th IDB		
March Town Council		
Maritime Leisure Cruises		
Marshland Smeeth & Fen IDB		
Member of the Public	yes	
Member of the Public	yes	
Member of the Public	yes	
Member of the Public	yes	
Member of the Public	yes	
Member of the Public	yes	
Member of the Public	yes	

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Organisation Name	Response	Meeting
Member of the Public	yes	
Member of the Public	yes	
Mepal CP		
Methwold Angling Club		
Middle Fen & Mere IDB (x2)		
Middle Level Commissioners	yes	yes
Middle Level Waterman's Club		
Mildenhall Angling Club		
Morton Parish Council		
Mr Daymond Hire Boats		
National Association of Boat Owners (NABO)	yes	
National Farmers Union (x2)	yes	
National Trust (x2)		
Needham Burial & Birdbeck IDB		
Nene Park Trust	yes	
Newborough Ward		
NFU East Anglia Region (x2)	yes	
Nightlayers IDB		
Nordelph, Upwell, Outwell and Welney CP		
Norfolk and Suffolk Yachting Association		
Norfolk Canoe Association		
Norfolk Constabulary		
Norfolk County Council	yes	
Norfolk Landscape Archaeology		
Norfolk Ornithologists' Association		
Norfolk Rural Community Council		
Norfolk Society (CPRE)		
Norfolk Wildlife Trust		yes
Norman Cole Marina		
North Kesteven		
North Level Internal Drainage Board		
OFWAT		
Old West IDB		
Otter Trust	yes	
Ouse Amateur Sailing Club		
Ouse Bridge Farm		
Ouse Valley River Club	yes	
OV, EM & IR Thurtle		
Padnal & Waterden IDB		
Peakirk Parish Council		
Peterborough & District Angling Association		
Peterborough Boating Centre		
Peterborough City Council (x5)	yes	
Peterborough City Rowing Club		
Peterborough Cruising Club		
Peterborough Yacht Club	yes	
Pike & Eel Marina		
Pinchbeck CP (x3)	yes	
Pointon & Sempringham Parish Council	yes	
Priory Marina		

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Organisation Name	Response	Meeting
Purvis Marine		
Quadrang		
Quarry Products Association		
Quiet Waters Boat Haven		
Ramblers Association (x7)	yes (x2)	
Ramsey & District Angling Society		
Ramsey CP (x2)		
Ransonmoor IDB		
Richard Allen Boat Sales		
Rippingale Parish Council		
River Mill		
Riverside Island Marina		
Royal Geographical Society		
RSPB (x4)		yes
Salmon & Trout Association (x2)		
Shrubbs Wharf		
Slea Navigation Society		
Soham Angling Club	yes	
Soham Town Council		
Somersham CP (x3)	yes	
South Bretton (x2)		
South Holland District Council (x7)	yes	
South Kesteven		
South Wootton		
Southery & District IDB	yes	
Southery CP		
Spalding Fishing Club		
Sport England (x2)	yes	
St Ives and District Fish Preservation and Angling Society		
St. Neots Marina	yes	
Stamford Welland Angling Club		
Stanground (x3)	yes	
Stanground Boating Association	yes	
Stoke Ferry IDB		
Stretham CP		
Stretham Engine Trust	yes	
Surfleet CP (x2)		
Sustrans	yes	
Sustrans (East of England)	yes	
Sutton & Mepal IDB		
Sutton Angling Club		
Sutton CP		
Swaton Parish Council		
Swineshead Parish Council		
Thetford Town Council		
Tiptree Marina		
Trent Boating Association		
Twenty Pence Marina		
Two Tees Boatyard		
Tydd Gote Angling Club		

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Organisation Name	Response	Meeting
Upware Marina		
Upwell IDB		
Upwell with Delph Constituency	yes	
Warboys CP (x2)		
Warboys, Somersham & Pidley IDB		
Waterbeach Level IDB		
Welland and Deepings Internal Drainage Board	yes	
Welland Yacht Club	yes	
Welney Angling Club	yes	
Welney Parish Council		
Wentworth CP		
West View Marina		yes
Weston by Welland Parish Council		
White Fen IDB		
Whittlesey IDB		
Whittlesey Progress (x2)		
Whittlesey Town Council (x14)	yes	
Wicken CP		
Wicken Fen		
Wilburton CP		
Wildfowl & Wetlands Trust (x2)		
Willingham CP		
Wimblington CP (x2)	yes	
Wisbech Harbour		
Wisbech Yacht Harbour		
Witcham CP		
Witham & District Joint Anglers Federation		
Woodlands Trust	yes	
World Wide Fund for Nature		
Wyberton Parish Council		

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<i>Appendix F: SPECIFIC DATA-SETS</i>

F.1 Specific Data Sets

The Strategic Appraisal was based largely on data available from the Environment Agency and internet sources together with high level information that could be easily and cost-effectively supplied by consultees. For further stages of the project more detailed data will be required at a site specific level to assess the impacts of individual projects. With this in mind during the consultation process, consultees were asked what data they hold and this could be collected when necessary for future works. Table A1 lists examples of the data-sets held by the organisations that responded to the consultation.

Table A1 – Examples of Data-sets Known to be Available from Consultees

Name of Organisation	Summary of Responses
British Trust for Ornithology	Atlas of Breeding Birds, Atlas of Wintering Birds, Common Bird Census (1961-2000), Waterways Bird Survey (1974 onwards), Breeding Birds Survey (1994 onwards), Wetland Bird Survey (1992 onwards), Heronries Census, Ornithological Sites Register, Ringing Recoveries and Nest Record Scheme. Also some specialist surveys.
Cambridgeshire County Council	The county council maintains the sites and monuments records.
Clean Rivers Trust	Information available regarding the "Sewers of Lincolnshire".
Coopers Angling Club (Ely)	Match weights from matches in the Ely area.
Countryside Agency (East Midlands)	The Countryside Character Landscape assessment of the English Countryside should be used to inform and guide the detailed design of the project. Copies of the relevant extracts are available from our website www.countryside.gov.uk .
CPRE (Norfolk)	Data held but not actually "within" but adjacent to: The Local Environment Agency Plan (LEAP) for North West Norfolk Nov 2002. Countryside and Rights of Way Act 2000: wildlife conservation and access to the countryside. Babbie Brown & Root Nar Ouse Navigation Link- initial consultation on environmental issues.
Earith Parish Council	Flood levels and water levels in Earith
Heart of England Tourist Board	Some data on visitor numbers to Lincolnshire.
East of England Tourist Board	Tourism impact data
National Association of Boat Owners (NABO)	Notes from meetings held in Lincolnshire.
Peterborough City Council	Data held that is required by statutory duty relating to planning, environmental, economic and tourism issues.
South Holland District Council	Planning and Development Service Department may hold information on Strategic Flood Risk Assessment, the Local Plan and some data on GIS
Sport England East	Water Recreation Strategy for the Eastern Region, last updated by the Eastern Council for Sport and Recreation in 1995/96. This may be reviewed in 2003/04.
Sustrans	Data on proposed and actual cycle routes in area.
Sustrans (East of England)	Information on Cycle Routes
Black Sluice Internal Drainage Board	5 years of flow data from 4 telemetry stations along the South Forty Foot. Paper records of flow at Black Hole Drove Pumping Station since 1967. Environmental surveys of drains of the larger catchments towards Boston. Map of the Black Sluice IDB area (also available electronically).
English Heritage	Fenland survey covers Lincolnshire and Cambridgeshire. Have details of listed buildings, registered parks and battlefields. Robert Wrathmall Atlas - a medieval settlement study.
RSPB	Wet fens for the future report. Futurescapes report. Needingworth leaflet.
English Nature	Wide range of data available concerning specific sites, general conditions and protected species.
Cambridgeshire Wildlife Trust	GIS data of location of CWS. Protected species sightings data. Specific site descriptions.

Norfolk Wildlife Trust	Protected species records and site description records of CWS.
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The following paragraphs highlight where specific data might be needed that currently has not been obtained or is out of date. This data may not be necessary until the scheme is at the local project stage but provisions may need to be made for it in the future.

F.1.1 Human Beings

Data on recreational activities may be held by the local authorities within the region and the local tourist information centres may have data on visitor numbers to local attractions and trends in tourism. Visitor information may also be available from the organisations that are responsible for the management of local visitor attractions such as the local wildlife trusts, RSPB, Wildfowl and Wetlands Trust, National Trust and British Waterways. Further information is also required on existing boat usage on the existing navigable watercourses.

F.1.2 Flora and Fauna

As the route will affect several conservation sites designated under European legislation further detailed information should be obtained about the features and condition of these sites. This data will be necessary as part of the appropriate assessments which will be required. As well as the sites of international importance there are several sites of national, regional, and local importance along the route. Information regarding these sites could be obtained from the wildlife trusts, English Nature and the local authorities. The local authorities and biological records offices may also have records of protected species and will have plans and policies for biodiversity including Biodiversity Action Plans (BAP) and Habitat Action Plans (HAP). Although fisheries data has been collected from the Environment Agency local angling clubs may have additional fisheries data. River Corridor Survey and River Habitat Survey data was also obtained but needs updating for some reaches and needs undertaking for where no surveys already exist such as Cat's Water Drain.

F.1.3 Air and Climate

The Environment Agency do not monitor air quality in the areas along the route, but the local authorities may undertake some monitoring and should be contacted for any data. Further information regarding climate may be available from the Met Office and UKCIP. It may also be useful to obtain climate change policies from local authorities and any regional climate scenarios. The vulnerability of the project to climate change should be considered particularly in terms of water availability.

F.1.4 Landscape and Visual Amenity

The local authorities should have information on conservation areas and tree preservation orders along the proposed route, plus any strategies or policies that the local authorities may have regarding the local landscape in the area. Information was obtained from the Countryside Agency's website regarding landscape character areas; however more specific data may be held. A Landscape Assessment will be required where new structures will protrude into the landscape and have a visual impact.

F.1.5 Water

The Environment Agency have details of specific pollution incidents which may need addressing as specific stretches become part of the navigation route.

A Flood Risk Assessment will be required for the whole route which should include catchment analysis and hydrological modelling, surface water drainage and the impacts on the existing floodplain. This will involve specific data being gathered including historic flood levels, channel cross sections, and flow data for each section as the project progresses. The majority of this information will be available from the Environment Agency, however the local councils and internal drainage boards will hold some data especially where they are responsible for maintaining the watercourses.

F.1.6 Land Use

Further work is required to identify any contaminated land risks along the route. In addition to the Local and Transport plans already obtained, the relevant Minerals Plans should also be obtained from the county authorities. Any Green Belt areas along the route should be identified.

F.1.7 Cultural Heritage, Archaeology and Material Assets

Further information is required from local authorities regarding the location of any listed buildings and built conservation areas. Further detail is also needed on the historical and archaeological features along the route. English Heritage and the relevant County Archaeologists should be contacted for this.

F.1.8 Traffic and Transport

Road traffic usage will need to be analysed in the area along the route and information obtained concerning existing infrastructure and an analysis made of the impact of an increase in usage of local transport infrastructure.

F.1.9 Soil, Geology and Hydrogeology

The Soil and Land Research Centre should be able to provide detailed soil classifications and mapping for the route. The British Geological Survey (BGS) should be contacted for information on aquifers and the detailed geology of the area if required. The BGS may also have their own observation boreholes which may be able to provide data on groundwater levels and thus groundwater availability. The Environment Agency also have boreholes for monitoring groundwater quality and availability and data from these may also be useful.

