THE MERSEY GATEWAY PROJECT

TERRESTRIAL AND AVIAN ECOLOGY

CHAPTER 10.0

TERRESTRIAL AND AVIAN ECOLOGY

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10. TERRESTRIAL AND AVIAN ECOLOGY

10.1 Introduction

General Introduction to Terrestrial and Avian Ecology

10.1.1 This Chapter describes the likely significant and non-significant other effects of the construction and operation of the Mersey Gateway Project (the Project), which crosses the Upper Mersey Estuary, on terrestrial and avian ecology.

10.1.2 The existing terrestrial and bird habitat ecological conditions of the Estuary and its surroundings are described and evaluated. This includes all terrestrial wildlife habitats and associated biodiversity that may be directly or indirectly affected by the Project. This description and evaluation is referred to as the baseline assessment.

10.1.3 The Estuary, like most other estuaries, is a complex ecosystem that consists of many terrestrial and aquatic habitats. As well as the saltmarsh and other terrestrial or predominantly terrestrial habitats that are assessed in this Chapter, there are subtidal and intertidal maritime habitats and other types of aquatic habitat associated with the Estuary, notably freshwater and brackish habitats. The aquatic and terrestrial estuarine and associated terrestrial habitats are closely linked and are often interdependent. A detailed and separate assessment of the aquatic ecology of the Estuary and freshwater habitats has been undertaken and is reported in Chapter 11.

10.1.4 The biodiversity considered in this Chapter includes wildlife habitats, semi-natural and planted vegetation, plant and animal communities and all species of flora and fauna. Special attention is given to the birdlife associated with the Upper Mersey Estuary because of the known importance of the Middle Estuary for wildfowl, wading and other birds, many of which depend on estuarine habitats for breeding, feeding, roosting, wintering, passage migration and other activities.

Relevance of Terrestrial and Avian Ecology to the Project

10.1.5 A detailed consideration of biodiversity is very relevant to the Project because part of the Estuary (the Middle Estuary) is of international importance for its habitats, saltmarsh vegetation and associated fauna, and particularly for its birdlife. The Middle Estuary is not crossed by the proposed New Bridge but it is approximately 1,770m downstream of the alignment of the proposed New Bridge, being immediately downstream of the Runcorn Gap and Silver Jubilee Bridge (SJB) (Figure 1.3).

10.1.6 The principal ecological interest and nature conservation value of the Estuary is its wintering and migratory birdlife. The Estuary is listed in *A Nature Conservation Review* (Ratcliffe, 1977) which classified its importance at that time as Grade 2 (national importance). Since then, detailed ornithological surveys of many other estuaries, carried out as part of the Wetland Bird Survey, a collaborative national surveillance scheme of the UK's waterfowl, have shown that the Estuary is of even greater importance for birds; it is now recognised as being of international importance.

10.1.7 Although the listing of the Estuary in *A Nature Conservation Review* conferred no statutory designation or legal protection for the Estuary, it did identify the Estuary as one of the most important sites in Britain that should be conserved to exemplify Britain's rich heritage of wild flora and fauna.

The Middle Mersey Estuary

10.1.8 The Middle Mersey Estuary is protected by four national and international nature conservation designations (Figure 4.4). They are;

a. The Estuary Site of Special Scientific Interest (SSSI);
b. The Estuary Ramsar Site;
c. The Estuary Special Protection Area for Birds (SPA); and
d. The Estuary European Marine Site.

10.1.9 The SSSI is a nationally designated site under the *Wildlife and Countryside Act 1981* (as amended by the *Countryside and Rights of Way Act 2000*). The SSSI citation, which was revised in 1985, includes the following statement;

"The Estuary is an internationally important site for wildfowl and consists of large areas of intertidal sand and mudflats. The site also includes an area of reclaimed marshland, salt-marshes, brackish marshes and boulder clay cliffs with freshwater seepages. The Manchester Ship Canal forms part of the southern boundary of the site and separates a series of pools from the main Estuary. These pools together with Hale Marsh are important roosting sites for wildfowl and waders at high tide."

10.1.10 The Estuary is also important for its migratory wildfowl and wading birds, particularly the latter, in spring and autumn when the Estuary is used as a staging post.

10.1.11 A detailed description of the birdlife and other wildlife interests of the SSSI is given later in this Chapter, in Section 10.10.

10.1.12 The Mersey Estuary Ramsar Site, which covers the same area as the SPA, is of international importance under the Ramsar Convention on wetlands of international importance. The citation states;

"The Mersey is a large, sheltered Estuary which comprises large areas of saltmarsh and extensive intertidal sand and mudflats, with limited areas of brackish marsh, rocky shoreline and boulder clay cliffs, within a rural and industrial environment. The intertidal flats and saltmarshes provide feeding and roosting sites for large and internationally important populations of waterfowl. During the winter, the site is of major importance for duck and waders. The site is also important during spring and autumn migration periods, particularly for wader populations moving along the west coast of Britain."

10.1.13 Further details of the Ramsar Site and its qualifying features are also given in the baseline section of this Chapter, in 10.10.

10.1.14 The Estuary was designated as an SPA under the *EC Council Directive on the Conservation of Wild Birds 79/409/EEC* of April 1995 (*The Birds Directive*). The SPA citation, which was revised in 2004, stated;

"The Estuary is located on the Irish Sea coast of North West England. It is a large, sheltered Estuary which comprises large areas of saltmarsh and extensive intertidal sand- and mud-flats, with limited areas of brackish marsh, rocky foreshore and boulder clay cliffs, within a rural and industrial environment. The intertidal flats and saltmarshes provide feeding and roosting sites for large populations of water birds. During the winter the site is of major importance for ducks and waders. The site is also important during the spring and autumn migration periods, particularly for wader populations moving along the west coast of Britain."

10.1.15 The baseline section of this chapter provides a detailed description of the birdlife and habitats of the SPA including information on its SPA-qualifying features.

10.1.16 The three internationally designated sites, namely SPA, Ramsar Site and European Marine Site, are now known collectively as *Natura 2000* sites.

The Upper Mersey Estuary

10.1.17 The Upper Mersey Estuary, upstream, of the Runcorn Gap and which is crossed by the proposed New Bridge, is not an SPA and it has no other statutory nature conservation designation such as SSSI and Ramsar site. Although it is not a proposed SPA, owing to its close proximity to the SPA it is assessed in this Chapter as though it was a proposed SPA.

10.1.18 The biodiversity importance of the Upper Estuary is recognised to be of significance in the local contexts of Halton and Warrington boroughs, and Cheshire County. It is listed as a Local Wildlife Site (LWS), formerly as a Site of Importance for Nature Conservation (SINC), for its estuarine habitats, namely the saltmarshes and associated sand and siltflats.

Overview of the Study Area

10.1.19 The Study Area (Figure 10.1) covered by this Chapter includes the entire Upper Mersey Estuary which consists of the river channels and all the intertidal habitats extending to the upper limits of the saltmarshes. Also included in the Study Area are the Fiddler's Ferry Power Station lagoons which were constructed on the former Cuerdley Saltmarsh, little of which remains. All the lagoons are of industrial origin and still operational; they attract birds and other important wildlife, many of which are known to use the Upper Mersey Estuary.

Figure 10.1 – Map showing the extent of the Study Area for terrestrial and avian ecology

10.1.20 Other features outside the Upper Mersey Estuary have also been included in the Study Area, notably the St. Helens Canal, a section of the disused Runcorn and Latchford Canal, and parts of Wigg Island.

10.1.21 Certain areas affected by the construction and use of the approach roads, junction improvements and toll booths associated with the Project are a considerable distance from the New Bridge crossing but they were surveyed because of the known or possible presence of protected species, notably Great Crested Newts and bats.

10.1.22 The Middle Mersey Estuary was included in the Study Area but was not surveyed in detail because its ecological interests and importance are well documented and accepted by nature conservation organisations including those authorities responsible for nature conservation in the UK. However detailed bird observations at the Runcorn Gap and at the existing road and railway bridges were undertaken to investigate bird movements between the Upper and Middle Mersey estuaries.

Overview of the Project

10.1.23 The following overview of the Project includes a general description and its location, which are relevant to this Chapter.

10.1.24 The Borough of Halton is located at a strategic crossing point of the Estuary (Figures 4.2 and 4.2). At one point, known as the 'Runcorn Gap', the Estuary narrows significantly and thus provides a long-used crossing point. This is now used by the main rail connection between Liverpool and the West Coast Main Line (via the Aethelfleda railway bridge) and the A557 road link between the M62 and the M56 (via the Silver Jubilee Bridge (SJB)). The M62 and M56 motorways pass to the north and south of the Borough respectively with connections via the A562/A5300 and A557 to the M62, and via the A557 to the M56. To the west of Widnes the A562, Speke Road, links Widnes to south Liverpool. To the south, the M56 links North Wales and Cheshire to Manchester. Halton lies at the convergence of a number of strategic transport links in the north west of England.

10.1.25 The SJB was opened in 1961 with two lanes of traffic and an opening year flow of less than 10,000 vehicles per day (vpd). It has since been widened and improved; at present it regularly carries in excess of 80,000 vpd on weekdays and is now severely congested at times, and unreliable. This, in turn, is having an adverse effect on the region's connectivity with the rest of the United Kingdom's road transport links, the Liverpool City region and local communities. Congestion associated with the bridge is a constraint to economic regeneration locally, within the Borough, and across the Merseyside region.

10.1.26 The aim of the Project is to deliver a new road crossing of the River in Halton that links into the existing principal road network. It aims to provide effective road connections to the Liverpool City Region from north Cheshire in the south, thereby providing effective connectivity for the sub-region and an opportunity to re-balance the transportation infrastructure within Halton towards delivering local transport and economic goals.

10.1.27 The Project will include a new tolled road crossing of the River referred to herein as the New Bridge. It involves the combination of the New Bridge with the SJB and improved public transport services associated with de-linking and tolling the SJB.

10.1.28 Due to the scale of the Project and its location close to the SPA and Ramsar site (the European Site), an Environmental Impact Assessment (EIA) is required, to assess the environmental effects associated with the Project.

10.1.29 This Chapter is one of a series of chapters that, collectively, provide technical environmental information to inform the Environmental Statement and the non-technical summary.

10.2 Purpose of the Study

10.2.1 The Study was carried out to assess the effects of the Project on terrestrial ecology and birds, primarily within the European Site, and secondarily on terrestrial ecology and birds within the Upper Mersey Estuary including its surroundings, outside the designated site.

10.2.2 The UK has obligations under Regulation 33(2) of the *Conservation (Natural Habitats & c.) Regulations 1994*, as amended, to implement *The Habitats Directive*. It is the responsibility of the relevant and competent authorities to implement *The Habitats Directive*. This is discussed further in this Chapter.

10.2.3 Advice to relevant and competent authorities has been provided in *Planning Policy Statement 9: Biodiversity and Geological Conservation* (hereafter PPS9) and in the document entitled *Mersey Estuary; European Marine Site (English Nature 2001*); hereafter referred to as the *Regulation 33 Package*. This applies to potential effects on any European site, including Special Protection Areas and Special Areas of Conservation.

10.2.4 Although the New Bridge does not cross any part of the SPA, Ramsar Site and European Marine Site (hereafter collectively referred to as the European Site), there may be direct and/or indirect effects of an adverse nature on it. PPS9 and the *Regulation 33 Package* provide a basis to inform on the scope and nature of "Appropriate Assessment" required in relation to plans and projects (Regulations 48 and 50, and by Natural England under Regulation 20).

10.2.5 Thus the principal purpose of the Study reported in this Chapter is to assess the effects, if any, of the Project on the European Site, taking into account its conservation objectives and the operations which may cause deterioration of the natural habitats or the habitats of species, or disturbance to species for which the site has been designated.

10.2.6 In the event that the Project is predicted to have adverse effects on the European Site, directly or indirectly, individually or cumulatively, temporarily or permanently, short-term or long-term, or in any other manner, mitigation measures will be necessary to avoid the effects or to reduce the effects to an acceptable level in accord with the requirements of the *Regulation 33 Package*.

10.3 The Study Area

The Upper Mersey Estuary

10.3.1 The Study Area (Figure 10.1) covers the whole of the Upper Mersey Estuary because the New Bridge crosses the central area of this part of the Estuary and it crosses the three main types of habitat, namely the coastal saltmarshes, the intertidal sand and silt-beds including sandbanks, and the river channels. The inclusion of the whole of the Upper Mersey Estuary in the Study Area is further justified because the three main types of habitat are largely continuous between the downstream area of the Upper Mersey Estuary in the vicinity of the Runcorn Gap, and the upstream area adjacent to or near the Fiddler's Ferry Power Station lagoons.

10.3.2 The coverage of the entire area of the Upper Mersey Estuary in the Study Area is also justified because of its Local Wildlife Site status, this being a non-statutory nature conservation designation which reflects its importance in local (Halton Borough and Cheshire) contexts.

10.3.3 Also included in the Study Area is Fiddler's Ferry Power Station and the associated power station lagoons. There are several reasons for the inclusion of the power station facility in the Study Area, these being;

a. The power station lagoons were constructed on the majority of Cuerdley Saltmarsh which was part of the Upper Mersey Estuary. The area contained saltings and creek systems. Although the maritime habitats were completely covered, marginal brackish areas remain;
b. It is known that the power station lagoons continue to provide habitats, in the form of open water areas and beds of power station ash resembling sand and silt-flats, for seabirds and other bird species including wildfowl and waders which also use the Upper Mersey Estuary;
c. The pulverised fuel ash which is deposited from the power station into the lagoons, contains soluble salts which, in certain respects, produce saline conditions resembling the estuarine waters and brackish areas of the saltmarshes;
d. The topography of the power station lagoon system provides sheltered areas of standing water and slurry which have the potential to function as "high tide roosts" and sheltered habitats in stormy weather for seabirds and other estuarine avifauna;
e. The power station lagoon system provides a dynamic system of habitats which is constantly changing due to ash deposition followed by extraction. This dynamic feature bears some resemblance, at least in physical terms, to the hydrodynamic nature of the Upper Mersey Estuary;
f. In the light of the above affinities of the power station lagoon system with the Upper Mersey Estuary ecosystem, it was concluded that movements of some bird species between the Estuary and the power station lagoons was likely; and
g. The power station lagoon system is a Site of Nature Conservation Importance in Warrington Borough, this being equivalent to Local Wildlife Site (LWS) status in Halton.

10.3.4 There are other sites of biological importance in local contexts that are associated with the Upper Mersey Estuary. They are the Manchester Ship Canal Bank at Astmoor LWS for its wild orchids and associated plant communities, and the disused St. Helens Canal LWS which is significant for its reedbeds and associated aquatic fauna including birds. Other LWSs in the locality are Haystack Lodge, Norbury Wood and Marsh, and Lodge Plantation which supports a colony of Great Crested Newt, a species that has European protection together with its habitats. The locations and boundaries of all the Local Wildlife Sites are shown in Figure 4.4.

10.3.5 The Upper Mersey Estuary may also be of regional significance as part of a wildlife corridor as river valleys and the tidal sections of rivers are commonly used as migratory routes for wildlife. Migratory species include various species of fish and Otters as well as birds, although there are no records of Otters in the Upper Mersey Estuary.

10.3.6 The Study Area (Figure 10.1) includes the narrow section of the Estuary through the Runcorn Gap and extending into the upper part of the Middle Mersey Estuary, immediately downstream of the Runcorn Gap. The justification for inclusion of this area was the need to record and examine bird movements and their flight behaviour between the Upper Mersey Estuary and the Middle Mersey Estuary European Site.

The Middle Mersey Estuary Downstream of the Existing Bridge

10.3.7 As described earlier in 10.1.12, and shown in Figure 4.4, the European Site is a large and sheltered Estuary which contains large areas of saltmarsh and extensive intertidal sand- and mud-flats. There are small areas of other maritime habitats, notably brackish marsh, rocky foreshore and boulder clay cliffs.

10.3.8 The European Site includes most of the area of the Middle Estuary with the exception of the sub-tidal channels. It does not extend upstream of the SJB, and it terminates downstream just before 'The Narrows' which connects the Inner Estuary with The Outer Mersey. The boundaries of the European Site are the same as those of the SPA, Ramsar Site and European Marine Site.

10.3.9 The definition of the extents (areas) of the European Site, the SPA, the Ramsar Site and the European Marine Site is the area between the existing Runcorn Bridge (SJB) and a line drawn between points A and B on the north and south shores respectively (English Nature 2004) immediately upstream of The 'Narrows'. Within this area the boundaries of the four sites are set by the Mean High and Mean Low Water marks. This means that the boundaries can change.

10.3.10 The areas presently cited for the SPA and Ramsar Site are 5,033.14 hectares and 5,023.35 hectares respectively. These figures are indicative of the size of the European Marine Site and the European Site.

10.3.11 The area cited for the SSSI is 6,702.14 hectares which is larger because of the inclusion of the sub-tidal channels, i.e. the areas below the Mean Low Water mark.

10.3.12 The European Site is of principal and international importance for its large populations of migratory wildfowl and wading birds which winter in the Estuary where they feed on the rich invertebrate fauna of the intertidal habitats and on the plant life and associated invertebrates of the saltmarshes. The Estuary also provides undisturbed roosting areas for the waterbird populations.

10.3.13 As also described in Section 10.1 of this Chapter (10.1.10 – 10.1.12), the European Site is important for its migratory birds and waders, and other water birds in the spring and autumn. The Estuary also acts as a staging post for these migratory birds.

10.3.14 Detailed descriptive and quantitative information on the birdlife of the European Site including that of the area covered by the SSSI is presented in the baseline assessment (10.6). The quantitative information is based on collation of recent WeBS records based on high tide and low tide bird counts in the Upper Mersey Estuary and in the European Site, on counts made by local ornithologists, and on the bird data obtained during the commissioned surveys from 2002 to 2007.

10.3.15 Information on the habitat and vegetation sub-features of the European Site is also given in the baseline assessment. These include the saltmarshes and their vegetation and invertebrates of importance for feeding wildfowl and waders, and the intertidal habitats including sand, silt and mud-flats, the sandbanks and the rocky shores which also provide habitats for feeding birds.

The Conservation Objectives of the SPA

10.3.16 Natural England, under Regulation 33 (2)(a) of the *Conservation (Natural Habitats & c.) Regulations 1994*, as amended (*Regulation 33*), has a duty to advise other relevant authorities as to the conservation objectives for the European Site. The conservation objectives for the Mersey Estuary European Site (SPA) are set out below and are reproduced from 4.1 of the European Marine Site document issued by Natural England in 2001.

a. The conservation objective for the internationally important populations of regularly occurring migratory bird species is subject to natural change, maintain in favourable condition the habitats for the internationally important populations of regularly occurring migratory bird species, under *The Birds Directive*; in particular:
    i. Intertidal sediments
    ii. Rocky shores
    iii. Saltmarsh
b. The conservation objective for the internationally important assemblage of waterfowl, is subject to natural change, maintain in favourable condition the habitats for the internationally important assemblage of waterfowl, under *The Birds Directive*, in particular:
    i. Intertidal sediments
    ii. Rocky shores
    iii. Saltmarsh

10.3.17 It is noted in the European Marine Site document that these SPA conservation objectives focus on habitat condition in recognition that bird populations may change as a reflection of national and international trends or events. Annual counts for qualifying species will be used by Natural England, in the context of five year peak means, together with available information on UK population and distribution trends, to assess whether this SPA is continuing to make an appropriate contribution to the Favourable Conservation Status of the species across Europe.

10.3.18 An integral part of Natural England's advice under *Regulation 33* is the supply of the favourable condition table which is produced as Table 2 in the European Marine Site document. This table is intended to supplement the conservation objectives only in relation to management of activities and requirements on monitoring the condition of the site and its features. It is emphasised that the table does not by itself provide a comprehensive basis on which to assess plans and projects as required under Regulations 20 and 48-50, but it does provide a basis to inform the scope and nature of any 'appropriate assessment' that may be needed.

Sites of Local Wildlife Importance

10.3.19 The Study Area was extended to include selected non-statutory sites of wildlife importance outside the Upper Mersey Estuary and known as Local Wildlife Sites (LWS). They were the following (Figure 4.4);

a. The St. Helens Canal LWS was included in the Study Area because it is crossed by the New Bridge and because of its very close proximity to Widnes Warth Saltmarsh, being virtually adjacent to the Upper Mersey Estuary between Spike Island and Fiddler's Ferry Power Station. The canal is reportedly brackish at times, giving it some affinity with the

adjacent estuarine habitats. The canal is of importance for its aquatic habitat, emergent plant communities and faunal interests;

b. The Manchester Ship Canal Bank LWS was surveyed because it is crossed by the New Bridge. This LWS is important for is plant communities, orchids and other botanical interests;

c. Wigg Island LWS/Local Nature Reserve (LNR) was examined because the western part of the Nature Reserve is crossed by the New Bridge and because the Nature Reserve is adjacent to the Astmoor Saltmarsh area of the Upper Mersey Estuary. Wigg Island is being managed for wildlife and is of increasing importance for its developing woodland and associated habitats, including butterflies, birds and other fauna of note;

d. A derelict and isolated section of the Runcorn and Latchford Canal, between the eastern part of Wigg Island and Astmoor Saltmarsh, is within the Study Area because of its location, brackish conditions and strong affinity with the adjacent saltmarsh habitats;

e. Haystack Lodge which is adjacent to the Manchester Ship Canal and very close to the coastline of the Upper Mersey Estuary was included. It is possible that it has a function as part of a wildlife corridor which includes the Upper Mersey Estuary;

f. The Norbury Wood and Marsh LWS and LNR was surveyed because of its location in very close proximity to the Upper Mersey Estuary and the Manchester Ship Canal, and because of its expanding heronry at a safe location which allows the birds to feed in the nearby Upper Estuary. The site may also have a wildlife corridor function; and

g. The Study Area covered Oxmoor Wood and Ponds LWS and LNR, which, like the Norbury Wood site, is very close to the Upper Mersey Estuary and may contribute significantly to the wildlife corridor function of the River Wildlife Corridor.

Surveys of Other Sites and Species

10.3.20 Several additional sites, with no non-statutory (LWS) wildlife site status but with known or potential wildlife interests, have been included within the Widnes and Runcorn parts of the Study Area. The following sites (Figure 10.2) have been examined for the reasons given;

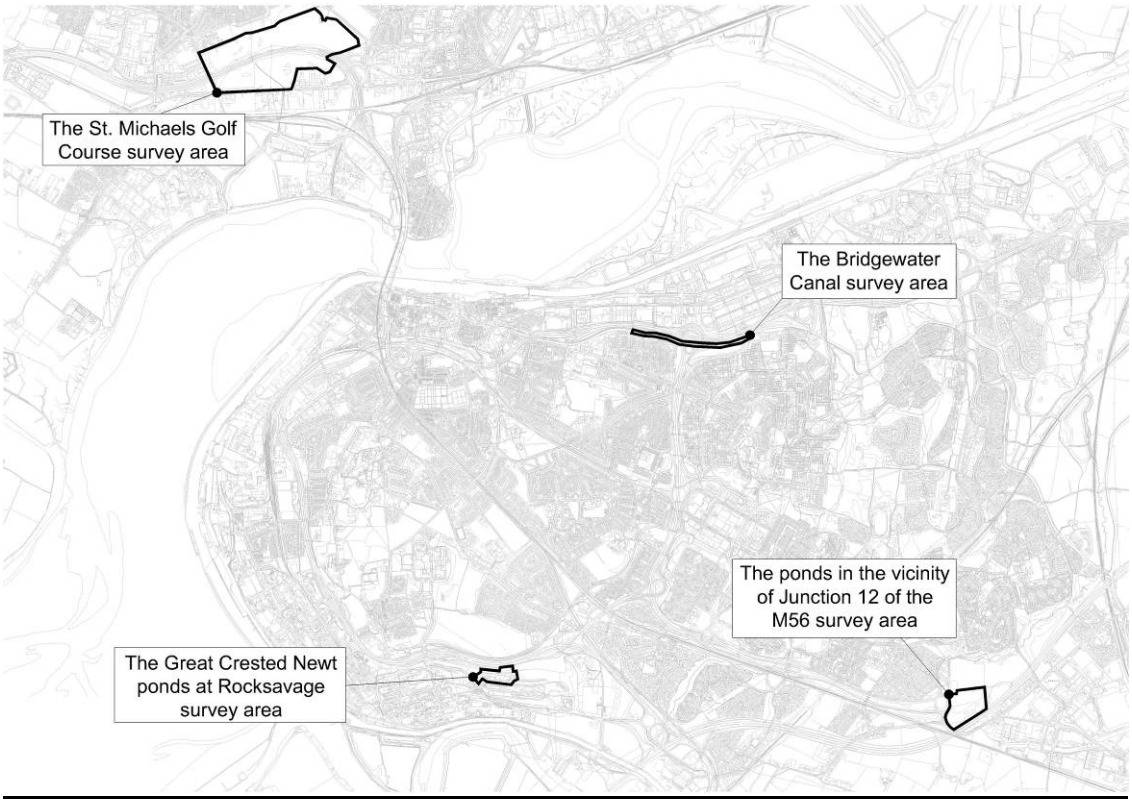
a. A section of the Bridgewater Canal on the south side of the Upper Mersey Estuary, associated with the Bridgewater Expressway, has been covered by inclusion in the Study Area because it is affected by the Project and because of its possible use by protected species such as Water Vole and other aquatic fauna as well as potential botanical interests;

b. Parts of the disused and partly overgrown St. Michael's Golf Course have been incorporated within the Study Area because part of the Project including tolling booths will be located in the former golf course. There is also the possibility of bat activity in the disused golf course area because of the extent of open grassland and woody vegetation within the open area which is surrounded by developed land. There are also records of Water Voles in the ditches of the site;

c. Built-up land where buildings are likely to be demolished and where trees may have to be felled during the Project have been included with the extended Study Area because of the possible presence of bat roosts. All bats and their roosts having strong legal protection because of their European protection status; and

d. The Study Area has also been extended to cover two sites towards the M56 Motorway in the south where the proposed junction improvements are within about 500 metres of ponds that are known to contain, or which may support, breeding Great Crested Newts which, like bats, are protected by European legislation that also protects their habitats.

Figure 10.2 Map showing the location of additional sites, without nature conservation designations, that were included in the surveys for protected species.



Previous Surveys Outside the Study Area and Surveys by Other Disciplines

10.3.21 Some of the preliminary surveys, carried out during 2002 and 2003, extended beyond the Study Area. This was the case during the Badger surveys and some of the pond because certain species such as Badgers and Great Crested Newts can move long distances over land. Relevant information from these earlier surveys is included in this Chapter.

10.3.22 This report draws on the findings of a number of other chapters and studies undertaken as part of the EIA for the Project including:

a. Chapter 7: Hydrodynamic and Estuarine Processes;
b. Chapter 11: Aquatic Ecology;
c. Chapter 8: Surface Water Quality;
d. Chapter 14: Contamination soils, sediments and ground water; and
e. Chapter 12: Landscape and Visual Amenity.

10.4 Relevant Legislation and Planning Policy

International and National Legislation

Introduction

10.4.1 European Union law and United Kingdom law apply to the Project because of the European designation of part of the Estuary as a European Marine Site, a Special Protection Area for Birds (SPA), a Ramsar Site and a Site of Special Scientific Interest (SSSI).

10.4.2 *Planning Policy Statement 9; Biodiversity and Geological Conservation* (PPS9) explains that the most important sites for biodiversity are those identified through international conventions and European Directives. These include the Estuary European Site, the SPA and the Ramsar Site.

The European Union Habitats Directive

10.4.3 *The Habitats Directive* is the *European Union Council Directive 92/43/EEC of 21 May 1992 on the Conservation of Natural Habitats and of Wild Fauna and Flora* which aims to maintain biodiversity by requiring Member States to promote the conservation of certain habitats and species in the European Union. The objectives are to maintain or restore natural habitats and wild species at a favourable conservation status in their natural range. *The Habitats Directive* applies to the UK.

10.4.4 Annex 1 lists 189 habitats and Annex II lists 788 species, both of which are to be protected by a network of sites. Each Member State has to prepare and propose a national list of sites for evaluation to form a European Network of Sites of Community Importance. These are designated as Special Areas of Conservation (SACS).

10.4.5 In addition a series of Annex I habitats and Annex II species is afforded “Priority” status as these habitats and species are judged to be in particular danger of disappearance (Article 1 of the Directive).

10.4.6 The Joint Nature Conservation Committee Report No. 312 entitled *Handbook on the UK Status of EC Habitats Directive Features; Provisional Data on the UK Distribution and Extent of Annex I Habitats and the UK Distribution and Population Size of Annex II species* (November 2000) describes and provides the relevant information on the habitats and species.

10.4.7 Several of the Annex I habitats occur within and on the margins of the Middle and Upper Mersey Estuary, notably the following;

a. Sandbanks which are slightly covered by seawater all the time;
b. Estuaries;
c. Mudflats and sandflats not covered by seawater at low tide;
d. *Salicornia* and other annuals (glasswort and other annual plants) colonising mud and sand; and
e. Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*).

10.4.8 Member States are required to protect the best examples of the Annex I habitats, not all of them.

Annex II Species

10.4.9 Species listed in Annex II known or thought to occur in the Middle and Upper Mersey Estuary include the following;

a. River Lamprey;
b. Atlantic Salmon; and
c. Otter (possibly present but not recorded as part of the Project baseline surveys).

10.4.10 Member States are required to protect the best examples of the habitats of the Annex II species, not all of them. Further, the majority of the Annex II species do not have legal protection.

10.4.11 In addition, Great Crested Newt, a European-protected species, together with its habitat, has been recorded to the south of the Estuary but outside the Study Area, and not in estuarine habitats.

The European Union Birds Directive

10.4.12 *The Birds Directive* is the *European Union Council Directive 79/409/EEC of 1979 on the Conservation of Wild Birds*. It is the European Union's oldest piece of wildlife legislation and one of the most important. It creates a comprehensive scheme of protection for all wild bird species in the European Union.

10.4.13 Of importance in an international context was the recognition by the European Union, in preparing the legislation, that many wild birds are migratory and can only be effectively conserved through international co-operation.

10.4.14 *The Birds Directive* gives strong protection to habitats used by endangered as well as migratory species. This is applied through the establishment of a coherent network of Special Protection Areas (SPAs) which comprise all the most suitable territories for the species to be protected.

10.4.15 *The Birds Directive* bans activities that directly threaten birds, such as the deliberate killing or capture of birds, the destruction of their nests and taking of their eggs.

10.4.16 *The Birds Directive* contains the most up to date annexes arising from the enlargement of the European Union. These annexes provide for the protection of endangered bird species and bird habitats in the new member states; it has been found that new member states often host species that have nearly vanished from Western Europe.

Natura 2000

10.4.17 *Natura 2000* is the centrepiece of EU nature and biodiversity policy. It covers a vast array of sites known as the *Natura 2000* network. These sites, which as designated as Special Areas of Conservation (SACs) and SPAs, are of the highest value for natural habitats and species of plants and animals. The Estuary SPA is part of the *Natura 2000* ecological network.

10.4.18 The legal basis for the *Natura 2000* network of sites comes from *The Birds Directive* and *The Habitats Directive*, which date back to 1979 and 1991 respectively. *Natura 2000* is therefore the centrepiece of EU nature and biodiversity policy.

The Habitats Regulations

Appropriate Assessment

10.4.19 The *Conservation (Natural Habitats & c.) Regulations 1994*, as amended, translate into UK law. requires than an appropriate assessment is undertaken to assess plans and development projects that may have an impact on European (*Natura 2000*) sites. The purpose of the appropriate assessment is to consider the impacts of a land-use plan or an application for planning permission against conservation objectives of the site and to ascertain whether it would adversely affect the integrity of the site. Where significant negative effects are identified, *The Regulations* require that alternative options should be examined.

10.4.20 Under Regulation 48(1) of the Directive, an appropriate assessment needs to be undertaken in respect of any plan or project which:

a. Either alone or in combination with other plans or projects would be likely to have a significant effect on a European Site, and
b. Is not directly connected with the management of the site for nature conservation.

10.4.21 Appropriate assessment is also required, as a matter of Government policy, in considering development proposals which may affect potential SPAs, candidate SACs and listed Ramsar Sites for the purpose of considering development proposals affecting them. The plan or project to be assessed does not have to be located within the designated area.

10.4.22 The appropriate assessment must be undertaken by the "competent authority," as defined in Regulation 6(1) of the *Habitats Regulations*, which includes any Minister, Government Department, public or statutory undertaker, and public body of any description or person holding a public office. The developer or promoter of the plan or project is required to provide information to satisfy these requirements.

10.4.23 The Directive gives Natural England a statutory responsibility to advise relevant authorities as to the conservation objectives for European Marine Sites in England. Natural England also has the responsibility to advise relevant authorities as to any operations which may cause deterioration of natural habitats or the habitats of species, or disturbance of species for which the sites have been designated.

10.4.24 If the decision as to whether or not the development would have a significant effect on the designated site is inconclusive, on the information available, the competent authority is required to make a fuller assessment; in doing so they may ask the developer or other parties for more information.

10.4.25 As explained in Chapter 3 of this EIA, Natural England has advised that in its opinion, the Project has the potential to have a significant effect on the designated status of the SPA. It follows, as also explained in Chapter 3, that the competent authorities, as defined in *The Habitats Regulations*, have a responsibility to undertake an appropriate assessment for the Project. The applicant for the development consent, Halton Borough Council (the Council), is responsible for providing the information required for the appropriate assessment.

Environmental Impact Assessment

10.4.26 An Environmental Impact Assessment (EIA) has been undertaken as part of the Orders and Applications submission for the Project. EIA is required under European law by *Council Directive 99/337/EEC* and in United Kingdom law by a variety of legislation including the *Town and Country Planning (Environmental Effect Assessment) (England and Wales) Regulations 1999.*

10.4.27 Chapter 3 (3.1.9-3.1.10), which deals with the content and approach of EIA, explains that the *EIA Regulations* (1999) set out a number of project types for which EIA is required. They are required for all Schedule I projects but the Project is not one. However EIA is required for Schedule II projects if the project may have a significant environmental effect. This Project does meet the Schedule II tests of *Circular 02/99/DPM 1999*) for several reasons including The Project is located in an ecologically sensitive area close to the Mersey Estuary SPA and Ramsar Site.

10.4.28 It is pointed out in 3.2.1 of Chapter 3 than an appropriate assessment is needed for the Project, in addition to EIA, due to its proximity to the Mersey Estuary SPA and Ramsar Site which are protected under the Habitats Regulations. Therefore this EIA also contains the information required for an appropriate assessment, and is relevant to any consideration of Regulation 48 of the *Conservation (Natural Habitats & c) Regulations 1994*.

10.4.29 The main ecological receptors likely to be significantly affected by the Project are listed. They are:

a. The Mersey Estuary SPA, Ramsar Site, SSSI and Upper Mersey Estuary SINC (LWS);
b. Protected species of flora and fauna including birds;
c. Protected species of aquatic flora and fauna; and
d. Surface water features such as canals and brooks.

National, Regional and Local Policies and Sites

National Policy

10.4.30 It is advised in PPS9; “Many SSSIs are also designated as sites of international importance and will be protected accordingly.” It is also stated in PPS9 under Key Principle (ii); “In taking decisions, local planning authorities should ensure that appropriate weight is attached to designated sites of international, national and local importance; protected species, and to biodiversity and geological interests within the wider environment.”

10.4.31 It follows from guidance given in Key Principle (vi) of PPS9 that if there would be significant harm to biodiversity interests which cannot be prevented or adequately mitigated against, or compensated for, then planning permission for development should be refused.

10.4.32 PPS9 requires local development documents to have criteria-based policies against which proposals for any development on, or affecting, such sites will be judged. It is stated that these policies should be distinguished from those applied to nationally important sites.

10.4.33 It follows from the above that any policy which applies to the Upper Mersey Estuary, which is a local site by virtue of its LWS listing, should be different to that which is applied to the European Site and SSSI in the west. However in the case of the Project, there may be significant effects on both the Upper Mersey Estuary LWS and on the European site and SSSI downstream.

Planning Policy Statement 9; Biodiversity and Geological Conservation

10.4.34 PPS9, which was published in August 2005, has three main aims in achieving the Government's nature conservation objectives as summarised below:

a. To promote sustainable development by ensuring that biological and geological diversity are conserved and enhanced as an integral part of social, environmental and economic development;
b. To conserve, enhance and restore the diversity of England's wildlife and geology by sustaining, and where possible improving, the quality and extent of natural habitat and geological and geo-morphological sites including the natural processes on which they depend and the populations of naturally occurring species which they support; and
c. To contribute to rural renewal and urban renaissance by enhancing biodiversity in green spaces and among developments so that they are used by wildlife and valued by people. This includes ensuring that developments take account of the role and value of biodiversity in supporting economic diversification and contributing to a high quality environment.

10.4.35 The UK Government expects local planning policies, including those in Structure Plans and Local Development Plans, to reflect the objectives of PPS9 so that the planning system plays a significant part in meeting the Government's international commitments and domestic policies for habitats, species and ecosystems. All documents within the *Local Development Framework* are expected to reflect all PPS requirements, starting at the Core Principles/Policies.

Key Principles of PPS9

10.4.36 PPS9 also sets out the key principles which should be adhered to by local planning authorities. There are six key principles which are itemised below with an explanation in each case as to how they apply to the Project.

10.4.37 Key Principle (i) states that planning decisions should be based upon up-to-date information about the environmental characteristics of their areas and that these characteristics should include the relevant biodiversity and geological resources of the area. In reviewing environmental characteristics they should assess the potential to sustain and enhance those resources.

10.4.38 Habitat survey information is available for the whole of Halton Borough but this information is not sufficiently detailed to provide the information required to assess the effects of the construction and operation of the Project. This was recognised at an early stage in the planning of the Project, at which time the Council commissioned detailed habitat, vegetation, ornithological and other wildlife surveys as part of the assessment of several possible route options for the Project.

10.4.39 The detailed ecological surveys have continued since the selection of the route for the Project, and have concentrated on those parts of the Borough that will be directly and indirectly affected by construction and operation of the Project. These surveys will ensure that the final planning decision is based on up-to-date information on all relevant aspects of biodiversity.

10.4.40 Key Principle (ii) states that planning decisions should aim to maintain, and enhance, restore or add to biodiversity interests. As pointed out earlier, it is also stated that local authorities should ensure that appropriate weight is attached to designated sites of international, national and local importance, to protected species, and biodiversity within the wider environment.

10.4.41 Similarly, the surveys have been designed and conducted at appropriate times of the year to assess all potential effects on protected species including those other than birds, for example bats, Water Voles, Badgers, Great Crested Newts, reptiles and other animal and plant species.

10.4.42 The surveys have also been planned to enable the biodiversity of the wider environment to be considered and assessed. This has included locally important sites adjacent to the Upper Mersey Estuary and in the immediate area, particularly in view of possible effects as a result of access road construction, the improvement of junctions, and long-distance effects of construction and vehicular use of the Project.

10.4.43 The baseline surveys have also been formulated to provide relevant information for enhancing, restoring and adding to biodiversity, in the Upper Mersey Estuary and in the surrounding area.

10.4.44 Key Principle (iii) of PPS9 concerns the form and location of development. A strategic approach is required to the conservation, enhancement and restoration of biodiversity. PPS9 advises that there should be recognition of the contribution that sites, areas and features, both individually and in combination, make to conserving biodiversity.

10.4.45 The form and location of the proposed route of the Project have been given very careful consideration during the selection of the route corridor which is examined in this Chapter, as part of the EIA. The alternatives are described and discussed in Chapter 5. They include options such as a travel plan network, charging for travel, dynamic lane management, improving the SJB or the rail service, and different alignments for the New Bridge crossing of the Estuary.

10.4.46 A New Bridge alignment to the west of the SJB would cross the European Site, one of the *Natura 2000* sites, and the SSSI. A fixed crossing between the SJB and railway bridge was discounted. A number of alternative routes to the east of the SJB, at different distances from the SJB, were considered and rejected for various reasons including potentially adverse hydrodynamic effects of route options1 and 2 which could have knock-on ecological effects on the European Site downstream. Route 4A would have severe effects on the northern saltmarsh, and although 4B would have less impact, it would be significant.

10.4.47 Short spans were rejected because of their potential to have the greatest long-term effects on morphology, erosion and river channel alignments, which could have ecological effects. Similarly, dredged channels, half-tide causeways and temporary islands were rejected for their detrimental effects on the morphology of the Estuary and potential ecological effects downstream.

10.4.48 The following issues were assessed during the original route selection process prior to 2003 and are re-examined in this Chapter.

10.4.49 Strategic aspects have been given due consideration, particularly the potential use of the Upper Estuary as a wildlife corridor or migratory route for birds and other wildlife from inland areas to the statutorily designated sites and beyond in the west.

10.4.50 The possible interference of wildlife movements has been assessed as a result of the migration of wildlife being inhibited, endangered, injured or killed by the bridge structure, and also by traffic movements, noise and lighting.

10.4.51 The restoration and enhancement of biodiversity following possible losses and/or damage have been investigated, especially the restoration of saltmarsh habitat if damage or loss during construction occurs. Likewise, biodiversity enhancement has been assessed, including possible changes in saltmarsh management such as cutting or grazing, and the creation of additional wetland features such as scrapes in the saltmarshes to support invertebrates and to attract feeding waders and other wetland birds.

10.4.52 Key Principle (iv) of PPS9 draws attention to the promotion of opportunities for the incorporation of beneficial biodiversity within the design of development. This issue has been given serious consideration by the Council and is considered further in this Chapter.

10.4.53 Key Principle (v) of PPS9, which states that development proposals where the principal objective is to conserve or enhance biodiversity and geological conservation interests should be permitted, does not apply to the Project.

10.4.54 Key Principle (vi) of PPS9 advises that the aim of planning decisions should be to prevent harm to biodiversity and geological interests. It is further advised that where granting planning permission would result in significant harm to those interests, local planning authorities will need to be satisfied that the development cannot reasonably be located on any alternative sites that would result in less or no harm.

10.4.55 Preliminary studies in 2002 and 2003 which led to the selection of the current Project and its route alignment, gave due consideration to biodiversity issues as well as to other factors such as properties, contamination, hydrodynamics and landscape. The alternatives are discussed in Chapter 5.

PPS9 Guidance for Regional Spatial Strategies

10.4.56 PPS9 advises that regional planning authorities should liaise closely with regional biodiversity for or equivalent bodies, English Nature or its successors (now Natural England), and the Environment Agency to identify the current regional and sub-regional distribution of Priority Habitats and Priority Species (now Habitats of Principal Importance and Species of Principal Importance respectively).

10.4.57 PPS9 also advises that this close liaison should cover internationally and nationally designated areas, and broad areas for habitat restoration and creation.

10.4.58 It is also advised that there should be regional spatial strategies to incorporate biodiversity objectives and other biodiversity issues such as cross-boundary issues in relation to species and habitats.

10.4.59 Although the Council is not a regional planning authority, it is responsible for promoting the development of regional significance and has liaised closely with officers of Natural England and the Environment Agency on the European Site, the SSSI and related biodiversity issues. This has been a continuous process that has involved a series of presentations and discussion meetings.

10.4.60 PPS9 points out that through policies in plans, local authorities should also conserve other important natural habitat types that have been identified in the *Countryside and Rights of Way Act 2000* Section 74 list. These are Habitats of Principal Importance for the conservation of biodiversity in England. PPS9 also advises that local planning authorities should identify opportunities to enhance and add to them.

10.4.61 The Section 74 list includes habitats that occur in the Upper Mersey Estuary and along the Project route corridor, namely the following:

a. Coastal saltmarsh;
b. Mesotrophic standing water, notably along the St Helens Canal; and
c. Mudflats (including sand and silt-flats).

10.4.62 However the Joint Nature Conservation Committee (JNCC) has now revised the list of Priority Habitats. As a result the number of Priority Habitats that occur in the Upper Mersey Estuary, on or near the Project, has been increased significantly as follows:

a. Coastal saltmarsh;
b. Eutrophic standing water;
c. Intertidal mudflats;
d. Sub-tidal sands and gravels;
e. Tide-swept channels;
f. Rivers;
g. Ponds;
h. Reedbeds;
i. Wet woodland;and
j. Hedgerows.

10.4.63 Whilst the Biodiversity Action Plans for Priority Habitats do not necessarily require that they are protected from development, many such as hedgerows and ponds are common and of widespread occurrence. The objectives are that the overall resources of such habitats, nationally and locally, are protected from decline and increased where possible.

Networks of Natural Habitats

10.4.64 The Upper Mersey Estuary may have some function as part of a network of natural habitats either by linking sites of biological importance and/or by acting as a route or stepping stone for the migration, dispersal and genetic interchange of species in the wider environment. For example, the Upper Mersey Estuary may link the upper sections of the Mersey, to the tidal limit at Warrington and possibly beyond, with the designated site of the Middle Mersey Estuary west of the Runcorn Gap.

10.4.65 Of importance is the Moore Nature Reserve north of the village of Moore, to the west of Warrington. This area has long been recognised as important for wildlife and was designated as a Grade A Site of Biological Importance of county (Cheshire) significance (equivalent to LWS). It contains several Habitats of Principal Importance and is of substantive importance for its birdlife, notably wildfowl and other wetland birds.

10.4.66 PPS9 advises that such networks should be protected from development, and, where possible, strengthened by or integrated within it. PPS9 elaborates further by advising that this may be done as part of a wider strategy for the protection and extension of open space and access routes such as canals and rivers, including those within urban areas.

10.4.67 The Upper Mersey Estuary appears to be situated at a strategic wildlife location where several wildlife links and possible migratory routes converge, in addition to the River itself. The converging linear features include the St. Helens Canal LWS, the Bridgewater Canal and the Manchester Ship Canal.

10.4.68 The possible function of the Upper Mersey Estuary as a key element within a network of natural habitats requires further investigation; this is included in the Assessment.

Biodiversity within Developments

10.4.69 PPS9 recommends that local planning authorities should maximise opportunities for building in beneficial biodiversity as part of good design in and around developments. Potential opportunities in and around the Upper Mersey Estuary are being explored as part of the current Assessment.

Species Protection

10.4.70 PPS9 draws attention to the need to ensure that Species of Principal Importance and their habitats are protected from the adverse effects of development. It is advised that planning permission should be refused where harm to the species and/or their habitats would result, unless the need for, and benefits of, the development clearly outweigh that harm.

10.4.71 Species of Principal Importance are listed in Section 74 of the *Countryside and Rights of Way Act 2000*. Examples which occur on and around the Upper Mersey Estuary include Great Crested Newt, Skylark, Reed Bunting, Bullfinch, Water Vole and bat species. It is also possible that Otters may also pass through the Upper Mersey Estuary although there are no reports of this European-protected animal.

10.4.72 As pointed out earlier in the case of habitats, the Section 74 list has been revised with additions and other changes to the list of Species of Principal Importance. Numerous species in addition to those named occur in areas of the Upper Mersey Estuary and along or in the vicinity of the Project; they include Herring Gull, Corn Bunting, Curlew, Starling, Lapwing, Common Toad and others.

10.4.73 Biodiversity Action Plans for most Species of Principal Importance do not require that developments that affect them adversely are refused. Many of these species such as Herring Gull, Starling and Skylark remain common and widespread. However, as described earlier for Habitats of Principal Importance, Biodiversity Action Plans should seek to protect species from further declines and increase their numbers by conservation measures such as habitat improvements and encouraging beneficial land management.

10.4.74 The additional Species of Principal Importance that occur in the area have been included in the assessment of effects, with appropriate mitigation where necessary and taking advantage of opportunities for habitat creation and enhancement.

Government Circular; Biodiversity and Geological Conservation – Statutory Obligations and their Effect Within the Planning System

10.4.75 The Office of the Deputy Prime Minister published the above *Government Circular (ODPM Circular 06/2005, Defra Circular 01/2005)* in August 2005 to accompany PPS9. It is intended to provide administrative guidance on the application of the law relating to planning and nature conservation in England.

10.4.76 The Circular explains that the UK is bound by the terms of the EC Birds and Habitats Directives and the Ramsar Convention. It is stated that the Habitats Regulations (*The Conservation (Natural Habitats &c.) Regulations 1994*) provide for the protection of European sites of which there are three categories. One of the categories is the SPA for Birds.

10.4.77 The Circular advises that planning authorities should follow prescribed procedures for SPAs and should have regard to *The Habitats Directive*.

10.4.78 The Circular explains that the protection and management of internationally designated sites are achieved by the combined provisions of *The Habitats Regulations* and Section 28 of the *Wildlife and Countryside Act 1981*, as amended by the *Countryside and Rights of Way Act 2000*. A planning authority is required to consult Natural England under the General Development Procedure Order 1995 and to notify Natural England before granting planning permission for development likely to damage a SSSI, even if it is not located within the SSSI as in the case of the Project.

10.4.79 Natural England is required to advise the planning authority whether, in its opinion, the proposed development would be likely to affect significantly the ecological value for which the site was notified as SSSI or classified internationally. Natural England is also required to advise whether in connection with the proposed development there may be reasonable steps that could be taken to further the conservation and enhancement of the SSSI and, if appropriate, suggest what measures might be taken to avoid damaging effects. Natural England has been consulted throughout the EIA and during this assessment, to give it the opportunity to advise on effects and mitigation, if required.

Consideration of New Plans and Projects

10.4.80 The Government Circular states that Regulation 40 of *The Habitats Regulations* restricts the granting of planning permission for development which is likely to affect significantly a European site, and which is not directly connected with or necessary to the management of the site, by requiring an Appropriate Assessment of the implications of the development for the conservation objectives of the site.

10.4.81 The EIA assesses whether the Project is likely to have a significant and negative effect on the Estuary SPA. Further, it is pointed out that the decision on whether an Appropriate Assessment is necessary should be made on a precautionary basis.

10.4.82 If planning permission is granted for the Project, negative effects will have to be compensated. Compensation will have to be feasible otherwise planning permission cannot be granted.

The Appropriate Assessment and Ascertaining the Effect on Site Integrity

10.4.83 Detailed advice is given in the Circular on the nature of an Appropriate Assessment. It must examine the effects on each of the European site's interest features and conservation objectives.

10.4.84 On completion of the Appropriate Assessment it has to be determined whether the integrity of the European site will be adversely affected. It must be ascertained that the integrity of the site will not be affected; there must be no uncertainty otherwise planning permission for the development should be refused.

10.4.85 The European Marine Site document (English Nature 2001), in the *Habitats Regulations Guidance Note* dealing with the *Appropriate Assessment (Regulation 48*), states at Paragraph 13 "In many cases, plans or projects that will be subject to an appropriate assessment will need an Environmental Statement (ES) to be prepared under the EA Regulations." This applies in the case of this Project.

10.4.86 The above document, at Paragraph 14, states "The ES will address all significant environmental effects. It will be appropriate to use the information assembled for the ES when carrying out the appropriate assessment under the Habitats Regulations. In view of this it would be helpful if the relevant ES clearly identified, under a specific subject heading, the likely significant effects on the internationally important habitats and/or species."

10.4.87 This Chapter provides the necessary information for the Appropriate Assessment.

10.4.88 This Chapter investigates whether or not the construction of the Project will affect the ecological condition of the intertidal habitats of the European site such as by the release of contaminants from the saltmarshes and intertidal silts in the Upper Mersey Estuary, if they are disturbed. The release of such contaminants could affect the rich invertebrate fauna of the European site and its potential to support the nationally and internationally important bird populations.

10.4.89 This Chapter also examines the potential effects of construction and operation of the Project on the possible movements of the important bird populations between the Upper Mersey Estuary and the European site.

10.4.90 If it can be established that appropriate planning conditions would help to ensure that site integrity was not affected, and that conditions would prevent risks materialising, permission may be granted.

Alternative Solutions and Imperative Reasons of Overriding Public Interest

10.4.91 The Circular advises that there are particular circumstances where planning permission can be granted, as outlined below;

a. There are no alternative solutions that would have no or lesser effects on the European site's integrity; and
b. There are imperative reasons of overriding public interest to justify planning permission.

10.4.92 Consideration of the above depends on whether or not the site hosts a Habitat or Habitats of Principal Importance, or one or more Species of Principal Importance.

10.4.93 If there is no alternative solution and the site does host a Habitat or Species of Principal Importance, planning permission can only be justified if there are a) overriding interests of human health, public safety, or beneficial consequences of primary importance to the environment, or b) other imperative reasons of overriding public interest agreed by the European Commission.

Conservation of Habitats and Species outside Designated Sites

10.4.94 *Circular 06/2005* draws attention to the conservation of important habitats and species outside designated sites such as those listed as priorities in the *UK Biodiversity Action Plan*.

10.4.95 As already mentioned, Section 74 of the *Countryside and Rights of Way Act 2000* requires local authorities to take steps to further the conservation of Habitats of Principal Importance and Species of Principal Importance. As stated earlier, the Upper Mersey Estuary and adjacent areas contain such habitats and species, most notably the saltmarsh habitat. Attention has also been drawn earlier in the assessment to the revision of the Section 74 lists with the additions of more habitats and species of Principal Importance, a significant number of which occur in areas potentially affected by the Project.

10.4.96 Also of relevance to the Project is the mention by *Circular 06/2005* of landscape features of major importance for wild flora and fauna. The Upper Mersey Estuary is in this category because of its strategic location and its unusual combination of maritime habitats, semi-natural terrestrial and freshwater habitats, industrial (artificial) habitats, linear habitats, and potential for enhancement because of its recovery from previous pollution episodes and long-term industrial pollution.

10.4.97 The Landscape and Visual Amenity Chapter (Chapter 12) refers to important landscape features such as the saltmarshes and the matrix of habitats with visual appeal including those developing on Wigg Island. This Chapter proposes the conservation and enhancement of the saltmarshes and informs the Landscape and Visual Amenity Chapter (Chapter 12) on this aspect of their protection and future management.

10.4.98 This Chapter also suggests the design of tree, shrub and herbaceous plantings to achieve wildlife as well as visual enhancement, particularly with regard to roadside plantings. Of importance here, for landscape and biodiversity, is the structure of roadside plantings for screening as well as for ecological purposes. The successful design of the associated woodland-edge scrub and wild flower grasslands to provide visual as well as ecological benefits depends on a joint landscape and ecological approach.

10.4.99 This Chapter is taking landscape features and recovery from pollution into full consideration, as part of the baseline assessment. Consideration is also given to the examination of the effects of recovery from pollution of aquatic invertebrates, as described in Chapter 11 by APEM Ltd, and other fauna and flora which provide the principal food sources for the wildfowl, wading and other estuarine birds.

Conservation of Species Protected by Law

10.4.100 Part IV of *Circular 06/2005* points out that the presence of a protected species is a material consideration when a planning authority is considering a development proposal that, if carried out, would be likely to result in harm to the species or its habitat. This assessment, as part of the EIA, is taking all protected species of plant and animal into consideration.

10.4.101 The surveys in this assessment have covered all protected animals and plants where there is a reasonable likelihood of the species being present and affected by the development. The species included are Water Voles, Badgers, bats, Great Crested Newts and birds, which are covered by the following legislation;

a. *The Wildlife & Countryside Act 1981 (as amended*);
b. The Protection of Badgers Act 1992;
c. *The Conservation (Natural Habitats & c. Regulations 1994*; and
d. *The Countryside and Rights of Way (CRoW) Act 2000*.

10.4.102 The *Amendment Acts to the Wildlife & Countryside Act 1981* include amendments to the lists of protected species, notably those protected under Schedule 1 (birds which are protected by special penalties), and Schedule 5 (animals which are protected). There is a statutory five yearly review of Schedule 5 and Schedule 8 species (plants which are protected) under the 1981 Act. The Water Vole, which has been recorded in the Study Area, was included in Schedule 5 in 1998.

10.4.103 There have also been amendments to the *CRoW Act 2000 Section 74 List of Habitats and Species of Principal Importance for the Conservation of Biological Diversity in England*. These lists include habitats and species recorded in the Study Area, for example Curlew and Lapwing in the list of Priority Bird Species, and ponds in the list of Priority Habitats.

10.4.104 *Circular 06/2005* goes on to describe the protection afforded to European protected species of animals, European protected plant species, and species protected by the *Wildlife and Countryside Act 1981* including badgers, birds, other animals and plants.

Planning for Biodiversity and Geological Conservation – A Guide to Good Practice

10.4.105 *A Guide to Good Practice* was published by the Office of the Deputy Prime Minister in 2006 to complement PPS9 and *Government Circular (ODPM Circular 06/2005) Biodiversity and Geological Conservation – Statutory Obligations and Their Effect Within the Planning System*. The Guide presents case studies and examples to show how the key principles and objectives of PPS9 can be supported.

10.4.106 This Study has been influenced and supported by the *Guide* in that the Study seeks to assemble a strong database on the habitats, vegetation and species from which reliable predictions of impacts can be made. This applies especially to the saltmarshes and other Habitats of Principal Importance. Good baseline information is also necessary for the identification of opportunities to follow the key principles of PPS9 which are to promote biodiversity as well as protecting it.

Regional Policies

Regional Planning Guidance for the North West

10.4.107 Policy ER5 Biodiversity and Nature Conservation of *RPG13 (2003)* commits planning authorities and other agencies to afford the strongest levels of protection to sites with international and national nature conservation designations in the Region. Those mentioned are Ramsar sites, SPAs and other European sites, and SSSIs. Statutorily protected species are also included.

10.4.108 The policy goes further by stating that the overall nature conservation resource is enriched by restoration and re-establishment of key resources. The policy emphasises the need to manage those resources that are irreplaceable within practical timescales. The no net loss principle is advocated. It is further stated that UK and Local Biodiversity Action Plans should be promoted, and that habitat fragmentation and species isolation should be reversed, particularly as it applies to wildlife corridors.

10.4.109 The principle of enhancing the quality of life when considering development proposals that will impact on biodiversity is promoted. The regional policy also covers sites with local or non-statutory designations, including those in built-up areas.

10.4.110 Appendix 1 of RPG13 describes biodiversity targets for the north-west Region. Those which are applicable to the Project include coastal grazing marsh and coastal saltmarsh which should be restored if degraded or lost.

The North West Plan

10.4.111 The *North West Plan* was issued in January 2006 as the Submitted *Draft Regional Spatial Strategy for the North West of England*. Policy EM4 of the Plan states that three areas of search for regional parks have been identified, one being the Mersey Basin which includes the Upper Mersey Estuary and another being the North West Coast which also covers the Upper Mersey Estuary as well as the rest of the Estuary.

10.4.112 It is made clear in the Plan, in Policy EM1, that plans and strategies should seek to deliver a "step-change" increase in the region's biodiversity resources by delivering the regional biodiversity targets for maintaining, restoring and expanding priority habitats, and delivering the habitat and species targets of the Local Biodiversity Action Plans. It is explained that this should be done by protecting, expanding and linking areas for wildlife within and between the locations of highest biodiversity resources, and encouraging the protection, conservation and improvement of the ecological fabric elsewhere.

10.4.113 Also relevant to the Project and to the Upper Mersey Estuary is Policy EM6 which mentions that account should be taken of natural coastal changes, coastal erosion, minimising the loss of coastal habitats and avoiding coastal erosion processes.

10.4.114 The policies of the *North West Plan* need to be considered in the Project because of the effects of the crossing of the Upper Mersey Estuary including its saltmarshes, and the crossing of the adjacent Wigg Island which is a Community Park and Local Nature Reserve, with increasing biodiversity interests and significant biodiversity potential.

Local Policies

Halton Borough Council; Unitary Development Plan

10.4.115 The *Halton Borough Unitary Development Plan* (UDP) was adopted in April 2005. Chapter 3, the Green Environment, covers nature conservation and wildlife planning policies amongst other green issues.

10.4.116 Policy GE10 is the Protection of Linkages in Greenspace Systems. Attention is drawn to networks of inter-connecting greenspace, and there is reference to functional linkages. It is stated that development will not be permitted if it would have an unacceptable effect on any part of the system, to the detriment of the overall amenity of the system, measured in terms of "effect on wildlife". This may apply to the Upper Mersey Estuary, namely the saltmarsh fringes and other vegetation.

10.4.117 The importance of an effective network of wildlife habitats and corridors is recognised in the UDP. This is crucial to the continuing success of wildlife in urban areas. It is stated that fragmentation, particularly as a result of development, is a major problem for nature conservation.

10.4.118 It is also stated under Policy GE10 that development will not be permitted if it impairs the movement of flora and fauna. The effect of the Project on the movement of flora and fauna is assessed in this Chapter.

10.4.119 The preceding considerations, on a larger scale, are also relevant to the conservation of the European Site, because of the possibility of significant bird movements or interchange of birds between the populations in the European Site and those in the Upper Mersey Estuary, the movements of which could be affected by the New Bridge.

10.4.120 Policy GE17 applies to the protection of sites of international importance for nature conservation. It is stated that development or land-use change that may affect a European Site will be subject to the most rigorous examination.

10.4.121 It is also explained that development or land-use change not directly connected with or necessary to the management of the site will not be permitted if it is likely to have a significant effect on the site unless three specified criteria can be satisfied. They are that a) there is no acceptable alternative, b) there are imperative reasons of over-riding public interest for the development of the land or land-use change, and c) that the development is necessary for reasons of human health or public safety or for beneficial consequences of primary importance for nature conservation.

10.4.122 The justification for Policy GE17 is Ramsar Site status and SPA designation under the *EC Convention of Wild Birds Directive 79/409*. It is stressed that the Government has a commitment to meeting international responsibilities and obligations for nature conservation, the Council being required to consult English Nature (now Natural England) before granting planning permission within a European Site, or within a designated Consultation Area surrounding one.

10.4.123 Policy GE17 applies to the Project because the construction and operation of the New Bridge may have direct and/or indirect effects on the European Site even though it does not cross the SPA and Ramsar site.

10.4.124 Policy GE18 applies to the protection of sites of national importance for nature conservation. It is made clear that development in or likely to affect SSSIs will be subject to special scrutiny and that development will not be permitted if it would have a significant effect, directly or indirectly, on a SSSI unless the reasons for the development clearly outweigh the nature conservation value of the site and the national policy to safeguard the national network of such sites.

10.4.125 Policy GE18 applies to the Project because construction and operation may have direct and/or indirect effects on the SSSI even though the New Bridge crosses the Estuary outside the SSSI. It is stated in the UDP, under Policy GE18, that where development is permitted, the Council will consider the use of planning conditions to ensure the protection and enhancement of the site's nature conservation interest.

10.4.126 Policy GE19 covers the protection of sites of local importance for nature conservation; these are sites with no statutory nature conservation designation. The Policy states that development and land-use change will not be permitted if it is likely to have a significant effect on a Site of Importance for Nature Conservation (SINC) as defined in the Proposals Map (now known as Local Wildlife Sites – LWS), unless it can be clearly demonstrated that there are reasons for the proposal that outweigh the need to safeguard the substantive nature conservation interest of the site.

10.4.127 Under Policy GE19 it is explained that there are strict criteria for the designation of sites of local importance; these are based on the Ratcliffe (1977) criteria of size, diversity, naturalness, rarity, fragility, typicalness, recorded history, position in an ecological/ geographical unit, potential value and intrinsic appeal. Community factors are also considered, namely community or amenity value, physical access (for people including the disabled), visual access, educational value, and situation in areas lacking natural habitats.

10.4.128 The sites listed that are potentially affected by the Project are:

a. The Manchester Ship Canal Bank at Astmoor LWS;
b. The St. Helens Canal (reclaimed) LWS;
c. The Upper Mersey Estuary Widnes Warth and Fiddler's Ferry Saltmarshes LWS;
d. The Upper Mersey Estuary Astmoor Saltmarsh and Swamp LWS; and
e. The Upper Mersey Estuary Intertidal Areas and Open Water LWS.

10.4.129 Policy GE20 applies to the protection and creation of Local Nature Reserves (LNRs). It is stated that development will not be permitted if it is likely to have an unacceptable impact on existing or proposed LNRs. Wigg Island, which is crossed by the Project, has been designated as LNR. Norbury Wood & Marsh and Oxmoor Wood is also an LNR but is unlikely to be affected by the Project.

10.4.130 Policy GE21 concerns species protection and states that development that would cause unacceptable harm to a species of flora or fauna protected under national or international legislation, or its habitat, will not be permitted unless three criteria can be satisfied which are:

a. That the development is in the interests of public health and public safety, or for other imperative reasons of overriding public interest, including those of a social or economic nature and beneficial consequences of primary importance for the environment;
b. That there is no satisfactory alternative; and
c. That the derogation is not detrimental to the maintenance of the species concerned at a favourable conservation status in their natural range.

10.4.131 Implementation of Policy GE21 must involve surveys of the relevant protected species by an expert on the relevant protected species. Where development is permitted, the authority must consider the use of conditions or planning obligations to protect the species or its habitat.

10.4.132 If the Project is implemented there is the possibility of the presence of one or more of several European protected species, namely bat species, Great Crested Newt and Otter, although there are no known records of Otter in the Upper Mersey Estuary.

10.4.133 There is also the possibility of Water Vole presence. From 6th April 2008 the Water Vole will receive increased protection under the provisions of the *Wildlife and Countryside Act 1981* (as amended); this will give protection against being taken from the wild and selling of the species, and protection against killing and injury. However protection will not apply to disturbance or damage to places of shelter and protection.

10.4.134 Defra has published further advice in *Local Sites; Guidance on their Identification, Selection and Management* (Defra 2006). This document gives clear-cut and carefully considered advice on the selection criteria local authorities should use to describe local sites. Of importance is Paragraph 42 which advises; "Local site systems should select all areas of "substantive" nature conservation value." .

10.4.135 The Defra document advises on how Local Site systems should be developed. They should have a set of clear and locally defined site selection criteria with measured thresholds developed with reference to a standard set of criteria listed in the Defra document. These are based on the Ratcliffe (1977) approach as described earlier (10.5.229-30), suitably adjusted for use in a local context.

10.4.136 The Defra guidance advises that potential sites should be evaluated against the agreed and documented criteria; all sites meeting the criteria should be selected. Further clarification on the use of the criteria is in Annex C of the Defra document.

10.4.137 The Council has designated local sites (LWS) against strict criteria which are listed in the UDP. There are based on the Ratcliffe (1977) criteria as described earlier in 10.5.229-30.

10.4.138 The Council's designation of LWSs is entirely consistent with the Defra guidance and it is clear that the sites have been selected using the recommended and appropriate criteria.

10.4.139 There are nine LWSs that are listed in the UDP and were identified in the original Main Scheme Assessment Study Area. As stated and listed earlier at 10.4.128, five of the sites are potentially affected by the Project. Four others, as listed below, have also been considered in this Chapter because of their proximity and relationship to the Upper Mersey Estuary. They are:

a. Haystack Lodge, Runcorn LWS;
b. Lodge Plantation, Runcorn LWS;
c. Norbury Wood and Marsh, Runcorn LWS and LNR; and
d. Oxmoor Wood and Ponds, Runcorn LWS and LNR.

10.4.140 Policy GE21 covers the protection of species. Development that would cause unacceptable harm to a species of flora or fauna protected under national or international legislation, or its habitat, will not be permitted unless the three relevant criteria are satisfied, namely those specified earlier after 10.4.130.

a. That the development is in the interests of public health and public safety, or for other imperative reasons of overriding public interest, including those of a social or economic nature and beneficial consequences of primary importance for the environment;
b. That there is no satisfactory alternative; and
c. That the derogation is not detrimental to the maintenance of the species concerned at a favourable conservation status in their natural range.

10.4.141 Policy GE22 involving the protection of ancient woodlands and other UDP policies are inapplicable because of the absence of ancient woodland and other relevant habitats and species in the Study Area.

The Emerging Halton Local Development Framework and Supplementary Planning Guidance

10.4.142 Halton Borough Council is preparing the *Local Development Framework* (LDF) which is programmed to take around three years, from January 2007 to July 2009. The LDF will consist of a number of different plans that will gradually supplement and then replace the UDP policies.

10.4.143 The new plans and strategies under the framework of the LDF will guide future land uses in the borough. The Development Plan Documents (DPDs) will contain land-use allocations and policies.

10.4.144 The GE (Green Environment) policies will be replaced by the Generic Development Control Policy (DPD).

10.4.145 The LDF scheme will include a *Habitats Regulations Assessment* (HRA) which will assess the potential effects of a proposed plan on one or more European Sites, such as Ramsar sites and SPAs.

10.4.146 The HRA will assess the effects of the proposed plan, in combination with other plans and projects, on one or more European sites. The HRA will then state whether the development does or does not affect the integrity of a European site.

10.4.147 The evidence base for the HRA will be the *Natural Assets Strategy* prepared by Halton Borough Council and other relevant information including reports, publications, and information held by databanks and other organisations.

10.4.148 Supplementary Planning Documents will be prepared for sites identified in *Regional Planning Guidance for the North West (2003)*. For example, *Draft Supplementary Planning Guidance* has been prepared for Widnes Waterfront.

10.5 Assessment Methodology

Project Study Area

10.5.1 The surveys undertaken as part of this Assessment have been designed to ensure that appropriate weight is attached to the European Site and SSSI. It is recognised that the Estuary is of international importance for its birdlife; therefore the surveys have been designed to investigate possible effects that the Project may have on the birdlife and other internationally important features of the Estuary and associated habitats.

10.5.2 Particular attention has also been given to the investigation of interactions between the maritime habitats of the Upper Mersey Estuary and the adjacent terrestrial habitats, and to interactions between the Upper Mersey Estuary and the European Site in the west. The study of interactions has included the movements of birds between the European Site which is outside the Project corridor, and the Upper Mersey Estuary crossed by the proposed New Bridge.

10.5.3 The Study Area for the Terrestrial and Avian Ecology assessment included the whole of the Upper Mersey Estuary and part of the Middle Estuary up to approximately two kilometres downstream of the Runcorn Gap (Figure 10.1).

10.5.4 The Study Area also covered an extensive area of land surrounding the Upper Mersey Estuary encompassing, in the north, West Bank and Spike Island, and the disused St Helens Canal, Fiddler's Ferry Power Station, the power station lagoons, open farmland and developed land including the Bowers Business Park area north-east of Spike Island. The Study Area extended to the A562 (Speke Road).

10.5.5 The Study Area also covered land to the north of the upstream area of the Middle Estuary encompassing the Ditton Roundabout area and St Michael's Golf Course.

10.5.6 South of the Upper Mersey Estuary the Study Area encompassed the whole of Wigg Island and extended south, across the Manchester Ship Canal, to the A558 Central Expressway. South of the Bridgewater Canal the Study Area extended to Halton Brook and the Norton area, and to Manor Park in the south-east.

Literature Review and Collation of Existing Baseline Information

10.5.7 Baseline information has been obtained and collated from a wide range of sources including the following and other local interest groups:

a. rECOrd (A Biodiversity Information System for Cheshire, Halton, Warrington and Wirral);
b. The Merseyside County Museum Service;
c. RSPB;
d. The Cheshire Wildlife Trust;
e. Butterfly Conservation;
f. A local ornithologist employed at Fiddler's Ferry Power Station;
g. The Council's Nature Conservation Officer;
h. WeBS data from the BTO, WWT, RSPB and JNCC (see below);
i. Bird Records of Halton Natural Environment Round Table (Halton Bird Reports compiled by Tony Parker); and
j. Bird Records of Tony Parker and David Norman.

10.5.8 Natural England (formerly English Nature) has provided information on designated sites, notably the Estuary SPA and SSSI. More recent information from the Joint Nature Conservation Committee (JNCC) has been obtained via the internet.

WeBS High Tide Bird Counts

10.5.9 Additional information has been provided by *The Wetland Bird Survey* (WeBS) counts which are organised and funded by the British Trust for Ornithology (BTO), The Wildfowl & Wetlands Trust (WWT), the Royal Society for the Protection of Birds (RSPB) and JNCC (Joint Nature Conservation Committee) which represents inter alia Natural England.

10.5.10 The WeBS data are used as the basis for determining the size of waterfowl populations wintering in the UK and the relative importance of individual sites including the Mersey Estuary

10.5.11 The WeBS Low Tide Counts were obtained for all years dating back to 1992-1993 when the Low Tide counts were started.

10.5.12 Under the WeBS scheme, numbers of wildfowl, waders and other waterfowl using estuaries are monitored as part of an ongoing programme. As far as possible, counts are undertaken at set locations monthly through the period from September to March at high tide when birds are forced to leave their intertidal feeding grounds and congregate in roosting flocks, facilitating counting.

10.5.13 It is assumed that during the WeBS count day there is no significant transfer of birds between estuaries, and that within any one estuary there is no significant movement between roosts during the count period and thus double counting is avoided. Such counts, which are known as “core counts”, aim to give a snapshot of total birds on each site monitored and by aggregating these, the national situation.

10.5.14 In some estuaries significant numbers of waterfowl pass through on migration in spring and autumn, outside the main count period. Those estuaries may hold sizeable numbers of non-breeding birds through the summer. For this reason, when possible, counts are also undertaken in the months of April and August. There are no counts in the period May to July.

10.5.15 For each year, the overall importance of each estuary is determined by summing the highest of the counts for each waterfowl species present, regardless of the month in which it occurred, so producing a “peak count”.

10.5.16 To get a longer-term picture of the relative importance of sites, where continuity of counts permits, the peak counts from five successive autumn to spring count periods are used to calculate a “five year mean peak”. This procedure helps to iron out the fluctuations which occur from year to year due mainly to annual variations in breeding success, food resources and winter weather, and conditions in different parts of western Europe which cause some redistribution of birds. The five year mean is therefore a reasonable way of ranking sites overall. By totalling counts for all sites, the peak numbers of birds present nationally can be determined.

10.5.17 The estuaries of the UK are used by birds which breed across the northern hemisphere from Ellesmere Island in Canada to Arctic Siberia and which winter in an area extending from north-west Europe to west Africa. Counts and estimates made throughout this area have allowed estimates of the flyway populations of individual species to be made (Smit and Piersma 1989: Rose and Scott 1997, updated by Wetlands International 2002), so the importance of a site or a number of birds can be evaluated in the international context as well as the national one.

10.5.18 The proportion of the flyway population supported in individual estuaries is an important consideration in evaluating sites and the significance of effects on them. A site is considered to be internationally important if it regularly holds at least 1% of the population of a species or sub-species occurring in the flyway, or a combined total of >20,000 waterfowl.

10.5.19 In addition, a site is considered to be of national importance if it regularly holds 1% of the national population of a species. As numbers fluctuate from year to year, for example due to variations in breeding success, 1% threshold figures are revised only when significant long term trends indicate a sustained change in population size. If an estuary hosts the same number of birds, but the overall population declines, this will increase the importance of that estuary.

10.5.20 Annual reports summarising the national results from each count period are published and the data for individual sites are available for more detailed analysis. In practice there is a substantial delay before data become available. The latest published report of the WeBS results available to this assessment is for the period 2004-05 and count data for the period to 2005-06.

WeBS Low Tide Bird Counts

10.5.21 In addition to regular counts at high tide, WeBS low tide surveys are undertaken at intervals in order to obtain a picture of the birds' feeding distribution. A low tide survey was undertaken on the Mersey in 2005-6, previous surveys having been in the 1990's.

10.5.22 Especially on large estuarine sites, low tide counts often find smaller numbers of birds than the core high tide roost counts and this is attributed to a number of influences related to the visibility of birds at distance from observers. Low tide counts cover the Upper Mersey Estuary in two sectors, one for the Runcorn Sands and one off Fiddler's Ferry, with a "gap" between. Given the relative narrowness of the Upper Estuary, low tide counts here can be expected to give a much more accurate picture of numbers of wildfowl and waders present.

WeBS Coverage of the Mersey Estuary

10.5.23 Core counts for the Mersey cover the whole of the Middle Estuary, that is the European Site. They cover only that part of the Upper Estuary that abuts the Fiddler's Ferry power station site plus the power station lagoons.

10.5.24 The WeBS core counts do not cover the section of the Upper Estuary that includes the New Bridge construction corridor. It is understood that this is because the area holds few or no birds at high tide and is considered to be unimportant in the evaluation of the whole Estuary.

10.5.25 WeBS low tide count coverage includes the entire European Site and Upper Estuary, including the Project site.

Literature Pertaining to the 1970s and 1980s

10.5.26 A relevant local publication is the report entitled *The Mersey Estuary; Naturally Ours* (Mersey Estuary Conservation Group 1995). This publication, which was based on a conference held in 1988, gives a comprehensive account of information on the Estuary that was obtained in the 1980s.

10.5.27 The above report refers to the work of the Estuarine Ecology Team at Salford University which carried out detailed studies of the estuarine invertebrates, mostly between 1976 and 1980. The Team's research and surveys covered fish, macro-invertebrates and diatoms. There was subsequent invertebrate monitoring by North West Water Authority which was conducted four times a year at 14 sampling sites.

10.5.28 Other published works relating to the Estuary and collated records are referred to as appropriate throughout the assessment. In addition, published and other surveys, and research on similar projects including their ecological effects, have been examined.

10.5.29 National and international scientific research papers and other publications on bird habitats, the ecology of estuarine and other birds, the behaviour of birds in relation to artificial structures and traffic, and other human influences, have been examined. Recent scientific literature on bird disturbance has been examined.

Information Pertaining to the 1990s and 2000s

10.5.30 The WeBS Low Tide and High Tide counts provide the most systematic and important information on birds in the Upper Mersey Estuary and in the European Site.

10.5.31 Bird observations in the Upper Mersey Estuary including counts of species have been provided by Halton Bird Club for 2000, 2001, 2002 and 2003. The areas covered were the River Mersey channels, Widnes Warth Saltmarsh, Cuerdley Marsh, Astmoor Saltmarsh, the Spike Island area of the Upper Estuary, Astmoor Saltmarsh Reedbed, Wigg Island Community Park and the Manchester Ship Canal. Observations were made at least once every month other than November.

Literature Review Relating to Impacts on Birds

10.5.32 A literature review of the effects of disturbance on birds and relevant case examples has been conducted by Andrews Ward Associates. Other relevant information published in scientific journals including Journal of Animal Ecology, Journal of Applied Ecology, Biological Conservation, Bird Study and Ibis has been examined.

General Introduction of the Survey Methodology

10.5.33 There are different methods of wildlife habitat, vegetation and species survey, all of which have been considered and applied where appropriate in the planning of the baseline surveys for the Project.

Joint Nature Conservation Committee Phase 1 Habitat Surveys

10.5.34 The JNCC Phase 1 Habitat Survey methodology was applied to the Study Area (Appendix 10.2) of the Upper Mersey Estuary and the surrounding land including developed land (built-up land, hardstanding and roads) as well as vegetated land including farmland, amenity grassland, woodland and other semi-natural vegetation. This method of survey was used for land mapping to identify sites requiring detailed surveys.

JNCC Phase 2 Habitat Surveys and National Vegetation Classification Surveys

10.5.35 JNCC Phase 2 habitat surveys involved the recording and compilation of plant species lists for selected areas of vegetation identified during the JNCC Phase 1 habitat surveys. The recording of species lists involved the use of the DAFOR system where D=dominant, A=abundant, F=frequent, O=occasional and R=rare. There were also estimates of the percentage ground cover of individual species and the identification of constant species to enable the assignment of individual vegetation to specific NVC plant communities.

10.5.36 The JNCC Phase 2 and NVC habitat survey methods were applied to the saltmarshes (Widnes Warth, Astmoor and Cuerdley), the Manchester Ship Canal Bank LWS vegetation, the landfilled areas along parts of the southern margins of the Upper Mersey Estuary, the St. Helens Canal

LWS and its water-margin and bank vegetation, the Fiddler's Ferry Power Station Lagoons including the grassland east of the lagoons, Haystack Lodge LWS, and Norbury Marsh and Oxmoor LWS and Local Nature Reserve (Appendix 10.1, Figures 10.16 to 10.23).

Comprehensive Botanical Surveys With and Without Quadrats

10.5.37 The JNCC Phase 2 and NVC vegetation surveys were carried out without the use of quadrats (an area of vegetation selected for study). Consideration was given to the potential use of quadrats but this was concluded to be inappropriate because quadrats surveys were unnecessary for NVC community assignment of vegetation types, and the baseline surveys were not intended to be used for monitoring changes in the species composition of vegetation after construction of the Project.

10.5.38 The recommended use of quadrats for monitoring vegetation change, particularly of the saltmarshes, is discussed in the monitoring section of this Chapter.

Faunal Surveys Using Transects and/or Distribution Mapping

10.5.39 Walked transect surveys were used for the recording of bird presence and bird activity on the saltmarshes.

10.5.40 Each of the above survey methods is described in the following sections with detailed descriptions of the methodologies applied during the baseline surveys.

Description of the Habitat and Vegetation Surveys

Joint Nature Conservation Committee Phase 1 Habitat Surveys

Introduction

10.5.41 The baseline surveys followed standard methods of habitat survey that have been developed for the assessment of habitats in terms of vegetation and physical features.

10.5.42 In the late 1980s and early 1990s the Phase 1 Habitat Survey was developed by the JNCC as a basic habitat mapping method. This method is useful for preliminary investigations, and is particularly useful for covering large areas of land and water such as road construction corridors which may cover extensive areas of agricultural land, woodlands and wetlands as well as industrial and urban land.

10.5.43 The Phase 1 Habitat Survey is essentially a land-use mapping method which categorises vegetation into very simple types such as planted grassland, agriculturally improved grassland and semi-improved grassland. Whilst it has botanical limitations in that it does not identify and categorise National Vegetation Classification (NVC) plant communities, it does identify and map physical habitats that are devoid of vegetation such as bare and toxic waste heaps, quarry floors that are devoid of vegetation, urban and industrial land, and other physical features, some of which may be natural exposures such as cliffs, rocky shores and intertidal habitats. Some artificial physical habitats lacking vegetation may be of special biodiversity importance, particularly for uncommon and rare species with specialised habitat requirements.

10.5.44 The Phase 1 Habitat Survey methodology uses Target Notes for written and descriptive purposes to support the mapping. The Target Notes identify features (habitats) of potential importance and provide a description which is useful for further investigations. Importantly, the Phase 1 Habitat Survey identifies areas and features which require further investigation such as detailed vegetation mapping, the recording and compilation of species lists, and searches for

protected and rare or uncommon species of flora and fauna.

Application of the Phase 1 Habitat Survey

10.5.45 Mapping of habitats and vegetation was carried out at in the summer of 2003 at 1;5000 scale using the JNCC Phase 1 Habitat Survey methodology (JNCC 1993). The survey results were captured and assessed using Geographical Information System (GIS).

10.5.46 The entire Project area, with the exception of the junction improvements near the M56, was covered by the Phase 1 Habitat Survey, including the Upper Mersey Estuary, land covered by access roads and associated road modifications, including junctions, the Central and Southern Expressway, and de-linking areas. The Phase 1 Habitat Survey extended downstream, past the Runcorn Gap where works to the SJB are proposed, and into the upstream area of the Middle Mersey Estuary to include the River channels and sandbanks.

10.5.47 The surveys within the Upper Mersey Estuary covered all the maritime habitat sub-features including the inter-tidal sand and siltflats, the sandbanks and sand/siltbanks, the saltmarshes and their creek systems, and the brackish vegetation of the reedbeds and tall swamp vegetation on parts of the margins of the Upper Mersey Estuary.

10.5.48 The wetland area associated with the former section of the disused Runcorn and Latchford Canal, between Astmoor Saltmarsh and the elevated area of Wigg Island on the southern side of the Upper Mersey Estuary, was covered by the survey.

10.5.49 The Phase 1 Habitat Surveys also extended beyond the Upper Mersey Estuary and maritime habitats to cover those terrestrial and aquatic habitats that may be affected directly or indirectly by the construction and operation of the Project. These included the St. Helens Canal and its banks, the Fiddler's Ferry Power Station lagoons, and the Manchester Ship Canal and its banks.

Surveys of the Saltmarshes

10.5.50 The saltmarshes of the Upper Mersey Estuary were surveyed in the summer of 2003 by mapping the vegetation and physical features including the creek systems, pools, and areas of mesotrophic vegetation located above the upper saltmarsh vegetation.

10.5.51 Habitat and vegetation mapping included the eroding margins of the saltmarshes and any areas of saltmarsh accretion. Cross-section drawings were prepared, where relevant, of selected sections of the saltmarsh margins to indicate physical features, notably height, gradient, stability, undercutting and evidence of colonisation by vegetation. The saltmarsh margins were assessed for the presence of continued or accelerating erosion.

10.5.52 Detailed habitat mapping was conducted on terrestrial sites of possible importance. Mapping covered woodland and individual trees where appropriate, particularly mature or veteran trees, scrub including dense and scattered scrub, Bramble underscrub and similar low scrub including Gorse and Field Rose, tall-herb vegetation and grasslands.

Survey of the Disused St. Helens Canal and other Canals

10.5.53 The surveys, in the summer of 2003, covered all the habitats and vegetation within the disused St. Helens Canal channel including reedbeds (tall swamp vegetation) and any aquatic vegetation. The survey also covered the canal bank habitats and vegetation including any vegetation within 2-3 metres from the top of the canal bank.

10.5.54 The banks of the Manchester Ship Canal were similarly surveyed, in the summer of 2003. The aquatic and wetland vegetation of the disused Runcorn and Latchford Canal was also examined. The habitats of the Bridgewater Canal and its banks were also surveyed, at the same time.

JNCC Phase 2 Habitat Surveys

10.5.55 This type of survey involves the recording and compilation of comprehensive plant species lists for vegetation of possible or known importance identified in the Phase 1 Habitat Surveys (JNCC 1993). Phase 2 Habitat Surveys were also used to confirm NVC mapping of plant communities, particularly where NVC allocation was difficult or doubtful. Faunal species were also recorded.

10.5.56 Phase 2 Habitat Surveys can be conducted with or without the use of quadrats. Surveys without quadrats are more likely to detect uncommon or rare species, including those that may be indicative of specific NVC communities. For this reason quadrats were not used in these surveys.

10.5.57 The surveys involved all higher plants (flowering plants and ferns) but surveys of other plant groups may be necessary, if judged to be of possible importance. They may include bryophytes (mosses and liverworts), fungi, algae and lichens.

10.5.58 The plant species were recorded by walking transects across the sites or field units, with the same method applied for linear sites, to ensure that all variations in topography and other habitat conditions such as wet ground, aspect and ground cover were covered. Surveying continued until no further species were found. Where there were areas with different NVC communities, there was separate recording and species listing of the different communities, except where the vegetation was a mosaic of two or more communities.

National Vegetation Classification Habitat Surveys

Introduction

10.5.59 The NVC system is now in common practice (NCC 1989, Rodwell 1991 & after) and is generally accepted for the mapping of habitats that can be assessed in terms of vegetation.

10.5.60 Rodwell (October 1992) described in *Landscape Design* (the Journal of the Landscape Institute), the method carried out without detailed species recording but by an experienced botanist who is familiar with the NVC system and can identify NVC plant communities by eye or by the rapid identification of key indicator species.

10.5.61 Assignment of a stand of vegetation to a specific NVC community is based on the particular combination of frequency and abundance of each species. Species with frequencies of 61-100% are constant species. For example the MG6 Perennial Ryegrass-Crested Dogstail grassland community is characterised by high frequency and high constancy values for both species. Other features of vegetation may also be indicative of specific NVC communities, including dominance, rarity and absence.

10.5.62 The method applied to the Study Area enabled NVC communities to be identified both in the field and by analysis of the recorded DAFOR and percentage cover observations for each species. Each DAFOR symbol for every species identified was qualified, where appropriate, by L (locally) or V (very), and given an estimated percentage cover value. This allowed the species lists to be compared with the published NVC tables and assigned to a specific NVC community and, where appropriate, a sub-community.

10.5.63 Other important NVC community identification factors used, in addition to species composition, were physiognomy (outward appearance of the vegetation), habitat conditions such as drainage and soil type, management such as cutting, grazing or absence of management, and distribution including geographical factors such as latitude, altitude and maritime locations.

Detailed Habitat Surveys of the Saltmarshes

10.5.64 There was botanical recording of the saltmarshes in the summer of 2003 to identify the dominant, co-dominant and most abundant species, particularly those with high constancies of occurrence to enable assignment of the vegetation to specific NVC plant communities.

10.5.65 Other relevant factors such as sward height, presence or absence of grazing, and position in the saltmarsh were taken into account in the identification of saltmarsh NVC communities and, where possible, sub-communities.

10.5.66 Widnes Warth Saltmarsh was separated into six distinct compartments which were identified as A-F. Separation was based on physical and vegetation features. The separation of the saltmarsh into compartments was necessary because of its extensive area and visual evidence, at least in some areas such as the upper parts of the saltmarsh, that more than one NVC Saltmarsh plant community was present.

10.5.67 Astmoor Saltmarsh is less variable than that at Widnes Warth and appears to represent one NVC community throughout with the exception of a small elevated area at the western end which resembles mesotrophic grassland rather than saltmarsh. Therefore the Astmoor Saltmarsh was surveyed as one ecological unit.

10.5.68 The tall swamp, open water and associated wetland habitats between Astmoor Saltmarsh and Wigg Island, along the course of the former Runcorn to Latchford Canal, were surveyed using binoculars from outside the wetland areas where access was impractical due to high water levels and swamp vegetation.

Detailed Habitat Surveys of Non-maritime Habitats and Vegetation

10.5.69 There was detailed mapping at 1:2500 or 1:1250 scales in the summer of 2003 of sites of specific ecological, biodiversity and known or possible nature conservation interest including those sites now classified as LWS. As in the case of saltmarsh vegetation, the vegetation types were assigned to NVC communities based on dominant, co-dominant and abundant species of constant occurrence.

10.5.70 The structure and physiognomy of the vegetation was also used for assignment to NVC plant communities as were management regimes such as cutting or absence of cutting where relevant. The occurrence of uncommon or local species was also used for assignment of vegetation to NVC communities. Where possible the plant communities identified were allocated to NVC sub-communities.

Comprehensive Botanical Surveys

Comprehensive Botanical Surveys without Quadrats

10.5.71 Comprehensive botanical surveys in the summer of 2003 were based on walkovers of specific habitats or plant communities identified in the Phase 1 surveys, until no further species were found. In many cases the survey compartments were based on individual field units or woodlands, but if different management regimes were operative within individual field units or woodland compartments, or different NVC communities were suspected to be present,

comprehensive recording was based on those specific compartments.

10.5.72 The walkover surveys were designed to cover the entire area of each survey compartment by either walking a series of transects across the survey units or by random walkovers but ensuring that no areas were omitted from the searches.

10.5.73 This type of survey was based on the DAFOR system, as described earlier. Here, the DAFOR categories were qualified by the use of L=local or locally, V=very, COD (co-dominant), and appropriate combinations such as VL=very locally or VO=very occasional.

10.5.74 Recording included quantitative estimates of the abundance of species in terms of percentage ground cover such as 10%, 50%, 90% >100% (greater than 100% cover) and <1% (percentage cover less than 1%).

10.5.75 Recording included flowering plants and ferns, and any significant bryophytes, fungi, algae and lichens.

10.5.76 Recording of species continued until few or no additional species were detected. The advantage of recording without quadrats is that a greater proportion of the species present is detected than is normally found in quadrats. This is because quadrats cover a relatively small area of the habitat or vegetation, and are necessarily limited in number because of the time taken /in recording individual survey units (squares). Recording of species without the constraints of quadrat examination also increases the chances of detecting important, uncommon and rare species, and those species with a very restricted distribution within a stand of a particular plant community.

10.5.77 The use of quadrats was not justified for the baseline surveys because the method is time-consuming and yields little additional information compared with recording without quadrats. As previously mentioned, quadrat surveys have limitations and can only cover a relatively small proportion of the area of the plant community under investigation.

10.5.78 However the results of the botanical surveys without quadrats were used to assess the scope for the use of fixed quadrats for the monitoring of future changes in plant communities as influenced by construction and operation of the Project, and also as influenced by subsequent habitat management as part of mitigation and possibly compensation, if the latter is necessary.

Surveys of the Sandbanks

10.5.79 There is a large sandbank in the central area of the River channel, a short distance upstream of the Runcorn Gap. Initially remote observations (with binoculars) were undertaken in 2006 and these detected colonisation by very scattered plants. However the vegetation cover was extremely low and much less than 1%. This is not unusual for such transient habitats.

10.5.80 A hovercraft was subsequently used for access to the island at low tide to examine the species composition of the extremely scattered and open plant community. This showed that the habitat was at an initial stage of development.

Faunal Surveys Using Transects and/or Distribution Mapping

10.5.81 Fauna were surveyed by different methods such as random or systematic walkover surveys, walked transect surveys, or binocular or telescopic surveys from vantage points, particularly for birds and Water Voles, depending on the types of species concerned.

10.5.82 There was a strong emphasis on ornithological surveys of breeding, wintering, migratory, passage, visiting and vagrant bird species. This reflected the presence of the European Site and SSSI immediately downstream of the Runcorn Gap, with their important bird populations. Further, it was necessary to assess the ornithological value and function of the Upper Mersey Estuary in the context of the entire estuarine ecosystem and its relationship to the European Site and SSSI.

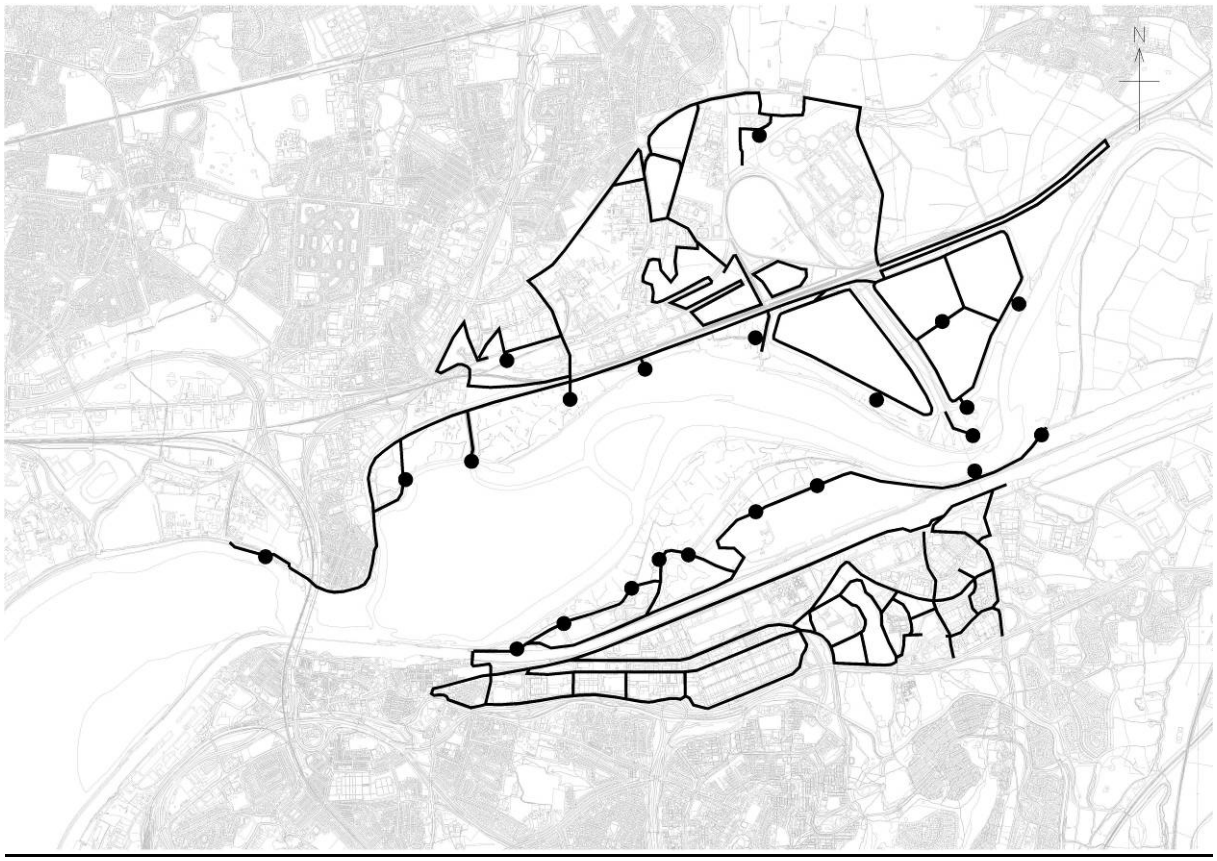
Surveys of Breeding, Roosting, Visiting, Passage and Migratory Birds from February 2002 until February 2003

Fortnightly Surveys of Birds in the Upper Mersey Estuary and Surrounding Area

10.5.83 The initial fortnightly surveys were conducted over a period of twelve months from early February 2002 until mid-February 2003, covering one season only. After February 2003 they were replaced with monthly surveys.

10.5.84 The fortnightly surveys covered an area of approximately 20 square kilometres (Figure 10.3) for several reasons. For example, most of the bird species are highly mobile and have extensive feeding areas and territories. They may use many parts of the Upper Mersey Estuary and its surroundings at different times depending on weather conditions, the state of the tide, the time of year and other factors.

Figure 10.3 - Map Showing the routes and locations from which observations were made during the fortnightly bird surveys from February 2002 to January 2003.



10.5.85 The surveys concentrated on the maritime habitats (saltmarsh, mudflats, sandbars and shoreline of the Upper Mersey Estuary). They also included adjacent and nearby woodland bird habitats, scrub, grasslands, urban and industrial areas. Many bird species use a range of habitats, notably Herons which nest in woodland and feed on a wide range of faunal prey in freshwater and salt-water habitats, and on terrestrial habitat prey.

10.5.86 The western boundary of the survey area included the large sandbank at Hale Bank, two kilometres downstream into the upper part of the Middle Mersey Estuary, immediately downstream of the existing bridges at the Runcorn Gap.

10.5.87 The eastern boundary was the locks at Fiddler's Ferry where the River and the St. Helens Canal almost meet. The northern boundary runs along the A562 Warrington-Widnes road, and the southern boundary runs along the A558.

10.5.88 The locations throughout the Study Area from which the birds were surveyed are identified in Figure 10.3.

10.5.89 The ornithological surveys were based, with modifications, on *The Common Bird Census* (CBC) methodology used by The British Trust for Ornithology (BTO). This methodology was developed in 1962 by English Nature (now Natural England) to assess the status of birds on farmland, where the growing use of agricultural chemicals and the accelerating destruction of hedgerows were causing particular concern. Other habitats, notably woodland, were included later in the scheme. Fieldwork was undertaken in accordance with specific guidelines where minimum levels of effort for different habitats are specified.

10.5.90 The CBC is based on mapping plots, where each species is marked on a habitat map when it is either seen or heard. This method was adopted and adapted for the Project survey although the final methodology applied differs slightly from the CBC methodology because of the large extent of the Study Area and because the emphasis was on wintering and migratory rather than breeding birds.

10.5.91 The bird surveys of the Study Area involved recording species over large areas from walkover routes and telescopic observation points. All the birds were recorded on one map during each survey. Unlike the CBC methodology, maps were not subsequently prepared showing the locations of individual species recorded during every survey. The recording of all species on one map at specified times allowed the use of favourable or preferred feeding and roosting habitats by wildfowl and waders to be easily identified and the numbers of each species counted.

10.5.92 Where woodland habitats surveyed were over 50 metres wide, recording was along transects at intervals of 50 metres to ensure overall and accurate plotting. The entry point to the woodland was varied to improve the evenness of cover but the same transects were followed and the same amount of time was spent on each individual survey.

10.5.93 During the winter months, when resident and summer visiting breeding species had left, less time was spent on each transect within the woodlands because there were fewer birds to record. Dense scrub was surveyed using the same methodology as for the woodlands.

10.5.94 Where grasslands were more than 200 metres across, the transect surveys were at intervals of 50 metres. This was carried out so that few or no ground-nesting species such as Common Snipe, Lapwing, Skylark or Meadow Pipit would be missed.

10.5.95 Some areas of open ground were inaccessible, such as where buildings had been or were being demolished, along disused railway sidings or within areas of waste tipping that were operational and devoid of vegetation. These areas were surveyed by scanning with binoculars and a telescope to detect and identify ground-nesting birds such as Ringed Plover and the protected Little Ringed Plover.

10.5.96 The Manchester Ship Canal on the south side of the Upper Mersey Estuary and the disused St. Helens Canal on the north side of the Estuary were both surveyed by walking along the banks. Special attention was paid to bird-rich habitat such as reed-beds.

10.5.97 The pond near Cuerdley Cross, adjacent to the A562, was surveyed by walking the perimeter footpath. Ponds in and around the Manor Park Industrial Estate were surveyed similarly.

10.5.98 The flooded woodland on the south side of the Manchester Ship Canal, which contains a heronry, was surveyed by traversing the northern bank of the wetland.

10.5.99 The older industrial estates on the southern and northern banks of the Upper Mersey Estuary contain little bird-rich habitat so they were surveyed briefly. An exception was Manor Industrial Estate where trees, scrub, mown grassland and ponds have been incorporated within landscaped areas between small building plots.

10.5.100 All the habitats were surveyed by walking through every corridor between the industrial units. A busway that passes through Astmoor Industrial Estate has hedgerows along both sides; this was given more survey time.

10.5.101 The Fiddler's Ferry Power Station lagoons were surveyed under different tidal conditions to determine if birds recorded in the Upper Mersey Estuary, and possibly in the European Site, use the lagoons at high tides and during stormy or extremely cold weather. A car was used from which to survey the lagoons from the tracks which surround each lagoon. The scrub and wetlands between the lagoons was surveyed by walking along the intervening tracks.

10.5.102 The estuarine survey methodology was governed by the state of the tide at the beginning of each survey. The "high water" and "low water" times were recorded for each visit from the *Liverpool & Irish Sea Tide Table* for 2002 and 2003. Temperature and other environmental conditions were also recorded.

10.5.103 Each survey commenced in the morning between 07.00 hrs and 08.00 hrs and continued for 9 or 10 hours. This ensured that each survey visit covered almost a full tidal cycle. If the tide was completely covering the estuary at the beginning of any day, the survey was started from Fiddler's Ferry Power Station lagoons.

10.5.104 Safety issues around the steep sides of the sand and mudflats, and sandbanks along the edge of the Upper Mersey Estuary, precluded any possibility of carrying out a "High tide roost count". When the tide is high the entire Estuary is covered up to the position of the vertical under-cliffs of the saltmarsh.

10.5.105 Due to the topographical characteristics of the site there may be limitations in comparing the survey results with similar information gathered from "High tide roost counts" conducted elsewhere. This type of study can only be applied satisfactorily to areas of coastline that contain gently-sloping shore-lines so that birds can retreat from the advancing tides on to permanent high dry ground nearby. If the dry land is unsuitable they will fly elsewhere to where it is suitable.

10.5.106 Another reason why it would be difficult to compare the surveys is because the saltmarsh in the area surveyed is not grazed and therefore does not provide favourable habitat for retreating birds. The tall saltmarsh vegetation does not allow birds such as small waders, vantage points to allow sight and early warning of any potential predators.

10.5.107 Given the absence of favourable high tide roosts in the Upper Mersey Estuary, with the possible exception of the Fiddler's Ferry Power Station lagoons, comparisons with "high tide roost counts" made elsewhere have limitations. However if the Power Station lagoons are acting as high tide roosts, their function as such may be evident from the survey data.

10.5.108 When surveying the northern part of the Estuary two access locations were used, one at Spike Island Visitor Centre and the other within Moss Bank Industrial Estate. Each access location was used alternately throughout the study.

10.5.109 The south bank of the St. Helens Canal, via Moss Bank Industrial Estate, was used for access along the top of the saltmarsh above the estuary. Along the length of the upper saltmarsh are areas where previous waste disposal activities have occurred. This has raised the land above the level of the saltmarsh and thus provides good observation points to view the adjacent saltmarsh, sandbanks, and the sand and mudflats.

10.5.110 At each observation point a telescope was used to survey the surrounding section of the Upper Mersey Estuary for 30 minutes. Species and numbers of each bird were recorded from every

point. When walking between observation points along the canal, the Upper Mersey Estuary was monitored continuously to check for any large-scale movements of birds. This ensured that the correct numbers of birds were recorded and not re-counted or omitted.

10.5.111 When surveying the lower (western) area of the Upper Mersey Estuary, the Spike Island Visitor Centre was used as this gives adequate views of the estuary and it was possible to record all birds whilst walking along the footpath. At the disused locks, 400 metres west of the railway bridge, a telescope was set up for 30 minutes to observe the large sandbank in the direction of Hale Bank.

10.5.112 The eastern section of the Upper Mersey Estuary was observed from the roads that surround the ash lagoons within the Fiddler's Ferry Power Station operational area. The lagoons are approximately 25 metres higher than the surrounding land and afford an extensive lookout position.

10.5.113 When moving from one end of the Upper Mersey Estuary to the other, if any large bird movements were detected, the flocks of birds such as Lapwing and Lesser Black-backed Gull, were re-counted. If the flock sizes were identical or very similar to those previously recorded, they were not included in the results, to avoid duplication and over-recording.

10.5.114 It was necessary to vary the times at which each area of the Upper Mersey Estuary was visited due to tidal influences and to improve the consistency of survey cover. As mentioned previously, the exception to this approach was to visit the power station lagoons first. This enabled the observer to count the number of birds on the lagoons and the upper reaches of the Upper Mersey Estuary. It was also possible from this vantage point to see almost the entire area of the Upper Mersey Estuary so that a provisional estimate of the total numbers of birds within the area of survey could be made. Once this was achieved a more detailed survey was carried out to identify the different species. This precaution was undertaken so that individual flocks of birds were not counted twice.

10.5.115 The Randle's Island Landfill Site was used to survey the southern section of the Upper Mersey Estuary. The western part of the Upper Mersey Estuary could be observed from a recently built footpath and from the banks of the disused Runcorn to Latchford Canal.

10.5.116 The central area of the Upper Mersey Estuary was surveyed from the chain-link fence surrounding the raised landfill site. This provided extensive views of the surrounding saltmarsh, wetlands and sand and mudflats. The eastern part of the Upper Mersey Estuary was observed from a tarmac road running east from the landfill site.

10.5.117 As on the northern side of the Upper Mersey Estuary, prominent positions overlooking the Upper Mersey Estuary were selected to set up a telescope, with observations for 30 minutes. When observing more than two habitats such as wetland and sand/mudflats from the same vantage point, more time was spent recording. During the spring and summer when birds were nesting on the saltmarshes, at which times there was no significant bird activity on the sand/mudflats and sand-bars, more time was taken observing the breeding areas.

Surveys of Breeding, Roosting, Visiting, Passage and Migratory Birds from March 2003 until December 2006

Monthly Surveys of Birds in the Upper Mersey Estuary and the Surrounding Area

10.5.118 The fortnightly bird surveys were replaced by monthly surveys in March 2003 which continued until December 2006. The survey area was also reduced and limited to the estuarine habitats and the Fiddler's Ferry Power Station lagoons so that survey effort could be concentrated on the

Project route corridor and associated estuarine habitats.

10.5.119 It was considered that monthly surveys, in addition to the earlier fortnightly surveys, would provide more than adequate survey data if carried out over at least three years and preferably over four years to cover at least four bird breeding seasons, and similar periods for wintering birds as well as spring and autumn passage migrants.

10.5.120 The total bird survey period from February 2002 to December 2006 covered almost five years. It was concluded during 2005 and 2006 that very little new information would be gained by continuing the monthly surveys, and nothing that would add significantly to the baseline assessment, but that there was a requirement for other types of bird survey to examine specific issues, as summarised below.

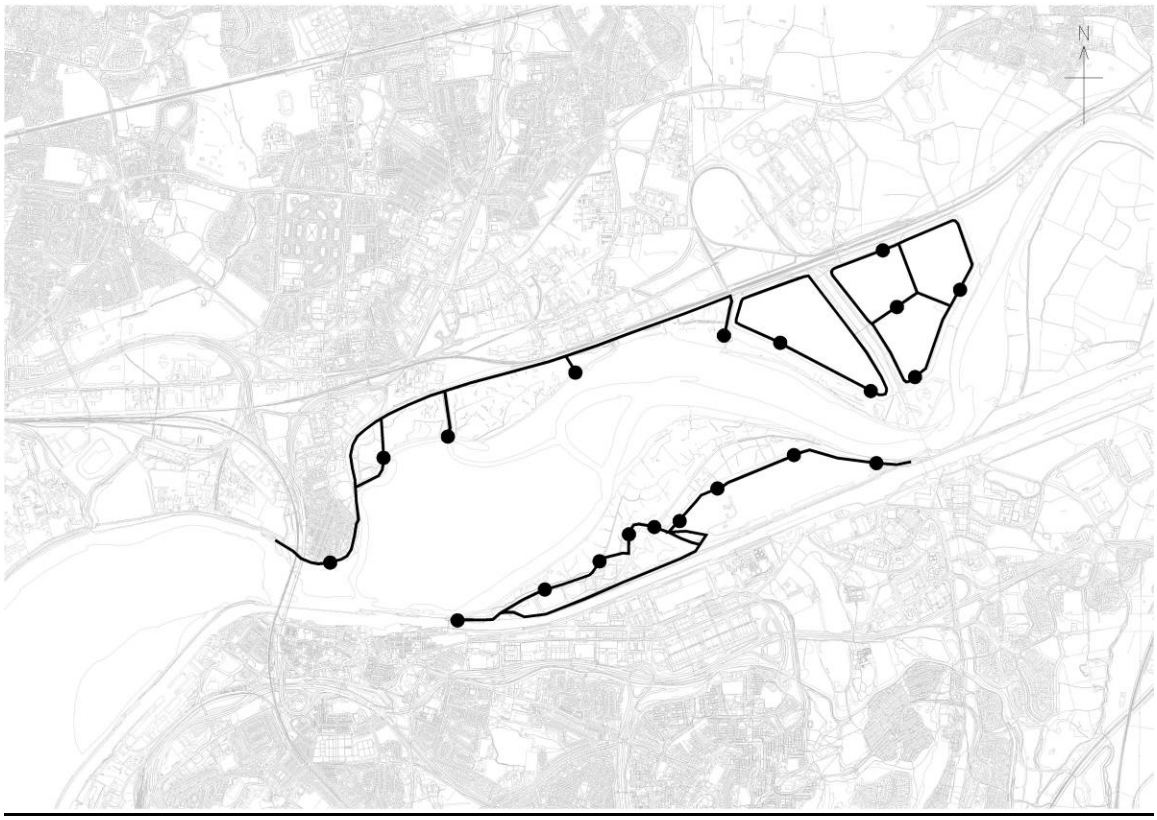
10.5.121 It was considered that there was a need to conduct specific surveys of bird movements between the Middle Mersey Estuary SPA and the Upper Mersey Estuary, designed to investigate whether or not the birds using the Upper Estuary are part of the SPA populations. It was also thought necessary to examine bird usage of the New Bridge corridor across the Upper Mersey Estuary, and to conduct Spring tide and Neap tide surveys along and in the vicinity of the New Bridge corridor.

10.5.122 Night-time surveys of the Upper Estuary were also conducted, to investigate whether or not there is significant night-time usage of the Upper Mersey Estuary by roosting and other birds.

10.5.123 In addition, the use of the saltmarshes by different breeding bird species was examined, including the breeding densities of individual species. Therefore the monthly surveys were phased out in late 2006 and replaced by surveys designed to determine the importance or otherwise of the New Bridge corridor for feeding, roosting, loafing and breeding birds, and the possibility that the Upper Mersey Estuary has some value for bird species found in the European Site, particularly those species which contribute to the international importance of the European Site.

10.5.124 The extent of the monthly bird survey area and the locations of the main bird observation points are shown in Figure 10.4. The same survey observation points were used along the northern and southern boundaries of the survey area as described for the fortnightly surveys, and birds were recorded for 30 minutes from each observation point.

Figure 10.4 - Map showing the routes and locations from which observations were made during the monthly bird surveys from March 2003 to December 2006.



10.5.125 As described previously, care was taken not to double-count flocks of birds when driving between different parts of the survey area. In the summer months the survey was carried out during a single day but during winter it was conducted over two days because of the shorter daylight hours. To ensure that the same birds were not counted on both days, the entire Upper Mersey Estuary was observed on the first day and the saltmarshes and saline pools on the second day.

10.5.126 Most of the surveys were carried out during suitable weather conditions with little or no wind, and absence of rain and snow. However several surveys were, intentionally, conducted during windy and rainy weather to determine if the numbers and movements of birds were different and to investigate whether or not any species used the Upper Mersey Estuary as a refuge during harsh weather conditions.

Surveys of Breeding Birds on the Saltmarshes

10.5.127 During the monthly surveys of the entire survey area it was only possible to obtain estimates of the numbers of breeding birds on the saltmarshes on both sides of the Upper Mersey Estuary because of the distances from the observation points. To overcome this limitation, further breeding bird surveys involving two surveyors were conducted on two occasions in the 2005 breeding season, by traversing the saltmarshes on foot along survey transects.

10.5.128 The entire saltmarsh areas, along both sides of the Upper Mersey Estuary (Maps 10.2, 10.5 and 10.6), were surveyed by walking transects 50 metres apart. The northern Widnes Warth Saltmarsh was surveyed during one day and the southern Astmoor Saltmarsh the following day. The first survey was carried out in May 2005 then repeated a month later in June 2005.

10.5.129 There were further breeding bird surveys, using the same methodologies, of the Widnes Warth and Astmoor saltmarshes in April, May and June 2007.

Surveys of Bird Movements between the Estuary Special Protection Area and the Upper Mersey Estuary and Beyond

10.5.130 An examination of topography and the locations of urban and industrial development by the Project team indicated that if wildfowl or waders were to move between the European Site and the Upper Estuary they would be most likely to do so by following the course of the Mersey through the Runcorn Gap. Here the land rises to well above river level on both the north and south banks and is occupied by urban and industrial development. Although the Estuary is crossed at this point by a single span road bridge and by a railway viaduct, there is no apparent reason why birds should avoid this route to fly over other ground subject to at least comparable levels of human activity and noise.

10.5.131 Further, an extensive review undertaken by Andrews Ward Associates of relevant English-language literature found no information which suggested there was the potential for bridges such as those at the Runcorn Gap to deter bird movements. In addition, a limited study of bird movements past the new Severn crossing found no evidence of an effect.

10.5.132 Counts of birds were made over ten days in October and November 2005. These counts produced broadly consistent results from day to day and it was therefore decided to reduce coverage to a single day per month to check for any important variation in the pattern of movement as the winter progressed. Further counts were therefore made in December 2005 and January 2006

10.5.133 The surveys were undertaken by a qualified ornithologist to determine the numbers and species of birds including passerines, waders, wildfowl and gulls passing the SJB from the European Site to the Upper Mersey Estuary and beyond, and downstream from the Upper Mersey Estuary to the European Site.

10.5.134 The first survey of five days was conducted over five day periods throughout the day, from dawn until dusk, on 25.10.2005, 26.10.2005, 27.10.2005, 31.10.2005 and on 01.11.2005. The second survey was on 03.11.2005, 04.11.2005, 08.11.2005, 09.11.2005 and on 10.11.2005. The third and final survey was on 19.12.2005, this being of one day only for the reasons stated in paragraph 10.5.132.

10.5.135 The surveys were repeated in the following year, on 25.09.2006, 02.10.2006, 21.11.2006, 18.12.2006, 05.01.2007 and on 14.02.2007.

10.5.136 The times, bird heights over the bridge, patterns of bird movement and whether any birds passed below or over the bridge were also investigated.

10.5.137 The surveys were planned and conducted to determine whether or not the bird population using the Upper Mersey Estuary is part of the bird population using the SPA in the Middle Mersey Estuary.

10.5.138 The surveys were also designed, by examining bird behaviour and flight directions on the approaches of birds to the bridge, to investigate whether or not the existing bridge is an obstruction or deterrent to the movements of birds throughout the entire Mersey Estuary, and particularly between the SPA in the Middle Mersey Estuary and outside the SPA into the Upper Mersey Estuary.

10.5.139 Two surveys in 2005, each of five days duration, were carried out to observe the numbers and

species of birds passing the existing bridge. Each survey involved observing the birds during dawn, dusk, high water, low water and mid-tide status during each day for a period of two hours. Due to the surveys being carried out in the winter when there were only eleven hours of daylight, the observer remained at the observation point from dawn until dusk during each day and the surveys continued without interruption throughout the survey period.

10.5.140 The weather and tidal status were recorded at the beginning of each day's survey and subsequently recorded throughout the day.

10.5.141 The surveys were carried out from an observation point on the northern bank of the estuary at the Runcorn Gap (Figure 10.5), directly below the A533 Widnes/Runcorn Bridge (Silver Jubilee Bridge).

Figure 10.5 - Map showing the locations at the Runcorn Gap, and on Widnes Warth and Astmoor saltmarshes respectively, where surveys of bird movements between the Upper and Middle Mersey estuaries, and bird usage of the New Bridge corridor across the Upper Mersey Estuary, were undertaken.

10.5.142 The bank beneath the SJB is a vertical and approximately four metres high sandstone wall, behind which is a gently-sloping tarmac area where cars can be parked. From this vantage point it was possible to see the full width of the Upper Mersey Estuary from the southern to the northern margins, for about 0.5 kilometre from the bridge. The Middle Mersey Estuary could be seen for approximately four kilometres west of the bridge. It was also possible to observe 1.5 kilometres beyond the southern bank of the Middle Mersey Estuary and 0.5 kilometre over the northern bank of the Middle Mersey Estuary.

10.5.143 The observation point on the northern bank also made it possible to move up and down the estuary from the bridge to give a wider field of vision into the Upper and Middle estuaries.

10.5.144 Observations from directly below the bridge from 25.10.2005 until 19.12.2005 made it possible to count the large numbers of birds passing during the dawn to dusk surveys. This was achieved by creating a sight-line along the superstructure of the bridge and recording the time in seconds taken for 100 birds to pass (e.g. 100 birds in 15 seconds = 400 birds per minute). The observations were updated every minute.

10.5.145 The south bank adjacent to the bridge had no access because of the Manchester Ship Canal running parallel to the Upper Mersey Estuary. Further, the views were obscured by houses and trees, making the southern bank an unsuitable vantage point.

10.5.146 The equipment used to observe the birds included 8 x 30 binoculars and an 80mm Opticron Eyemagic telescope fitted with an 80x zoom eyepiece.

10.5.147 Migratory birds flying from north to south over the Estuary within 0.5 kilometre upstream and downstream of the bridge were also recorded.

10.5.148 During the first survey of the five days of survey, beginning on 25.11.05 the numbers of birds flying up the Estuary at dawn and down the Estuary at dusk were not counted. Instead this preliminary survey concentrated on finding an appropriate observation point from which to conduct the entire survey, and identifying the alignments of the main bird flight-lines.

10.5.149 At the beginning of each survey, in the early morning, there was a large influx of gulls flying up the Estuary to their feeding areas and again in the evening flying down the estuary to their roosting sites. It was impossible to identify all individual gull species during these periods so the number of gulls per minute flying past the bridge was recorded.

10.5.150 When the number of gulls passing the bridge declined to less than 3-5 per minute, each individual species was recorded including waders, wildfowl, other seabirds and passerines.

10.5.151 Further surveys of bird movements between the Middle Mersey Estuary (SPA) and the Upper Mersey Estuary (outside the SPA) were carried out on 25.09.06, 02.10.06, 21.11.06 and 18.12.06. These surveys continued on 05.01.07 and 14.02.07.

Bird Surveys along the Project Route Alignment Across the Upper Mersey Estuary

10.5.152 A more precise determination of the numbers of water birds using the New Bridge corridor, and the nature of their activity, was conducted by observations through daylight hours on spring and neap tides on twelve dates in the periods October 2006 to February 2007.

10.5.153 The survey corridor was 600 metres wide, that is 300 metres along both sides of the New Bridge, measured from the centre point. Based on studies of disturbance effects as reviewed in Section 10.17 (10.17.26-49) of this Chapter, it was considered that outside this zone, negative effects would be minimal or absent. In addition, a 300 m wide corridor extending westward to Spike Island covered the likely location of a half tide construction jetty, should such be required.

10.5.154 All cormorant, heron, wildfowl and waders (including all species noted in the Ramsar/SPA and SSSI citations) that entered or passed through the corridor were counted and plotted on maps of the corridor to show their locations and/or direction of movement with particular attention given to any evidence of bird movements between the survey area and the SPA. Activity was recorded as feeding, roosting, loafing, swimming or flying. A separate map was used for each half hour of recording time through the day. Tide state and weather conditions were recorded on each map.

10.5.155 It was known that very large numbers of gulls can occur in the corridor prior to going to roost in the Middle Estuary, especially when there are exposed areas on which the birds can loaf and preen. The recording of use by gulls was a secondary objective and precise counts were not made but recorded as singles, low numbers, 10+, 50+, 100+ 200+ etc, 500+ etc, 1,000+, 1,500+ etc, and as large numbers where it was impractical to obtain reliable estimates.

10.5.156 Six counts were made on spring tide dates, when the greatest extent of the inter-tidal zone was exposed, giving the fullest opportunity for birds to exploit food resources of the sand and mud-flats. Six counts were made on neap tide dates to ensure that any significant change in the level of use at this time in the tidal cycle was not overlooked.

10.5.157 The surveys were carried out on 30.01.06, 14.02.06, 02.03.06 and 20.03.06 from a specially constructed hide on the north side of the Upper Mersey Estuary (Figure 10.5).

Nocturnal Surveys

10.5.158 Nocturnal surveys to look for movement into or from the Runcorn Sands area were carried out on 2 and 3 November 2006, one from the north shore and one from the south shore, in good moonlit conditions from 1 hour after sunset for three hours.

Investigation of the Effects on Birds of the M4 Severn Road Bridge

10.5.159 This study comprised a review of relevant published and other reports of known/potential effects of the M4 Second Severn Crossing road bridge on wading birds followed by field surveys in 2003 and 2004 of effects. In addition, a desk study was made to evaluate known effects/future threats to wading birds attributable to the M4 Second Severn Crossing.

10.5.160 The M4 Second Severn Crossing is an important area for wading birds and wildfowl, and crosses the Severn Estuary which has both national and international designations. Protection status includes SSSI, SPA for birds, Important Bird Area (IBA) and Ramsar Site. Therefore the existing M4 Second Severn Crossing provides a useful comparison with the proposed Project.

10.5.161 Visits to the English (07.02.04) and Welsh (19.10.03) sides of the Severn Estuary were made to study the interaction between wading birds and the M4 Second Severn Crossing. This covered both the migration and wintering periods.

10.5.162 On the first reconnaissance visit in October 2003, ‘casual’ wading and other shore bird counts were made on both the Welsh and English sides in proximity to the M4 Second Severn Crossing. Additionally, both sides of the M48 Severn Bridge were also visited briefly to assess effects on waders in the locality of a more established estuary bridge. On the first survey, the estuary in proximity to the English side of the M4 Second Severn Crossing was identified as a far superior wading bird habitat and subsequently a greater amount of time was spent on that side.

10.5.163 For part of the first survey day and over the whole duration of the second survey day in February 2004 ‘effort-related’ counts (Welsh side, n=3 hours, English side n=10 hours) were made of wading and other shore birds. A continuous timed watch was made alternating on either side of the road bridge (i.e. north and south), from single fixed-point viewpoints, covering high, low, rising and falling tide periods.

10.5.164 For each wader encounter (individual sighting) the following information was recorded;

a. Time of observation;
b. Species of bird;

c. Number of birds seen;
d. Distance to the bridge; and
e. Bird behaviour e.g. flying, feeding, roosting etc.

10.5.165 For flying birds, the following were recorded;

a. Direction of flight;
b. Whether travel was under or over the bridge; and
c. Whether the flight path was modified due to the presence of the bridge.

10.5.166 On the second survey day on the English side, counts were also made of waders at the Old Crossing (located approximately 200 metres north of the bridge) to determine wader distribution and abundance in the vicinity of the bridge.

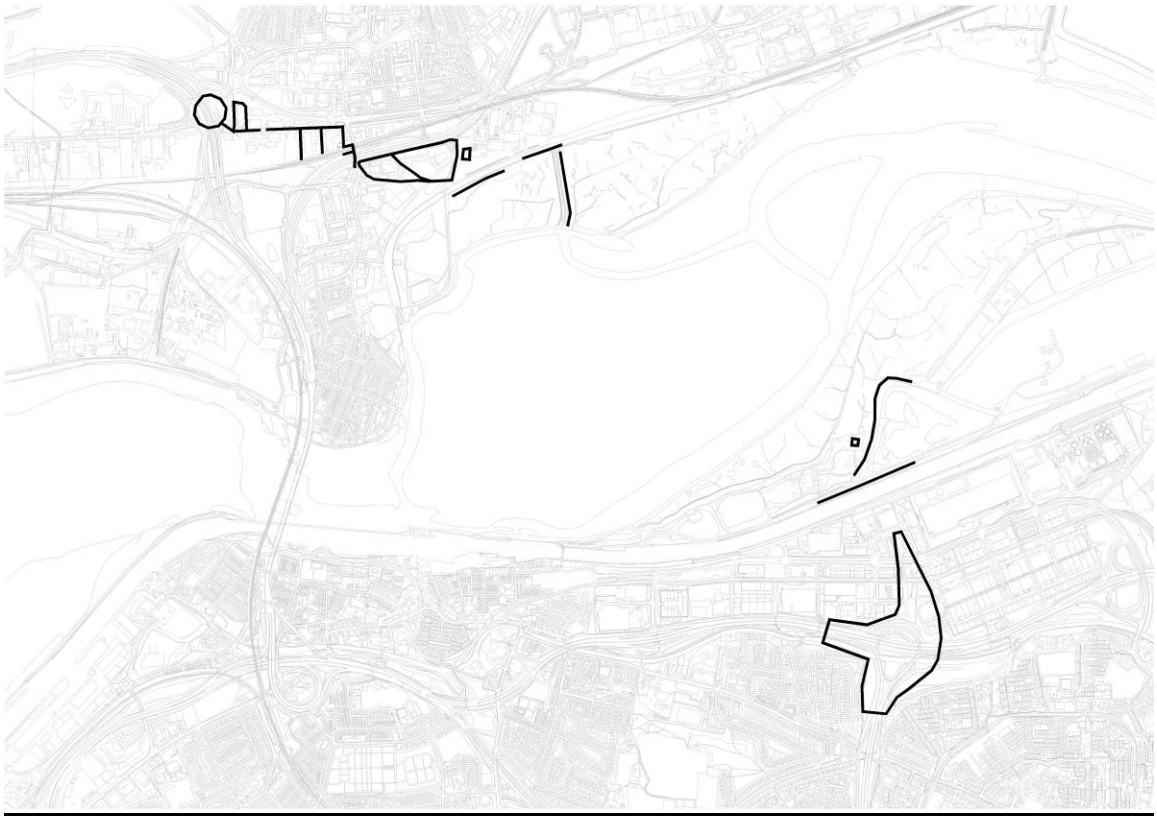
Protected Species Surveys

Bat Surveys in 2005

10.5.167 Nocturnal bat surveys were conducted in 21st July 2005 along the New Bridge corridor route across the St Helens Canal and Widnes Warth Saltmarsh. Three surveyors operated ultrasonic bat detectors were stationed at three survey stations. The equipment used were Pettesson 10100 and Barbox Direct bat detectors. The survey locations were (Figure 10.6):

a. Along the St Helens Canal Towpath between Spike Island and Rhodia, below the New Bridge corridor (Station 2); and
b. Along the St Helens Canal Towpath at the crossing of the dyke (water channel to the Mersey) (Station 3).

Figure 10.6 - Map showing the locations within the Study Area where nocturnal surveys for foraging and commuting bats were undertaken in 2005.



10.5.168 Following the stationary surveys, nocturnal surveys were continued along the dyke (water-course in the steep-sided channel which carries water from the Rhodia area to the Estuary (Station 4).

10.5.169 On 25th July 2005 nocturnal surveys were conducted on Wigg Island at three locations (Station 5 and 6):

a. Area of trees, scrub and grassland;
b. Adjacent to the section of the former Runcorn to Latchford Canal; and
c. On the northern side of the road to the landfill site and along the edge of the Manchester Ship Canal.

10.5.170 The nocturnal surveys on 26th July 2005 were south of the Manchester Ship Canal at the following stations::

a. (Station 8) Along the south bank of the Manchester Ship Canal between the canal and the Schreiber Factory;
b. (Station 9) Along Astmoor Road between the factory units; and
c. (Station 10) From the busway south to the trees along the Central Expressway.

10.5.171 Surveys on 8th August 2005 were along the Bridgewater Canal:

a. (Station 11) Along the Bridgewater Canal towpath;
b. (Station 12) South side of the Bridgewater Canal and the planted roadside trees;
c. (Station 13) Around the ERF buildings;
d. (Station 14) Around buildings south of the Bridgewater Canal; and

e. (Station 15) Bridgewater Canal roundabout area.

10.5.172 Further nocturnal surveys were conducted on 7th September 2005 at stations 11 and 12.

Bat Surveys in 2007

10.5.173 All buildings or structures that have been assessed as having potential for roosting bats and that may be affected either by the road proposals or the proposed de-linking were examined by an experienced and licensed bat surveyor. The first inspections were carried out during April 2007 before tree foliage had developed.

10.5.174 Where considered to be necessary by the licensed bat surveyor, nocturnal observations were conducted at dusk and dawn to detect emergence and re-entry respectively to potential roosts.

10.5.175 In addition, all trees that may be affected by the proposals were assessed in terms of their value for roosting, foraging and commuting.

10.5.176 Where potential for roosting habitat was identified, relevant information was recorded to provide future advice on the procedures required before tree felling, including nocturnal surveys, detailed tree inspections or section-felling under the supervision of a licensed bat surveyor.

10.5.177 Water bodies and their shore-lines were examined and evaluated in relation to any potential effects of the construction proposals on bat foraging habitats, particularly on Daubenton's Bat. Although other bat species often forage over water, Daubenton's Bat is highly dependent on water bodies for feeding. It is less common than the Common Pipistrelle and the Brown Long-eared Bat and therefore could be vulnerable in the area if its access to foraging areas is obstructed.

Survey coverage

10.5.178 Properties and trees along the alignment of the Project were assessed by site 'walkovers' (Appendix 10.1, Figures 10.8 to 10.14). The walkovers aimed to identify the general level of bat roost potential but did not involve detailed examinations, although foraging habitat and any commuting links between the two were noted. Buildings, bridges and trees were investigated with the aid of close-focusing binoculars but the timing of the survey was such that the presence of foliage restricted the inspection of the trees to some extent.

10.5.179 Following the daytime assessment nocturnal transects were undertaken by two surveyors to cover areas that had not been previously monitored during 2005 (Appendix 10.1, Figures 10.8 to 10.14). These localities were re-surveyed where it was deemed that more information would be of value. Where necessary surveyors took up separate observation posts before dusk to identify roost emergence patterns, and walked separate transects with communication maintained with two-way radios. This method gives greater coverage over a given area and enables bat movements to be relayed to each observer.

10.5.180 The nocturnal observations were between July and September 2007 which covers the main period of bat activity. Where bats were located, the high frequency echolocations were recorded with the aid of ultra-sonic bat detectors and analysed with computer software to verify species.

Badger Surveys

10.5.181 Searches for Badger setts and any other evidence of Badger activity were undertaken during the habitat, vegetation, bird and other species surveys throughout 2002. This was followed by a specific Badger survey in late January 2003 (Figure 10.7) which involved daytime searches for field evidence of Badgers as described in *Species Conservation Handbook – Badgers* (English Nature 1995) published by English Nature (now Natural England) and Problems with Badgers (RSPCA 1994).

a. Setts with "D"-shaped entrances at least 25 cms wide and wider than high;
b. Setts with large spoil mounds;
c. Discarded bedding at sett entrances, such as grass and leaves;
d. Scratching posts on shrubs and trees close to sett entrances;
e. Presence of Badger hairs on barbed-wire fences and on thorny or prickly scrub. Badger hairs are coarse, up to 100mm long with a long black section and a white tip;
f. Pit latrines (dung pits) and associated Badger footprints;
g. Badger pathways through vegetation including fields and woodland, and beneath fences; and
h. Foraging signs in grassland and woodland including diggings into turf for Pignut, Bluebell bulbs, earthworms and other foods.

Figure 10.7 - Map showing the extent of the Badger survey areas.

10.5.182 The searches were concentrated in the southern and south-eastern parts of the Study Area around the Upper Mersey Estuary where there have been previous records of Badger activity.

10.5.183 All the woodlands in the area and other potential Badger sett habitats were searched up to a distance of at least three kilometres from the eastern section of the Runcorn Central Expressway.

10.5.184 There were further surveys, using the same methodology, on 29.01.07 and 30.01.07. These surveys also included land up to 300 metres on either side of the access road and junction improvement construction corridor.

Great Crested Newt Surveys

10.5.185 In the case of the Great Crested Newt, the possibility cannot be discounted that the species and its habitats may be affected by junction improvements in the M56 area remote from the Upper Mersey Estuary crossing point because the species has a widespread distribution throughout Cheshire.

10.5.186 Ponds within the Study Area were assessed in terms of their suitability for Great Crested Newts. These included ponds within about one kilometre of the New Bridge and ponds within 500 metres of the junction improvements with the M56 motorway and at Rocksavage. This distance is based on advice in *Great Crested Newt Mitigation Guidelines* (English Nature 2001).

10.5.187 Pond netting surveys for aquatic invertebrates, including amphibian larvae, were conducted within the Study Area in 2002 before finalisation of the Project alignment. These surveys identified Great Crested Newt presence in the pond at Lodge Plantation. However a detailed Great Crested Newt survey for a population size-class assessment, as specified in *Great Crested Newt Mitigation Guidelines* (English Nature 2001), was unnecessary because this pond

is more than 500 metres (approximately 1.5 kilometres) from any of the proposed Project works and there are barriers (buildings, roads etc) to newt migration within the intervening land.

10.5.188 There are no other potential Great Crested Newt breeding ponds within at least 500 metres of the construction route of the New Bridge across the Upper Mersey Estuary, and of the immediate approach roads. However there are known and possible Great Crested Newt breeding ponds in the vicinity of two junction improvements, the possible ponds being in the Junction 11 area of the M56 and the known Great Crested Newt ponds are at Rocksavage on the south side of the A557 Weston Point Expressway. Therefore detailed Great Crested Newt surveys were necessary in the areas of these junction improvements.

10.5.189 The areas where ponds were surveyed for Great Crested Newts are shown in Figure 10.2.

10.5.190 The Great Crested Newt surveys were carried out in May and June 2007 using the methodology accepted by Natural England and described in *Great Crested Newt Mitigation Guidelines* (English Nature 2001). The *Guidelines* show that late April to early June is the time of peak egg-laying by Great Crested Newts and the newts do not leave the water until after the beginning of June, particularly in the north of England.

10.5.191 The methods applied were bottle trapping, torchlight surveys at night where feasible, and searches for Great Crested Newt eggs along pond margins. The trapping involved the use of bottles of 2 litres capacity, these being set at intervals of 2 metres along the shorelines of the ponds, with the inclusion of an air bubble to prevent the newts and other amphibians drowning, as recommended in *The Great Crested Newt Conservation Handbook* (Froglife 2001). Other survey precautions were taken, as advised in *Great Crested Newt Mitigation Guidelines*.

10.5.192 The bottle trapping and torchlight surveys were undertaken when weather conditions were suitable, with minimum night-time temperatures above 5 degrees Celsius, no rain and no wind or strong breeze.

10.5.193 The egg search surveys were used to determine presence or absence only, with termination of egg searching to avoid harm as a result of exposure or predation to developing or hatching eggs if Great Crested Newts were detected by any means.

10.5.194 The presence and absence surveys for Great Crested Newts involved four surveys of each method between mid-March and mid-June, with at least two of the surveys between mid-May and mid-June.

10.5.195 If Great Crested Newts were detected, two further surveys using both bottle trapping and torchlight counts (where feasible) were conducted to complete a minimum of six surveys using both methods which is necessary to determine the size or size-class of the newt population(s).

Reptile Surveys

10.5.196 The reptile surveys followed methods described in *Herpetofauna Workers' Manual* (JNCC 1998). These involved placing refugia consisting of squares of 0.5m X 0.5m roofing felt on the ground in suitable habitats for reptiles, particularly Slow-worm, Common Lizard and Grass Snake, which are of scattered but widespread occurrence in Cheshire.

10.5.197 300 refugia were placed in selected locations along the southern and northern sides of the Upper Mersey Estuary (Figure 10.13). These included the grassland, scrub and tall-herb vegetation on the outer margins of the saltmarshes, the outer margins of the upper saltmarsh vegetation, the banks of the Manchester Ship Canal and the St. Helens Canal, Wigg Island, the margins of Randle's Island Tip, and other habitats of the type known to be used or favoured by

basking and foraging reptiles.

Figure 10.13 - Map showing the areas surveyed for reptiles.

10.5.198 Where refugia were placed in areas of tall or dense vegetation, the vegetation was strimmed prior to placement to ensure that the traps were set close to the ground. The refugia were held down by small stones to prevent wind disturbance and to ensure that the roofing felt was either touching the ground surface or vegetation.

10.5.199 The refugia were placed in late June 2005 at which time there were searches for basking reptiles during dry, warm and sunny weather. Ground debris including timber, stones, plastic and metal sheets was lifted and searched, and piles of stones and other materials judged to be potential reptile cover were dismantled and searched.

10.5.200 After setting the refugia, there was searching for basking reptiles and lifting of the refugia, during dry and sunny weather on twelve occasions. These surveys were conducted at approximately weekly intervals throughout July, August and September 2005. Any reptiles found were to be counted.

10.5.201 Observations were also made of amphibians using the refugia as cover with recording of species and numbers of individuals under each of the refugia.

Water Vole Surveys

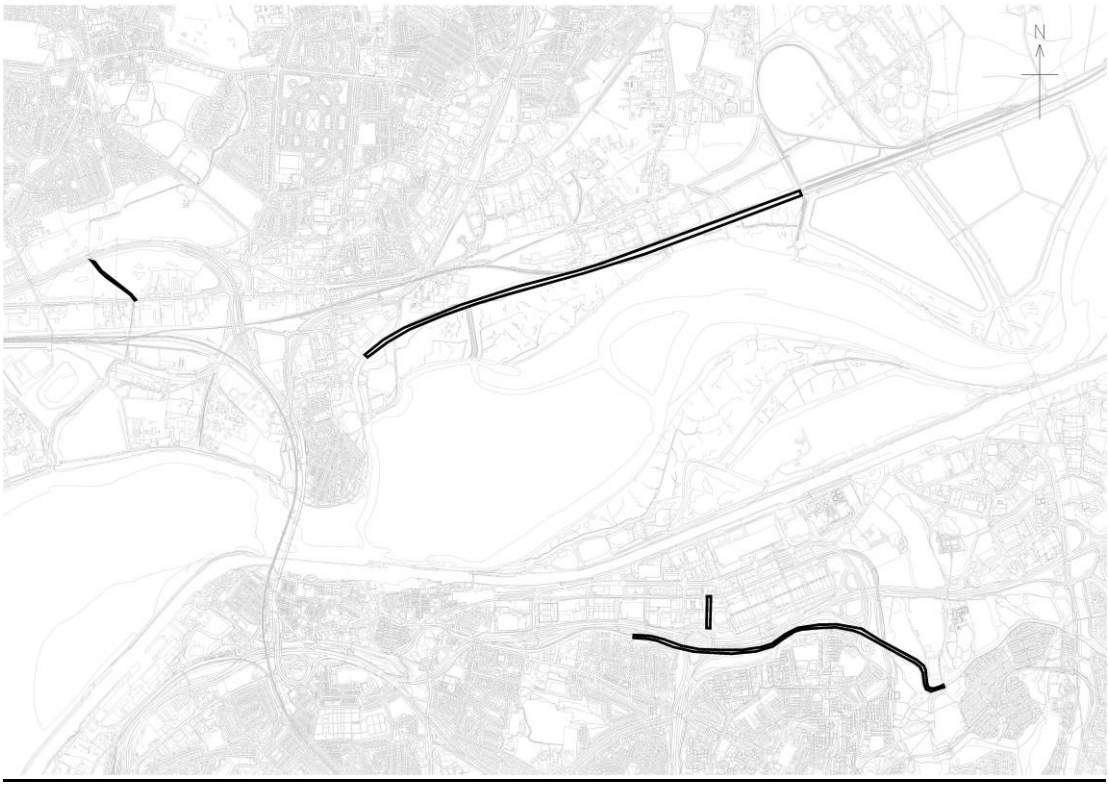
10.5.202 Collated records indicated that there was a reasonable likelihood of Water Voles being present and affected by the construction of the Project outside the Upper Mersey Estuary, such as along the St. Helens Canal.

10.5.203 Surveys for Water Voles, in suitable habitats, were conducted using the methods described in the *Water Vole Conservation Handbook* (Strachan 1998) and the *Water Vole Conservation*

Handbook (*Second Edition, Strachan & Moorhouse 2006*). These involved searches for evidence of Water Vole activity including burrows, latrines, grazed lawns, footprints, runs in vegetation, chewed shoots of rushes, Yellow Iris and other plants, sightings of the species and sounds of the animals entering the water.

10.5.204 The surveys covered the St. Helens Canal from Spike Island to Fiddler's Ferry Power Station, the banks of the Bridgewater Canal and the Manchester Ship Canal, and the water-courses including ponds where appropriate in the original and wider Study Area. Potentially suitable habitats in the former St Michael's Golf Course were also surveyed for signs of Water Vole activity. Locations of Water Vole surveys are shown in Figure 10.14.

Figure 10.14 - Map showing the water-courses surveyed for Water Vole activity.



10.5.205 The surveys included searches for signs of active and previous Water Vole activity as well as the animals themselves, as listed below;

a. Burrows in water-course banks with typical diameters of 4-8cms;
b. Latrines and associated faeces, or scattered faeces elsewhere;
c. Feeding stations and grazed lawns;
d. Chewed vegetation including rush stems, Iris leaves and other vegetation;
e. Footprints on mud or silt, and runs in vegetation;
f. Above-ground nests; and
g. Sounds (plops) of animals entering the water, or sightings of animals.

10.5.206 However the above methods were modified for the two canal surveys in 2007 because of the difficulties of examining the habitats due to the width of the canals and artificial banks which made bank searches for burrows and other signs of activity extremely difficult. The surveys were limited for access reasons and partly because Water Voles often burrow behind the stone-lined or metal-reinforced banks, with little or no evidence of burrowing from examination of the outer side of the banks.

10.5.207 Various survey methods were considered including the use of boats, dinghies and rafts. The last method, which has been used successfully and described by the Yorkshire Wildlife Trust, involves the construction of mini-rafts on which Water Voles deposit droppings, use as latrines, leave food remains and sometimes leave footprints. However it was decided to attempt to survey the canal banks, reedbed vegetation and other aquatic habitat of the St. Helens Canal by wading through the open water and reedbeds with direct access to all of the potential Water Vole habitats from canal channel.

10.5.208 The direct survey method proved to be feasible along the entire length of the canal to be surveyed, with the surveyor roped to an assistant on the canal bank for safety.

10.5.209 Eight hours were spent searching the St. Helens Canal in the final survey in June 2007 using the preceding method.

10.5.210 The Bridgewater Canal was searched for 200 metres along both sides of the canal from the Project crossing point, with searches from the towpath every 10 metres for section lengths of two metres. Both banks of the canal were searched in this manner. The main difficulty of the searches of this canal was the dense Bramble cover along the south bank which made conditions hazardous for the surveyor.

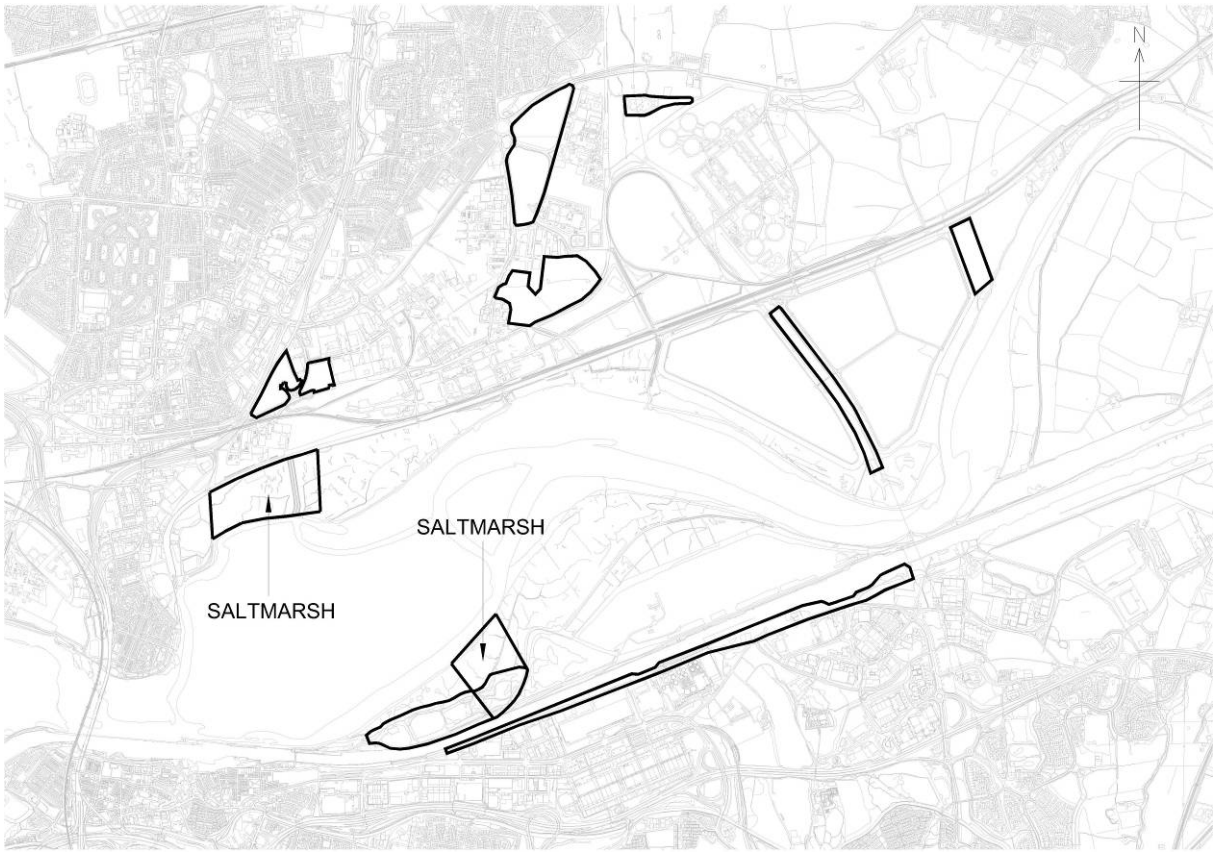
10.5.211 It was impractical and unnecessary to wade along the canal because of the water depth and the absence of reedbed and other potential habitat where latrines, faeces, chewed vegetation or other signs of Water Vole activity could have been found.

10.5.212 Nine hours were spent searching the banks of the Bridgewater Canal; this was conducted entirely from the banks.

Terrestrial and Saltmarsh Invertebrate Surveys of the Saltmarsh

10.5.213 Surveys of butterflies and other terrestrial invertebrates were conducted throughout Study Area. The surveys concentrated on those areas with suitable vegetation including the Local Wildlife Sites, Wigg Island, grasslands and mosaics of vegetation (Figure 10.15).

Figure 10.15 - Map showing the areas surveyed for terrestrial and saltmarsh invertebrates.



10.5.214 The saltmarsh invertebrate surveys were carried out at Spike Island and Wigg Island along the Project route corridor across the Upper Mersey Estuary. The Spike Island surveys were conducted on 12.07.05, 19.07.05 and the Wigg Island surveys on 02.08.05, 08.08.05. Approximately twenty hours were spent at the two sites.

10.5.215 The main target invertebrates were Coleoptera, Diptera (particularly hoverflies), Hemiptera, Lepidoptera and Araneae. The survey area was larger than that affected by the New Bridge.

10.5.216 The following sampling methods were used;

a. Sweep netting of the grassland, using a standard sweeping technique;
b. At Spike Island, near to the canal St. Helens Canal, there was a large area of Great Willowherb and Creeping Thistle. Scattered amongst the False Oat-grass, which covers most of the survey area, there were numerous clumps of Sea Aster and Scented Mayweed, and along the side of a concrete channel was Hemlock Water Dropwort. These vegetation types were all swept thoroughly;
c. At Wigg Island, the main area of interest was a large patch of flowering Prickly Sow Thistle. Most of the Diptera – especially the Syrphidae, came from here, using sweep netting and direct observations;
d. On the second visit to Wigg Island all of the micro-moths recorded, many of which were taken with a net;
e. Hand searching was conducted on the ground and at grass roots and associated habitats;
f. Several of the smaller beetles such as Ochthebius dilatatus were taken by entering the creek and crawling along examining the mud, or pulling back grass growing over the

creek edges;

g. Sieving was used for the examination of wind blown debris, grass etc. A good method applied for extracting small Coleoptera from grass litter etc, was to sieve it over a container; this is particularly useful for Staphylinidae and produced several species listed here; and
h. Pitfall trapping was carried out by placing traps at likely capture sites using a standard technique.

10.5.217 At both sites traps were placed so that they would be easy to find and likely to produce the greatest range of species.

10.5.218 The Spike Island traps were set on 12.07.2005 and located as follows;

a. Trap 1 ('t1') was set in bare dry mud surrounded by grassland, to intercept species running across;
b. Trap 2 ('t2') was set in dense grassland;
c. Trap 3 ('t3') was set in a creek, at the end where it was damp and shaded by overhanging grass; and
d. Trap 4 ('t4') was set in bare ground near to a shallow salt pan where plenty of Bembidion activity was seen.

10.5.219 The Wigg Island traps were set 02.08.2005 and located as below;

a. Trap 1 ('t1') was set at the base of a metal post for ease of recovery;
b. Trap 2 ('t2') was set the base of a metal post, near to the riverbank; and
c. Trap 3 ('t3') was in the bed of a dried-up salt pan.

Freshwater Invertebrate Surveys of Ponds and Surveys for Amphibian Larvae

10.5.220 There were freshwater invertebrate surveys in 2003 of all ponds and ditches with standing or very slow-flowing water, surrounding the Upper Mersey Estuary and up to 2 kilometres from the Project. The surveys included some of the brackish pools in the upper saltmarshes and the power station lagoons.

10.5.221 In addition, all aquatic plant species and vegetation associated with the water bodies studied were recorded. The surveys included identification of amphibians (vertebrates), including amphibian larvae.

10.5.222 All accessible habitats in the ponds were sweep-netted until no further freshwater invertebrate species were found. All species netted were identified to species level.

10.5.223 The survey methodology followed that adopted for the *Pondlife Critical Biodiversity Survey* which has been applied to many ponds in the North-west of England including Lancashire, Cheshire, Merseyside and Greater Manchester.

10.5.224 Invertebrates were taken for laboratory examination where necessary, with no large-scale removal of any species. There were searches for the presence of nationally scarce and protected species, including the presence of Great Crested Newt eggs in the folded leaves of aquatic and water-margin plants.

10.5.225 The following groups of macro-invertebrate species were recorded and each invertebrate found was identified to species level;

a. Tricladida; Flatworms;

b. Hirundinea; Leeches;
c. Mollusca; Snails;
d. Malacostraca; Water fleas;
e. Ephemeroptera; Damselflies;
f. Odonata; Dragonflies;
g. Hemiptera; Water bugs;
h. Lepidoptera; Butterflies;
i. Trichoptera; Caddis-flies; and
j. Coleoptera; Beetles.

10.5.226 Assessment of the abundance of each species was estimated as follows;

a. A = abundant;
b. F = frequent;
c. O = occasional;
d. R = rare;
e. V = very (very abundant, very frequent etc); and
f. Ad. = adult.

10.5.227 The above is a modification of the DAFOR system (dominant, abundant, frequent, occasional or rare) which was designed for botanical recording.

10.5.228 The majority of the surveys were carried out between June and July 2003 which is the optimal time of the year for freshwater invertebrate surveys. It is also a suitable time for detecting amphibian larvae.

Evaluation of Species, Habitats and Sites

10.5.229 The habitats, vegetation, plant and animal life have been evaluated with reference to standard nature conservation criteria as described by Ratcliffe (1977) and the Nature Conservancy Council (1989). These are size (extent), diversity, naturalness, rarity, fragility, typicalness, recorded history, position in an ecological or geographical unit, potential value and intrinsic appeal.

10.5.230 The Ratcliffe approach is highly relevant to the estuarine environment of the Upper Mersey Estuary because each of the ten criteria is readily applied. For example it is easy to determine and evaluate size (extent), and it is well known that most estuaries are ecosystems that still exhibit a high degree of semi-naturalness. Further, the number of estuaries in Britain is easy to determine, enabling rarity to be assessed with a high level of confidence.

10.5.231 The NVC was used to evaluate those habitats that can be assessed in terms of plant communities, the saltmarsh vegetation being a good example. The NVC covers all natural, semi-natural and major artificial habitats, with descriptions of over 250 plant communities and many more sub-communities.

10.5.232 Government advice on wildlife, as set out in *Planning Policy Statement 9; Biodiversity and Geological Conservation* (PPS9), has also been taken into consideration. The associated legislative regulations and documents *Countryside and Rights of Way Act 2000*, *Planning for Biodiversity and Geological Conservation – A Guide to Good Practice* (March 2006), *Government Circular; Biodiversity and Geological Conservation – Statutory Observations and their Effect Within the Planning System*, have been used for the evaluation.

10.5.233 The requirements of the *EC Habitats Directive and The UK Biodiversity Steering Group Report (1995)*, which are set out earlier in this Chapter in Section 10.4 have also been taken into

account in the evaluation, as are guidelines for local and non-statutory sites including those used for the designation of Sites of Biological Importance in Cheshire and Greater Manchester, and Local Wildlife Sites in Halton.

10.5.234 Attention has also been given to the objectives of the *UK Biodiversity Action Plan*, local biodiversity action plans, and to species action plans where appropriate.

10.5.235 The urban-fringe and industrial location of the site has been considered during the evaluation because wildlife habitats and semi-natural vegetation are generally scarce in built-up areas, giving an enhanced value to any habitats and wildlife present. In addition urban wildlife sites have an added value because they often provide an accessible resource for wildlife study and the enjoyment of nature by local residents.

10.5.236 Lastly, consideration has been given to the criteria described by the Halton Wildlife Sites Partnership (2007) in *Halton Local Wildlife and Geology Sites; Guidelines for Designation*. The criteria are based on the Ratcliffe (1977) criteria, namely size (the larger the better), diversity (of species and habitats), rarity (of species and habitats), fragility (vulnerability to change), irreplaceability (such as ancient woodland), typicalness or representativeness (of the habitat or vegetation type), geographical position (such as adjacent to a wildlife corridor or proximity to other wildlife sites), important populations of species (large populations are more important), and age or continuity of land-use (such as ancient woodland and old pastures).

10.5.237 The *Guidelines* document gives detailed advice on criteria and their application to the major habitat types in the Borough which include woodland, grassland, the Estuary, ponds and artificial habitats. Community factors are also considered; these include physical access, physical access and educational value.

Assessment of Effects and Mitigation

Introduction

10.5.238 The assessment of effects and mitigation measures is adapted from the methods recommended in *Guidelines for Ecological Effect Assessment in the United Kingdom* (Institute of Ecology and Environmental Management July 2006). The methods of effect and mitigation assessment described in the Aquatic Ecology Chapter (Chapter 11.0) by APEM Ltd. are also adapted from the IEEM Guidelines.

10.5.239 The effects tables in the unpublished *Draft Guidelines* (Institute of Ecology and Environmental Management, February 2006) have also been adapted for the assessment.

10.5.240 The IEEM guidelines followed in this Chapter have been applied after taking account of the published guidelines of Natural England in *Mersey Estuary European Marine Site; English Nature's Advice given under Regulation 33(2) of the Conservation (Natural Habitats & c.) Regulations 1994, as amended (English Nature 2001)*.

Baseline Projection

10.5.241 The baseline projection is based on the assumption that there will be no construction of the Project and that the Upper Mersey Estuary and the Middle Mersey Estuary SPA, including their immediate surroundings, are left in their existing condition with no significant change in management or land-use, including the continuation of very occasional duck shooting, for at least ten years and up to 30 years.

Evaluation of Ecological Receptors and Effects

Evaluation of Ecological Receptors

10.5.242 The evaluation of ecological receptors, as the basis for effect analysis, follows the principles and general approach of the Institute of Ecology and Environmental Management (IEEM) *Guidelines* (July 2006). The IEEM Guidelines describe the key guidance on selecting designated sites including internationally important and nationally important sites.

10.5.243 The IEEM *Guidelines* also refer to Local Sites which may be designated by Local Authorities and The Wildlife Trusts, and which are recognised as being important at regional/county and district/borough etc levels

10.5.244 The following Table 10.1 shows the system of evaluation used in this Chapter.

Table 10.1 - Evaluation of Ecological Receptors

Designation and importance	Criteria
International value (**High** and statutory)	Internationally designated sites (Special Protection Areas for Birds (SPA), Special Areas of Conservation (SACs) & Ramsar sites), and equivalent sites based on habitats and species).
National value (**High** and statutory)	Nationally designated sites (Site of Special Scientific Interest (SSSI), National Nature Reserve (NNR) and equivalents in terms of species)
Regional value (**Moderate** and non-statutory)	Sites which exceed County level designations but fall short of SSSI guidelines.
County/Metropolitan (**Moderate** and non-statutory)	Sites of County/Metropolitan importance (non-statutory) designated by local authorities or others, including semi-natural ancient woodland greater than 0.25ha, and species equivalents. Sites of this level of importance in Halton are known as Local Wildlife Sites (LWSs), formerly Sites of Biological Importance (SBIs) or Sites of Importance for Nature Conservation (SINCs). Includes some Local Nature Reserves.
District/City/Borough (**Moderate** and non-statutory)	Sites of County Borough importance designated by local authorities or others, including semi-natural ancient woodland smaller than 0.25ha, and equivalents. Sites of this level of importance in Halton are known as LWSs, formerly SBIs or SINCs. Includes some Local Nature Reserves.
Local or Parish (**Low** and not-substantive)	Areas of habitat which appreciably enrich the habitat resource in the local or parish context but are not of substantive biological importance.

10.5.245 Account has also been taken of the Section 74 listing of habitats and species of major and significant importance for the conservation of biological diversity in England, published in the *Countryside Rights of Way Act (2000)* and *Planning Policy Statement 9; Biodiversity and Geological Conservation.*

10.5.246 The above publications provide lists of Habitats of Principal Importance (formerly Priority Habitats) and Species of Principal Importance (formerly Priority Species).

10.5.247 The UK lists of Habitats of Principal Importance and Species of Principal Importance have been recently revised (2007) with numerous additions to the lists of species. This assessment takes account of the new UK lists of species and habitats.

10.5.248 A list of Habitats of Principal Importance (Priority Habitats) known and likely to occur in the Study Area is given in Table 10.2.

Table 10.2 – Lists of Priority Habitats (Habitats of Principal Importance

Maritime Priority Habitats	Terrestrial Priority Habitats	Aquatic and Wetland Priority Habitats
Coastal saltmarsh	Hedgerows	Eutrophic standing waters
Intertidal mudflats	Lowland meadows	Ponds
Rivers	Lowland mixed deciduous woodland	Reedbeds
Sub-tidal sands and gravels	Open mosaic habitats on previously developed land	
Tide-swept channels	Wet woodland	

10.5.249 A list of Species of Principal Importance (Priority Species) known and likely to occur in the Study Area is given in Table 10.3.

Table 10.3 – Lists of Priority Species (Species of Principal Importance

Priority Mammal Species	Priority Bird Species	Priority Amphibians and Reptiles	Priority Invertebrate Species
Water Vole, Hedgehog, Soprano Pipistrelle Brown Long-eared Bat	Skylark, Linnet, Cuckoo, Bittern, Yellowhammer, Reed Bunting, Herring Gull, Black-tailed Godwit, Grasshopper Warbler, Corn Bunting, Yellow Wagtail, Spotted Flycatcher, Curlew, Willow Tit, House Sparrow, Grey Partridge, Dunnock, Bullfinch, Starling, Song Thrush, Lapwing	Common Toad Great Crested Newt	Garden Tiger Wall Butterfly White Letter Hairstreak

10.5.250 There is no evidence of Priority Species of plant in the Study Area and there are no species that are likely to be present.

Evaluation of Ecological Effects

10.5.251 Effects are assessed as follows;

a. Positive or negative;
b. Magnitude (high, moderate or low);
c. Extent (distance);
d. Timescale of effect, short-term (0 to 3 years), medium term (3 to 10 years), long-term (10+ years);
e. Permanent or temporary;
f. Rapid or delayed;
g. Reversibility;
h. Timing; including one-off or repeated;
i. Frequent or infrequent;
j. Direct or indirect;
k. Significant or not significant;
l. Significance (high, moderate, low or not significant); and
m. Importance of receptor (high, moderate or low).

10.5.252 Consideration is also given to *The Habitats Directive* requirement regarding "favourable

conservation status".

10.5.253 In the *Directive*, the conservation status of a natural habitat is defined as the sum of the influences acting on the habitat and its typical species that may affect its long-term natural distribution, structure and functions as well as the long-term survival of its typical species, within the UK in this case. Similarly, the conservation status of a species means the sum of the influences acting on the species concerned that may affect the long-term distribution and abundance of its population, within the UK.

10.5.254 The conservation status of a natural habitat is taken as favourable when its natural range and area it covers within that range are stable and increasing, and the specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and the conservation status of its typical species is favourable (as described for species). The conservation status of a species is taken as favourable when population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

10.5.255 Cumulative effects are also considered in the assessment of effects.

10.5.256 The following guidance (Table 10.4) is given to characterise the effects on ecological receptors;

Table 10.4 - Definition of Effects.

Magnitude	Criteria
Negative (High)	Adverse effect on a site or population of high value
Negative (Moderate)	Adverse effect on a site or population of moderate value
Negative (Low)	Adverse effect on a site or population of low value
Neutral	No effect
Positive (Low)	Beneficial effect on a site or population of low value
Positive (Moderate)	Beneficial effect on a site or population of moderate value
Positive (High)	Beneficial effect on a site or population of high value

10.5.257 Other factors taken into account include confidence in predictions;

a. Certain = 95%+ probability;
b. Probable = 50% chance;
c. Unlikely = 5%-50% chance; and
d. Extremely unlikely = less than 5% chance.

10.5.258 Integrity of a site is an important issue and is therefore also taken into account. Integrity here is defined, in accordance with , as the coherence of a site's ecological structure and function across its whole area that enables it to sustain the habitat, complex of habitats and/or levels of populations of the species for which it was classified.

10.5.259 For all the features of ecological interest identified in the proposed development site and the surrounding area, the scale of any effects of the proposed development has been assessed following the IEEM approach *Guidelines for Ecological Effect Assessment* (July 2006).

Effect Assessment Criteria

High Negative Effects

10.5.260 High negative effects include significant and damaging effects on the integrity of large-scale and ecologically significant areas. The area being affected is likely to comprise a designated site (SPA, SAC, SSSI etc) or key habitats as listed in *The UK Biodiversity Action Plan Steering Group Report* (lowland meadow, lowland dry acid grassland, standing open waters etc) and/or support statutorily protected species.

Moderate Negative Effects

10.5.261 Effects on this scale will significantly affect a moderate proportion of an area that is considered to be ecologically important, including designated sites, key habitats, local sites of substantive biological importance (LWS or LNA), but will not affect the overall integrity of the area. Also included here are minor but significant effects on protected species.

Low Negative Effects

10.5.262 These include significant but not major effects on common wildlife habitats, common types of semi-natural vegetation and minor but valuable wildlife features in the landscape. They include adverse effects on important but not protected species where there is temporary disturbance and minor effects.

Neutral Negligible Effects

10.5.263 This category applies to temporary or very small-scale damage to common types of semi-natural vegetation or habitat, or minor losses of such habitat. It also applies to minor adverse effects on very common wildlife species.

Low Positive Effects

10.5.264 This applies to situations where there are significant but not major beneficial effects on common wildlife habitats, common types of semi-natural vegetation and minor but valuable wildlife features in the landscape. It covers positive effects on important but not protected species.

Moderate Positive Effects

10.5.265 This effect category is assigned to a situation where a moderate proportion of an area that is considered to be ecologically important is significantly but positively affected. It also applies to designated sites, key habitats, sites of local and substantive biological importance (LWS or LNA), and significant beneficial but not major effects on protected species.

High Positive Effects

10.5.266 This situation occurs where a development results in significant but beneficial effects, on a large-scale and on site integrity, on the ecological significance of an area or site. It would apply where the ecological importance of a site is elevated to SPA, SAC, SSSI etc standard, and possibly to the status or importance level of key habitats as listed in *The UK Biodiversity Action Plan Steering Group Report* such as lowland meadow, lowland dry acid grassland or standing

open waters, on a large-scale. It could also apply to a situation where a site becomes capable of supporting large or exceptional populations of statutorily protected species.

Introduction to the Assessment of Effects of the Project

10.5.267 The effects are assessed with reference to *The MGP Construction Methods Report (B4027 OA/20005.12.07 Revised 07.02.08 HBC The MG Team*).

10.5.268 In assessing the biodiversity effects of the construction and operation of the Project, the primary consideration is the potential for adverse effects on the European Site because of its international importance, its location immediately downstream of the Project, and the fact that it is important principally for its wild birds which are mobile and may be adversely affected by the Project during their migratory, feeding, roosting and other activities outside the designated site.

10.5.269 Natural England's advice on the protection of the designated site is set out in *Mersey Estuary European Marine Site; English Nature's advice given under Regulation 33(2) of the Conservation (Natural Habitats & c) Regulations 1994, as amended (*English Nature 25 May 2001*).*

10.5.270 It is stated in the above document, hereafter referred to as the *Regulation 33 Package*, that a major aim of *The Birds Directive* is to take special measures to conserve the habitats of qualifying birds to ensure their survival and reproduction within the European Union. A key mechanism is SPA designation. The conservation objectives at site level focus on maintaining the condition of the habitats used by the qualifying species.

10.5.271 In addition to focussing on avoiding deterioration to the habitats of the qualifying species, also requires that activities are taken to avoid significant disturbance to the species for which the site was designated.

10.5.272 Natural England's advice in the *Regulation 33 Package* is that bird communities are highly mobile and exhibit patterns of activity related to tidal water movements and many other factors. Different bird species exploit different parts of a marine area and different prey species. Changes in habitat may affect them differently. The important bird populations therefore require a functional estuary which is capable of supporting intertidal habitat for feeding and roosting.

10.5.273 The *Regulation 33 package* goes on to specify the most important factors related to the above which include;

a. Extent and distribution of suitable feeding and roosting habitat (e.g. intertidal sediments, saltmarsh and rocky shores);
b. Sufficient food availability (e.g. molluscs, crustaceans, worms and insects, soft-leaved and seed-bearing plants);
c. Levels of disturbance consistent with maintaining conditions for bird feeding and roosting;
d. Water quality necessary to maintain intertidal plant and animal communities; and
e. Water quality and salinity gradients necessary to maintain saltmarsh conditions suitable for bird feeding and roosting.

10.5.274 Figure 4 of the *Regulation 33 Package* provides an indicative illustration of key bird concentrations within the European Marine Site. Figure 4.i of the document indicates the key bird concentrations for roosting/loafing birds, and Figure 4.ii shows the key feeding areas.

10.5.275 The key bird concentrations for roosting/loafing birds are all the saltmarsh areas and those areas of the sand and mudflats which are not inundated by the spring tides (Figure 4.i of the *Regulation 33 Package*). The latter include a continuous area of intertidal habitat along the south shore of the European Site beginning about 3.5 kilometres downstream of the Runcorn Gap and continuing about 14 kilometres west along the shoreline, a continuous area along the north shore of the European Site extending immediately downstream of the Runcorn Gap for about 12-13 kilometres in the west, and three separate areas of intertidal sand and mudflats in the central parts of the Middle Estuary, the first extending west from the north shore key area about 3.5 kilometres downstream of the Runcorn Gap.

10.5.276 The greatest extent of the European Marine Site key feeding area, as shown in Figure 4.ii of the *Regulation 33 Package* begins about eight kilometres downstream of the Runcorn Gap, in the central part of the Middle Estuary, where there is by far the greatest extent of intertidal sand and mudflats that are exposed at low tide. This area extends to approximately 21.5 square kilometres (216,000 hectares).

10.5.277 There is a much smaller area of key bird feeding habitat about three kilometres downstream of the Runcorn Gap but the extent of this area is relatively limited, covering approximately 1.25 square kilometres (12,500 hectares).

10.5.278 However birds do feed outside the key feeding areas, the feeding areas indicated in Figure 4.ii being significantly greater in extent than the key feeding areas. They include all the remaining area of the SPA sand and mudflats, and the saltmarsh, within the exception of the River channels where sand, silt and mud are never or rarely exposed.

10.5.279 The information presented in Table 2 of the *Regulation 33 Package* document gives an indication of important factors which need to be considered in maintaining favourable condition for birds. These are relevant to the Project assessment and are summarised as follows;

a. Significant disturbance to birds due to human activities can result in reduced food intake and/or increased energy expenditure by birds. The Project could cause disturbance to birds feeding and roosting outside the European Site, during construction and thereafter;
b. Wildfowl and waders require unrestricted views over 200 metres to allow early detection of predators when feeding and roosting. The Project could restrict views of birds feeding and roosting outside the European Site, during and after construction;
c. Intertidal sediments and their plant and animal communities provide both roosting and feeding areas for migratory bird species. Construction of the Project could affect intertidal sediments and their fauna and flora in the European due to release of contaminants downstream during construction and operation of the Project. Further, effects on intertidal sediments upstream of the European in and around the construction area could affect their feeding and roosting value for bird belonging to populations within the SPA but using habitats outside the European Marine Site;
d. Important prey species for birds of the European are marine invertebrates including molluscs, marine worms and crustaceans. Construction of the Project could affect the densities of these prey species in the SPA and in the Upper Mersey Estuary due to release of contaminants and/or due to changes in hydrodynamic conditions. The same considerations apply to marine algae and diatoms; for example Enteromorpha is important for Wigeon;
e. Waterfowl feed and roost on the rocky shores of the European Site. It is unlikely that such waterfowl or their habitats would be affected by the Project because the rocky shores are, in the western part of the European Site, are more than 14 kilometres downstream of the proposed Project;
f. Waterfowl feed and roost on the saltmarsh areas of the European Site. Construction of the Project could result in the release of contaminants and their accumulation in the

saltmarshes of the European Site, an effect which could persist if the continued presence of the Project resulted in hydrodynamic changes in the Upper Mersey Estuary and the continued release of contaminants;

g. Saltmarsh plants are important to Teal and Wigeon in the European Site. Any release of contaminants from the Upper Mersey Estuary during construction of the Project and thereafter could affect the growth of saltmarsh plants and any accumulation of heavy metals or other contaminants in the foliage of plants could affect feeding birds as a result of accumulation. However the effects of contaminants on saltmarsh plants should be assessed against the background that the survival of the saltmarsh is threatened by the natural hydrodynamic forces in the Upper Mersey Estuary which are occurring despite the existing and historic contamination; and
h. Saltmarsh vegetation of a specified height (<10cms) is required by roosting waders and a height of <5cms is required by feeding Wigeon. Any release of contaminants during construction of the Project could affect the growth and height of vegetation in downstream areas of saltmarsh in the European Site, as already mentioned.

10.5.280 Natural England, in the *Regulation 33 Package*, advises that any operations that may cause deterioration of habitats for which sites have been designated, or cause disturbance to species which use those habitats, should be assessed using a three step process as follows;

a. Assessment of the sensitivity of the interest features or their component sub-features to the proposed operations;
b. Assessment of the exposure of each interest feature or their component sub-features to the operations; and
c. Final assessment of current vulnerability of interest features or their component sub-features to operations.

10.5.281 Further advice in the *Regulation 33 Package* is summarised as follows;

a. Sensitivity assessment should consider the relative sensitivity to the effects of broad categories of human activities, and in relation to the use of the habitat by birds;
b. Exposure assessment should consider the relative sensitivity to the effects of broad categories of human activities currently occurring on the site, and in relation to the use of the habitat by birds; and
c. Vulnerability assessment is the process to determine vulnerability of interest features or component sub-features to operations. The effects of sensitivity and exposure are integrated so that vulnerability is where a feature is exposed to an external factor to which it is sensitive.

10.5.282 The *Regulation 33 Package* goes on to advise that the relevant and competent authorities for the European Marine Site should avoid habitat and species deterioration, and significant disturbance to species for which the site is designated, through any of the following;

a. The physical loss through removal, smothering and reclamation for development and other purposes. This could include conversion of saltmarsh to agricultural grassland, as has occurred in the Estuary;
b. Physical damage abrasion including siltation and selective extraction. This could include dredging;
c. Noise or visual disturbance. The latter could be caused by bridgeworks and the presence of large structures such as bridges;
d. There could be increased synthetic and/or non-synthetic toxic contamination including radionuclides;
e. Non-toxic contamination including changes in nutrient and/or organic loading, changes in thermal regime and/or turbidity, and/or salinity may occur; and

f. Biological disturbance through the introduction of non-native species and translocation, and/or the selective extraction of species for which the site has been selected or which form important food sources or habitat for the migratory species and waterfowl.

10.5.283 More detailed advice of the above effects is presented in the *Regulation 33 Package*. The following issues are relevant to the assessment of the Project.

a. The loss or deterioration of important intertidal habitats may reduce bird numbers on the Estuary;
b. Development may remove intertidal habitats and reduce the amount of suitable land available for the inland migration of saltmarsh;
c. Intertidal sediments and saltmarsh are highly vulnerable to loss and moderately vulnerable to smothering;
d. Physical damage can alter habitat structure and may cause adverse changes in species composition. This can lead to sediment de-stabilisation and increased erosion, with degradation of bird feeding and roosting habitat. Natural England's guidance in the *Regulation 33 Package* states "The habitats of the Estuary both within the European Marine Site and adjacent to it contribute to the "health" of the internationally important wildfowl populations including all qualifying species and their associated food supplies. Therefore, any operations or activities that would adversely affect the feeding and roosting habitats may be detrimental to the species and it will be important to ensure that any development proposals outside the European Marine Site do not have a knock-on effect within." It is clear from the above that consideration must be given to the effects of the Project on the European Marine Site because it is adjacent to it, and there is a potential knock-on effect within the designated site for the first two reasons and also because it is upstream of the designated site and there is an established history of contamination and other urban and industrial influences;
e. Construction of the Project may cause localised and temporary increases in the levels of suspended sediments which may be deposited on the intertidal habitats, including those downstream in the European Site, reducing the visibility of prey species, causing reduced light availability for photosynthesis, and posing a risk of damage to feeding or respiratory structures;
f. Direct scouring or abrasion activities could occur as a result of development in the estuary, particularly in areas where the estuary is at its narrowest. This could lead to hydrodynamic changes including potentially increased sediment erosion in other parts of the Estuary. Physical damage to saltmarsh due to abrasion is given moderate vulnerability in the *Regulation 33 Package*; this could apply to Project construction activities on the saltmarsh habitats; The *Regulation 33 Package* advises that the estuary has a high vulnerability score to the combined effects of noise and visual disturbance from industrial, transport and recreational activities. It is pointed out that if noise and visual disturbance are persistent, roosting and feeding opportunities for birds may be reduced. Further, such disturbance effects may be more damaging in prolonged periods of cold weather. Other factors need to be considered including level of disturbance, reactions of other birds nearby, flock size, bird habituation, and the presence of alternative sites;
g. The *Regulation 33 Package* also draws attention to the issue of artificial lighting, which could affect night feeding by birds or cause disorientation during flight or collision with structures. It is stressed that disorientation can be particularly significant where nationally or internationally important bird populations concentrate along flyways or on regular feeding and roosting areas;
h. The *Regulation 33 Package* points out that the Estuary contains one of the largest concentrations of heavy industry in the UK with the result that the Mersey catchment has received a heavy load of pollutants in the past. It is stated that seabirds and wildfowl are

subject to the accumulation of toxins through the food chain and can be affected in other ways, directly and indirectly, by toxic substances; and

i. Attention is drawn in the *Regulation 33 Package* that recent research has shown that saltmarshes and mudflats, because of the significant level of pollution carried on, the fine silts and clays of which they are composed, can constitute a major pollution threat should those sediments be re-worked. The *Regulation 33 Package* names PCBs (polychlorinated-biphenyls), pesticides, fertilisers and heavy metals amongst others. Erosion of the sediments will cause the pollutants to be made available for wider distribution. Examples are given of pollution episodes.

10.5.284 Detailed advice is given in the *Regulation 33 Package* on other issues including non-toxic contamination and biological disturbance.

10.5.285 Non-toxic contamination includes changes in nutrient loading, changes in organic loading, changes in thermal regime, changes in turbidity and changes in salinity. The Project is unlikely to cause nutrient, organic and thermal regime changes but changes in turbidity due to the possibility of sediment releases need to be considered. Salinity is unlikely to be altered because such changes are dominated by the existing tidal influences affecting the Upper and Middle Mersey estuaries.

10.5.286 Biological disturbance includes the introduction of microbial pathogens, non-native species and translocation, and selection extraction of species. The Project is unlikely to cause such disturbance apart from the possibility that non-native plant species, particularly Japanese Knotweed and Giant Hogweed, could be introduced to areas where they do not occur, by the construction works.

10.5.287 The Regulation 33 Package tabulates the guidance given on sensitivity, exposure and vulnerability assessment, a summary of which is given in Table 10.5 for exposure.

Table 10.5 - Assessment of the Relative Vulnerability of Interest Features and Sub-Features of the Estuary European Marine Site to Different Categories of Operation of the Project.

Categories of construction & operation that may cause deterioration or disturbance		**Internationally important assemblage of migratory birds and waterfowl**	
		Intertidal sediment communities	**Saltmarsh communities**
Loss	Removal	High sensitivity High vulnerability	High sensitivity High vulnerability
	Smothering	Moderate sensitivity Moderate vulnerability	Moderate sensitivity Moderate vulnerability
Damage	Siltation	Low sensitivity Low vulnerability	Low sensitivity Low vulnerability
	Abrasion	Low sensitivity Low vulnerability	Moderate sensitivity Moderate vulnerability
	Selective extraction	Low sensitivity Moderate vulnerability	Low sensitivity Low vulnerability
Non-physical disturbance	Noise	High sensitivity High vulnerability	High sensitivity High vulnerability
	Visual	High sensitivity High vulnerability	High sensitivity High vulnerability

Categories of construction & operation that may cause deterioration or disturbance		Internationally important assemblage of migratory birds and waterfowl	
		Intertidal sediment communities	Saltmarsh communities
Toxic contamination	Introduction of synthetic compounds	Moderate sensitivity High vulnerability	Moderate sensitivity High vulnerability
	Introduction of non-synthetic compounds	Moderate sensitivity High vulnerability	Moderate sensitivity High vulnerability
Non-toxic contamination	Changes in nutrient/ organic loading	Moderate sensitivity High vulnerability	Low sensitivity Low vulnerability
	Changes in turbidity	Low sensitivity Low vulnerability	Low sensitivity Low vulnerability

10.5.288 The preceding advice from the European Marine Site document and the information in the preceding tables has been considered and taken into account in the assessment of potential construction and operational effects of the Project.

Assessment of the Significance of Effects

Definition of significance with regard to birds

10.5.289 It has been assumed in this assessment that the objective is to maintain all bird species in the area affected by the Project at a favourable conservation status in their natural range. This is the requirement set for European protected species by The Habitats Directive and the Conservation Regulations. It sets a high standard as none of the bird species present in the area affected by the Project is a European protected species.

10.5.290 However this objective does not preclude reduction in absolute numbers provided that the reduction does not prejudice the long-term survival of the species in the locality in which the development will take place. Accordingly, any impact that would prejudice the long-term survival of the species in the locality is considered significant and any which does not is considered to be not significant.

Determination of significant effects with regard to birds

10.5.291 The significance for birds of the loss of an area of habitat can only be determined by a three-stage process. First, the species and numbers of birds utilising the habitat(s) must be determined by accurate counts related to the specific area of land impacted, as has been done. Second, the way(s) in which the area is used by the birds must be established. Third, the numbers of birds affected must be put into the context of the population size and dynamics of the species under consideration, as these determine the vulnerability of the local population to a given reduction in numbers.

10.5.292 While habitat type determines the bird assemblage that can potentially occur, the condition of the habitat modifies this potential. As is evident from the preceding sections of the assessment, the carrying capacity of a habitat may vary widely due to local influences. For example, the value of inter-tidal flats as feeding habitat for birds varies according to the nature of the substrate and its stability as well as physical factors such as slope, the presence of drainage channels and the duration of exposure by the tide.

10.5.293 Similarly, saltmarsh may support a wide range of breeding and wintering birds but the species present and their numbers will depend on factors including the character of the vegetation, its structure, the presence of other features such as creeks and pools and the frequency of tidal inundation. As there may be considerable localised variation in habitat quality, detailed information is required. Some losses of land area may be of no significance whatever while others may be of great importance for large numbers of birds.

10.5.294 In general, it is a fair assumption that loss of feeding habitat that is used by birds will reduce the potential maximum population size of the affected species. A given reduction will be less likely to affect the national and local survival of a species where the species is numerous and with a stable or increasing population and more likely to do so where the species is not numerous and is declining. Factors such as the potential reversibility of any decline, individual longevity and recruitment rates may also be relevant where the vulnerability of the species is uncertain.

10.5.295 The temporary denial of access to feeding habitat, by disturbance, may also result in a reduction in overall numbers using the site for the duration of the disruption. However, because the numbers wintering in an area vary in response to a variety of factors including breeding success, and the winter food resource also varies, there are years in which a site will have surplus carrying capacity, so that birds displaced by disturbance will be unaffected. There are also years in which the converse is true and displacement is more likely to result in mortality. As such years cannot be predicted, enabling work to be timed to minimise risk, the worst-case assumption should be made that mortality will ensue.

10.5.296 However, unlike permanent habitat loss, the removal of the cause of disturbance frees the area affected for recolonisation, enabling the affected species to recover their numbers. Whether or not they will do so again depends on a number of factors but, in general, it is reasonable to assume recovery in the case of species with a stable or increasing population, and to consider the status of and influences on any declining species before reaching a conclusion on the probable outcome.

10.5.297 Loss of habitat used by estuarine waterbirds for roosting does not necessarily have effects comparable to the loss of feeding areas. There may be alternative roosting areas in the vicinity that can be used without significant additional expenditure of energy in commuting. In the case of the Project, such a site exists at Fiddler's Ferry Power Station Lagoons and displacement of birds whether temporary or permanent is unlikely to have any effect on survival or population size.

National and site specific trends

10.5.298 Numbers of birds on UK estuaries are monitored by the BTO as part of an "Alerts System" to identify significant population trends in individual species. Proportional changes in smoothed index values over 5, 10 and 25 year terms are calculated. Declines of 25-50% trigger Medium Alerts and trends greater than 50% trigger High Alerts. Nationally, evaluated species include all species potentially affected in more than minimal numbers by the proposed Project, with the exception of Canada goose.

10.5.299 Table 10.5a gives a general indication of vulnerability of the species present on the New Bridge line based on British population size (Pollitt et al 2003) and 25-year trend (17-year trend for cormorant), as taken from the WeBS Alerts (Maclean & Austin 2006). Note that stable populations include those with a decline or increase within the natural range of variation. Based on this matrix, two species have moderate vulnerability at the national scale – shelduck and mallard, dunlin has low vulnerability and other relevant species have nil vulnerability.

Table 10.5a - Vulnerability of populations

Long-term Alert status Population SIZE	**High alert** *>50% decline.*	**Medium alert** *25-50% decline.*	**Stable** *<25% decline - <33% increase.*	**Medium increase** *33-100% increase.*	**High increase** *>100% increase.*
<1000	Very high	Very high	High	Moderate	Moderate
1000-10,000	Very high	High	Moderate	Low	Low
10,000-100,000	Very high	High	Moderate Shelduck	Low	Nil Cormorant Canada Goose
100,000-1 million	High	Moderate Mallard	Low Dunlin	Nil	Nil Teal Curlew Redshank
>1 million	High	Moderate	Nil	Nil	Nil

10.5.300 WeBS Alert data for the European Site (i.e. excluding the Upper Estuary) covering the period to 2004/05 (Maclean & Austin 2006) embrace 12 wintering species including shelduck, teal, lapwing, dunlin, curlew and redshank. Results are given at Table 10.5b. Of the species potentially affected by the Project, only shelduck has Alert status.

Table 10.5b - Alert status of relevant European Site species

Species	**Alert status**		
	Short-term	**Medium-term**	**Long-term**
Shelduck	(Medium alert) *(1)*	Medium alert	High alert (-61%)
Teal	Stable	Stable	Stable (0%)
Lapwing	Stable	Stable	High increase (+237%)
Dunlin	Stable	Stable	Medium increase (+63%)
Curlew	Stable	Stable	High increase (+195%)
Redshank	Stable	Stable	High increase (+275%)

(1) Status in brackets indicates that the change in numbers is within the range of natural fluctuation and may therefore be of no significance.

Application to this Assessment

10.5.301 Significance is judged taking account of:

a. Vulnerability of species, as defined in Table 10.5a**,**
b. The current abundance of species in the locality which has been taken to be the whole Estuary,
c. Status of species in the locality, as defined in Table 10.5b**,**
d. The numbers of birds predicted to be affected, and
e. Whether the activity affecting the birds is temporary or permanent.

10.5.302 Table 10.5c sets out the numbers of birds predicted to be affected by the proposed Project.

Table 10.5c - Numbers of birds affected

Species	Temporary activities			Permanent effect
	Habitat loss to causeway	Habitat loss to jetty	Disturbance from construction	Habitat loss to bridge
Cormorant	0	<1	3	<1 bird
Canada goose	<1	<1	12	
Shelduck	0	<1	22	
Teal	<1	<1	40	
Mallard	<1	<1	15	
Ringed plover	0	1	0	
Lapwing	<1	3.6	132	
Dunlin	0	<1	19	
Curlew	<1	<1	15	
Redshank	<1	<1	9	

10.5.303 No Alert status has been calculated for cormorant or Canada goose in the European Site. Cormorant numbers are increasing nationally and on the Mersey the mean peak rose from 94 for the period 1995/6-99/00 to 133 for the period 1999/00-03/04. Canada geese are increasing rapidly in numbers nationally and on the Mersey the mean peak rose from 512 to 719 for the same period. It is considered that a "worst case" reduction in numbers of the size indicated by Table 10.15c would not be significant in relation to either of these species, which could reasonably be predicted to recover their former numbers by recruitment.

10.5.304 Alert status for teal, curlew and redshank gives no cause for concern and all three have very low vulnerability at the national level. Accordingly, its is reasonable to conclude that mortality at the levels indicated, were it to occur, would be made good by recruitment subsequently.

10.5.305 Shelduck is moderately vulnerable at national level and in the Mersey SPA is subject to a provisional Medium Alert in the short term and a High Alert in the medium term. The decline in shelduck numbers on the Mersey is in contrast to largely stable national and regional trends (BTO 2005). The evidence is of a move away from the European Site and it is likely that site-specific factors are the cause of this change. The short-term trend may simply relate to normal fluctuation and it is therefore unclear whether or not the decline will continue. The most recent five-year mean in the whole estuary is 3016 birds and a worst case reduction by 23 birds would represent 0.76% of this total. In view of the total size of the national and local populations, this would not result in loss of favourable status of the species in the locality.

10.5.306 Mallard has no Mersey Alert status. Its national population is moderately vulnerable and the mean peak for the whole Estuary has declined from 1355 to 1045 between 1995/6-99/00 and 1999/00-03/04, though the latter mean is based on incomplete counts in each of the years in the five year period. A worst case reduction by 30 birds in the population would therefore represent a decline of less than 2.9%. Taking into account population size at both national and local levels, it is reasonable to conclude that this reduction would not result in a permanent loss of favourable status. In this connection, it is noted that mallard is a wildfowling quarry species on the Estuary and that there is a general presumption that existing wildfowling mortality is already made good by recruitment.

10.5.307 Ringed plover has no Mersey Alert status. The national population has very low vulnerability and on the whole Mersey the mean winter peak of 76 birds declined to 65 between 1995/6-99/00 and 1999/00-03/04 while the autumn passage peak rose from 521 to 603 birds. These changes are too small scale to be taken as representing a defined trend. It is concluded that the possible worst case reduction by one bird would not alter the status of the species in the Estuary and would be made good by subsequent recruitment.

10.5.308 Lapwing numbers in the European Site have decreased sufficiently since the mid-1990s to trigger Medium Alerts in the short and medium term. This trend is similar to but more severe, than regional and national trends and may be related to a series of mild winters with a greater proportion of birds wintering inland (and remaining in continental Europe) rather than to changes in the Estuary. The long-term national trend for lapwing is positive and the species has very low vulnerability. The worst-case reduction of 136 birds against an Estuary mean peak of 11,832 is 1.15% and this reduction would not affect the species' status in the locality even if it were not subsequently made good.

10.5.309 Dunlin has moderate vulnerability at national level but no Alert status in the Estuary. A worst case reduction of 20 birds against a mean peak of 49,384 would have no effect on the species status.

10.5.310 Table 10.5d summarises species status and the conclusions reached. With no grounds to conclude that there will be significant negative effects on any species, no consideration has been given to compensation provision other than remediation of effects on the saltmarsh zone arising from construction works.

Table 10.5d. - Significance of predicted effects on species

Species	Vulnerability	Alert status	Local population		Numbers affected		Significant
			Upper Estuary	Mersey SPA	Temp-orary	Perm-anent	
Cormorant	Nil	No	44	109	4	0	No
Canada goose	Nil	No	126	916	14	0	No
Shelduck	Moderate	Medium-high	57	3064	23	0	No
Teal	Nil	No	264	8830	42	0	No
Mallard	Moderate	No	130	778	17	up to 15	No
Ringed plover	Nil	No	3	58	1	0	No
Lapwing	Nil	No	4100	12150(1)	136	up to 136	No
Dunlin	Low	No	16	42876	20	20	No
Curlew	Nil	No	95	1535	17	0	No
Redshank	Nil	No	16	4359	11	0	No

Note: (1) incomplete count

Assessment of Construction Effects

Definition of significance with regard to birds

10.5.311 Assessment of the construction effects is based on the *Construction Methods Report* (Appendix 2.1).

10.5.312 The assessment of construction effects covers three major elements of the construction process as outlined below;

a. There will be construction and use of access roads, haul roads and contractors' compounds. This includes the construction of access roads across the saltmarsh and other habitats including the intertidal sandbanks and the River channels prior to and during bridge construction;
b. Secondly, there will be construction of the Project infrastructure. This involves the

construction of the piers and towers, the bridge deck and other elements, including the possible construction of temporary coffer dams; and

c. The third element will be construction of the Project approach roads and junction improvements. These scheme elements involve the construction of embankments, bridges and modifications to existing highways and junctions. They include de-linking works.

10.5.313 The effects on receptors fall into five main categories as summarised below;

a. Potential effects on habitats and flora;
b. Potential effects on fauna, particularly birds;
c. Potential effects on protected species and their habitats including bat species, Badgers, Water Voles and Great Crested Newts;
d. Potential long-distance direct and indirect effects on designated sites, namely the Estuary SPA, SSSI, Ramsar site and European Marine Site; and
e. Potential obstruction(s) to bird and other faunal movements either directly due to structures or due to disturbance.

Assessment of Operational Effects

10.5.314 The operational effects considered fall into four main categories as follows;

a. There will be potential effects due to the presence of the Project and associated infrastructure, and traffic activities including people on wildlife and habitats in the Upper Mersey Estuary and its surroundings;
b. Potential effects of lighting and noise on wildlife, particularly birds, may occur, emanating from activities associated with the bridge and approach roads, including traffic and people;
c. There are potential long distance effects on the European Site in the Middle Estuary; and,
d. There are potential effects of the use of the proposed Project on wildlife migration between the European Site downstream and the Upper Mersey Estuary.

10.5.315 The effects on the four main receptor categories as described for the construction effects have been assessed.

Consultation

10.5.316 Consultation meetings with regard to nature conservation matters have been ongoing on the project since 2005. The consultation meetings have involved Natural England, formally English Nature, the Environment Agency (EA), the Royal Society for the Protection of Birds (RSPB) and the Local Wildlife Trust (LWT).

10.5.317 Eight formal meetings between 2005 and 2007 have been held with Natural England, the minutes of the meetings are included in Appendix 10.3. The EA, RSPB and LWT attended a number of these meetings and the EIA Scoping Report was issued to each organisation for comment.

10.5.318 The meetings provided an opportunity for the project team to give an update on the progress of the project and ensure that the scope of the ecological surveys were appropriate for the potential effects of the project.

10.5.319 The effect of the project on the European Site was the focus of many of the meetings and the consultation enabled the Project Team to discuss draft findings and methods of assessment. Natural England provided feedback on the work that had been undertaken and comments received from all the organisations were taken into account in the ongoing assessment work.

10.5.320 Many of the meetings focused on the understanding the direct and indirect impacts of the project on the European Site and identified assessment methods to be employed to ensure that the effects of the project were fully explored and understood.

10.6 Baseline and Results: Literature Review and Collation of Existing Information on the Estuary

Identified Sites of International, National and Local Nature Conservation Importance, and Context

The Mersey Estuary

10.6.1 The principal habitat feature of the Study Area is the Upper Mersey Estuary which is a small part of the Estuary that extends from Warrington in the east to Liverpool Bay in the north-west.

10.6.2 The entire Mersey Estuary is an estuarine ecosystem which was first brought to national prominence as an important area for the conservation of nature in 1977 with the publication of *A Nature Conservation Review* that was edited by Dr Derek Ratcliffe, Chief Scientist of the Nature Conservancy Council at that time.

10.6.3 In 1947 two Government White Papers were published, one of which was *Conservation of Nature in England and Wales (Cmd 7122).* This, and *Cmd 7235* which applied to Scotland, presented the basic philosophy that nature conservation in Britain should be centred on the safeguarding of a fairly large number of key areas. The intention was that these key areas should adequately represent all major types of natural and semi-natural vegetation, including their characteristic assemblages of plants and animals which were associated with the habitat conditions of the areas, namely climate, topography, rocks, soils and biotic influences. The selection of key sites was also intended to represent geological and physiographic features for their particular interests.

10.6.4 The key site concept, on which *A Nature Conservation Review* is based, resulted in the identification of 735 selected key sites, which are described in Volume 2 of *A Nature Conservation Review*. The Estuary was selected as a coastland key site and included in the Midlands region.

10.6.5 The extent of the Estuary key site, as described in *A Nature Conservation Review* (Volume 1), is described as the Upper Mersey above Liverpool; this is the part of the Estuary which is referred to as the Middle Mersey Estuary in this Chapter. The site was described as having extensive flats but as being important mainly for its large wintering population of duck, with wading birds being much less numerous than on the Dee Estuary that was also identified as a key site. The Dee Estuary was described as containing large areas of flat and coastal saltmarsh, and being of high ornithological importance for its wader populations, the latter being the third largest in Britain.

10.6.6 The key sites identified in *A Nature Conservation Review* were graded as follows;

a. Grade 1 – These are sites of international or national (Great Britain) importance which are equivalent to National Nature Reserves (NNR) in nature conservation value. It is stated in the Review that the safeguarding of all grade 1 sites is considered essential if there is to be an adequate basis for nature conservation in Britain; that is in terms of a balances representation of ecosystems, and inclusion of the most important examples of wildlife or habitat;
b. Grade 2 – These key sites are of equivalent or only slightly inferior merit to those in grade 1. They are of prime importance but may duplicate the essential features of related grade 1 sites, which should have priority in conservation;
c. Grade 3 – These are sites of high regional importance, rated as high quality SSSI but not of NNR standard. Regional as distinct from national criteria apply; and
d. Grade 4 – Sites of lower regional importance are graded 4 but are still rated as SSSI

status. However some of these sites would not qualify as SSSI if located in a region with more extensive representation of the particular ecosystem.

10.6.7 The Estuary was identified as a grade 2 key site in *A Nature Conservation Review*. Since the designation applies only to the upper and wider part of the Estuary, the Upper Mersey Estuary is excluded from the designation. There are no other key sites of any grade in the Project Study Area and none in close proximity to the Study Area.

10.6.8 Although the Estuary Grade 2 Key Site is outside the proposed construction area of the Project, it is necessary for the Environmental Assessment to give prime consideration to the assessment of potential effects on its habitats and associated wildlife for many reasons, of which the following are, potentially, of major importance;

a. The Upper Mersey Estuary which is crossed by the Project is part of the large estuarine ecosystem, the major part of which (downstream of the Upper Estuary) is designated as a key site. It is possible that changes in the upper part of the ecosystem could result in adverse changes to the habitats in the larger and downstream part of the ecosystem (the European Site) which is of key site status;
b. It is also possible that the construction and/or the operation of the Project could affect the movements of birds between the upper and middle estuaries; for example this could apply to species which use one part of the Estuary for feeding and another part for roosting, or both parts of the Estuary for feeding;
c. The hydrological continuity of the Upper Estuary and the key site downstream could result in water quality changes such as pollution or sedimentation caused by the Project being transmitted to the Key Site, via the ebbing tide of river water flows; and
d. It is not known if particular bird species inhabiting the Upper Estuary are part of the larger populations of the same species in the Key Site. If the populations of any species are the same, any changes to the numbers of birds outside the Key Site could affect the overall size of the population. This could be of significant importance in the cases of species upon which the Key Site designation is based.

10.6.9 Because of the identification of the Estuary as a grade 2 Key Site, it is necessary for the literature review to give the Middle Mersey Estuary prime consideration so that existing knowledge is utilised in the assessment. This applies to the Upper Mersey Estuary as well as to that covered by the grade 1 Key site.

Sites of Local Nature Conservation Importance and Areas Inhabited by Protected Species

10.6.10 The Project Study Area includes several sites of local nature conservation importance that are significant in county or borough contexts, and there are localised and sometimes extensive areas inhabited by protected or rare species. Data, where available, have been collated from these sites and areas, and are presented either here in the literature review and/or in the descriptions and evaluation of those sites or areas as appropriate.

Review of Existing Information on the Mersey Estuary

10.6.11 The area of the Estuary Grade 2 site is stated in *A Nature Conservation Review* to be 5,300 hectares. The site description refers to a large area of inter-tidal mud flats.

10.6.12 The *Review* states that despite the proximity of large urban-industrial complexes, the area supports very large numbers of wildfowl. It is mentioned that, in particular, Pintail (1,000 birds) had increased markedly there in recent years (up to the 1970s), and in 1970-71 the November and February figures were 5,500. Total wildfowl numbers at that time reached 11,000. Teal (1,800 birds) had also increased to about 2,500 and represented the second largest gathering in

the British Isles, whilst Mallard, Wigeon and Shelduck also occurred regularly in some numbers.

10.6.13 Waders were up to 19,000 in 1970-71; this figure included 13,000 Dunlin.

10.6.14 The *Review* description also mentioned the reclaimed and consequently fresh marshes to the south of the Manchester Ship Canal which runs close to the south shore between Ince and Frodsham. These marshes were considered to be an integral part of the area from an ornithological viewpoint by providing refuge and feeding habitats during high tides, and they also supported uncommon plants. However it was stated that the marshes were affected by industrial development and agricultural improvement.

10.6.15 The industrial history of the Estuary, as well as information on its habitats and wildlife, is relevant to the review and collation of information. One of the most significant developments was the construction of the Manchester Ship Canal, between 1887 and 1893. The Manchester Ship Canal is 36 miles long and extends from Eastham on the south bank of the Middle Mersey Estuary to Runcorn at the Upper Mersey Estuary, and then to Manchester.

10.6.16 The construction of the Manchester Ship Canal involved considerable changes to the south side of the Estuary, largely due to retaining wall construction. There were also numerous dock developments which affected the northern and southern banks of the Estuary.

10.6.17 According to the late Eric Hardy (Mersey Estuary Conservation Group 1995), the construction of the Manchester Ship Canal affected tidal flows and sedimentation, forming the higher mud “fret” and increasing Ince-Stanlow marshes.

10.6.18 John Handley (Mersey Estuary Conservation Group 1995) explains how the Manchester Ship Canal had the most profound effect on the Estuary, both ecologically and hydrographically, often in an indirect way. He states that dredging work around the mouth of the Estuary, together with other activities, caused the main low water channel to be fixed. It was also fixed for a long period against the north shore near Runcorn. As a result, during the 1920s, ‘30s and ‘40s, the channel was kept away from the Ince and Stanlow Banks. This resulted in significant accretion of mudflats on the seaward side of the Manchester Ship Canal which later led to a spectacular surge in importance of the Estuary, and to pre-eminence in Europe as a site for wintering waders and wildfowl.

10.6.19 Handley also explains that the Manchester Ship Canal has had qualitative effects on the Estuary. The water tends not to enter the Estuary from the canal in a uniform manner; instead it enters as surges of water through a process termed levelling as the lock gates at the end are opened. This meant that if pollutants were entering the canal there could be accumulation with very high concentrations of pollutants suddenly entering the Estuary. Handley (1995) refers to this happening in the 1970s when organic lead contamination entered the Estuary from the Manchester Ship Canal. Dunlin were entering the Estuary when this happened, with the result that very large numbers of the birds died.

10.6.20 The Manchester Ship Canal cut off a large area of saltmarshes and saltings on the landward side of the Estuary, including Helsby Marshes.

10.6.21 Handley (1995) also explains that the Manchester Ship Canal also completely disrupted the natural discharge of rivers and sediments from the Mersey catchment. As a result, all the detritus carried by the rivers from the Pennines ended up in the Manchester Ship Canal which had to be dredged to maintain conditions for navigation. The dredgings were dumped in large lagooned areas, some of which had begun to colonise naturally in the 1980s and developed significant wildlife interest as at Woolston Eyes which was subsequently listed as a Site of Special Scientific Interest.

10.6.22 There has also been tipping of industrial wastes on the saltmarshes associated with the Estuary. For example chemical waste, including waste from the former Leblanc Process for the manufacture of sodium carbonate, was tipped on some of the saltmarshes along the northern side of the Upper Mersey Estuary, and power station ash slurry lagoons were constructed on Cuerdley Marsh, on the north side of the Upper Mersey Estuary.

10.6.23 A detailed introduction to the natural history of the Estuary has been provided in *The Mersey Estuary – Naturally Ours* (Mersey Estuary Conservation Group, 1995) by the late Eric Hardy, an eminent naturalist of Merseyside Naturalists' Association. Hardy refers to wader counts of 1917-1931, along the Garston-Speke shore, with a roost of 500 Golden Plover and 2,000 Curlew before the airport was built. Also of note were five Dotterel in April 1926.

10.6.24 In 1771 Pinkfoot Geese roosted by the Mersey on Cuerdley Moss (in the Upper Mersey Estuary). Dunlin nested at Cuerdley Moss during the 1904-1923 period.

10.6.25 There was shooting disturbance, with 50-60 guns shooting the Cuerdley-Cromwell's Bank marsh and Bower's Brook before the Second World War. Flights of duck declined to only 30-40 at the start of the Second World War. Also of interest is that Halton Marsh had been mainly a Wigeon marsh but Wigeon had deserted the marsh by 1947. A single pair of Garganey nested at Halton Marsh in 1957. Halton Marsh was later drained, contributing to a diminution in the size and ecological interest of the Upper Mersey Estuary.

10.6.26 Hardy (1995) states that regular duck-counting began in 1947 when new national monthly wildfowl counts started.

10.6.27 According to R H Allen (1952-53), an integral part of the Estuary birdlife was the habitats provided by the Frodsham Marsh sludge-deposit pools, but at least part of this site was lost due to grassing over.

10.6.28 It is clear from the accounts of Hardy (1995) that shooting has caused a serious decline in wildfowl using parts of the Estuary. The establishment of the first no-shooting reserve on the tidal Mersey, on part of the south side of the Middle Mersey Estuary, resulted in Teal, Wigeon and Shelduck soon increasing threefold, with Mallard and Pintail nearly doubling. Counts by R H Allen from 1960 to 1977 (Hardy 1995) showed the following increases in counted maxima following the cessation of shooting (see Table 10.7).

Table 10.7 - Counts of birds following the cessation of shooting in parts of the Estuary.

Bird species	Year and number of birds	Year and number of birds
Mallard	1960=278	1976=1,990
Wigeon	1963=1,300	1972=3,270
Teal	1963=2,200	1975=13,114
Pintail	1965=650	1975=10,075
Shelduck	1965=161	1977=4,023

10.6.29 In 1972 Eric Hardy, Peter Scott, Directors of the then CEGB and the Nature Conservancy Council initiated the construction of a bird reserve at Fiddler's Ferry Power Station lagoons where duck shooting and disturbance were controlled. The reserve included the adjacent marsh of the Upper Mersey Estuary for waders and Teal.

10.6.30 Records of gulls using the Power Station Lagoons (Hardy 1995) include Little Gull and Ring-billed Gull. Hardy has also reported that in the 1990s Lesser Black-backed Gulls began to winter

in the Estuary and Great Black-backed Gulls also increased, mainly in the winter.

10.6.31 Thomason, G. and Norman, D. (1995) give an account of wildfowl and waders of the Estuary in *The Mersey Estuary; Naturally Ours* (Mersey Estuary Conservation Group, 1995).

10.6.32 Thomason and Norman (1995) present a useful overview of the Estuary, drawing attention to its dynamic nature. Whilst the main river channel is largely pinned by sandstone outcrops at the Runcorn Gap, the deep channel swings from side to side in the centre of the Estuary with a cycle of only a few years. This rapidly changes the mudflats and saltmarshes, with erosion and accretion cycles. It was pointed out that there was some indication that deposited mud is rapidly colonised by invertebrates.

10.6.33 It was also mentioned that lower numbers of birds are found in the Estuary in mild winters but in very hard weather, when wetlands in continental Europe are completely frozen and eastern Britain is similarly inhospitable, the Estuary holds larger numbers of birds because it very rarely freezes and is usually sheltered from the worst of the weather.

10.6.34 Thomason and Norman (1995) also point out that the Estuary (in the 1980s) was the only British estuary that holds higher numbers of wildfowl than waders. Further, it is a relatively small estuary, and its high bird counts make the density of waterfowl greater than any other major estuary.

10.6.35 The same authors also state that all of the species for which the Estuary is important feed by night and in the cases of some, such as Wigeon, night is the preferred feeding time. However, little is known about nocturnal movements of birds.

10.6.36 Thomason and Norman (1995) have also drawn attention to the fact that the presence of the Manchester Ship Canal makes the south side of the Estuary inaccessible to casual visitors, thereby ensuring lack of disturbance. The presence of good feeding areas and good roosting areas nearby may be another key factor in making the Estuary so important for wintering birds. It is pointed out that this situation contrasts markedly with the Dee Estuary, where vast flocks of birds, reportedly, have suffered so much from human disturbance that they usually fly up to 20 kilometres away, to the Alt Estuary (Mitchell et al, 1988).

10.6.37 Thomason and Norman (1995) present tables of the maximum counts (peak counts) of wildfowl and waders in the winter of each year, in the 1980s. The periods for which data are presented are from 1968/69 to 1988/89. Tables and discussion of the results are provided for a range of wildfowl and waders.

10.6.38 The Estuary (in the 1980s) was stated to be the third best area in the U.K. for wintering Shelduck, the Wash being first and the Dee second. Shelduck was the only wildfowl species likely to occur in any numbers in the Estuary in the summer.

10.6.39 For Wigeon, the Mersey was the ninth best area in the U.K. However for Teal, the Mersey was by far the most important site in Britain, being the only internationally important British site at that time.

10.6.40 According to Thomason and Norman (1995), in the 1980s the Estuary sometimes held more Teal than all the rest of Britain put together, and being the most important site for this bird in North-west Europe. The maximum count of 18,450 in November 1980 represented over three quarters of the British total. Numbers fluctuate considerably, with a low count of 4,290 in the mild winter of 1988/89.

10.6.41 Up to 1980, the above authors stated that Great Crested Grebes were only recorded in ones and twos in the Estuary, but numbers then increased markedly. The authors stated that the Estuary had become nationally important for this species of grebe, and possibly of international importance. The increase was attributed to an increase in water quality and more fish. Grey Heron and Cormorant numbers rose similarly, very probably for the same reasons.

10.6.42 Mallard numbers also increased but not to the level of national importance.

10.6.43 Thomason and Norman (1995) state that Mute Swans are very rarely seen in the Inner Mersey Estuary (Middle Mersey Estuary), with only three records in the 20 years prior to and including 1985.

10.6.44 Turning to wading birds, the same authors stated that the Estuary ranks the seventh most important site in Britain, and three different races of Dunlin use the Estuary. Of interest is the finding elsewhere, by ringing studies of other estuaries, is that individual birds are very faithful to a particular area of an estuary; it is unusual to find a bird more than one or two kilometres from its favoured site. It is not known if this is true of the Estuary but if it is, as is likely, it indicates that there is likely to be little or no interchange or movements of birds between the Middle Mersey Estuary and the Upper Mersey Estuary.

10.6.45 Thomason and Norman (1995) reported increased counts of Redshank between 1968/69 and 1988/89, the Estuary becoming the eleventh best site in Britain for this bird, at that time. The top site in 1988/89 was the nearby Dee Estuary which had also shown increased numbers of wintering birds. It was reported that small numbers of Redshank bred near the Estuary.

10.6.46 The counts referred to by the authors show that Curlew numbers in the Estuary were good but not at nationally important levels at that time. However Rothwell (1995) mentions that Curlew did attain nationally important numbers in the Estuary.

10.6.47 In the case of Golden Plover, the same authors reported that the birds frequently stay outside the counted area, so the Estuary counts do not regularly reflect the numbers present. They also explained that the feeding and roosting habits vary depending on the phase of the moon, with birds preferring to feed at night, although they appear to need some moonlight to feed efficiently. Golden Plover were reported to have declined considerably during the 1980s; until the late 1970s the Estuary regularly held 2-3,000 birds with peak counts of over 4,000 recorded in the winters of 1977/98 to 1979/80.

10.6.48 In the spring there used to be an April peak as high as 6,000 of “Northern” breeders of Golden Plover on Frodsham Marsh and around the Weaver but the spring passage virtually disappeared for reasons unknown.

10.6.49 Thomason and Norman (1995) also stated that Grey Plover were formerly scarce on the Estuary but subsequently became a regular winter visitor with peaks of 300-400 in the 1980s, the Estuary becoming nationally important for this species. There had been an enormous increase in the numbers of wintering Grey Plover in Britain since 1970.

10.6.50 The authors gave details for other waders including Black-tailed Godwit, which at that time (the 1980s) were rarely present in flocks of more than 140-150. They stated that hopes that the species would form a regular wintering flock were not fulfilled, and it returned to its former status as being mainly an autumn passage migrant at that time.

10.6.51 The Estuary, according to the same authors, has seen the return of Peregrine Falcons to their former numbers but Merlin has become rarer. Other visiting or passing raptors mentioned, in small numbers, are Hen Harrier, Marsh Harrier and Short-eared Owl.

10.6.52 Large mixed flocks of common finch species were reported to be attracted to the saltmarshes in the winter months, with Brambling and Twite occurring every winter. Snow Buntings and Lapland Buntings have been occasionally recorded. Skylarks were reported to occur in flocks of hundreds.

10.6.53 The Estuary Conservation Group (1995) stated that the main importance of the Estuary (based on observations in the 1980s) is the vast numbers of common birds for which the Estuary provides vital winter habitat. Attention was also drawn to the important relationship between invertebrate density and waders, and between fish numbers and some birds.

10.6.54 Reference has been made by the Estuary Conservation Group (1995) to the National Gull Census organised by the British Trust for Ornithology and post-1970 bird reports (up to the mid-1980s). It was found that enormous numbers of gulls and terns used the Estuary and its surroundings, with gulls being present throughout the year.

10.6.55 The majority of the gulls were reported to use the Estuary for roosting, particularly at night, with huge flocks feeding inland on rubbish tips in the daytime and returning to the Inner Estuary (Middle Mersey Estuary) to roost on an inter-tidal area where over 100,000 may occur. It was also mentioned that many birds use the Fiddler's Ferry Power Station lagoons.

10.6.56 The numbers of gulls using the Estuary were estimated to be over 100,000 Black-headed Gulls, nearly 23,000 Common Gulls, about 5,000 Herring Gulls, around 10,000 Lesser Black-backed Gulls and about 450 Greater Black-backed Gulls. These numbers represented 11% of the total British coastal numbers of all gulls at that time.

Review of Existing Information on the Fiddler's Ferry Power Station Lagoons

10.6.57 Information on Fiddler's Ferry Power Station Lagoons is relevant to an understanding of the habitats and birdlife of the Estuary because the lagoons replaced most of Cuerdley Saltmarsh and it became evident that the lagoons were being used by many of the bird species that were associated with the intertidal habitats and saltmarshes of the Estuary.

10.6.58 Handley (1995) has referred to the fact that the Fiddler's Ferry Power Station lagoons have become useful wildlife habitats, and they contain breeding areas for Sand Martins.

10.6.59 According to Thomasson and Norman (1995), up to 300 Shoveler have been recorded on the Fiddler's Ferry Power Station lagoons (in the 1980s). They also reported that large concentrations of Pochard have occurred on the Power Station lagoons, and small numbers of Tufted Duck (in the 1980s).

Review of the Saltmarsh Habitats and their Importance in a National Context

10.6.60 According to Alan Grey of the former Institute of Terrestrial Ecology (Mersey Estuary Conservation Group, 1995), there is a total area of around 45,000 hectares of saltmarsh in Britain. The largest single area is in the Wash which contains about 4,500 hectares.

10.6.61 Grey (1995) points out that the Mersey saltmarshes have been rapidly colonised by *Puccinellia maritima* (Common Saltmarsh Grass) which has become dominant in parts of the south shore and reached its maximum height there. In the Estuary it is mentioned that the rayed variety of Sea Aster (*Aster tripolium*) is more common than the rayless form.

10.6.62 With reference to management of the saltmarsh, Grey (1995) points out that large wintering flocks of herbivorous wildfowl, particularly Wigeon, are attracted to the cattle-grazed Puccinellia dominated areas, and often roosting waders, particularly Dunlin.

10.6.63 The preferred management for the saltmarshes is generally considered to be cattle grazing because this improves the attractiveness and availability of the sward for herbivorous wildfowl. The Common Saltmarsh Grass swards (*Puccinellia*) often attract large winter flocks of Wigeon and roosting waders, mainly Dunlin, whereas couch and fescue dominated swards, as on the ungrazed saltmarshes, do not.

10.6.64 From the late 1960s to 1975 there was expansion of the saltmarsh area (Mersey Estuary Conservation Group 1995). The Stanlow and Ince Banks accounted for 220 and 500 hectares of saltmarsh respectively, this being more than half of the saltmarsh in the Estuary in the early 1990s. It was stated that in 1995 there were several hundreds of hectares of saltmarsh in the Estuary of which most was in the Inner Estuary (Middle Mersey Estuary).

The Eastern Irish Sea Concept and Threats to Estuaries

10.6.65 Rothwell, P. (Mersey Estuary Conservation Group, 1995) explains that the Estuary fits into a complex of sites around the Irish Sea from Morecambe Bay in the north to the Wyre, Lune, Ribble, Alt and Dee towards the south. It is explained that individually these sites are of national and international significance, but collectively the Liverpool Bay/Morecambe Bay complex ranks second only to the Banc d'Arguin in North Africa in terms of wintering wader population in the East Atlantic Flyway.

10.6.66 Rothwell draws attention to the fact that an average peak winter count from 1984-1988 revealed the figure of 428,432 wading birds, this being over twice that of the Wash and nearly one-third that of the British wintering wader population at that time. Rothwell claimed that it is perfectly legitimate to sum the bird counts of the estuaries in that the estuaries undoubtedly form a single ecological unit with much interchange of birds between them.

10.6.67 Rothwell presented a table of activities threatening estuaries. At the time of writing of his report, in 1988, the types of threat and number of sites at risk were as shown in Table 10.8.

Table 10.8- Analysis of Threats to Estuaries

Threat type	Number of sites at risk
Recreational	49
Marinas	33
Pollution	29
Land claim	29
Barrage	22
Bait digging	17
Industry	17
Cockle fishing	15
Port expansion	14
Sand winning	8
Threat type	**Number of sites at risk**
Wildfowling	8
Fish farming	3

10.6.68 The threat posed by recreational activities is clearly the greatest but pollution remains a serious threat.

10.6.69 It is worth noting that bridges are not included as a threat but it is possible that bridge construction and subsequent use could result in other threats included in the preceding table, notably pollution and, indirectly, recreation. The Estuary has been used for wildfowling in the past, an activity which still occurs but to a much reduced frequency and extent.

10.6.70 Rothwell also reports that in 1988 a survey of the views of RSPB staff on estuary threats was undertaken (Rothwell 1989). Of the 123 estuaries recorded, 80 were considered to be threatened to some degree, and many sites were at risk from more than one activity. The Estuary was one of the estuaries considered to be most at risk, being one of 24 estuaries considered to be directly threatened. This compares with 14 estuaries considered to be heavily threatened and 37 estuaries considered to be at risk.

10.6.71 As well as water pollution and the deposition of contaminated sediments which have affected water quality, the Estuary has been drastically disturbed at some locations by construction work, notably by the Manchester Ship Canal as described earlier, and the construction of settlement lagoons for ash disposal at Fiddler's Ferry Power Station which resulted in the loss of most of Cuerdley Saltmarsh.

Review of Pollution of the Estuary and Improvements in Water Quality

10.6.72 As mentioned in *A Nature Conservation Review* Volume 2 (Ratcliffe 1977), the Estuary is in proximity to large urban and industrial complexes which cause pollution. The Estuary has also been affected by reclamation of saltmarshes to fresh marshland, and the reclaimed marshes have since been affected by industrial development and agricultural improvement.

10.6.73 The Estuary has long been known to have been affected by pollution. Hardy (1995) states that the first investigation of the effect of pollution on Mersey Estuary birds was the RSPCA's 1920-32 national oiled seabird survey. Pollution was widespread for a long time and there was a case of copper sulphate being used in 1930 to destroy Spartina grass off Stanlow Point; this had a devastating effect on fauna and flora. Pollution controls were removed during the war.

10.6.74 The ecological condition of the Estuary has been significantly and very greatly affected by numerous industrial and other development influences, principally as a result of pollution from the releases of industrial effluents and sewage discharges. It is well known that the Estuary has been severely contaminated in the past over a very long time-scale by chemical works and oil refineries, with the accumulation of a wide range of contaminants including heavy metals (zinc, copper, arsenic, cadium and others) and organic chemicals.

10.6.75 Because of this background, an important study of the Estuary was instigated by the Estuary Conservation Group in the 1970s and 1980s with the involvement of a research team at the University of Salford together with other local organisations and individuals. The proceedings of a conference on the conservation of the Estuary were published in *The Mersey Estuary; Naturally Ours* (edited by M S Curtis, D Norman and I D Wallace for the Estuary Conservation Group, December 1995).

10.6.76 Early invertebrate surveys of the Estuary were carried out by Bassindale (1938) of the Warrington to Hoylake section of the Estuary which revealed 69 species of invertebrate including species of mud, muddy sand and sand sediments. Invertebrates are useful indicators of pollution and they are also the principal diet of most wading birds and some wildfowl.

10.6.77 Hardy (1995) refers to the use of diatoms as noted pollution indicators. In 1972 a list of 26

diatom species was identified, taken from riverbank mud at Eastham. Only 25% of the diatoms contained chlorophyll and most were quite small, these characteristics being indicative of high water pollution.

10.6.78 Invertebrate surveys of the Inner Estuary (Middle Mersey Estuary and Upper Mersey Estuary) began around 1976. Ghose (1979) stated that invertebrates will only inhabit certain areas of intertidal flats where there is a suitable substrate. It was pointed out that a meandering low-water channel will constantly erode and deposit materials in other areas, an action which removes and reforms potential estuarine habitats.

10.6.79 Ghose (1979) examined 10 sites in the outer and inner estuary (Middle Mersey Estuary). He detected 135 invertebrate species including Tubificids and Oligochaete worms. It was found that the Hydrobia (snail) and Macoma (snail) were of quite widespread occurrence but they did not penetrate further upstream than the Oligochaete. Hediste was the only abundant invertebrate in the Mersey and it occurred as far upstream as Fiddler's Ferry.

10.6.80 Whilst the changes in saltmarshes and mudflats may have marked effects on bird numbers and their distribution within the Estuary, the changes are relatively short-term. The biggest long-term effect has undoubtedly been the gradual reduction in pollution in the River leading to a steady increase in its attractiveness for birds. This is evident from plotting the maximum total of all wildfowl counted each winter against river water quality measurements (Mersey Estuary Conservation Group 1995). There were two major decreases in BOD (biochemical oxygen demand), in 1973 and 1979, both of which were followed by massive increases in wildfowl numbers, presumably due to increases in invertebrate densities and therefore greater feeding value.

10.6.81 Thomason and Norman (1995) also pointed out that more wader species were present in important numbers (in the 1980s) which might be an effect of reduced pollution on the invertebrate populations of the mudflats. They also drew attention to a rise in fish-eating species, especially since 1983/84, this being a manifestation of a cleaner river.

10.6.82 Handley, J. (1995) has shown how the fall in BOD (Biological Oxygen Demand) and the increase in oxygen concentration of the water passing over Howley Weir, the upstream tidal limit of the Mersey, has occurred during the period 1962 to 1988. The improvement in water quality was very significant, with the 5 day BOD falling from 40 mg/l in 1962 to about 5 mg/l in 1988.

Summary of the Ornithological Importance of the Estuary in the 1980s

10.6.83 The wintering wildfowl and wader average peak counts for the Estuary in 1984-85 and 1988-89, expressed in terms of their percentages of the British and European populations (Mersey Estuary Conservation Group, 1995), underline the ornithological importance of the Estuary in national and international contexts in the mid-1980s. The percentage figures are presented in Table 10.9;

Table 10.9 - Wintering Wildfowl and Wader Counts, Expressed as Percentages of the British and European Populations, for the Estuary in 1984-85 and 1988-89.

Species	% of British population	% of European population
Lapwing	0.3	0.1
Grey Plover	1.3	0.2
Golden Plover	0.2	0.1
Curlew	1.5	0.4
Redshank	3.7	1.8
Dunlin	5.1	1.6
Shelduck	5.0	1.5
Wigeon	3.5	1.2
Teal	8.7	2.2
Mallard	0.3	0.1
Pintail	34.7	12.4

10.6.84 To summarise, the report of the Mersey Estuary Conservation Group (1995) states that the Estuary was in the top seven British estuaries for total numbers of wildfowl in the mid-1980s. It was 1st for Pintail, 1st for Teal, 6th for Shelduck and 9th for Wigeon. For wading birds it was in the top 15 for total numbers of birds, and 7th for Dunlin and 11th for Redshank.

10.6.85 As will be explained later is this Chapter, numbers of wildfowl and waders may vary significantly from year to year, and numbers of some species, notably Pintail, have declined greatly, but the Estuary is still of national importance for most of the above species that were present in nationally important numbers in the 1980s.

10.6.86 Of major significance to the present assessment is that the publication points out that the Inner Estuary (Upper Mersey Estuary), upstream from the Widnes to Runcorn bridges, was in the 1980s a relatively unimportant feeding area for wading birds and wildfowl.

10.6.87 The question was posed as to what will happen when conditions begin to improve in the Upper Mersey Estuary. However it was cautioned that there could be mobilisation of heavy metals in the sediments, but no evidence was put forward as to how this might occur.

10.7 Baseline and Results: Habitat and Vegetation Surveys of the Saltmarshes and Intertidal Habitats in the Upper Estuary

10.7.1 The habitat surveys and detailed botanical recording of the Widnes Warth, Astmoor and Cuerdley saltmarshes were carried out in the summer of 2003, specifically for the effects assessment for the Project. A final validation survey was conducted in December 2007 to identify any changes in the distribution and species composition of plant communities. The saltmarsh remained ungrazed and there were no differences in the structure (physiognomy) of the vegetation or NVC plant communities.

10.7.2 The saltmarshes are colonised by maritime plant communities that are an integral part of the Estuary ecosystem. They occur in the Upper Mersey Estuary, outside the European Site and SSSI), as well as within the European Site in the Middle Estuary.

10.7.3 As recognised by the National Vegetation Classification in *British Plant Communities Volume 5; Maritime Communities and Vegetation of Open Habitats* (Rodwell ed., 2000), there is a wide range of saltmarsh vegetation types and 29 distinct saltmarsh plant communities have been identified, plus many sub-communities.

10.7.4 However there are four main types of saltmarsh vegetation comprising the following

a. Eel-grass and tassel-weed plant communities of tidal flats, pools and ditches;
b. Lower saltmarsh plant communities;
c. Middle saltmarsh plant communities; and
d. Upper saltmarsh plant communities.

10.7.5 Further, other types of vegetation can occur on saltmarshes, especially mesotrophic grassland (MG plant communities), swamp communities (S plant communities), and tall-herb fen communities (M plant communities).

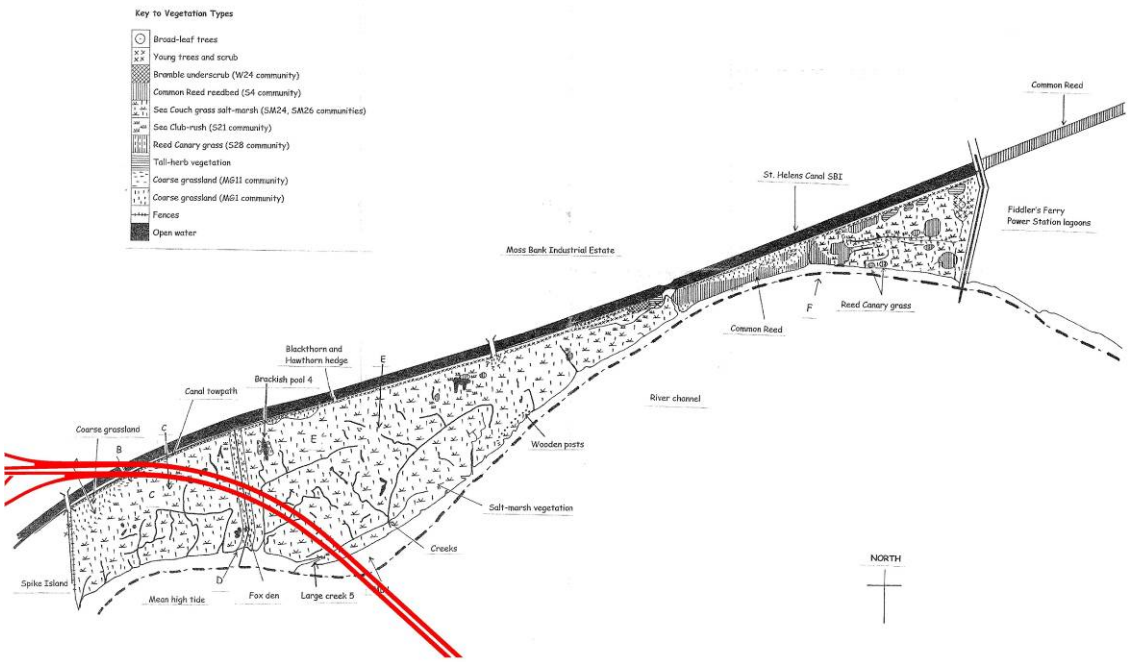
10.7.6 This section of the Chapter covers all the saltmarsh and associated plant communities represented in the saltmarsh vegetation of the Upper Mersey Estuary. It provides a description and evaluation of those habitats, within the Study Area, that were surveyed using JNCC and NVC habitat and vegetation classification systems.

Description of Widnes Warth Saltmarsh

General Description

10.7.7 The north-western section of the route corridor over the Upper Mersey Estuary crosses Widnes Warth Saltmarsh which is part of a large and mostly continuous area of saltmarsh along the Widnes coastline (Appendix 10.2, JNCC Phase 1 Habitat Survey Maps 4 and 5), Figure 10.17 and Appendix 10.1 Figure 10.16.

10.17 - Habitat and vegetation map of Widnes Warth Saltmarsh showing route alignment.



10.7.8 The coastline (maritime) vegetation consists primarily of saltmarsh but the upper areas where sea-water has a limited influence on soil chemistry due to the low frequency of tidal inundation, is essentially mesotrophic (MG) and neutral grassland rather than true saltmarsh. There is a transition zone between the two types of habitat where the vegetation exhibits characteristics of both types of plant community.

10.7.9 The following description of the vegetation covers the saltmarsh within the route corridor plus the larger areas of saltmarsh which extend mainly to the east and for a short distance to the west, on both sides of the MG route corridor. Thus the survey covers the whole of Widnes Warth Saltmarsh.

10.7.10 This descriptive approach and assessment, of the whole of the area of saltmarsh which extends beyond the construction corridor, is necessary because of the functional value of the potentially affected saltmarsh, even though it is a relatively small proportion of a habitat type. The importance of the entire saltmarsh is related to its size, continuity, overall diversity, integrity and principal habitat constituent of the estuarine ecosystem.

Literature Review

10.7.11 The August 2000 citation for the Widnes Warth Saltmarsh includes the part which is in Warrington Borough. It covers approximately 54.4 hectares. The habitat classification is given as open standing water, coastal saltmarsh (45.4 hectares), saltmarsh with scattered plants, intertidal habitat, scattered scrub and other artificial habitats.

10.7.12 Like Astmoor Saltmarsh on the south side of the Upper Estuary, the Widnes Warth Saltmarsh is reported to have both grazed and ungrazed areas in 2000. Again, like Astmoor Saltmarsh, it is a typical upper saltmarsh at the extreme edge of tidal inundation, and similarly species-poor

except along the edges, in creeks and on areas of deposition where it is richer in species. Saltmarsh plants were reportedly Sea Couch, Common Saltmarsh Grass, Halberd-leaved Orache, Sea Aster, Scurvy Grass, Annual Seablite, Sea Plantain, Sea Milkwort and Sea Clubrush.

10.7.13 There are 19 flowering plant species recorded, most of which are saltmarsh plants. They include both Common Couch-grass and Sea Couch-grass. However this species list is much shorter than the comparable list for Astmoor Saltmarsh, and consequently is likely to be an underestimate of the species normally present.

10.7.14 The bird records were obtained by observing the saltmarsh from the towpath of the St Helen's Canal. The list is of 67 species comprising wildfowl and waders with numerous passerines. Of interest is the record of Lesser Kestrel and eight warbler species. There are records of several wintering passerines, namely Fieldfare and Redwing.

10.7.15 Of note is the record of Common Shrew, as would be expected on ungrazed saltmarsh.

Saltmarsh Area C

10.7.16 The New Bridge corridor crosses Area C (Figure 10.17) at a point at which it consists of upper saltmarsh which is truncated laterally due to river channel erosion. The saltmarsh contains several pools and creeks.

10.7.17 The saltmarsh terrain, on the river channel side of the 2 metres high slope from the coarse and mesotrophic grassland of Area A (Figure 10.17), is flat. The width of this area of saltmarsh from the edge of the mesotrophic grassland to the river channel is approximately 300 metres on the western side of the route crossing point, in the Spike Island area. However the saltmarsh becomes wider towards the east and at Area E its width increases to 400 metres.

10.7.18 The scattered brackish pools or scrapes are mostly quite shallow. Closer to the River channel there are some very deep creeks in the saltmarsh; the water in these creeks was not always visible due to the depth of the channels.

10.7.19 In the upper saltmarsh, at the foot of the slope from the coarse MG1 grassland, there is a fresh-water influence on the vegetation. This is from run-off or seepage and is indicated by the presence of species such as Celery-leaved Buttercup (*Ranunculus sceleratus*), Water Pepper (*Polygonum hydropiper*) and Groundsel (*Senecio vulgaris*). There are small patches of grassland in which Marsh Foxtail (*Alopecurus geniculatus*) and Creeping Bent (*Agrostis stolonifera*) are co-dominant. The small patches represent the MG11 Creeping Bent-Marsh Foxtail NVC community, a terrestrial habitat which is occasionally inundated.

10.7.20 The majority of the saltmarsh vegetation contains abundant Red Fescue (*Festuca rubra*), Spear-leaved Orache (*Atriplex prostrata*) and Common Saltmarsh Grass (*Puccinellia maritima*) (Appendix 10.4, Table 1). Other frequent species include Sea Plantain (*Plantago maritima*) and Sea Arrow-grass (*Triglochin maritima*). There are very infrequent clumps of Common Cord-grass (*Spartina anglica*) and False Fox-Sedge (*Carex otrubae*).

10.7.21 Of occasional occurrence, at the edges of pools, there are clumps of Sea Milkwort (*Glaux maritima*) and Sea Aster (*Aster tripolium*). The brackish pools at the time of survey were, on average, approximately 30 cms deep with a muddy substratum.

10.7.22 The saltmarsh community is the SM16-Red Fescue community. This community occurs over extensive areas of middle and upper saltmarsh habitats, especially in North West Britain. The distinction between the Common Saltmarsh grass communities and this community is unclear

but there is more Common Saltmarsh Grass lower down the saltmarsh where there is more tidal inundation during the year. This vegetation in Area C is the SM16a-Red Fescue-Common Saltmarsh Grass sub-community.

10.7.23 Other plant sub-communities amongst the grassland include the SM16c Red Fescue-Sea Milkwort sub-community.

10.7.24 One pool contains aquatic vegetation including moderately large quantities of Fennel Pondweed (*Potamogeton pectinatus*) which is tolerant of brackish water. This small area of vegetation represents the A12 Fennel Pondweed aquatic community.

10.7.25 Sea Club-rush (*Scirpus maritimus*) is particularly abundant at the edges of pools in the upper saltmarsh. This represents the S21 Sea Club-rush swamp community (S21a Sea Club-rush sub-community) of the NVC. The S21a sub-community is characteristic of ill-drained brackish sites on coastal saltmarshes. The vegetation is usually characterised by the overwhelming dominance of Sea Club-rush.

10.7.26 Other NVC communities include patches of the OV26 Great Willowherb tall-herb community at the transition between the saltmarsh and the MG13 inundation grassland on the sloping terrain. This plant community is usually found on inland areas in the lowlands on the margins of freshwater habitats.

10.7.27 The creeks in the saltmarsh closer to the river channel are steep-sided and mostly only 2-3 metres wide. The muddy ledges created by water movements are colonised by plants that are more tolerant of brackish water and wetter conditions. These include Common Scurvy-grass (*Cochlearia officinalis*), English Scurvy-grass (*Cochlearia anglica*) and Greater Sea-spurrey (*Spergularia media*).

10.7.28 At the time of survey in 2002 the western section of the Widnes Warth Saltmarsh, adjacent to Spike Island, was grazed by five ponies. Some parts of the coarse grassland on the upper saltmarsh, into areas A and B, had been mown. However there was no evidence of management in 2007.

Saltmarsh Area E

10.7.29 The New Bridge (Figure 10.17) crosses the south-western extremity of Area E; this area is the larger of the two areas of saltmarsh on the northern side of the Upper Mersey Estuary, including all the northern saltmarsh to the east of Area D.

10.7.30 This area of saltmarsh extends from the outlet channel (Area D) approximately 1.2 kilometres east to the next major channel where the saltmarsh tapers to a much reduced width, beyond which is tall-swamp vegetation. The saltmarsh in this area is approximately 350 metres wide at Area D, widening to a maximum of about 400 metres, and tapers in the east to a width of 100 metres at the channel which carries water through the Saltmarsh into the river channel. Beyond, in the east, the saltmarsh widens through Area F in the direction of Fiddler's Ferry Power Station lagoons (Figure 10.17).

10.7.31 The Area E saltmarsh is very similar to that of Area C but there is an increased abundance of Creeping Bent (Appendix 10.4, Table 2). Other very abundant species include Spear-leaved Orache, Red Fescue and Sea Couch-grass (*Elytrigia atherica*).

10.7.32 The brackish pool within the saltmarsh and marked (4) on the habitat and vegetation map (Figure 10.17) is surrounded by mounds of earth colonised by False Oat-grass (*Arrhenatherum elatius*), Common Ragwort (*Senecio jacobaea*) and Creeping Buttercup (*Ranunculus repens*).

The pool supports scattered Sea Aster plants around the margins.

10.7.33 Other pools scattered throughout this area of saltmarsh are colonised by Sea Arrowgrass on the margins.

10.7.34 The creeks in Area E support different plant species which are more tolerant of saline conditions; these include Common Scurvy-grass, Sea Milkwort and Sea Aster. The large creek marked 5 in Figure 10.17 contains Sea Milkwort, Sea Aster, Sea Club-rush and Common Scurvy-grass on the sloping margins. There is a small isolated patch of Common Cord-grass on the mud in the creek.

10.7.35 The saltmarsh community represented here is the SM16 Red Fescue community (SM16c Sea Milkwort sub-community). This community has an overwhelming presence of Creeping Bent but other species such as Saltmarsh Rush (*Juncus gerardi*) are poorly represented. This saltmarsh community often has a competitive advantage in polluted areas which may account for its abundance in Widnes Warth Saltmarsh.

Area D (outlet channel)

10.7.36 This outlet channel (Figure 10.17) is approximately 500 metres to the east of the fenced boundary with Spike Island. It bisects the whole of the saltmarsh between the St. Helens Canal and the river channel. There is a bank approximately 2.5 metres above the surface of the saltmarsh along both sides and the channel is lined with concrete. At the time of survey the fast-flowing water in the channel was approximately 20 cms deep.

10.7.37 There is strandline habitat here with dumped detritus along the foot of the embankments.

10.7.38 The coarse grassland which has colonised the banks contains abundant False Oat-grass with Sea Couch-grass, Creeping Thistle (*Cirsium arvense*), Perennial Sow-thistle (*Sonchus arvensis*), Prickly Lettuce (*Lactuca serriola*) and Bramble (*Rubus fruticosus agg.*) (Appendix 10.4, Table 3). Of note is the fact that Perennial Sow-thistle and Prickly Lettuce are both fairly tolerant of brackish soil conditions. This is the MG1 False Oat-grass community (MG1a Red Fescue sub-community) of the NVC. The banks also support scattered OV24 Stinging Nettle-Cleavers tall-herb stands, particularly at the end closest to the Mersey.

10.7.39 Where the banks slope down to the water channel the vegetation changes and False Oat-grass is replaced by Sea Couch-grass as the most abundant species (Appendix 10.4, Table 4) due to the increased salinity. Other species include Spear-leaved Orache, Clustered Dock (*Rumex conglomeratus*) and Perennial Sow-thistle.

10.7.40 On the steep concrete slope at the edge of the water channel, where mud has accumulated to provide a rooting substratum, there is a linear stand of vegetation dominated by Sea Aster. It was evident that during occasional periods of high tide and high rainfall the water level rises over the Sea Aster as it was grey with accumulated mud. The channel is devoid of aquatic vegetation.

Area B (Upper Saltmarsh)

10.7.41 The Mersey Bridge crosses Area B close to the route of the St. Helens Canal. The vegetation of this upper saltmarsh (Figure 10.17) consists of abundant Creeping Bent and Red Fescue. It is visibly a different plant community to the coarse grassland of Area A. The vegetation is almost grass-dominated with only occasional occurrence of Ragwort, Ribwort Plantain (*Plantago lanceolata*) and small herbs such as Common Bird's-foot-trefoil (*Lotus corniculatus*) and Dove's-foot Cranesbill (*Geranium molle*) (Appendix 10.4, Table 5).

10.7.42 This vegetation is the MG11 Red Fescue-Creeping Bent-Silverweed grassland community of the NVC. This NVC community occurs within areas that are inundated with fresh or brackish water, particularly on the upper saltmarsh. The grassland has not been agriculturally improved as indicated by the fact that Perennial Ryegrass is not abundant here.

Area A (Grassland adjacent to Spike Island)

10.7.43 Area A (Figure 10.17) is a raised area of coarse grassland approximately two metres above the level of the true saltmarsh. The survey of this area was limited to terrestrial plants; where halophytic species were present on the slope down to the saltmarsh proper, a separate species list was compiled.

10.7.44 There are few woody species in this grassland. These include Sea Buckthorn (*Hippophaea rhamnoides*) along the timber post and wire fence that separates Spike Island from the saltmarsh. There is also Blackthorn (*Prunus spinosa*) encroachment into the grassland from a Blackthorn and Hawthorn hedgerow along the edge of the towpath alongside the St. Helen's Canal.

10.7.45 The chief grassland species of Area A (Appendix 10.4, Table 6) include abundant False Oat-grass with clumps of Common Nettle and Creeping Thistle. The abundance of Sea Couch-grass here is attributed to the influence of salt spray and colonisation of maritime species from the adjacent saltmarsh. However there are no true saltmarsh species in this area.

10.7.46 Tall herbs such as Creeping Thistle, Ragwort and Common Nettle are more abundant on the slope down from the MG1 coarse grassland to the saltmarsh.

10.7.47 The grassland is the species-poor MG1 False Oat-grass coarse grassland (MG1a Red Fescue sub-community). This grassland characteristically contains few umbellifers. In some areas the grassland contains more forbs with increased frequencies of Common Ragwort, Yarrow (*Achillea millefolium*) and Common Mouse-ear (*Cerastium fontanum*). Patches of tall-herb species are fairly frequent throughout, notably Stinging Nettle and Creeping Thistle as the OV25 Common Nettle-Creeping Thistle tall-herb community. This plant community has developed on the more nutrient-rich soils, particularly where horses have manured the ground.

10.7.48 Towards the east there is a decrease in tall-herb species with an increase in Yorkshire Fog (*Holcus lanatus*), resulting in a transition to the vegetation of Area B.

Area F (Eastern Section of Widnes Warth Saltmarsh)

10.7.49 The eastern section of Widnes Warth Saltmarsh (Figure 10.17) is well outside the New Bridge corridor but it is necessary to assess this section of the saltmarsh because it is an integral part of the continuous area of saltmarsh along the Widnes side of the Upper Mersey Estuary. It provides a larger area of habitat and contains plant communities that are not found elsewhere within Widnes Warth Saltmarsh. It adds to the overall biodiversity of the saltmarsh and possibly provides significantly greater carrying capacity for birds and other wildlife species, and may also provide habitats for species not found elsewhere in the saltmarsh, thereby increasing the overall value of the Widnes Warth Saltmarsh.

10.7.50 At the eastern extremity of the saltmarsh, by Cuerdley Marsh and near to the power station lagoons (Figure 10.17), are large stands of Common Reed (*Phragmites australis*) which represent the S4 Common Reed tall-swamp community.

10.7.51 Inland of the Common Reed but still within the saltmarsh is an area of developing scrub of Goat Willow (*Salix caprea*) and Crack Willow (*Salix fragilis*) over Common Nettle and Hogweed

(*Heracleum sphondylium*). This woody vegetation is difficult to assign to any NVC woodland community but it exhibits characteristics of both the W1 Grey Willow-Marsh Bedstraw community and the W6b Crack Willow sub-community of the W6 Alder-Common Nettle community. Given time and continued colonisation of the woodland it is likely successional changes will result in the development of either the W1 or the W6 woodland communities.

10.7.52 On the slopes of the major creek in this eastern area of Widnes Warth Saltmarsh (Appendix 10.4, Table 7) are abundant Sea Aster and Hemlock Water Dropwort (*Oenanthe crocata*) with frequent Spear-leaved Orache.

10.7.53 Adjacent to the hedgerow on the south side of the St. Helens Canal are stands of Common Reed. Towards the river there are stands of Sea Couch with Sea Aster and algal mats in closer proximity to the river channel. Glasswort (*Salicornia europaea*) occurs very locally here.

10.7.54 The upper part of the area, adjacent to the canal, has been raised by tipping above the level of the saltmarsh and consequently supports coarse grassland (MG1 community) with associated Great Willowherb and Creeping Thistle plus local Prickly Lettuce and Perennial Sow-thistle.

10.7.55 The strand-line vegetation consists of locally abundant Field Bindweed (*Convolvulus arvensis*) with associated Hedge Bindweed (*Calystegia sepium*). There are patches of tall-herb vegetation which include Tansy (*Tanacetum parthenium*), Common and Spear-leaved Orache.

10.7.56 There is a low bank, covered by coarse grassland (MG1 community) which encloses the majority of this far eastern saltmarsh.

Preliminary Assessment of the Ecological Value of Widnes Warth Saltmarsh

10.7.57 The vegetation of Widnes Warth Saltmarsh, with the exception of the communities of MG1 coarse grassland, S4 Common Reed tall-swamp community and W1/W6 developing woodland communities, is largely saltmarsh. Coastal saltmarsh is listed in the *Countryside and Rights of Way Act 2000* (hereafter *The CRoW Act*), as a Habitat of Principal Importance. This listing is recognised in *Planning Policy Statement 9; Biodiversity and Geological Conservation* (PPS9), and is confirmed by the recent JNCC (Joint Nature Conservation Committee) revision of *The CRoW Act* Section 74 list.

10.7.58 The Widnes Warth Saltmarsh, although it has been modified in places by channel and bund construction, and by past pollution and associated artificial influences, exhibits a high degree of semi-naturalness in terms of habitat and plant communities. It also covers a significant area of land (approximately 48.5 hectares) and is significant in terms of the total area of maritime habitat in the Upper Mersey Estuary.

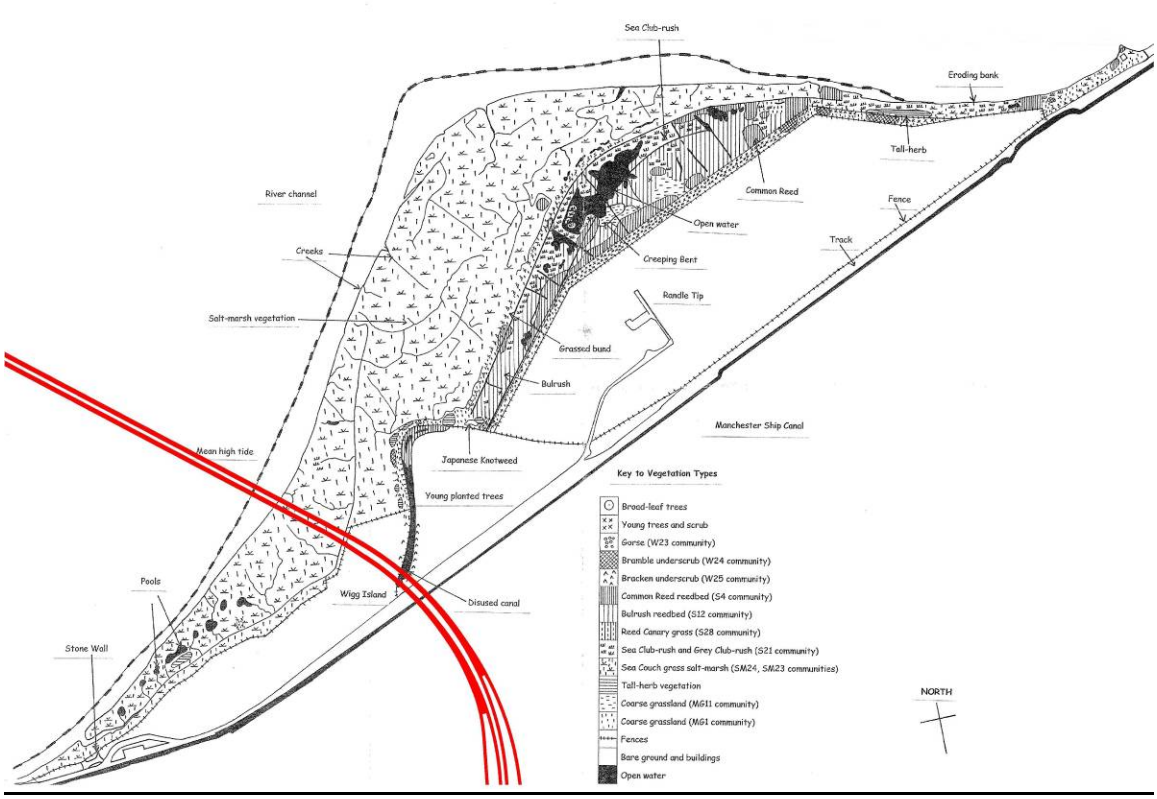
10.7.59 The preliminary assessment of the ecological value of Widnes Warth Saltmarsh is that, considered in isolation, it is of substantive and of county (Cheshire) importance. It is a Habitat of Principal Importance and part of an Annex 1 Habitat (estuary). Given its location as an integral part of an estuarine ecosystem (Upper Mersey Estuary) it is of county importance but further information, particularly on its associated birdlife, to be considered later in this Chapter, is required for a more precise quantification of its level of importance, such as being an integral part of the whole of the Estuary ecosystem, the majority of which is of international importance.

Description of Astmoor Saltmarsh and Associated Vegetation

General Description

10.7.60 The New Bridge crosses the western part of Astmoor Saltmarsh where its width is approximately 200 metres and narrowing towards the south-west. This section of Astmoor Saltmarsh (Appendix 10.2 - JNCC maps 2, 5 & 6, Figure 10.19 and Figure 10.18 of Appendix 10.1) is part of an extensive and very uniform area of saltmarsh. It is dominated by Sea Couch-grass virtually throughout although there are distinctive and localised wetter areas, on lower ground, some of which appear to be man-made, where more salt-tolerant species such as Common Saltmarsh Grass, Sea Aster and Sea Milkwort are prevalent.

Figure 10.19 - Habitat and vegetation map of Astmoor Saltmarsh.



10.7.61 Astmoor Saltmarsh is of varied width, the widest area being approximately 375 metres from the river channel to the bank on the northern edge of the former Runcorn and Latchford Canal.

Literature Review

10.7.62 The August 2000 SINC report for Astmoor Saltmarsh, including the swamp and open water habitats along the course of the former Runcorn to Latchford Canal, covers 66.00 hectares. There are 51 hectares of coastal saltmarsh and 15 hectares of tall fen vegetation.

10.7.63 According to the records available, the saltmarsh contained grazed and ungrazed areas and was a good example of upper saltmarsh at the extreme edge of tidal inundation. The saltmarsh was described as species-poor but with greater diversity at the edges, in the creeks and on areas of deposition. The saltmarsh is recorded as being colonised by Sea Couch (*Elytrigia atherica*), Common Saltmarsh-grass, Halberd-leaved Orache, Sea Aster, Scurvy Grass, Annual Seablite, Sea Plantain, Sea Milkwork and Sea Clubrush.

10.7.64 Astmoor Saltmarsh was stated to be important for birds throughout the year for a wide variety of species such as Shelduck, Tufted Duck, Ringed Plover, Shoveler, Wigeon and Pochard.

10.7.65 The citation includes a list of 53 flowering plant species which consists of a mixture of typical saltmarsh species and mesotrophic grassland plants of non-maritime habitats. However there is no information on the distribution and abundance of each species. Some species listed, such as Celery-leaved Buttercup and Common Reed, whilst not occurring in true saltmarshes, are tolerant of brackish condition.

10.7.66 The species list contains two nationally scarce plants, namely Seaside Centaury (*Centaurium littorale*) and Sharp Rush (*Juncus acutus*). The former is mainly restricted to the west coast of England, with records at the Outer Mersey Estuary, but the latter is largely restricted to parts of the west coast of Wales. These records require confirmation in view of the national scarcity of the species and their distribution.

10.7.67 The only damselfly recorded is the Emerald Damselfly, and the only amphibian listed in the records is Common Toad, which is able to breed successfully in brackish waters.

10.7.68 The records of bird species include 104 species, most of which are often associated with saltmarshes. They include many wildfowl and waders, noteworthy species being Bewick's Swan, Whooper Swan, Pintail, Garganey, Water Rail, Temmink's Stint, Ruff, Jack Snipe, Black-tailed Godwit and Greenshank. Raptors have also been recorded, namely Marsh Harrier, Peregrine, Barn Owl and Short-eared Owl.

10.7.69 Seabird records of note are Arctic Skua and Common Tern. The record of Corn Bunting, a passerine species, is of interest.

Saltmarsh from Old Quay Bridge to Randle's Island Tip (south-western area of saltmarsh)

10.7.70 The route corridor crosses the narrow section of saltmarsh between Old Quay Bridge and Randle's Island Tip.

10.7.71 This area of saltmarsh extends in an east by north-east direction from a narrow area of the saltmarsh close to Old Quay swing-bridge over the Manchester Ship Canal towards Randle's Island Tip (Figure 10.19). There is significant erosion of the saltmarsh on this side of the Upper Estuary with a 3-4 metres high vertical face to the channel of the Mersey.

10.7.72 The majority of the saltmarsh is colonised by dense and coarse Sea Couch-grass with little else (Appendix 10.4, Table 8) apart from approximately circular patches of Perennial Sow-thistle and Spear-leaved Orache, which are approximately 3 metres across and located where decayed drift litter has accumulated. This is the low diversity SM24 Sea Couch saltmarsh community that is characteristic of ungrazed, upper saltmarsh habitat.

10.7.73 The only significant variation in the saltmarsh occurs at the brackish pools, which are to the south-west of the route corridor, many of which had dried-out at the time of the survey. The occurrence of Sea Aster, Creeping Bent and Spear-leaved Orache provide some limited botanical diversity within and around the brackish pools.

10.7.74 The route corridor crosses a large creek that extends from east to west and almost divides the saltmarsh into two areas. At the river extremity of the creek the channel contains settled mud that is colonised by Sea Aster and Spear-leaved Orache. There is also brick rubble that is covered by algae. Where the creek extends further into the saltmarsh the channel becomes drier and shallower. This creek contains the SM11/SM12 Sea Aster saltmarsh community that typically occurs on muddy creek-sides.

10.7.75 At the western end of the saltmarsh by Old Quay Bridge there is a concrete retaining wall. The saltmarsh is very narrow here and frequently inundated by sea-water. Species here are mostly saltmarsh plants including Spear-leaved Orache, Sea Aster and Sea Milkwort that are of scattered occurrence throughout the muddy surface.

10.7.76 A range of brackish pools and areas of open ground where Sea Couch is less dominant or less abundant has allowed colonisation by other species including Spear-leaved Orache, Common Saltmarsh Grass, Sea Aster and Creeping Bent. The grassland surrounding the pools is the MG11 Creeping Bent-Marsh Foxtail inundation grassland community with patches of the SM23 Lesser Sea Spurrey-Reflexed Saltmarsh Grass saltmarsh community that is characteristically located in dried pans on the edges of pools in the upper saltmarsh.

10.7.77 There are mounds created following the excavation of pools which are above the level of tidal inundation and sea-water influence. These mounds are colonised by the MG1 False Oat-grass coarse grassland NVC community, the chief species being an abundance of False Oat-grass, Common, Creeping Thistle, Great Willowherb (*Epilobium hirsutum*), Cleavers, Yorkshire Fog and Hogweed.

10.7.78 Where there is less erosion and where the edge of the saltmarsh is sheltered by a protruding area of saltmarsh, the sparsely vegetated mud is colonised by occasional Common Saltmarsh Grass and Sea Aster.

10.7.79 Further east, along the river channel margin, the bank becomes lower and there are exposed mudflats that do not appear to be inundated during every tidal cycle. This saltmarsh has a more varied species composition which includes Lesser Sea Spurrey (*Spergularia marina*), Common Saltmarsh Grass, Glasswort, Herbaceous Sea-blite (*Suaeda maritima*) and a strip of Sea Aster. On the inland side of the Sea Aster, Sea Couch becomes dominant, about one metre higher up the saltmarsh.

Bund between the saltmarsh and the wetland along the former Runcorn and Latchford Canal

10.7.80 Immediately north-east of the New Bridge route is a bund (Figure 10.19) colonised by grass vegetation which extends from Wigg Island and separates the saltmarsh from the fenced-off contaminated area that was previously a mustard gas factory.

10.7.81 The top of the bund, which is approximately two metres above the level of the saltmarsh, is rabbit-grazed and colonised mostly by plant species of waste ground and ruderals (generally tall and coarse weedy species such as docks and thistles). The rabbit-grazed flat area along the top of the bund is colonised by frequent Greater Plantain (*Plantago major*), Annual Meadow-grass (*Poa annua*), White Clover (*Trifolium repens*) and Ribwort Plantain (*Plantago lanceolata*)

10.7.82 Along the disused and polluted Runcorn and Latchford Canal margin are patches of Rosebay Willowherb (*Chamerion angustifolium*) and Creeping Thistle which extend to the high metal post and chain-link wire fence.

10.7.83 Along the saltmarsh side of the bund is tall-herb vegetation which extends down to the foot of the bund. Species here include Rosebay Willowherb, Creeping Thistle and Common Nettle with occasional Hawthorn, Elder (*Sambucus nigra*), Broom (*Cytisus scoparius*) and Gorse (*Ulex europaeus*) shrubs. The tall-herb vegetation at the foot of the bund is covered by Hedge Bindweed and Field Bindweed, beyond which there is a transition to Perennial Sow-thistle followed by dominant Sea Couch-grass. Bramble is encroaching over the bund.

10.7.84 The disused canal section behind the fence contained stagnant and contaminated water with a bright orange-brown coloration at the time of the survey. However water quality has improved significantly since the surveys in 2002 and 2003. The margins of the canal are colonised by Bracken (*Pteridium aquilinum*), Great Willowherb and scattered shrubs including Broom, Silver Birch, Pedunculate Oak and Goat Willow. Across the water channel and along the margins are extensive stands of Bulrush (*Typha latifolia*) and a small stand of Reed Sweet-grass (*Glyceria maxima*).

10.7.85 On the other side of the disused canal is a large mound which has been densely tree-planted to Silver Birch, Crack Willow, Ash (*Fraxinus excelsior*), Rowan (*Sorbus aucuparia*) and other broadleaf species. This tree cover has now formed a dense and closed canopy on the steeply sloping ground.

10.7.86 Japanese Knotweed (*Fallopia japonica*) occurs in the area at the south-western extremity of the bund, before the wetland (Figure 10.19). There is a large rabbit-grazed area here with Lesser Trefoil (*Trifolium dubium*), Creeping Buttercup (*Ranunculus repens*), mosses, Self-heal (*Prunella vulgaris*) and Bramble.

10.7.87 NVC plant communities that have developed on the bund include;

a. MG1 False Oat grass grassland;
b. OV27 Rosebay Willowherb tall-herb community;
c. OV25 Common Nettle-Creeping Thistle tall-herb community;
d. W25 Bracken-Bramble underscrub community;
e. S12 Bulrush swamp community; and
f. S5 Reed Sweet-grass swamp community.

10.7.88 The survey and evaluation of Widnes Warth Saltmarsh on the northern side of the Upper Mersey Estuary covered the whole of the saltmarsh, beyond the corridor traversed by the proposed route. This approach has also been followed here on the south side of the Estuary, along Astmoor Saltmarsh, to provide a complete baseline assessment because of the continuity of the saltmarsh and because the section crossed by the route is an integral part of a much larger area.

Eastern Area of Astmoor Saltmarsh

10.7.89 The eastern extremity of Astmoor Saltmarsh is marked by the end section of the metal fence

surrounding Randle's Island Tip.

10.7.90 At the eastern extremity of the saltmarsh is a small headland on which stands an electricity pylon (Figure 10.19). Beneath the pylon is coarse grassland but there is a small section of saltmarsh which includes Common Saltmarsh Grass, Spear-leaved Orache, Sea Milkwort and Lesser Sea Spurrey (Appendix 10.4, Table 9).

10.7.91 The saltmarsh becomes very narrow at the eroding section as indicated in Figure 10.19. There are muddy banks with Sea Milkwort and Common Saltmarsh Grass. Along the top of the mound there is colonisation by woody species including Goat Willow and Silver Birch.

10.7.92 NVC communities along this very narrow section of saltmarsh and associated land include the following;

a. OV21 Annual Meadowgrass-Greater Plantain community;
b. MG1 False Oat-grass coarse grassland;
c. S4 Common Reed tall swamp community;
d. S5 Reed Sweet-grass tall swamp community; and
e. SM23 Common Saltmarsh Grass saltmarsh community.

Wetland south of Astmoor Saltmarsh

10.7.93 The wetland bordering the southern and eastern margins of Astmoor Saltmarsh (Figure 10.19), although it is not strictly part of the saltmarsh habitat, exhibits several key vegetation and faunal similarities and should be considered in many respects as a complementary habitat which enhances and/or extends the biodiversity interest and importance of the saltmarsh. The wetland is the remnant of the former and long disused Runcorn to Latchford Canal.

10.7.94 The wetland consists of two parallel water channels that are surrounded by reedbeds, rushes and open water. The entire area is a mosaic of numerous swamp communities and comprises stands of Bulrush (Appendix 10.4, Table 10), particularly in the eastern part of the wetland. Common Reed is abundant along the southern edge at the foot of the slope from Randle's Island Tip. There are also scattered and localised patches of Great Willowherb and Common Spike-rush.

10.7.95 Of significance is the presence of Sea Club-rush which covers extensive areas and is occasionally mixed with Grey Club-rush (*Schoenoplectus tabernaemontani*), both of which are often associated with brackish conditions.

10.7.96 As mentioned above, water pollution from the landfill site has decreased substantially since the 2002 and 2003 surveys, as noted during the regular bird surveys of the area. It is likely that the reduction in pollution is due to a decrease in leachate production from the landfill site and/or the effects of the dense reed and tall-herb vegetation in absorbing soluble contaminants.

10.7.97 The wetland is separated from the true saltmarsh by a narrow bund which is colonised by MG1 community coarse grassland species including False Oat-grass, Creeping Thistle, Common Nettle, Bramble, Yorkshire Fog and Field Bindweed. Bund species at the water's edge include Gipsywort (*Lycopus europaeus*), Marsh Woundwort (*Stachys palustris*), Spear-leaved Orache and Bittersweet (*Solanum dulcamara*).

10.7.98 NVC communities include the following;

a. S12a Bulrush tall swamp (Typical sub-community);
b. S4a Common Reed tall swamp (Typical sub-community);

c. S4c Common Reed (Spear-leaved Orache sub-community);
d. S21a Sea Club-rush swamp (Sea Club-rush dominated swamp community);
e. S20a Grey Club-rush swamp (Grey Club-rush) dominated swamp community);
f. MG11 Creeping Bent- Marsh Foxtail inundation grassland community; and
g. OV26 Great Willowherb tall-herb community.

10.7.99 Other vegetation to the south and east of Astmoor Saltmarsh and associated with Randle's Island Tip has little functional relationship to the saltmarsh and associated maritime habitats, at least in vegetation terms.

Preliminary Assessment of the Value of Astmoor Saltmarsh

10.7.100 Like Widnes Warth Saltmarsh, Astmoor Saltmarsh is dominated by saltmarsh plant communities and is a Habitat of Principal Importance as listed in the *CRoW ACT 2000* and in PPS9. It is also part of an Annex 1 (estuary) habitat. From vegetation and habitat standpoints alone it is of Borough and County importance.

10.7.101 From a plant community standpoint the coastal wetland adjacent to the saltmarsh, which is essentially enclosed, should be evaluated as part of the saltmarsh habitat because of its botanical and functional relationship with the saltmarsh. Therefore the wetland is also of Borough and County importance.

10.7.102 As pointed out earlier for Widnes Warth Saltmarsh, further information is needed for a complete evaluation of Astmoor Saltmarsh, in particular its functional relationship with the Middle Mersey Estuary. A full evaluation is provided later in this Chapter, in the light of the results of all the habitat and vegetation surveys of the Upper Mersey Estuary and its associated birdlife, including any other significant fauna.

Description of Cuerdley Saltmarsh

General Description

10.7.103 Although the New Bridge corridor is at least two kilometres from Cuerdley Saltmarsh, it is necessary to include this saltmarsh within the baseline assessment because saltmarsh is an integral part of the Upper Mersey Estuary and Cuerdley Saltmarsh is largely continuous with Widnes Warth Saltmarsh.

10.7.104 Further, it is possible that any area of saltmarsh within the Upper Mersey Estuary could be affected by possible changes in hydrodynamics of the Upper Mersey Estuary as a result of construction of the New Bridge and as a consequence of its permanent supporting structures (piers and towers) within the saltmarshes, sand-banks and/or the river channel. All habitats and vegetation that are potentially affected need to be examined in the baseline assessment.

Literature Review

10.7.105 There is no recorded and relevant information on Cuerdley Saltmarsh beyond what has been described earlier for the Fiddler's Ferry Power Station Lagoons complex and for the saltmarshes in general.

Description of Cuerdley Saltmarsh

10.7.106 Cuerdley Saltmarsh is adjacent to the western lagoon (D Lagoon) of Fiddler's Ferry Power Station (Appendix 10.2 - JNCC Phase 1 Habitat Survey Map 6, and Figure 10.20, Appendix 10.1). It is about 1.375 kilometres in length with a mean width of approximately 75 metres.

There are creeks in the marsh that extend out to the River and there are two pools that have been excavated at the apex of the triangle created by the lagoons. There is also a pond at the foot of the slope from the field to the east of 'A' Lagoon.

10.7.107 Cuerdley Marsh is not normally inundated by tidal water, but during storm surges at high tide and with suitable wind conditions, seepage may occur from below. This has probably resulted in saline conditions in the marsh groundwater which is reflected in the species composition of the plant communities.

10.7.108 Along the length of the saltmarsh, at the junction of the bunds with the marsh, is a linear stand of tall herbs including Garden Angelica and Hemlock Water Dropwort (Appendix 10.4, Table 11).

10.7.109 On the coastal side of the bunds the marsh is dominated by Common Couch-grass (*Elytrigia repens*) which was approximately 50 centimetres high at the time of the survey. The grass cover is very dense and of uniform appearance apart from the scattered presence of Creeping Thistle, Spear Thistle (*Cirsium vulgare*) and very occasional Spear-leaved Orache. Other occasional and very local plants include Silverweed (*Potentilla anserina*), Clustered Dock, Curled Dock (*Rumex crispus*) and Field Horsetail (*Equisetum arvense*) (Appendix 10.4, Table 11).

10.7.110 The Common Couch-grass saltmarsh extends over approximately 50 metres of the strip of marsh. This vegetation is the SM28 Common Couch-grass saltmarsh community of the NVC and is characteristic of the upper-marsh areas where there is a combination of disturbance, drift litter deposition and some fresh-water influence. This type of saltmarsh is common in North-west England, particularly off the Irish Sea coast.

10.7.111 The Common Couch-grass saltmarsh is mixed with Common Reed tall-swamp vegetation. The Common Reed does not extend to the river channel but it forms partitions which dissect the Common Couch-grass cover. The stands of Common Reed have associated Bittersweet, Spear-leaved Orache and Sea Mayweed (*Tripleurospermum maritimum*) which represents the S4d Common Reed-Hastate Orache tall-swamp sub-community. Common Reed is tolerant of saline soils.

10.7.112 Of fairly isolated occurrence amongst the patches of Common Reed and Common Couch-grass are small and localised areas of Creeping Bent and Common Bent (*Agrostis capillaris*) with associated plants of wetter ground including Carnation Sedge (Carex flacca), Marsh Foxtail (*Alopecurus geniculatus*), Red Fescue, Silverweed and Clustered Dock (Appendix 10.4, Table 11). These small areas are the MG11 Creeping Fescue-Creeping Bent-Silverweed inundation grassland community which occurs on soils which may be frequently inundated with fresh or brackish surface water as in upper saltmarsh habitat.

10.7.113 Closer to the River the Common Couch-grass decreases in cover and the ground becomes bare locally. This strip, which is occasionally covered by river water, is between three and eight metres wide. Species here include Sea Aster, Common Saltmarsh Grass, Sea Purslane, Marsh Hawk's-beard (*Crepis paludosa*) and Sea Mayweed (Appendix 10.4, Table 11). These species are more tolerant of inundation and saline conditions and form the SM13 Common Saltmarsh-grass saltmarsh community that is characteristic of the lower saltmarsh.

10.7.114 The various gullies and creeks traversing the saltmarsh (Appendix 10.1, Figure 10.20) fill with water at high tide. The muddy slopes and channel beds are colonised by algae and fucoid species. The protected slopes support scattered Sea Aster and very local Common Scurvy-grass (Appendix 10.1, Figure 10.20). This creek community is still part of the SM13 Common Saltmarsh-grass community but it extends further inland within the gullies.

10.7.115 There is a small and oval-shaped pond surrounded by scattered Goat Willow and Crack Willow, and Common Reed tall-swamp community, towards the east of Cuerdley Marsh (Appendix 10.1, Figure 10.20). Species growing in the standing water include Sea Club-rush, Sea Couch-grass and Sea Plantain. The surrounding and associated species extending up the slope of the bund include Common Nettle, Bittersweet (*Solanum dulcamara*), Cleavers (*Galium aparine*) and Bramble.

10.7.116 On either side of the raised area that extends from between the lagoons out onto the saltmarsh, where there is a pumping station, are two pools. These pools have been created by Fiddler's Ferry Power Station as directed by the former Central Electricity Generating Board. The ponds have been created with varying depths to attract wading birds. The shape of the ponds resembles 'fingers' to give maximum water's-edge habitat, and tree planting around the pools shelters the water. The western pool is maintained as a brackish habitat whilst the pool on the eastern side is fresh-water with the water level being controlled annually by pumping water from 'C' Lagoon.

10.7.117 The western pool is surrounded by Common Couch-grass saltmarsh with adjacent Bulrush tall-swamp. In the water are clumps of Sea Club-rush and Common Reed. The eastern pond is also within the Common Couch-grass saltmarsh but the Common Reed has a much higher cover on this side. The saltmarsh is much wider here and there are extensive patches of Common Reed forming the S4d Common Reed-Hastate Orache tall-swamp sub-community.

Preliminary Assessment of the Ecological Value of Cuerdley Saltmarsh

10.7.118 Cuerdley Saltmarsh, like the other saltmarshes in the Upper Mersey Estuary, is a Habitat of Principal Importance and part of an Annex 1 habitat. It is of importance in borough (Warrington) and county (Cheshire) contexts. As pointed out for Widnes Warth and Astmoor saltmarshes, Cuerdley Marsh may be of greater importance depending on the functional relationship of the Upper Mersey Estuary with the designated Middle Mersey Estuary.

10.7.119 The full evaluation of Cuerdley Saltmarsh is given later in this Chapter, following consideration of other habitats and biodiversity features of the Upper Mersey Estuary including its birdlife and other fauna.

Existing Erosion of the Saltmarshes

10.7.120 Observations at the end of 2007 have shown that there is continuing erosion of Widnes Warth Saltmarsh along the margins adjacent to the meandering River Mersey channels. Near the western end of the saltmarsh there is a vertical face that is devoid of vegetation and about two metres high, directly beneath which are large blocks of collapsed soil, silt and mud material. These large blocks are devoid of vegetation apart from persisting saltmarsh vegetation on the previously upper parts of the blocks which formed part of the upper saltmarsh plant community.

10.7.121 Beneath the collapsed blocks, on less steeply-sloping material, are numerous smaller blocks of collapsed material which are breaking up into blocks of smaller size. All the blocks are devoid of vegetation. Towards the water channel the gradient is much reduced and the margins are similar to the other intertidal habitats which are devoid of saltmarsh and other vegetation.

10.7.122 Further east, along the saltmarsh margin, there is a continuous and similar pattern of active erosion with a vertical face along the eroded edge of the saltmarsh, beneath which is a slope of decreasing gradient towards the water channel and the occurrence of fallen blocks of mud and silt which are breaking up into smaller fragments. In some places the steep slope immediately adjacent to the eroded face of the upper saltmarsh is stepped in the form of a terrace.

10.7.123 The vertical eroded edges of the saltmarsh vary in height between one and two metres, and the lateral distance between the edge of the saltmarsh and the water channel, at low water, is mostly between six and twelve metres.

10.7.124 In the eastern part of Astmoor Saltmarsh the erosion situation is different in that the vertical eroded margins of the saltmarsh are only 0.5 metre high, although still devoid of vegetation, and there is no evidence of continuing erosion. Instead the gently-sloping mud and silt terrain to the river channel is colonising to saltmarsh species, with a two metres wide zone exhibiting the early stages of accretion and colonisation by Common Saltmarsh-grass and Creeping Bent-grass. Beyond which is bare silt and mud. The width of the intertidal habitat between the upper saltmarsh and the low water channel is approximately 27 metres.

10.7.125 There is a similar pattern of saltmarsh erosion along the river channel margins of Widnes Warth Saltmarsh although erosion appeared in December 2007 to be less active. At the western end of the saltmarsh, east of Spike Island, a typical section has a 0.6 metre high vertical face on the edge of the saltmarsh, beneath which is a sloping terrace colonised by saltmarsh vegetation. The terrace has a 0.4 metre high vertical face, below which is a very gentle slope to the river channel. The upper zone of the gentle slope adjacent to the terrace, for a width of 1.5 metres, is being colonised by Sea Aster (*Aster tripolium*) and Common Bent-grass, with signs of saltmarsh accretion.

10.7.126 At a point approximately 300 metres further east, there is evidence of recent erosion which has now ceased. Here there is a one metre high vertical face along the edge of the saltmarsh, the face being devoid of vegetation. Approximately 0.2 to 0.3 metre from the eroded face are blocks of slumped saltmarsh with persisting saltmarsh vegetation on the upper surface. The gently sloping terrain down to the river channel is littered with slumped blocks and sods of upper saltmarsh material that are colonised by an abundance of Sea Aster and Common Saltmarsh-grass, beyond which is a bare and muddy margin to the river channel.

10.7.127 These recent observations, and those of the ornithologist who has examined the upper saltmarshes and other intertidal habitats regularly since 2002, indicate that there has been a progressive loss of upper saltmarsh vegetation and habitat during the last seven years, with little evidence of recolonisation.

Overall Evaluation of the Saltmarshes in the Context of the Upper Mersey Estuary

10.7.128 The overwhelming majority of the saltmarsh vegetation along both sides of the Upper Mersey Estuary consists of upper saltmarsh plant communities as indicated by the large amounts and high constancy of *Elytrigia* grasses and the abundance and high constancy of *Festuca rubra* (Red Fescue).

10.7.129 On both sides of the Estuary the saltmarsh vegetation terminates at the upper limit of the saltmarshes which is characteristic of the *Elytrigia (*Couch*)* saltmarsh communities. Consistent with this is the presence of mesotrophic coarse grassland (MG1 False Oat-grass coarse grassland community) on the landward edge of the saltmarshes on both sides of the Estuary, particularly in the western part of Widnes Warth Saltmarsh in the vicinity of Spike Island.

10.7.130 There is active river erosion of Widnes Warth and Astmoor saltmarshes along both sides of the Estuary, with continuous lengths exhibiting slumping and detachment of very large turves. Nowhere is there a distinct zonation from upper saltmarsh plant communities to any other type of saltmarsh community.

10.7.131 According to Rodwell (2000), the SM24 Sea Couch community is most abundant in the south-east of England whereas stands on the west coast are local and small. The SM28 Common

Couch community can be regarded as the north-western equivalent of the SM24 community. However the geographical range of Sea Couch does extend up the west coast to the Solway and it has been recorded elsewhere in the Estuary.

10.7.132 Whereas the SM24 *Elytrigia atherica* (Sea Couch) saltmarsh community was recorded on Widnes Warth and Astmoor saltmarshes in this survey, the SM26 Common Couch Saltmarsh community was recorded on Cuerdley Marsh. This can be explained by the predominantly freshwater character of Cuerdley Marsh, seawater having little influence on this freshwater marsh.

10.7.133 The saltmarshes, individually and collectively, are of importance in county (Cheshire) contexts. However it is debatable whether or not they are of greater importance on the information so far available. Whereas ungrazed saltmarshes are relatively scarce, they are generally of lower value for birds, particularly for feeding and roosting, although they are of higher value than grazed saltmarshes for breeding species such as Redshank and Skylark, and hunting species such as Short-eared Owl, harriers and other raptors.

10.7.134 The Upper Mersey Estuary saltmarshes are predominantly of one type (*Elytrigia* saltmarshes). There is a lack of lower and middle saltmarsh communities and no sequences of different types of saltmarsh community because most of the Upper Mersey Estuary saltmarshes are at similar levels and only inundated at spring or other high tides

10.7.135 The lack of lower and middle saltmarsh communities can be attributed to the hydrodynamic nature of the Upper Mersey Estuary with its constantly meandering river channels and strong currents which inhibit accretion and consequently the natural development of lower saltmarsh communities.

10.7.136 For a full evaluation of the saltmarshes it is necessary to consider their avifauna and other relevant features including invertebrates.

Habitat and Vegetation Surveys of the Upper Mersey Estuary River Channel Mudflats and Sandbanks

General Description

10.7.137 The river channel and sandbanks (Appendix 10.2 JNCC Phase 1 Habitat Survey Maps 2, 4, 5, 6 & 7) are mostly devoid of higher plant vegetation due to erosion by the river and as a result of tidal water movements. The hydrodynamic conditions which affect these intertidal habitats prevent the establishment of saltmarsh and other marine plants apart from the intermittent colonisation of the existing sandbank, a short distance upstream of the Runcorn Gap, by a very limited number of saltmarsh plant species.

Literature Review

10.7.138 According to the August 2000 SINC Report on the Upper Mersey Estuary, the area of the site, excluding the saltmarshes, is 286 hectares.

10.7.139 A list of bird species for this part of the Estuary, recorded from the St. Helens Canal in the north and from Wigg Island in the south, is provided in the SINC Report of 2000. The list contains records of 70 species of which most are wildfowl and waders with some seabirds and passerines. No information is given on the numbers of each species.

10.7.140 The species list includes Bewick's Swan, Whooper Swan, Pintail, Marsh Harrier, Knot, Temmink's Stint, Ruff, Black-tailed Godwit, Arctic Skua and Common Tern. Several raptors including Marsh Harrier are listed. It appears that the list includes some species associated with the saltmarshes.

10.7.141 There are reports from local people that the saltmarsh extended into the central part of the Upper Mersey Estuary around the position of the existing sandbank. However significant erosion has occurred with the complete loss of the central area of saltmarsh vegetation.

Description of the Intertidal Channels, Mudflats and Sandbanks

10.7.142 In 2005 and 2006 the sandbank was being colonised by very scattered Sea Aster (*Aster tripolium*) plants with very local Sea Plantain (*Plantago maritima*) only. This represented the SM11 Sea Aster saltmarsh community. This developing plant community was eroded in the winter and regenerated in the following spring, but it was eroded completely in the winter of 2006-2007, leaving the sandbank devoid of vegetation.

10.7.143 Continuing surface erosion has lowered the height of the sandbank and there has been partial erosion of its margins, particularly on the upstream side as a result of the river channel moving south from the northern bank of the Upper Mersey Estuary towards the southern bank immediately upstream of the Runcorn Gap. However there appears to have been little change in the overall area of the sandbank due to local deposition of sand and silt which has compensated to at least some extent for the continuing erosion.

10.7.144 During the last five to six years it has been noted that accretion of sand and silt has occurred along the northern margin of the Upper Mersey Estuary, on the eastern side of Cuerdley Saltmarsh and the power station lagoons. The river channel has moved away from the edge of the saltmarsh but there has been no saltmarsh recolonisation to date.

10.7.145 Although no detailed observations have been made, it appears that there has been an overall loss of about 1% of the area of existing saltmarsh due to river erosion and slumping into the channel.

10.7.146 Observations of incipient saltmarsh colonisation of the sandbank island upstream of the Runcorn Gap indicate that the SM11 Sea Aster saltmarsh community may develop here or elsewhere in the Upper Mersey Estuary, given sufficient accretion. This NVC community is characterised by Sea Aster as a constant species with subsequent colonisation by Sea Meadow-grass (*Puccinellia maritima*) and Glasswort (*Salicornia*) that are normally of constant occurrence in the SM11 community.

10.7.147 Other conspicuous species that are characteristic of the SM11 NVC community are Herbaceous Seablite (*Suaeda maritima*) and Sea Purslane (*Atriplex portulacoides*). Algal mats form and other saltmarsh plants may appear in lesser quantities, examples being Sea Plantain mentioned earlier and Sea Arrow-grass (*Triglochin maritima*).

10.7.148 The SM11 community is able to tolerate regular tidal submergence and is essentially a primary coloniser of the lower saltmarsh under certain conditions.

Preliminary Assessment of the Value of the River Channel and Sandbanks

10.7.149 The river channel, sandbanks and sandflats are Habitats of Principal Importance but there is only transient or incipient floristic interest at present. They also qualify as Annex 1 habitat in two respects, first as part of estuarine habitat and second as mudflats and sandflats not covered by seawater at low tide. However the habitats are an integral part of the Upper Mersey Estuary and

its established saltmarshes, and therefore form part of a site of Borough (Halton) and county (Cheshire) wildlife importance.

10.7.150 The largely physical features of the river channel and associated sand habitats may be of greater than county importance depending on their functional relationship with the Middle Estuary which is of international importance. Further assessment of their possible value in this respect is necessary, particularly with reference to their value for feeding and roosting birds, and the abundance and species composition of their invertebrate fauna. These aspects are discussed later in this Chapter.

Overall Evaluation of the Upper Mersey Estuary from Habitat and Vegetation Perspectives

10.7.151 The Upper Mersey Estuary, in its entirety from the Runcorn Gap to Fiddler's Ferry Power Station Lagoons at the eastern extremity of Astmoor Saltmarsh, covers an area of 708 hectares. This figure includes the power station lagoons that were built over part of the Upper Mersey Estuary and replaced the majority of Cuerdley Saltmarsh.

10.7.152 The Upper Mersey Estuary is the only example in Cheshire of an upper estuarine ecosystem with its characteristic saltmarshes and other intertidal habitats together with meandering river channels and the typical hydrodynamic processes that are often found in this type of environment. For these reasons the Upper Mersey Estuary is of County importance.

10.7.153 However the Upper Mersey Estuary is a particularly good example of an upper estuarine environment because it exhibits a high degree of typicalness in respect of the characteristic hydrodynamic processes. The hydrodynamics and fluvial processes studies have shown that there are high rates of morphodynamic variability on a day-to-day basis, suggesting that meander migration of the river channels is highly stochastic. There is no doubt that the complexity of meander migration is well represented in the Upper Mersey Estuary, and morphodynamic variability proceeds at high rates.

10.7.154 Also of special interest is the fact that the Estuary is macro-tidal, having one of the largest tidal ranges in Britain. This has implications for the ecology of the Upper Mersey Estuary. As demonstrated by the hydrodynamic and fluvial processes studies, the high erosion processes have resulted in a retreat of the saltmarshes due to erosion of the edges, as is very evident on the river channel margins of Widnes Warth and Astmoor saltmarshes.

10.7.155 The combination of physical and ecological conditions that are represented in the Upper Mersey Estuary are important, as is the existence of typical examples of four Priority Habitats, namely coastal saltmarsh, intertidal mudflats, sub-tidal sands and gravels, and tide-swept channels.

10.7.156 For the above reasons, the Upper Mersey Estuary is assessed as being of regional biological and nature conservation importance, in the context of the North-west Region, from Cheshire in the south to Cumbria in the north.

10.8 Baseline and Results: Habitat and Vegetation Surveys of the Fiddler's Ferry Power Station Lagoons

Introduction to the Power Station Lagoons

10.8.1 The baseline survey for the ecological assessment of the Project would be incomplete without an examination of the habitats and vegetation in the surrounding area. This is because many of the terrestrial and aquatic habitats, including their plant communities and associated faunal species, exhibit some relationship to the maritime habitats of the Upper Mersey Estuary.

10.8.2 Many of the wildlife habitats in the area surrounding the Upper Mersey Estuary are used by bird species which also use the estuarine and associated habitats, notably Heron, ducks and other waterfowl, wading birds and occasionally raptors such as harriers and other birds of prey.

10.8.3 Further, the Upper Mersey Estuary should be assessed as only a small part of the entire estuarine ecosystem of the Mersey. Consequently it is possible that there are populations of bird species that use the whole of the Estuary, throughout the year or at different times of the year. Some species may migrate or commute on a daily basis, or less frequently.

10.8.4 There may, for example, be significant movements of wildfowl and wading birds between the Upper Mersey Estuary and the Middle Mersey Estuary, and between the Upper Mersey Estuary and the Fiddler's Ferry Power Station lagoons, or even between the lagoons and the Middle Mersey Estuary.

10.8.5 It is also possible that the Estuary, including the Upper Mersey Estuary, is used as a commuting route for birds and other wildlife species that migrate daily between the Estuary and inland habitats, notably gulls but possibly some important wildfowl and wading bird species.

10.8.6 Further, many bird species and certain other fauna require large territories, particularly birds of prey such as harriers and Short-eared Owl but also mammals such as Otter and migratory fish.

10.8.7 For the above reasons, the baseline assessment includes a description and evaluation of the habitats, vegetation and fauna of the power station lagoons, with particular attention given to their birdlife and especially to those birds that use estuaries for breeding, feeding, roosting and for migration.

10.8.8 Other sites of nature conservation importance in the wider area have also been examined and evaluated as part of the Project assessment. This was considered to be necessary to ensure that the inter-relationships of the habitats and species populations in the surrounding area with those in the Upper Mersey Estuary have been understood and considered during the assessment of effects of the Project on biodiversity.

Literature Review of the Power Station Lagoons

10.8.9 The Fiddler's Ferry Power Station settlement lagoons have been constructed over the former saltmarsh habitat of Cuerdley Marsh at the head of the Upper Mersey Estuary, with the loss of a very large part of the semi-natural vegetation of the upper part of the Estuary. The reduction in size of the estuarine ecosystem has been significant in the context of the Upper Mersey Estuary but probably minor and insignificant in the contexts of the Middle Mersey Estuary, and the Estuary in its entirety.

10.8.10 The deposits of pulverised fuel ash produced by the power station exhibit a significant degree of salinity when they are lagooned or tipped, giving some affinity with the habitats influenced by the tidal waters of the Upper Mersey Estuary. The soluble salts in the lagoons are released by the lagooned ash which, initially, contains phytotoxic levels of various soluble salts, notably borates.

10.8.11 The power station lagoons provide suitable habitats for estuarine birds, notably gulls, wildfowl and wading birds and other coastal and migratory species. As will be shown later in this assessment, the lagoons have attracted a wide range of birdlife including rare species as well as wildfowl and waders. The lagoons and their surroundings also support other wildlife of importance, notably colonies of wild orchids and other flora.

10.8.12 The ecological and nature conservation importance of the power station lagoons has been recognised by the listing of the entire lagoons complex as a Site of Biological Importance (SBI) in Cheshire and as a Site of Importance for Nature Conservation (SINC) in Warrington Borough, this being equivalent to LWS status in Halton. This local designation alone and its relationship to the Upper Mersey Estuary justify inclusion of the power station lagoons system in the baseline assessment.

10.8.13 During the European Year of the Environment in 1987, the St. Helens Groundwork Trust and the Mersey Valley Partnership were commissioned to carry out a project at Fiddler's Ferry Power Station to demonstrate good practice in the identification of opportunities for creative nature conservation as part of a large-scale environmental improvement of an industrial complex. A report was prepared by the Groundwork Trust and the Mersey Valley Partnership in 1987 and 1988 entitled *Fiddler's Ferry Power Station; Energy for Wildlife*.

10.8.14 In 1987 the "D" lagoon was almost full of power station ash slurry, with areas of open water and deltas in varying stages of colonisation by vegetation. It was noted that ruderal weeds, marginal plants and willow scrub were starting to develop. The combination of cover and wide open surfaces was stated to provide ideal roosting habitat at high level for wader species, adjacent to the Estuary. The combination of habitats provided a safe refuge for the wading birds, at high tide.

10.8.15 "A" lagoon, in 1987, contained vertical ash cliffs which provided nesting sites for Sand Martin colonies. It was pointed out that these sites are of national importance as the Sand Martin is under great pressure and numbers have declined dramatically through loss of habitat.

10.8.16 "C" lagoon, also in 1987, consisted of 16 hectares of open water. It was described in the report as an important area for a great variety of wildfowl.

10.8.17 The report (*Fiddler's Ferry Power Station; Energy for Wildlife*) includes a major section on habitat creation habitat creation and enhancement which were part of the project design for the European Year of the Environment initiative. The habitat creation and enhancement included woodland, grassland, wetland and excavation of scrapes along the foreshore area. The wide aqueduct corridor through the system of lagoons was encouraged to develop naturally, with minimal interference.

10.8.18 Consideration was given to enhancement of the adjacent saltmarsh by the control of illicit wildfowling, the designation of a nature conservation area by signposting, erection of barriers to deter or prevent access, and by creation of a security canal. A bird hide was constructed at a location overlooking the lagoons and the saltmarsh of the Upper Mersey Estuary.

10.8.19 The longer term proposals were set out in the form of a Masterplan for 1992 and a Masterplan for 2025.

10.8.20 The appendices to the report provide information on habitats, vegetation, plant species and fauna. Botanical interests recorded were several orchid species and large orchid populations, notably Common Spotted Orchid, Southern Marsh Orchid, Early Marsh Orchid, Fragrant Orchid and various orchid hybrids. There were thousands of orchid plants.

10.8.21 Breeding passerine bird species, based on records of members of Warrington Bird Club, include Reed Bunting, Reed Warbler, Sedge Warbler and Skylark. Cuckoo was seen regularly and had bred. Other interesting or notable passerines recorded rarely or as singles were Rock Pipit, Water Pipit, Yellow Wagtail, Blue-headed Wagtail, Spanish Wagtail, Citrine Wagtail, Whinchat, Wheatear, Greenland Wheatear, Black Redstart, Ring Ousel, Grasshopper Warbler, Snow Bunting and Corn Bunting.

10.8.22 Heron was resident and other wildfowl of note, as rare visitors or resident in low numbers, a few species breeding, were Red-throated Diver, Great Crested Grebe, Mute Swan, Bewick Swan, Whooper Swan, Grey-lag Goose, Brent Goose, Barnacle Goose, Canada Goose and a single Snow Goose.

10.8.23 Ducks recorded in good numbers were resident Shelduck and Mallard. Ruddy Duck was a rare resident. Wintering ducks seen in good numbers were Wigeon, Teal, Pintail, Shoveler, Pochard and Tufted Duck. Ducks of rare occurrence, or wintering in small numbers, were Garganey, Gadwall, Ring-necked Duck, Scaup, Ferruginous Duck, Long-tailed Duck, Common Scoter, Velvet Scoter, Goldeneye, Red-breasted Merganser, Wood Duck and Ruddy Duck.

10.8.24 Diurnal raptors recorded, rarely or in very low numbers, were Marsh Harrier, Hen Harrier, Merlin and Gyr Falcon. There were regular sightings of Sparrow Hawk, Kestrel and Peregrine Falcon. Four owl species use the site, namely Barn Owl, Little Owl, Tawny Owl and Short-eared Owl.

10.8.25 The bird records were impressive for coastal and seabirds using the site, particularly waders and gulls. Waders of note, in terms of numbers, were Golden Plover, Lapwing, Dunlin and Curlew. Uncommon species, seen in singles or very low numbers, were Oystercatcher, Little-ringed Plover, Ringed Plover, Grey Plover, Knot, Sanderling, Ruff, Black-tailed Godwit, Bar-tailed Godwit, Common Sandpiper, Turnstone, Whimbrel, Spotted Redshank, Greenshank, Marsh Sandpiper, Green Sandpiper and Wood Sandpiper.

10.8.26 All of the common species of gull were recorded plus a good number of uncommon, rare and very rare species, namely Laughing Gull, Franklin's Gull, Little Gull, Ring-billed Gull, Yellow-legged Herring Gull, Iceland Gull, Glaucous Gull and Slender-billed Gull. Other noteworthy seabirds identified were Great Skua, Sandwich Tern, Arctic Tern, Common Tern and Black Tern.

10.8.27 Butterflies recorded were Meadow Brown, Small Skipper, Large Skipper and Small Tortoiseshell. Dragonflies and damselflies identified were Blue-tailed Damselfly, Common Blue Damselfly and Common Sympetrum.

General Description of Fiddler's Ferry Power Station Lagoons

10.8.28 A summary description of the habitats and vegetation at the Fiddler's Ferry Power Station Lagoons is given here. A detailed description is presented in Appendix 10.5.

Ecological Description of the Power Station Lagoons

10.8.29 Details of the habitat conditions and ecological importance of the power station lagoons including their immediate surroundings are given in Appendix 10.5. The habitat conditions are summarised below;

a. There are four lagoons, A, B C and D (Figure 10.20, Appendix 10.1) which present a range of habitat types of value to wildlife including open water habitat, seasonally and temporarily wet areas, dry ground and variations in topography and aspect, sheltered and exposed conditions, and variations in soil chemistry ranging from alkaline and saline conditions to neutral and infertile ground;
b. As explained in the literature review, the ecological importance of the lagoons arises from the fact that they are used for the treatment by settlement of power station ash (pulverised fuel ash). The ash (PFA) is initially calcareous and saline but otherwise it is non-toxic to plant growth. After the leaching by rainfall of the soluble salts including borates, the ash supports good plant growth because of its moisture retention and excellent physical structure for the root growth of plants; and
c. The four lagoons are generally used in rotation so that suitable habitat is always available for colonisation by plant and animal life. For example A lagoon contained about 40% of open water habitat in 2002.

10.8.30 The principal ecological and nature conservations interests of the PFA lagoons, based on the literature review and the 2002-2003 surveys, are summarised as follows;

a. Large colonies of several species of wild orchid have developed on the lagoon sites because of the calcareous nature of the ash and the combination of low nutrient status and moist conditions. Species include Common Spotted Orchid, Southern Marsh Orchid and Bee Orchid, with reports of Fragrant Orchid (*Gymnadenia conopsea*). Some marsh orchid colonies contain many thousands of individual plants;
b. The ash supports numerous species that are characteristic of unimproved and species-rich grassland, notably Rough Hawkbit, Kidney Vetch, Ox-eye Daisy and Common Bird's-foot-trefoil;
c. The incipient or transient occurrence of developing brackish or saltmarsh vegetation is of interest, particularly because of its similarities to the maritime vegetation of the Upper Mersey Estuary;
d. The development of tall swamp vegetation is also significant, especially the stands of Reed Canary-grass, Bulrush and Common Reed on wet ground and deltas. Associated wetland herbs are Yellow Iris, Soft Rush and Celery-leaved Buttercup;
e. Other types of developing wetland vegetation include communities of Hard Rush, Marsh Bedstraw, Gypsywort and Marsh Willowherb;
f. As described later in this Chapter, the absence of vegetation in parts of the lagoon system, due to ash extraction and deliberate habitat modifications such as vertical ash cliff construction, provides breeding habitat for Sand Martins;
g. Some of the well-weathered areas of PFA where the soluble salts have been removed by natural leaching but which retain a calcareous soil reaction, support distinctive communities of liverworts and flowering plants. Species of interest include frequent Common Centaury, Yellow-wort, Mouse-ear Hawkweed, Squirreltail Fescue and Great Mullein. Tor-grass (Brachypodium pinnatum) and Rat's-tail Fescue (*Vulpia myuros*) have also been recorded; and

h. There is also a mixture of planted and naturally colonising woody vegetation of scrub and young trees, of different ages and sizes, colonising the ash and retaining bund habitats which add to the biodiversity of the ash lagoons complex. There are significant amounts of willow and birch species.

Central Valley Between the Lagoons (Vyrnwy Aqueduct Corridor)

10.8.31 The central valley which passes through the lagoon system is described in Appendix 10.5 and shown in Figure 10.20 (Appendix 10.1). This is an important ecological feature because of its size (1.25 kilometres long and 50 metres wide) and species content.

10.8.32 The vegetation of the narrow valley is of significant botanical interest and consists of a mosaic of reedbeds, tall-herb vegetation, rushy grassland, scattered scrub and mesotrophic grassland communities that support a high breeding and feeding bird population, notably of warblers.

10.8.33 As described in more detail in Appendix 10.5, the wetland vegetation is a feature of this area. Of importance is a mosaic of reedbeds, principally of Common Reed, and tall-herb vegetation with smaller and localised patches of additional species including an important assemblage of sedges and rushes.

10.8.34 The sedge and rush vegetation contains much Common Sedge, Distant Sedge, Common Spike-rush, Jointed Rush, Hard Rush, False-Fox Sedge, Marsh Horsetail, Soft Rush and Sea Club-rush. Southern Marsh Orchids are also associated with the wet areas, and Bee Orchids on dry ground.

10.8.35 NVC communities represented in the complex mixture and mosaic of vegetation include the following, with the proportions of each quantified;

a. 70% S4 Common Reed tall-swamp community;
b. 10% W24 Bramble-Yorkshire Fog underscrub community;
c. 10% OV26 Great Willowherb tall-herb community;
d. 5% OV25 Common Nettle-Creeping Thistle tall-herb community;
e. 2% MG1 False Oat-grass coarse grassland community;
f. 1% S12 Bulrush swamp community;
g. 1% S21 Sea Club-rush swamp community;
h. 1% MG10 Soft Rush-Yorkshire Fog wet grassland community;
i. <1% S18 False Fox-sedge swamp community; and
j. <1% A2 Common Duckweed aquatic community.

Ecological Description of the Grassland to the North-East of the Power Station Lagoons

10.8.36 The grassland immediately north-east of the system of Power Station Lagoons (Appendix 10.2 - JNCC Phase 1 Habitat Survey Map 7, & Figure 10.20, Appendix 10.1), adjacent to “A” Lagoon, was part of the Fiddler’s Ferry Power Station site but it was not used for lagoon construction, although part of the field unit has been disturbed and used for localised tipping of pulverised fuel ash.

10.8.37 The grassland is between the disused St. Helens Canal and the narrow remaining strip of the formerly extensive Cuerdley Saltmarsh in the south, beyond which is the Mersey. A detailed description of the habitats and vegetation is given in Appendix 10.6.

10.8.38 The field covers approximately 18 hectares of which approximately 70% is grassland, the remainder consisting of tall-herb vegetation, reedbed, open water and Bramble underscrub.

10.8.39 The grassland is moderately species-rich and mostly mesotrophic, being characterised by grasses and forbs. Frequent species include Yarrow, Common Knapweed, Cowslip, Silverweed, Ribwort Plantain, Ox-eye Daisy and Wild Carrot.

10.8.40 The tipping of calcareous PFA has influenced the vegetation of the western parts of the grassland, close to the ash lagoons. The plant communities in this area include calcareous grassland plants, notably Rough Hawkbit and Southern Marsh Orchid.

10.8.41 The vegetation of the field unit is essentially a mosaic of plant communities comprising the MG1 False Oat-grass coarse grassland (MG1a Red Fescue sub-community) and the MG1e Common Knapweed sub-community, of the NVC. The localised patches of species-rich grassland are calcareous (CG) grassland communities.

10.8.42 The slope in the north to the St. Helens Canal is wetter. Of note is a strip of tall and dense Common Reed along the foot of the slope. At the eastern end of the slope there is further wetland vegetation on the lower ground, notably Hemlock Water Dropwort, Reed Canary-grass, Bulrush and Common Reed with associated Marsh Hawk's-beard and Southern Marsh Orchid and Curled Dock. There is also Common Reed on the lower slope to Cuerdley Saltmarsh.

10.8.43 The following NVC plant communities form the vegetation mosaic;

a. CG/MG semi-improved-unimproved grassland;
b. S4 Common Reed tall swamp community;
c. OV26 Great Willowherb tall-herb community;
d. W24 Bramble-Yorkshire Fog underscrub;
e. S28 Reed Canary-grass tall-fen community;
f. OV24 Common Nettle-Cleavers tall-herb community;
g. OV27 Rosebay Willowherb tall-herb community; and
h. S12 Bulrush tall swamp community.

Assessment of the Ecological Value of the Fiddler's Ferry Power Station Lagoons

10.8.44 The Power Station Lagoons and their surrounding bunds provide a wide range of wildlife habitats and vegetation types ranging from open plant communities on dry and wet ground to dense grassland, tall-herb and woody vegetation at different stages of development. The cyclic regime of PFA slurry lagooning followed by extraction of the accumulated and dry material provides a dynamic system for natural colonisation by a wide range of plant communities and species. The wide range of water regimes adds to the ecological potential of the site.

10.8.45 Many of the habitat conditions and habitat mosaics are unusual and uncommon or rare in the local context of Halton and Warrington boroughs, and in the county context of Cheshire. Calcareous habitats, for example, are largely confined in Cheshire to lime waste beds.

10.8.46 The assemblage of orchid species is of particular interest and many of the colonies of orchids are sizeable because PFA is known to provide extremely favourable habitat for marsh orchids and more local species such as Bee Orchid and Fragrant Orchid which require dry soils.

10.8.47 On the basis of habitat conditions, plant communities and plant species alone, the site is important in Borough and County (Cheshire) contexts. The suitability of the habitats for birds and other fauna is demonstrated by the survey data presented later in this Chapter.

10.8.48 The lagoons, in Warrington Borough, have been included as part of the Upper Mersey Estuary Grade A Site of Biological Importance (SBI of county importance) and SINC because of the open water, marsh, tall-swamp and wet carr habitats present.

10.8.49 However the ornithological data from the literature review alone are impressive in terms of the large numbers of coastal wading birds that use the site, and the large numbers of seabirds recorded including ducks, gulls, terns, swans and a few other seabirds that are rarely seen inland.

10.8.50 It appears that although the lagoons have been constructed over saltmarsh habitat and caused its loss, they still provide an important habitat for the estuarine birds and seabirds from the Outer Mersey Estuary and beyond. Their value seems to be their function as a sanctuary, particularly for roosting birds, at high tides and during harsh and stormy weather.

10.8.51 Thus it is possible that the Power Station Lagoons system may have some functional relationship with the Middle Mersey Estuary SPA, in which case its value may be greater than county importance.

10.8.52 The reedbeds represent Habitat of Principal Importance. It may be argued that the complex of lagoons represents an additional Habitat of Principal Importance on the site, namely 'open mosaic habitats on previously developed land'. However the site is still in industrial use but only on a rotational basis; the majority of the site is disused at any one time. Therefore there is a strong case for classification of the site as 'open mosaic habitat on previously developed land'.

10.8.53 The site contains certain habitats, vegetation, features and species, including numerous bird species, which occur in the adjacent Upper Mersey Estuary. Further consideration needs to be given, in the light of analysis of the ornithological data from the literature review and from the recent ornithological surveys described later in this Chapter, as to whether or not the system of lagoons has a significant functional relationship with the Upper Mersey Estuary and possibly with the Middle Mersey Estuary.

10.8.54 If there is a functional relationship of the lagoons with the Middle Mersey Estuary, such as movements of birds between the Middle Mersey Estuary and the value of the lagoons as a high tide and harsh weather roost, the lagoons may have greater than county (Cheshire) wildlife importance.

10.8.55 The north-eastern field unit contains Habitats of Principal Importance (S4 community and borderline mesotrophic MG6/MG5 grassland), orchids and possibly ornithological interests. It has enhanced value because of its contiguity with the St. Helens Canal, the Power Station Lagoons and the Upper Mersey Estuary. It is of at least borough (Warrington) importance.

10.9 Baseline and Results: Habitat and Vegetation Surveys of Local Wildlife Sites Outside the Upper Mersey Estuary

Description and Evaluation of the Disused St Helens Canal Local Wildlife Site

General Introduction

10.9.1 The Project crosses the western section of the St. Helens Canal on the north side of the Upper Mersey Estuary and to the east of Spike Island (Appendix 10.2 - JNCC Phase 1 Habitat Survey Maps 4, 5 & 7, and Figure 10.21, Appendix 10.1).

10.9.2 Because the canal is a linear and continuous habitat with the free movement of flora and fauna along its entire length, it is inappropriate to restrict the baseline assessment to the route corridor crossing point. Therefore the baseline assessment covers the full length of the canal from Spike Island to Fiddler's Ferry Power Station, to a point between the power station buildings and the power station ash lagoons (Appendix 10.2 JNCC Phase 1 Habitat Survey maps 5 & 7, and figures 10.17 and 10.20, Appendix 10.1).

Literature Review

10.9.3 An ecological survey of part of the disused St. Helens Canal Local Wildlife Site (LWS) was conducted as part of the Fiddler's Ferry Power Station project that was part of the Mersey Basin Campaign to clean up the Mersey catchment area (Operation Groundwork and Mersey Valley Partnership, 1987-88).

10.9.4 The canal, in 1987, was described as a clean, freshwater and scarce habitat and a long-established biological corridor. There was aquatic, emergent and marginal vegetation, in particular stands of Common Reed and Bulrush.

10.9.5 Although debris was reportedly present in the water, the report by Operation Groundwork and the Mersey Valley Partnership described the canal as containing good coarse fish, invertebrate and waterfowl populations. The canal is reportedly of importance for its insect fauna.

10.9.6 Bird records associated with the canal and provided by Warrington Bird Club up to 1987 included breeding Little Grebe in the reeds, the occasional occurrence of breeding Coot, and a few records of resident Kingfisher. Kingfishers bred successfully in 1987 (rECOrd) but not in the western section of the canal. Sedge Warblers and Reed Warblers were probable breeders in the canal-side reedbeds.

10.9.7 Bird recorded as hunting over the canal were Sand Martin, Swallow and House Martin.

10.9.8 Information on birds obtained from rECOrd were records of Grasshopper Warbler, Grey Heron, Grey Wagtail, House Martin, Linnet, Moorhen, Redshank, Reed Bunting, Sedge Warbler and Swift. There was no information on the numbers of birds or other details.

10.9.9 Fish data held by rECOrd are Crucian Carp, Perch, Pike, Roach and Three-spined Stickleback.

10.9.10 There are previous sightings, from observations of local anglers, of breeding turtles (presumably Red-eyed Terrapin) in the canal, since 1990.

10.9.11 Substantial data on the canal are included in the April 2004 SINC (Site of Importance for Nature Conservation) report held by the Council. This gives the area of the site as 3.63 hectares comprising 2.54 hectares of marginal/inundation habitat, 1.73 hectares of tall herb and fern; Bracken habitat, and 0.36 hectare of open water. 900 metres of the canal are in Halton.

10.9.12 In the early 1990s there was a good insect population but it appears to have declined, with more recent records revealing a paucity of aquatic invertebrate fauna other than masses of Daphnia in the summer of 2003. The scarcity of invertebrates is attributed to the large fish populations but the reportedly brackish water may be a limiting factor.

10.9.13 Detailed species lists are included in the Council's report. The plant species list, which provides information on presence only, contains two species of note, namely Great Water Dock (*Rumex hydrolapathum*) and Lesser Centaury (*Centaurium pulchellum*).

10.9.14 Notable bird species (Priority Species) held on Recorder database are Grey Partridge, Skylark, Song Thrush, Linnet, Bullfinch and Reed Bunting.

Description of the Disused St Helens Canal Local Wildlife Site

10.9.15 The St. Helens Canal is disused. The study area of the canal and its banks extends from an inlet of the River at West Bank to the swing bridge at Station Road, Fiddler's Ferry. There are several bridges along its length and at Fiddler's Ferry a concrete channel has been built across the water channel that restricts the flow along the canal and allows water to flow from the canal to the power station.

10.9.16 A footpath and cycle track run along the entire length of the south side of the canal, and a Blackthorn and Hawthorn hedge separates the canal from Widnes Warth Saltmarsh in the south.

10.9.17 The canal has extensive stands of marginal reedbed and wetland vegetation which is inhabited by a variety of fauna including warblers, wildfowl and invertebrates. It also provides shelter for numerous fish species, as described later in this Chapter. The canal is well-used by anglers.

10.9.18 The water channel, in the western section of the canal eastwards towards Fiddler's Ferry Power Station, is free of channel vegetation but there is well-established marginal vegetation. However the eastern section, adjacent to the power station and the power station lagoons, is choked by reedbed (tall swamp vegetation) with only small areas of open water. This provides a more suitable habitat for warblers and other bird species such as Reed Bunting.

10.9.19 The canal has a stony gravel bed and there are areas of shallow water where stony rubble appears to have been tipped in the past. The vegetation close to the canal sides is growing on a muddy substratum.

10.9.20 In mid-September 2002 the vegetation along the south bank of the canal was cut to the height of the stone banks. Amongst the strimmed vegetation debris were the remains of many old nests of birds. This indicates that the Reed Canary-grass and other marginal vegetation are suitable and important habitats for nesting Moorhens and warblers.

Western Section - Spike Island to Tanhouse Lane Bridge

10.9.21 This section of the St. Helens Canal (Figure 10.17) extends from the timber footbridge at Spike Island eastwards towards the timber footbridge at the end of Tanhouse Lane. The water channel is clear of vegetation along the whole length but there is a 2-3 metres wide strip of marginal vegetation which is almost continuous.

10.9.22 The south side of the canal is bordered by the cycle track with species characteristic of trampled areas such as plantains, Pineappleweed and Annual Meadow-grass. The narrow north bank is colonised by overhanging willow carr and other tree and scrub species.

South Bank of the Canal

10.9.23 Most of the south bank of this section is colonised by marginal wetland vegetation which forms an almost continuous strip with a width of 2-3 metres. The vegetation consists of constant Reed Canary-grass with occasional stands of Common Reed (Appendix 10.7, Table 2). Branched Bur-reed and Yellow Iris (*Iris pseudacorus*) are scattered along the length of Reed Canary-grass but most are further out towards the open water.

10.9.24 Other frequent associates include abundant Gipsywort, Common Nettle, Bittersweet, Great Willowherb, Fool's Water-cress and Cocksfoot grass.

10.9.25 There was little floating aquatic vegetation present at the time of the survey. Common Duckweed is of constant occurrence throughout this length of the canal but it is never dominant and it occurs in association with green algae. Amphibious Bistort (*Persicaria amphibia*) patches occur occasionally along this canal section.

10.9.26 There are intermittent bare patches of muddy bank used by fishermen where there are gaps in the Reed Canary grass-margin. The bank vegetation is trampled and there is associated litter. The trampled muddy section is partly colonised by Perennial Ryegrass, Hemlock Water Dropwort, Creeping Bent, Cocksfoot, Broad-leaved Dock and White Clover.

10.9.27 The cycle track and pathway along the top of the bank are colonised by ruderal forbs that do not require a deep substratum and are tolerant of trampling. Abundant species include Annual Meadow-grass, Greater Plantain, Ribwort Plantain, Mugwort (*Artemisia vulgaris*), Scentless Mayweed and Pineappleweed (*Matricaria discoidea*). Frequent species include Canadian Fleabane (*Solidago Canadensis*), Crested Dogstail (*Cynosurus cristatus*), Hedge Mustard (*Sisymbrium officinale*), Common Cat's-ear (*Hypochaeris radicata*) and Knotgrass.

10.9.28 The marginal vegetation decreases towards Spike Island and there are gaps in the margin of Reed Canary-grass. In this section the canal water is deeper and a less organic material has accumulated to support the growth of terrestrial plants. These areas with no marginal vegetation support occasional higher plants growing in the crevices in the concrete banks; species include Common Nettle and Male Fern.

10.9.29 At the bridge at Spike Island there is a metal screen which has retained accumulated rubbish and a dense cover of Common Duckweed over the water surface.

North Bank of the Canal

10.9.30 The section of canal along the north bank from Spike Island extending to the east includes a narrow strip of land between a concrete slab factory fence and the canal. The bank is colonised by dense and young trees that overhang the water. The most abundant species is Osier (Salix viminalis) with frequent Common Alder, Crack Willow and Goat Willow (Appendix 10.7, Table 1). The field layer beneath the trees includes Great Willowherb and Common Nettle on the water's edge, with Bramble and Bracken patches along the fence.

10.9.31 Further east along the canal the bank widens and the cover of young trees decreases. The grassland vegetation here includes Stinging Nettle patches with associated Cocksfoot, Creeping Fescue, Yorkshire Fog, False Oat-grass and Great Willowherb. Bramble is encroaching over this grassland and it is predicted that colonisation of the open area will follow a natural successional process with the development of Common Alder and Crack Willow woodland.

10.9.32 Other species of interest along the eastern part of this canal section include Common Centaury

(*Centaurium erythraea*) and Yellow-wort (*Blackstonia perfoliata*) which are characteristic of calcicolous grassland. These plants have colonised bare concrete areas where there were railway sidings.

10.9.33 The clearing in the tall vegetation is very suitable for butterflies, particularly for Common Blue, Speckled Wood, Meadow Brown and possibly Gatekeeper. Larval food plants present include a wide variety of forbs, namely Common Bird's-foot-trefoil, Common Ragwort, Creeping Cinquefoil (*Potentilla reptans*), Tufted Vetch, Red Clover and Hogweed.

10.9.34 The patches of Bramble and dense stands of trees provide a suitable habitat for breeding and feeding passerine birds.

10.9.35 The occurrence of small mammal holes beneath the fence and trampled vegetation into the water indicated the presence of rats and Water Vole (in 2002). Rabbit burrows and scrapings were also evident.

10.9.36 NVC plant communities that have developed in this western section of the St. Helens Canal include the following;

a. A2 Common Duckweed aquatic community;
b. S28 Reed Canary-grass swamp community;
c. S4 Common Reed tall swamp community;
d. OV26 Great Willowherb tall-herb community; and
e. A10 Amphibious Bistort aquatic community.

10.9.37 There is also developing W6 Alder-Common Nettle wet woodland and MG1 False Oat-grass coarse grassland.

Middle Section - Tanhouse Lane Bridge to the Western End of Fiddler's Ferry Power Station

South Bank

10.9.38 The central part of the surveyed section of the St. Helens Canal runs from the bridge at Tanhouse Lane to the edge of the Fiddler's Ferry Power Station.

10.9.39 The marginal vegetation along the south bank of the central section of the canal contains abundant Reed Canary-grass with patches of Branched Bur-reed (Appendix 10.7, Table 3). The vegetation here is similar to that along the south bank of the western section. There are trampled muddy gaps in the Reed Canary-grass that are colonised by Annual Meadow grass and Greater Plantain.

10.9.40 Further east along the canal there is a transition from the Reed Canary-grass community to stands of dense Common Reed. This is the only distinct difference in the vegetation compared with that along the western section of the canal. Numerous breeding Moorhen were present amongst the Common Reed.

North Bank

10.9.41 The whole of the northern bank along the central section of the canal has been colonised by a marginal strip of Common Reed (Appendix 10.7, Table 4). This stand of tall swamp vegetation is between 2 and 5 metres wide and is aligned parallel to the adjacent railway line.

10.9.42 The presence of the railway line and the steep banks made access to this section of the canal bank extremely difficult to survey but there was evidence that Water Voles were present in 2002. This evidence was the presence of “Water Vole Lawns” and areas of Common Reed stems cut due to Water Vole foraging activities.

10.9.43 Further Water Vole surveys were judged to be necessary to predict the size of the Water Vole population but the survey constraints may preclude this or limit the success of the surveys. The results of the Water Vole surveys are described later in this Chapter.

10.9.44 The canal is lined with stone slabs and it is likely that the Water Voles seek cover and burrow behind the stones and into the earth, subsoil, rubble and mud, as recorded along other canals. Further, the burrows and holes will be buried under the Common Reed plants and visibility is severely restricted.

10.9.45 NVC plant communities identified along the central section of the canal include;

a. S28 Reed Canary-grass tall-herb fen community;
b. OV21 Greater Plantain-Annual Meadowgrass community of trampled areas; and
c. S4 Common Reed swamp community.

Eastern Section of the Canal - Between Fiddler’s Ferry Power Station and the Power Station Lagoons

South Bank

10.9.46 The eastern section of the surveyed canal extends east, from the western end of the power station lagoons to between the lagoons and the main power station cooling towers and buildings.

10.9.47 The canal is discontinuous along this section, with a concrete divide. There is an abundance of Common Duckweed where the continuity of the water channel is interrupted (Appendix 10.7, Table 5).

10.9.48 The land surrounding the concrete channel is short and rabbit-grazed grassland. Species here include Cocksfoot, Creeping Fescue, Yorkshire Fog, White Clover, Creeping Bent, False Oat-grass, Perennial Ryegrass and Creeping Buttercup.

10.9.49 The water channel beyond the concrete divide is choked with Common Reed and along the whole length there is only about 10% of open water. The extent and density of the Common Reed along the canal increases further east.

10.9.50 Beneath the bridge over the canal that carries traffic from the power station to the lagoons is an area of open water which contains scattered stands of Bulrush. On the eastern side of the bridge the open area continues and there is a concrete bank used by anglers. There is, as reported by anglers consulted during the surveys, a good variety of fish species in the canal. This is confirmed in the Aquatic Ecology Chapter (Chapter 11.0) by APEM Ltd which mentions that the main species found in the adjacent section of the canal are Bream, Eel, Carp (Mirror, Common, Leather and Crucian, Perch, Pike, Roach and Rudd. Many dragonfly species were recorded here.

10.9.51 Further along the canal the channel again becomes covered and choked by Common Reed. This becomes very dense and is associated with Hedge Bindweed. Other species amongst the Common Reed include Great Willowherb, Common Nettle and Reed Canary-grass.

10.9.52 Moorhens are common amongst the reeds with frequent Reed Warblers and Willow Warblers in the breeding season.

10.9.53 Associated fauna recorded were abundant Carp at the surface of the water beneath the reeds and Reed Canary-grass. Water Voles were recorded in 2002, as reported later in this Chapter during the vegetation and habitat surveys of the Study Area, at the end of the factory fence to the east.

North Bank

10.9.54 The dense cover of Common Reed across the canal channel continues to the north bank where the canal runs parallel with the railway line (Appendix 10.7, Table 6). Between the Common Reed stands is a 20 metres long section of Bracken.

10.9.55 Immediately east of the lorry bridge over the canal is an area of scrub and trees which contains a large apple tree, Sycamore, Hawthorn, Goat Willow, Pedunculate Oak, Elder and others. A row of oak trees continues along the railway line. There is a further bridge over the canal immediately after the signal box of the power station railway; this bridge is colonised by grassland including Perennial Ryegrass, Cocksfoot, Creeping Thistle and False Oat-grass.

10.9.56 Woody species in the hedgerow are Hawthorn, Elder, Blackthorn, Alder and Dog Rose.

10.9.57 Bulrush becomes abundant in the canal close to the lorry bridge leading to the lagoons.

Preliminary Assessment of the Ecological Value of the Disused St Helens Canal

10.9.58 The canal contains three Habitats of Principal Importance, namely eutrophic standing water, reedbed and developing wet woodland. There is one protected mammal Species of Principal Importance present, namely Water Vole, although this had disappeared by 2007, at least in the western section of the canal, due to colonisation by Mink.

10.9.59 The Hawthorn and Blackthorn hedgerow (W21 Hawthorn-Ivy NVC community and W22 Blackthorn-Bramble community), even though it is neither ancient nor species-rich, is a Habitat of Principal Importance because of the recent inclusion of all hedgerows in the JNCC Priority Species list.

10.9.60 The combined habitat and species interests of the canal are of substantive importance in Halton and Warrington Borough contexts and in a Cheshire County context.

The Manchester Ship Canal Bank at Astmoor Local Wildlife Site

General Introduction

10.9.61 The Project route crosses the central section of the Manchester Ship Canal Bank LWS, a short distance to the north-west of the MFI Superstore.

10.9.62 The crossing of the central section of this linear and continuous site of nature conservation importance requires the inclusion of the entire length of the Manchester Ship Canal Bank LWS, of recognised ecological importance, in the baseline assessment.

Literature Review

10.9.63 There are few available records on the Manchester Ship Canal Bank LWS. There is a report of survey by Sidney Duff which is held by the Council, noteworthy species being orchid populations including Bee Orchid (*Ophrys apifera*), Fragrant Orchid (*Gymnadenia conopsea*) and marsh orchids (*Dactylorhiza* spp). Also of interest was the presence of Grass Vetchling (*Lathyrus nissolia*).

10.9.64 The citation for the LWS (formerly SINC) mentions that the site boundary was revised to exclude a small area in the Shreiber UK grounds which was lost due to the construction of a car park.

Description of the Manchester Ship Canal Bank LWS

10.9.65 Five species of orchid were recorded on the site in 1992, notably over 300 Bee Orchids, two Fragrant Orchids, over 40 Southern Marsh Orchids, Common Spotted Orchid and more than 20 Early Marsh Orchids (*Dactylorhiza incarnata*). Grass Vetchling was recorded on the top footpath in 1990.

10.9.66 The banks of the Manchester Ship Canal (Figure 10.21, Appendix 10.1) are lined with concrete blocks with a steep slope down to the water. Plants growing in the cracks in the blocks include Ribwort Plantain, Hemlock Water Dropwort and False Oat-grass. Other occasional species include Garden Angelica, Annual Meadow grass-and Creeping Thistle (Appendix 10.7, Table 7).

Grassland Strip

10.9.67 The grassland strip along the bank of the canal is approximately 20 metres wide and slopes down to the canal at about 30 degrees. The majority of this grassland is uncut but there are long and narrow stands of Bramble and tall-herb vegetation such as Rosebay Willowherb, Hemlock Water Dropwort and Meadowsweet adjacent to the canal, and some patches of scrub along the top of the slope.

10.9.68 The uncut grassland contains abundant False Oat-grass, Red Fescue and Yorkshire Fog (Appendix 10.7, Table 7). In the western part of the grassland and particularly towards the top of the slope, but beyond the route corridor, a large colony of marsh orchids (*Dactylorhiza* spp.) was recorded. A total of 508 Southern Marsh Orchid (*Dactylorhiza praetermissa*) plants and 40 Common Spotted Orchid (*Dactylorhiza fuchsia*) plants were counted and significant numbers of Bee Orchids (*Ophrys apifera*) were found.

10.9.69 Associated grassland species include Common Sedge (*Carex nigra*), Field Horsetail, Meadow Vetchling (*Lathyrus pratensis*), Red Clover, Field Wood-rush (*Luzula campestris*) and Common Bird's-foot-trefoil. Other species characteristic of this grassland and the prevailing calcicolous conditions include Yellow-wort (Appendix 10.7, Table 7).

10.9.70 Along this section of the canal bank is a concrete inlet; the grassland to the east of the inlet supports only localised orchid plants.

10.9.71 The presence of occasional saplings of Hawthorn and Sycamore suggests that management may be essential in the near future to maintain the grassland habitat and its associated orchid populations.

Scrub Further up the Canal Bank

10.9.72 The grassland further up the canal bank is suffering encroachment by taller woody species including Italian Alder, Sycamore and Hawthorn. The stands of scrub are particularly wide along the area of the site to the east of the concrete inlet.

10.9.73 The path along the Manchester Ship Canal runs through the sections of scrub along the fences to the rear of Astmoor Road. Other woody species along this strip include Pedunculate Oak, Field Maple, Rowan, Common Sallow and Alder.

10.9.74 The field layer vegetation consists of Cleavers, Hogweed, Bramble, False Oat-grass, mosses, Smooth Sow-thistle, Cow Parsley, Rosebay Willowherb and Common Nettle.

10.9.75 There are occasional Southern Marsh Orchids along the path. Within the scrub are localised and large patches of Meadow Vetchling.

10.9.76 Towards the eastern end is a fenced-off area of scrub that surrounds a 'mooring section' of the canal. There is a concrete base here with Squirreltail Fescue (*Vulpia bromoides*), Biting Stonecrop (*Sedum acre*) and a cover of mosses.

10.9.77 The remaining section along the Manchester Ship Canal bank is woodland which extends to the east of the sewage works and Haystack Lodge. The woodland canopy is approximately five to seven metres high and many of the trees are semi-mature. Species include Sycamore, Pedunculate Oak, Alder, Italian Alder and Common Sallow. The shrub layer contains Elder and Hawthorn. The field layer is very poorly developed with associated bare or very sparsely colonised ground because the tree canopy is fairly dense. Constant species include Red Campion, Common Nettle, Bramble, Cleavers and Creeping Buttercup with a high percentage cover of moss species

10.9.78 There is another stand of woodland towards the western end of the area. Woody species here are mostly Horse Chestnut with an understorey of Common Nettle, Scaly Male Fern (*Dryopteris affinis*), Garden Lupin and Hogweed.

NVC Plant Communities

10.9.79 It is difficult to assign the vegetation to NVC communities because the site is artificial and colonisation by plants is still in progress.

10.9.80 The grassland with the orchid populations bears some resemblance to developing MG1 False Oat-grass coarse grassland (MG1e Common Knapweed sub-community) because of the abundance of False Oat-grass and the species-rich assemblage of short perennial species and Common Knapweed. This type of grassland has affinities with the important MG5 Crested Dogstail-Common Knapweed community but the latter is cut or grazed although the two NVC communities are often inter-convertible by a change in cutting and/or grazing management.

10.9.81 The mosaic of communities includes two other plant communities, the OV27 Rosebay Willowherb tall-herb community and the W24 Bramble-Yorkshire Fog underscrub community.

Preliminary Assessment of the Ecological Value of the Manchester Ship Canal Bank at Astmoor

10.9.82 The Manchester Ship Canal Bank has substantive borough (Halton) and county (Cheshire) importance, principally for the MG1e plant community with its assemblage of different orchid species, and its affinity to Habitat of Principal Importance (MG5 grassland).

10.9.83 Although the Manchester Ship Canal Bank is of artificial or industrial origin, this does not detract from its botanical and associated interests, and value in a local context. Plant colonisation has been completely natural and the terrain has presented a new habitat for colonisation of several species which are otherwise uncommon or of extremely localised distribution in the area.

10.9.84 The JNCC revised list of Priority Habitats includes open mosaic habitats on previously developed land. Reference to Figure 10.21, Appendix 10.1, indicates that the Manchester Ship Canal Bank qualifies as this type of mosaic, which in this case is enhanced by the orchid and other botanical interests.

Wigg Island LWS and Local Nature Reserve

General Introduction

10.9.85 Wigg Island LWS and Local Nature Reserve (LNR) include all the land between the Manchester Ship Canal and Astmoor Saltmarsh, excluding the raised land in the east where there is industrial waste tipping. The site covers 25.56 hectares.

Literature Review

10.9.86 Information in the citation shows that the site contains 8.66 hectares of woodland and 9.09 hectares of grassland plus footpaths, a car park and land owned by the Manchester Ship Canal Company (MSCC).

10.9.87 The rECOrd database holds botanical and faunal species lists but there is no quantitative information on individual species.

10.9.88 Uncommon birds reported in recent years include Buzzard, a possible breeder, and Corn Bunting (a visitor). There is a very recent record of a breeding pair of Long-eared Owls on Wigg Island but outside the LNR/LWS boundary.

10.9.89 Approximately 80 plant species have been recorded on the site but the exact number is uncertain because some species have been recorded by genus only. Species of interest or scarcity are Yellow-wort (*Blackstonia perfoliata*), Grass Vetchling, Bee Orchid and Midland Hawthorn (*Crataegus laevigata*). There are several maritime species including Sea Buckthorn (*Hippophae rhamnoides*), Sea Plantain and Sea Aster.

10.9.90 There are records of Azure Damselfly, Green Lestes and Brown Hawker Dragonfly. Moths recorded are Common Swift, Six-spot Burner and Narrow-bordered Five-spot Burnet. Of interest is the record of Garden Tiger.

10.9.91 The butterfly records are of interest. Common species recorded are Large Skipper, Common Blue, Large White, Green-veined White, Orange-tip, Small Tortoiseshell, Speckled Wood, Gatekeeper and Meadow Brown. Of note are the additional presence of Brimstone, Purple Hairstreak and White-letter Hairstreak, the last named being a strong and well-established colony. All these species are probably breeding on Wigg Island. In 2002, twenty species of butterfly were recorded which is impressive for a relatively small and suburban area.

10.9.92 Amphibians in the recorded list are Smooth Newt, Common Frog and Common Toad. Great Crested Newt and Palmate Newt appear to be absent.

10.9.93 A large number of terrestrial invertebrate species has been recorded including moths, bumble bees and flies.

10.9.94 Wigg Island is reported to contain species-rich grasslands which have developed on industrial land; this probably refers to the Manchester Ship Canal Bank vegetation.

Description of Wigg Island LWS and Local Nature Reserve, Including the Tipped Area in the East.

10.9.95 The eastern part of Wigg Island has been tipped with chemical and other wastes. There is much bare and sparsely colonised ground in this raised area of land and tipping is still in progress and will continue for many years. However the northern part of the tipped area, where there are steep slopes down to the wetland area of the former Runcorn to Latchford Canal, is well colonised by planted trees which now provide a good cover or broadleaf species over mostly dense Bramble underscrub.

10.9.96 The western part of Wigg Island consists of large areas of established and developing broadleaf woodland with very local coniferous species. All the woodland is plantation, with no ancient or mature woodland.

10.9.97 The most abundant tree species are very abundant Ash, very abundant Common Alder which is dominant locally, frequent to locally abundant Silver Birch, and locally frequent Lombardy Poplar plus locally frequent Pedunculate Oak. There are small amounts of Sycamore and Cherry. The coniferous species, in small quantities, are Scots Pine and Corsican Pine (*Pinus nigra*).

10.9.98 There are significant areas of mature scrub of Goat Willow, Grey Willow (*Salix cinerea*), Hawthorn and Blackthorn, some of which provide well-established woodland-edge scrub. Other shrubs, in lesser quantities, are Hazel, various willow species and hybrids, Elder and Dog Rose. In many areas there is a well-developed Bramble underscrub.

10.9.99 Other woody species in localised or small quantities are Wych Elm, Crack Willow, Hybrid Poplars, Aspen, Rowan, Whitebeam and Field Maple.

10.9.100 There are large areas of open grassland surrounded by trees and scrub. Much of the grassland is mown and dominated by a mixture of Perennial Ryegrass, Red Fescue, Common Bent-grass, Creeping Bent-grass and Yorkshire Fog with an abundance of pleurocarpous mosses. White Clover occurs locally in abundance. Cocksfoot and Timothy are frequent very locally.

10.9.101 Most of the grassy vegetation resembles improved grassland (MG7 Perennial Ryegrass NVC community and Perennial Ryegrass-Crested Dogstail NVC community). Wetland plants are colonising locally, in small quantities, namely Creeping Buttercup, Soft Rush and Hard Rush.

10.9.102 There is rough grassland in a few areas where there has been little or no cutting management.

10.9.103 A recently improved wetland feature is the former Runcorn to Latchford Canal in the eastern part of the Local Nature Reserve. This contains a small amount of reedbed.

Preliminary Evaluation of Wigg Island LWS and Local Nature Reserve

10.9.104 Wigg Island is of importance principally for its invertebrate fauna, particularly the assemblage of breeding butterflies. The occurrence of at least twenty species, nearly all of which are believed to be breeding species, is impressive.

10.9.105 There are no local guidelines on the evaluation of sites for assemblages of butterfly species but Lancashire County Council has published guidelines for site selection of local wildlife sites in Lancashire, these being known as Biological Heritage Sites. The guidelines, which were developed in collaboration with English Nature in 1998, state that a site qualifies if it regularly supports breeding populations of nine or more butterfly species, excluding those that are migratory or are largely associated with cultivated plants.

10.9.106 The relevant species that have been recorded on Wigg Island are Large Skipper, Common Blue, Green-veined White, Orange-tip, Small Tortoiseshell, Speckled Wood, Gatekeeper, Meadow Brown, Purple Hairstreak, White-letter Hairstreak and Brimstone. It is very probable that all of these species breed regularly on Wigg Island, with the possible exception of Brimstone, because the larval food plants of all the species are present. The number of regularly breeding species is ten which would exceed the qualifying level of nine. It is also probable that Small Skipper and Small Copper breed regularly.

10.9.107 The occurrence of the strong breeding population of White-letter Hairstreak and the occurrence of Purple Hairstreak strengthen the case for LWS designation. The *Halton Local Wildlife and Geology Sites; Guidelines for Designation* (Halton Wildlife Sites Partnership 2007), in Guideline 25, includes “Sites which regularly support a significant population of a declining species, a species of restricted distribution in Halton or one at the edge of its geographical range”. The presence of the two hairstreaks satisfies this qualification because both have a restricted distribution in Halton.

Haystack Lodge Local Wildlife Site

General Introduction

10.9.108 Haystack Lodge, on the south side of the Manchester Ship Canal (Appendix 10.1, JNCC Habitat Survey Map 6, & Figure 10.22, Appendix 10.1), is separated from the eastern part of the Upper Mersey Estuary, adjacent to the Power Station Lagoons, by the eastern extremity of Wigg Island. The site is about is about 500 metres from the Upper Mersey Estuary.

Literature Review

10.9.109 The Haystack Lodge citation describes Haystack Lodge as an extensive area of damp grassland and woodland over an area of approximately 5.0 hectares. It consists of a variety of habitats, the ground flora having been reduced by regular mowing.

10.9.110 A list of 130 higher plant species has been recorded. These are common species, with a few exceptions, notably Midland Hawthorn, Yellow-wort, Pyramidal Orchid (*Anacamptis pyramidalis*) and Northern Marsh Orchid (*Dactylorhiza purpurella*) which are of very local or uncommon occurrence.

10.9.111 There is a record of Marsh Sow-thistle (*Sonchus palustris*), this being a nationally scarce species. However this record is a case of mistaken identity.

10.9.112 Invertebrate records include nine common butterfly species and numerous macro-moth species, all of which are common or of unknown distribution and occurrence. The terrestrial invertebrate fauna of this site has been well-recorded and includes a long list of fly and hoverfly species, nearly all of which are common species. Of note, however, are three local species of dance fly, and five local hoverfly species. A further hoverfly species is nationally notable/Nb.

10.9.113 There are records of common species of bee, wasp, ant, woodlouse, spider, gall mite, sawfly, gall wasp, beetle and bug. The only species of local occurrence were three spiders, a flower beetle, a leaf beetle and a micro-moth.

Description of Haystack Lodge LWS

10.9.114 The site covers approximately 5.03 hectares and contains mown neutral grassland, dense plantations of semi-mature broadleaf and coniferous trees and shrubs of mainly native species, Bramble scrub (W24 community), mixed tall-herb vegetation and Bracken (W25 community).

10.9.115 The 2002 surveys revealed a colony of approximately 150 Southern Marsh Orchids by the Ship Canal and a colony of about 200 plants towards the central part of the site. Pyramidal Orchids (*Anacamptis pyramidalis*) have been recorded previously.

10.9.116 The grassy clearings that have been created amongst the trees are rich in small herb species including Self-heal, Common Fleabane, Water Pepper, Dove's Foot Crane's-bill, Common Bird's-foot-trefoil and others.

10.9.117 Marsh Sow-thistle (*Sonchus palustris*), a nationally scarce species, has been recorded previously but searches for this species have failed to detect it. The Atlas of the British Flora shows no records of this species in the Upper Mersey Estuary area or in the wider area. It is concluded that the record was a mis-identification.

10.9.118 The woodland and scrub are good bird-breeding habitat. Anthills are very abundant, especially in the sandy soil close to the Manchester Ship Canal amongst the short grassland close to the water.

10.9.119 There are records of nine species of butterfly including skippers and Gatekeeper plus notable moths, namely Poplar Hawkmoth and Ruby Tiger. Terrestrial and flying invertebrates have been well recorded with 15 local species detected.

10.9.120 Haystack Lodge has been designated as LWS for its botanical and invertebrate interests. The site's proximity to the Upper Mersey Estuary and Wigg Island Local Nature Reserve (LNR) gives the site enhanced importance as does its urban location.

10.9.121 Further details of Haystack Lodge including a botanical species list are given in Appendix 10.8 (Table 1).

Preliminary Evaluation of Haystack Lodge LWS

10.9.122 Haystack Lodge is of principal importance for its grassland habitat which is enhanced by the presence of associated tall-herb vegetation, underscrub, tall scrub and woodland vegetation which includes coniferous, deciduous and mixed woodland communities. It is of substantive value, in a local context for its range of semi-natural plant communities.

10.9.123 The grassland is of botanical importance principally for its marsh orchids (*Dactylorhiza* spp.) species and notably for the occurrence of Pyrqamidal Orchid. Also of importance is the occurrence of Midland Hawthorn, a southern species, in the scrub.

10.9.124 The most important feature of this site is its invertebrate fauna which is diverse, species-rich and well-recorded. Although most are common species, the assemblage of a wide range of genera including a small number of local species gives the site substantive value for invertebrates alone but particularly for the rich butterfly and moth fauna.

10.9.125 This site is rated highly in terms of the Ratcliffe criteria. Its value is significant in a county context as well as a local (Halton) context.

Norbury Wood and Marsh, and Oxmoor Wood and Ponds Local Wildlife Sites, including Oxmoor Local Nature Reserve

General Introduction

10.9.126 Norbury Wood and Marsh (JNCC Habitat Survey Map 6 and Figure 10.23, Appendix 10.1), which incorporates Oxmoor Wood and Ponds Local Nature Reserve, is on the south side of the Manchester Ship Canal and within 100 metres of the Upper Mersey Estuary, and only 0.7 kilometre south-east of the Power Station Lagoons.

10.9.127 Previously, Norbury Marsh and Oxmoor Wood were designated as one Wildlife Site (SINC at that time) but they have now been designated as two Local Wildlife Sites.

10.9.128 The Norbury Wood and Marsh LWS and LNR cover 4.41 hectares. The Oxmoor Wood and Ponds LWS and LNR cover 7.0 hectares.

Literature Review of Norbury Wood and Marsh, and Oxmoor Wood and Ponds

10.9.129 Previous surveys, prior to the Project, included botanical surveys in 2003 and recording of birds and invertebrates.

10.9.130 The combined site is known for its high diversity of habitats, but chiefly for its woodlands which include wet willow and Alder carr, and dry birch and oak woodland. Associated habitats are dense and scattered scrub, semi-improved mesotrophic grassland, marshy grassland, marsh and tall swamp communities, and tall-herb vegetation including Bracken. A good diversity of higher plant species have been recorded.

10.9.131 The botanical survey in 2003 revealed 82 higher plant species. Uncommon, local or otherwise notable species are limited to Yellow Rattle, Common Reed and native Bluebell. There are reports that Marsh Helleborine (*Epipactis palustris*) has been introduced.

10.9.132 Eight common butterfly species were recorded. The only amphibian species listed is Common Frog.

10.9.133 A list of 32 bird species has been recorded. Priority Species and others of note included in the list are Grey Partridge, Ringed Plover, Curlew, Skylark, Linnet and Reed Bunting.

10.9.134 The most important recorded feature of the site is the heronry that is reported to be growing in size.

10.9.135 The Norbury Wood and Marsh LWS part of the combined site consists of 1.67 hectares of broadleaved semi-natural woodland and 2.74 hectares of tall-herb and fern plus other ruderal vegetation. The Oxmoor Wood and Ponds part of the combined site contains 1.1 hectare of broadleaved semi-natural woodland, 0.3 hectare of improved grassland, 1.85 hectares of tall-herb and fern plus tall-ruderal vegetation. Additionally there are 2.74 hectares of tall swamp and fen, and 1.01 hectares of standing, mesotrophic open water.

Description of Norbury Marsh Local Wildlife Site

10.9.136 The Norbury Marsh site contains a mixture of open water habitats including a fairly large man-made pond, two drainage ditches and an outflow connected to the Manchester Ship Canal. Other habitats and vegetation include wetland vegetation, notably Common Reed and Bulrush tall-swamp, rush-pasture, coarse grassland, neutral pasture and densely planted scrub.

10.9.137 The most significant feature is the wet Alder woodland which is a good representative of Habitat of Principal Importance. It is also of importance for its heronry which is likely to continue to increase in size.

10.9.138 The site is also important for the presence of Water Voles and there is evidence of breeding Skylarks, breeding Reed Warblers and Sedge Warblers, butterfly and other invertebrate interests including molluscs and spiders.

10.9.139 Also of note are Southern Marsh Orchids, and reports of introduced Marsh Helleborine.

10.9.140 The designation of Norbury Marsh as a LWS is fully justified, and its value is enhanced by its relationship to the Upper Mersey Estuary and its urban location.

10.9.141 Further information on Norbury Wood and Marsh, and Oxmoor Wood and Ponds, including botanical species lists of the habitats and vegetation are provided in Appendix 10.9.

Preliminary Evaluation of Norbury Wood and Marsh, and Oxmoor Wood and Ponds LWS

10.9.142 The preliminary evaluation of these two sites is based on their importance as a single ecological unit because most of the faunal species are likely to use both parts of the combined site. The principal feature of the site is its range of wetland habitats.

10.9.143 The combined site covers approximately 10 hectares of semi-natural habitat. Habitats and species of principal importance are well-represented, the wet woodland being itself of importance as an excellent example of its NVC community type and probably amongst the best in Cheshire. The presence of Water Voles, now given increased legal protection, is of increased significance in view of the disappearance of the species from the St. Helens Canal and the upper reaches of Steward's Brook in St. Michael's Golf Course.

10.9.144 The value of combined site is preliminary rated as significant in a county (Cheshire) context as well as a more local (Halton) context.

Other Site of Less than Local Importance, Outside the Upper Mersey Estuary

10.9.145 There are several sites outside the Upper Mersey Estuary that contain features of ecological and nature conservation interest but they do not have substantive importance in a local context and are not included in the list of Halton Local Wildlife and Geology Sites.

10.9.146 Sites which fall into this category may be worthy of conservation for a number of reasons, although perhaps not in the manner in which Local Wildlife Sites are protected. Such sites are

considered here for several reasons;

a. Sites may be under-recorded and may merit LWS status in the light of further survey and evaluation. This may, for example, reveal the presence of protected species which are difficult to detect, reptiles and some amphibians being cases in point;
b. Sites may attain greater value as a result of natural colonisation or successional changes, such as the appearance or large orchid colonies following disturbance;
c. Changes in legislation and/or the revision of the JNCC lists of Priority Species and Priority Habitats may gave sites containing such species and/or habitats a higher level of conservation importance;
d. Management of habitats for nature conservation may enhance their importance very significantly, and a change in land-use or land management may have the same beneficial effect. For example the cessation of wildfowling at sites in the Estuary has increased their importance dramatically; and
e. Some sites may have a very high level of potential nature conservation value for one or more reasons. Potential is included in the well-established Ratcliffe criteria.

10.9.147 The following sites are ones that, because of their location, may be affected by construction and/or use of the Project. They are sites that are considered to merit further investigation.

St Michael's Golf Course

10.9.148 St. Michael's Golf Course, which is disused, is an area of open land within Widnes to the north and south of Speke Road. It is almost completely enclosed by residential and industrial developed land.

10.9.149 The site is largely open grassland with peripheral areas of trees and scrub. There is a ditch system which flows south where it is known as Steward's Brook which eventually discharges into the Middle Mersey Estuary. The ditch, which flows under Speke Road from the northern edge of the former golf course land, is a continuation of a ditch which flows through the housing area to the north-east of the disused golf course.

Literature Review

10.9.150 The site was surveyed by Environmental Advice Centre Ltd in July 2003 and a sizeable population of Water Voles was discovered along the brook.

10.9.151 The brook has been polluted by leachates from a former chemical waste tip adjacent to the course of the brook. To improve the water quality of the brook, the Council proposed to realign the brook so that the channel was moved away from the contamination source, to a distance of 25-50 metres. The proposal was to infill the original channel with impermeable material to prevent further water pollution.

10.9.152 To inform the remediation proposals, a further Water Vole survey was carried out by Jacobs Babtie in 2004. The ecological condition of the brook and the surrounding areas of golf course were examined in August 2004. The surveys, which covered a 500 metres length of the brook, showed that the land around the brook consisted of amenity and semi-improved grasslands, areas of scrub, and stands of planted and naturally regenerating woodland.

10.9.153 Japanese Knotweed was found near the car park area. No important habitats or vegetation were identified which could be adversely affected by the works.

10.9.154 The ditch was described as running along the bottom of a vegetated trapezoidal channel. There was a marginal growth locally of Common Reed, Soft Rush, Great Willowherb and Reed

Canary-grass.

10.9.155 There was good evidence of Water Vole activity in the form of burrows and latrines. It was estimated that the brook supported 20 Water Voles, with a mean density of 4.11 Water Voles per 100 metres of ditch length. The site was concluded to be of regional significance for Water Voles.

10.9.156 The Water Voles were trapped and translocated to Moore Nature Reserve near Warrington where there were previously populations of Water Voles and the habitat was suitable. The objective was to realign the brook after translocation of the Water Voles. The realigned brook was designed to provide favourable habitat for natural colonisation by Water Voles from outside the treatment site.

Description of St Michael's Golf Course

10.9.157 The grassland is a typical example of a disused golf course turf with an abundance of fine-leaved grasses, namely Red Fescue and Creeping Bent-grass. However Yorkshire Fog is present with a local abundance of False Oat-grass and Common Couch-grass, the last two species being characteristic of unmanaged grasslands which are invaded by coarse grasses, particularly False Oat-grass.

10.9.158 Nevertheless the grassland contains a good assemblage of forbs (broad-leaved wild flowers), with conspicuous Yarrow, Common Cat's-ear, Ribwort Plantain, Wild Carrot, Common Centaury and Dovesfoot Cranesbill. However, as would be expected in unmanaged grassland, there is invasion by tall herbs, notably Common Ragwort, Rosebay Willowherb and docks.

10.9.159 On the southern and western margins of the golf course is mown, species-poor grassland of Perennial Ryegrass and other common herbs with little else.

10.9.160 The dense woody plantings along the site margins have now established mixed young woodland and scrub vegetation of Hawthorn, Blackthorn, Alder, Sycamore, Balsam Poplar, Cherry, Whitebeam, Crab Apple, pine species, Crack Willow, Goat Willow, Ash, Common Sallow, Field Maple, Elder, Dog Rose, Holly, Field Rose, Bramble, Hazel, Silver Birch, Sea Buckthorn, Spindle Tree, Osier, Small-leaved Lime, Pedunculate Oak, Norway Maple, Dogwood, White Poplar, Guelder Rose and others.

10.9.161 Examination of the ditch vegetation in October 2006 revealed signs of continuing pollution, the water being turbid with a foul smell. However the ditches and their margins are colonised by an abundance of Reed Canary-grass, Fool's Watercress, Creeping Buttercup and Creeping Bent-grass. Associated wetland plants, in smaller quantities, included Bittersweet, Hemlock Water-dropwort, Angelica, Bulrush, Yellow Iris, Common Reed, Great Willowherb, Clustered Dock, Redshank and duckweed species.

10.9.162 The site supports common urban bird species in the developing woodland and scrub but there were no water birds associated with the ditch system.

Preliminary Evaluation of St Michael's Golf Course

10.9.163 From habitat and vegetation perspectives the site has limited nature conservation value although its urban location gives it enhanced value because unmanaged open space is scarce.

10.9.164 The site has potential for recolonisation by Water Voles following ditch remediation, and the developing woodland and scrub habitats are likely to attract more resident and breeding as the vegetation matures. The grassland has potential value for breeding butterflies such as Meadow

Brown and Large Skipper, and for other terrestrial if it is left unmown.

10.9.165 Given the absence of a large Water Vole population, the site does not qualify for Local Wildlife Site status but the situation may change if there is successful remediation of the Steward's Brook ditch system and recolonisation by Water Voles, either naturally or by re-introduction.

The Manchester Ship Canal

General Introduction

10.9.166 The Manchester Ship Canal has always been regarded as a very poor habitat for wildlife, largely because of its polluted water and fairly regular disturbance by ships.

Literature Review

10.9.167 There is a deficiency of published or otherwise recorded information in the locality of the Project, apart from information on the species-rich vegetation and orchid populations on some sections of the canal banks.

10.9.168 Surveys by Environmental Research & Advisory Partnership, elsewhere along the Manchester Ship Canal corridor between Halton and Manchester, have revealed that the open water habitat is used by various species of waterfowl including Mallard, Tufted Duck (wintering), Pochard (wintering), Coot, Moorhen, Great Crested Grebe and a few other common waterbirds. Various gull species also use the Manchester Ship Canal.

10.9.169 There are several records of Kingfisher breeding in sections of the Manchester Ship Canal Bank in the Manchester and Irlam areas. Sand Martins have nested in associated cliffs to the east of the New Bridge crossing point.

10.9.170 Observations of the Manchester Ship Canal by the Partnership at other locations have shown that insect eating bird species such as Swift, Sand Martin, House Martin and Swallow feed over the canal water.

Description of the Manchester Ship Canal

10.9.171 The water quality of the Manchester Ship Canal is very poor and is frequently disturbed by the passage of ships and by wind, both of which cause highly turbid conditions. Consequently there is no submerged, emergent or floating-leaved aquatic vegetation, and there are no marginal fringes of Common Reed or other reedbed plants.

10.9.172 The Halton section of the Manchester Ship Canal attracts a limited number of water bird species, with small numbers of very occasional Tufted Duck, Mallard, Mute Swan, Moorhen and Coot. Sewage discharges attract modest numbers of Black-headed Gulls at times, although usually no more than 50-60 birds.

10.9.173 There is very little canal bank vegetation adjacent to the water's edge due to the continuous steel reinforcement of the banks. The artificial and vertical cladding provides no substratum for rupestral plant colonisation as commonly occurs along smaller canals. Consequently there is very limited and localised vegetation in the vicinity of the water's edge which is limited to a few common species such as Dandelion, Broad-leaved Willowherb (*Epilobium montanum*) and Pellitory-of-the-Wall (*Parietaria judaica*).

10.9.174 The upper banks of the Manchester Ship Canal, along the northern side, are colonised by developing scrub of Hawthorn, Goat Willow, Sycamore and Silver Birch with small amounts of

Pedunculate Oak. There are Bramble patches locally. There is also localised acidic grassland of Wavy Hair-grass, Red Fescue and Common Bent-grass. Much of the grassland is intensively grazed by rabbits.

10.9.175 A cliff about 30 metres long along the eastern section of the Manchester Ship Canal and over one kilometre away from the Project crossing point has supported a small colony of Sand Martins during at least one breeding season, but the colony has not persisted. However Sand Martins, probably from the breeding colonies in the pulverised fuel ash at Fiddler's Ferry Power Station Lagoons, hawk over the Manchester Ship Canal for insect prey and it is possible that they may return to breed on the canal bank.

Preliminary Evaluation of the Manchester Ship Canal

10.9.176 The Manchester Ship Canal is of low wildlife value for the small numbers of waterfowl attracted to the open water habitat and for the common species of passerine bird that use the developing scrub.

10.9.177 However the continued development of the canal bank vegetation is likely to increase its ecological value, particularly as the trees begin to mature and there is increased regeneration of woody species including trees and well as scrub. The canal and its banks are predicted to have an increasing wildlife corridor function for a wide range of wildlife including foraging and ultimately roosting bats.

10.9.178 If the water quality improves there are likely to be increased numbers of common wildfowl, particularly Moorhen, Coot, Mallard and potentially less common species such as Great Crested Grebe and Little Grebe. There is also the potential for wintering wildfowl such as Tufted Duck, Pochard, Coot and others as at Salford Quays.

Description of the Project Corridor North-West of the St. Helens Canal to Ditton Roundabout

General Description

10.9.179 This section of the Project corridor crosses developed land comprising buildings, car parks, hardstanding, roads, a railway line, areas of planted grassland and other urban vegetation of recent origin. There is nothing of significant biodiversity importance along this section of the route.

The Bridgewater Canal

Description of the Bridgewater Canal

10.9.180 The Bridgewater Canal contains open water but there is no marginal reedbed, possibly due to boat movements. Both banks are artificial with sections of vertical steel reinforcement and some sections reinforced with either concrete or stone.

10.9.181 The banks support only small amounts of rupestral vegetation with localised Common Nettle, Dandelion, Rosebay Willowherb and other common species.

10.9.182 No birdlife associated with open water habitats was seen along the canal during the surveys. There was occasional disturbance due to the passage of motorised boats and the canal towpath has been improved by the placement of limestone chippings, with the result that there will be much pedestrian use of the towpath. Increased human access will limit the value of the canal for waterbirds such as ducks and grebes.

10.9.183 The Aquatic Ecology Chapter (Chapter 11.0) has reported that the Bridgewater Canal contains large numbers of aquatic macrophytes, namely Fennel Pondweed (*Potamogeton pectinatus*), Nuttall's Pondweed (*Elodea nuttallii*), Spiked Water-milfoil (*Myriophyllum spicatum*), Curled Pondweed (*Potamogeton crispus*), Hornwort (*Ceratophyllum demersum*) and Ivy Duckweed (*Lemna trisulca*). These species are common in nutrient-rich (eutrophic) waters. Fennel Pondweed is common in many canals and fairly polluted ditch and river water-courses; it has a high tolerance of enriched and moderately polluted waters, including rapidly flowing as well as standing waters. The other species are more typical of ponds and very slow-moving and standing waters.

10.9.184 The Aquatic Ecology surveys have also detected stonewort (algae) in the canal, namely Chara globularis, in abundance. The Aquatic Ecology surveys also found Nitella muctonata var gracillima which is a Red Data Book species but it is not considered to be threatened.

10.9.185 The Aquatic Ecology Chapter (Chapter 11.0) has referred to a good range of fish species caught by anglers in the Bridgewater Canal, namely Bleak, Bream, carp (Mirror, Common, Leather), Gudgeon, Pike, Perch, Roach, Rudd and Tench. Smaller numbers of Chub were also reported, and possibly Minnow.

Preliminary Evaluation of the Bridgewater Canal

10.9.186 The Bridgewater Canal has value as an example of eutrophic standing water which is a Habitat of Principal Importance. However its associated flora and fauna are relatively species-poor and limited compared with those of most canals. Its value is low and it is not of substantive importance.

10.9.187 The canal has limited potential for the further development of its aquatic vegetation as boat movements will continue to inhibit the submerged and other aquatic vegetation, particularly if boat movements increase. There is limited potential for wildfowl and other water birds because of boat and towpath uses by people.

The Bowers Business Park Plot and Lugsdale Railway Sidings

10.9.188 The Project route crosses nothing of substantive biodiversity importance north-west of the Upper Mersey Estuary, between the St. Helens Canal and Ditton Roundabout. However a survey of largely open land, in close proximity to the east of the route known as the Bowers Business Park Plot (which has since been developed) and Lugsdale Railway Sidings, revealed significant biodiversity on undeveloped industrial and railway land. Details of the ecological condition of this land are provided for reference in Appendix 10.10.

10.9.189 Species such as Bee Orchid and other plants of interest on land awaiting development and railway land could, potentially, be translocated for mitigation and enhancement onto areas affected by the Project, such as the Manchester Ship Canal Bank LWS and new habitats created during landscaping for the Project.

10.9.190 A brief summary list of the recorded biodiversity interests of the undeveloped Bowers Business Park Plot and Lugsdale Railway Sidings in 2002 is given;

a. Short and species-rich grasslands supported Common Bird's-foot-trefoil, Meadow Vetchling, Yarrow and other plants characteristic of unimproved grassland. There were breeding butterflies including Common Blue, Meadow Brown and Gatekeeper;
b. Bramble scrub and coarse grassland provided good bird and butterfly breeding habitats;
c. Bee Orchids and calcicolous (lime-loving plants) were present; and
d. Breeding Lapwings were seen sparsely colonised or bare ground.

10.9.191 Other land awaiting development may have similar biodiversity value for the Project by providing sources of important species for ecological enhancement works as well as mitigation. Such site, for example, may provide Bee Orchids and other locally scarce plants for transfer to the Manchester Ship Canal Bank LWS.

10.10 Baseline and Results: Birds Using the Mersey Estuary and the Surrounding Area

10.10.1 The birdlife of the Estuary is its most significant wildlife feature which is important in national and international contexts. It is the extremely large numbers of wildfowl and wading birds which visit the Mersey during migration and in the winter which give the Estuary its very special interest.

10.10.2 The passage and wintering birds, which use the Estuary for feeding and roosting, are dependent on the estuarine inter-tidal mud-flats and silt-flats for their invertebrate food sources, most of the birds being carnivorous or omnivorous. However some of the birds are herbivorous and depend on the saltmarshes and brackish wetland habitats for feeding.

10.10.3 The Upper Mersey Estuary, which is crossed by the Project, is outside the boundaries of the European Site and SSSI but it is treated here as a proposed SPA (pSPA). Detailed investigations of the previous and current avian importance of the Estuary, in terms of the bird species and their population sizes are necessary, to inform the Appropriate Assessment. Information on the conditions of the bird habitats is also required, in terms of the value of the various habitats for feeding, roosting, loafing and breeding birds.

10.10.4 However there are further survey requirements of the Upper Mersey Estuary to inform the Appropriate Assessment as explained in Section 3.2 of Chapter 3.0. These include bird movements and bird behaviour. For example, it is not known if there are regular movements of birds between the Upper Mersey Estuary and the European Site, and whether or not the bird populations in the Upper Mersey Estuary are parts of the populations in the European Site, with regular interchange of birds via the Runcorn Gap. It is probable that if such bird movements occur, they would cross the route of the Project and could be obstructed by the New Bridge.

10.10.5 Also of importance is the fact that the Upper Mersey Estuary contains saltmarsh which is suitable breeding habitat for Skylark, Meadow Pipit, Reed Bunting and Redshank, the last species being of importance in the European Site for the large populations which winter there and visit on passage.

10.10.6 The purpose of the bird surveys is therefore to provide the following information on birds which use the Mersey Estuary and related habitats;

a. Information on bird species and their numbers which use the European Site including the Upper Estuary based on the WeBS high tide and low tide counts.
b. Details of the species which use the Study Area based on the Project surveys, particularly wildfowl and waders but also other important migratory and breeding birds including seabirds, uncommon and rare species, and protected species;
c. Information on the population sizes (flock sizes and total numbers) of bird species which use the Upper Mersey Estuary and adjacent habitats;
d. Identification of habitats and locations in the Upper Mersey Estuary which are important for birds, for feeding, roosting, loafing and breeding;
e. Information on commuting routes for birds and bird movements between the Upper Mersey Estuary and the European Site, across the proposed Project crossing of the Upper Mersey Estuary; and
f. Details of the bird species and their numbers which use the area of the Upper Mersey Estuary crossed by the Project.

10.10.7 As explained in the methodology section the Study Area for birds covered a much larger area than the Project construction corridor and extended beyond the possible limits of construction and operational disturbance because many bird species use the whole of the estuarine ecosystem and related areas outside and often far beyond the maritime habitats.

10.10.8 The areas surveyed for birds and the observation points are identified in Figure 10.3 for the 2002-2003 surveys, and in Figure 10.4 for the 2003-2006 surveys.

10.10.9 Further, birds are extremely mobile and populations of breeding, roosting, migratory and other birds may use any part of the Upper Mersey Estuary and its surroundings, depending on species, at different times of the day, month and year. An additional consideration is that birds from other parts of the Upper Mersey Estuary, and elsewhere, may use the Project route solely as a flyway, but use of the corridor in this way may be of significant or even crucial importance to the conservation of bird species in the area.

10.10.10 A principal issue is whether or not the construction and use of the Project will affect the nationally and internationally important bird populations of the European Site. Evaluation of the baseline bird survey data of the Upper Mersey Estuary and its surroundings is crucial to addressing this issue. As explained in the methodology section (Section 10.5), the survey area for this Assessment did not extend far into the European Site because the required information on the European Site is available from previous studies, particularly the WeBS surveys, and which is summarised in the SSSI and SPA citations, the relevant details of which are presented here.

The Mersey Estuary SSSI

10.10.11 The SSSI citation, which was revised in 1985, states:-

"The Mersey Estuary is an internationally important site for wildfowl. Throughout the winter the estuary supports large numbers of wildfowl and waders…. The Estuary is also a valuable staging post for migrating birds in spring and autumn." Count data for the period 1978-83 are cited. "

10.10.12 The SSSI is 6,702 hectares in extent and includes the sub-tidal areas. The New Ferry SSSI, which is downstream of the SSSI, was incorporated in the SSSI in June 2004.

The Mersey Estuary SPA

10.10.13 The citation for the SPA, revised in 2004 states that the site qualifies under Article 4.1 of *The Birds Directive* as it is used regularly by 1% or more of the G.B. population of golden plover, and under Article 4.2 as it is used regularly by 1% or more of the biogeographical populations of shelduck, teal, pintail, dunlin, black-tailed godwit and redshank in winter and of redshank on passage. In addition, the site qualifies under the *Directive* by being regularly used by over 20,000 waterfowl (the potentially qualifying species being as defined by the Ramsar Convention) in any season. The cited population levels are given at Table 10.10.

Table 10.10 – The Qualifying Numbers of Bird Species at the Latest Revision of the Mersey Estuary SPA Citation.

Species	Season	Mean count	% of G.B. population	% of biogeographical population.
Shelduck	Winter	6476	-	2.2
Teal	Winter	11723	-	2.9
Pintail	Winter	1169	-	1.9
Golden plover	Winter	3040	1.2	-
Dunlin	Winter	48789	-	3.7
Black-tailed godwit	Winter	976	-	2.8
Redshank	Winter	4993	-	3.8
	Passage	4513	-	3.5

10.10.14 The Mersey Estuary SPA includes the whole of the SSSI but not the sub-tidal channels. The New Ferry SSSI is outside the SPA. The SPA covers an area of 5,023 hectares.

10.10.15 The citations refer to the large area of the Estuary which is sheltered and comprises large areas of saltmarsh and extensive areas of intertidal sand and mudflats. Other important habitats (sub-features) mentioned are brackish marsh, rocky shoreline and boulder clay cliffs, and the fact that the estuarine and associated habitats are within a rural and industrial environment.

10.10.16 The SPA citation of May 2004 Version 1.1 summarises the principal interests of the Estuary as;

a. "The intertidal flats and saltmarshes provide feeding and roosting sites for large and internationally important populations of waterfowl.";
b. "During the winter, the site is of major importance for duck and waders."; and
c. "The site is also important during spring and autumn migration periods, particularly for wader populations moving along the west coast of Britain."

10.10.17 The Estuary qualifies as SPA under Article 4.1 of *Directive (79/409/EEC*) as it is used regularly by 1% or more of the Great Britain populations of the following species listed in Annex I in any season (Table 10.11).

Table 10.11 - SPA Qualification of the Estuary.

Annex 1 species	Count & season	Period	% of GB population
Golden Plover	3,040 birds wintering	5 year peak mean 1993/94-1997/09	1.2%

10.10.18 The Estuary also qualifies as SPA under Article 4.2 of the *Directive (79/409/EEC)* as it is used regularly by 1% or more of the biogeographical populations of the regularly occurring migratory species (other than those listed in Annex I) in any one season (Table 10.12);

Table 10 12 - SPA Qualification of the Estuary.

Migratory species	Count & season	Period	% of sub-species/ population
Redshank	4,513 passage birds	5 year peak mean 1993-1997	3.5% brittanica
Shelduck	6,476 wintering birds	5 year peak mean 1993/94-1997/98	2.2% breeding (North-western Europe)
Teal	11,723 wintering birds	5 year peak mean 1993/94-1997/98	2.29% non-breeding (North-western Europe)
Pintail	1,169 wintering birds	5 year peak mean 1993/94-1997/98	1.9% non-breeding (North-western Europe)
Black-tailed Godwit	976 wintering birds	5 year peak mean 1993/94-1997/98	2.8% islandica
Redshank	4,993 wintering birds	5 year peak mean 1993/94-1997/98	3.8% brittanica

10.10.19 The Estuary also qualifies under Article 4.2 of the *Directive (79/409/EEC*) as it is used regularly by over 20,000 waterbirds in any season. The total figure of 104,599 for the Estuary is well over the qualifying figure, based on the peak mean for 1993/95–997/98. The qualifying species are Great Crested Grebe, Shelduck, Wigeon, Teal, Pintail, Ringed Plover, Golden Plover, Grey Plover, Lapwing, Dunlin, Black-tailed Godwit, Curlew and Redshank.

10.10.20 It is also mentioned in the citation that there is a number of non-qualifying Annex I bird species of interest, namely Bewick's Swan, Whooper Swan, Merlin, Peregrine Falcon, Ruff, Bar-tailed Godwit and Short-eared Owl. These species occur in non-breeding numbers of less than European importance (less than 1% of the G.B. population).

Mersey Estuary Ramsar Site

10.10.21 The Ramsar site has the same boundaries and covers the same extent as the SPA. It qualifies for designation as set out in the preceding reasons and tables as explained for the SPA.

10.10.22 The citation for the Ramsar site, dated 1993, states that the site is of international importance because it regularly supports over 20,000 waterfowl (Ramsar Site selection criterion 3a) and 1% of individuals in a population of waterfowl (Ramsar Site selection criterion 3c); the species in question are those also listed in the SPA citation. Other species that occur in nationally important numbers are also listed.

Mersey Estuary European Marine Site

10.10.23 The Estuary European Marine Site is the marine part of the SPA and therefore its seaward boundary is identical to the SPA boundary. However the landward boundary extends only to the limit of the marine habitats; that is only to the extent of land covered continuously or intermittently by tidal waters. This means that the Marine Site boundary is very similar to the SPA boundary but the former encompasses a slightly smaller area.

10.10.24 The Marine Site includes "interest features" and "sub-features habitats". The former are those areas where SPA qualifying species occur. The key sub-features of the Marine Site include the following;

a. Intertidal sediments that support dense populations of marine invertebrates which provide the main feeding habitats for wintering and passage wildfowl and waders;
b. Rocky shores that also contain intertidal sediments which support fucoid algae and invertebrates, providing feeding and roosting habitats for wildfowl and waders; and
c. Saltmarsh with salt-tolerant vegetation and creeks, the saltmarsh vegetation being of principal importance for herbivorous and omnivorous wildfowl, but it is also important for roosting wildfowl and waders.

10.10.25 Further details relating to the designation and conservation of the Estuary European Marine Site (EMS) can be found in English Nature's advice given under Regulation 33(2) of the *Conservation (Natural Habitats & c.) Regulations 1994*, as amended (25 May 2001).

Description of the Mersey Estuary European Site and SSSI

10.10.26 There are extensive sand and mudflats on the northern and southern shores of the European Site. The most important areas for feeding wildfowl and waders are Dungeon Banks off Hale, Stanlow Bay, the Gowy Estuary and Frodsham Score. The Oglet Bay and Mount Manisty areas are also important, particularly for Black-tailed Godwit.

10.10.27 The principal rocky shore habitats, on the northern side of the European Site, are between

Otterspool and Garston. There are also rocky shores along the southern margins of the European Site, extending from Eastham Locks to the limit of the European Site boundary.

10.10.28 There is extensive saltmarsh, around 11 kilometres long, along much of the southern shore of the Estuary, between Mount Manisty and Frodsham Marsh Farm. Along the northern shore of the Estuary there are fragmented areas of saltmarsh, notably Halegate Marsh, and at Hale Head and Oglet Bay.

10.10.29 Much of the saltmarsh is grazed by sheep and/or cattle, providing favourable conditions for feeding and roosting herbivorous wildfowl. However there are areas of ungrazed saltmarsh, notably at Stanlow Banks, which are used by roosting wildfowl and waders.

10.10.30 The other major habitat feature and probably the most important habitat for birds is the extensive area of intertidal sand and mudflats in the Estuary. These habitats support dense populations of lugworm, ragworm and many mollusc species as described in Chapter 11 on Aquatic Ecology. There are extensive sand and mudflat areas along both the northern and southern shores of the Estuary.

Comparisons of Bird Numbers in the European Site with Those in the Upper Estuary

10.10.31 The ability of an area to support feeding birds is determined by the size and type of the food resource. If only peak counts of birds are used to measure the importance of an area, they may give a false picture of the extent of the resource. Thus, if there is enough food to support 10 birds for 10 days (100 bird/days) and 100 birds feed on it for one day, there will be no food left and all subsequent counts of feeding birds in that winter will be nil. The peak count of 100 birds is not the number of birds that the area can support through the winter or in the longer term. The mean number based on several counts is a more reliable guide to the importance of the area. For this reasons, both peak and mean counts are cited in the following assessment.

European Site Core Counts

10.10.32 Table 10.13 shows the numbers of birds of the relevant species that constitute the reasons for classification of the European Site at the latest revision of the citation, which is based on bird counts for the period 1993/4-1997/8, and compares these with the latest WeBS core count dataset for the period 2001/02-2005/06.

Table 10.13 - Mersey Estuary SPA. Qualifying numbers at latest revision of the citation, compared with latest available WeBs data. Mean peaks cited.

Note 1. The citation refers to “over 20,000 waterbirds”. This is the actual figure taken from the relevant WeBS annual report.

Species	Season	Qualifying population	% of Sub-Species population	Mean Peaks 2001/02 - 2005/06	% of Sub-Species Population
Shelduck	Winter	6746	2.2	3064	1.02
Teal	Winter	11723	2.9	8830	1.77
Pintail	Winter	1169	1.9	162	0.27
Golden plover	Winter	3040	1.2 GB	2400	0.96 GB
Dunlin	Winter	48789	3.7	42876	3.22
Black-tailed. Godwit	Winter	976	2.8	509	1.08
Redshank	Winter	4993	3.8	4539	1.56
	Passage	4513	3.5	5544	1.98
All waterbirds		107,439 (1)	-	76,704	-

10.10.33 The total number of waterbirds in the SPA includes all species as well as those for which the site is specifically classified. For the most recent five year period, this includes mean peak counts of 109 cormorant, 916 Canada geese, 3771 wigeon, 778 mallard, 120 oystercatcher and 1535 curlew. The SPA also holds very large numbers of lapwing; these are not subject to complete counts because at least 25% of the total are on land that is not covered by the counts. The highest incomplete peak count was of 12150 lapwings in December 2003 and the lowest was 4452 in November 2005.

10.10.34 It should be noted that there have been substantial declines in all "SPA" species and in total numbers since the citation was last revised. The British Trust for Ornithology monitors trends in numbers and produces "Alerts" where significant declines are taking place. The most recent report for the Mersey (Maclean & Austin 2006) notes that declines in shelduck, pintail, golden plover and grey plover may be due to adverse local factors but that this has not yet been confirmed. There are also climatic factors at work which are resulting in fewer birds wintering in western Britain. Black-tailed godwit may have moved to the Morecambe Bay SPA, for reasons unknown. Teal, dunlin and redshank numbers are not currently the subject of alerts.

Upper Estuary Core Counts

10.10.35 Upper Estuary core counts cover an area extending from the eastern end of Runcorn Sands to Penketh, including the Fiddler's Ferry power station lagoons but exclude the greater part of the Runcorn Sands (the proposed line of the New Bridge lies close to but outside the edge of the count area). Bearing in mind that core counts such as these are undertaken at high tide when birds are at roosts, it is probable that these numbers include all or most of the birds using the whole Upper Estuary. Table 10.14 gives the mean peaks for all species for the period 2001/02 – 2005/06.

Table 10.14 - Upper Estuary core counts; mean peak 2001/02 – 2005/06

Species	Mean peak	Species	Mean peak
Great crested grebe	3	Mallard	130
Little grebe	2	Pintail	1
Cormorant	44	Shoveler	5
Grey heron	11	Tufted duck	1
Moorhen	17	Oystercatcher	1
Coot	11	Ringed plover	3
Mute swan	1	Golden plover	225
Greylag goose	3	Lapwing	4100
Canada goose	126	Dunlin	16
Shelduck	57	Snipe	21
Wigeon	61	Jack snipe	11
Gadwall	18	Curlew	95
Teal	264	Redshank	16
Mean of annual peak counts of all species			**5244**

10.10.36 The core counts largely comprise species that are not necessarily mainly dependant on estuarine habitats, such as lapwing (4100), teal (264), golden plover (225), mallard (130) and Canada goose (126). This probably reflects the inclusion in the core count area of the Fiddler's Ferry lagoons as well as the proximity of farmland feeding habitats.

Upper Estuary Low Tide Counts

10.10.37 Low tide counts cover the whole of the Upper Estuary, counting it as two sectors, with BM028 covering the Runcorn Sands and BM029 the area upstream to Penketh. The Fiddler's Ferry lagoons are not included. Table 10.15 gives the numbers of birds present during low tide counts of the whole Upper Estuary in winter 2005/6 and compares these with the high tide counts for that winter. Peak numbers for each species are cited.

Table 10.15 - Upper Estuary low tide counts 2005/06 and high tide counts for 2005/06

Species	Low tide			High tide
	BM028	BM029	Combined	
Great crested grebe	0	0	0	4
Little grebe	0	0	0	1
Cormorant	2	4	6	50
Grey heron	3	9	12	4
Moorhen	0	0	0	10
Coot	0	0	0	0
Mute swan	3	0	3	0
Greylag goose	0	0	0	7
Canada goose	4	79	83	102
Shelduck	40	113	153	53
Wigeon	0	3	3	102
Gadwall	0	0	0	10
Teal	33	120	153	300
Mallard	12	36	48	106
Pintail	0	0	0	0
Shoveler	0	0	0	0
Tufted duck	0	0	0	0
Oystercatcher	0	0	0	1
Ringed plover	0	0	0	6
Golden plover	0	200	200	574
Lapwing	300	5000	5300	4000
Dunlin	2	0	2	4
Snipe	0	0	0	9
Jack snipe	0	0	0	16
Curlew	41	160	201	140
Redshank	15	3	18	9

10.10.38 The broad pattern of abundance at low tide is similar to that at high tide, with relatively low numbers of estuarine species such as Snipe, shelduck and redshank.

10.10.39 Although the low and high tide counts do not take place on the same dates, this does not invalidate consideration of reasons for variation in numbers, bearing in mind that small differences in numbers may reflect counting error or birds missed.

10.10.40 The following species are present in higher numbers at high tide:- great crested grebe, little grebe, cormorant, moorhen, greylag goose, Canada goose, wigeon, gadwall, teal, mallard, oystercatcher, ringed plover, golden plover, dunlin, snipe, jack snipe. There are three possible explanations for this. Firstly, the high tide count sector includes the Fiddler's Ferry lagoons and their margins and birds may remain there to feed at low tide; this is likely to be true of great crested grebe, little grebe, moorhen, greylag goose, Canada goose, wigeon, gadwall, mallard, snipe and jack snipe. Secondly, low tide counts may miss birds that are distant or obscured by sandbars or other features; this is a known limitation of such counts although relatively unlikely to be a major contributing factor on this site. Thirdly, birds may move to feed at locations outside the Upper Estuary at low tide; which may include the SPA. This could apply to all species,

though geese, ducks, lapwing and golden plover may also utilise non-SPA sites including farmland.

10.10.41 The following species are present in higher numbers at low tide:- heron, mute swan, shelduck, lapwing, curlew and redshank. Except in the cases of shelduck, lapwing and curlew the numbers involved are small and the differences may reflect minor counting error. Shelduck make very little use of non-estuarine sites and the presence of higher numbers at low tide would suggest that birds have moved in either from a roost in the Upper Estuary not in the area covered by the core counts, or from a roost in the SPA. Lapwing and, to a lesser extent, curlew move widely around farmland, freshwater wetlands and estuarine sites so they could be roosting on farmland, or elsewhere in the Upper Estuary as well as potentially in the SPA.

Comparison with the European Site

10.10.42 Both core and low tide counts for the Upper Estuary (tables 10.16 and 10.17) show that the Upper Estuary holds small or no populations of those species for which the SPA is classified, with the exception of golden plover. Although the Upper Estuary's total waterbird population is not inconsiderable, it principally comprises lapwing which is not one of the classified species, but Lapwing has recently been classified as a Priority Species by JNCC.

Table 10.16 - Core (high tide) counts for Upper Estuary compared with European Site (SPA). Mean peaks 2001/02 – 2005/06 cited.

Species	Season	SPA	Upper Estuary	Counts as % of SPA population
Shelduck	Winter	3064	57	1.9
Teal	Winter	8830	264	2.99
Pintail	Winter	162	1	0.6
Golden plover	Winter	2400	225	9.4
Dunlin	Winter	42876	16	0.04
Black-tailed Godwit	Winter	509	0	0
Redshank	Winter	4539	16	0.35
	passage	5544	1	0.02
All waterbirds	-	76,704	5244	6.8

Table 10.17 - Low tide counts for Upper Estuary compared with European Site (SPA). Peaks counts for species winter 2005/06

Species	Season	SPA	Upper estuary	As % of SPA population
Shelduck	Winter	4044	153	3.8
Teal	Winter	9200	153	1.7
Pintail	Winter	200	0	0
Golden plover	Winter	1500	200	13
Dunlin	Winter	34731	2	0
Black-tailed Godwit	Winter	312	0	0
Redshank	winter	2283	18	0.8
	passage	n/a	n/a	-
All waterbirds	-	66074	6182	9.4

The Upper Mersey Estuary and Associated Habitats

Results of the February 2002 to January 2003 fortnightly surveys of the Upper Mersey Estuary including the Power Station Lagoons

10.10.43 The mean numbers of each of the bird species that are of international and national importance in the Estuary SPA have been calculated for the Upper Mersey Estuary including the Power Station Lagoons for the entire survey period of one year, comprising 24 surveys. The Power Station lagoons have been included in this comparison because they are known to be used by the important bird species; the lagoons provide similar habitats to some of those found in the Upper Mersey Estuary. Further, the lagoon system replaced a large part of the saltmarsh of the Upper Mersey Estuary so its location in this respect is significant.

10.10.44 Examination of the results in terms of the internationally important criteria are presented in Table 10.18

Table 10.18 - The Mean Numbers of Internationally Important Wildfowl and Waders Which Use the SPA, Recorded in the Upper Mersey Estuary in the 2002-2003 Surveys.

Bird species	Lagoons (L)	WW & CUSM (WWSM)	ASTSM & wetland (ASM)	Mersey Channel (MC)	Total	Maximum	Survey	Habitat	International Threshold (WeBS)
Black-tailed Godwit	0	0	0	<1	<1	1	12	MC	700
Dunlin	8	0	0	32	41	220	27	MC	14000
Pintail	<1	<1	0	0	<1	2	27	L	600
Redshank	2	4	2	4	11	36	22	L	1500
Shelduck	10	4	2	14	30	130	25	MC	3000
Teal	14	37	116	103	271	642	20	ASM	4000
Wigeon	<1	0	<1	7	7	94	3	MC	12500
Total	35	46	120	159	360				

KEY; WWSM=Widnes Warth Saltmarsh, CUSM= Cuerdley Saltmarsh, ASTSM= Astmoor Saltmarsh, Maximum=maximum number of birds during any one survey, Survey=Survey number (relates to time of survey), Habitat=Mersey Channel, lagoons, Astmoor Saltmarsh, International Threshold=qualifying number of birds to satisfy the 1% criterion for international importance and published by WeBS.

NOTE: The maximum (peak) figure is the greatest number of birds present on any one survey and is the only figure that can be compared with the National Threshold (WeBS).

10.10.45 The figures in Table 10.10 in the first five columns are the mean numbers of birds of each species recorded throughout the year, based on 24 survey visits. The mean numbers cannot be compared with the WeBS High and Low Tide counts; they can only be used to compare and provide an indication of the levels of usage of each of the habitats by the different species. However the maximum figures shown in the third column provide an approximate comparison with the WeBS International Threshold figures in the right and final column, for each species.

10.10.46 Interpretations of the survey results for the individual species are given below.

Black-tailed Godwit

10.10.47 Black-tailed Godwit was recorded on one occasion only, within the Mersey channel; this single bird was seen in July 2002 off the eastern side of the power station lagoons. The single record is consistent with the historical data of the area with the exception of the 1,200 Black-tailed Godwits recorded in September 1996 (Appendix L). It is clear from these data that Black-tailed Godwits remain in the European Site as the count there in December 1998-99 recorded 1,573 birds.

Dunlin

10.10.48 It is evident from the summary table that Dunlin is a frequent visitor, particularly to the Mersey Channel and to the power station lagoons. The maximum of 220 Dunlin in the Mersey Channel was in mid-February 2003. The number of Dunlin is far below the threshold number required to be of international importance.

Pintail

10.10.49 Pintail was recorded on two occasions only in the 2002 survey; a single bird was seen on the Widnes Warth Saltmarsh and a pair was recorded in mid-February 2003 on the power station lagoons. Pintail is regarded as more of a seabird and would not be expected to travel so far inland.

Redshank

10.10.50 The number of breeding Redshank recorded in this area is discussed later in this Assessment but moderate numbers have been counted on the mudflats and saltmarsh. The maximum of 36 feeding Redshank was in early December 2002. The number of Redshank recorded is well below the threshold required for this bird to be described as internationally important in the Upper Mersey Estuary, but it would do so if included with the designated site figures but only if the birds were shown to be part of the Middle Mersey Estuary population.

Shelduck

10.10.51 Shelduck reach moderate numbers throughout all the sites included within the Upper Mersey Estuary but the power station lagoons are of particular importance. Analysis of the data indicate that when high numbers are on the lagoons the counts within the river channel are low; this suggests that Shelduck move between the saltmarsh, the mudflats and the lagoons. They feed on Hydrobia snails and Tubifex worms on the mudflats, and plant seeds on the saltmarsh. The maximum number recorded is well below the international threshold.

Teal

10.10.52 Teal counts are fairly high, the maximum count of 642 being associated with the wetland on Astmoor Saltmarsh, particularly in the winter months. The international threshold for Teal in the sites surveyed by WeBS is 4,000 and it appears that the Upper Mersey Estuary may be an extension of the area of importance for Teal and could be viewed as part of the entire Estuary as Teal habitat. However the Upper Mersey Estuary in isolation does not satisfy the national and international thresholds for Teal, and it is not known whether or not the Teal population in the Upper Mersey is part of the population of this species in the European Site.

10.10.53 In the Upper Mersey Estuary the counts of Teal steadily increased from the beginning of September and throughout the winter months. It is believed that Teal are numerous throughout the whole area because of the availability of food provided by seeds on the saltmarshes.

10.10.54 Any future accretion of saltmarsh and colonisation by *Salicornia* (Glasswort) will attract larger numbers of Teal as they prefer the seeds of this maritime plant.

Wigeon

10.10.55 Wigeon were recorded most frequently on the mudflats within the river channel, particularly during March 2002. However the numbers are insignificant compared with the 12,500 international threshold, the maximum in the Upper Mersey Estuary being 94.

10.10.56 There is evidence that Wigeon graze on Common Salt-marsh grass during the night and they would not be expected to be found on the saltmarsh during the daytime although six birds were recorded throughout the year on Astmoor Saltmarsh.

Consideration of Wildfowl and Waders present in Nationally Important Numbers in the SPA

10.10.57 Table 10.19 lists the numbers of birds recorded within the Upper Mersey Estuary during the 2002-2003 surveys, together with the counts for the different habitats, for those birds that occur in nationally important numbers in the Middle Mersey Estuary SPA.

Table 10.19 - The Mean Numbers of Nationally Important Wildfowl and Waders which use the SPA, Recorded in the Upper Mersey Estuary in the 2002-2003 Surveys.

Bird species	Lagoons (L)	WW & CU SM (WSM)	AST SM & wetland (ASM)	Mersey Channel (MC)	Total	Maximum	Survey	Habitat	National Threshold (WeBS)
Curlew	1	4	<1	52	57	200	16	MC	1200
Golden Plover	104	0	0	133	236	1500	19	MC	2500
Great Crested Grebe	3	0	<1	<1	3	10	14	L	100
Grey Plover	0	0	0	0	0	0	-	-	430
Total	107	4	<1	185	296	0	-	-	-

NOTE: The maximum (peak) figure is the greatest number of birds present on any one survey and is the only figure that can be compared with the National Threshold (WeBS).

Curlew

10.10.58 Curlew was recorded very frequently within the river channel from August 2002 throughout the autumn and winter. The lagoons and the Widnes Warth Saltmarsh habitats are also visited by Curlew. A maximum of 200 Curlew was recorded in the river channel during Survey 16 in September 2002 but this is well below the national threshold of 1,200 birds.

Golden Plover

10.10.59 Golden Plover have been recorded in high numbers, particularly during October and November

2002. The most important local sites for Golden Plover are the power station lagoons and the river channel. The maximum count of 1,500 towards the end of October 2002 is exceptional, highlighting the importance of the mudflats for Golden Plover. However the maximum count is well below the national threshold of 2,500 birds.

Great Crested Grebe

10.10.60 Great Crested Grebes were recorded most frequently on the power station lagoons, the habitat being very suitable because the grebes require large areas of water with reedbed margins. Comparisons with the historical data reveal that the Great Crested Grebe counts at the lagoons are similar to those recorded in previous years, and the population in the Upper Mersey Estuary area is restricted to the lagoons and is, therefore, a separate population to those in the SPA.

Grey Plover

10.10.61 Grey Plover was not recorded in the present survey but there are previous records of up to 16 birds in September 1990. However in December 1998-99, 1,623 Grey Plover were counted on the mudflats in the Middle Mersey Estuary SPA. Previous records indicate that the increase in visiting Grey Plover in the winter since 1970 is related to the improved breeding success in the Taimyr Peninsula in Siberia.

Breeding Birds on the Saltmarshes

10.10.62 The survey data were examined to determine the total numbers of each species of bird that were breeding on the saltmarshes including Widnes Warth Saltmarsh, Cuerdley Saltmarsh and Astmoor Saltmarsh. Reference is made to tables 1 to 5 of Appendix 10.11 for the breeding bird data, and to Table 6 of Appendix 10.11 for the survey dates, state of the tide, weather and other conditions.

10.10.63 The four species recorded breeding on the saltmarsh are Redshank, Meadow Pipit, Skylark and Lapwing. In addition Reed Bunting, which is a Priority Species in the UK Biodiversity Action Plan, was recorded breeding amongst the stands of Common Reed associated with the saltmarsh. Skylark is also a Species of Principal Importance and is protected under the EC Birds Directive, and Lapwing has been included in the revised JNCC list as a Species of Principal Importance (Priority Species). Meadow Pipit and Lapwing are Species of Conservation Concern and the numbers of Redshank in the Estuary SPA are of international importance.

10.10.64 Tables 1 to 5 of Appendix 10.11 show the numbers of Redshank, Lapwing, Meadow Pipit, Skylark and Reed Bunting counted breeding, feeding and roosting on the saltmarshes. The other habitats where the above species were recorded breeding are also included in the tables. Incorporating the data of these breeding species from elsewhere in the surveyed area allows the numbers breeding and the value of the saltmarsh habitat to be assessed quickly and also highlights the importance of a range of habitats in close proximity to one another.

Redshank

10.10.65 Redshank (Table 1 of Appendix 10.11) is an internationally important species in terms of its numbers in the European Site and a total count of 273 birds (sum total of all the fortnightly surveys for the whole year giving a mean of 11 birds) has been recorded feeding on the mudflats and saltmarsh within the Upper Mersey Estuary.

10.10.66 A maximum of 13 breeding Redshank was recorded on Widnes Warth Saltmarsh on the survey date at the end of May 2002. The count range of breeding birds was 7 to 13 on Widnes Warth Saltmarsh and 1-12 on Astmoor Saltmarsh. This covered the period from 15.05.2002 to

12.07.2002.

10.10.67 Redshank has also been recorded in low numbers during December 2002 and January 2003 in the Mersey channel, and on the saltmarsh, and very infrequently on Power Station Lagoon 'A'. It is likely that breeding Redshank are resident birds.

10.10.68 Redshank is restricted to the saltmarsh, particularly at Widnes Warth, for breeding, but it visits the Mersey channel and power station lagoons to roost and feed. A mean count of 273 birds recorded feeding on the mudflats, lagoons and saltmarsh within the Upper Mersey Estuary. These numbers are insignificant in terms of the national and international thresholds on the assumption that they are a separate population to that in the SPA. This assumption will be tested later in this Chapter.

Lapwing

10.10.69 Lapwing has been included as a Priority Species in the *JNCC New UK List of Priority Species and Habitats*. Small numbers of Lapwing (Table 2 of Appendix 10.11) have been recorded breeding on the saltmarshes from 19.03.2002 to 28.06.2002. The maximum number of breeding Lapwing on the saltmarshes was four on Astmoor Saltmarsh during the end of May 2002, and four during April, on Lagoon 'D'. Changes in farming practices have led to the decline of breeding Lapwing on farmland which has resulted in the use of alternative breeding sites on non-agricultural land such as the power station lagoons.

10.10.70 Other habitats that have equal, if not greater importance for breeding Lapwing, include Lagoon 'D' where on average four breeding birds were recorded regularly from 02.02.2002 to 31.05.2002. Small numbers of breeding Lapwing were also recorded on Lagoon 'A' and on Lagoon 'B', and single birds have been recorded in the fields to the north of the Mersey and on the Bowers Business Park plot.

10.10.71 In total, during the survey starting on 15.05.2002, 11 individual breeding Lapwings were recorded throughout the whole of the Upper Mersey Estuary and its surrounding habitats; this can be considered to be the maximum number of breeding pairs.

10.10.72 Lapwing feed regularly on the mudflats and on Lagoon 'A'. There is a dramatic increase in the abundance of Lapwing in post-breeding flocks on the mudflats and on Lagoon 'A' from July and into the winter; the maximum record of 2,000 birds on Lagoon 'A' occurred during mid-September and a maximum of 3,850 Lapwing was recorded in early January 2003 in the Mersey channel. In comparison with the previous bird data obtained at the power station, the counts of Lapwing are similar to peak counts over the winter months of 2,000 birds.

10.10.73 These numbers, taken as an isolated population, are insignificant in terms of national and international thresholds.

Meadow Pipit

10.10.74 Meadow Pipit is a Species of Conservation Concern (species on the *Long List of Globally Threatened/Declining Species* published in *Biodiversity; The UK Steering Group Report, 1995*) and breeds in moderately high numbers on the saltmarshes (Table 3 of Appendix 10.11). In total, on all three of the areas of saltmarsh, a maximum of 29 breeding Meadow Pipit was recorded during the survey starting on 11.06.2002. The range of breeding Meadow Pipit pairs was from 2 to 15 on Widnes Warth Saltmarsh and from 1 to15 on Astmoor Saltmarsh; these records are during the period from the beginning of April towards the end of July.

10.10.75 Breeding Meadow Pipits are not restricted to the saltmarsh and other important breeding sites

include the field to the east of the power station lagoons where up to four breeding birds were recorded regularly throughout May and June. The fields to the north of the Mersey channel including the rough grassland at Shell Green and the Bowers Business Park plot also supported small numbers of breeding Meadow Pipit.

10.10.76 The counts of feeding and roosting Meadow Pipit can reach high numbers, particularly towards the end of the breeding season. In early July, 150 Meadow Pipits were recorded on Astmoor Saltmarsh and 63 on the Widnes Warth Saltmarsh (Table 3 in Appendix 10.11). The number of feeding Meadow Pipit recorded on the saltmarshes throughout the remainder of the year, outside the breeding season, fluctuated between 2 and 93. The weather conditions have to be taken into consideration as Meadow Pipits will not sing or fly far along the saltmarsh during wet and windy weather.

Skylark

10.10.77 As mentioned earlier, Skylark is a Priority Species. Skylarks breed in high numbers on the saltmarsh but they are not confined to this habitat; they have been recorded in moderate numbers in the fields to the north of the Mersey channel, in the fields to the east of the power station lagoons and on Lagoon 'D'.

10.10.78 From late February onwards, on Widnes Warth Saltmarsh, the number of breeding birds gradually increased and remained around 23 breeding birds throughout the breeding season (Table 4 in Appendix 10.11). Similar numbers of breeding Skylark were recorded on Astmoor Saltmarsh with a maximum of 60 birds in early July. Lagoon 'D', within the power station lagoon system, supports a small population of breeding Skylark.

10.10.79 A maximum of 26 breeding Skylark was recorded on Widnes Warth Saltmarsh during July 2006. The breeding Skylark populations increase through the year from March to the end of July with a maximum of 60 breeding Skylarks on Astmoor Saltmarsh in July 2002.

Reed Bunting

10.10.80 As stated earlier, Reed Bunting is also a Priority Species, and although it is not restricted to the saltmarsh high numbers do breed within the undisturbed Common Reed stands that are invading parts of the saltmarsh. A maximum of eight breeding Reed Buntings were recorded in mid-May on Widnes Warth Saltmarsh, and a maximum of eight were also recorded on Astmoor Saltmarsh in June 2002.

10.10.81 The St. Helens Canal section adjacent to the Upper Mersey Estuary is also particularly important for breeding Reed Bunting with a maximum of nine breeding pairs recorded in June 2002 (Table 5 of Appendix 10.11). Other sites suitable for breeding Reed Bunting include Cuerdley Saltmarsh, the fields to the north of the St. Helens Canal, and the aqueduct between the power station lagoons. During Survey 10, in July 2002, 37 pairs of breeding Reed Bunting were recorded throughout the whole of the survey area.

Pre-2002 Surveys of the Power Station Lagoons and Adjacent Section of the Upper Mersey Estuary

10.10.82 As described in Section 10.8 of this Chapter, during the European Year of the Environment in 1987, the St. Helens Groundwork Trust and the Mersey Valley Partnership undertook a creative nature conservation project at the Fiddler's Ferry Power Station lagoons complex. The project has been a great success to the extent that the lagoons and their margins attract large numbers of birds including wildfowl, waders and other estuarine birds, and also seabirds. The avian interest of the lagoons is clearly related to their location at the head of the Upper Mersey Estuary, on former saltmarsh; for these reasons it was concluded that bird records for the lagoons should be included as part of the data-base for the avian assessment of the Estuary.

10.10.83 Detailed bird observations were made at and from the power station lagoons over the 25 years preceding the present surveys, from 1977 until 2002. These data are extremely reliable and are of significant importance for the following reasons;

a. The surveys were conducted by an experienced observer with a long-standing and consistent interest in ornithology;
b. Surveys were carried out almost every day during each year from 1977 until 2002;
c. The observations were consistently recorded in notebooks during the surveys. At the end of each survey month the date and maximum numbers of each species were recorded in a separate notebook;
d. All the data has been made available for the present Assessment of the Project; and
e. The observations include part of the Upper Mersey Estuary that is adjacent to the power station lagoons, namely Cuerdley Saltmarsh and the adjacent section of the River channel and associated intertidal habitats.

10.10.84 A detailed report of the bird observations is provided for reference in Appendix 10.12 to this assessment. References to the observations are made in the following ornithological baseline assessment of the 2002-2003 and subsequent survey results.

2002-2003 Surveys of Other Roosting and Feeding Waders, Wildfowl and Seabirds on the Upper River Mersey Estuary Saltmarshes, River Channel, Sand and Mudflats, and Power Station Lagoons.

10.10.85 The numbers of each species of wading bird recorded on the following five habitats were summed for each survey date throughout the 2002-2003 survey period;

a. Widnes Warth Saltmarsh and Cuerdley Saltmarsh (WW & CU SM);
b. Astmoor Saltmarsh and associated wetland habitat (AST SM & wetland);
c. Water and mudflats, including sandbanks) in the Upper Mersey Estuary;
d. All the Fiddler's Ferry Power Station lagoons; and
e. Water and mudflats in the surveyed area of the SPA immediately downstream of the Runcorn Gap.

10.10.86 Over 30,000 individual waders of 20 species have been counted in the five habitat types in the 2002-2003 surveys. Those wader species that have been previously recorded at the power station lagoons but not in the 2002-2003 surveys include Greenshank, Spotted Redshank, Grey Plover, Turnstone, Curlew Sandpiper, Wood Sandpiper, Marsh Sandpiper, Grey Phalarope and Red-necked Phalarope.

Lapwing

10.10.87 The most abundant wader species in the Upper Mersey Estuary area is Lapwing; 40,653 feeding birds were recorded throughout the survey period. The maximum total count in any one survey was 4,890 in Survey Number 17, the majority (2,690) of which were on the mudflats in the Mersey channel. The rest were on the power station lagoons, with none on the saltmarshes and none in the upper part of the European Site downstream of the Runcorn Gap.

10.10.88 Lapwings breed on the saltmarsh and on sites with coarse undisturbed grassland including the Bowers Business Park plot outside the Upper Mersey Estuary.

10.10.89 The Mersey channel is the most important area for feeding Lapwing. The counts steadily increased from the end of June through the late summer and winter with a maximum of 3,810 in late December. The power station lagoons are the second favoured habitat with a peak of 2,200 birds in September 2002.

Black-tailed Godwit, Redshank, Dunlin, Curlew and Golden Plover

10.10.90 The results for Black-tailed Godwit, Redshank, Dunlin, Curlew and Golden Plover, as discussed earlier, were a single Black-tailed Godwit in the river channel/sand and mudflats area with modest numbers of Redshank using all the habitat types of the Upper Mersey Estuary but none was recorded in the upper part of the SPA.

10.10.91 In contrast Dunlin used the river channel and associated sand and mudflats of the Upper Mersey Estuary, with lesser numbers on the power station lagoons and none elsewhere. Most of the Curlews were in the river channel and adjacent sand and mudflats with appreciable numbers in the upstream part of the SPA.

10.10.92 The distribution of Golden Plover was similar to that of Lapwing, with the majority in the river channel and sand/mudflats and good numbers on the power station lagoons.

Bar-tailed Godwit

10.10.93 Only two Bar-tailed Godwits were recorded, on the power station lagoons only, this being consistent with the single records in the historic data. It appears that the construction of power station lagoons have produced a suitable habitat for this species (although sub-optimal) which did not exist previously in the Upper Mersey Estuary.

Common Sandpiper

10.10.94 A total of eight Common Sandpipers was recorded, based on occasional birds seen at different times, in the Mersey channel in the late summer of 2002; the highest count of five birds was during the survey of 20.08.02. The majority of the birds were on the mudflats of the Mersey channel but a single Common Sandpiper was on the power station lagoons in early August 2002.

10.10.95 Between 1977 and 2002, Common Sandpiper was recorded frequently (on 113 occasions) in the power station lagoons and nearby, with a maximum of 15 birds during one survey.

Common Snipe

10.10.96 Common Snipe is a resident breeder in Britain. It is absent from the Upper Mersey Estuary throughout the breeding season but counts increased from the beginning of September throughout the winter, particularly at the lagoons and on the Widnes Warth and Cuerdley saltmarshes. Observations in December 2007 revealed large numbers in the tall swamp and wetland vegetation on the south side of Astmoor Saltmarsh, along the former Runcorn to Latchford Canal.

10.10.97 A maximum of six birds were recorded on the power station lagoons on 19.09.2002. These low numbers at certain times of the year are in accord with the historic bird data collected over the last 25 years at the power station lagoons; the species were recorded on 170 occasions with a maximum count of 80 birds.

Oystercatcher

10.10.98 Oystercatchers prefer food such as cockles and mussels that are absent or scarce in the Upper Mersey Estuary, accounting for the infrequency of Oystercatchers in this part of the Estuary. The counts of between one and five birds throughout the year, particularly in the Mersey channel and on the lagoons, are consistent with previous data although Oystercatchers were recorded on 167 occasions between 1977 and 2002, with a peak count of 32 birds.

Ringed Plover

10.10.99 Ringed Plovers were infrequently recorded with usually no more than several birds at the power station lagoons and a single count of 13 birds in the Upper Mersey Estuary in August 2002. However the pre-2002 surveys at the power station lagoons recorded Ringed Plover on 171 occasions with a maximum count of 150.

Green Sandpiper

10.10.100 Green Sandpiper is a passage migrant as indicated by the present records. Between one and three birds were counted between the end of July and mid-September. However the species has been fairly consistently recorded prior to 2002, at the power station lagoons, being present on 85 occasions since 1977 but in low numbers as in the recent surveys and with a maximum count of just five individuals.

Jack Snipe

10.10.101 A single count of 17 Jack Snipe was made in Cuerdley Marsh in November 2002. The pre-2002 surveys at the power station lagoons and adjacent estuary recorded a similar maximum of 16 birds, with the species recorded on 54 occasions in 25 years.

Little Ringed Plover

10.10.102 There was one record of 12 birds on the power station lagoons in March. This is a much lower frequency than previous records; the historic records from 1977 to 2002 were sightings on 98 survey days with a maximum count of 20 birds.
Little Stint

10.10.103 There was only one record of Little Stint during the survey period, this being a single in late

October 2002. This is consistent with the historic records (Appendix 10.12) as only 17 birds have been recorded over the last 25 years, with a maximum of four birds during one survey.

Knot

10.10.104 There was a single flock of 40 Knot in February 2002 on the Mersey channel. The highest figure previously recorded was three birds, indicating that a flock of 40 is unusual. During the 25 years preceding the present surveys, Knot has been seen on 12 occasions only.

Ruff

10.10.105 Ruff is usually recorded during the autumn on the lagoons but six birds were noted on the Mersey channel in late October. The total number at the lagoons in 2002-2003 was 18. The species has been present consistently at the power station lagoons, on 83 occasions in the previous 25 years with a maximum of 22 in July 1979.

Sanderling

10.10.106 Three Sanderling were seen in early November 2002 with sightings of the species on three occasions in the Mersey channel and sand/mudflats and a maximum of eight. Sanderling is a winter passage migrant. Previous observations from 1977 detected the species on nine occasions only, with a maximum of 15 birds during one survey.

Whimbrel

10.10.107 A single Whimbrel was at the lagoons in mid-September 2002. According to the historic data, a single Whimbrel has been recorded during the previous three years, in May, with sightings on 24 occasions during the preceding 25 years and a maximum of 12 birds.

Conclusions on Waders

10.10.108 The most important sites for waders, in terms of total counts, are the power station lagoons and the sand and mudflats within the Upper Mersey Estuary. Although the counts of each wader species recorded in the adjacent area of the European Site in 2002-2003 have been included in the tables, these counts cover only a very small proportion of the European Site.

10.10.109 The 2002-2003 survey results are summarised in the following Table 10.12 which shows the mean numbers of birds of each species recorded during the fortnightly survey period, and the maximum counts for a single survey including the habitats and locations of the maximum counts. Each species of wader is discussed and their distribution and abundance examined below.

Table 10.12 –Mean Counts of Wader Species in the Upper Mersey Estuary and Associated Habitats, Including Part of the SPA, in 2002-2003.

Bird species	Lagoons (L)	WW & CU SM (WSM)	AST SM & wetland (ASM)	Water and mudflats (SBI)	Designated site (SPA)	Totals	Maximum	Survey No	Habitat
Bar-tailed Godwit	<1	0	0	0	0	<1	2	15	L
Black-tailed Godwit	0	0	0	<1	0	<1	1	12	MC
Redshank	2	4	2	4	0	11	36	22	L

Bird species	Lagoons (L)	WW & CU SM (WSM)	AST SM & wetland (ASM)	Water and mudflats (SBI)	Designated site (SPA)	Totals	Maximum	Survey No	Habitat
Common Sandpiper	<1	0	0	<1	0	<1	5	15	MC
Common Snipe	1	1	0	0	0	2	6	17/21	WSM,L
Dunlin	8	0	0	32	0	41	220	27	MC
Curlew	1	4	<1	52	40	97	250	14	D
Oystercatcher	<1	<1	0	1	<1	1	5	10	MC
Golden Plover	104	0	0	133	2	238	1500	19	MC
Green Sandpiper	<1	0	<1	<1	0	<1	3	17	MC
Lapwing	495	100	22	913	165	1694	3810	24	MC
Little Ringed Plover	1	0	0	0	0	1	12	3	L
Little Stint	<1	0	0	<1	0	0	1	19	L
Knot	0	0	0	2	0	2	40	1	MC
Ringed Plover	1	<1	0	1	0	1	13	14	MC
Ruff	1	0	0	<1	0	1	12	6	L, MC
Sanderling	<1	<1	0	1	0	1	8	1	MC
Whimbrel	<1	0	0	0	0	<1	1	17	L
	0	0	0	0	0	0			
Totals	613	109	24	1138	207	2090	-	-	-

NOTE: The maximum (peak) figure is the greatest number of birds present on any one survey and is the only figure that can be compared with the National Threshold (WeBS).

Seabirds Including Gulls

10.10.110 Counts of gull and other seabird species in the Upper Mersey Estuary and associated habitats are given in Table 10.13.

Table 10.13 – Mean Counts of Gull and Tern Species in the Upper Mersey Estuary and Associated Habitats, Including Part of the SPA, in 2002-2003.

Bird species	Lagoons (L)	WW & CU SM (WSM)	AST SM & wetland (ASM)	Water and mudflats (SBI)	Designated site (SPA)	Totals	Maximum	Survey No	Habitat
Black-headed Gull	89	7	13	961	857	1927	4060	25	D
Common Gull	11	0	0	76	70	156	315	3	MC
Great Black-backed Gull	10	0	0	21	43	74	204	18	D
Lesser Black-backed Gull	81	<1	1	511	811	1404	3000	18	D

Bird species	Lagoons (L)	WW & CU SM (WSM)	AST SM & wetland (ASM)	Water and mudflats (SBI)	Designated site (SPA)	Totals	Maximum	Survey No	Habitat
Cormorant	14	<1	0	9	6	29	68	21	D
Herring Gull	39	<1	<1	127	167	333	720	23	MC
Sandwich Tern	0	0	0	<1	0	<1	1	8	MC
Yellow-legged Gull	<1	0	0	0	0	0	1	16,17	L
Total	244	8	14	1703	1954	3923	**-**	**-**	**-**

10.10.111 Gull and tern species seen previously in the vicinity of Fiddler's Ferry Power Station lagoons (Appendix 10.12 were not seen in the 2002-2003 survey were Arctic Tern, Black Tern, Kittiwake, Caspian Tern, Guillemot, Common Tern, Shag, Glaucous Gull, Great Skua, Gull-billed Tern, Iceland Gull, Laughing Gull, Little Gull, Long-tailed Skua, Mediterranean Gull, Pomarine Skua, Ring-billed Gull, Roseate Tern, Sabine's Gull and Slender-billed Gull.

10.10.112 It is difficult to make comparisons as the historic data for most gulls only covers the period 1995-1999. The historic records at the power station are daily records for the past 25 years and it would be improbable that rare migrants such as Iceland Gull would be seen in a survey conducted fortnightly. The majority of the birds which were not seen in 2002-2003 are seabirds which are not usually expected to occur so far inland or in the habitats of the Upper Mersey Estuary.

10.10.113 During the bird surveys it was noted that thousands of gulls flew up and down the Upper Mersey Estuary daily, with flight paths over and under the existing bridges before alighting on various mudflats with the wader species in the SPA immediately downstream of the Runcorn Gap.

Black-headed Gull

10.10.114 Black-headed Gull is the most frequent gull species although lower counts occur through the bird-breeding season when many will be further inland at their nesting sites. At all other times of year the total number of Black-headed Gulls in each survey period is greater than 1,000 with a peak of 6,736 in January 2003.

10.10.115 The largest numbers of Black-headed Gulls were in the Mersey channel, both in the European Site and in the Upper Mersey Estuary. There were additional numbers on the power station lagoons, with similar numbers there as in the river channel and associated sand and silt areas. Low numbers use the vegetated saltmarsh habitats. However the figures are likely to include duplicated counts as birds move between the European Site and the Upper Mersey Estuary.

Common Gull

10.10.116 Common Gull was most frequently recorded in the Mersey channel, in both the Upper Mersey Estuary and in the SPA, particularly from February to March and August to January. The total number is less than 8% of the total of Black-headed Gulls. The power station lagoons offer a roosting habitat for smaller flocks of between eight and 56 birds on occasions throughout the year.

10.10.117 Common Gulls, unlike Black-headed Gulls, did not use the saltmarsh habitats in the Upper Mersey Estuary.

Great Black-backed Gull

10.10.118 Moderate numbers of around 50-200 Great Black-backed Gulls were frequently recorded within the Mersey channel, particularly from early September. Again, the lagoons offer a roosting habitat for appreciable numbers of this gull species but of smaller flocks. As noted for Common Gulls, Great Black-backed Gulls did not use the saltmarshes.

Lesser Black-backed Gull

10.10.119 Lesser Black-backed Gull was the second most frequent gull species with over 11,000 counts in the Upper Mersey Estuary area. Lesser Black-backed Gull is the most frequent gull to visit the power station lagoons with a peak of 3,000 birds in October 2002. This is consistent with the data previously recorded at the power station as Lesser Black-backed Gull has been seen frequently in the area.

Herring Gull

10.10.120 Herring Gulls have been recorded in numbers of approximately 100 to 700 in the Mersey channel and usually around 30 birds occur on the power station lagoons with a peak count of 200 in October. Herring Gulls are more frequent than Common Gulls but in fewer numbers than Lesser Black-backed and Black-headed Gulls. Herring Gull is now a Priority Species.

10.10.121 Like most other gulls, Herring Gulls rarely use the saltmarshes. There were more Herring Gulls in the surveyed area of the European Site downstream of the Runcorn Gap than in the Upper Mersey Estuary, excluding the power station lagoons.

Cormorant

10.10.122 Cormorant is a Species of Conservation Concern and has been recorded feeding and roosting at the power station lagoons on almost every survey date, where around 60-70% of the birds in the Upper Mersey Estuary were recorded. There were usually up to 10 Cormorants resting on a buoy in the middle of the open water of 'C' lagoon.

10.10.123 Cormorants were frequently recorded on the mudflats and in the water in the river channel with a maximum count of 68 birds on mudflats in November 2002. According to the historic bird data from the power station, the number of Cormorants has increased since 1990.

10.10.124 Cormorants were seen on the saltmarshes on one occasion only, when five birds were recorded on Widnes Warth Saltmarsh.

Sandwich Tern

10.10.125 Sandwich Tern was recorded only once, flying along the Mersey channel in mid-May 2003.

Yellow-legged Gull

10.10.126 Yellow-legged Gull was recorded only twice, on the power station lagoons only. The bird was not expected to remain for long because the species is a passage migrant. Single birds have been recorded previously at the power station in 1984, 1985, 1986, 1987, 1990, 1991, 1992, 1993, 1994 1995, 1996, 1997, 1998 and in 2000.

Waterfowl

10.10.127 The waterfowl counts for the Upper Mersey Estuary and associated habitats, excluding those in nationally and internationally important numbers in the European Site, are summarised in Table 10.14. Waterfowl associated with the Manchester Ship Canal, the St. Helens Canal and other water bodies have been included in separate counts.

Table 10.14 – Mean Counts of Waterfowl Species in the Upper Mersey Estuary and Associated Habitats, Including Part of the European Site, in 2002-2003.

Bird species	Lagoons (L)	WW & CU SM (WSM)	AST SM & wetland (ASM)	Water and mudflats (SBI)	Designated site (SPA)	Totals	Maximum	Survey No	Habitat
Canada Goose	3	11	6	19	0	39	205	2	MC
Coot	1	<1	18	0	0	19	54	14	ASM
Gadwall	5	<1	12	0	0	17	99	17	ASM
Garganey	9	0	<1	9	0	18	206	15	MC
Goldeneye	0	<1	0	0	0	<1	4	19	WSM
Great Crested Grebe	3	0	<1	<1	0	3	10	14	L
Heron	1	1	1	3	<1	6	11	1	MC
Little Grebe	<1	<1	1	0	0	1	7	27	ASM
Mallard	28	15	18	60	0	147	250	23	ASM
Moorhen	2	<1	2	0	0	4	18	19	L
Mute Swan	<1	<1	1	1	0	2	8	16	MC

Bird species	Lagoons (L)	WW & CU SM (WSM)	AST SM & wetland (ASM)	Water and mudflats (SBI)	Designated site (SPA)	Totals	Maximum	Survey No	Habitat
Pintail	<1	<1	0	0	0	<1	2	27	L
Pochard	0	0	1	0	0	1	10	26	ASM
Shelduck	10	4	2	14	9	38	130	25	MC
Shovelor	1	<1	8	<1	0	10	40	2	ASM
Teal	14	37	116	103	3	274	642	20	ASM
Tufted Duck	0	<1	3	0	0	3	20	2	ASM
Water Rail	0	0	<1	0	0	<1	1	3	ASM
Wigeon	<1	0	<1	7	0	7	94	3	MC
Total	77	71	188	215	12	589	-	-	-

NOTE: The maximum (peak) figure is the greatest number of birds present on any one survey and is the only figure that can be compared with the National Threshold (WeBS).

Canada Goose

10.10.128 Canada Geese have been recorded in all four habitat areas; they occur most frequently on the mudflats in the river channel but the grassland on the saltmarsh is important for grazing. On many survey dates between 20 and 50 geese have been recorded on Widnes Warth Saltmarsh, and overall there were twice as many on Widnes Warth Saltmarsh than on Astmoor Saltmarsh.

10.10.129 A peak count of 60 geese was recorded during August on the lagoons but otherwise the geese are of very infrequent occurrence there. The peak of 60 occurred when geese were absent in the river channel, but high tide occurred around mid-day on this occasion and it is likely that the geese had moved from the mudflats after their tidal inundation.

Coot

10.10.130 There were consistently moderate to good numbers of Coot (around 20-50 birds) amongst the reeds and rushes in the wetland at Astmoor with a peak of 54 birds in early August 2002. However there were only singles and pairs on Widnes Warth Saltmarsh, probably because the vegetation is less favourable for feeding and breeding.

10.10.131 Very low numbers of Coot were recorded at the power station lagoons but it is possible that they breed there amongst the rushes, particularly at 'C' Lagoon. Coot were absent from the river channels and associated sand and siltflats, both in the Upper Mersey Estuary and the visible area of the SPA.

Gadwall

10.10.132 Gadwall is most abundant within the wetland at Astmoor with significant but much lower numbers on the power station lagoons. Numbers increased in mid–September and 99 were recorded in the wetland at Astmoor. Gadwall has been regularly recorded at the lagoons and the 2002-2003 data are consistent with this.

10.10.133 As in the case of Coot, Widnes Warth and Cuerdley saltmarshes are largely avoided, and there was none in the river channels and associated sand and silt intertidal habitat.

Garganey

10.10.134 Garganey has been recorded on only three occasions, on two of which there were 200 or more birds. Garganey is a summer visitor and the peak counts were recorded in July and August.

10.10.135 The river channels and power station lagoons were the only favoured habitats, with the exception of just eight birds on Astmoor Saltmarsh and wetland.

Goldeneye

10.10.136 Only four Goldeneye have been seen in the Study Area, these being on Widnes Warth Saltmarsh in October 2002. Goldeneye is a winter visitor.

10.10.137 Although none was seen at the power station lagoons, Goldeneye were recorded on 56 occasions at the power station lagoons although the maximum number present was only four.

Heron

10.10.138 The heronry in Norbury Wood, the wet woodland near Oxmoor Nature Reserve on the south side of the Mersey, over two kilometres from the Project, accounts for the high frequency of Heron throughout the survey, on 21 survey dates. There are now two other heronries in the locality. The most frequent sightings are within the Mersey channel part of the Upper Mersey Estuary; the records at the lagoons and saltmarsh are consistently low at counts of 1-3 birds.

10.10.139 The surveys at the power station lagoons during the 25 years preceding the 2002-2003 surveys detected Heron on 288 occasions with a maximum of 62 birds. This high frequency of the species can also be attributed to heronries in the wet woodland nearby on the south side of the Upper Mersey Estuary but well within commuting range of the lagoons.

Little Grebe

10.10.140 The tall swamp and wetland at Astmoor Saltmarsh held up to seven Little Grebes in February 2002 and two birds were recorded on Widnes Warth saltmarsh in April 2002. Astmoor Saltmarsh and wetland is clearly the more favourable habitat, Little Grebe being of very rare occurrence on Widnes Warth Saltmarsh and on the power station lagoons. It is absent from the river channel and intertidal sand and silt banks.

Mallard

10.10.141 Mallard is the commonest breeding duck in Cheshire and Merseyside. These birds have adapted to many habitats and were recorded in moderate numbers throughout all habitats in the Upper Mersey Estuary area. A peak count of 250 was recorded during December 2002 in the Mersey channel, with good but considerably lower numbers in the SPA immediately downstream of the existing bridges although the latter are clearly a very small proportion of the European Site population.

10.10.142 The largest numbers of Mallard duck recorded were in the river channel and on the associated intertidal sands and silts but the power station lagoons supported good numbers, throughout most of the survey period.

Moorhen

10.10.143 The reedbeds and dense cover of vegetation associated with open water at the lower station lagoons and the wetland at Astmoor Saltmarsh support modest numbers of Moorhen. A maximum of 18 individuals was recorded in October at the lagoons. Moorhen is a Species of Conservation Concern.

10.10.144 The Astmoor Saltmarsh and wetland is clearly more favourable habitat than Widnes Warth Saltmarsh, this being attributed to the wetter conditions and available open water habitat on the Astmoor wetland. Moorhen is absent from the river channel and associated sand and silt areas because of the absence of vegetation cover.

Mute Swan

10.10.145 Mute Swans were recorded at all sites in the Upper Mersey Estuary but mostly in very low numbers. The Astmoor tall swamp and wetland habitats and the river channels including the intertidal sand and silt habitats appear to be the most favourable; a peak of eight birds was recorded on the river channel and associated habitats in September. Mute Swan is a Species of Conservation Concern.

Pochard

10.10.146 Pochard was recorded exclusively within the wetland at Astmoor, highlighting the relative importance of this habitat. This duck was seen only from February to May and again in January. Pochard is also a Species of Conservation Concern.

10.10.147 In contrast, the power station lagoons have consistently attracted large numbers of Pochard during the period 1977 to 2002, being recorded on 233 occasions with a maximum number of 890 counted in January 1983. It appears that the power station lagoons are optimal habitat whereas the Upper Mersey Estuary is either unsuitable or only sub-optimal.

Shoveler

10.10.148 The tall swamp and wetland in Astmoor Saltmarsh supports moderate to good numbers of Shoveler with a peak count of 40 in February. In September, 24 Shoveler were recorded on the lagoons. This duck is another Species of Conservation Concern.

10.10.149 However the power station lagoons appear to be a more favourable habitat, with Shoveler being recorded on 265 occasions and an impressive maximum count of 484 Shoveler in September 1989. These Figures indicate that the Upper Mersey Estuary is sub-optimal habitat, for Shoveler as well as many other waterfowl species.

Tufted Duck

10.10.150 The tall swamp and wetland habitat, along the course of the former Runcorn to Latchford Canal at Astmoor, is a relatively important habitat for Tufted Duck, a peak count of 20 birds being recorded in February 2002. None was recorded in the Upper Mersey Estuary or adjacent SPA channels and associated sand and silt habitats, and only six were seen on Widnes Warth Saltmarsh. Tufted Duck is a Species of Conservation Concern.

10.10.151 The power station lagoons have consistently attracted Tufted Duck with the records of the duck being present on 241 survey dates, and a maximum number of 378 being present during any survey. It appears that the power station lagoons are the preferred habitat.

Water Rail

10.10.152 Only one Water Rail was recorded, within the wetland vegetation on Astmoor Saltmarsh in March 2002. This species does not appear to have been recorded at the power station lagoons.

Movements of Birds between the Upper Mersey Estuary and the European Site: 2005 Surveys

10.10.153 The surveys of bird movements between the Upper Mersey Estuary and the Middle Estuary SPA involved observations from a vantage point beneath the A533 Widnes/Runcorn Bridge, on the north side of the river channel (Figure 10.5).

10.10.154 The first survey included observations during five days in October and November 2005, on 25.10.2005, 26.10.2005 and 27.10.2005 and on 31.10.2005 and 01.11.2005 (Appendix 10.13).

Movements of Gulls

10.10.155 A summary of the movements of gulls and all other bird species during the first survey day of 25.10.2005 is given in Table 10.15.

Table 10.15 - Surveys of the Movements of Gulls and Other Birds Between the European Site and Upper Mersey Estuary on 25.10.2005.

Bird species	Flying upstream	Flying downstream	Flying elsewhere	Feeding	Total number of passes
All gull species	123+	44	0	27	194+
Redshank	0	0	0	2	2
Shelduck	4	5	0	0	9
Teal	0	20	0	0	20
Mallard	0	0	0	2	2
Cormorant	1	2	0	1	4
Pied Wagtail	0	0	0	1	1
Fieldfare	0	0	90+	0	90+
Peregrine Falcon	0	0	0	3	3
Starling	0	0	1000s	0	1000s

10.10.156 The above table shows that gulls were the major commuting species between the Upper Mersey Estuary and the European Site. There was a clear pattern of movement throughout the 11 survey days (Appendix 10.13), as summarised in Table 10.16.

Table 10.16 - Surveys of the Movements of Gulls Between the European Site and Upper Mersey Estuary from October to December 2005.

Date of survey	Flying upstream	Flying downstream	Flying elsewhere	Feeding	Total number of passes
SURVEY 1					
25.10.2005	123+	44	0	27	194+
26.10.2005	208+	68	0	6	282+
27.10.2005	388+	54	0	32	474+
31.10.2005	78	56	0	0	134
01.11.2005	51	121+	0	36	208+
Totals	848	343	0	101	
SURVEY 2					
03.11.2005	63	39	0	0	102
04.11.205	552+	13	0	16	581+
08.11.2005	91	28	0	15	134
09.11.2005	37	45	0	50	132
10.11.2005	95	15	0	6	116
Totals	838	140	0	87	
SURVEY 3					
19.12.2005	1236	12	0	0	1248+

10.10.157 Although there were occasional gull movements, mostly of single birds, upstream and downstream throughout the day, there was clearly a general movement upstream in the early morning, around dawn, and downstream in the late afternoon and until dusk.

10.10.158 The following observations of the gull movements were recorded in the surveys;

a. Most of the gulls flying up the Estuary in the early morning are coming from the downstream reaches of the European Site, from areas towards Liverpool Bay;
b. It appears that when wind speeds are low, the gulls search for thermals to gain altitude before flying over the bridges;
c. During the survey of 31.10.2005 there was very little movement of gulls during high tide. This was probably due to the absence of exposed sandbanks and mudflats near the bridges. It was also noted that the gulls flying up the Estuary during this survey were flying at a higher altitude than usual, suggesting that there were flying from lower down the Estuary. The weather conditions were good so the weather was unlikely to have resulted in low numbers passing the bridge;
d. It is also possible that the gulls set off earlier in the afternoon for the lower part of the Estuary if there is a head-wind; and
e. The gulls fly mostly over the north side of the bridge, in large numbers.

10.10.159 Although individual gulls could not be identified at the start of the morning influx, it was possible to determine, with confidence, that the majority of the first birds to fly up the estuary were Black-headed Gulls followed between 10-15 minutes later by the larger gulls, namely Herring Gull, Lesser Black-backed Gull and Greater Black-backed Gull.

10.10.160 The approximate numbers of each species were 10,000 Black-headed Gulls, 10,000 Herring Gulls, 8,000 Lesser Black-backed Gulls and several hundred Greater Black-backed Gulls. The immature gulls were the last to fly up the estuary.

10.10.161 The gulls observed flying up or down the Estuary at the beginning and end of each day flew between 20 and 100 metres above the road level on the bridge. When flying up the Estuary in the morning, up to 90% of gulls flew along the northern bank, and when flying out at dusk up to 80% flew along the southern bank and up to 1 kilometre inland.

10.10.162 Only when the resident pair of Peregrine Falcons was hunting near the bridges did the gulls scatter along the whole width of the Estuary. Almost all the gulls flew over the lowest section of the bridge and rarely at its highest point.

10.10.163 Only small numbers of Common Gulls flew up the Estuary past the bridge, several hundred at most. It was possible to observe that most of the Common Gulls roosted on the large sandbank in the European downstream of the bridge. Only small numbers of Common Gulls have been recorded in the Upper Mersey Estuary during the surveys carried out over the four years preceding the surveys.

10.10.164 The number of gulls flying up the Estuary past the bridge in the morning was always lower than the number flying out in the evening. It is probable that thousands of gulls fly up the estuary over land on both sides of the bridge. The number of gulls flying up the Estuary in the morning ranged from between 15,000 to 20,000 whilst the number of gulls flying out of the Estuary in the evening ranged from between 25,000 to 33,000.

10.10.165 During the previous four years of surveying the Upper Mersey Estuary, there have never been more than 15,000 gulls present. It is known, from observations by Environmental Research & Advisory Partnership, that many thousands fly east past the Upper Mersey Estuary to feed on a landfill site five kilometres to the east at Moore (Arpley Landfill Site) on the southern fringes of Warrington.

10.10.166 A survey of the Arpley Landfill site in December 2005 by Environmental Research & Advisory Partnership revealed around 15,000 to 30,000 gulls feeding and flying over and around the site in the late afternoon, prior to leaving for their roosts in the direction of the Runcorn Gap.

10.10.167 Up to 250,000 gulls roost in the Middle Mersey Estuary and the surrounding coastline, and approximately 10% of these fly up and down the Estuary past the bridge. The numbers of gulls flying up and down the Estuary are not influenced by the state of the tide or even the weather, but this may change during extreme weather conditions.

10.10.168 The large sandbank in the European Site, approximately one kilometre below the bridge, usually holds between 2,000 and 3,000 gulls. If the tide submerges the sandbank in the morning, approximately half of the gulls roosting there fly up the Estuary past the bridge but if it is covered by the tide in the afternoon all the gulls fly down to the European Site. If the incoming tide is relatively low many birds retreat to the inner bend of the sandbank which is almost permanently dry.

10.10.169 When the lower sandbank was covered by the tide in the morning there did not appear to be any greater number of birds flying up the Estuary. When the sandbank was exposed in the afternoon there were only slightly lower numbers of birds roosting on the sandbank, suggesting there is little mixing of birds between the Upper Mersey Estuary and the European Site. The numbers and species composition of gulls on the sandbank appears to be stable regardless of the time of day it is exposed, except in the late afternoon when the birds are flying towards their roosting areas.

10.10.170 Thus there is a clear functional relationship between the European Site and the inland feeding sites in terms of gull behaviour. The gulls roost in the European Site and feed at the landfill sites, and many of the gulls pass through the Upper Mersey Estuary and the river corridor beyond because it is the most direct route.

Movements of Wildfowl and Wading Birds for which the European Site is of Importance

10.10.171 It is clear from the WeBS core and low tide counts that the Upper Estuary holds small numbers of birds of those species for which the SPA is classified and that the bird species present in greatest numbers may feed on land outside the SPA and outside the Estuary. This applies principally to golden plover and lapwing but also to most of the other wildfowl present with the exception of shelduck. Numbers present at high and low tide are for most species not grossly different or where differences exist there are one or more potential explanations that do not involve birds moving to or from the European Site.

10.10.172 Overall, the composition and abundance of the waterbird assemblage appears to be fully consistent with the nature and abundance of the food resource. There are thus no obvious grounds to assume that the birds in the Upper Estuary form a part of the European Site population as they could function as a self-contained group.

10.10.173 However, in order to investigate further the possibility that movements do take place and that negative effects on the Upper Estuary population would impinge on the European Site, survey was carried out to seek evidence of movements

10.10.174 Table 10.17 summarises the information in Appendix 10.13 for all the wildfowl and wading bird species whose numbers satisfy the importance criteria in the European Site designation.

Table 10.17 - Surveys of the Movements of Wildfowl and Wading Birds (Qualifying Species) Between the European Site and the Upper Mersey Estuary from October to December 2005.

Survey date	Flying upstream	Flying downstream	Feeding	Total number	Other observations
25.10.2005	SUX4 SUx1	SUx5 Tx20	RKx2	RKx2 SUx10 Tx20 DNx0	RK downstream SU under bridges
26.10.2005	RKx4 SUx2 SUx4	SUx10	None	RKx4 SUx16 Tx0 DNx0	RKx2 pairs
27.10.2005	RKx1 SUx1 DNx12	None	None	RKx1 SUx1 Tx0 DNx12	-
31.10.2005	None	None	None	RKx0 SUx0 Tx0	-
01.11.2005	SUX1	None	RK2	RKx2 SUx0 Tx0 DNx0	RK under bridges
03.11.2005	None	None	RKx1	RKx1 SUx0 Tx0 DNx0	RK downstream
04.11.2005	RKx1 SUx1	None	RKx1	RKx2 SUx1 Tx0 DNx0	RK between bridges
08.11.2005	None	SUx40+	RKx1	RKx1 SUx40+ TX0 DNx0	RK under bridge
09.11.2005	None	None	None	RKx0 SUx0	RK under bridge

Survey date	Flying upstream	Flying downstream	Feeding	Total number	Other observations
				Tx0 DNx0	
10.11.2005	None	None	RKx1	RKx1 SUx0 Tx0 DNx0	
19.12.2005	None	None	RKx1	RKx1 SUx0 Tx0 DNx0	RK under bridge
NOTES; No Pintail, Golden Plover and Black-tailed Godwit seen					
KEY; DN=Dunlin, RK=Redshank, SU=Shelduck, T=Teal,					

10.10.175 The above figures for movements of Redshank, Shelduck, Teal and Dunlin are extremely low compared with the population sizes of these species in the European Site. They contrast sharply with the figures showing extremely large movements of gulls.

10.10.176 The figures indicate that the populations of all four species in the European Site are different to those in the Upper Mersey Estuary and there is only an extremely minor interchange of birds between the two areas. Further there is no observed movement at all of Pintail, Golden Plover and Black-tailed Godwit into the Upper Mersey Estuary.

Movements of Other Wildfowl and Wading Birds

10.10.177 Table 10.18 shows the local migratory behaviour of other wildfowl and wading birds with reference to the bridges (the European Site and Upper Mersey Estuary boundary).

Table 10.18 - Surveys of the Movements of Wildfowl and Wading Birds (Non-Qualifying Species) Between the European Site and Upper Mersey Estuary from October to December 2005.

Survey date	Flying upstream	Flying downstream	Feeding	Total number	Other observations
25.10.05	CAx1	CAx2	CAx1 MAx2	CAx4	Birds fly under bridge
26.10.05	CAx1 CAx1 CUx1 MAx2 Lx250+ Lx100+ Lx60+	MAx4 MAx2 Hx1	CAx1 CAx1 CAx1 CAx1 Greylagx18	CAx6 CUx1 MAx8 Lx410+ Greylagx18	Greylag feeding upstream Lapwings fly over bridge
27.10.05	MSx1 MAx2	Max2	CAx1 CAx1 CAx1 CAx1 Cax1 CAx1		Birds fly under bridge
31.10.05	CAx3 CAx2 CAx1 Max2	CAx1	Max5	CAx7 Max7	Birds fly under bridge
01.11.05	CAx3 CAx2 CAx1 CGx1 Hx1	CAx1	Hx1 Hx1	CAx7 CGx1 Hx3	Birds fly under bridge
03.11.05	CAx1 CAx1	CAx2 CAx1 CGx7 Lx30 MSx3	MAx6 CAx2 CAx4	CAx11 CGx7 Lx30 MAx9 MSx3	Birds, except Lapwing, fly under bridge
04.11.05	CAx1 CAx1	CAx1	CAx1 CAx4 CAx1 Max6	CAx9 Max6	Birds fly under bridge

Survey date	Flying upstream	Flying downstream	Feeding	Total number	Other observations
08.11.05		CAx1 CAx1 CAx1	CAx1 CAx2 CAx1 Hx1 MAx4 MAx5 MAx5 MS11	CAx7 Hx1 MAx14 MSx11	Birds fly under bridges
09.11.05	CAx1 CAx1 Greylagx23	CAx3		CAx5 Greylagx23	Birds fly under bridges
10.11.05	CAx1 CAx2	CAx3 CAx1 CAx1 CAx1 CAx1 CAx1	Hx1 MAx4	CAx11 Hx1 Max4	Birds fly under bridges
19.12.05	CAx3 CAx1 CUx1	CAx1 CAx1	Hx1	CAx6 CUx1 Hx1	Birds fly under bridges
NOTES; Most species, except Lapwing and gulls, fly under the bridges					
Key; CA=Cormorant, CG=Canada Goose, CU=Curlew, H=Heron, MA=Mallard, MS=Mute Swan, DN=Dunlin, L=Lapwing, RK=Redshank, SU=Shelduck, T=Teal,					

10.10.178 Of note in Table 10.13 is the movement of 410+ Lapwings from the European Site to the Upper Mersey Estuary during a single day. These birds flew between 60 to 100 metres above the road level of the bridge, and did not return.

10.10.179 None of the other wildfowl or waders moved between the European Site and the Upper Mersey Estuary in large or significant numbers. There is no evidence of patterns of movement, as identified in the case of gull movements, to indicate daily and regular commuting of any of the wildfowl and wading birds.

10.10.180 However there are good reasons to believe that Lapwing and Heron may behave differently because both species use habitats inland and around the Upper Mersey Estuary to a great extent. Earlier surveys have shown large numbers of Lapwings using the power station lagoons and large flocks occur on farmland, often some distance from the Upper Mersey Estuary. There are heronries close to the southern margin of the Upper Mersey Estuary from which birds would be expected to range for up to several kilometres to suitable feeding habitats, including the European Site.

10.10.181 Earlier surveys have shown that large numbers of Lapwing, Golden Plover and Teal roost and feed within the Upper Mersey Estuary but no regular and large-scale movement of these birds was observed past the bridge during the survey.

Movements of Other Bird species

10.10.182 Other bird movements detected during the surveys (Appendix 10.13) were resident species, notably Starling and Peregrine Falcon which use the bridges for roosting and nesting respectively.

10.10.183 Throughout the October and November 2005 surveys there was intermittent passage of low numbers of migrating Fieldfare, Redwing and small passerines flying high over the river in a north-south direction. Flock sizes ranged from between 10 to 50+ individual birds and some of these were mixed.

10.10.184 Other bird movements detected were mixed flocks of finches, Wood Pigeon and pairs of Linnet. The flight paths of these birds were not related to the alignment of the Estuary and the course of the river channel. There was no evidence that they were affected by the present road and rail bridges.

Use of the Sandbanks

10.10.185 The observed movements of some of the birds between the European Site and the Upper Mersey Estuary can be explained by the presence and locations of sandbanks in relatively close proximity to the existing bridges. In addition to the sandbank a short distance (0.5 kilometre) upstream of the bridges, there is an extensive sandbank in the European Site, about 2-3 kilometres downstream of the Runcorn Gap. The sandbank extends along the inner curve of the river channel where there is dry sand at a higher level, providing roosting habitat for birds at high water levels.

10.10.186 The principal bird species using the sandbanks both upstream and downstream of the bridges included Lapwing, Curlew, Cormorant, Dunlin, Shelduck and singles of Oystercatcher, Heron and Redshank.

10.10.187 It was noted that none of the above species flies up from the European Site into the Upper Mersey Estuary when the upstream sandbank is covered by the tide, whatever the time of day.

10.10.188 Also of significance are the mudflats along the northern bank of the European Site below the bridge, which provide feeding habitat for occasional Redshank, Heron, Cormorant and very low numbers of Black-headed Gulls and Mallard. No other species was recorded feeding on the mudflats during the entire survey.

10.10.189 The only birds that fly frequently beneath the bridges are Black-headed Gull, Heron, Cormorant, Mallard, Dunlin and Redshank. However only single birds or very small flocks were observed flying beneath the bridges.

Movements of Birds between the Upper Mersey Estuary and the Estuary Special Protection Area; 2006-2007 Surveys

10.10.190 Further observations of bird movements between the European Site and the Upper Mersey Estuary were carried out in 2006 and 2007 to validate the results of the 2005 surveys and to obtain more detailed information on gull movements as well as those wildfowl and wading species that occur in the European Site in nationally and internationally important numbers.

10.10.191 Observations of bird movements between the European Site and the Upper Mersey Estuary were made continuously and throughout the day on 25.09.2006, 02.10.2006, 21.10.2006, 18.12.2006, 15.01.2007 and 04.02.2007 (Appendix 10.14).

Movements of Gulls

10.10.192 The numbers of gulls were too large to be counted so they were classified as high (over 500 and up to 1000s), moderate (50-500), low (up to about 50) or singles in the above table. This assessment was based on the gull survey experience of the ornithologist.

10.10.193 On 25.09.2006 there were only low numbers of gulls flying upstream at 6.30am, at an ebbing and fairly low tide, but large numbers were flying upstream at 6.45am. Large numbers continued flying upstream until 7.15am but at 7.30am there were only low numbers flying upstream. The upstream movement of low numbers continued until 8.03am but at 8.15am there were only very low numbers flying upstream; this level of movement continued until 11.00am.

10.10.194 At 11.15am only very occasional gulls, as singles, were flying upstream and downstream, a situation which continued until 12.09pm. Around 12.15pm there were no bird movements.

10.10.195 At 12.30pm the very occasional movement of single gulls resumed until 12.42pm but thereafter

there were no gull movements until 16.00 pm when the movement of occasional gulls, as singles, resumed upstream and downstream.

10.10.196 At 16.15pm small numbers of gulls were seen flying downstream only, a movement which continued uninterrupted until 17.45pm, after which time, at 18.00pm, the numbers of gulls moving downstream began to increase.

10.10.197 At 18.15pm there were large numbers of gulls flying downstream and by 18.30pm even larger numbers flying downstream. This movement of large numbers continued until at least 19.30pm when it became too dark for further observations. The tide was low at this time.

10.10.198 As noted in the surveys of 2005, all the gulls were flying over the bridge.

10.10.199 Examination of the gull movement data of 02.10.2006 showed a similar pattern of gull movements with large numbers flying upstream at 7.00am but low numbers moving upstream at 8.00am and only occasional gulls moving upstream between 8.30am and 9.45am.

10.10.200 At 10am, however, there were occasional gulls flying upstream and downstream; this type of movement continued until 17.00pm. However at 17.15pm there were low numbers moving downstream, and at 18.15pm large numbers were moving downstream; this continued until 19.30pm by which time it was almost dark.

10.10.201 On 21.11.2006 large upstream movements of gulls started at dawn (around 7.45am) and continued until 8.45am. The downstream return of large numbers of gulls was underway at 16.30pm and continued until dark and possibly well after sundown.

10.10.202 The gull movement results for 18.12.2006, 05.01.2007 and 14.02.2007 were almost identical, with movements upstream starting before dawn and ending sometime after dusk. There was also a similar pattern of movement in the daytime, with occasional gulls, mostly singles, moving upstream and downstream.

Movements of Wildfowl and Wading Birds for which the SPA is of Importance

10.10.203 A summary of the movements between the downstream European Site and the Upper Estuary, of the wildfowl and wading bird species whose populations justify the Estuary SPA status, are shown in Table 10.19 for the survey period of September 2006 to February 2007;

Table 10.19 - Surveys of the Movements of Wildfowl and Wading Birds (Qualifying Species) Between the European Site and Upper Mersey Estuary from September 2006 to February 2007.

Survey date	Flying upstream	Flying downstream	Feeding	Total number	Other observations
25.09.2006	RKx2	RKx2	None	RKx4	
02.10.2006	None	None	None	None	No waders seen or heard
21.11.2006	None	None	None	None	No waders seen or heard
18.12.2006	None	None	None	None	No waders seen or heard
05.01.2007	None	None	None	None	No waders seen or heard

Survey date	Flying upstream	Flying downstream	Feeding	Total number	Other observations
14.02.2007	None	None	None	None	No waders seen or heard
NOTES; No Shelduck, Teal, Pintail, Dunlin, Golden Plover and Black-tailed Godwit seen					
KEY; RK=Redshank					

10.10.204 The figures in the preceding Table 10.19 show that there was movement between the European Site and the Upper Mersey Estuary of only one of the seven species, namely Redshank, whose population numbers in the European Site reach the qualifying selection criterion. Further, there was movement on only one of the six days of survey and by only two birds flying in one direction and two, possibly the same birds, in the other direction.

10.10.205 Table 10.20 summarises the recorded movements of all the other wildfowl and wading bird species passing the existing bridges, between the downstream European Site and the Upper Mersey Estuary;

Table 10.20 - Surveys of the Movements of Wildfowl and Wading Birds (Non-Qualifying Species) Between the European Site and Upper Mersey Estuary from September 2006 to February 2007.

Survey date	Flying upstream	Flying downstream	Feeding	Total number	Other observations
25.09.06	CAx6 CGx4 Hx1 Hx2 MSx10	Hx1 Hx1 HAx1 MAx4 MAx2	Max1	CAx6 CGx4 Hx5 MAx7 MSx10	Birds on downstream sandbank include CUx12, SUx17
02.10.06	CAx1 CAx1 CAx1 CAx2 Max3	CAx1 CAx1 CAx1 Max1	CAx1	CAx9 CGx0 Hx0 MAx34 MSx0	Birds on downstream sandbank include CUx16, SUx10+, Lx1000+
21.11.06	None	CAx1	None	CAx1 CGx0 Hx0 MAx0 MSx0	CAx5 on downstream sandbank
18.12.06	CAx1	CAx1 CAx1 CAx1 CAx1 CAx1	None	CAx6 CGx0 Hx0 MAx0 MSx0	CAxseveral, CUx1 on downstream sandbank
14.02.07	CGx2	CAx2	None	CAx2 CGx2 Hx0 MAx0 MSx0	CAx6 CUx2 SUx4 on downstream sandbank
NOTES; No Shellduck, Teal, Pintail, Dunlin, Golden Plover and Black-tailed Godwit seen					
KEY; CA=Cormorant, CG=Canada Goose, CU=Curlew, H=Heron, MA=Mallard, MS=Mute Swan, L=Lapwing, SU=Shelduck.					

NOTE: The maximum (peak) figure is the greatest number of birds present on any one survey and is the only figure that can be compared with the National Threshold (WeBS).

10.10.206 Of note in Table 10.20 is the absence of Curlew, Lapwing and other wader movements between the European Site and Upper Mersey Estuary. The Cormorant, Mallard and Canada Goose movements are relatively small and insignificant, and the Heron movements were expected because of the nearby heronry.

Evidence for a Separate SPA & Upper Estuary Population

Movements between the SPA and the Upper Estuary

10.10.207 Section 4.6 details the method of survey for movements of birds via the Runcorn Gap and explains why the Gap was considered to be the most likely route for such movement. Counts of birds were made on twelve dates in October 2005 to January 2006.

10.10.208 The survey found that there were daily movements of large numbers of gulls over the Runcorn Gap with 15,000 to 20,000 flying eastward up the Estuary in the morning and from 25,000 to 33,000 flying west in the evening. There are a number of possible explanations for the differences in numbers noted including different roost locations, feeding sites and pre-roost loafing areas. The numbers of gulls flying up and down the Estuary were not affected by the status of the tide or weather during the survey period. Gulls are not amongst the species for which the European Site is classified.

10.10.209 A large sandbank in the European Site about 1km south west of the Silver Jubilee Bridge usually held 2,000-3,000 loafing gulls. Other species on the sandbank included cormorant (10+), shelduck (30+), lapwing (2000+), curlew (40+), dunlin (20+) and individual heron, oystercatcher and redshank. Gulls present here would fly east up the estuary if the tide covered the bank in the morning but down the Estuary in response to an afternoon tide. The information available showed that none of the other species present flew up the estuary when the sandbank was covered by the tide, whatever the time of day.

10.10.210 Table 10.20a presents the species and numbers of birds other than gulls recorded moving past the bridge in either direction. Colons separate each movement by a bird or group. In all, birds of 14 species flew past the bridge, with cormorant, heron, mallard, dunlin and redshank flying beneath it.

10.10.211 Only cormorant made daily movements between the European Site and the Upper Estuary, with individuals (maximum of three together) passing under the bridge. Of the species for which the European Site is classified, shelduck made 11 movements (maximum 40 birds), teal one movement (20 birds), dunlin one movement (12 birds) and redshank six movements (maximum two birds). The species moving in largest traversing numbers was lapwing with four movements of 250, 100, 60 and 30 birds.

10.10.212 These result show that there is no strong functional linkage between the Upper Estuary and the European Site and suggest that the bird populations of the European Site and the Upper Estuary are not one population but separate.

Table 10.20a - Numbers of species other than gulls noted transiting the Runcorn Gap

Date	25 Oct 05	26 Oct 05	27 Oct 05	31 Oct 05	1 Nov 05	3 Nov 05	4 Nov 05	8 Nov 05	9 Nov 05	10 Nov 05	19 Dec 05	23 Jan 06
Cormorant	2:1	1:1:1	1:1:1:1	3:1:1	3:2:1	1:1:2:1	1:1:1	2:1:1:1	2:3:1:1	3:1:1:1:2:1:1	3:1:1:1	
Heron		1		2	1	1		1				
Mute swan			1			3		11				
Canada goose					1	7						
Greylag									23			
Shelduck	4:5	2:4:1:10	1		1		1	40				
Teal	20											
Mallard	2	2:4:2	2:2	2				4				
Tufted duck		4										
Oystercatcher												
Lapwing		>250:>100:>60				>30						
Dunlin			12									
Curlew		1									1	
Turnstone		4										
Redshank		2:2	1				1			1		
Individual movements by a bird or flock are separated by colons												

Effects of high tide

10.10.213 The movement survey covered dates when tides covered the Ince Banks, a major waterfowl roosting area in the European Site, so that a check could be made for movements which occurred possibly due to this factor. Table 8 gives height of high tides at Hale Head, opposite Ince Banks in the European Site, and at Widnes in the Upper Estuary on the relevant dates. Spot heights on the Ince Banks and on the Upper Estuary saltmarshes were taken from Environment Agency LIDAR files. Almost the whole of the Ince Banks is at heights of less than six metres while saltmarsh in the Upper Estuary is mainly at heights of more than five metres. Chart datum and ordnance datum are the same at Widnes and accordingly, the tide heights can be related directly to the LIDAR results, showing that on four dates (31/10/2005; 1, 3, 4/11/2005) the Ince Banks were inundated at high water while those in the Upper Estuary remained exposed.

Table 10.20b - Tide heights on Runcorn Gap survey dates in 2005 and 2006

	25/ 10	**26/ 10**	**27/ 10**	**31/ 10**	**1/11**	**3/11**	**4/11**	**8/11**	**9/11**	**10/ 11**
HT Hale Head	4.4	4.1	4.4	6.3	6.5	6.7	6.8	5.5	5.1	4.9
HT Widnes	2.5	2.2	2.4	4.4	4.7	4.9	4.9	3.6	3.2	3.0

10.10.214 Table 10.20a shows that there were no significant movement of wildfowl or waders from the SPA to the Upper Estuary in response to these conditions. It should be noted that the movement by 30+ lapwing on 3 November was in fact downstream towards the European Site.

Other information on movements

10.10.215 These results are consistent with those of the monthly counts of the Upper Estuary undertaken for the project since 2002, which noted no movements of flocks of wildfowl or waders into the area from the west (i.e. the European Site and beyond) at any tide state. This is also the situation with the counts made of the construction corridor in 2006-07. Both these studies could be expected to detect flocks of birds moving to the Runcorn Banks area by routes not only through the Runcorn Gap but overland from either south or north.

10.10.216 The broad consistency between core and low tide counts undertaken in the Upper Estuary supports the view that at no time are bird numbers augmented or reduced by major movements.

10.10.217 Information on bird movements has also been obtained from Tony Parker, who has been bird-watching on the Estuary for over 20 years and coordinated the WeBS low tide counts for the Estuary. He stated that there is very little movement of birds between the European Site and the Upper Estuary. Even during bad weather or high spring tides birds tend to move to adjacent farmland on Ince Marsh and Frodsham Marsh, (typically 1-2 kilometres distant), rather than moving up the Estuary to saltings which are approximately 10 kilometres away.

Birds using the Project Corridor

10.10.218 The results of the monthly bird surveys of the Upper Mersey Estuary during 2005 have been examined to identify which species use the Project corridor habitats across the Upper Mersey Estuary, specifically the Widnes Warth Saltmarsh in the north, the Astmoor Saltmarsh in the south, and the intervening river channel including its associated sandbanks and mudflats.

10.10.219 The results of the surveys, including the total numbers for 12 monthly surveys, were examined initially and as a preliminary investigation for a corridor extending to 500 metres on both sides of the centreline of the bridge.

10.10.220 Although it was not expected that bird disturbance would be likely to extend as far as 500 metres from the New Bridge, this wide corridor on either side was examined in line with a precautionary approach to ensure that all areas of possible disturbance or other adverse influences of the Project, including its construction and use, were assessed. This allows for the fact that some bird species will be much more sensitive than others to the high and lengthy structure of the bridge, as well as the piers, towers and traffic movements. This initial approach was also taken to detect any bird species that might use the New Bridge part of the Estuary on a very occasional or infrequent basis.

10.10.221 This examination of the survey results involved, separately, the saltmarshes on both sides of the channel and including, again separately, the river channel itself. (Appendix 10.15, tables 1 and 2).

10.10.222 The results of the bird survey analyses are summarised in Table 10.21;

Table 10.21 - Total Numbers of Birds Recorded in the Upper Mersey Estuary During the Twelve Monthly Surveys of 2005.

Birds within 500 metres of centreline of the New Bridge		**Birds beyond 500 metres of centreline of the New Bridge**	
Birds downstream (west)	**Birds upstream (east)**	**Birds downstream (west)**	**Birds upstream (east)**
BHx1807 BZx1 CAx17 Cx18 CGx32 CMx47 CUx94 DNx29 GEx1 GBx37 Hx4 HGx493 Lx538 LBx248 LGx127 LIx24 MAx105 MGx19 MPx53 MSx26 PEREGRINEx5 RKx23 RPx2 Sx14 SGx14 SUx267 WPx172+ Tx78	BHx1308 BZx1 Cx7 CGx4 CMx36 CUx16 GBx22 GOx7 Grey Ploverx2 Hx9 HGx140+ IGx10 Kx1 Lx484 LBx206+ LIx30 MAx46 MGx38 MPx394 MSx2 RBx18 RKx19 RPx3 Sx72 SDx260 SGx36+ SLx4 SUx117 Tx1 WPx226+	BHx3020 Cx2 CAx3 CMx12 CUx21 GBx5 Hx1 HGx97 Lx10 LBx35 MGx2 Tx25	BHx9271 BZx4 Cx8 CAx47 CMx222 CUx80 CGx239 DNx7 GBx288 GADx409 GEx2 GREYLAGx2 GOx37 Hx12 HGx3038 Kx1 Lx2269 LBx3810 LIx117 LGx226 MAx703 MGx14 MPx235 OCx1 OSPREYx1 RBx34 RKx32 RPx11 Sx85 SDx1 SEx1 SKx6 SLx4 SMx6 SUx551 SWx3 Tx187 WPx152
KEY; BH=Black-headed Gull, BZ=Buzzard, C=Carrion Crow, CA=Cormorant, CG=Canada Goose, CM=Common Gull, CU=Curlew, DN=Dunlin, GAD=Gadwall, GB=Great Black-backed Gull, GE=Green Sandpiper, GO=Goldfinch, H=Heron, HG=Herring Gull, IG=Iceland Gull, K=Kestrel, LB=Lesser Black-backed Gull, L=Lapwing, LG=Little Grebe, LI=Linnet MA=Mallard, MG=Magpie, MP=Meadow Pipit, MS=Mute Swan, OC=Oystercatcher, RB=Reed Bunting, RK=Redshank, RP=Ringed Plover, S=Skylark, SD=Stock Dove, SE=Short-eared Owl, SG=Starling, SL=Swallow, SU=Shelduck, T=Teal, WP=Wood Pigeon.			

Numbers and distribution of gulls

10.10.223 The following observations on gulls are made from the preceding Table 10.21;

a. The Project corridor is populated mainly by gulls, the total numbers of gulls recorded throughout the year being 4,354+. Most were Black-headed Gulls (3115+) followed by 633+ Herring Gulls, 454+ Lesser Black-backed Gulls, 83+ Common Gulls, 59+ Greater Black-backed Gulls and 10 Iceland Gulls;
b. There were more gulls (2,632) downstream of the Project corridor compared with upstream (1,722); this was associated with the presence of the large sandbank in the central part of the channel;
c. Outside the Project corridor there were 19,798 gulls, over four times the number recorded in the corridor. The majority (16,629) were upstream of the corridor, compared with 3,169 downstream;
d. Black-headed Gull was the predominant species outside the Project corridor, as within it. There were generally similar proportions of the other four species as in the corridor, with large numbers of Lesser Black-backed and Herring gulls, and relatively very low numbers of Common Gulls and Greater Black-backed Gulls; and
e. The vast majority of the gulls, as evident from analysis of Appendix 10.15, Table 1, use the river channel and associated sand/silt flat and sandbank habitats rather than the saltmarshes. Flocks of up to 150-200 Herring Gulls and Lesser Black-backed Gulls were recorded on Widnes Warth Saltmarsh but these were of rare occurrence.

Numbers and distribution of Lapwings and other wading birds

10.10.224 Observations of Lapwings and other wading birds made from the tabulated figures include;

a. Lapwing is the only abundant wading species using the Upper Mersey Estuary. Within the Project corridor 1022 were counted out of 1211 wading birds in total. Outside the New Bridge corridor 2,279 Lapwing were seen, compared with a total of 2,433 waders;
b. Within the Project corridor, there were slightly greater numbers of Lapwing (538) downstream from the bridge centre-line than upstream of the centreline (484 Lapwing); and
c. About two thirds of the Lapwings recorded were outside the Project corridor and in the upstream area of the Upper Mersey Estuary.

10.10.225 Other wading birds recorded were limited to Curlew, Dunlin, Redshank, Green Sandpiper, Ringed Plover, Grey Plover and Oystercatcher. The numbers counted within and outside the New Bridge corridor are shown in Table 10.22.

Table 10.22- Total Numbers of Wading Birds Recorded in the Upper Mersey Estuary During the Twelve Monthly Surveys of 2005

Species	Within New Bridge 1km wide corridor	Outside New Bridge 1km wide corridor
Curlew	110	101
Dunlin	29	7
Grey Plover	2	0
Green Plover	1	2
Lapwing	1022	2279
Oystercatcher	0	1
Redshank	42	32
Ringed Plover	5	11
TOTALS	**1,211**	**2,433**

10.10.226 Curlew occurs in moderate numbers with Redshank and Dunlin in low numbers; other species use the Project corridor and Upper Mersey Estuary in very low numbers only.

10.10.227 Most of the Lapwings and other wading birds were using the sand-silt flats and sandbanks rather than the saltmarshes, particularly the margins of the river channels adjacent to the saltmarshes. However Redshank and Lapwing were of occasional occurrence on the saltmarshes and appeared to favour Widnes Warth Saltmarsh.

Wildfowl and other water birds

10.10.228 The numbers of wildfowl and other water birds within and outside the New Bridge corridor in the 2005 surveys were as shown in the following Table 10.23.

Table 10.23 - Total Numbers of Wildfowl and Other Water Birds Recorded in the Upper Mersey Estuary During the Monthly Surveys of 2005.

Species	Within New Bridge 1km wide corridor	Outside New Bridge 1km wide corridor
Cormorant	17	50
Canada Goose	36	239
Gadwall	0	409
Greylag Goose	0	2
Heron	13	13
Mallard	151	703
Mute Swan	28	0
Shelduck	384	551
Teal	79	187
TOTALS	**708**	**2,154**

10.10.229 Of note are the relatively large numbers of Shelduck and Gadwall. The Shelduck were almost all in the river channel, river margins and flats, at various locations, but Gadwall were restricted to the upstream area near the Fiddler's Ferry lagoons, with none in the New Bridge corridor.

Although Mute Swans were restricted in the Study Area to the New Bridge corridor, most of the other species, notably Cormorant, Canada Goose, Mallard and Teal were more frequent outside the corridor.

Other bird species

10.10.230 Comparable observations to those above are given in Table 10.24 for raptors and passerine birds.

Table 10.24 - Total Numbers of Raptors and Passerine Birds Recorded in the Upper Mersey Estuary During the Monthly Surveys of 2005.

Species	Within New Bridge 1km wide corridor	Outside New Bridge 1 km wide corridor
Buzzard	2	4
Carrion Crow	25	10
Linnet	54	117
Magpie	57	16
Meadow Pipit	53	235
Osprey	0	1
Peregrine Falcon	5	0
Sedge Warbler	0	3
Skylark	86	85
Starling	50	0
Wood Pigeon	398	152
TOTALS	**730**	**623**

10.10.231 There are marked differences in the distribution of certain species in relation to the New Bridge corridor. For example Meadow Pipit numbers are over four times greater outside the corridor than within, and Linnet numbers are twice those counted within the corridor than outside. The differences are probably due to the fact that both species are commoner in more rural areas, away from disturbance in the west, and breeding habitat is more favourable in the east.

10.10.232 In contrast, Carrion Crow, Magpie, Starling and Wood Pigeon are commoner within the New Bridge corridor than beyond, this being attributed to their high breeding densities in the nearby urban/industrial areas and their use of the open saltmarsh habitat solely for feeding.

10.10.233 The occurrence of five Peregrine Falcons recorded within the New Bridge corridor is explained by the fact that the falcons nest nearby, on the railway viaduct at the Runcorn Gap.

SPA qualifying species

10.10.234 The mean counts for each of the SPA qualifying species within the 1 kilometre wide New Bridge corridor compared with the upstream and downstream counts in the Upper Mersey Estuary outside the corridor are given in the following Table 10.25. The other qualifying species, Pintail, Golden Plover and Black-tailed Godwit, were not recorded in the area surveyed in 2005.

Table 10.25 - Mean Counts for Each of the SPA Qualifying Bird Species Within the New Bridge corridor compared with the upstream and downstream counts outside the corridor, during the monthly surveys of 2005.

Species	Within New Bridge 1km wide corridor	Outside New Bridge 1 km wide corridor
Shelduck	16.0	23.0
Teal	3.3	8.8
Dunlin	1.2	0.3
Redshank	1.7	1.3

10.10.235 Apart from Shelduck, the numbers of the qualifying species present are low and of no significance. Further, the Shelduck numbers are not unusual and are not significant.

Detailed Bird Surveys Within the New Bridge Corridor

The Runcorn Sands

10.10.236 WeBS low tide counts cover the sector of the Upper Estuary that includes the proposed line of the bridge. This sector includes the whole of Runcorn Sands and intertidal flats off Hempstones Point and is 239 hectares in extent. Low tide counts are not undertaken annually and there were no counts after 1998/9 until 2005/6.

10.10.237 The data from the 1990's are not reliable as an indication of current status of the site; it is known that there have been changes in a number of species in the European Site over the period since that time and thus use of these earlier counts would give an incorrect picture of current importance of the site. Accordingly, Table 10.26 presents the peak numbers of birds noted in the 2005/6 count, the mean numbers, derived from counts once a month from November to March, and the mean density of birds per ha of the count sector. For comparison, mean densities in the Fiddler's Ferry sector upstream of Runcorn Sands and in the whole Mersey are also given. The densities are calculated relative to the extent of each species' preferred habitat (non-tidal, inter-tidal, sub-tidal or a combination) in the sector or site. Species for which the SPA (European Site) is classified are asterisked.

Table 10.26 - Low Tide Counts in the Runcorn Sands Sector

Species	Peak count	Mean count	Birds/ha	Birds/ha Fiddler's Ferry	Birds/ha Upper Estuary
Cormorant	2	1	0	0.04	0.04
Grey heron	3	2	0.01	0.03	0.01
Mute swan	3	1	0.02	0	0.04
Canada goose	4	1	0	0.15	0.04
Shelduck *	40	14	0.06	0.31	0.57
Teal *	33	16	0.07	0.25	0.74
Mallard	12	5	0.02	0.09	0.05
Lapwing	300	101	0.56	31.25	2.32
Dunlin *	2	1	0	0	9.34
Curlew	41	21	0.12	0.6	0.22
Redshank *	15	8	0.04	0.01	0.45

10.10.238 Overall numbers of birds are small relative to the size of the count sector and bird densities are low compared with the adjacent Upper Estuary sector off Fiddler's Ferry and with the Mersey Estuary as a whole. This supports the evidence that the sector is poor quality feeding habitat attributable to the hydrodynamic influences on the Runcorn Sands and the main channel of the Mersey upstream of the Runcorn Gap.

10.10.239 While a single winter's count data may be an inadequate base on which to assess the importance of an area (5 year averages are usually used), the counts undertaken for the Project, undertaken in 2002/07, provide additional information on bird usage of the area. They are presented in the following section.

Numbers in the New Bridge corridor in 2002/05

10.10.240 From 2002 to 2005, counts were carried out covering the New Bridge corridor with the aims of determining the numbers of birds present and their use of the corridor. The choice of 300 metres as the extent of survey was based on a considerable body of evidence on the effects of disturbance on birds and is discussed in the literature review.

10.10.241 Table 10.27 presents numbers of birds across the saltmarsh, Table 10.29 over the intertidal flats and Table 10.28 over waters at low tide. Each table covers the period from the beginning of the spring count period in 2002 to the end of the winter period in 2004/5. For each count year (April to March), the data have been analysed into count periods – spring (for spring passage), autumn (for autumn passage) and winter. In the Tables, the means and maxima are the highest observed in any period that year; in practice, the great majority fall in the winter period. Where they fall in spring or autumn they are marked S or A respectively. Mean numbers of any other species present were less than 10.

Table 10.27 - Numbers of Birds in the Saltmarsh Corridor

Species	2002-3		2003-4		2004-5	
	Mean	max	Mean	Max	Mean	Max
Cormorant	**0**	**0**	0	0	0	0
Canada goose	**1S**	**5 S**	11	80 A	16	40
Shelduck	**2S**	**7 S**	0	0	0	0
Wigeon	0	0	0	0	0	0
Teal	41	264	2	6	1	2
Mallard	4	10	2 S	6	5	24
Golden plover	0	0	0	0	0	0
Lapwing	169	1350	35	176 A	1	6
Dunlin	0	0	0	0	0	0
Curlew	4	28	0	0	0	0
Redshank	7 S	17 S	10 S	11 S	1 S	2
All species	220	1670	53 A	260 A	26	84

Table 10.28 - Numbers of Birds in Tidal Waters

Species	2002-3		2003-4		2004-5	
	mean	Max	mean	Max	Mean	Max
Cormorant	0	0	3	7	0.75 A	3 A
Canada goose	0	0	0	0	0	0
Shelduck	0.2 S	1 S	0	0	0.7 S	2 S
Wigeon	0	0	0	0	0	0
Teal	12	80	0	0	24	120
Mallard	3 A	24 A	0.4 A	2 A	4 S	10 S
Golden plover	0	0	0	0	0	0
Lapwing	0	0	0	0	0	0
Dunlin	0	0	0	0	0	0
Curlew	0	0	0	0	0	0
Redshank	0	0	0	0	0	0
All species	13	86	3	10	24	122

Table 10.29 - Numbers on Inter-tidal Flats

Species	2002-3		2003-4		2004-5	
	mean	Max	mean	Max	Mean	Max
Cormorant	2	8	**2 A**	**7**	**2**	**6**
Canada goose	7	59	**0**	**0**	**2 A**	**6 A**
Shelduck	1	8	**41 A**	**110 A**		**82 A**
Wigeon	0	0	0	0	0	0
Teal	18	60	18	80	2	8
Mallard	2	12	6	30 A	20	32
Golden plover	0.1	1	0	0	0	0
Lapwing	106	505	38 A	74 A	61	300
Dunlin	29	220	20 A	60 A	9	43
Curlew	12	41	18 A	56 A	11 A	28 A
Redshank	4	10	3 A	8 A	3	13
All species	180	917	134 A	374 A	100	413

10.10.242 The species present are those to be expected on saltmarsh, being principally Canada goose, teal, mallard and lapwing. Numbers of shelduck and redshank in spring may be birds prospecting potential breeding areas. Lapwing is the most numerous species but not consistently present.

10.10.243 Tidal waters hosted cormorant, shelduck, teal and mallard with an inconsistent pattern of occurrence in respect of all species.

10.10.244 The intertidal flats also showed an inconsistent pattern of occurrence by individual species with considerable variations in abundance from year to year.

10.10.245 To facilitate assessment of the importance of the New Bridge corridor, the means and mean peaks for each of the three habitat components over the three years have been calculated and are presented at Table 10.30.

Table 10.30 - Means and Mean Peaks of Birds Along the Line of the New Bridge, 2002/3-2004/5

Species	Saltmarsh		Tidal waters		Inter-tidal flats	
	Mean	Mean peak	Mean	Mean peak	Mean	Mean peak
Cormorant	0	0	1	3	2	7
Canada goose	9	41	0	0	3	11
Shelduck	0.6	2	0.3	1	21	67
Wigeon	0	0	0	0	0	0
Teal	15	90	12	67	13	49
Mallard	4	13	2	12	9	25
Golden plover	0	0	0	0	>0	0.3
Lapwing	64	511	0	0	68	293
Dunlin	0	0	0	0	19	108
Curlew	1	9	0	0	14	42
Redshank	6	10	0	0	3	10
All species	100	675	13	73	138	568

10.10.246 Species with mean counts of 10 or fewer in all habitats combined were cormorant (3), wigeon (0), golden plover (<1) and redshank (9). Species with mean counts of 11-50 birds in all habitats combined were Canada goose (12), shelduck (22), mallard (15), teal (40), dunlin (19), curlew (15). Only lapwing was present in greater numbers (132). These findings are broadly consistent with the results of WeBS low tide counts.

10.10.247 During the counts for the Project, other species were also noted. They were great crested grebe, grey heron, mute swan, gadwall, tufted duck, moorhen, oystercatcher, ringed plover, grey plover and green sandpiper. Over the three habitats and the three year period, the mean number present in each case was less than one bird.

Numbers in the Bridge Corridor 2006/07

10.10.248 In 2006/07, a total of 16 counts were undertaken recording bird numbers in the bridge corridor throughout daylight hours. Table 10.30a gives the peak count of each species on each date. Table 10.30b gives the mean of all counts on each date. Table 10.31 presents the highest of the peak counts and the mean numbers present for the whole count period and compares with the WeBS low tide counts for 2005/06.

Table 30a - Peak counts in the construction corridor 2006/07

Species	30 Jan 06	14 Feb 06	02 Mar 06	20 Mar 06	09 Oct 06	30 Oct 06	07 Nov 06	28 Nov 06	12 Dec 06	19 Dec 06	04 Jan 07	25 Jan 07	02 Feb 07	12 Feb 07	19 Feb 07	26 Feb 07
Cormorant	3	4	1	1	1	0	0	3	0	0	0	0	0	0	4	3
Heron	4	1	2	1	2	3	3	1	1	0	0	1	1	0	3	1
Mute swan	2	2	1	2	0	0	3	0	0	0	0	0	0	0	0	0
Canada goose	6	2	15	2	4	0	0	26	0	6	0	0	0	0	0	0
Shelduck	19	20	2	2	1	22	3	17	19	10	12	36	86	52	48	40
Teal	74	100	50	23	10	60	6	50	14	4	0	50	55	5	1	16
Mallard	2	6	2	2	0	2	0	4	0	0	0	0	12	4	0	4
Lapwing	253	500	50	0	370	12	225	0	0	0	200	130	0	0	60	0
Dunlin	19	0	0	0	0	0	0	0	1	0	0	0	4	0	0	0
Curlew	9	15	4	3	3	2	6	5	0	0	8	2	6	8	1	8
Redshank	5	15	5	5	22	11	27	8	17	14	6	12	20	8	4	4

Table 10.30b - Mean counts in the construction corridor 2006/07

Species	30 Jan 06	14 Feb 06	02 Mar 06	20 Mar 06	09 Oct 06	30 Oct 06	07 Nov 06	28 Nov 06	12 Dec 06	19 Dec 06	04 Jan 07	25 Jan 07	02 Feb 07	12 Feb 07	19 Feb 07	26 Feb 07
Cormorant	1	1	0.4	0.15	0.04	0	0	1.5	0	0	0	0	0	0	0.8	1.7
Heron	1	0.2	0.5	0.15	0.5	0.3	0.6	0.4	0.1	0	0	0.45	0.1	0	0.8	0.3
Mute swan	0.1	0.1	0.1	0.23	0	0	0.1	0	0	0	0	0	0	0	0	0
Canada goose	0.9	0.1	2	0.08	0.3	0	0	1.4	0	0.6	0	0	0	0	0	0
Shelduck	6	15	0.2	0.35	0.4	13	0.8	14	12	4.4	6	19	72	38	22	37
Teal	60	73	45	18	0.7	42	4	42	12	2	0	35	19	0.5	0.1	9
Mallard	0.2	0.5	0.4	0.4	0	0.2	0	1.4	0	0	0	0	3	0.9	0	2.7
Lapwing	107	233	7	0	47	5	39	0	0	0	32	6.5	0	0	2.6	0
Dunlin	2.2	0	0	0	0	0	0	0	0.4	0	0	0	0.8	0	0	0
Curlew	2.6	6	0.8	0.15	1.5	1.2	1.8	0.9	0	0	4.4	0.7	3	1.7	1	5
Redshank	3.1	9	3.3	2	10	9	1.9	6	13	7	3	8.5	14	7	0.8	2.5

Table 10.31 - Individual peak and mean counts for the survey period

Species	Peak count for period	Mean count for period	Mean count from WeBS
Cormorant	4	0.4	1
Heron	4	0.3	2
Mute swan	3	0.04	1
Canada goose	26	0.3	1
Shelduck	86	16	14
Teal	100	23	16
Mallard	12	0.6	5
Lapwing	500	30	101
Dunlin	19	0.2	1
Curlew	15	2.4	21
Redshank	27	5.3	8

10.10.249 There is a reasonable correlation between all counts, bearing in mind that WeBS covers the whole of the Runcorn sands and that somewhat higher mean counts would be expected.

Use of the Bridge Corridor

10.10.250 The overall pattern of species presence and activity as observed by the all-day counts in 2006/07 followed a consistent pattern as can be summarised as follows:-

a. Cormorant were occasionally present feeding in the deeper water channels or drying on exposed sand (mean 0.4 birds, max 4).
b. Heron occurred mainly along the edge of the saltmarsh (mean 0.3, max 4).
c. Mute swan were only rarely present and were not noted to feed (mean 0.04, max 3).
d. Canada goose occurred occasionally and were not seen feeding (mean 0.3, max 26).
e. Shelduck were present on every survey date, where they were feeding on the flats while exposed and at high water flying off to feed or roost elsewhere (mean 16, max 86).
f. Teal were present on all dates but one, mainly along the deep water channel beside the north shore, birds feeding or loafing in the low water period and still present but afloat during high water (mean 23, max 100).
g. Mallard were occasionally present, feeding or loafing (mean 0.6, max 12).
h. Lapwing were present on nine dates, in variable numbers. They were noted feeding or roosting on exposed flats and absent at high water (mean 30, max 500).
i. Dunlin were present on only three dates, but were noted to be feeding when present (mean 0.2, max 19).
j. Curlew were present on 14 dates, always as feeding birds on the exposed flats (mean 2.4, max 15).
k. Redshank were present on all dates in small numbers, largely feeding along the north shore (mean 5.3, max 27)
l. Gulls made considerable use of the area, often in large numbers during the latter half of the day. As well as loafing and bathing on the Runcorn Sands before going to roost, they also fed in this area.

10.10.251 Teal and lapwing were the only two species that fed and roosted in the site in substantial numbers. Activity analysis on the four dates when each species was present in the greatest numbers found that appreciably more time was spent roosting than feeding, see Tables 10.32 and 10.33. This is relevant to the assessment of the effects of the presence of the bridge.

Table 10.32 - Teal Activity in the New Bridge Corridor

Date	Max number present	Bird hours feeding	Bird hours roosting
30 January 2006	74	1702	1675
14 February 2006	100	40	762
30 October 2006	60	143	315
2 February 2007	55	108	76
Total hours		1993	2828

Table 10.33 - Lapwing Activity in the New Bridge Corridor

Date	Maximum number present	Bird hours feeding	Bird hours roosting
30 January 2006	253	534	782
14 February 2006	500	0	2301
09 October 2006	370	345	219
7 November 2006	250	25	374
Total hrs		904	3676

Movements into and out of the New Bridge corridor

10.10.252 The study also noted movements into, out of and through the area by flocks and by individual birds. There was no evidence of regular large-scale movements by any species other than gulls. Most observed movements were over short distances in response to tide state or by small numbers of birds, usually in single figures. This does not prove that there are no movements between the area and the SPA but it does support other evidence that there is no significant population shared between the two areas.

Spring Tide Surveys

10.10.253 The results of the surveys of birds using the New Bridge corridor throughout the day during spring tides on days in October, November and December 2006, and similarly in January and February 2007, are appended in tables 10-7 of Appendix 10.16. The surveys covered the intertidal and saltmarsh habitats for 200 metres on both sides of the centreline of the route.

10.10.254 The totals for each of the survey days, taken from the appended tables and excluding gulls, are presented in the following Table 10.34.

Table 10.34 - Totals of Birds Using the New Bridge Corridor, Throughout the Day During Spring Tides, in 2006 and 2007.

Date	Channel	Channel margins	Saltmarsh
09.10.06	BZx1 CAx3 CGx56 CUx27 Cx2 Hx1 Lx1150 MSx6 RKx42 SUx11 Tx40	CGx4 Hx5 LIx1 RKx185 Tx20	Hx1 MGx10 MPx44 LIx6 RKx7 Sx3
07.11.06	CAx11 CGx30 CUx20 Hx11 Lx802 RKx99 SUx12	Cx2 CUx1 Hx5 Lx100 RKx205 Tx106	Dx1 Lx270 MPx34 MGx2 RKx155 Sx3
19.12.06	CAx7 CGx39 CMx18 RKx15 SUx50 Hx1	CGx10 RKx101 SUx16 Tx39	Bx9 BZx1 Cx1 Dx4 MG6 MPx11
04.01.07	CAx6 CGx100 CUx29 Lx520 MSx2 SUx66	CUx8 RKx43	CUx22 Lx40 MGx2 MPx6 RKx1 WRx1
02.02.07	Cx16 CGx40 CUx58 DNx4 MSx2 SUx285 Tx353	Cx2 Hx1 MGx4 PWx2 RKx225 Tx26	Bx1 Dx2 Hx1 LIx1 MGx30 MPx30 PWx3 RKx36 Sx56 Tx33 WRx11
19.02.07	Cx31 CAx20 CGx47 CUx17 Hx4 Lx1060 Max2 SUx443	CAx34 CGx2 Hx8 MSx2 RKx18 Tx5	Cx29 GTx3 Hx5 MGx8 MPx20 Rx1 RBx10 RKx1 STx2 Sx31
TOTALS	**BZx1 Cx49 CAx47 CGx312 CMx18 CUx151 DNx4 Hx17 Lx3532 MAx2 MSx10 RKx156 SUx867 Tx393**	**Cx4 CAx34 CGx16 CUx9 Hx19 Lx100 LIx1 MSx2 MGx4 PWx2 RKx777 SUx16 Tx196**	**Bx10 BZx1 Cx30 CUx22 Dx7 GTx3 HX7 Lx310 LIx7 MGX58 MPx145 PWx3 Rx1 RBx10 RKx200 Sx93 STx2 Tx33 WRx12**

KEY; BH=Black-headed Gull, BZ=Buzzard, C=Carrion Crow, CA=Cormorant, CG=Canada Goose, CM=Common Gull, CU=Curlew, DN=Dunlin, GAD=Gadwall, GB=Great Black-backed Gull, GE=Green Sandpiper, GO=Goldfinch, H=Heron, HG=Herring Gull, IG=Iceland Gull, K=Kestrel, LB=Lesser Black-backed Gull, L=Lapwing, LG=Little Grebe, LI=Linnet MA=Mallard, MG=Magpie, MP=Meadow Pipit, PW=Pied Wagtail, MS=Mute Swan, OC=Oystercatcher, R=Robin, RB=Reed Bunting, RK=Redshank, RP=Ringed Plover, S=Skylark, SD=Stock Dove, SE=Short-eared Owl, SG=Starling, SL=Swallow, SU=Shelduck, T=Teal, WP=Wood Pigeon, WR=Wren

10.10.255 Interpretation of the above figures should be based on the assumption that the daily totals of individual species include a substantial amount of double counting of birds. These were, notably, flocks of Shelduck which were within the New Bridge corridor or nearby during some days, and which may have remained within the survey corridor throughout the day.

10.10.256 It was impractical to avoid double counting so the data are assessed primarily in terms of the extent of use of the New Bridge corridor by birds. If a species or a flock of a particular species is present on more than one occasion during the day, and particularly if it is present throughout the day, then such behaviour is indicative of greater habitat value of the New Bridge corridor than if it is used on one occasion or on an intermittent basis. The totals given above are therefore a reasonable measure of the habitat value of the corridor for the species concerned.

10.10.257 The spring tide results for the bird species whose numbers satisfy the SPA qualifying criteria are discussed below.

Shelduck

10.10.258 The totals figures in the preceding Table 10.34 for the channel, channel margins and saltmarsh birds are 867, 16 and 93 respectively. Analysis of the figures for the six survey dates shows that most of the Shelduck were present on 02.02.2007 and 19.02.2007 when the total numbers were 285 and 443 respectively. All the Shelduck, on both dates, were in the river channel only.

10.10.259 Analysis of the 02.02.2007 observations (Appendix 10.16, tables 1 to 5), shows that low tide numbers, in the morning, were around 45 birds but there was an increase to around 86 Shelduck at high water. After high water, until low water in the late afternoon, numbers remained around the 86 level and were feeding.

Teal

10.10.260 The total numbers of Teal recorded during all the surveys were 393 in the channel, 194 along the channel margins, and only 33 on the saltmarsh. The numbers observed on the six survey dates beginning in October 2006 were 60, 106, 37, 0, 412 and 5.

10.10.261 On 02.02.2007, when 412 were seen, the birds appeared around high water and increased to a maximum of around 55 on the ebbing tide.

Redshank

10.10.262 The total figures for Redshank, in the preceding Table 10.34, were 156 in the channel, 777 on the margins and 200 on the saltmarsh. The total figures for the six surveys beginning in September 2006 were 234, 459, 116, 44, 225 and 36.

10.10.263 Redshank numbers were low and did not vary much with the incoming tide on 09.10.2006, but on 07.11.2006 numbers reached a peak of well over 120 soon after high tide, when most of the birds were on the saltmarsh. After high tide there were low to modest numbers of Redshank in the Upper Mersey Estuary, with most favouring the saltmarsh and to lesser extents the channel margins.

10.10.264 In the subsequent surveys from January 2007 the birds again favoured the water margins and the saltmarsh around soon after high tide.

Dunlin

10.10.265 The Dunlin counts in all the surveys were very low, being a total of just four in the channel, none on the channel margins and seven on the saltmarsh. No birds were seen during the first survey, only one on the second, four during the third, none during the 4th, six during the fifth and none during the sixth.

Other wildfowl and wading birds

10.10.266 None of the other SPA qualifying species were seen during the spring tide surveys; however the Curlew and Lapwing figures are worthy of consideration.

10.10.267 The total channel counts of Curlew were 151 over the survey period, the corresponding figures for the channel margins and saltmarsh being 9 and 22 respectively. The total Curlew figures from 09.10.2006 until February 2007 were 27, 21, 0, 59, 58 and 17.

10.10.268 The highest counts, on 04.01.2007 and 02.02.2007, were for Curlew feeding in the channel and on the saltmarsh, but their numbers were low.

10.10.269 The total numbers of Lapwings seen during all the surveys were 3,532 in the channel, 100 on the channel margins and 310 on the saltmarshes. The total counts for each of the six surveys from October 2006 were 1,150, 1,172, 0, 560, 0 and 1,060.

10.10.270 On 09.10.2006 Lapwing numbers were very low during most of the day but increased significantly from less than 40 to approaching 400 at low tide, late in the afternoon. They were feeding and roosting. In contrast, the pattern was different on 07.11.2006 when Lapwing numbers were around 25 in the morning, at low tide, but increased markedly to over 400 during the rising tide in the late morning. However the birds left and Lapwing numbers were around 25 or absent in the afternoon.

10.10.271 On the last spring tide survey, of 19.02.2007, about 200 Lapwings arrived at around high tide soon after noon and remained for about four hours until after high tide.

Meadow Pipits and Skylarks

10.10.272 The numbers of Meadow Pipits and Skylarks counted on the saltmarshes during each of the six surveys, including counts for the whole of each day, are given in Table 10.35.

Table 10.35 - Total Numbers of Meadow Pipits and Skylarks Using the New Bridge Corridor, Throughout the Day During Spring Tides, in 2006.

Species	09.10.06	07.11.06	19.12.06	04.01.07	02.02.07	19.02.07
Meadow Pipit	44	34	11	6	30	20
Skylark	3	3	0	0	56	31

10.10.273 These data are probably under-estimates of the numbers of birds present because the observations were directed principally at the river channel, sandbanks and channel margins. However, given that the observations were from a fixed point and were recorded during observation of other birds within a limited sample area, the numbers of Meadow Pipits and Skylarks recorded suggest that the use of Widnes Warth Saltmarsh by these species is fairly high. Further and more specific surveys of both species on Widnes Warth and Astmoor saltmarshes are described later in this Chapter.

10.10.274 Analysis of the figures during the tidal cycle from tables 1 to 7 (Appendix 10.16) indicates the following;

a. The low figures for both bird species on 04.01.2007 were due to disturbance by shooters;
b. The consistent presence of Meadow Pipit during each half-hourly survey indicates that the saltmarsh habitat along the New Bridge corridor is suitable for this species, an observation that is confirmed by the breeding bird surveys;
c. The consistent presence of Skylark on 02.02.2007 indicates that conditions along the corridor are also suitable for this species, a conclusion also borne out by the breeding bird surveys; and
d. The appended tables referred to above also show that the saltmarsh within the corridor is used by other passerine birds in the winter as well as in the breeding season. These species include Dunnock, Linnet, Reed Bunting and Song Thrush; and
e. Also of note is the use of the saltmarsh by Buzzard.

Gulls

10.10.275 As is evident from Appendix 10.16, variable but often large numbers of gulls use the New Bridge corridor for feeding, loafing, roosting and for local migration upstream and downstream.

10.10.276 The corridor is used by flocks of gulls and scattered birds. A favoured haunt is the large sandbank in the central part of the channel. Gulls, including mixed flocks, were also noted to fly to the Middle Estuary within the European Site, and gulls were frequently seen to be flying in both directions, to and from the European Site.

Neap Tide Surveys

10.10.277 The results of the surveys of birds using the New Bridge corridor throughout the day on neap tides in October, November and December 2006, and in January and two dates in February 2007, are tabulated in Appendix 10.17).

10.10.278 The totals for each of the survey days, taken from the appended tables and excluding gulls, are shown in Table 10.36.

Table 10.36 - Total Numbers of Birds Using the Project Corridor, Throughout the Day During Spring Tides, in 2006.

Date	Channel	Channel margins	Saltmarsh
30.10.06	Cx10 CAx9 CGx14 CUx20 Hx8 MSx3 Lx74 RKx34 SUx147	Hx2 Lx60 MAx5 RKx156 SUx100 Tx914	Cx2 Hx1 MGx5 MPx55 RKx1 Sx19 WRx1
28.11.06	Cx21 CAx26 CGx67 CUx10 Hx4 MSx32 RKx49 SUx85 Tx396 Peregrine Falcon	CAx6 CGx6 Hx2 MAx20 RKx55 SUx139 Tx254	None
12.12.06	CAx11 CUx1 DNx1 MSx5 RKx23 SUx140	Cx4 DNx6 Hx2 RKx156 SUx19 Tx182	Dx1 MGx6 MPx10
25.01.07	Cx2 CGx64 CUx17 Hx1 MSx1 Lx32 SUx179	Hx2 Kx1 RKx170 SUx155 Tx700	Bx3 Hx4 MGx8 MPx18 WRx4
12.02.07	Cx4 CAx9 CGx22 CUx40 MAx4 MSx4 OCx3 SUx794	Cx2 JSNx8 MAx16 RKx132 Tx7	Cx2 Dx3 Hx1 MGx18 MPx37 Sx51 WRx6
26.02.07	Cx4 CAx19 CGx40 CUx112 SUx860	CAx23 Hx5 MAx64 RKx56 Tx224	Hx1 MPx19 MGx10 RBx2 Sx36 STx1
TOTALS	**Cx41 CAx74 CGx207 CUx200 DNx1 Lx106 Hx13 MAx4 MSx45 OCx3 RKx106 SUx2205 Tx396 Peregrine Falconx1**	**Cx6 CAx29 CGx6 DNx6 Lx60 Hx13 JSNx8 MAx105 RKx725 SUx413 Tx2281**	**Bx3 Cx4 Dx4 Hx7 MGx47 MPx139 RBX2 RKx1 SX106 STx1 WRx11**

KEY; BH=Black-headed Gull, C=Carrion Crow, CA=Cormorant, CG=Canada Goose, DN=Dunlin, H=Heron, L=Lapwing, MA=Mallard, MG=Magpie, MP=Meadow Pipit, MS=Mute Swan, OC=Oystercatcher, RB=Reed Bunting, RK=Redshank, S=Skylark, SU=Shelduck, T=Teal, WR=Wren.

10.10.279 The neap tide survey results for the bird species whose numbers satisfy the SPA qualifying criteria are considered below.

Shelduck

10.10.280 Shelduck numbers were variable and generally very low during October 2006 to January 2007 inclusive, with numbers in the range of singles to within the range 15-25 present at times, and exceptionally 36. However larger numbers were present during the two surveys in February 2007, with numbers ranging from less than 10 to as many as 40 or 50+.

Teal

10.10.281 The totals for Teal were high, with total figures for the channel and channel margins being 396 and 2281 respectively, with none on the saltmarsh. The situation was similar to that during the spring tides although some were recorded on the saltmarsh around high spring tides.

10.10.282 Teal numbers were greatest in October and November 2006 with half-hourly counts up to around 50-60+ at low tide and at high tide. During most survey days the numbers present at any particular time were much lower and mainly within the range of 5-25, and sometimes only singles or none.

10.10.283 There was disturbance from hovercraft on 30.10.2006 when 60+ Teal were present before two hovercraft arrived. Most of the birds left the New Bridge corridor during hovercraft activity but almost all the birds had returned by about 1-2 hours after the hovercraft had left the Upper Mersey Estuary.

10.10.284 Immediately prior to the arrival of the hovercraft there were 50+ Lapwing in the middle of the Estuary, 60+ Teal on the channel margins close to Widnes Warth Saltmarsh, 22 Shelduck on the channel margins by the saltmarsh, eight Redshank close to the Teal, one Curlew in the channel and one Peregrine Falcon near the Teal.

10.10.285 The hovercraft left after one and a half hours, at just after 12.00 hours. Approximately an hour later, at 13.00 hours, 26 Teal, 11 Redshank one Curlew and eight Shelduck had returned. After a further half hour, at 13.30 hours, there were 56+ Teal, 11 Redshank, two Curlew and eight Shelduck. Therefore all of the Teal returned as did most of the other species apart from Lapwing which are less dependent of the Estuary.

10.10.286 However at 14.00 hours four Lapwing had returned to feed on the sand and silt close to the saltmarsh margins and by 15.00 hours there were 16 Lapwings feeding close to the Teal and Redshank.

10.10.287 Based on his experience, the ornithologist believed that the disturbed birds were displaced to another part of the Upper Mersey Estuary before returning to their preferred feeding area.

Redshank

10.10.288 Total numbers of Redshank using the channel, channel margins and saltmarsh habitats were 106, 725 and only one respectively. Birds were present during almost all of the daytime surveys and throughout the day.

10.10.289 In October and November 2006 numbers present ranged from 6 to 11 (exceptionally 14) with some movement between the channel and the margins. The only occasions when none was recorded was due to poor visibility. Redshank were present at most times during the 2007 surveys in similar but sometimes lower (1-6) numbers.

Dunlin

10.10.290 Dunlin was recorded in the late December 2006 survey only when a single bird was seen on eight occasions, one feeding in the channel, six feeding on the channel margins, and one on the saltmarsh. The sightings in the channel and margins were probably of the same bird.

Other wildfowl and wading birds

10.10.291 Lapwings used the channel and channel margins only, the total numbers being 132 and 60 respectively. The only birds seen were in low numbers (4-12) in October 2006 and but there was a flock of 130 in January 2007.

10.10.292 200 Curlew used the channel with no observed presence on the margins or on the saltmarsh. The birds were mostly of scattered occurrence in ones or twos but small groups of 7-8 were also seen feeding, these being in all probability the same groups seen at different times of the day.

10.10.293 Also of note were very small numbers of Jack Snipe but their numbers may have been under-recorded.

10.10.294 Cormorant, Canada Goose and Mallard occur in modest to good numbers (50+ to 100+), mostly in the channel but also along the margins although in lower numbers.

Meadow Pipits and Skylarks

10.10.295 Good numbers (100+) of Meadow Pipit and Skylark use the saltmarshes, in similar numbers as seen during the spring tide surveys. Similarly, there was very small numbers of Reed Bunting and a few other passerines, as noted during the spring tide surveys. The low numbers of Reed Bunting are probably an under-estimate of those present because there is more favourable habitat for this species at the eastern ends of the Widnes Warth and Astmoor salt-marshes.

Gulls

10.10.296 Gulls, ranging from singles or low numbers and sometimes large flocks or large numbers (100s to 1,000s) were seen moving upstream and downstream past the Project corridor. The large flocks were moving upstream in the early morning and downstream in the late afternoon and early evening during each of the one day surveys, these movements being daily commuting between feeding sites inland up the Mersey Valley and roosting sites in the European Site.

10.10.297 In addition to the daily commuting of gulls, there were singles, small numbers and moderate numbers of Black-headed Gulls and lesser numbers of other gull species, sometimes in mixed flocks, using the New Bridge corridor of the Upper Mersey Estuary, together with other areas, for feeding, loafing and roosting.

The Possibility of Nocturnal Movements of Birds

10.10.298 Studies of dunlin and consideration of work with other species of waders and wildfowl (Luis & Goss-Custard 2005) suggest that wintering birds find it advantageous to use the same feeding grounds and roost sites repeatedly and consistently over long periods of time. However, it is known (e.g. Burton & Armitage 2005) that some wildfowl and wader species make nocturnal flights to feed at sites that are not used by day, apparently because of human disturbance at the nocturnal feeding site.

10.10.299 There is also evidence that waders may switch from feeding by day at locations where the prey species can be detected using visual clues to feeding at night where the prey species is one that can be detected by probing. Other studies have advanced the opinion that birds may change foraging areas at night to reduce the risks of predation.

10.10.300 Nocturnal surveys to look for movement into or from the Runcorn Sands area were carried out in November 2006, one from the north shore and one from the south shore, in good light conditions from 1 hour after sunset for three hours. No movements were noted. In addition, once a month from September 2006 to February 2007, observations were made at the Runcorn gap from dusk to dawn and apart from gulls no movements other than individual cormorant and heron were noted. While not in themselves conclusive proof that movements do not occur at least occasionally, these results are consistent with the character of the Upper Estuary and the improbability of its use by nocturnal feeding birds.

10.10.301 Levels of human disturbance on the Upper Mersey are very low. There is negligible recreational use of the water space; none was noted during the commissioned counts of the construction corridor. A low level of wildfowling takes places on the Astmoor Saltmarsh but, despite that, pools on the marsh are used by wildfowl of several species, principally teal. Activity around the Fiddler's Ferry lagoons varies for operational reasons but for long periods much of the site is minimally disturbed and holds good numbers of birds as demonstrated by the core counts. Thus there are no grounds to assume that birds are normally excluded from potential feeding areas by day, necessitating nocturnal use.

10.10.302 Studies and reported in Chapter 11 have shown that the inter-tidal zone supports a food resource that is restricted in species composition and abundance. The saltings carry tall grass cover which is poor feeding habitat, though at times areas of standing water do hold moderate numbers of teal. Thus there are no grounds to conclude that there is an important under-utilised food resource in the Upper Estuary which might attract birds to feed at night. Conversely, it is known that golden plover from the Upper Estuary flight inland to farmland to feed at night, returning before first light and it is believed that this flock is separate from the golden plover flock that roosts in the SPA at Frodsham (G. Clarke pers comm.). It is thought that the same applies to lapwings.

10.10.303 Theories related to predator avoidance suggest that birds may move further from land to reduce the risk of predation when feeding at night. Even if the theories are correct, the central part of the intertidal zone in the Upper Estuary is a substantial distance offshore and protected from ground predators such as foxes by the two deep water channels running along its south and north edges which suggest that such activity by predators would be unlikely to cause birds to leave the Upper Estuary to feed in the European Site. Similarly, the European Site has very extensive feeding areas well offshore, again making movement away from that site improbable.

10.10.304 The condition of the saltings in the Upper Estuary makes it improbable that birds would fly to here to roost, as they carry a rank, ungrazed grass cover which is not attractive to roosting wildfowl or waders. They have not been noted to be used at any time in the period since 2002 when monthly counts of the Upper Estuary began except occasionally by small numbers of lapwing which preferentially roost on the Runcorn Sands until forced off by the tide. The only major roost site in the Upper Estuary is at Fiddler's Ferry which is 12 kilometres distant from the nearest feeding area in the European Site at Ince Banks and thus would not be expected to be used in preference to other much nearer sites.

The Possible Use of the Upper Estuary in Hard Weather

10.10.305 As pointed out by the Mersey Estuary Conservation Group (1995), birds have been known to make increased use of the Mersey Estuary in hard winters, with reduced numbers in the east of Britain. Birds may alter their behaviour and their distribution in response to hard weather conditions. As examples, lapwing are very sensitive to ground frost and may undertake rapid movements over long distances when it prevents them from feeding on farmland by killing or driving prey underground.

10.10.306 In general, estuaries are less susceptible to cold due to the ameliorating marine influence of the sea but any sustained drop in temperature reduces the availability of prey and, combined with the direct effects of cold on the birds, necessitates an increase in feeding rates and duration to maintain condition. Often, birds lose condition. Where freezing of the shore occur there may be mortality of species such as redshank.

10.10.307 Because it affects their ability to maintain body temperature and may also impair feeding, birds attempt to avoid exposure to wind. In sustained cold wind conditions they may alter roosting or feeding areas.

10.10.308 Historically, estuaries on the west coast of Britain have tended to enjoy milder conditions than those on the east coast, though this has not been so in the last 25 years and the reduction in wintering numbers of some species in the west has been tentatively attributed to their not moving through from the east of England and mainland Europe (Rehfisch et al. 2004; Austin & Rehfisch 2005).

10.10.309 Throughout the period of this Study there have been no hard weather events that might have caused birds to move from the east to the west not locally from the European Site to the Upper Estuary). There are no records of such local movements between the Middle and Upper Estuary in the past.

10.10.310 Bearing in mind the very poor feeding conditions in the Runcorn Sands area, this part of the Estuary cannot be seen to be a potential emergency feeding site for displaced birds. There is the possibility that under exceptional weather conditions, parts of the Upper Estuary might offer better wind shelter than roost sites in the European Site but as birds must feed, the energetic costs of this move would be questionable. Nonetheless the possibility that birds would flight to the Upper Estuary to roost under exceptional storm conditions cannot be ruled out.

Conclusion on Movements of Birds between the European Site populations and the Upper Estuary Populations

10.10.311 All the evidence available indicates that there are minimal movements of birds, other than gulls, between the European Site and the Upper Estuary, and that the populations of the two sites are separate. Therefore, there are no grounds to predict significant negative effects on the integrity of the European Site as a result of any displacement of birds that may be predicted to result from construction and operation of the proposed New Bridge.

10.10.312 Notwithstanding this conclusion, as very small numbers of birds have been shown to move between the two sites and as numbers of birds might move under exceptional weather conditions, the issue is considered further in the context of the quantified effects of the construction of the New Bridge.

Breeding Bird Surveys of the Saltmarshes

10.10.313 The detailed results of the 2005 breeding bird surveys of the saltmarshes are given in Table 1 of Appendix 10.18. Summary results of breeding birds along the New Bridge corridor (500 metres on either side of the centreline) and for all of the Widnes Warth and Astmoor saltmarshes in the east are given in Table 10.37

Table 10.37 – Results of the Breeding Bird Survey of the Saltmarshes in May 2005.

BREEDING BIRD SURVEY OF THE SALTMARSHES ON 06.05.2005 and on 07.05		
Saltmarsh Area	**500 metres on both sides of centreline of the New Bridge**	**Eastern area of saltmarsh beyond 500 metres from New Bridge**
Widnes Warth Saltmarsh	MPX35 RBX2 RKX1 SX20 WHX1	MPX30 RBx10 RKx1 Sx16 SWx4 WHx1 WWx1
Astmoor Saltmarsh	MPX24 RBX3 SX6	MPx33 RBx6 Sx18
Totals for both saltmarshes	MPX59 RBX5 RKX1 SX26 WHX1	MPx63 RBx16 RKx1 Sx34 WHx1 WWx1

BREEDING BIRD SURVEY OF THE SALTMARSHES ON 23.05.2005		
Saltmarsh Area	**500 metres on both sides of centreline of the New Bridge**	**Eastern area of saltmarsh beyond 500 metres from New Bridge**
Widnes Warth Saltmarsh	MPx44 OCx1 RKx8 Sx22	MPx24 OCx2 Sx14
Astmoor Saltmarsh	MPx16 Sx3	MPx34 RBx2 Sx12 SWx1
Totals for both saltmarshes	MPx60 OCx1 RKx8 Sx25	MPx58 OCx2 RBx2 Sx26 SWx1
KEY; MP=Meadow Pipit, OC=Oystercatcher, RB=Reed Bunting, RK=Redshank, S=Skylark, SW=Sedge Warbler, WH=Whitethroat, WW=Willow Warbler.		

10.10.314 Within the New Bridge corridor Meadow Pipit is the commonest breeding species followed by Skylark; Meadow Pipit numbers were slightly more than twice those of Skylark at the two surveys. The breeding densities of both species are high.

10.10.315 There was no significant difference between the numbers of breeding Meadow Pipits within and outside the Project corridor. Skylark numbers were also variable with no consistent differences.

10.10.316 Breeding Redshank numbers were low. However breeding Redshank pairs are usually widely spaced and disturbance from walkers and occasional shooters may reduce breeding numbers in the otherwise favourable habitat.

10.10.317 Breeding Reed Bunting numbers were very low although they were mostly greater outside the Project corridor, probably due to the presence of wetland vegetation of reeds and associated tall wetland herb vegetation in the eastern parts of both saltmarshes.

10.10.318 The surveys were repeated in April, May and June 2007 to obtain more reliable information. The results are in tables 1 and 2 of Appendix 10.18, and summarised here in Table 10.38.

Table 10.38 - Breeding Bird Surveys of the Saltmarshes in 2007

BREEDING BIRD SURVEY OF THE SALTMARSHES ON 02.04.2007		
Saltmarsh Area	500 metres on both sides of centreline of the New Bridge	Eastern area of saltmarsh beyond 500 metres from New Bridge
Widnes Warth Saltmarsh	MPx27 RBx1 Sx24	Bx2 CCx1 CGx1 Dx5 G GOx1 LIx1 MAx1 MPx32 Rx3 RBx5 RKx2 Sx7 SNx3 STx1 WRx6
Saltmarsh Area	500 metres on both sides of centreline of the New Bridge	Eastern area of saltmarsh beyond 500 metres from New Bridge
Astmoor Saltmarsh	MGx1 MPx13 Rx1 RBx2 RKx1 Sx7 WRx1	CGx1 MGx1 MPx23 RKx1 Sx15 SNx1
Totals for both saltmarshes	MGx1 MPx40 Rx1 RBx3 RKx1 Sx31 WRx1	Bx2 CCx1 CGx2 Dx5 G GOx1 LIx1 MAx1 MPx55 Rx3 RBx5 RKx3 Sx22 SNx4 STx1 WRx6
BREEDING BIRD SURVEY OF THE SALTMARSHES ON 18.05.2007		
Saltmarsh Area	500 metres on either side of centreline of the New Bridge	Eastern area of saltmarsh beyond 500 metres from New Bridge
Widnes Warth Saltmarsh	Bx4 Dx4 MGx6 MPx27 RBx2 RKx2 Sx17 SCx1 WRx4	Bx7 CGx12 Dx5 GOx1 MPx32 Px1 Rx2 RBx7 RKx2 Sx18 SWx5 WHx5 WRx6 WWx1
Astmoor Saltmarsh	MAx1 MPx15 RBx1 RKx2 Sx11	MPx26 MRx1 RBx2 Sx16 SWx2
Totals for both saltmarshes	Bx4 Dx4 Max1 MGx6 MPx42 RBx3 RKx4 Sx28 SCx1 WRx4	Bx7 CGx12 Dx5 GOx1 MPx58 MRx1 Px1 Rx2 RBx9 RKx2 Sx34 SWx7 WHx5 WRx6 WWx1
BREEDING BIRD SURVEY OF THE SALTMARSHES ON 05.06.2007 AND ON 06.06.2007		
Saltmarsh Area	500 metres on either side of centreline of the New Bridge	Eastern area of saltmarsh beyond 500 metres from New Bridge
Widnes Warth Saltmarsh	Lx1 MPx36 RKx4 Sx24	Dx1 LIx1 MPx29 RBx11 Sx10 STx2 SWx4 WHx8
Astmoor Saltmarsh	MPx23 RBx5 RKx1 Sx12	MAx1 MPx31 RBX3 RKx1 Sx13 SWx1
Totals for both saltmarshes	Lx1 MPx59 RBx5 RKx5 Sx36	Dx1 LIx1 Max1 MPx60 RBx14 RKx1 Sx23 STx2 SWx5 WHx8

10.10.319 As recorded in 2005, densities of breeding Meadow Pipit were much greater than Skylark but overall Meadow Pipit densities were rather less than twice those of Skylark. As in 2005, these two species were by far the commonest breeding birds.

10.10.320 There were slightly more Meadow Pipits outside the New Bridge corridor in the east than within the corridor, but slightly fewer Skylarks outside the corridor. The latter difference was small and not considered significant.

10.10.321 The numbers of breeding Reed Bunting and Redshank were low, with no consistent differences between the Project corridor saltmarsh and those outside the corridor in the east, although Reed Bunting numbers appeared to be greater in the east as in 2005, evidently due to the presence of taller wetland vegetation.

Protected Bird Species

10.10.322 During the 2007 bat surveys, a Barn Owl was seen hunting, at dusk, over the grassland between the Manchester Ship Canal and the car park, south of the western area of Astmoor Saltmarsh.

10.11 Baseline and Results: Assessment of the Ecological Value of the Birdlife of the Upper Mersey Estuary

10.11.1 The evaluation of the birdlife of the Upper Mersey Estuary is considered in terms of the birdlife of the estuarine habitats. Consideration is also given to the ornithological importance of the power station lagoons because the site of the lagoons was previously estuarine habitat and in view of the fact that the lagoons are used by many estuarine birds.

10.11.2 The birdlife of the Upper Mersey Estuary includes typical species of estuarine habitats but the populations of the species present are low, partly because of the limited size (area) of the Upper Mersey Estuary and partly because there is an absence of grazed saltmarsh. There are other reasons, relating chiefly to food supply, for the low population sizes of many of the bird species, as will be discussed later.

10.11.3 However the Upper Mersey Estuary does support, or has been used by, many Species of Principal Importance, namely Skylark, Linnet, Yellowhammer, Bullfinch, Reed Bunting, Herring Gull, Black-tailed Godwit, Dunnock, Starling, Song Thrush and Lapwing. However the presence of some of these species is not significant, either because they are of rare occurrence in the Upper Mersey Estuary (Black-tailed Godwit), or because they are relatively common species (Herring Gull, Dunnock, Starling, Song Thrush and Lapwing).

10.11.4 The densities and numbers of breeding Skylark and Reed Bunting are noteworthy but both species occur in numerous habitats nearby, outside the Upper Mersey Estuary, but at lower densities and in lower numbers.

10.11.5 In terms of wading birds, for which estuaries are of major importance, the Upper Mersey Estuary supports or is used by Black-tailed Godwit, Redshank, Common Sandpiper, Snipe, Dunlin, Oystercatcher, Golden Plover, Curlew, Green Sandpiper, Lapwing, Little Stint, Knot, Ringed Plover, Ruff and Sanderling, and rarely others. Some of these species are rare or uncommon visitors to the Upper Mersey Estuary, notably Black-tailed Godwit and Little Stint. Others are of very occasional occurrence in small flocks, for example Green Sandpiper, Knot, Ringed Plover, Ruff and Sanderling.

10.11.6 The situation is similar for waterfowl species. There are modest but not large numbers of Shoveler and Wigeon, and good but not outstanding numbers of Teal and Shelduck. Some typical estuarine waterfowl such as Pintail are of rare occurrence in the Upper Estuary.

10.11.7 Of interest is the occasional use of the Upper Mersey Estuary by rare raptor species, particularly in the winter, namely Hen Harrier, Marsh Harrier and Osprey. The ungrazed saltmarshes with their abundant populations of small mammals and other prey are attractive to raptors such as harriers and owls which can be of frequent occurrence in some winters, but Osprey is of very rare occurrence. The presence of breeding Long-eared Owls on Wigg Island and sightings of Short-eared Owl add to the raptor importance of the site, and Barn Owl has been recorded over Wigg Island in 2007.

10.11.8 Seabirds other than gulls are rare visitors to the Upper Mersey Estuary and this part of the Estuary lacks the large flocks of herbivorous and omnivorous wildfowl and waders that are the major feature of many estuaries.

10.11.9 The birdlife of the Upper Mersey Estuary cannot be said to be outstanding or to be particularly representative of an estuarine habitat in terms of avian species diversity or the population sizes of those bird species whose populations are nationally and internationally significant in the European Site. The Upper Mersey Estuary has attracted little interest from ornithologists in the past and its ornithological interest has been reduced by loss of saltmarsh habitat at Fiddler's

Ferry and by industrial pollution. However it may be argued that it has some degree of enhanced importance because of its relatively urban and industrial setting where bird populations of the type present are uncommon or rare. Further, it is typical of upper estuarine habitat in terms of its hydrodynamics characteristics, notably the meandering channels, erosion of the upper saltmarshes, and the constantly shifting sands and silts.

10.11.10 Whilst the birdlife of the Upper Mersey Estuary is of importance in local (Halton and Cheshire) contexts, and the latter partly because Cheshire is largely an inland county, it is not of significant importance in a national context.

10.11.11 From a regional perspective, the importance of the Upper Mersey Estuary's birdlife is enhanced by the adjacent and estuarine-related sites and habitats, principally the power station lagoons which attract significant numbers of estuarine birds and other seabirds at times. The power station lagoon system also attracts rare visiting birds and has been well-recorded for a long time which is significant in terms of the Ratcliffe criteria (1977).

10.11.12 Although the sizes of the bird populations are limited, the Upper Mersey Estuary and the Power Station Lagoons' system do attract a wide diversity of avian species which include wildfowl and waders, seabirds, raptors, passerines on the saltmarshes, and numerous rare bird species including many Priority Species. From an avian standpoint, the Upper Mersey Estuary is assessed as regionally important in the context of the North-west Region of Merseyside, Cheshire, Lancashire and Greater Manchester.

10.12 Baseline and Results: Survey of Mammals Using the Upper Mersey Estuary and the Surrounding Area

10.12.1 This section of the Chapter deals primarily with protected species (bat species, Water Voles, Otter and Badgers), and secondly with other mammals including Red Fox and voles.

Bat Survey Results

Nocturnal survey of bat commuting and foraging areas in 2005

10.12.2 The summer 2005 nocturnal surveys to investigate bat commuting and feeding areas, during July to September, revealed three species of bat in the general area. Most of the bats detected were Common Pipistrelle with low to modest numbers of Daubenton's Bat associated with the St. Helens Canal, the Bridgewater Canal and the Manchester Ship Canal. The Daubenton's Basts were flying in an easterly direction along the St Helens Canal.

10.12.3 The Pipistrelles were commuting and feeding along the tree and shrub areas, and over the St. Helens Canal, from Spike Island to the Bowers Brook crossing and beyond. The commuting and foraging routes cross the corridor of the proposed New Bridge. There was a low level of foraging along the saltmarsh margins, associated with the tall scrub vegetation.

10.12.4 Single Noctules were detected commuting over the St. Helens Canal and over Wigg Island where there is plenty of foraging habitat associated with the developing woodland and mature scrub. There was some evidence that the course of the disused Runcorn to Latchford Canal is an important bat feeding habitat, which would be expected because of the combination of open water habitat, tall swamp vegetation with associated scrub and developing woodland which can be expected to provide plenty of insect prey.

10.12.5 There was Common Pipistrelle activity along the proposed New Bridge route from the Manchester Ship Canal south to the Bridgewater Canal.

10.12.6 The Pipistrelles are probably roosting in houses and other properties in the surrounding area. It is likely that the Noctules are flying in from well wooded areas.

Ditton Roundabout & North Junction

10.12.7 The buildings along this section are mainly commercial and consist of typical industrial units and maintenance yards. However in the area of Victoria and Ditton Road, to the east, there are properties that have slate and tiled roofs which could be used by crevice-dwelling bats, notably Pipistrelle (*Pipistrellus pipistrellus*). Also, to the north, Ashley Way consists mainly of residential dwellings which will provide typical roost sites for this species. However, high value roost potential within the commercial premises is considered to be low.

10.12.8 The bridges are constructed of concrete with section-decking and, although there are gaps between the sections, they do not appear to progress very far and thus would not be able to support bat numbers that are usually associated with a breeding roost. Depending upon the depth that is available, it is possible that the gaps could be used for hibernation or temporary roosting.

10.12.9 The Project route crosses the St. Helens Canal in this area before the crossing of the Upper Mersey Estuary.

10.12.10 In the vicinity of the roundabout and along Speke Road the habitat is dominated by young to mature trees and shrubs. The trees are mainly linear and follow the line of the carriageway and

will act as a sheltered flyway in conjunction with foraging opportunities. Similar features are present along Ashley Way and Ashley Way West, but are not as dense.

10.12.11 Beyond the north carriageway the landscape becomes more variable in the form of St. Michael's Golf Course which is now closed and where rank vegetation is abundant. Along the western section of Ditton Road, roost potential is low but the waste ground immediately adjacent to the roundabout provides suitable foraging areas.

10.12.12 Obvious tree roost potential was not identified but it should be borne in mind that the presence of foliage can act as a constraint when searching for such features.

Nocturnal Observations

10.12.13 The 2005 surveys revealed Common Pipistrelle (*Pipistrellus pipistrellus*) activity in the vicinity of Ditton Roundabout but their commuting route was not established. This area was re-visited with the following results.

10.12.14 29.8 2007; Weather conditions; dry, slight breeze with full cloud cover. Temperature of 14 Celsius throughout.

Initial Observation Posts located at North and South of the roundabout

10.12.15 A single Common Pipistrelle was noted to approach the roundabout from an easterly direction. One observer moved eastwards which revealed three Common Pipistrelles commuting from the east along Ashley Road West and Ditton Road. Foraging followed in a tree-sheltered area adjacent to a large industrial building and to the south of the roundabout where the feeding success rate was greatest.

10.12.16 A single Common Pipistrelle was recorded foraging along Speke Road carriageway trees, having arrived from a southerly direction. During the remainder of the nocturnal survey period there was no evidence of bats in other areas, and species were Common Pipistrelle.

10.12.17 The 2005 surveys recorded two bat species at the proposed crossing of the St. Helens Canal and, as expected over water, Daubenton's Bat (*Myotis daubentonii*) was one of them and Common Pipistrelle the other. Canals are used regularly by several bats species but Daubenton's Bat relies heavily upon water-courses for foraging and commuting. This area was not re-surveyed as sufficient data had been obtained and the use of the canal by bats is highly predictable.

St Michaels Golf-course

10.12.18 Weather conditions; Dry still with a clear sky. Temperature of 14.5 Celsius throughout

10.12.19 Varied transects over the golf-course commenced with two-way radio communication which detected only minor Common Pipistrelle activity along the tree-lined boundaries, and insect capture rate was low. However, the use of habitats by bats varies over their active season and it is not unusual for areas such as the golf-course to support no bat activity during one month but to be intensively used at other times. To the east of the golf-course there are dense areas of residential dwellings which represent the highest percentage of roost selection by Pipistrelle bats.

Bridgewater Junction & Central Expressway

10.12.20 Buildings in this locality are purpose-built commercial units forming a large industrial estate that caters for a range of small to large businesses. The majority of the buildings are constructed of steel-profiled panels which significantly reduce bat roost potential.

10.12.21 The tree and shrub-lined approach and service roads form regular linear features that appeal to bats as sheltered unrestricted flyways along with the associated invertebrates that gather in the sheltered environs. The buildings extend to the banks of the Manchester Ship Canal where bank side vegetation offers good foraging opportunities.

10.12.22 At the roundabout and along the Central Expressway the vegetation is of a similar type and age to that of all the carriageways within the Runcorn road network and theoretically provides a wealth of feeding places for bats. However the tree species are limited to a great extent which probably reduces the diversity and abundance of invertebrates. Cavities or crevices that could be used as roosts are absent.

10.12.23 The Bridgewater Canal is close to this section and as with most water bodies, it attracts foraging bats and acts as a highly efficient commuting route.

Nocturnal Observations

10.12.24 31.7.2007; Weather conditions; dry, still with 5–10% cloud cover. Temperature; 16-17 Celsius throughout

10.12.25 As revealed by the 2005 observations, sporadic Common Pipistrelle activity was detected along the roadside tree-lines and around the shelter of buildings. The direction from which the bats arrived was south-westerly via Astmoor Road where dispersal took place into the service roads. However numbers were estimated to be no more than ten.

10.12.26 Foraging by the Common Pipistrelle was also recorded along the banks of the Manchester Ship Canal along with Daubenton's Bat, and in a southerly direction the Central Expressway vegetation was used by foraging Common Pipistrelle. Feeding success rate was higher along the canal vegetation which could be due to the variation in the habitat and the presence of aquatic insects.

Silver Jubilee South

10.12.27 There is complex of buildings and road network along the southern approach to the Project Upper Mersey Estuary crossing point, and the area is close to Runcorn town centre. Potential bat habitat is sparse and confined to the area around the Campanile Hotel, a large warehouse and the western extremity of the Bridgewater Canal. Beyond the railway station there are high density residential estates. Roost potential in the immediate buildings is low but towards the town centre and close to the canal there are more opportunities.

10.12.28 Traffic is carried on concrete bridges supported by concrete pillars; these offer no realistic roosting sites. A minor road runs through a subway which connects the town centre and commercial outlets to the housing estates.

Nocturnal Observations

10.12.29 10.7.2007; Weather conditions; Mainly dry, strong breeze with full cloud cover. Temperature 14 Celsius in sheltered areas.

10.12.30 The surveyors took up two observation posts, the first close to the Campanile Hotel and the second close to the canal bridge and nearby buildings.

10.12.31 No emergence pattern was recorded in the vicinity of the surveyors but approximately ten minutes after the anticipated emergence time, and at different locations, each surveyor recorded two Common Pipistrelle bats flying across the main A533 carriageway from a south-westerly direction where there are residential properties.

10.12.32 Despite the strong winds the bats chose to fly over the road rather than use the subway or under the road bridge. Foraging activity then commenced around a small group of trees close to a car park and the area around the hotel, with a relatively high insect capture rate.

Weston Point to Central Expressway

10.12.33 On both expressways similar structured and age-related vegetation is present with large roundabouts at strategic junctions that are planted to shrubs and trees. Buildings, mainly residential, are situated in compartments that are sandwiched between the road networks and are not included in the survey but it is highly probable that the residential buildings have potential for bat roosts. The carriageway vegetation, at times, could be used for foraging and commuting.

Nocturnal Observations

10.12.34 15.8.2007; Weather conditions; Dry, moderate to strong breeze 70% cloud cover. Temperature; 12 Celsius in exposed areas, higher away from main road. Year 2005 observations were not undertaken in this area.

10.12.35 The survey transects followed each side of the carriageways. The roundabouts were monitored by surveyors for bat activity and the routes repeated to cover the peak foraging time i.e. two to three hours after the anticipated emergence time.

10.12.36 Over the survey period sporadic echolocation calls of Common Pipistrelle were recorded, but activity was low in the entire area and from the echolocation calls it was apparent that the feeding success rate was low which would indicate an absence of available prey items.

Weston Point Expressway to M56 Junction 12

10.12.37 This area makes the link to the M56 and is located at the southern edge of the Runcorn Expressway network. Around the Rocksavage Expressway there is a more diverse landscape and tree species which will increase the abundance and variety of invertebrates. There is further favourable foraging habitat at the nearby Weaver Navigation but this is outside the Study Area.

10.12.38 There are residential properties to the east, and to the west there is a mixture of industrial buildings and a small number of residential/farming properties. Bat roost potential at the buildings within the Land Take boundaries is low.

10.12.39 18.7.2007; Weather conditions; dry and still with 40% cloud cover. Temperature; 15 -16 Celsius throughout.

Nocturnal Observations

10.12.40 Two observation posts taken up before dusk were 1) Close to small business estate near to Clifton Lane, and 2) at the slip-road leading to Rocksavage Works at the A557 roundabout. At the slip-road observation post eleven Soprano Pipistrelles (*Pipistrellus pygmaeus*) were commuting from the east across the A557 at the northern side of the roundabout, and foraged at the woodland edge/pasture. One of the residential properties contains the most probable roost. Foraging activity extended west towards the Rocksavage Works along the slip-road.

10.12.41 Transects on both sides of the A557 resulted in continuous echolocation calls but were confined to Common Pipistrelle with high prey capture rates on both sides of the road. Activity was absent at No 1 Observation post.

Wigg Island

10.12.42 The area around Wigg Island is the southern land-fall of the Project before crossing over the Manchester Ship Canal in a southerly direction. The landscape around Wigg Island is variable, with saltmarsh and rank herb vegetation along the banks of the River and inland there is pasture with associated high hedgerow habitat. All of these features represent high biomass for bats in terms of invertebrate prey suitability.

10.12.43 From the daytime assessment, potential for bat roosts is located towards Runcorn Town centre and the residential properties to the south; both are within the flying capabilities of bats that are known to be present in the locality. The Manchester Ship Canal is a high quality foraging area and commuting route which will allow an unrestricted flyway between favoured feeding places and roost sites.

10.12.44 6.09.2007; Weather conditions; Dry, still with full cloud cover. Temperature 15 Celsius throughout.

Nocturnal Observations

10.12.45 Surveys during 2005 recorded Common Pipistrelle, Daubenton's Bat and Noctule (*Nyctalus noctula*).

10.12.46 In 2007 two observation posts, 1) Access road from the Manchester Ship Canal vehicular road bridge, and 2) close to the car parking area, were established; with contact maintained by two-way radios.

10.12.47 Post emergence time up to six Common Pipistrelles arrived from directly across the Manchester Ship Canal from a southerly direction and flew to the area of high hedgerow along the footpath. Observation post (OP) No. 2 recorded bats arriving to coincide with the activity noted at the No. 1 OP.

10.12.48 In addition to Common Pipistrelle, Soprano Pipistrelle was located and the direction of flight was along the Manchester Ship Canal from the west with an estimated number of 5 to 10 bats. There was continuous feeding around the hedgerow and pasture with limited forays on the shoreline; prey capture rate was high. A single Daubenton's Bat was located foraging around the nearby concrete ramp leading in the Manchester Ship Canal.

The Project – Road De-Linking

10.12.49 The de-linking of roads can be positive whereby the level of traffic on the existing roads is reduced or removed completely and thus they become less hostile to bats. Selective habitat can

be created but it can also result in the loss of roost potential when built structures such as buildings and bridges are removed. However, in the areas of de-linking, high value roost potential has not been identified.

Conclusions on Bats

10.12.50 The 2005 and 2007 surveys results provide an indication of bat species along in the locality of the Project route, and show how they are using the landscape and roost potential. However all bat species use habitat features differently at certain times of the year, which will be influenced by invertebrate abundance and densities. Thus where bat activity is found to be low at any given locality during one month, bat activity may change to a higher level at other times of the year and vice versa in response to invertebrate densities and the level of invertebrate activity. To ensure fair results, account has been taken of the type and condition of the vegetation, such as the increasing value of uncut grassland through the summer as populations of flying invertebrate rise, providing more prey.

10.12.51 Four bat species were identified; based on the assessment of environmental conditions those species could be expected to be present. Predictably, Common Pipistrelle represented the most frequently encountered bat species as it is a transient species that has a high dependency upon buildings, particularly residential dwellings where warm, clean crevices occur.

10.12.52 Common Pipistrelle contacts, during the surveys, significantly out-numbered Soprano Pipistrelle contacts; this can be attributed to the lack of preferred habitat for the latter. Noctule and Daubenton's bat were the least recorded but the sample rate of the canals was low.

10.12.53 The two canal systems, the Manchester Ship Canal and the Bridgewater Canal, are an important habitat feature as is the area around Wigg Island, but generally the carriageways have been planted with single tree species which will reduce the diversity and abundance of invertebrates that form the exclusive diet of all U.K. bats. However at the southern end of the Runcorn Road network close to the M56, habitat is more variable.

10.12.54 Throughout all of the study areas, Common Pipistrelle was found, although not in significant numbers. The highest rate of activity was at Wigg Island and along the Rocksavage Expressway.

10.12.55 The frequency that bats were encountered during the surveys depended on several factors, 1) the number of roosts in the survey area and the number of individuals in the roost, and 2) the availability of good quality foraging habitat and the distance to which it extends from a roost.

10.12.56 Where an abundance of habitat is present, the distribution of bats will be greater and the frequency and repetition rate of echolocation calls will be reduced; this can give the impression that bat populations are low. From the results of the nocturnal work it appears that in most of the Study Area, bat distribution is wide and may not necessarily reflect the true bat population. However the results do give an indication of habitat use and the only variable would be the level of use at any of the surveyed locations over different times of the year.

Water Vole Survey Results

The St. Helens Canal and Banks

10.12.57 The surveys of the St. Helens Canal in 2002 detected very localised evidence of Water Vole activity in the western section of the St. Helens Canal, from Spike Island to the Tanhouse Lane bridge. In the eastern part of this section, on the north bank, there was evidence of rat and Water Vole activity as indicated by small mammal holes and trampled vegetation into the water.

10.12.58 In the middle section of the canal, from Tanhouse Lane Bridge to the western end of Fiddler's Ferry Power Station, there was further evidence of Water Vole activity, on the north bank, as shown by the chewed stems of Common Reed and the disappearance of stands of Common Reed due to Water Vole grazing. It was concluded that in this section of the canal the Water Voles were burrowing behind the stone slabs that line the northern bank of the canal.

10.12.59 There was more evidence of Water Vole activity, in 2002, in the eastern section of the canal between the power station and the power station lagoons. Here, Water Voles were detected at the eastern end of the factory fence on the south bank.

10.12.60 The survey of the St. Helens Canal in August 2007 revealed no signs of Water Vole activity during eight hours of intensive searching by wading through the canal, as described earlier in the methodology section. No burrows were detected and there was no evidence of chewed vegetation, latrines, footprints or pathways through vegetation.

10.12.61 The disappearance of Water Voles is not due to the absence of suitable vegetation for foraging because there is still an abundance of plants favoured by Water Voles, namely Common Reed, Branched Bur-reed, Great Willowherb, Hemlock Water-dropwort, Floating Sweet-grass, Reed Canary-grass, Gipsywort, Yellow Iris, Amphibious Bistort and others. Water quality is also very favourable, as was evident and reported by fishermen, and there are very good fish stocks in the canal

10.12.62 A local fisherman has reported that American Mink appeared suddenly and in large numbers, about two years ago, and killed all the Water Voles which were seen regularly by fishermen up to this time. There was also a reported decline in the waterbirds due to Mink, especially Mallard, Mute Swan, Moorhen and Coot. It is well known that the widespread disappearance of Water Voles is largely due to colonisation of Water Vole habitats by American Mink.

The Bridgewater Canal

10.12.63 The June 2007 survey of the Bridgewater Canal detected no evidence of Water Vole activity during an intensive search of seven hours duration. Brown Rat excrement was found at many locations and occasional rat footprints were evident.

10.12.64 The habitat along the Bridgewater Canal is, in vegetation terms, much less favourable for Water Voles compared with the St. Helens Canal. There is no dense emergent vegetation of species such as Common Reed, Yellow Iris, Branched Bur-reed and others that are favoured by grazing Water Voles; instead the bank vegetation is dominated by Bramble. Overall, the habitat conditions are unfavourable.

St. Michael's Golf Course

10.12.65 Unconfirmed evidence of Water Vole activity in 2006 has also been found in St. Michael's Golf Course, now disused.

10.12.66 In 2004 surveys by Jacobs Babtie detected a good population of at least 20 Water Voles in Steward's Brook (Jacobs Babtie, 2004). This was assessed as being a regionally important population because of the scarcity of the species in the region.

10.12.67 The Water Voles were translocated to Moore Nature Reserve near Warrington to allow the brook to be realigned and remediated.

Other Water Vole Habitats

10.12.68 Water Voles have been recorded in Norbury Marsh and the surrounding area. The 2002 surveys detected Water Vole activity in the small ditch along the southern side of horse pasture adjacent to the Manchester Ship Canal (Oxmoor 1). This location was not re-surveyed in 2007 because it is too far from the Project for Water Voles to be affected, if they are still present.

Badger Survey Results

10.12.69 The 2002, 2003 and January 2007 surveys detected no Badger setts or evidence of Badger activity within 500 metres of the Project and within at least 200 metres of the areas affected by the proposed junction and access road improvements.

10.12.70 The land to the north of the Upper Mersey Estuary crossing point is unfavourable for Badgers because of the intensive industrial, commercial and residential use the whole area. This explains the absence of evidence of Badger activity there, including the railway and other limited areas of open land.

10.12.71 The estuarine habitats are unfavourable, the absence of signs of Badger activity being attributed to the water regime and the absence of dry sandy and similar habitats for sett excavation. Although there are steep embankments in places, overlooking the saltmarsh, no evidence of Badger activity was found there. Other limiting factors, restricting Badger access to the area, are the Manchester Ship Canal and the extensive industrial and other development of land on the south side of the Upper Mersey Estuary.

10.12.72 Further surveys, subsequent to the January 2007 Badger surveys, detected no setts or evidence of Badger activity in the areas affected by the road junction improvements.

10.12.73 The nearest active Badger sett to the Project was found approximately two kilometres east of the proposed route alignment.

Otters

10.12.74 There are no records of Otter use of the Upper Mersey Estuary but records held by the Environment Agency for the River Weaver and the Weaver Navigation at Northwich indicate that Otters pass through the Middle Mersey Estuary and move up the River Weaver and the Weaver Navigation to Northwich and beyond.

10.12.75 It is conceivable that Otters reach the Upper Mersey Estuary and pass through to tributaries upstream, particularly in view of the presence of fish in the Upper Mersey Estuary and the improvements in water quality, as has occurred on the River Weaver and Weaver Navigation. Given the continued improvement in water quality and fish stocks, and the continued expansion of the Otter population nationally, it is increasingly likely that Otters will pass through the Upper Mersey Estuary within the next few years, including the period preceding the proposed construction of the Project.

10.12.76 However Otter passage would be extremely difficult or impractical to survey and validate, unless there was active and regular sprainting along the banks or within the minor tributaries of the Upper Mersey Estuary.

Red Fox, Deer and Small Mammals

Red Fox, Deer, Rabbit and Brown Hare

10.12.77 Two Red Fox dens were found within the Fiddler's Ferry Power Station lagoons area. The dens are well-established and have been there since 2002 and probably during previous years. Observations of other pulverised fuel ash tips have revealed Badger setts and Red Fox dens; the dry and friable structure of the ash combined with its other physical properties provide favourable conditions for excavation of stable tunnels by badgers and foxes.

10.12.78 Over five years of survey visits to the lagoons' complex there have been 21 sightings of Red Fox, on some occasions with cubs, and evidence of successful breeding every year. The existence of a large rabbit population provides plenty of prey. To the west of the power station and north of the St. Helens Canal, on and in the vicinity of a large pile of cinders, ash and other waste materials, there was evidence of further Red Fox activity.

10.12.79 There is a Red Fox den on Widnes Warth Saltmarsh, within grassland on the raised bank of the large water channel which discharges into the saltmarsh about one kilometre east of Spike Island. There were also occasional sightings of foxes in the fields to the north of the power station.

10.12.80 Foxes are also common on Wigg Island, with several sightings on the margins of Randle's Island Tip where there is plenty of dense Bramble and woodland cover. Foxes have also been seen on the upper parts of Astmoor Saltmarsh, along the raised margins of the course of the former Runcorn to Latchford Canal. Foxes have been seen hunting on Astmoor Saltmarsh where there are large populations of small mammals.

10.12.81 Further south, to the south of the Manchester Ship Canal and in the Norbury Wood area, one den was discovered together with three sightings of foxes. It is concluded that foxes are of widespread occurrence in the area, in rural, suburban and even urban areas.

10.12.82 There have been no sightings of deer but evidence of deer browsing on young trees has been seen on Wigg Island, in the vicinity of Astmoor Saltmarsh.

10.12.83 Large Rabbit populations occur in the Power Station Lagoon's complex where there are good burrowing habitats on drained pulverised fuel ash deposits and plenty of vegetation for foraging, and good ground cover. Rabbits are also numerous throughout Wigg Island, particularly on the eastern parts in and around Randle's Island Tip.

10.12.84 The upper parts of the saltmarshes on both sides of the Estuary are used by small numbers of Rabbits. They also occur in the Norbury Wood and Oxmoor area.

10.12.85 Brown Hare was never sighted during the surveys; this species appears to be absent from the Study Area, probably because much of the area is suburban and to a significant degree isolated by the Upper Mersey Estuary, canals and other artificial features from the traditional haunts of the species which is the open countryside with large field units and plenty of cover.

Stoat, Weasel, Hedgehog, Grey Squirrel, Mole, Voles and Shrews

10.12.86 There have been occasional sightings of Stoat during the surveys of the Power Station Lagoons' area where the habitat is very favourable due to the absence of disturbance and plenty of rabbit prey. There is suitable habitat for Stoat on Wigg Island and along the banks of the Manchester Ship Canal but none has been seen during the surveys, although the species is probably present. The Stoat is a largely nocturnal species although it is active and occasionally seen in the daytime.

10.12.87 Weasel is likely to be present for the reasons given for Stoat although there were no sightings during the surveys.

10.12.88 There is plenty of suitable habitat for Hedgehog, this being a common species in suburbia as well as in rural and semi-rural areas of the types found in parts of the Study Area, but none was seen during the surveys.

10.12.89 During the surveys Grey Squirrel was seen to be of widespread occurrence where there are stands of woodland, trees and developing plantation woodlands as on Wigg Island.

10.12.90 There is extensive small mammal activity on Astmoor Saltmarsh as indicated by the presence of runs, burrows and chewed vegetation in the upper saltmarsh vegetation. This habitat is very favourable for small mammals, particularly Short-tailed Vole and Common Shrew, because the grassland is ungrazed and therefore tall, very dense and matted, and infrequently inundated except during high spring tides. Widnes Warth Saltmarsh provides similarly favourable habitat over a smaller area.

10.12.91 Other areas of dense and matted grassland, such as parts of Wigg Island and in some of the Local Wildlife Sites such as Haystack Lodge LWS, Norbury Wood and Marsh LWS and LNR, and Oxmoor Wood and Ponds LWS and LNR, contain areas of ungrazed and dense grassland that are used by these small mammals.

10.12.92 Although no detailed surveys have been conducted for small mammals, other than bats and Water Voles, common species such as Short-tailed Vole are of widespread occurrence where suitable habitat is present. Wood Mouse is also likely to occur in many parts of the Study Area where there are fields and hedgerows. This species also frequents gardens.

10.12.93 Brown Rats (*Rattus norvegicus*) have been seen during surveys along the Bridgewater Canal but there are many other suitable habitats for this widespread and common species.

10.12.94 Other small mammal species, namely Pygmy Shrew, Bank Vole, Water Shrew and Mole may occur locally in small numbers.

10.13 Baseline and Results: Surveys of Reptiles and Amphibians

Reptile Surveys

10.13.1 The results of the reptile trapping surveys, using 0.5 X 0.5 metre squares of roofing felt, are set out in the following Table 10.40.

Table 10.40 - Results of the Reptile Surveys.

220 traps set on 29.06.2005				
Date	**Temp ^{o}C**	**Weather**	**Reptiles**	**Amphibians**
11.07.05	25.0	Sunny	0	2 adult Common Toads
18.07.05	16.5	Sunny Intervals	0	2 adult Common Toads
27/07/05	19.5	Sunny intervals	0	1 adult Common Toad
05/08/05	18	Sunny intervals	0	1adult + 1 juv. Common Toad in north, 1 juv. Common Toad on tip, 2 adult + 3 juv Common Toad at Wigg Isl. & canal in north. 1 juv. Common Toad by canal in south.
11/08/05	21	Overcast bright	0	1 juv. Common Toad in north. 1 adult Common Toad on Wigg Island
21/08/05	19	Mainly overcast	0	1Juv. & 1 adult Common Toad in north, 2 Juv Common Toad by Ship Canal, 1 Juv. Common Toad on Wigg Island Reserve
26/08/05	17	Mainly overcast	0	2 Juv. Common Toad on tip, 1 Juv Common Toad by Ship Canal. 1 Juv. Common Toad by Ship Canal Sth, 1 adult & 2 Juv. Common Toad in north.
04/09/05	25	Sunny	0	No amphibians
18/09/05	18	Overcast	0	3 Juv. Common Toad by north saltmarsh area. 2 Juv. Common Toad by Ship Canal, 1 Juv. Smooth Newt by Ship Canal. 1 juv. Common Toad by southern saltmarsh
25/09/05	17	Overcast	0	2 juv. Common Toad by northern saltmarsh 2 juv. Common Toad N of Ship Canal 2 juv. Common Toad S of Ship Canal

10.13.2 No reptiles were trapped, seen or heard moving on the ground during the surveys. Low numbers (10 individuals) of adult Common Toad were recorded under the traps, and good numbers (30 individuals) of juvenile Common Toad. One juvenile Smooth Newt was caught.

10.13.3 Reptiles have never been seen during any of the other ecological surveys of the Project Study Area and there are no known records of reptiles in the areas surveyed.

Great Crested Newt and Amphibian Surveys

10.13.4 The nearest Great Crested Newt (*Triturus cristatus*) population to the Project is at Lodge Plantation LWS which is approximately 1.5 kilometres from the Project. The majority of this site is covered by broadleaf plantation woodland but there are two ponds, one of which is very shallow and devoid of aquatic vegetation. The other pond, north of the woodland, is larger and much deeper and contains emergent vegetation of Bulrush (*Typha latifolia*) and Floating Sweet-grass (*Glyceria fluitans*), the submerged leaves of both plants being used by spawning Great Crested Newts. The pond also supports Great Willowherb (*Epilobium hirsutum*) on parts of the margins; the submerged leaves of this species are also used by spawning Great Crested Newts.

10.13.5 Great Crested Newt breeding was confirmed in 2002 during freshwater invertebrate surveys. A single Great Crested Newt egg was found in the folded leaf of Creeping Bent-grass (*Agrostis stolonifera*) and pond netting detected a single Great Crested Newt larva. Eight small newt larvae were also netted, of Smooth Newt (*Triturus vulgaris*) and/or Palmate Newt (*Triturus helveticus*), probably the former; the young larvae of these two common species cannot be distinguished.

10.13.6 The presence of a rich aquatic fauna in the Lodge Plantation pond, of 60 species which is very high, provides suitable conditions for Great Crested Newt which is carnivorous and dependent on aquatic invertebrate prey. Fish, which are predators of Great Crested Newt larvae, appeared to be absent.

10.13.7 Although Great Crested Newts may disperse up to 500 metres from their breeding ponds, and exceptionally up to a kilometre, the Project is well beyond the these distances. Further, there is intervening development which is an obstruction to amphibian dispersal.

10.13.8 There are ponds in the vicinity of Junction 11a of the M56 and at Rocksavage that appear to be suitable for Great Crested Newts and other amphibians. These ponds were surveyed for Great Crested Newts in late April and May 2007.

Ponds in the vicinity of Junction 11a of the M56

10.13.9 Pond 1, nearby and within the playing field at Grid Ref. SJ 55600 was surveyed by the Council in 2005 but there was no evidence of Great Crested Newts. This pond supports little aquatic vegetation other than a 10% cover of Common Water Starwort (*Callitriche stagnalis*). Mature Alder trees shade about 40% of the water surface. Although conditions do not appear to be very favourable for Great Crested Newts, there is the possibility of their presence.

10.13.10 Pond 2 is adjacent to the M56 at Grid Ref. SJ 555798. There are no records of Great Crested Newts at this pond and no information that any surveys were carried out.

10.13.11 Pond 2 has a 90% cover of locally dominant and very abundant Water Soldier (*Stratiotes aloides*) with locally very abundant Bulrush (10% cover) and frequent Ivy Duckweed (*Lemna trisulca*), locally abundant Water Forget-me-not (*Myosotis scorpioides*), very locally abundant Watercress (*Rorippa nasturtium-aquaticum*) and Rigid Hornwort (*Ceratophyllum demersum*). There is localised shading of a small area of the water's edge by Grey Willow (*Salix cinerea*). This pond was assessed as being suitable for Great Crested Newts.

10.13.12 Pond 3, to the west of Junction 11a, is a small and heavily silted pond which is partly enclosed by willow and sallow scrub with mats of wetland vegetation over deep silt. There is a limited amount of open but shallow water and conditions are adequate but not favourable for amphibians. This pond is in an advanced state of succession and extremely dangerous to survey personnel because the nature and depth of the silt would prevent escape from the pond. Further, there was very limited access to the water's edge, at one location only.

10.13.13 The surveys of Pond 1 for Great Crested Newts, in 2007, revealed no evidence of Great Crested Newt or any other newt species (Table 1 of Appendix 10.19). The only breeding amphibian species were Common Frog and Common Toad, in small to modest numbers.

10.13.14 The absence of Great Crested Newts and other newt species is attributed to the combination of the presence of sticklebacks and the scarcity of aquatic vegetation which affords newt larvae little or no protection from predators, notably fish but also other carnivorous invertebrates which may be present. The pond is also isolated from other known Great Crested Newt populations, which may have prevented colonisation.

10.13.15 Great Crested Newts were also absent from Pond 2 by the M56 but this pond supports Smooth Newts, with a maximum count of 11 adult Smooth Newts (Table 1 of Appendix 10.19). This is just within the medium population size-class (11-100 maximum count). There was no evidence of Palmate Newts but the pond supports modest numbers of breeding Common Frog, as indicated by the larval counts, and a good population of breeding Common Toad.

10.13.16 The presence of sticklebacks make conditions unfavourable for Great Crested Newts but there is an abundance of submerged and emergent aquatic vegetation which will give newt larvae adequate cover and protection from predators which also include Great Diving Beetle, Water Scorpion and the nymphs of dragonflies and damselflies. Isolation of the pond from known Great Crested Newt populations may also have prevented colonisation by this species.

10.13.17 The pond in the west (Pond 3), adjacent to the railway line, presented serious survey limitations due to its deep silt content and extremely restricted access to the water's edge. The limited surveys undertaken, at the most suitable location for amphibians, revealed no evidence of any amphibian species. Despite the survey limitations, it is concluded that Great Crested Newts are absent from Pond 3 due to its unfavourable habitat for breeding newts.

Ponds at Rocksavage

10.13.18 There is a group of ten ponds, at Rocksavage, on the south side of the A557 Weston Point Expressway, between the road and the chemical works. Many of these ponds are artificial and of recent origin, having being constructed as part of a Great Crested Newt mitigation scheme for the development of adjacent land as a power generation and chemical works.

10.13.19 Previous Great Crested Newt surveys of these ponds have been conducted as part of a monitoring scheme but there have been no bottle trapping and population size-class assessments.

10.13.20 The eastern pond (Pond 4) **(**Table 1 of Appendix 10.19) is within a very large hollow with steep slopes and a dense cover of trees, shrubs, Bramble, tall grassland and tall-herb vegetation. Parts of the pond margin are shaded by mature willow, sallow and other scrub.

10.13.21 The pond has dense and wide marginal stands of Reed Sweet-grass (*Glyceria maxima*), Bulrush and small quantities of associated water-margin plants. The large central area is deep open water habitat.

10.13.22 The pond (Table 1 of Appendix 10.19) supports small populations of Great Crested Newt and Smooth Newt, but no Palmate Newts. There were very small numbers of Common Frog tadpoles. Pond 4 appears to be free of fish and conditions are very suitable for breeding Great Crested Newts because of the large area of open water and plenty of terrestrial habitats around the pond and beyond.

10.13.23 Pond 5 (Table 1 of Appendix 10.19) is a much smaller pond but of similar size to typical Great Crested Newt breeding ponds (100-300 square metres in area). This pond also supports a small Great Crested Newt population but the Smooth Newt population is just into the medium (good) sized population size-class, with a maximum count of 13 Smooth Newts. This pond was created as a mitigation pond to replace a colony affected by development.

10.13.24 There is a small population of breeding Common Frog and no fish, conditions being very favourable for Great Crested Newts due to the combination of open water habitat with rich submerged, floating-leaved and emergent aquatic vegetation. This pond is also a new Great Crested Newt mitigation pond.

10.13.25 Pond 6 supports small populations of Great Crested Newts and Smooth Newts but no other amphibian species and no fish. It is also of recent construction.

10.13.26 Pond 7 is an extremely small mitigation pond with very small populations of both Great Crested Newts and Smooth Newts but with no other amphibians and no fish.

10.13.27 Pond 8 is the third pond of the small and compact group of four mitigation ponds; like the others it supports very small populations of Great Crested Newt and Smooth Newt.

10.13.28 Pond 9 is the fourth pond of the small group of four ponds. It also contains a very small population of Great Crested Newt and a small Smooth Newt population.

10.13.29 Pond 10 is a large and pre-existing pond in a large hollow. It is colonised by dense and tall Bulrush, Reed Canary-grass and associated wetland including aquatic plants, with standing water amongst the vegetation but no large areas of open water habitat.

10.13.30 Pond 10 contains small breeding populations of Great Crested Newt and Smooth Newt but there was no evidence of other amphibians or fish apart from small numbers of Common Frog tadpoles.

Assessment of the Ecological Importance of the Great Crested Newt Populations

10.13.31 There are no Great Crested Newts or important assemblages of amphibians in the vicinity of Junction 11a.

10.13.32 At Rocksavage, however, the situation is unusual in that there is a group of ten ponds, two of which are old ponds but eight of which are of recent construction, and all contain breeding Great Crested Newts. All the populations are small ones.

10.13.33 However the Rocksavage ponds are sufficiently close together for the populations to be part of a single population, known as a meta-population, with interchange of newts between the ponds. Therefore the Great Crested Newt population size-class assessment should be based on summing the counts for all the ponds on each date, as in the following Table 10.40a.

Table 10.40a - Results of the Great Crested Newt Surveys at Rocksavage

Date of survey	Total counts for all the ponds	
	Great Crested Newt	Smooth Newt
11 May 2007	19	24
16 May 2007	12	11
15 May 2007	20	25
31 May 2007	8	6
1 June 2007	25	10
2 June 2007	14	9
NOTE; Small (low) population = 1-10 newts, medium (good) population = 11-100 newts, large (exceptional) population = 101+ newts.		

10.13.34 The above figures show a maximum count for Great Crested Newts of 25 on 1st June 2007. There was the same maximum count of 25 for Smooth Newts on 15th May 2007. Both figures indicate good (medium) population size-class populations based on Natural England's published criteria.

10.13.35 It is possible that the populations are expanding following the mitigation scheme because the pond habitats are very favourable in terms of size, aquatic vegetation and absence of fish. Further there is plenty of good quality terrestrial habitat in the surrounding area including artificial hibernacula that were constructed as part of the mitigation scheme.

10.13.36 Also of note is the fact that there is an assemblage of amphibian species, namely medium populations of Great Crested Newt and Smooth Newt and the presence of a small population of Common Frog (*Rana temporaria*). However this is not an outstanding population because two of the three common amphibian species, Palmate Newt and Common Toad (*Bufo bufo*), are absent.

10.13.37 In the wider area, to the north of the Rocksavage ponds and north of the Weston Point Expressway, are three Great Crested Newt ponds in the golf course but they are a considerable distance from the proposed junction improvements.

Amphibians on Wigg Island

10.13.38 During the reptile surveys of Wigg Island and the areas north of the Upper Mersey Estuary, low numbers of Common Toads including juveniles were recorded under reptile refugia in the vicinity of the wetland on Wigg Island (adjacent to the saltmarsh) and near the St. Helens Canal. The only suitable breeding habitats are the wetland on Wigg Island (the former Runcorn to Latchford Canal section) and the disused St. Helens Canal. Although the former is brackish, Common Toads are able to breed successfully in slightly saline waters.

10.13.39 The only other amphibian species detected during the reptile trapping was a single Smooth Newt near the bank of the Manchester Ship Canal. This may have originated from less brackish or freshwater parts of the Wigg Island wetland, or from a more distant site in the east. The Manchester Ship Canal is totally unsuitable for breeding amphibians.

Conclusions on Reptiles and Associated Amphibians

10.13.40 Although reptiles are usually difficult to detect, especially when low numbers are present, the combination of the absence of records, the failure of trapping and searching to detect their presence, and the isolation of the habitats from the open countryside by major waterways and developed land, indicate that reptiles are absent.

10.13.41 Common Toad has been listed as a Species of Principal Importance in the recent JNCC 2006 Review of the UK lists of Priority Species. Smooth Newt is a Species of Conservation Concern. The brackish water habitat along the former Runcorn to Latchford Canal is concluded to be the breeding site for Common Toad and possibly Smooth Newt.

10.14 Baseline and Results: Baseline Survey of Invertebrates

Butterflies and Moths

10.14.1 Butterflies and moths are very mobile insects and many species such as Red Admiral and Peacock may move considerable distances of up to one kilometre or more whereas some species such as Purple Hairstreak are restricted to colonies breeding in specific patches or small areas of habitat, which is woodland for the Purple Hairstreak.

10.14.2 The following Table 10.40b shows the numbers of species recorded in each area surveyed in 2002 within or close to the Project or sufficiently close for significant movement of species to occur between the sites and the Project route. The habitats within the Power Station Lagoons site are omitted from the table because of the distance of the lagoons from the Project; the inclusion of the lagoons in relation to fauna being applicable for birds only, because of their high mobility and the fact that the lagoons are known to be used by estuarine birds.

Table 10.40b - Summary Table of the Numbers of Butterflies Recorded in Each Site or Habitat in 2002.

Site	Number of species recorded	Total number of butterflies	Most abundant butterfly species (*)
Disused St. Helens Canal	14	304	Large White (100)
Wigg Island and Astmoor Saltmarsh	12	767	Gatekeeper (220)
Astmoor Estate	9	606	Gatekeeper(140)
Banks of Ship Canal	9	1078	Gatekeeper (220)
Widnes Warth Saltmarsh	6	22	Gatekeeper (20)
Spike Island	3	664	Large White (15)
(*) = maximum number recorded on one occasion			

10.14.3 Seventeen species of butterfly were recorded throughout the survey in 2002.

10.14.4 In 1999 the Cheshire and Peak District Branch of Butterfly Conservation recorded 19 species of butterfly but this survey covered a much wider area. All the species recorded in 2002 were previously recorded in 1999 with the exception of Painted Lady that was recorded at Widnes Warth Saltmarsh in August 2002. The additional three species recorded in 1999 include Purple Hairstreak, Large Skipper and Holly Blue.

10.14.5 At Astmoor Saltmarsh and swamp five species were recorded in 1999 including Small Skipper, Meadow Brown, Gatekeeper, Small White and Large Skipper, the last of which was not recorded in 2002.

10.14.6 On Spike Island seven species were recorded in 1999 including Small Skipper, Meadow Brown, Gatekeeper, Speckled Wood, Large White, Green-veined White and Small Tortoiseshell. Of note is that Purple Hairstreak was recorded at Norton Priory Wood in 1999.

10.14.7 The 2002 results (Table 10.40b) shows that the banks of the St. Helens Canal support the

largest number of butterfly species (14) and the most frequently recorded is the Large White. It is difficult to assess each area and make comparisons because the areas are of different sizes and incorporate a range of habitats suitable for different butterfly species.

10.14.8 Table 10.40c3 shows the species of butterfly recorded throughout the surveys, with indications of the frequency or abundance. Most of these species have low butterfly conservation status.

Table 10.40c - Butterfly Species Recorded Along and in the Vicinity of the Project in 2002.

Butterfly species	Abundance/occurrence
Gatekeeper	Very abundant
Meadow Brown	Abundant
Large White	Very frequent
Common Blue	Frequent
Small Skipper	Frequent
Speckled Wood	Frequent
Small White	Frequent
Peacock	Occasional
Small Tortoiseshell	Occasional
Green-veined White	Occasional
Red Admiral	Very occasional
Comma	Very occasional
Orange Tip	Very occasional
Wall	Very occasional
Brimstone	Rare
Painted Lady	Rare
Small Copper	Rare

10.14.9 The Wall and Small Copper butterflies have no Priority Species status but both are scarce and declining nationally; sites with good colonies of these species are uncommon. Brimstone is of localised occurrence in the north of England.

10.14.10 Wigg Island is the most favourable habitat for butterflies, with 12 species recorded and recent records of well-established Purple Hairstreak and White-letter Hairstreak colonies. Purple Hairstreak is uncommon in the North-west England but is under-recorded. White-letter is very scarce or rare in the north-west and is now listed as a Priority Species in the recent JNCC review.

10.14.11 There is good habitat on Wigg Island for breeding common species including Meadow Brown, Gatekeeper, Speckled Wood, Large Skipper, Small Skipper and Common Blue.

10.14.12 The Manchester Ship Canal Bank LWS and sections of the canal bank beyond are also good for breeding butterflies, notably those found on Wigg Island with the exception of the two hairstreak species.

10.14.13 Four common and day-flying moth species were noted throughout the surveys, namely Cinnabar, Emerald, 6-spotted Burnet and Yellow Underwing. Wigg Island is suitable for hawkmoths and Puss Moth.

Dragonflies and Damselflies

10.14.14 Like the butterflies, the dragonflies and damselflies are highly mobile and some species, particularly the larger dragonflies, will fly considerable distances from their aquatic breeding sites to hunt over terrestrial habitats.

10.14.15 The most important habitats for dragonflies and damselflies are the Wigg Island wetlands, the St. Helens Canal and the banks of the Manchester Ship Canal. These sites all support the most abundant species, namely Common Darter, Common Blue Damselfly and Blue-tailed Damselfly. The Emperor Dragonfly has been recorded breeding in ponds in the wider area. The first three species are of very common occurrence in the north of England but the Emperor Dragonfly, although widespread in southern England, is less common in the north although its range and occurrence appear to be increasing in the north.

Saltmarsh Invertebrates

10.14.16 The results of the saltmarsh invertebrate surveys are presented in the report of July 2005 by Mr Don Stenhouse entitled Terrestrial Invertebrates of Saltmarsh at Spike Island, Widnes, and Wigg Island, Runcorn (Appendix 10.21). The results are summarised in Table 10.40d.

Table 10.40d - Table of Saltmarsh Invertebrate Species Recorded in July 2005.

Order, Class, Family etc	Number of species
Coleoptera (beetles)	
Weevils	1species
Soldier beetles	3 species
Ground beetles	25 species
Ladybirds	6 species
Mould beetles	10 species
Weevils	2 species
Water beetles	4 species
Rove beetles	17 species
Diptera (flies)	
True flies	5 species
Flesh flies	3 species
Dung flies	2 species
Soldier flies	2 species
Hoverflies	4 species
Clegs and others	2 species
Hemiptera (bugs)	
True bugs and plant bugs	6 species
Shield bugs	1 species
Lace bugs	1 species
Plant bugs	1 species
Hymenoptera (bees, wasps, ants & sawflies)	
Bees	5 species
Ants	1 species

Order, Class, Family etc	Number of species
Sawflies	1 species
Lepidoptera (butterflies & moths)	22 species
Mecoptera (scorpion flies)	1 species
Odonata (dragonflies/damselflies)	3 species
Amphipoda (shrimps)	1 species
Araneae (spiders)	14 species
Isopoda (woodlice)	1 species
Mollusca (molluscs)	2 species

10.14.17 The appended report states that approximately 130 invertebrate species were identified. The Coleoptera (beetles) formed the largest group, with at least 67 species from 16 families. The Diptera (flies) and Lepidoptera (butterflies and moths) are less well represented, with 16 species from 5 families and 22 species from 11 families respectively. There were 14 species of Arachneae (spiders) from 5 families, but no protected or rare species.

10.14.18 Very few of the Coleoptera species identified are restricted to saltmarsh. Several of the Carabidae (ground beetles) and Staphylinidae (rove beetles) are usually found in marshy areas, but they are not restricted to coastal marshes; they are not fastidious 'halobionts' (species that depend on a saline environment).

10.14.19 Only one beetle listed in the table of the appended report is a true saltmarsh species, namely *Dicheirotrichus gustavii*. This occurs in very large numbers at local *emergent* saltmarsh at West Kirby, Heswall and elsewhere, and is only found on the muddy shore at Runcorn and Widnes. A few others species, *Bembidion minimum, B.aeneum, B.maritimum, Thinobaena vestita* are often found on the shore, particularly the first and last species, although not exclusively so.

10.14.20 Similarly, the Diptera listed are not exclusively saltmarsh species. Only larger flies were identified and of these several families are represented in the appended list by single species only. The Syrphidae (hoverflies) are much better represented and were particularly targeted because they were very noticeable, and there are good keys for identification – although generally they are good indicators this was not thought to be as relevant here as it would be for other habitats such as woodland.

10.14.21 The species listed fall into two main groups – they either have larvae that are 'aphidophagus' (eat aphids) – that is the tribes *Syrphini & Bachini* (Milesiinae), or larvae that live in decaying vegetation, organically enriched mud, *Typha* (Bulrush) etc – the tribe *Eristalini* (Syrphinae).

10.14.22 Behind the Wigg Island (Astmoor) saltmarsh is the defunct Runcorn to Latchford Canal which is stagnant and exhibits all the features attractive to the Eristalini. It is very likely that a large number of the hoverflies seen feeding on flowers on the Wigg Island marsh breed in or near the canal. However, although there is also a canal behind the Spike Island (Widnes Warth) saltmarsh, most of the hoverflies recorded are aphidophagous.

10.14.23 Many more hoverflies were seen and recorded from the Wigg Island site, but there are almost certainly other species that had been missed. None of the species is restricted to saltmarsh.

10.14.24 The situation for the Lepidoptera (butterflies and moths) is slightly different. The 'macro' Lepidoptera, such as Peacock, occurs in a variety of situations well away from saltmarsh. The 'micro' Lepidoptera records include species that are linked more to coastal plants, in particular to Sea Aster. Although there are a few new 10 Km x 10Km records, none of the species is scarce.

10.14.25 In the conclusions to the appended report it is indicated that the results have confirmed that invertebrate species diversity is low. This should also be evaluated in the knowledge that most of the invertebrates identified are generalists and are not restricted to saltmarsh habitats.

Pools at Astmoor Saltmarsh

10.14.26 An aquatic invertebrate survey of the main gully on the landward side of Astmoor Saltmarsh, in 2002, revealed a typical assemblage of saltmarsh species. These included the shrimp Palaemonetes varians, a hopping crustacean Orchestia sp. and the isopod *Sphaeroma rugicauda*.

10.14.27 The shrimp *Gammarus duebenii* was also present; this inhabits brackish water and is found in the lower reaches of rivers such as the Mersey and Weaver. The tiny scavenger beetle *Ochthebius dilatatus* was abundant; this species is scarce in Cheshire, where the few records from inland ponds may refer to strays from the saltmarsh.

10.14.28 The larger scavenger beetle *Laccobius biguttatus* which was also found appears to be rare in the region but it may also have a distribution centred on saltmarsh. The Notable B scavenger beetle *Cercyon tristis* is thinly distributed across the region but shows a particular association with brackish sites. The Glass Blenny, a saltmarsh fish, was also netted.

10.14.29 No protected species, listed species or Species of Principal Importance were found.

10.15 Baseline and Results: Overall Ecological Importance of the Upper Mersey Estuary, the Project Corridor, and the Surrounding Area

10.15.1 An overall evaluation of the ecological importance of wildlife sites, wildlife habitats and wild species is considered here to provide a basis for the assessment of effects.

10.15.2 The Upper Mersey Estuary is assessed as a natural part of the entire Mersey Estuary which represents a single ecosystem. As part of a single ecosystem, the Upper Mersey Estuary is continuous in many respects with the Middle Mersey Estuary and the Outer Mersey Estuary, and with the River corridor upstream, including that beyond the tidal limit.

10.15.3 It is inappropriate to conduct a separate assessment of the section of the Estuary crossed by the Project in isolation to an assessment of the remainder and larger part of the Estuary, because this will ignore any functional relationships between the different parts of the Estuary, such as the movements of birds between feeding, roosting and breeding areas which may be in different parts of the Estuary. Therefore functional relationships may be of significant importance to this assessment. Nevertheless, there is clear-cut evidence that the Upper Mersey Estuary is significantly different from the much larger part of the Estuary in certain physical, biological and functional terms.

10.15.4 The Project corridor to the north and south of the Upper Mersey Estuary cannot be assessed as part of a single ecological unit because it crosses much more than a single ecosystem. The corridor contains numerous sites which contain different and in some cases isolated habitats, many of which exhibit few or no ecological inter-relationships, and are not inter-dependant as in the cases of, for example, saltmarsh and inter-tidal sand and mudflats.

10.15.5 This evaluation considers sites of significant or substantive importance, of or equivalent to Local Wildlife Site status, along the non-estuarine sections of the Project on an individual basis. However attention is also drawn to other important features or species because protected species occur in many places outside nationally and locally designated sites.

10.15.6 The surrounding area is assessed insofar as it may contain features used by important species described in the SSSI/SPA citation, or may have some functional relationship with the Estuary.

Overall Evaluation of the Upper Mersey Estuary

Evaluation Based on Habitats of Principal Importance and Annex I Habitats

10.15.7 Regardless of species, the presence in the Upper Mersey Estuary of four habitats of Principal Importance included in the revised UK List of Priority Habitats, namely coastal saltmarsh, intertidal mudflats, subtidal sands and gravels, and tide-swept channels, gives the Upper Mersey Estuary significant and substantive importance, at least in county (Merseyside and Cheshire) contexts. These habitats are all representative examples of UK BAP habitats.

10.15.8 There are also good reasons to include reedbed as a BAP habitat in the Upper Mersey Estuary because this habitat does occur in some types of saltmarsh vegetation and there are significant areas of this habitat in the eastern part of Widnes Warth Saltmarsh, in Cuerdley Marsh, and in brackish areas along the southern margins of the Upper Mersey Estuary.

10.15.9 Also of note is the recent inclusion of rivers in the revised UK List of Priority Habitats. The inclusion of rivers is qualified by the statement "Further work by specialists is required to develop guidelines for the identification of river reaches which will be priorities for UK BAP action". In the case of the course of the River through the Upper Mersey Estuary, such reasons might be the rapidly and constantly changing course of the river due to the prevailing hydrodynamic conditions, the fact that the river is part of an ecosystem of which the major part is protected by four international conservation designations, and because the protection of the upper and intertidal section of the river is fundamental to the maintenance of favourable conservation status of the Middle Mersey Estuary.

Value of Receptors Based on the Ratcliffe Criteria

10.15.10 The application of the Ratcliffe (1977) criteria to the evaluation of the Upper Mersey Estuary is considered here. The Ratcliffe criteria are long-established and apply to current evaluation methodologies. The IEEM guidelines are broadly in line with the Ratcliffe criteria and the two methods are consistent in their application.

10.15.11 The application of the Ratcliffe criteria to site evaluation has been facilitated by the publication of the National Vegetation Classification (NVC) which covers all types of semi-natural vegetation in Britain, and also applies to plant colonisation and vegetation establishment on industrial habitats.

10.15.12 The Ratcliffe criteria are size, diversity, naturalness, rarity, fragility, typicalness, recorded history, position in an ecological/geographical unit, potential value and intrinsic appeal. The NVC is particularly valuable in the assessment of naturalness and typicalness of those habitats that can be assessed in terms of their vegetation, good examples being saltmarsh habitats and swamp vegetation. However the NVC is also applicable to the use of other Ratcliffe criteria, notably rarity, fragility and potential value.

10.15.13 In terms of size (extent), Ratcliffe refers to the size of a habitat as related to a large population or the density of an important species. The baseline ornithological surveys have shown that there are relatively very low numbers of birds in the Upper Mersey Estuary compared with those in the European Site of the Middle Estuary. The reasons for this and the possibility that the numbers of birds may change will be considered later but based on existing information the Upper Mersey Estuary is not highly rated in terms of size. A low size rating is justified whereas the Middle Estuary has a high rating.

10.15.14 There is a good diversity of Habitats of Principal Importance in the Upper Mersey Estuary, as explained earlier. However there is not the full range of maritime habitats that would be expected to be present in a large estuary. Habitats that are absent include coastal grazing marsh, sand dunes, estuarine rocky habitats and shingle. However there is high bird diversity although mostly in low numbers. Nevertheless a moderate diversity rating is appropriate.

10.15.15 Despite previous industrial modifications to the Upper Mersey Estuary and the previously extremely poor water quality of the river due to past industrial pollution, the Upper Mersey Estuary still exhibits many natural features, most notably the large areas of saltmarsh and the meandering river channels. The Upper Mersey Estuary scores moderate in terms of naturalness.

10.15.16 The Upper Mersey Estuary is mostly colonised by relatively common species of gull, wildfowl, waders and other birds. However it has attracted rare or very occasional visitors, namely Osprey, Marsh Harrier and Hen Harrier. However there are no rare habitats. A low rating for rarity is appropriate.

10.15.17 The fragility criterion must be considered against the background of an extremely dynamic ecosystem which exhibits large water erosion features, with constant changes in the extent of the habitats present, particularly the saltmarshes and sandbanks. However there is no clear-cut or strong evidence from the Hydrodynamic Assessment that the Upper Mersey Estuary is highly fragile and sensitive to change from its existing dynamic state. Further, the species which inhabit the Upper Mersey Estuary are not highly sensitive to environmental change because they are extremely mobile and well-adapted to changing environments. The Upper Mersey Estuary cannot be considered to be highly fragile although there is inherent fragility of the saltmarsh to erosion which could occur in response to pollution and effects of change on the extent of meandering of the river channels. Overall, the Upper Mersey Estuary is concluded to have moderate fragility. However some parts have high fragility and some have low fragility.

10.15.18 There is conclusive evidence that the Upper Mersey Estuary is a good and representative example of an upper estuarine habitat, as demonstrated by its high level of hydrodynamic activity, significant saltmarsh erosion, and the relatively species-poor and poorly developed aquatic invertebrate communities. This part of the Estuary rates high in terms of typicalness.

10.15.19 Although the Upper Mersey Estuary has attracted less interest from naturalists than the Middle Estuary, largely because of its relatively poor bird populations, it has a good recorded history. For example the Upper Mersey Estuary is covered in *The Halton Bird Report* , and is unusual in that part of the Upper Mersey Estuary has been surveyed daily for very many years by a local ornithologist. It is also described in *The Estuary; Naturally Ours* (The Estuary Conservation Group 1995). However it has not commanded the same level of interest and recording as the Middle Estuary. The Upper Mersey Estuary rating is moderate for recorded history.

10.15.20 Another Ratcliffe criterion is “position in an ecological/geographical unit”. Ratcliffe states that contiguity of one site with a highly rated example of another formation confers higher quality. The Upper Mersey Estuary is an extension of the Middle Mersey Estuary and is part of the same ecosystem. The saltmarsh and other intertidal habitats are similar in both parts of the Estuary except the saltmarshes in the Middle Mersey Estuary are grazed and the other intertidal habitats of the Middle Mersey Estuary contain much higher densities of invertebrates, having suffered less pollution due to dilution downstream with seawater.

10.15.21 It is also pointed by Ratcliffe that this criterion is related to size and diversity. The Upper Mersey Estuary clearly increases the size of the designated site as a habitat for birds. However the baseline surveys indicate that the Upper Mersey Estuary bird populations of different species are separate populations from those of the Middle Mersey Estuary. The Middle Estuary, by virtue of its extent, habitat diversity and bird diversity clearly justifies a high value but the Upper Mersey Estuary is much smaller and physical forces are dominant which restrict its biodiversity value.

10.15.22 Ratcliffe also mentions that there is a practical convenience in having two different key sites within a single geographical area.

10.15.23 As will be shown later, the limited invertebrate fauna of the Upper Mersey Estuary is a constraint on the bird populations. If the bird populations of the European Site are unable to obtain additional feeding and other resources in the Upper Mersey Estuary, little benefit is conferred by habitat continuity with the Middle Estuary. Therefore contiguity in this case does not confer higher quality, but a moderate contiguity rating, although the situation may change in the event of increases in water quality and significant accretion of saltmarsh.

10.15.24 It may be considered that the Upper Mersey Estuary has potential value for habitat enhancement as a result in improvements in water quality and the continued reduction in the levels of contamination of the sediments. Whilst water quality is likely to improve, it does not

follow that the sediments will be capable of supporting a more species-rich and denser invertebrate fauna because the dominant factor is hydrodynamic activity which prevents the establishment of a rich and dense invertebrate fauna on the shifting sediments. The Upper Mersey Estuary, in terms of potential value, scores low.

10.15.25 Intrinsic appeal relates to human interest in the wildlife of the Upper Mersey Estuary. Birds are the principal feature of interest but bird importance is much less than that of the Middle Mersey Estuary. However the Upper Mersey Estuary has enhanced value because it is a wide open space within a generally built-up area; it contains saltmarsh which is rich in breeding birds, notably Skylark and Meadow Pipit which are uncommon in urban areas, and it is relatively accessible, at least from a visibility standpoint. The Upper Mersey Estuary has moderate intrinsic appeal.

10.15.26 Taking all the Ratcliffe criteria into account, the evaluation of the Upper Mersey Estuary is summarised in the following Table 10.40e. A similar evaluation of the Middle Estuary European Site is included in Table 10.40e for comparative purposes.

Table 10.40e - Evaluation of the Upper Mersey Estuary Using the Ratcliffe (1977) Criteria.

Ratcliffe criteria	Evaluation = high (3), moderate (2), low (1)	
	Upper Mersey Estuary (LWS)	**Middle Estuary (European Site)**
Size	Low (1)	High (3)
Diversity	Moderate (2)	High (3)
Naturalness	Moderate (2)	High (3)
Rarity	Low (1)	High (3)
Fragility	Moderate (2)	High (3)
Typicalness	High (3)	High (3)
Recorded history	Moderate (2)	High (3)
Position in an ecological/ geographical unit	Moderate (2)	High (3)
Potential	Low (1)	Moderate (2)
Intrinsic appeal	Moderate (2)	High (3)
Overall evaluation	**Moderate (1.8)**	**High (2.9)**

10.15.27 Overall, the evaluation is moderate.

Evaluation based on Counts of Wildfowl and Wading Birds

10.15.28 The ornithological surveys of the entire Upper Mersey Estuary and the more detailed surveys of the Project route corridor, presented earlier in this Assessment, show that relatively low numbers of wading birds and wildfowl use the river channel and the associated sand and silt-flats for feeding and roosting. The numbers of birds using the Upper Mersey Estuary are particularly low compared with those of the European Site in the Middle Estuary.

10.15.29 The observed low numbers of birds in the Upper Mersey Estuary are particularly significant in terms of those wildfowl and waders whose numbers satisfy the SPA qualifying criteria, namely

Redshank, Shelduck, Teal, Pintail, Golden Plover, Dunlin and Black-tailed Godwit. Pintail and Black-tailed rarely visit the Upper Mersey Estuary, and probably only visit during exceptionally stormy or cold weather conditions. Dunlin numbers are always very low.

10.15.30 The following Table 10.40f gives the WeBS Low Tide Winter Count data for the whole of the Upper Mersey Estuary, extending from the Runcorn Gap to Penketh, the latter being about two kilometres upstream of the Power Station lagoons where the River and the St. Helens Canal are adjacent. For comparison, the SPA qualifying counts are given in the table.

Table 10.40f - Evaluation of the Upper Mersey Estuary Using the Webs Low Tide Winter Count Data for the Upper Mersey Estuary.

Bird species	WeBS Low Tide Winter Counts						
	1996-1997		1997-1998		1998-1999		SPA qualifying count
	Count	% of SPA count	Count	% of SPA count	Count	% of SPA count	
Shelduck	54	0.8%	54	0.8%	47	0.7%	6746
Teal	221	1.9%	321	2.7%	53	0.5%	11723
Pintail	0	0	0	0	0	0	1169
Golden Plover	71	2.3%	64	2.1%	222	7.3%	3040
Dunlin	10	0.02%	0	0	0	0	48789
Black-tailed Godwit	0	0	0	0	0	0	976
Redshank	14	0.3%	9	0.2%	10	0.2%	4993
All species	370	0.5%	448	0.6%	332	0.4%	77436
NOTE; Redshank numbers are based on winter counts only; no counts of passage birds							

10.15.31 The above figures show that the counts for every species, for every one of the three years, range from 0% to 7% of the SPA qualifying count for those species.

10.15.32 The figures do not include counts for the Power Station lagoons or the area of the Project. The fortnightly and monthly surveys for the Project assessment revealed that the lagoons are used by significant numbers of some of the qualifying species, particularly Golden Plover.

Conclusions on Birds

10.15.33 It is possible that the Golden Plovers recorded in the Power Station lagoons during the monthly surveys in 2002 were feeding in the European Site and moving to the lagoons for roosting. However Golden Plovers are known to roost at various locations in the Middle Estuary. Further, there was no evidence during recent surveys of bird movements, as part of the present assessment, of Golden Plover movements between the European Site and the Upper Mersey Estuary, unless they are using flyways which do not pass in the vicinity of the Runcorn Gap.

10.15.34 Other SPA qualifying wildfowl and waders that were recorded in low numbers or not at all during the WeBS Low Tide winter counts could have been missed because they were using the Power Station lagoons. The following Table 10.40g compares the total numbers of each species during the 2002-2003 surveys that were recorded in the Power Station lagoons compared with the other Upper Mersey Estuary habitats (saltmarsh, river channel and other intertidal habitats).

Table 10.40g - Comparison of SPA Qualifying Wildfowl and Waders Using The Power Station Lagoons and Upper Mersey Estuary Habitats.

Bird species	Total counts in 2002-2003		Maximum count in 2002-2003
	Power Station lagoons	Upper Mersey Estuary saltmarsh and other intertidal habitats	
Shelduck	234	483	130
Teal	336	6160	642
Pintail	2	1	2
Golden Plover	2490	3180	1500
Dunlin	201	772	220
Black-tailed Godwit	0	1	1
Redshank	48	222	36
All species	3311	10819	N/A
NOTE; The total counts are the totals of all the monthly counts for the year.			

10.15.35 The above figures show that whereas the inter-tidal habitats are preferred by wildfowl and waders to the Power Station lagoons, there are significant numbers of birds of some species, particularly Shelduck, Golden Plover and Dunlin, which use the lagoons. Around 50% of the Shelduck counted throughout the year were in the lagoons. Two of the three Pintail sightings were also in the lagoons.

Evaluation Based on Bird Feeding Value of the Habitats in the Upper Mersey Estuary

10.15.36 The bird feeding value of the Upper Mersey Estuary is likely to be the principal factor governing the numbers of wintering and passage wildfowl and waders, as well as breeding birds, which use it. It is extremely unlikely that birds will commute from the European Site to use the Upper Mersey Estuary for roosting because there is plenty of roosting habitat in the European Site. Birds are also most unlikely to commute to the Upper Mersey Estuary for feeding, unless there is a large quantity or density of available prey there, because there is an abundant food supply for both herbivorous and omnivorous wildfowl and waders in the European Site.

10.15.37 Further, the surveys show no evidence of significant wildfowl and wader movements upstream and downstream between the Upper and Middle Mersey estuaries. They appear to be separate populations. The situation contrasts strongly with that of gull behaviour where there is daily commuting in extremely large numbers, with the gulls commuting to refuse tip feeding sites inland and well beyond the Upper Mersey Estuary.

10.15.38 Relevant information on the feeding requirements of wildfowl, wader and gull species that use the Estuary is given in Appendix 10.21. This is considered in the light of the aquatic invertebrate survey and fish information presented in the Aquatic Ecology Chapter (Chapter 11.0) by APEM Ltd., and the botanical information obtained during the terrestrial ecology surveys and presented in this Chapter.

10.15.39 Consideration is given, firstly, to the feeding requirements of the wildfowl and wading species whose numbers satisfy the SPA qualifying counts, as summarised in the following Table 10.40h.

Table 10.40h - The Feeding Requirements of Wildfowl and Waders whose Numbers Satisfy the SPA Qualifying Counts.

Bird species	Feeding type	Vertebrates	Invertebrates	Plants
Shelduck	Omnivore	Fish	Molluscs (*Hydrobia etc*, insect larvae, annelid worms, crustaceans	Sea Club-rush, various seeds
Teal	Omnivore	None of significance	Molluscs, flies, caddis fly larvae, water beetles, crustaceans, annelids, shrimps and chironomids.	Seeds of aquatics such as sedges, bulrushes, pondweeds, buttercups, docks. Also Sea Aster and other maritime plants
Pintail	Omnivore	None of significance	Mainly insects, esp. water beetles, Diptera, caddis fly & dragonfly larvae, grasshoppers. Molluscs, *Hydrobia*, annelids, oligochaetes, crustaceans etc.	Chiefly seeds, tubers, rhizomes of pondweeds, sedges, docks, Bistort, grasses and others, including saltmarsh plants.
Golden Plover	Omnivore	None of Significance	Chiefly beetles & earthworms. larvae, pupae & adults of moths, sand fly larvae, crane flies, horseflies. shield-bugs, froghoppers, ants, dragonflies, earwigs, spiders, millipedes. Snails, marine molluscs infrequently (*Hydrobia, Myrilus, Tellina*) and crustaceans.	Berries, seeds, grasses etc
Dunlin	Carnivore	Small fish	Chiefly insects, dipteran flies (esp. Chironomidae), beetles, planktonic crustaceans. On coast chiefly intertidal invertebrates, amphipods, polychaete worms, esp. *Nereis*, also *Hediste, Scoloplos*, *Arenicola*. Gastropod snails & bivalves (*Hydrobia*, *Littorina, Macoma*).	None
Black-tailed Godwit	Omnivore	Occasionally fish eggs, frog-spawn & tadpoles	Wide range of invertebrates. Mostly insects, esp. beetles, annelid worms (*Arenicola* etc), molluscs. Insects & larvae, beetles, Dipteran flies, grasshoppers, dragonflies, water-bugs,	Seeds *Polygonum*, *Ranunculus*, sedges etc.

Bird species	Feeding type	Vertebrates	Invertebrates	Plants
			mayflies, butterfly larvae. Molluscs inc. earthworms, ragworms *Nereis*, crustaceans, Spiders	
Redshank	Carnivore	None of significance	Mainly crustaceans, molluscs (bivalves, gastropods), polychaete worms (*Nereis*). Shrimps, worms, crustaceans. Large variety of other prey.	None

10.15.40 It follows from the above table and the bird diet information in Appendix 10.21 that the macrofaunal species, particularly the Annelida (true worms), mollusca (snails and mussels) and the larger crustaceans are of principal and key importance for all the birds, whether they be omnivorous or carnivorous. However seeds of maritime and wetland plants are also important to some species, particularly Teal and Pintail.

Species and Densities of Invertebrates in the Upper Estuary and Comparisons with those of the European Site

Species and Densities of Invertebrates in The Upper Mersey Estuary

10.15.41 In the Aquatic Ecology Chapter (Chapter 11.0) surveys the macrofauna were taken as species retained by a 500 micron mesh sieve and which live on or within sediments (epifauna and infauna respectively). These species, because of their size and food value, are the most important prey for the wildfowl and waders.

10.15.42 The following Table 10.40i summarises the results of the Aquatic Ecology Chapter (Chapter 11.0) invertebrate surveys and shows which prey species in the preceding table occur in the Upper Mersey Estuary.

Table 10.40i - Details of the Wildfowl and Wader Invertebrate Prey that Occur in the Upper Mersey Estuary.

Phylum	Species, genus, taxa, family, order, class, common name)
Annelida (true worms)	Tubificadae, Tubificoides spp. Oligochaetae, Nereidae, Naididae, *Nereis diversicolor* (polychaete worm), *Limnododrilus hoffmeisteri*, *Eteone longa* (Bristle Worm)
Crustacea	*Neomysis integer* (shrimp), *Crangon crangon (*Common Shrimp*)*, Chironomidae, *Asellus aquaticus* (Water Louse - isopod), Coryophidae (amphipod), Calanoida (Copeopod), *Bathyporeia pilosa*, *Gammarus zaddachi*, *Corophium volutator*, *Cyathura carinata* (isopod), Colembola (springtail), *Balanus improvisus* (barnacle), *Semibalanus balanoides* (barnacle), *Palemons elegans*, Cladocera, Cyclopoid, *Corophium volutator*, *Corophium arenarium*, *Corophium multisetosum* (shrimp), *Corophium* sp. Sphaeroma rugicauda (Sea Slater), *Carcinus maenus* (Shore Crab), *Bathyporeia pilosa*, Nymphon sp. (Sea Spider), Harpacticoida
Mollusca	*Mytilus edulis* (Common Mussel), *Malcoma balt*hica (Baltic Mussel), *Hydrobia ulvae* (a snail)

Phylum	Species, genus, taxa, family, order, class, common name)
Gastropoda	*Skena serpuloides*, Hydrobilidae, *Planorbis albus (*Ram's Horn Snail*)*
Others including freshwater species	Isotomidae (springtails), Pericoma (moth fly), Nematocera, Chironomidae (midges), Stratiomylidae, Oribactei, Staphyliinidae, Muscidae, Diptera (true flies), Scatopsidae, Chaoboridae (Phantom midges), Erpobdella sp. (freshwater leech), Dolicopodae (true fly larva), Psychodidae (true fly larva), Orbatei (mites).

10.15.43 The preceding Table 10.40i shows that there is a good range of invertebrate prey species for the important bird species, including annelida (true worms), crustaceans and molluscs. There is also plenty of plant seed, particularly of Sea Club-rush, the favoured food for Shelduck. An important prey species, *Nereis diversicolor* (Ragworm) is more abundant in the lower (downstream) zone of the Upper Mersey Estuary, and the zone in the European Site, than in the upstream zone in Upper Estuary. The Upper Mersey Estuary also contains 20 different fish species, compared with 40 species recorded in the whole of the Estuary.

10.15.44 However it is not the number of species present which determine the value of the food resource in the Upper Mersey Estuary for wildfowl and waders. It is the density (population size) and availability of the species required as prey. Fish densities reported in the Aquatic Ecology Chapter (Chapter 11.0) by APEM Ltd were 4.4 fish per 100 square metres in Zone 1 (downstream zone), 16.83 in Zone 2 and 77.08 in Zone 3. These densities are very low and, as pointed out in the APEM report, most were juveniles. Further, few fish were recorded by APEM in the saltmarsh scrapes.

10.15.45 The low numbers of fish can be attributed to the high hydrodynamic activity within the Upper Mersey Estuary which limits the density of fish prey species, but as indicated in the APEM Aquatic Ecology Chapter (Chapter 11.0), the situation is complex because numerous factors can affect the distribution, species-richness and abundance of fish prey. It is pointed out, however, that estuaries in general are characterised by relatively few fish species, and it is typical of estuarine fish assemblages that most fish species occur in very low numbers.

10.15.46 Turning to invertebrates, the Aquatic Ecology surveys revealed that the meiofauna (invertebrates living on or within sediments of size range 63 to 500 microns) were mostly nematoda (round worms) and small oligochaeta worms. The abundance of meiofauna was considerably higher than that of the macrofauna but the biomass of the meiofauna was far lower, largely because of the large numbers of foramanifera in the meiofauna.

10.15.47 The Aquatic Ecology survey findings were that the abundance of invertebrates in individual samples of the intertidal macrofaunal samples was generally low and many samples contained no organisms. The figures for abundance of macrofauna per square metre for zones 1, 2 and 3 (from 2004 to 2007 inclusive) were 87.0, 0.0 and 0.0 respectively. The figures on an annual basis were 0.0, 43.0, 87.0 and 87.0 for 2004, 2005, 2006 and 2007 respectively.

10.15.48 The corresponding figures for the Project tower sites were all 0.00. The Aquatic Ecology Chapter (Chapter 11) points out that no invertebrates were collected in many samples from Tower 1 and Tower 3 during the surveys from 2004 to 2007. It is also stated in the Aquatic Ecology Chapter (Chapter 11.0) report that meiofaunal abundance, like macrofaunal abundance, was lower at the Tower sites compared with other intertidal sites in the Upper Mersey Estuary.

10.15.49 The discussion of the baseline data in the Aquatic Ecology Chapter 11 points out that the estuarine fauna collected was sparse, although there did appear to be a greater abundance of infauna in the intertidal zones. The sublittoral samples were dominated by small motile crustacea and amphipods.

10.15.50 In discussing macrofaunal abundance in the Upper Mersey Estuary, it is explained that the fast-flowing currents, shifting sands, salinity pressures and pollution stress combine to limit the macrofauna to highly tolerant and species-poor communities.

10.15.51 Attention is also drawn in the Aquatic Ecology Chapter 11 to the patchy distribution of macroinvertebrates. The dominant taxon was reported to be the Oligochaeta although *Nereis diversicolor* (polychaete worm, Common Ragworm) was present at a number of sites. Attention is also drawn to the difficulty for invertebrates to persist in the Upper Mersey Estuary because of the fast currents and considerable movement of sediments in the Upper Mersey Estuary, with consequent topographical changes over time as observed in the Aquatic Ecology studies and in the terrestrial ecology and bird surveys. It is very difficult for invertebrates to persist in particular areas.

10.15.52 Also of relevance is the conclusion in the Aquatic Ecology Chapter (Chapter 11.0) that the scouring, reworking and shifting of sediments results in fine sandy muds which suit the polychaetes and smaller meiofauna, but it is a less suitable substratum for bivalves and gastropods.

10.15.53 With reference to previous pollution of the Estuary, the Aquatic Ecology Chapter 11 points out that there has been a significant increase in macrofauna diversity in the Upper Mersey Estuary in recent years. Species diversity was formerly very low and only the oligochaetes and a limited number of other pollution-tolerant species could exist. However it is pointed out that invertebrate recovery is most noticeable in the European Site downstream where the number of invertebrate species has increased more than in the Upper Mersey Estuary. Further, the European Site is a more stable and more saline estuarine environment, allowing greater numbers and densities of macrofauna to exist.

10.15.54 In addition to the dominance of Oligochaeta and Common Ragworm (*Nereis diversicolor*) in the macrofauna, the Aquatic Ecology survey results show that *Neomysis integer* (shrimp) and *Crangon crangon* (Common Shrimp) were the commonest species. Attention was also drawn to the large numbers of meiofauna, with nematodes being particularly widespread and they were often the only group present.

Species and Densities of Invertebrates in the European Site

10.15.55 A study of waterfowl diet on the Mersey Estuary was undertaken in 1990/91 (Rehfisch et al 1991). Direct comparisons of the data on bird densities with invertebrate numbers showed that the birds fed mostly in areas with most potential prey, as would be expected. Cockles *Cerastoderma edule*, the Baltic tellin *Macoma baltica*, the shrimp *Corophium volutator*, the polychaete ragworm *Hediste diversicolor* and oligochaete worms were all important food resources, one or more of which were utilised by shelduck, teal, dunlin and redshank.

10.15.56 The findings of the surveys were considered to be wholly consistent with the physical conditions in the upper estuary. Studies for the project have shown that the estuarine substrate consists mainly of fine sand that is constantly reworked and subject to great extremes of tide, salinity and water quality. The influence of the Narrows at the entrance to the Mersey and the Runcorn Gap is to cause a short tidal flood period and a considerably longer ebb. The natural channels through the upper estuary meander in a highly unpredictable manner and rework the top few metres of silt and sand in a continuous process. Regardless of any other influences that may operate, this would of itself greatly restrict the development of a diverse infauna capable of supporting a large population of bird species by preventing settlement and development of shellfish beds and populations of the larger annelids such as *Arenicola* and *Hediste*. This process also effects negatively the formation and persistence of drainage channels across the flats; these features are recognised as providing particularly favourable feeding sites for wader species (Lourenço et al 2005).

Food Resources in the Upper Estuary

10.15.57 The preceding considerations of the invertebrate survey findings provide good reasons for the very low numbers of wildfowl and wading birds using the Upper Mersey Estuary, compared with the very high numbers using the European Site in the Middle Estuary. To summarise, the combination of the low densities of the macrofauna, their patchy distribution and the large numbers of very small invertebrates, make it difficult for the birds to find sufficient prey. There are no rich feeding grounds with high densities of macrofauna which would be needed to support large flocks of wildfowl and waders, in the size range that would meet the SPA qualifying criteria.

Description of the Prey of Birds Recorded in the Upper Estuary which are present in SPA qualifying Numbers in the European Site

Shelduck

10.15.58 Shelduck is one of the commonest birds in the Upper Mersey Estuary, based in the surveys carried out for this assessment and the WeBS data. Shelduck feed on invertebrates dwelling on or near to the surface of the substrate in the intertidal zone. Small molluscs are usually the main prey, with the laver spire-snail *Hydrobia ulvae* a principal resource at many sites. The principal prey species include Annelid worms and the larger crustacea, namely *Neomysis* and *Crangon* shrimps; these species are the commonest macro-invertebrates in the Upper Mersey Estuary. Shelduck also feeds on Sea Club-rush and other plant seeds (Cramp & Simmonds 1977). Fish may be taken. There appears to be no great shortage of prey herbaceous food for Shelduck but the birds will have to move about the Upper Mersey Estuary to get it because of its patchy distribution. The ornithological survey results are consistent with this explanation.

Teal

10.15.59 Teal are also relatively common in the Upper Mersey Estuary, particularly in the upper reaches. Like Shelduck, Teal have the advantage of being omnivorous and their prey is annelid worms and larger crustacea which are the commonest macrofauna present. Prey includes oligochaete worms such as tubifex, the shrimp *Corophium volutator* and many *mollusca* species, these species being taken from the surface of the substrate or dabbled from the superficial layer of soft mud.

10.15.60 Teal may be disadvantaged to some extent because they do not take fish. However, as shown in the table of feeding requirements, they feed on the seeds of many saltmarsh plants such as Sea Aster and also on seeds of buttercups, Bulrush and many other plant species including grasses which were recorded in the botanical surveys of the saltmarshes and adjacent wetland areas of the Upper Mersey Estuary. Teal also feed extensively in freshwater habitats and may flight away from an estuary at night to inland sites where their winter diet will include invertebrates but consist mainly of seeds of wetland plants.

Pintail

10.15.61 Pintail is also omnivorous and feeds on many of the species favoured by Shelduck and Teal. It feeds chiefly in shallow waters. *Hydrobia ulvae* is an important prey and other small molluscs and oligochaetes living on or close to the surface of the substrate are eaten. Where available, seeds of saltmarsh plants including *Salicornia* and *Suaeda* are also taken as are the leaves of *Zostera* and other plants. From a feeding standpoint, it is difficult to explain the virtual absence of Pintail in the Upper Mersey Estuary although it has visited on rare occasions. However Pintail is essentially an estuarine bird and is normally found in the middle and lower areas of large estuaries where there is a much stronger maritime influence on the intertidal habitats.

Golden Plover

10.15.62 Golden plover feed by picking invertebrate prey from the ground surface or probing to a depth of 1-2 cms where there are visual clues. They do not feed in water. Although Golden Plovers feed on a wide range of invertebrates, they feed only infrequently on marine invertebrates species, namely the marine molluscs *Hydrobia*, *Myrilus* and *Tellina*. The Aquatic Ecology surveys have shown that these molluscs are not abundant in the Upper Mersey Estuary and flocks of Golden Plover would be short of prey. Many golden plover winter on farmland, both tillage and pastures being exploited for earthworms, slugs, beetles, spiders and other invertebrate species (Cramp et al 1983). The Upper Mersey Estuary is unattractive to the species as a feeding area. The commonest macrofauna of the Upper Mersey Estuary and the associated saltmarsh plants have little value for wintering or passage Golden Plover flocks.

Dunlin

10.15.63 Dunlin is a carnivorous species so the vegetation of the Upper Mersey Estuary is of no value for feeding. The invertebrate prey is largely intertidal invertebrates, chiefly polychaete worms, especially *Nereis* which is of common although patchy occurrence in the Upper Mersey Estuary, and various gastropods and bivalve snails but they are less common than the annelid worms and larger crustacea.

10.15.64 Although Dunlin may take small fish, which are available in the Upper Mersey Estuary, they are not significant in the diet. Dunlin, being carnivorous, cannot take advantage of the seeds and herbage of saltmarsh and other plants which fringe the Upper Estuary. Dunlin feed by sight and touch, taking polychaete worms such as *Hediste*, amphipods such as *Corophium* and *Bathyporeia* and molluscs including *Hydrobia*, *Littorina* and *Macoma* (Cramp et al 1983). Typically, feeding birds follow the falling tide to exploit areas where the surface is still moist and prey is present on or close to the surface. They then distribute themselves across the exposed area, again tending to concentrate more where the surface remains moist than on well-drained banks.

10.15.65 The Upper Mersey Estuary is not ideal for wintering and passage Dunlin because its prey, although they are present, are of patchy distribution and relatively low in numbers. The European Site is clearly the preferred habitat. Another factor is the unfavourable topography of the Upper Mersey Estuary for Dunlin which prefers wide areas of very gently sloping intertidal mudflat where the birds can take prey from the surface. The instability of the intertidal sandbanks and strong erosion forces make the habitat unattractive to feeding Dunlin. However there are suitable areas locally and sufficient prey to account for the modest numbers of Dunlin recorded in the monthly and other surveys.

Black-tailed Godwit

10.15.66 Black-tailed Godwit is another omnivorous wader. It favours annelid worms such as *Arenicola marina*, molluscs and the larger crustaceans but it feeds on a large range of invertebrate species in the intertidal zone. *Lanice* is probably a major resource (Cramp et al 1983). However it also takes plant material including seeds, especially in the winter.

10.15.67 There would appear to be an adequate food supply in the Upper Mersey Estuary to support small numbers of Black-tailed Godwit but its occurrence has been shown, by the surveys in recent years for this assessment, to be rare. The probable explanation is that this godwit prefers to feed in deeper waters and its chief woods are *Arenicola marina* (Lugworm) and *Nereis* (Ragworm). The topography of the Upper Mersey Estuary and its hydrodynamic characteristics combined with the patchy occurrence of *Nereis* do not provide the preferred type of feeding habitat, as occurs, for example, on the coast of the Outer Ribble Estuary. Further, Lugworm is absent from the Upper Mersey Estuary and the daily reported food intake of 86 kcal per day of *Nereis* is unlikely to be achieved for more than the occasional visiting bird.

Redshank

10.15.68 Redshank is carnivorous so it does not have the advantage of most other species of taking plant foods in the Estuary. A further disadvantage is that it does not eat fish.

10.15.69 Redshank feeds mainly on crustaceans, molluscs, polychaete worms (*Nereis*), small crabs and shrimps which are the most abundant invertebrates in the Upper Mersey Estuary. It is also very adaptable in that it takes a wide range of other invertebrate prey including molluscs and various crustaceans. *Corophium volutator* is an important prey species. It can feed on adjacent non-maritime land where it takes earthworms, Tipulid larvae and other prey.

10.15.70 The availability of the required prey in the Upper Mersey Estuary and nearby accounts for the moderate numbers of birds recorded in the monthly surveys in recent years, and the modest numbers of breeding Redshank.

Requirements of non-qualifying species

10.15.71 Four non-qualifying species which occur frequently in the Upper Estuary need consideration; they are Canada goose, mallard, lapwing and curlew.

10.15.72 Canada geese feed primarily on plant material, mostly by grazing grasses and cereal crops on farmland. Mallard are omnivores, feeding mainly in shallow waters up to 0.3 metre deep and principally on freshwater, but the intertidal zone is also exploited.

10.15.73 Lapwing feed on invertebrates including earthworms, beetles, spiders and molluscs picked from the surface of the ground or by shallow probing; most of the population occurs on farmland though significant numbers do use estuaries. Curlew also feed on invertebrates but are able to exploit a much wider range of prey species on inter-tidal flats, in shallow waters and on rocky shores as well as, to a minor degree, agricultural pastures.

10.15.74 The lack of some food resources and the scarcity of others is an obvious explanation of the low numbers of birds utilising the intertidal zone of the Upper Estuary and for the virtual absence of pintail, golden plover and black-tailed godwits as well as many other wader species.

Overall Evaluation of the Project Corridor Outside the Upper Mersey Estuary

The St. Helens Canal Local Wildlife Site

10.15.75 Although the baseline assessment has revealed that the St. Helens Canal is no longer colonised by Water Voles, the original habitat and semi-natural vegetation features remain and their natural development is continuing.

10.15.76 The recently revised *UK List of Priority Habitats* (Habitats of Principal Importance) has confirmed Eutrophic Standing Waters as a UK BAP habitat, and has also confirmed reedbeds, both of which are well represented in and along the canal. Further, although the hedgerow adjacent to the canal towpath is neither ancient nor species-rich, it qualifies similarly as a UK BAP habitat because all hedgerows are included in the revised list, without qualification.

10.15.77 The canal continues to qualify as a Local Wildlife Site and is of both borough (Halton) and County (Cheshire and Merseyside) importance.

The Manchester Ship Canal Bank Local Wildlife Site

10.15.78 The Manchester Ship Canal Bank, designated as LWS, falls into the revised Habitat of Principal Importance category as “open mosaic habitat on previously developed land”. Further, this assessment has drawn attention to additional interests of butterflies as well as orchids and other vegetation interests.

10.15.79 Reference to Figure 10.21 indicates that the Manchester Ship Canal Bank qualifies as this type of mosaic, which in this case is enhanced by the orchid and other botanical interests.

10.15.80 Further considerations which give this site enhanced value are its potential for further colonisation, its urban and industrial location, and its contiguity with several other important wildlife sites including Wigg Island LNR as well as the Upper Mersey Estuary and, in the east, Haystack Lodge LWS, Norbury Marsh LWS and LNR, and Oxmoor Wood and Ponds LWS and LNR.

10.15.81 The presence of such a large number of wildlife sites within one area is unusual, particularly when account is taken of the LWSs on the north side of the Upper Mersey Estuary, namely the St. Helens Canal and the power station lagoons. The Manchester Ship Canal Bank adds to the very significant biodiversity of the whole area of the Upper Mersey Estuary and its surroundings, in terms of habitats, plant communities, and species of flora and fauna.

10.15.82 The Manchester Ship Canal Bank is therefore a key element of a much larger area of biodiversity and nature conservation value which should be protected to avoid fragmentation and reduction in the overall and special interest of the whole area. For these reasons it has substantive value in a county context.

Overall Evaluation of the Surrounding Area

10.15.83 As indicated above and earlier, the Upper Mersey Estuary and its surroundings encompass a wide range of habitats including numerous examples of Habitats of Principal Importance, Species of Principal Importance, Annex I habitats and Annex II species.

10.15.84 For example, the Upper Mersey Estuary contains four Habitats of Principal Importance comprising saltmarsh, intertidal mudflats, river habitat and tide-swept channels. The immediately surrounding area contains even more Habitats of Principal Importance, notably eutrophic standing waters, hedgerows, reedbeds and wet woodland.

10.15.85 The area as a whole supports a large number of Species of Principal Importance as would be expected from such a wide range of important habitat diversity. These include mammals, birds, amphibians and fish.

10.15.86 Further, the area is contiguous geographically with the European Site. Although this assessment has shown that there is little or no movement of many of the important bird species between the Upper Mersey Estuary and the European Site, this does not detract from the intrinsic value of the Upper Mersey Estuary and its environs, which may of course change favourably due to the effects of several influences including improvements in water quality, increased fish stocks, local nature conservation initiatives involving habitat protection, enhancement and management initiatives promoted by the Council, and the natural colonisation of previously polluted and disturbed areas by species such as Otter and aquatic invertebrates. In addition, designation critera for sites of national importance may change with time.

10.15.87 It is not for this assessment to conduct a critical evaluation of the area as a whole, in terms of existing and future nature conservation designation criteria, because the current assessment relates to a specific development along a defined corridor, although there may of course be cumulative effects to be considered.

10.15.88 The evaluation of the baseline survey information available is consistent with the local designations that apply to the Upper Mersey Estuary and its surroundings. However it is pointed out that the collective importance of the locally designated sites and other areas has not been fully assessed, but it is clearly substantive, and is likely to be greater than is reflected by the sum of the average or individual values of the different locally designated sites.

10.16 Baseline and Results: Baseline Projection

10.16.1 The baseline projection gives primary consideration to the Upper Mersey Estuary because it is part of an extensive estuarine ecosystem, the majority of which is of national and international importance.

10.16.2 Attention is also focussed on the Upper Mersey Estuary because it is the most ecologically important natural area crossed by the New Bridge.

10.16.3 The Upper Mersey Estuary consists of three major habitat features, namely the saltmarshes, the sand and silt-flats including the sandbanks, and the river channels. These features are of importance chiefly as habitats for wild birds, notably wildfowl and waders.

10.16.4 The baseline projection covers a period of 10 to 30 years which is equivalent to the sum of the planning, construction, operation and reasonable maintenance periods for the New Bridge. The projection assumes “do nothing”, i.e. there will be no Project for the foreseeable future and the existing SJB will continue to be used by traffic and maintained for that purpose. Further, there will be delinking and no junction improvements that depend on the implementation of the Project.

10.16.5 A baseline projection is also made for the St. Helens Canal LWS and the Manchester Ship Canal Bank LWS because these are sites of substantial biological importance and both are crossed by the Project and have the potential to be significantly affected by the Project.

10.16.6 There is no baseline projection for the European Site in the Middle Estuary because it is assumed that the designated site will be largely unchanged during the next 10 to 30 years because this part of the Estuary is affected by a lower level of hydrodynamic activity than the Upper Estuary and has a high level of statutory protection against any adverse changes.

The Upper Mersey Estuary

The Saltmarshes

10.16.7 The studies of the hydrodynamics of the Upper Mersey Estuary (Hydrodynamics and Estuarine Processes, Chapter 7.0) have shown that between 1906 and 1997 the positions of the Riverbanks and its channels have varied significantly. Upstream of Fiddler’s Ferry there is a single channel but the river channel splits into two between Fiddler’s Ferry Power Station lagoons and Wigg Island. One channel is close to the northern bank of the Upper Mersey Estuary and the other is close to the southern bank.

10.16.8 Both channels exhibit significant and often rapid lateral movements. For example between 1967 and 1972 both channels have moved laterally by up to 300 metres. The Hydrodynamics and Estuarine Processes investigation (Chapter 7.0) has concluded that channel movements will continue to exist and that lateral migration is likely to continue to be most pronounced upstream of Wigg Island. Whilst a north and south channel is the most likely future morphology, there have been times when one or other has disappeared for a period.

10.16.9 Further evidence from the hydrodynamics studies is that the saltmarsh has been retreating over the last 50 years, with a general loss of saltmarsh from 1945 to at least 2000. Figures reported show a maximum net loss of 2.05 metres/year with a net gain in some areas of 0.34 to 2.31 metres/year.

10.16.10 The net loss figures given for Widnes Warth Saltmarsh are 0.23 to 0.51 metre/year and the corresponding figures for Astmoor Saltmarsh are 0.67 to 2.05 metres/year. In terms of area of

saltmarsh loss, the following figures are given, in Table 10.41.

Table 10.41 - Saltmarsh Losses in the Upper Mersey Estuary from 1945 to 1991.

Year	Astmoor Saltmarsh	Widnes Warth and Cuerdley Saltmarshes	Comments
1945	58.1 hectares	127.1 hectares	
1951	58.1 hectares	136.0 hectares	
1959	59.2 hectares	129.5 hectares	
1966	59.3 hectares	106.3 hectares	Power Station construction on Curdle Marsh
1975	54.6 hectares	92.8 hectares	Power Station construction
1979	52.8 hectares	N/A	Power Station completion
1983	55.1 hectares	55.7 hectares	Power Station present
1991	52.7 hectares	55.2 hectares	Power Station present

10.16.11 The preceding figures show that the loss of Astmoor Saltmarsh habitat was 5.4 hectares, a decline of 9.3%, giving an average loss of about 0.2% per year. However the loss was 7.9% between 1966 and 1975 and there was an apparent increase in saltmarsh between 1979 and 1983. The figures are clearly very variable which is probably due to significant greater losses in years when exceptionally high tides or strong river flows would have caused increased erosion.

10.16.12 The very large loss of the northern saltmarsh (71.9 hectares or 56.6%) was due to the loss of much of Cuerdley Saltmarsh during the construction of the Fiddler's Ferry Power Station lagoons complex. The figures given indicate that the construction of the Power Station lagoons accounted for almost all of the saltmarsh loss; there is no significant evidence in the figures that erosion was responsible for even part of the loss.

10.16.13 The limited information available, from the Astmoor Saltmarsh figures, suggests that there will be a continued loss of about 0.2% of saltmarsh per year but this is a very crude estimate. In area terms, including the southern and northern saltmarshes, the loss would be approximately 0.21 hectare per year and about 2.07 hectares over 10 years.

10.16.14 However the above prediction should be treated with caution because the tabulated figures show that 4.7 hectares of saltmarsh were lost from Astmoor Saltmarsh in nine years, between 1966 and 1975, but there was an increase of 2.3 hectares of saltmarsh at Astmoor Saltmarsh in just four years between 1979 and 1983.

10.16.15 From the above it can only be concluded that in any period of 10 years there may be loss of saltmarsh due to erosion or a gain from accretion, and the changes may be up to several hectares or less than one hectare and insignificant. Nevertheless the overall trend is loss of saltmarsh but a change in trend cannot be ruled out.

10.16.16 It is also assumed that there will be no grazing of the saltmarsh vegetation or of the associated mesotrophic grassland, tall swamp and other vegetation during the next 10 to 30 years. Over this time-scale it is unlikely that the physiognomy and species composition of the vegetation will change significantly; the vegetation is predicted to remain dense and much taller than grazed saltmarsh. The overall ground cover is expected to remain high except in the saltmarsh creeks and pools where there is standing water or exposed sediments.

10.16.17 Any losses or accretion of saltmarsh vegetation are expected to be localised as a result of the meandering but unpredictable behaviour of the river channels. There is no evidence that large-scale or wholesale loss of saltmarsh is likely, but the possibility of loss of larger magnitude than previously known cannot be entirely discounted.

The Sand and Silt Flats, Sandbanks and River Channels

10.16.18 The sand and silt-flats, and the river channels, according to information in the Hydrodynamics and Estuarine Processes chapter (Chapter 7.0), will remain in a constant state of flux for the projection period. Consequently, and because of the high mobility of the sediments, plant colonisation is unlikely to occur except on an intermittent and very temporary and localised basis.

10.16.19 However there may be periodic but temporary colonisation by plants of the large sandbank, a short distance upstream of the Runcorn Gap. Sea Aster is likely to be the principal and possibly the only significant colonist unless conditions remain relative stable to allow colonisation by other saltmarsh plants.

The Birdlife of the Upper Mersey Estuary

10.16.20 The birdlife, including breeding, feeding, roosting and visiting species, is unlikely to change significantly over 10 to 30 years because any changes in saltmarsh habitat are likely to be small and probably of minor magnitude.

10.16.21 The sediments will continue to support very low numbers of invertebrate fauna for feeding birds because of the continuing state of flux and river channel meandering.

The St. Helens Canal Local Wildlife Site

10.16.22 Over the next five to 30 years there is likely to be an increase in the amount of tall swamp vegetation along the canal margins and into the central open water area, with a simultaneous reduction in the amount of open water habitat.

10.16.23 The proportions of tall swamp and open water habitats are likely to vary significantly depending on the extent of clearance of reeds and other aquatic vegetation by anglers. However the overall nature conservation value of the canal is unlikely to be significantly affected by such changes.

The Manchester Ship Canal Bank Local Wildlife Site

10.16.24 During the next 10 to 30 years it is likely that the amount of scrub and other woody vegetation along the canal banks will increase but the rate and extent of the increase will depend on the level of vegetation management to retain the orchid and other botanical interests.

10.16.25 There is also the likelihood of changes in the grassland and associated herbaceous vegetation with rises in the proportions of coarse grasses and tall herbs due to natural increases in soil fertility as a result of nitrogen fixation by leguminous plant species.

10.17 Effect Assessment

Introduction to Potential Effects

Effects on the Intertidal Habitats and Birds of the Estuary

10.17.1 The assessment of the effects of the Project on birds, including their estuarine habitats and associated habitats, has given primary consideration to the potential for adverse effects on the European Site and SSSI. There is the potential for both direct effects on wild birds and indirect effects by deterioration of their habitats in the European Site and SSSI. As previously stated, the assessment has also considered the effects on birds and their habitats in the Upper Mersey Estuary but has treated it as though it was a proposed SPA (pSPA).

10.17.2 Natural England has given advice on the conservation of the Estuary European Marine Site under Regulation 33(2) of the *Conservation (Natural Habitats & c*) *Regulations 1994*, as amended, which was issued on 25.05.2001. The advice is known as the *Regulation 33 Package*. This advice is applicable to the SSSI, SPA and Ramsar site as well as to the European Marine Site.

10.17.3 The advice relates specifically to the Estuary designated site, but it clearly applies to any activities or development outside the European Marine Site, such as in the Upper Mersey Estuary, because they could have adverse effects on the European Marine Site.

10.17.4 Further, for the purpose of this assessment, the Upper Mersey Estuary is considered as if it were a Proposed Special Protection Area (pSPA) and assessed as advised in the *Regulation 33 Package*.

Conclusions on the Ecological Receptors and their Levels of Importance

10.17.5 The baseline assessment has identified and evaluated the ecological receptors that may be affected by the construction and operation of the Project. It is now necessary to identify the ecological receptors in order of their importance to inform the assessment of effects section of this Chapter.

The Estuary Ecosystem

10.17.6 The following Table 10.42 presents a list of habitats in the Estuary ecosystem that are potentially affected by the Project. This is based on the fact that the Estuary is the most important interest feature (natural area) that is potentially affected by construction and operation of the Project.

10.17.7 In addition to a key treatment as an SPA, it is assumed that the Upper Mersey Estuary is part of the European Site.

Table 10.42 - Table of Ecological Receptors in the Estuary including the SPA, European Marine Site and the Upper Mersey Estuary.

Interest feature	Sub-feature	Attribute	Comments
Estuarine ecosystem of international importance for its assemblage of internationally important migratory bird species	All Sub-features	Absence of disturbance to birds	Disturbance is caused by people, dogs and motorbikes. Birds require an unobstructed field of view for escape.
		Absence of obstruction to view lines	
	Intertidal sediments	Extent and distribution of habitat for birds	Birds require large areas of invertebrate-rich habitat to provide prey for large populations.
		Food availability to birds	
	Saltmarsh	Extent and distribution of habitat	Birds require large areas of saltmarsh for feeding on invertebrate prey and for roosting.
		Food availability to birds	
	Rocky shores	Extent and distribution of habitat	Birds require large areas of rocky shore for feeding on invertebrate prey and for roosting.
		Food availability to birds	
	River channels	Extent and distribution of habitat	Many birds estuarine feed on fish and invertebrates in river channels.
		Food availability to birds	

10.17.8 All the Sub-features are represented in the European Site and SSSI. However rocky shores are absent from the Upper Mersey Estuary.

10.17.9 The most important Sub-feature is the combination of all Sub-features because birds use different Sub-features at different states of the tide. For example, if undisturbed invertebrate-rich intertidal sediments are close to undisturbed saltmarshes which provide feeding areas and high tide roosting habitats, the birds will spend less energy in moving from one habitat to the other, in the course of their natural activities and if they are disturbed by people, dogs and other human activities.

10.17.10 After all Sub-features, the intertidal sediments are the next most important Sub-feature because it is the invertebrate feeding value of the Estuary that determines the numbers of birds, i.e. the sizes of the bird populations of wildfowl and waders that the Estuary can support.

10.17.11 The saltmarshes are next in level of importance but their value depends on their ecological condition, that is whether or not they are grazed, and whether or not high level saltmarshes (upper saltmarshes) are represented which provide important roosting sites on spring tides.

10.17.12 Ungrazed high level saltmarshes, which are represented in the Upper Mersey Estuary, can also be of importance for Teal and other birds which feed on upper saltmarsh plants, and the upper saltmarshes, if ungrazed, can support small mammals which can attract wintering raptors to the Estuary, providing enhanced avian interests.

10.17.13 The rocky shores are next in order of importance, largely because of their rich and specialised invertebrate fauna, and value for feeding birds, as well as low tide roosts. The river channels are of lowest importance because of their lower invertebrate fauna for feeding birds (although fish are present) and absence of roosting habitat.

10.17.14 Thus, the intertidal sediments, saltmarshes, rocky shores and river channels, collectively and then in order of decreasing importance, are the sub-features of the Estuary that are ecological

receptors which need to be considered in the effect assessment that follows in this Chapter.

The Local Wildlife Sites and Local Nature Reserves

10.17.15 Next it is necessary to consider the sites with local wildlife designations, namely the Local Wildlife Sites (LWS) and the Local Nature Reserves (LNRs). Although LNR is a statutory designation, the importance levels of the LNRs in the Study Area are below the level of SSSI importance; they are equivalent to or similar to LWS importance. For example Norbury Wood and Marsh is covered by both LNR and LWS designations, as are the other LNRs in the Study Area.

10.17.16 It is difficult to compare the levels of importance of the different LNRs and LWSs as ecological receptors because many are designated for different reasons. However the Upper Mersey Estuary is clearly the most important LWS because of its extensive maritime habitats of saltmarsh, intertidal habitats and river channels, all of which are Habitats of Principal Importance and are also represented as Sub-features within the SPA, although of lesser importance to those actually located in the SPA.

10.17.17 As stated earlier, in this Chapter the Upper Mersey Estuary is assessed as if it were a pSPA and part of the Estuary SPA, although it has no such statutory designation. For this reason the Upper Mersey Estuary LWS has been included in Table 10.42 with the European Site.

10.17.18 The following Table 10.43 lists the Local Wildlife Sites and Local Nature Reserves, and provides comparable information on their Sub-features and attributes as set out in Table 10.42 for the Estuary ecosystem.

Table 10.43 - Table of Ecological Receptors which may be Affected by the Construction and Operation of the Project.

Name of site	Interest feature	Sub-feature	Attribute	Comments
Fiddler's Ferry Power Station Lagoons	Migratory birds including rarities and protected species	Migratory wildfowl, waders, seabirds and Sand Martin colony	Absence of disturbance to birds. Dynamic system of habitats.	A very large industrial site planned and managed for wildlife in conjunction with power station ash disposal.
		Large Orchid populations	New habitats created favour recolonisation.	
St. Helens Disused Canal	Open water with reedbeds	Aquatic habitat	Managed for fishing	The Water Vole populations have disappeared due to Mink, which should be eradicated.
		Common Reed	Priority habitat used by breeding birds	
Manchester Ship Canal Bank	Species-rich grassland	Orchid populations	Industrial habitat providing favourable conditions for natural colonisation.	Management should seek to maintain open and species-rich grassland habitats, with control of trees, scrub and bramble.
		Scarce plants	Low soil fertility is favourable for Grass Vetchling and other scarce plants.	
Wigg Island	Developing woodland and associated habitats	Butterflies and other invertebrates	Favourable management for nature conservation.	Wigg Island, now designated as a Local Nature Reserve, has major potential for
		Breeding and visiting birds	Undisturbed areas for uncommon birds.	

Name of site	Interest feature	Sub-feature	Attribute	Comments
				increased biodiversity.
Haystack Lodge	Woodland copses	Species-rich grassland with orchids.	Low maintenance regime is essential for conservation of biodiversity.	Regular mowing has reduced the biodiversity of the grasslands. Orchid colonisation should be encouraged.
	Damp grassland	Butterfly and invertebrate interests	Natural colonisation is to be encouraged.	
Norbury Wood and Marsh, and Oxmoor Wood and Ponds	Wet woodland, swamp, standing water and marshy grassland	Herony in site and three heronries nearby	Absence of disturbance due limited access.	Both sites have Local Nature Reserve status. Oxmoor Wood and two balancing ponds are owned by Halton BC.
		Wide range of wildlife habitats and species	Favourable management regime in place, and management plan.	

10.17.19 The six sites have all been given the same level of importance because it is difficult to rank the sites in order of importance. Ranking would be a theoretical exercise and therefore of little if any practical value. Further, the values of the sites are constantly changing; for example the St. Helens Canal has declined in importance during the present assessment because of the loss of its Water Vole population, and Wigg Island has increased in importance in the light of further records of breeding birds and butterflies of importance.

Other Important Wildlife Sites and Populations of Important Species

10.17.20 There are other wildlife sites, sites with populations of important species, and wildlife features that form a third tier in order of importance, the first tier being sites with statutory designations and the second tier being Local Wildlife Sites.

10.17.21 The Great Crested Newt population at Rocksavage is an example of a third tier site, solely because of the presence of a significant population of a European-protected species. Similarly, St Michael's Golf Course is of importance for its Water Vole habitat, even though the Water Vole population has been translocated to a remote site for reasons of decontamination works, after which successful recolonisation from outside the site might be expected.

10.17.22 It is inappropriate to consider sites of this type as discrete sites with boundaries because of the nature of the species concerned. It is more the case that the ecological receptor will be the species population rather than the site, because the viability of the populations of such species can be affected by developments or land-use changes at significant distances from their breeding sites.

Effects on Terrestrial Habitats and Birds Outside the Estuary

10.17.23 Although primary consideration has been given to the maritime habitats of the Estuary and their associated birdlife, particularly the European Site, SSSI and the Upper Mersey Estuary, the Project crosses many sites of local wildlife importance, namely the St. Helens Canal, the Manchester Ship Canal Bank and parts of Wigg Island.

10.17.24 The Project may also affect wildlife outside sites with statutory and local designations, examples being highly mobile species such as birds, protected species such as bats, Water Voles and Great Crested Newts.

10.17.25 There are also potential effects on habitats and species that are not protected but which have

Habitat of Principal Importance status and Species of Principal importance status respectively. Such habitats include, for example, eutrophic standing waters such as canals and ponds, and hedgerows and open mosaic habitats on previously developed land. Examples of Species of Principal Importance which could be affected are many bird species (Skylark, Linnet, Reed Bunting, House Sparrow, Dunnock and Song Thrush).

Consideration of Disturbance to Birds and Review of Literature

Predicted sources and effects of disturbance

10.17.26 Disturbance to birds is an important issue in a range of construction works and the use of land. It is recognised as a threat to birds in the *Wildlife and Countryside Act (1981*) which, in Part 1 of the *Act* to disturb Schedule 1 species.

10.17.27 Four main sources of disturbance resulting from the Project and potentially affecting birds using the Upper Estuary have been identified. They are:-

a. Human presence during construction and operation of the bridge;
b. construction noise;
c. vehicle use of the bridge; and
d. lighting of the bridge.

10.17.28 Human disturbance of wildfowl and waders has been the subject of numerous studies because it can deny birds access to food resources or cause increased energy expenditure resulting from avoidance. It may reduce birds' ability to maintain condition, especially in cold weather, and possibly be a contributory cause of mortality. It may reduce birds' ability to reach optimum condition before migration or commencement of breeding, so that breeding success is adversely affected.

10.17.29 However neither of these effects necessarily results in a permanent reduction in total population size. Birds that cannot utilise one site may find alternative feeding areas in another location. Occasional mortality events are normally followed by recovery in subsequent years.

10.17.30 The potential for significant effects arises where disturbance is sufficiently intensive and sustained to permanently deny birds access to food resources, thus reducing the carrying capacity of the affected site, or to permanently reduce breeding productivity. In determining the significance of any such effect, additional factors including population size and trend, distribution and threat also need to be take into account.

10.17.31 To evaluate the risk of significant disturbance, the literature on the responses of wildfowl and waders to disturbance has been reviewed by Andrews Ward Associates.

Data sources

10.17.32 A computer search was made for all papers on disturbance of wildfowl and waders. The following sources were also consulted:-

a. Davidson N and Rothwell P 1993. Disturbance to Waterfowl on Estuaries *(Wader Study Group Bulletin 68, Special Issue*);
b. The Recent Publications list contained in *Wader Study Group Bulletins* 1993 to date;
c. Hockin D *et al* 1992. Examination of the effects of disturbance on birds with reference to its importance in ecological assessments. *Journal of Environmental Management* 36:253-286;

d. Kellar V 1995. *Effects of human disturbance on birds – a literature review*. *Ornithologische Boebachter* 92:3-38;
e. Ward D 1988. *Review of the effects of recreation on waterbirds of enclosed waters. Internal report.* RSPB and NCC;
f. All issues of *Wildfowl*, published by the Wildfowl and Wetlands Trust, UK from 1993 to date;
g. All issues of *Waterbirds*, published by the Waterbird Society, USA, from 1993 to date; and
h. Drewitt A 2000. *Escape flight distances of waterfowl in response to disturbance. Bird Network Information Note*. English Nature.

10.17.33 A number of generally-applicable conclusions can be drawn from the literature. They are that:-

a. Different species have different tolerances to human activities;
b. Birds show a degree of habitation to routine activities that experience has shown to be harmless;
c. Birds react less to slowly-moving people and objects than to fast movement;
d. Birds react less to humans, vehicles or boats or a route which will pass them by than to those which approach them directly;
e. Birds react less to humans and objects on a fixed course than to those moving erratically;
f. Birds react less to apparently "non-human" activities such as vehicles than to visible humans;
g. Birds may react sooner and at greater distance when in larger flocks than in smaller ones;
h. Even where disturbance is shown to displace birds from chosen feeding areas, there may be no effect on population size in the locality;
i. Waterfowl can compensate for disruptions to their natural behaviour patterns in a variety of ways, including extending their periods of feeding and accelerating their intake rates; and
j. Birds may react less to disturbance events when food resources are in short supply and thus be less affected by it at the time when it is potentially more damaging.

10.17.34 The following studies illustrate these conclusions.

Relevant case examples

10.17.35 A study of wader disturbance on a part of the Dee Estuary subject to high levels of human disturbance was undertaken over the five year period 1986/7 to 1990/91 (Kirby *et al* 1993). Type and frequency of potential disturbances, details of actual disturbance events and numbers of waders using the West Kirby beach were recorded.

10.17.36 Walkers and dogs were the main sources of disturbance and the potential for disturbance increased and diversified during the period. Most types of disturbance events caused waders to leave the beach on occasions. Grey plover, knot, dunlin and bar-tailed godwit most commonly left the estuary altogether when disturbed. Over the same period, the numbers of these four species and most other wader species using the West Kirby beach increased.

10.17.37 While the possibility could not be ruled out that a further increase in intensity and duration of disturbance might result in a decline in bird numbers, the study showed that even the species that reacted most strongly to human activities on the beach were co-existing with the level of disturbance.

10.17.38 Comparable results came from a study of human disturbance of oystercatchers on the Exe Estuary (Goss-Custard and Verboven 1993) which found that on two large mussel beds disturbance could reduce feeding rates by as much as 33-50%. Despite this, over the period, oystercatcher numbers on the estuary increased in line with the whole British wintering

population.

10.17.39 It was concluded that the perception of disturbance is exaggerated because humans visit the beds at low water spring tides in daylight whereas birds feed through the tidal cycle on springs and neaps and at night as well as by day, can reschedule their foraging routines, move to other areas and habituate to people. It was noted that oystercatchers would feed close to people who remained in one place for long periods such as anglers and mussel-gatherers.

10.17.40 A study of the depletion of the food resources of black-tailed godwits at twenty locations on five estuaries in Suffolk and Essex (Gill *et al* 2001) found no evidence that human disturbance of the birds affected their ability to exploit their prey species as compared with depletion at undisturbed sites.

10.17.41 Numerous studies show that waders and wildfowl may habituate to activities that are benign or predictable in character. Mean flight distances of waders on a beach in Belfast Lough much used by the public were 29 metres for oystercatcher, 38 metres for curlew and 37 metres for redshank (Fitzpatrick and Bouchez 1998).

10.17.42 A review of the utilisation of fields in Scotland by pink-footed geese (Keller 1991) found that they avoided fields close to roads and that flight distances at the approach of a car ranged from 100 metres to 250 metres. These distances were less than half those found in a Danish study and this was thought to be likely to be the result of habituation due to higher traffic density in Scotland.

10.17.43 An assessment of the effects of the proposed construction of a cycleway along a part of the northern side of Langstone Harbour found that black-tailed godwits were already habituated to walkers on the shore and would readily tolerate approaches to within 100 metres, or to 30 metres given care in approaching (R. Chapman personal communication in Andrews Ward Associates, 2003).

10.17.44 A study of the responses of feeding waders to vehicles used to transport sand along a haul road through the intertidal zone of the Ribble Estuary in 1977/78 (Bainbridge 1982) found that some knot took flight when a vehicle was up to 80 metres away and all knot were disturbed by vehicles that approached within 30 metres. Comparable figures for dunlin were 60 metres and 20 metres respectively, and for redshank 50 metres and 10 metres respectively.

10.17.45 When disturbed, many birds flew round and settled nearby to re-commence feeding but some left the area. It was calculated that, for birds which did not leave the vicinity of the track when disturbed, the mean loss of feeding time in knot was 47 seconds, in dunlin 38 seconds, and in redshank 25 seconds. For birds that habitually fed within 50 metres of the track, the total loss of feeding time, taking into account the number of vehicle movements, could be in the order of 4 or 5%. The study found no evidence that sandwinning traffic significantly affected either the numbers of birds wintering on the estuary or their winter survival.

10.17.46 A study of waders on land adjacent to the Firth of Forth found even greater habituation to traffic, with oystercatchers feeding within 1 m of roadsides carrying almost continuous passing traffic and redshank and curlew within 30 m (Andrews Ward Associates unpubl.).

10.17.47 As habituation increases with time, any disturbance is greatest in the early part of winter when food resources are greatest and weather often mild, with birds becoming more tolerant as resources diminish and the need to maximise intake increases. This has been shown for brent geese which avoided disturbed areas in early winter but used them later as other areas were depleted of food (Owens 1977).

10.17.48 It is known that as the acquisition of adequate food gains in urgency, birds adjust their behaviour. They can compensate for disruptions in a variety of ways such as extending feeding times and accelerating food intake rates. A review of disturbance to waders and wildfowl on estuaries notes that "waders have a phenomenal capacity to vary their intake rate in response to changing environmental and physiological demands" (Cayford 1993).

10.17.49 Lighting effects are not necessarily disadvantageous to estuarine waterfowl. Some species, such as oystercatcher (Goss-Custard 1996) need to feed at night in order to maintain an adequate intake; others may do so to exploit prey species that are active at night. In the absence of moonlight, artificial lighting may facilitate feeding for many species that use sight as well as touch to find prey, including shelduck (Cramp & Simmons 1977) and lapwing (Cramp & Simmons 1983).

Assessment of Construction Effects on the Upper Mersey Estuary LWS

10.17.50 In this Chapter, the potential effects of construction on the Upper Mersey Estuary LWS are assessed before the potential effects on the European Site and SSSI. This sequence of assessment is followed because the sources of effects will be in the Upper Mersey Estuary and their potential effects there, at or close to their sources, need to be identified before the longer distance effects on the European Site can be properly assessed.

10.17.51 The New Bridge crossing area is one currently subject to low levels of human activity and disturbance so the assessment of effects is based on the assumption that birds are not habituated.

10.17.52 For the purposes of this assessment, based on the literature review, a worst-case assumption has been made that birds up to 300 metres from the source of disturbance will be affected. In practice, as already shown, waterfowl species tolerate human activities at lesser distances and tolerance increases with time, so that the zone of disturbance becomes smaller, affecting fewer birds.

10.17.53 The potential construction and subsequently the operational effects on the Upper Mersey Estuary, as explained earlier, are based on the assumption that the Upper Estuary is a pSPA and therefore a European Site.

10.17.54 The effects on its wildlife fall into the following broad categories;

a. Effects on saltmarsh habitat involving temporary or permanent losses of saltmarsh, and/or temporary or permanent damage to saltmarsh vegetation;
b. Direct and indirect effects on intertidal sand, silt or mudflats, including sandbanks, involving temporary or permanent losses or damage to the habitat;
c. Temporary disturbance to breeding, feeding, roosting and loafing birds;
d. Temporary disturbance to commuting and migrating birds including obstruction of bird movements between the European Site and the Upper Mersey Estuary;
e. Pollution caused by the release of contaminated materials, particularly sediments, and possibly by oil spills and release of other contaminants from construction machinery; and'
f. Possible collisions of birds with the bridge structure and construction machinery.

10.17.55 The piers of the completed bridge will each be 5 metres x 2 metres in size and there will be a total of 30 piers in the saltmarshes, including those on both sides of the Estuary. This will result in a permanent loss of approximately 0.03 hectare of saltmarsh.

10.17.56 There will be shading effects from the carriageway which will be approximately 44 metres at its widest point. The deck height will be approximately 12 metres above Widnes Warth Saltmarsh,

rising to 22 metres above Astmoor Saltmarsh. Shading effects may be less where the bridge line runs most nearly north-south as low angle sunlight in morning and evening will penetrate beneath it.

10.17.57 The effects of shading will be very low in the construction phase because maximum shading will not begin until the completion of the bridge decking over the saltmarshes. However, there will probably be a reduction in plant growth under the bridge centre line towards the end of the construction phase. If it is assumed that the growth and vigour of the saltmarsh vegetation is reduced beneath the central third of the strip, this would result in the deterioration of a approximately 1.2 hectares of saltmarsh.

10.17.58 The bird count data for the zone extending 100 metres either side of the bridge line (that is a total extent of 200 metres x 930 metres equating to18.6 hectares) in the three winters of 2002 to 2004 inclusive is presented in Table 10.44. The data indicate that the zone is minimally used by birds of all species. Taking into account the fact that the strip of land affected by the construction works will be approximately seven metres wide, affecting only 1.26 hectares, and that the possible permanent loss of habitat will not exceed 1.28 hectares, the effects on birds will be small. Pro rata, the works would remove a part of the total habitat extent used by one each of Canada goose, teal, mallard, lapwing, curlew and redshank.

Table 10.44 - Mean Peak Count of All Species in 200 metres Belt Along Jetty Line

Species	On saltmarsh	In tidal waters	On intertidal flats
Cormorant	*0*	*0.3*	*2*
Canada goose	*0*	*0*	*2*
Shelduck	*0*	*0*	*0.8*
Wigeon	*0*	*0*	*0*
Teal	*0*	*0*	*9*
Mallard	*0*	*0.5*	*0.7*
Ringed plover	*0*	*0*	*5*
Golden plover	*0*	*0*	*0*
Lapwing	*0*	*0*	*73*
Dunlin	*0*	*0*	*14*
Curlew	*0*	*0*	*5*
Redshank	*0*	*0*	*0.8*

10.17.59 Natural England's *Regulation 33 Package* advice for the European Site lists loss of or damage to saltmarsh as a potential cause of negative effects on the waterfowl assemblage. Although the deterioration and potential loss of approximately 1.28 hectares of habitat with minimal use by birds will be relatively small compared with the total area of saltmarsh in the European Site and the Upper Estuary, it will be significant because this assessment is based on the Upper Estuary being a pSPA and therefore part of the European Site.

Effects on saltmarsh habitat

Effects of stone access road construction and use

10.17.60 Direct effects on saltmarsh habitat may be caused by the construction of the stone access roads, using the methods described earlier, and their subsequent use which will exert physical pressures on the underlying vegetation and soils, even though the method of construction will spread the loads. The effects on the underlying vegetation and soils will also depend on the length of time the access roads are in place and in use.

10.17.61 The physical effects on the saltmarsh soils are also likely to be significantly influenced by the moisture content of the soil, particularly if the degree of saturation is high. If the soil is completely saturated, by heavy and/or prolonged rainfall, or by tidal inundation such as during spring tides, the damage to the soil structure is likely to be severe and possibly irreversible unless physical treatments are applied to restore the soil structure and normal levels of soil density.

10.17.62 On the assumption that the stone access roads will be constructed directly on the saltmarsh vegetation, the vegetation would be lost, at least temporarily. However the vegetation could be lost for a longer period, and permanently if covered for up to three years as proposed. The damage to soil structure will depend on factors such as the time of year when the road is constructed and the degree of compression and compaction of the underlying soils. The degree of damage to the soil structure will also depend on the intensity of use, the types and weights of machinery, and the water regime of the soil during the period the access road is in place.

10.17.63 For example a thick mat of vegetation could suffer significant decomposition and loss, or damage to the root systems of plants due to the combination of lack of light and anaerobic conditions caused by the combined effects of compaction, waterlogging and impeded drainage. The seedbank could also be reduced by the changed edaphic conditions and by the possible covering of the vegetation before the shedding of the current year's seed.

10.17.64 There is a risk, which is increased by the length of time the stone access road is in place, that the covered vegetation is lost entirely, including all its vegetative parts and root systems, as a result of decomposition and other factors, leaving a bare saltmarsh soil surface with no immediate prospect of vegetative regeneration. However natural regeneration from seed could occur relatively quickly as a result of seed deposition from adjacent vegetation and the vegetative spread of stoloniferous grasses from existing vegetation along both sides into the access road.

10.17.65 It is also possible that on removal of the stone roads, if the ground is compacted and does not recover due to natural processes of siltation, then depending on the depth of the depression and its relationship with existing saltmarsh drainage lines, it may become a pool or pools holding water after high tides. Conversely, it may accelerate drainage run-off from the surrounding marsh. Consequently, there could be positive (from pools) or negative (from increased drainage) effects on bird habitat, particularly on the habitat of those species which feed in saltmarsh pools and gutters, notably teal but also curlew and redshank.

10.17.66 The construction effects of stone access roads on the habitats of Widnes Warth Saltmarsh and Astmoor Saltmarsh are summarised in Table 10.45. On the assumption that the Upper Mersey Estuary is a pSPA, the Interest Feature is "the internationally important assemblage including internationally important populations of migratory species". The Sub-feature in the table is the saltmarsh.

Table 10.45 - Assessment of the Effects of the Construction and Use of Stone Access Roads on Saltmarsh Habitats across Widnes Warth Saltmarsh and Astmoor Saltmarsh (treated as within pSPA).

Receptor 1 – Widnes Warth Saltmarsh and Astmoor Saltmarsh			
Brief Description of Effect	Construction and use of stone haul road	Construction and use of stone haul road	Construction and use of stone haul road
Effect	Loss of vegetation	Loss of seedbank	Damage to soil structure

Receptor 1 – Widnes Warth Saltmarsh and Astmoor Saltmarsh			
+ve or –ve or neutral	Negative	Negative	Negative
Timescale of effect	Short-term	Short-term	Short-term
Permanent or temporary	Temporary	Temporary	Permanent
Direct or indirect effect	Direct	Direct	Direct
Secondary effect	Erosion	Erosion	Change in species composition
Importance	High	High	High
Magnitude	Moderate	Moderate	Moderate
Significance	High	High	High
Comments Box	The effects are based on the access roads being in place and in use for up to three years.		

Effects of bridge pier construction

10.17.67 The construction of cofferdams during bridge pier construction will probably have more localised but potentially greater effects on saltmarsh habitat and vegetation due to the permanent loss of vegetation at the bridge support locations and the temporary loss of vegetation in the working areas associated with the piers.

10.17.68 Whilst it is assumed that the original saltmarsh vegetation in the working areas will be lost, the effect is assessed as temporary because it is assumed that the saltmarsh will recolonise the working areas naturally on completion of the works.

10.17.69 The effects of cofferdam construction and use of working areas during bridge pier construction on Widnes Warth Saltmarsh and Astmoor Saltmarsh are summarised in the Table 10.46.

Table 10.46 - Assessment of the Effects on Saltmarsh Vegetation of Cofferdam Construction and Working Areas for Bridge Pier Construction on Widnes Warth Saltmarsh and Astmoor Saltmarsh (treated as within pSPA).

Receptor 1 – Widnes Warth Saltmarsh and Astmoor Saltmarsh			
Brief Description of Effect	Construction of coffer-dams and working areas for construction of piers	Construction of coffer-dams and working areas for construction of piers	Construction of coffer-dams and working areas for construction of piers
Effect	Loss of vegetation	Loss of seedbank	Damage to soil structure
+ve or –ve or neutral	Negative	Negative	Negative
Timescale of effect	Short term	Short term	Short term
Permanent or temporary	Part permanent, part temporary	Permanent	Permanent
Direct or indirect effect	Direct	Direct	Direct
Secondary effect	Erosion	Erosion	Change in species composition

Importance	High	High	High
Magnitude	Moderate	Moderate	Low
Significance	Moderate	Moderate	Low
Comments Box	The effects are based on the use of a stone road to give access to the cofferdams and working areas.		

10.17.70 The saltmarsh along the New Bridge alignment is rather uniform, grass-dominated and with few pools or gutters. There is no grazing management. It is estimated that 1.26 hectares of saltmarsh will be permanently lost to the piers.

10.17.71 The piers of the completed bridge will each be 12x10 metres in size and there will be a total of 18 in the saltmarsh zone. Thus this will result in a permanent loss of at least 0.216 hectares of saltmarsh. In addition, there will be shading effects from the carriageway (approximately 44 metres at its widest point) which will be 10m above, rising to 20 metres above, the saltmarsh surface. The shading effect will occur progressively as the New Bridge is built and will be relatively minor in the construction phase compared with the operational phase as discussed later.

10.17.72 Effects may be less where the New Bridge line runs most nearly north-south as low angle sunlight in morning and evening will penetrate beneath it. However, there will probably be a reduction in plant growth under the bridge centre-line during the construction period but it is unlikely that there will be complete dieback of vegetation at this stage, even under the centre-line of the New Bridge.

10.17.73 Therefore approximately 0.25 hectare of saltmarsh will be permanently lost in the construction phase and the growth of a further 0.6 to 1.2 hectares will be suppressed to a variable extent by shading.

10.17.74 In assessing the effects of the stone access roads and coffer-dam construction on the saltmarsh habitats, there are variables to consider which may affect the magnitude and significance of the effects. The obvious uncertainties relate to the following;

a. The access roads may have to be retained for longer periods than anticipated, thereby increasing the risk of loss of viability of the vegetation and seedbank;
b. There may be prolonged periods of wet weather, particularly in the winter, which may make the saltmarsh soils more vulnerable to compaction and damage to soil structure;
c. There may be delays in removing the access roads if their use finishes in the autumn or early winter because of the possible risks of leaving bare ground exposed throughout the winter months when recolonisation will be much slower than in the growing season;
d. If significant compression of the saltmarsh “topsoil” and “subsoil” occurs, the risks of damage to soil and subsoil structure are likely to be increased due to the combined effects of ground level reduction, increased waterlogging and a greater likelihood of irreversible damage to the covered vegetation and seedbank; and
e. There is also the possibility of exceptionally adverse weather conditions either during the use of the access roads or after their removal which could affect the regeneration of saltmarsh vegetation.

10.17.75 It is difficult, because of the above uncertainties, to make an accurate prediction of effects. Therefore allowance will need to be made for the uncertainties, preferably through a monitoring scheme in conjunction with appropriate mitigation.

10.17.76 If there is erosion and the formation of a gully on access road removal, the natural drainage pattern of the saltmarsh could be altered, leading to further erosion and possibly subsidiary

gulleys. Further, the potential for adverse effects on the stability and drainage regime of the saltmarsh could be compounded by the effects of pier construction, and ultimately the loss or inhibition of saltmarsh vegetation due to shading by the New Bridge, as considered later in this Chapter.

10.17.77 If the seedbank has not been lost, and there is also recolonisation from seed shed by adjacent saltmarsh plants, recolonisation is likely to be rapid, given access track removal at the beginning of the growing season, absence of serious damage to the soil structure, and assuming favourable weather conditions. Rapid colonisation will stabilise the soil surface by root binding effects and the protective cover of fine-leaved vegetation, particularly if there is a high proportion of fescues. Saltmarsh vegetation establishment will therefore prevent erosion, or at least reduce the risk of erosion.

Direct and indirect effects on intertidal sand, silt or mudflats, including sandbanks

Effects of access and working methods

10.17.78 Three possible methods of working in the intertidal areas to construct the towers for the New Bridge, beyond the saltmarshes where there is no vegetation, are considered here. They are hovercraft, low ground pressure tractors and piled jetties.

10.17.79 Access to these intertidal areas will not affect saltmarsh vegetation so most of the effects assessed earlier will not occur. Further, effects on soil structure will not apply because the constantly shifting sediments do not allow the development of a soil structure with distinct soil horizons, a significant organic matter or humus content, and the characteristics of a good soil structure including a low to moderate bulk density and a reasonably high porosity.

10.17.80 Further, there is no evidence from the Hydrodynamics and Estuarine Processes Chapter (Chapter 7.0) to predict a significant change in the extent and locations of the intertidal sand, silt and mudflat habitats, other than changes that would be expected to occur naturally. The risk of changes to the habitat as a result of the construction works is relatively low compared with the risk presented by working on the saltmarshes where there is a vegetation cover of high sensitivity which, if damaged or lost, will result in a fundamental change to the nature and integrity of the saltmarsh habitat.

10.17.81 Construction of rectangular barrettes, which may be used during tower construction for the New Bridge in the intertidal habitats, would probably involve sheet piling and the cofferdams would probably be circular with a diameter of about 25 metres. In addition, larger working areas around the cofferdams would be necessary. Therefore larger areas of intertidal habitat would be affected but the effects would be localised.

Use of piled jetties

10.17.82 The installation and use of piled jetties will have no significant effect on the intertidal habitats. There will be no disturbance to vegetation because saltmarsh plant communities are absent from the affected habitats, apart from very occasional and localised colonisation by Sea Aster and associated plants.

10.17.83 There will be no adverse effects due to shading because of the existing absence of saltmarsh and other vegetation.

Use of low ground-pressure tractors

10.17.84 Low ground-pressure tractors will have a very minor effect, again because of the absence of

vegetation and due to the fact that the intertidal sands, silts and associated materials are subjected to constant disturbance and reworking due to tidal effects and erosion caused by river channel flows.

Use of hovercraft

10.17.85 According to Turner, D. (2003) in *Environmental Effect of Hovercraft; Report by Hoverdril Inc.,* the pressure exerted by a low speed hovercraft on the ground is 1-2 psi (pounds per square inch). This is reported to compare with a pressure of 5-10 psi caused by a man walking over the ground.

10.17.86 According to the above-mentioned report the use of hovercraft instead of tractors and other vehicles can avoid rutting of the ground and adverse physical impacts such as the crushing of sea shells into a fine powder.

10.17.87 Reference is also made in the Turner, D. (2003) report to the use of hovercraft on peat bog habitat at Cowdenbeath in Scotland where a modular hover barge with a 50 tons payload was used for access to a core sampling site. The report states that the ground-bearing pressure of the hover barge, when sat on the surface and coring, was less than 2 psi and when hovering was less than 1 psi.

10.17.88 The Turner report also quotes from abstracts of other work and papers, including work in Alaska. One example is applicable to the Project and states “The hovercraft does not pierce the surface over which it is travelling. The advantage is two-fold, a) less friction = less fuel burnt to move; b) less friction or interruption to the surface = less disturbance to the environment.”

10.17.89 Also relevant to the Project is the following; “Damage to the shore environment, such as beaches, mud flats and vegetation is virtually nil because of the hovercraft’s low pressure “footprint”. For example, the average human being when standing on a beach exerts a pressure of some 3 psi underfoot, rising locally to 25 psi when walking. The average hovercraft by comparison, exerts a pressure of only 0.22 psi on the surface regardless of speed. This “footprint” pressure is less than that of a seagull standing on one leg.”

10.17.90 The report also quotes “It therefore becomes obvious that fish and other marine life are in no way affected. This has been confirmed by independent scientific tests.”

10.17.91 Other advantages of hovercraft, based on the citations in Turner (2003) are;

a. There is no exhaust discharge into the water, thus eliminating marine pollution by oil and fuel particles;
b. The wake created by hovercraft is minimal, ensuring that riverbank erosion and damage by waves is virtually nil;
c. Hovercraft do not require dredged channels;
d. Reference to a recent study in the UK concluded that hovercraft passage over intertidal areas caused no damage to sea grasses or invertebrates; and
e. There are reports that bird life rapidly adjusted to the presence of hovercraft.

10.17.92 It is concluded that the localised use of hovercraft, in the tower construction areas, will have very minor effects, which are not significant, on intertidal habitats and maritime vegetation.

Effects of Superstructure Construction of the Bridge

10.17.93 Construction of the superstructure of the bridge will have lower effects than construction of the piers and towers, and associated cofferdams, because much of the work will be on the bridge

structure, above the level of the saltmarshes and intertidal habitats. However there will be effects if bridge components, whether pre-fabricated or not, are delivered to the site via the access tracks over the saltmarshes. This will increase compaction of the underlying saltmarsh soils and subsoils, resulting in greater damage to the soil structure and drainage.

10.17.94 A summary of the effects of all the bridge construction works on the intertidal habitats, outside the saltmarshes, is given in Table 10.47. Piled jetties will have no significant effects so are omitted from the table.

Table 10.47 - Assessment of the Effects of Construction Methods on the Intertidal Sand, Silt, Mudflat and Sandbank Habitats between Widnes Warth Saltmarsh and Astmoor Saltmarsh (treated as within pSPA).

Receptor 2 – Intertidal sand, silt, mud-flat and sandbank habitats between Widnes Warth Saltmarsh and Astmoor Saltmarsh.		
Brief description of effect	Hovercraft	Low ground pressure tractors
Effect	Release of sediments	Release of sediments
+ve or –ve or neutral	Negative	Negative
Timescale of effect	Short term	Short term
Permanent or temporary	Temporary	Temporary
Direct or indirect effect	Direct	Direct
Secondary effect	Erosion	Erosion
Importance	Moderate	Moderate
Magnitude	Low	Low
Significance	Low	Low
Comments Box	The effects are based on the conclusions from hydrodynamic studies that the potential effect of any of the methods is minor when compared with the existing sediment dynamics presently experienced in the Upper Mersey Estuary.	

Effects on Birds within the Upper Estuary

Temporary disturbance to breeding, feeding, roosting and loafing birds

10.17.95 It is clear that disturbance effects due to human presence, construction traffic movements, noise and lighting are less when confined to a fixed and predictable route. Given that the piled jetty option has been shown to affect only small numbers of birds then, it is assumed that access vehicles or hovercraft move along fixed corridors.

10.17.96 The construction of a jetty is a potential cause of disturbance. The simple presence of a jetty will not disturb birds but vehicle movements and visible human activity along it will do so, though the extent of their respective effects is likely to differ. In the cases of vehicles and hovercraft, birds that are disturbed may tend to return to preferred feeding areas when the perceived threat moves on but this depends on the distance over which they initially move and the quality and availability of alternative feeding areas. Visible human presence will tend to be largely associated with the current working location and form a static disturbance zone which may exclude birds for long periods. As work on the New Bridge proceeds, the main areas of activity and potential disturbance will be higher above and therefore further away from feeding habitats and this will affect the size of the disturbance zone. Further, birds will habituate over time and this will reduce the effects of disturbance.

10.17.97 Piles will be driven into the intertidal flats, with piers and towers then being built on them. Pile driving will introduce an unusual and relatively loud noise impact. However, while it may cause an initial response by birds feeding in the vicinity, it can be predicted that, because it is repetitious, static and not associated with any overt threat, habituation will occur.

10.17.98 The locations and extent of disturbance will change during the construction programme. Additionally, the number of bird affected will change in relation to the timing of work items. It is reasonable to assume that potential effects will be slight as the works progress across the saltmarsh, where very few birds are present outside the breeding season, but will increase as the inter-tidal flats are approached. By timing work correctly, disturbance potential may be minimised.

10.17.99 Data in Table 10.47a indicate that mean numbers of up to three cormorant, 12 Canada geese, 22 shelduck, 40 teal, 15 mallard, 132 lapwing, 19 dunlin, 15 curlew and nine redshank, plus minimal numbers of other species, may be present in a belt extending to 300 metres each side of the New Bridge line. In a worst case in which mortality were to occur as a result of construction disturbance, then the probability and rate of recovery will depend on population size and trends.

10.17.100 The question of whether the construction works would form a barrier to bird movements within the Upper Estuary has also been considered. No published studies of this issue have been found but it is predicted that birds will fly around or over sources of disturbance and will be free to move when work ceases each day.

10.17.101 It is therefore concluded that the effects of disturbance during construction will be temporary, will be small in spatial extent, and will involve small numbers of birds.

Table 10.47a - Mean Bird Numbers Along the Line of the Bridge in 2002/3-2004/5

Species	Saltmarsh	Tidal waters	Inter-tidal flats	Total
Cormorant	0	1	2	3
Canada goose	9	0	3	12
Shelduck	0.6	0.3	21	22
Wigeon	0	0	0	0
Teal	15	12	13	40
Mallard	4	2	9	15
Golden plover	0	0	>0	0
Lapwing	64	0	68	132
Dunlin	0	0	19	19
Curlew	1	0	14	15
Redshank	6	0	3	9

10.17.102 The construction and use of access roads across the saltmarshes, and the construction of cofferdams for pier and tower erection, have the potential to cause noise and visual effects. There will be disturbance to breeding birds if the roads and bridge supports are constructed in the bird breeding season of March to August inclusive. This may cause abandonment during nest building, egg incubation and the tending of young. Birds likely to be affected in significant numbers are Skylark and Meadow Pipit, with possible disturbance to small numbers of Redshank and to passerines such as Wren and Reed Bunting.

10.17.103 Other activities across the saltmarshes such as the movements of personnel, small vehicles driving directly across the saltmarshes, tracked machines and other equipment may also disturb breeding birds, the magnitude of which will depend on the frequency of movements. Isolated occurrences are likely to cause temporary disturbance, with birds returning to their nesting sites. Frequent or regular occurrences are likely to cause abandonment of eggs and breeding sites, depending on the frequency of disturbance.

10.17.104 The literature review on bird disturbance indicates that the extent of noise and visual disturbance across the saltmarshes is likely to be up to about 200 metres, and possibly more in the case of Redshank because this species is more sensitive to disturbance than, for example, Skylark and Reed Bunting. However, as indicated by the literature review, a significant degree of habituation is probable, particularly if access is limited to a defined access road, and if the frequency of movements of vehicles, machinery and personnel is low.

10.17.105 If the construction and use of access tracks starts outside the bird breeding season, birds will be inhibited from breeding in areas close to the disturbance corridor, within a distance of up to 200 metres from the zone of disturbance, and possibly beyond this zone depending on the species concerned. Birds displaced in this way may nest elsewhere on the saltmarshes, depending on breeding densities and carrying capacity, but it is more likely that there will be a temporary reduction in the numbers of breeding birds on the saltmarshes during the period of disturbance. This is likely to affect overall breeding success for a full year, or two years if the works in a particular area are prolonged, as it cannot be assumed that displaced birds will nest successfully in other parts of the saltmarsh that are already occupied by breeding birds.

10.17.106 There will also be disturbance to feeding, roosting and loafing birds which may result in displacement to undisturbed areas of the saltmarshes or movements to other areas. However some birds may use saltmarsh habitats close to the access roads for feeding, loafing and roosting when construction work is suspended such as at night and in the early morning.

10.17.107 It is assumed that most or all of the construction work will be in the daytime but there may be some work at night, requiring artificial lighting. Such lighting is predicted to have only a minor, negative effect on birds because it will be largely directional and the light sources will be fixed or largely stationary.

10.17.108 The effects are predicted to be of moderate magnitude, negative and temporary if construction starts in the breeding season, and of low magnitude, negative and temporary if the work starts outside the breeding season. However the level and duration of effects may be affected by the methods of construction adopted. For example the *Construction Methods Report (B4027 OA/200 of 05.12.07 and revised 07.02.08*) produced by the Project Team for Halton Borough Council) indicates that stone roads may not be removed for up to three years.

10.17.109 The effects of the Tower Crane to be used for New Bridge construction has been considered and will have no significant effects on bird migration and disturbance because there will be no associated human disturbance apart from operatives at specific locations in the inter-tidal habitats, and no associated predators. The Tower Crane will be relatively immobile and will operate from fixed locations.

10.17.110 Pollution from the release of contaminants is not predicted to have significant adverse effects as it is not proposed to use materials that of a hazardous nature other than oils used by construction machinery.

10.17.111 Table 10.48 summarises the effects of construction, excluding artificial lighting because this will have a low effect which will not be significant, on all bird activities.

Table 10.48 - Assessment of the Construction Effects of the Project on Birds in the Upper Mersey Estuary (treated as pSPA).

Receptor 3 – All birds including species in the assemblage of internationally important migratory species.			
Brief Description of Effect	Construction of structures and working areas	Presence and movements of structures, machinery and personnel	Noise and pollution produced by machinery
Effect	Loss of saltmarsh and intertidal habitats	Disturbance to breeding, roosting, feeding, loafing and migrating birds.	Disturbance to breeding, roosting, feeding, loafing and migrating birds. Oiling of birds.
+ve or –ve or neutral	Negative	Negative	Negative
Timescale of effect	Short term	Short term	Short term
Permanent or temporary	Part permanent, part temporary	Temporary	Temporary
Direct or indirect effect	Direct	Direct	Direct
Secondary effect	Erosion of saltmarsh	None	None
Importance	High	High	High
Magnitude	Low	Moderate	Low
Significance	Low	Moderate	Low
Comments Box	The effects are based on the access roads being in place and in use for up to three years.		

10.17.112 A quantitative method of assessing the effects on bird habitat and birds during and as a direct result of construction is by considering surveyed bird usage and quality of habitat along the saltmarsh construction corridor.

10.17.113 Table 10.49 gives the mean numbers of birds present in the zone extending 300 metres either side of the bridge line and 100 metres each side. The species and numbers present are

consistent with habitat condition.

Table 10.49 - Bird Numbers on the New Bridge Line Across the Saltmarsh

Species	600 metres zone	200 metres zone
	Mean	Mean
Cormorant	0	0
Canada goose	9	4
Shelduck	0.6	0
Wigeon	0	0
Teal	15	3
Mallard	4	3
Golden plover	0	0
Lapwing	64	6
Dunlin	0	0
Curlew	1	1
Redshank	6	<1
All species	100	<20

10.17.114 The species listed would be disturbed to different extents, with Wigeon, Teal, Golden Plover, Dunlin, Curlew and Redshank being most sensitive to disturbance, and would probably be displaced. The other species, particularly Canada Goose and Mallard, are tolerant of a considerable level of disturbance and may not be displaced entirely from the surveyed corridor; they would probably respond by drawing back from the access road and pier construction sites, perhaps only up to approximately 100 metres or little more.

Assessment of Construction Effects on the Mersey Estuary European Site and SSSI

Introduction to Construction Effects

10.17.115 All the evidence available indicates that there are minimal movements between the European and the Upper Estuary, and that the populations of the two sites are effectively separate. Therefore, there are no grounds to predict significant negative effects on the integrity of the European Site as a result of any displacement of birds that may be predicted to result from construction and operation of the proposed New Bridge.

10.17.116 Notwithstanding this conclusion, as very small numbers of birds have been shown to move between the two sites and as numbers of birds might move under exceptional weather conditions, the issue is considered further in the context of the quantified effects of the construction of the New Bridge.

10.17.117 Although there are no proposals for construction activities within the European Site and SSSI, there is the potential for direct and indirect effects downstream of the construction site.

10.17.118 The previous assumptions made on the methods of construction apply here, as described in the *Construction Methods Report (B4027 OA/200 of 05.12.07* and revised 07.02.08).

Effects of Construction on the Mersey Estuary European Site and SSSI

10.17.119 The potential construction effects on the habitats and birdlife within the European Site fall into the following broad categories;

a. Temporary disturbance to breeding, feeding, roosting and loafing birds;
b. Temporary disturbance to commuting and migrating birds including bird movements

between the European Site in the Middle Mersey Estuary and the Upper Mersey Estuary;

c. Pollution caused by the release of contaminated materials, particularly sediments, and the release of heavy metals and other soluble compounds from those sediments, and possibly by oil spills and release of other contaminants from construction machinery; and,

d. Possible collisions of birds with the bridge structure and construction machinery.

Temporary disturbance to breeding, feeding, roosting and loafing birds

10.17.120 There is evidence from the baseline assessment that the bird communities of the European Site and those of the Upper Mersey Estuary are separate populations, with little evidence of birds that breed, feed and roost in the European Site using the Upper Mersey Estuary for feeding or roosting, and conversely no evidence of birds breeding in the Upper Mersey Estuary using the European Site for other activities. The surveys of bird movements have shown that gulls are the only species which use the European Site for roosting and sites upstream for feeding, the main commuting route being via the Upper Mersey Estuary.

10.17.121 Therefore construction disturbance to birds in the Upper Mersey Estuary will not affect birds such as Shelduck and Teal belonging to populations which satisfy the European Site qualification criteria. Birds within the Upper Mersey Estuary, if affected by disturbance, would move elsewhere in the Upper Mersey Estuary or to the power station lagoons.

10.17.122 Temporary disturbance will have no significant effect on bird populations of the European Site, but it will affect Shelduck and Teal in the Upper Estuary and other birds of the species which satisfy the European Site criteria because effects on birds in the Upper Estuary as assessed on the basis that the Upper Estuary is a pSPA.

Temporary disturbance to commuting and migrating birds including bird movements between the European Site and the Upper Mersey Estuary.

10.17.123 There is no evidence from the baseline assessment of regular bird movements of European Site qualifying species between the Upper and Middle parts of the Estuary. Further, there are very low densities of invertebrate prey species in the intertidal sand and mudflats of the Upper Mersey Estuary as reported in the Aquatic Ecology Chapter (Chapter 11.0). Therefore there are no reasons for birds belonging to the European populations downstream to use the intertidal habitats in the Upper Mersey Estuary upstream of the New Bridge for feeding.

10.17.124 If there is a delay of over two to three years or more before construction starts, it is possible that the numbers of invertebrate prey species in the Upper Mersey Estuary sediments could increase, and the biomass of particular species could increase, leading to some birds from the SPA moving to the Upper Mersey Estuary to feed. This is unlikely because even if water quality improves, the hydrodynamic conditions in the Upper Mersey Estuary will continue to limit invertebrate abundance in the intertidal sediments there.

10.17.125 Therefore temporary disturbance during construction will have no significant effect on the movements of European Site qualifying bird species.

Pollution caused by the release of contaminated materials, particularly sediments, and possibly by oil spills and release of other contaminants from construction machinery

10.17.126 The accidental spillage of oils and other contaminants from construction machinery could be carried on the ebbing tide or along the river channel flows into the European Site where saltmarsh vegetation and other intertidal habitats could be affected.

10.17.127 In Chapter 8 dealing with surface water quality it is stated at 8.6.20 the spillage of chemicals or

materials into the Estuary during construction would have a detrimental effect on water quality of the Estuary relative to the quantity and nature of the material that is released. It is also stated that water quality in the Estuary Study Area is classed as 'fair' and has a high dilution capacity.

10.17.128 Whilst small spills of fuels or chemicals could reach the European Site, particularly on an ebbing tide, the negative impact would be of much lower magnitude. Because of the high dilution capacity of the Estuary Study Area, as pointed out in the water quality Chapter, it is unlikely that there would be any significant adverse effect on the European Site.

10.17.129 Chapter 8 also assesses the effects of the construction of a piled jetty and cofferdams on the release of potentially contaminated sediments. It was concluded that the effect would be negligible, even if the release of such sediments occurred in one tidal cycle. It is stated that dilution within the tidal prism will minimise the effect.

10.17.130 It is also concluded in Chapter 8 that piling is unlikely to cause a change in water quality in the Estuary, even if sediments are released.

10.17.131 In Chapter 8 increases in sediment load due to scouring associated with construction of the towers are examined. It was concluded that potential scouring could increase the overall oxygen demand of the water immediately above the scour area by 17%, but the localised effect would be dissipated by dispersion. It was also concluded that any changes in oxygen demand due to the development of scour holes would be no different that that which presently occurs in the Estuary. Therefore it was advised that the effects of scour around the piles and cofferdams would not be significant.

10.17.132 A summary of construction effects of the Project on habitats in the European Site is shown in Table 10.50.

Table 10.50 - Assessment of the Construction Effects of the Project on Habitats Downstream in the European Site.

Receptor 4 – Habitats in the European Site			
Brief Description of Effect	Release of contaminants from saltmarsh sediments in Upper Mersey Estuary	Release of sediments from intertidal habitats including silt-flats and sandbanks in Upper Mersey Estuary	Pollution from oil and chemical spillages in the Upper Mersey Estuary
Effect	Pollution of saltmarsh and intertidal habitats in European Site by contaminants	Increased turbidity and deoxygenation of river and other tidal waters in European Site, and deposition of sediments on intertidal habitats	Oiling and chemical contamination of waters and intertidal habitats in European Site
+ve or –ve or neutral	Negative	Negative	Negative
Timescale of effect	Short term	Short term	Short term
Permanent or temporary	Temporary	Temporary	Temporary
Direct or indirect effect	Direct	Direct	Direct
Secondary effect	None	None	None
Importance	High	High	High

Receptor 4 – Habitats in the European Site			
Magnitude	Low	Low	High
Significance	Not significant	Not significant	Moderate
Comments Box	The effects under examination are pollutants and sediments released in the Upper Mersey Estuary and carried downstream into the European Site.		

Possible collisions of birds with the bridge structure and construction machinery, and potential oiling or chemical contamination of birds

10.17.133 The baseline surveys have shown that there is no significant movement of birds of European Site importance across or through the construction area, so there is no significant risk of effects such as disturbance that could affect the bird populations in the European Site. The movements of low numbers of birds through or passing the working areas and structures (e.g. towers and cranes) would not be obstructed and there is no significant risk of collisions with structures or slow-moving machinery or vehicles.

10.17.134 There is no evidence to suggest that the commuting gulls will be affected because they are already adept at circumnavigating the existing bridges or flying over the bridges. Although the new bridge structure will be high at the apex of the Cable Stays, it is likely that the gulls will simply fly through the lower parts of the triangular gaps and hence will habituate to safe flyways through or past the bridge structure during its assembly.

10.17.135 The main difference is that the Project will present the gulls with three structures to pass, in fairly close succession during their twice daily commuting. It is probable that the gulls will simply remain at altitude after passing the first bridge structure, which will be the Project in the evening during their commuting downstream, so there will be little or no additional energy expended during their daily commuting activities.

10.17.136 Table 10.51 summarises the construction effects of the Project on birds in the European Site.

Table 10.51 - Assessment of the Construction Effects of the Project on Birds Downstream in the European Site.

Receptor 5 – Birds in the European Site			
Brief Description of Effect	Presence of structures and machinery	Movements of machinery	Pollution from oil and chemical spillages in Upper Mersey Estuary
Effect	Obstruction to bird movements and collisions of birds with structures and machinery	Disturbance to birds and obstruction of bird movements	Oiling of birds and ingestion of chemicals
+ve or –ve or neutral	Negative	Negative	Negative
Timescale of effect	Short term	Short term	Short term
Permanent or temporary	Temporary	Temporary	Temporary
Direct or indirect effect	Direct	Direct	Direct
Secondary effect	None	None	None

Receptor 5 – Birds in the European Site			
Importance	High	High	High
Magnitude	Negligible	Negligible	High
Significance	Not significant	Not significant	Moderate
Comments Box	The effects under examination in the first two columns are due to machinery and structure in the Upper Estuary. The effects under examination in the third column are pollutants and sediments released in the Upper Mersey Estuary and carried downstream into the European Site. This also applies to their effects in the Upper Mersey Estuary.		

Assessment of Operational Effects on the Upper Mersey Estuary LWS

Introduction to Operational Effects

10.17.137 When the bridge is operational, it will carry vehicles, and be lit at night. The effects of these activities on birds are likely to be less than the disturbance effects of construction because the level of noise will be more continuous by day and, at lower intensity, probably also at night. Research has shown that sustained high levels of traffic noise affect breeding densities of a number of waterfowl species including lapwing and black-tailed godwit (Reijnen et al 1996), though effects on redshank found by Van der Zande et al (1980) were not confirmed by this later study. There are, however, no studies suggesting that traffic noise affects the use of feeding grounds by wintering birds and no effect is predicted.

10.17.138 By way of introduction to the operational effects of the Project, reference is made to the M4 Severn Road Bridge which is known as the Second Severn Crossing. This crosses the Severn Estuary which is of major UK and international nature conservation importance.

10.17.139 The Second Severn Crossing has been examined on several occasions by Environmental Research & Advisory Partnership in connection with the Project Environmental Effect Assessment. Details of the study are provided in the report which is presented in Appendix 10.22 and summarised here.

10.17.140 The Severn Estuary is located between Wales and England at the mouth of four major rivers (the Severn, Wye, Usk and Avon) and many lesser rivers. It is a large estuary with extensive intertidal mudflats and sandflats, rocky platforms and islands. Saltmarsh fringes the coast backed by grazing marsh with freshwater ditches and occasional brackish ditches. Beds of eel-grass (*Zostera* spp.) occur on the more sheltered mud and sand-banks. The seabed is rock and gravel with sub-tidal sandbanks.

10.17.141 A greater variety of invertebrates tend to occur on the intertidal rock platforms, a more stable habitat with rock pools and a relatively high cover of seaweeds. The immense tidal range, (the second highest in the world), and classic funnel shape, make the Severn Estuary unique in Britain and very rare worldwide. This tidal regime results in plant and animal communities typical of the extreme physical conditions of liquid mud and tide-swept sand and rock.

10.17.142 The species-poor invertebrate community includes high densities of ragworms, lugworms and other invertebrates forming an important food source for passage and wintering waders. A further consequence of the large tidal range is an extensive intertidal zone, one of the largest in the UK. The site is of importance during the spring and autumn migration periods for waders moving up the west coast of Britain, as well as in winter for large numbers of waterbirds, especially swans, ducks and waders.

10.17.143 As described in Appendix 10.22, the Severn Estuary is covered by several nature conservation designations including SSSI, SPA, Important Bird Area (IBA) and Ramsar Site. It is of international importance.

10.17.144 Therefore, in many respects, the Severn Estuary has features in common with the (Mersey Estuary European Site and the Upper Mersey Estuary). These include the intertidal sand and mudflats, the saltmarsh vegetation, some of which is ungrazed, large populations of roosting, feeding and passage wildfowl and waders, and high densities of aquatic invertebrates. Also in common are the national and international designations.

10.17.145 However there are important differences between the two estuaries in that the Severn Estuary is very much larger in area and it has not been affected by past pollution to anything like the extent of that suffered by the Mersey Estuary. It does not have the industrial setting of that experienced by the Mersey Estuary.

10.17.146 The Second Severn Crossing Study came to the following conclusions as reported in Appendix 10.22;

a. The literature review found no evidence to indicate that the M4 Crossing is a current or future threat to the wading bird interests of the site, which is of international importance;
b. Field surveys were completed in the autumn and winter months. The surveys found little evidence to indicate that presence of the road bridge directly affects wading bird feeding, distribution or roosting behaviour. The main threats detected on the survey days were recreational disturbance, especially by dog walkers; and
c. The main effect was on the flight pattern of three species, Curlew, Dunlin and Lapwing; their flight paths were temporarily altered as they preferred to fly above the bridge. However, this effect was short-lived and the birds returned to their normal flight cruising height within 100 metres, with the general direction of flight being unaffected throughout.

10.17.147 Part of the Second Severn Crossing bridge structure has Cable Stayed Spans as proposed for the Project.

10.17.148 The Second Severn Crossing is an informative example for this assessment because it represents a large and continuous structure crossing the entire width of a major estuary which is internationally important for its estuarine habitats and birdlife.

Apart from the differences between the two estuaries, there is an important difference between the two developments which requires consideration. The Second Severn Crossing passes through the designated site along its entire length whereas the Project will be located outside the designated site and does not present such direct effects on habitats and fauna.

10.17.149 Physical consequences of the Second Severn Crossing passing through the European Site are the following losses of areas of Sub-features;

a. There are been losses of small amounts of saltmarsh directly due to the bridge footprint and indirectly due to shading;
b. Losses or intertidal sand, silt and mud-flat feeding and roosting habitats for birds have occurred due to the bridge footprint, and possibly indirect effects due to shading;
c. Small amounts of rocky shore habitat have been lost, directly due to the bridge supports, with possible deterioration of additional habitat caused by shading; and
d. River channels and sub-tidal habitats have been lost due to the bridge footprint.

10.17.150 The potential operational effects of the Project are;

a. The presence of the piers and towers could result in increased erosion of the saltmarsh and sediments;
b. The presence of the piers and towers could also deter breeding, feeding, roosting and other birds from their proximity;
c. There could be disturbance to the birdlife of the Upper Mersey Estuary LWS due to the presence of the bridge structure, traffic movements, noise, lighting and maintenance work;
d. The migration of birds, particularly passage wildfowl and waders, between the designated site and elsewhere could be affected by either obstruction or collisions with the bridge structure and/or by traffic;
e. Lighting and traffic movements could disorientate birds and other wildlife including bats, in the designated site and in the Upper Mersey Estuary (LWS);
f. The use of the bridge by traffic could pose a pollution threat as a result of accidental collisions and other events to the LWS; and
g. The bridge may cause shading of saltmarsh vegetation and potential inhibition of growth with the possibility of dieback in the LWS if there is heavy shading.

10.17.151 These potential operational effects are discussed below, with account taken of all Project inspection and maintenance works.

Increased erosion of the saltmarshes and sediments caused by the towers and piers

10.17.152 The investigations reported in the Hydrodynamics and Estuarine Processes Chapter (Chapter 7.0) have produced no firm evidence that the presence of the towers and piers will cause increased erosion of saltmarsh vegetation or intertidal sediments.

10.17.153 The Upper Estuary is characterised by shifting tidal sand flats bordered by saltmarsh. The influence of the Narrows at the entrance to the Mersey and the Runcorn Gap is to cause a short tidal flood period and a considerably longer ebb period. The natural channels through the Upper Estuary meander in a highly unpredictable manner and rework the top few metres of silt and sand in a continuous process. Regardless of any other influences, this would greatly restrict the development of a diverse infauna capable of supporting a large population of bird species by preventing settlement and development of shellfish beds and populations of the larger annelids such as *Arenicola* and *Hediste*. This process also effects the formation and persistence of drainage channels across the flats; these features are recognised as providing particularly favourable feeding sites for wader species (Lourenço *et al* 2005).

10.17.154 Computer modelling of the effects of the presence of the bridge on the bathymetry of the Upper Estuary indicate very little change (Chapter 7: Hydrodynamic and Estuarine Processes). Predicted change in bathymetry over a simulated period of 12 months is typically of the order of 0.2 metre with maxima in the order of 0.4 metre. These results need to be considered in relation to a regime where differences in bathymetry over a relatively short period can exceed 1.5 metres. It is concluded that effects on the Upper Estuary will be insignificant and will have no discernible effects on bird food resources.

10.17.155 A view has been expressed that a meandering channel could attach to a tower and become fixed. Detailed and extensive investigation as reported in Chapter 7 has found no evidence that such a circumstance could arise. Were it to do so, there are no grounds to suppose that effects on birds would be negative because more stability in the inter-tidal zone would enable the development of conditions in which a more abundant range of food resources would flourish.

Effects of the presence of the towers and piers on breeding, feeding and roosting birds

10.17.156 The presence of the towers, piers and bridge structure is predicted to deter some species of breeding, feeding and roosting birds, but evidence from the Second Severn Crossing indicates that many bird species, including flocks, use the estuarine habitat in close proximity to the bridge supports and even go beneath the bridge. A moderate magnitude, negative and permanent effect is predicted because there will be saltmarsh bird-breeding habitat adjacent to the New Bridge which could result in disturbance to Skylark and other birds which may be more sensitive to disturbance compared with wildfowl and waders, particularly in the breeding season.

Disturbance to birdlife of the Upper Mersey Estuary (treated as pSPA)

10.17.157 Previous investigations by Environmental Research & Advisory Partnership for North West Water, of wildfowl and wader disturbance at Crossens and Marshside Marshes at Southport, have shown that bird disturbance from adjacent highways, after habituation, is limited to about 50-200 metres, depending on the species affected and provided the disturbance is from a source above the level of the saltmarsh. At this site the traffic and human disturbance was from a highway on embankment, not on a bridge supported by piers.

10.17.158 Observations of bird movements past the M48 Severn bridge were made over a continuous period of 13 hours in February 2004. Nine species were noted feeding within 100 metres of the bridge, namely oystercatcher (95 birds), lapwing (210), knot (1), dunlin (88), bar-tailed godwit (1), black-tailed godwit (3), curlew (310), redshank (29) and turnstone (30). Lapwing and turnstone were recorded feeding directly under the bridge. It was considered that the feeding habitat directly under the bridge was less suitable for other species. Three species roosted within 50 metres of the bridge. They were lapwing (81 birds), dunlin (8) and turnstone (22). Mallard (119 birds) roosted directly under the bridge.

10.17.159 It is therefore concluded that the presence of the New Bridge will have no negative effects on birds feeding in the vicinity, apart from the loss of saltmarsh habitat due to shading.

10.17.160 The disturbance effect to birds is predicted to be low, negative and permanent in the LWS (treated as pSPA).

Collision risk

10.17.161 Documented collision events involving birds are associated with a combination of circumstances, typically birds moving at night in bad visibility or where strong light attracts nocturnal migrants which then collide with unlit obstacles such as mast lattices and guy wires. In general, it is large species such as Canada geese that are more at risk than smaller species including ducks and waders.

10.17.162 The New Bridge is a large structure and will be lit by highways lighting at night and in poor light. Cables are of large diameter (approximately 350mm) and are likely to be seen even at night. The bird species present are almost all capable of in-flight manoeuvres to avoid obstacles. Based on size, Canada geese and shelduck are at moderate risk but other species that regularly occur in the Estuary are at low risk. Although collision risk in bad visibility cannot be ruled out it is considered that any mortality events will be infrequent and involve small numbers of birds of species whose populations are not vulnerable so that recovery of numbers is predicted.

Obstructions to bird movements and effects on migrating birds, to and from the designated site, and the Local Wildlife Site (treated as pSPA)

10.17.163 A literature search has found no published studies of the effects of construction of a major bridge on estuarine bird movements. Anecdotal information suggests that birds move freely both below and above structures.

10.17.164 Observations of bird movements past the M48 Severn Bridge were made over a continuous 13 hour period in February 2004. Nine species were noted feeding within 100 metres of the bridge and four within 50 metres. Five wader species were noted to fly past the bridge (Table 10.51a)

Table 10.51a - Bird movements past the Severn bridge

Species	Number of events	Number of birds	Flight path	Modified flight path
Oystercatcher	3	17	Under	No
Lapwing	5	333	Over	Yes
Dunlin	3	103	Over	Yes
Curlew	22	172	Over	Yes
Turnstone	2	23	Under	No

10.17.165 Birds that flew over the bridge altered their flight altitude when approaching and then to dropped to the former height. Cormorant, mute swan, shelduck and mallard flew both under and over the bridge without deviation. One pair of shelduck turned back from the bridge. Gulls flew both over and under the bridge.

10.17.166 The study of bird movements at the Runcorn Bridge found that 14 species flew past it. They were cormorant, heron, mute swan, Canada goose, greylag, shelduck, teal, mallard, tufted duck, oystercatcher, lapwing, dunlin, curlew, turnstone and redshank; of these species, cormorant, heron, mallard, dunlin and redshank flew beneath the bridge.

10.17.167 The available evidence indicates that the bridge will not obstruct bird movements around the Upper Estuary.

10.17.168 There are no predicted or potentially significant effects on migrating wildfowl and waders which use the designated site because birds are unlikely to be using the Upper Mersey Estuary as a migratory corridor when entering or leaving the European Site. There is no evidence of such movements from any of the surveys and the relatively large area of the European Site makes it highly improbable that birds will use a route through the Runcorn Gap and beyond to the Project when there are numerous opportunities to fly in other directions.

10.17.169 Even if the Project does inhibit the movements of migratory birds, the bridge is easily avoided. Effects on migratory birds are expected to be absent or of no significance.

10.17.170 In the case of the Upper Mersey Estuary, the Project is likely to have a similar effect to that of the existing bridges. The baseline survey results have indicated that there is significant habituation but there is no saltmarsh in sufficiently close proximity to the existing bridges to assess the effects on birds breeding on the saltmarshes.

Disorientation of birds and bats by traffic movements and lighting

10.17.171 The effects on the birdlife of the LWS are assessed as being moderate, negative and permanent, largely because of the reduction in suitable bird breeding habitat on the saltmarshes.

10.17.172 The birdlife and any bat activity associated with the Upper Mersey Estuary are not predicted to be affected adversely because of the low numbers of birds present, their predicted habituation to the New Bridge and to traffic movements, and the occurrence of bat activity along specific linear habitats, and related factors considered earlier.

10.17.173 The risk of disorientation of birds and bats is assessed as being low because both groups of species are likely to avoid the bridge because of its structure, noise and traffic movements. However there is a low risk of negative and permanent effects.

Pollution from oil releases and from traffic collisions

10.17.174 There is a risk of local pollution from oils and chemicals release by traffic, particularly from accidental collisions.

10.17.175 Any releases of oils and petroleum products, or chemicals, are likely to be diluted out because, as stated in Chapter 8 dealing with surface water pollution, the Estuary has a high dilution capacity. Therefore accidental releases of pollutants that may subsequently enter the Estuary are assessed as being of moderate magnitude and moderate significance.

Shading of saltmarsh vegetation

10.17.176 There is likely to be significant shading of parts of the saltmarsh vegetation beneath the centre-line of the New Bridge.

10.17.177 Studies by Environmental Research & Advisory Partnership of the Second Severn Crossing and bridges over riverside grassland have shown that suppression of saltmarsh and grassland occurs beneath bridge decks, and this can extend a short distance beyond the spread of the bridge deck, depending on the bridge alignment.

10.17.178 At the Second Severn Crossing there has been complete dieback of saltmarsh beneath parts of some sections of the bridge but the extent of dieback depends on the alignment of the bridge and to a minor extent by the presence of piers. However complete dieback is always restricted to areas beneath the centre-line of the bridge and nearby.

10.17.179 It is assumed that the central third of the strip of saltmarsh vegetation beneath the bridge will become devoid of vegetation. This would result in the permanent a loss of approximately 1.2 hectares of saltmarsh vegetation.

10.17.180 The dieback of vegetation may result in increased erosion within affected saltmarsh habitat due to the loss of root binding and reduced stabilisation of the sediments. This effect may be exacerbated by the presence of creeks which may form wider channels and increased loss of saltmarsh, thereby destabilising larger areas of saltmarsh and increased vulnerability during high spring tides and prolonged and heavy rainfall.

10.17.181 It is also likely that towers and piers constructed over intertidal habitats with no present saltmarsh cover would, in due course and in the absence of the bridge, be colonised by saltmarsh vegetation. Colonisation will be inhibited by shading which may reduce the stabilising effect of saltmarsh accretion. This effect, excluding effects on existing saltmarsh vegetation, will be of low magnitude, negative and permanent.

10.17.182 There has been no such erosion effect under the Severn Bridge because the estuary bed is very stable, fairly level, rocky in places, and is not subjected to the same high level of hydrodynamic forces as in the Upper Mersey Estuary.

10.17.183 The overall effect of shading, on existing saltmarsh vegetation and on potential saltmarsh vegetation if accretion occurs beneath sections supported by towers, is assessed as being of moderate magnitude, negative and permanent.

10.17.184 The operational effects, in the absence of mitigation, are summarised in Table 5.52 for effects on habitats, and in Table 10.53 for effects on birds.

Table 10.52 - Assessment of the Operational Effects of the Project on Habitats in the Upper Mersey Estuary LWS (treated as pSPA).

Receptors 1 & 2 – Habitats in the Upper Mersey Estuary LWS			
Brief Description of Effect	Presence of piers and towers	Release of oils and other pollutants from traffic	Shading of saltmarsh vegetation
Effect	Erosion of saltmarsh and sediments	Pollution of saltmarsh and other intertidal habitats, and river channels	Inhibition of growth or dieback of vegetation
+ve or –ve or neutral	Neutral	Negative	Negative
Timescale of effect	Long-term	Long-term	Long-term
Permanent or temporary	Permanent	Temporary	Permanent
Direct or indirect effect	Direct	Direct	Direct
Secondary effect	None	None	Erosion of sediments
Importance	High	High	High
Magnitude	Negligible	Low	Low
Significance	Not significant	Low	Low
Comments Box	The effects are assessed on the existing locations and extents of receptor habitats and do not allow for changes in the distribution of saltmarsh vegetation, intertidal habitats and river channels.		

Table 10.53 - Assessment of the Operational Effects of the Project on Birds in the Upper Mersey Estuary LWS (treated as pSPA).

Receptor 3 – Birds in the Upper Mersey Estuary LWS			
Brief Description of Effect	Presence of bridge structure	Movements of traffic, noise and artificial light	Pollution from oils and road run-off
Effect	Disturbance to breeding, feeding, roosting and flying birds	Disturbance to breeding, feeding and roosting birds, and disorientation of birds	Oiling of birds
+ve or –ve or neutral	Negative	Negative	Negative
Timescale of effect	Long-term	Long-term	Long-term
Permanent or temporary	Permanent	Permanent	Permanent
Direct or indirect effect	Direct	Direct	Direct
Secondary effect	None	None	None
Importance	High	High	High
Magnitude	Moderate	Low	Low
Significance	Moderate	Moderate	Low
Comments Box	It is assumed that there will be habituation of birds to the effects but this will differ according to species.		

10.17.185 The Project will be too far upstream from the European Site to cause direct disturbance by the presence of the bridge structure or by traffic movements. The bridge will be at least 1,800 metres from the European Site, and there is the intervening Runcorn Gap and the presence of the existing railway viaduct and the SJB, both of which will remain in use.

10.17.186 Little of the bridge will be visible by birds within the European Site. The Project structure and its traffic will be above ground and water level.

10.17.187 There will be no disturbance to the birdlife of the European Site in the light of the baseline information which has shown that there are no significant movements of wildfowl and waders, with the exception of gulls, between the European Site and the Upper Mersey Estuary.

10.17.188 There is a risk of local pollution from oils and chemicals release by traffic, particularly from accidental collisions. This is assessed as a moderate effect in the absence of standard best practice pollution prevention measures as required by the Environment Agency.

Assessment of Operational Effects on the Estuary SSSI and on the European Site

Disturbance and obstructions to commuting and migrating birds including bird movements between the European Site and the Upper Mersey Estuary

10.17.189 The baseline surveys have shown that there are very few movements of commuting and migratory birds across the Project construction corridor, and no significant movements of birds between the Upper Mersey Estuary and the European Site, with the exception of gulls. The populations of wildfowl and waders in the European Site are different to those in the Upper Mersey Estuary with no significant interchange of birds.

10.17.190 The observations of commuting gull behaviour indicate that gulls, and other birds to a lesser extent, will avoid the bridge structure and its traffic, by flying over the bridge, under the bridge, between the cable stays, or bypassing the bridge on either side.

10.17.191 The effects are therefore predicted to be not significant.

Pollution caused by the release of oils, petrol and other contaminants from traffic

10.17.192 Any release of pollutants from bridge traffic is predicted to be localised and will be greatly diluted if it enters the river channels or tidal water and subsequently reaches the sensitive saltmarsh and inter-tidal habitats in the European Site. There will be greater dilution before any pollution reaches the European Site if it is released during flow tide.

10.17.193 The findings of Chapter 8 which covers surface water quality are that the water of the Estuary has a high dilution capacity. The pollution from normal traffic movements and other than major catastrophes is assessed as a low, negative and temporary effect.

10.17.194 The Contamination of Soils, Sediments and Groundwater Chapter (Chapter 14.0) has shown that potential contaminants of concern in the Upper Mersey Estuary are metals/metalloids including heavy metals, polycyclic aromatic hydrocarbons, ammonia and pesticides.

10.17.195 The concentrations of contaminants are greatest in the top two metres of saltmarsh and made ground. In the intertidal silt and sandbanks the concentrations are low and below the limits of probable effects. Thus the source of any pollution risk to the European Site would be the superficial and upper saltmarsh sediments if they were released as a result of the presence of the bridge piers and towers causing changes to the hydrodynamics of the Upper Mersey Estuary, or as a result of saltmarsh erosion in the Upper Estuary following the removal of the access roads and subsequent channel erosion.

10.17.196 The Hydrodynamics and Estuarine Processes Chapter 7.0 predicts no significant change in the extent and locations of the intertidal habitats as a result of the Project construction and use, other than changes that would be expected to occur naturally. Therefore there will be no risk of pollution of the European Site from the presence and use of the Project.

Possible collisions of birds with the bridge structure and traffic

10.17.197 The possibility of bird collisions with the bridge structure and traffic cannot be completely discounted, but there will be habituation as is evident from the earlier description of gull behaviour.

10.17.198 The potential for effects on birds is concluded to be very low and not significant.

10.17.199 A summary of the operational effects of the Project on habitats in the European Site is in Table 10.54.

Table 10.54 - Assessment of the Operational Effects of the Project on Habitats in the Middle Mersey Estuary SPA for Birds

Receptor 4 - Habitats in the Middle Mersey Estuary SPA for Birds		
Brief Description of Effect	Presence of piers and towers	Pollution due to release of oils and other contaminants from traffic
Effect	Pollution of intertidal habitats and channels due to increased release of contaminants	Pollution of saltmarsh and other intertidal habitats, and river channels
+ve or –ve or neutral	Neutral	Negative
Timescale of effect	Long-term	Long-term
Permanent or temporary	Permanent	Temporary
Direct or indirect effect	Direct	Direct
Secondary effect	None	None
Importance	High	High
Magnitude	None	Low
Significance	Not significant	Low
Comments Box	The pollution effects are an existing effect but consideration has been given to an increase in traffic volumes and continued use of the existing bridge.	

10.17.200 A summary of the operational effects of the Project on birds in the European Site is given in Table 10.55.

Table 10.55 - Assessment of the Operational Effects of the Project on Birds in the Middle Mersey Estuary SPA for Birds

Receptor 5 - Wildfowl and Wading Birds in the Middle Mersey Estuary SPA for Birds			
Brief Description of Effect	Presence of the bridge and traffic movements, noise and artificial light	Presence of fast-moving traffic and associated hazards to birds	Pollution due to release of oils and other contaminants from traffic.
Effect	Disturbance and obstructions to commuting and migrating birds from SPA	Bird collisions with traffic and disorientation of birds	Pollution of birds using the intertidal habitats, and river channels
+ve or –ve or neutral	Negative	Negative	Negative
Timescale of effect	Long-term	Short-term	Short-term
Permanent or temporary	Permanent	Permanent	Permanent
Direct or indirect effect	Direct	Direct	Direct
Secondary effect	None	None	None
Importance	High	High	High

Receptor 5 - Wildfowl and Wading Birds in the Middle Mersey Estuary SPA for Birds			
Magnitude	Negligible	Negligible	Low
Significance	Not significant	Not significant	Low
Comments Box	It is assumed that bird collisions and pollution of birds can occur at any time and the threat of such effects is permanent but each time the effect occurs, its duration is short-term.		

10.17.201 The preceding tables shows that the only significant operational effect of the Project on birds is pollution from oils and other materials released by traffic, either through the accumulation of frequent minor discharges or from major pollution incidents. There are negligible effects from the presence of the bridge structure and from traffic movements.

Assessment of Construction and Operational Effects on the St. Helens Canal LWS

Construction Effects

10.17.202 The crossing of the St. Helens Canal will result in the total and temporary loss of vegetation and aquatic habitat within the working corridor section, due to the proposed temporary infilling of the section of the canal crossed by the works. However there will be maintenance of hydraulic connectivity by a temporary pipe system.

10.17.203 The effect will be moderate, negative and temporary because the canal habitat on either side of the construction corridor is unlikely to be significantly affected. However the canal habitat will be fragmented and reduced in area for the duration of construction which is expected to be nine months. This is likely to result in a moderate reduction in the numbers of breeding birds along the canal because of the temporary loss of breeding habitat and disturbance on both sides of the works

10.17.204 There will be no adverse effect on protected species because the Water Vole populations have disappeared.

10.17.205 The water channel and its original physical features will be restored after bridge construction but there will be a minor realignment of the restored section of the canal.

10.17.206 The construction effects are summarised in Table 10.56.

Table 10.56 - Assessment of the Construction Effects of the New Bridge on the St. Helens Canal LWS.

Receptor 6 - St. Helens Canal Local Wildlife Site			
Brief Description of Effect	Infilling a section of the canal	Construction activities involving movements of machinery and noise	
Effect	Loss of aquatic and water-margin habitats and vegetation	Disturbance to fauna	Fragmentation of the canal habitat
+ve or –ve or neutral	Negative	Negative	Negative
Timescale of effect	Short-term	Short-term	Short-term
Permanent or temporary	Temporary	Temporary	Temporary

Direct or indirect effect	Direct	Direct	Direct
Secondary effect	Fragmentation	Reduction in fauna	Reduction in fauna
Importance	Moderate	Moderate	Moderate
Magnitude	Moderate	Moderate	Low
Significance	Moderate	Moderate	Low
Comments Box	It is assumed that the canal will not be restored for boating.		

Operational Effects

10.17.207 After construction there will be recolonisation of the aquatic habitat of the canal by fish and invertebrates but the canal bank vegetation including the tall swamp and wetland herb species (Common Reed and Yellow Iris) will be suppressed by shading, and submerged and floating-leaved aquatic species will be similarly affected. The effect on vegetation will be moderate, negative and permanent.

10.17.208 The movements of birds and other fauna between the eastern and western sections of the canal are unlikely to be significantly affected because there will be sufficient clearance for most species to fly beneath the bridge.

10.17.209 The noise and movements of traffic across the New Bridge are unlikely to cause significant disturbance to birds and other fauna but the presence of the bridge is likely to deter birds from breeding close to it.

10.17.210 The operational effects are summarised in Table 10.57.

Table 10.57 - Assessment of the Operational Effects of the New Bridge on the St. Helens Canal LWS.

Receptor 6 - St. Helens Canal Local Wildlife Site			
Brief Description of Effect	Presence of the New Bridge structure	Presence of the bridge and traffic use	
Effect	Shading of the canal vegetation and change to the local environment	Disturbance to birds	Fragmentation of the canal habitat
+ve or –ve or neutral	Negative	Negative	Negative
Timescale of effect	Long-term	Long-term	Long-term
Permanent or temporary	Permanent	Permanent	Permanent
Direct or indirect effect	Direct	Direct	Direct
Secondary effect	Reduction of invertebrate fauna	None	Reduction in fauna
Importance	Moderate	Moderate	Moderate
Magnitude	Moderate	Low	Negligible
Significance	Moderate significance	Low significance	Not significant

Receptor 6 - St. Helens Canal Local Wildlife Site	
Comments Box	It is assumed that the canal will not be restored for boating.

Assessment of Construction and Operational Effects on the Manchester Ship Canal Bank LWS

Construction Effects

10.17.211 There will be inevitable disturbance and localised losses of the Manchester Ship Canal Bank vegetation during construction but it should be possible to retain the existing terrain without the wholesale loss of habitat and vegetation.

10.17.212 There will be significant and negative effects on plant communities and populations of orchid species and other important plant species such as Grass Vetchling (*Lathyrus nissolia*) due to trampling and use of the canal bank for access and construction-related operations. The sizes of orchid populations are likely to be reduced.

10.17.213 There will also be an effect on fauna, particularly butterflies, and breeding birds will be disturbed if construction starts within the bird-breeding season. The overall effect will be of moderate magnitude and negative**.** There may be regeneration of affected plants and vegetation in some areas but there is a risk of damage beyond recovery in some places.

10.17.214 The construction effects are summarised in Table 10.58.

Table 10.58 - Assessment of the Construction Effects of the New Bridge on the Manchester Ship Canal Bank LWS.

Receptor 7 - Manchester Ship Canal Bank Local Wildlife Site			
Brief Description of Effect	Construction activities involving access, movements of machinery and personnel, and storage of materials	Construction activities and presence of the bridge	Construction activities
Effect	Mechanical and trampling damage to soils, vegetation and plant species.	Disturbance to breeding birds	Damage to butterflies
+ve or –ve or neutral	Negative	Negative	Negative
Timescale of effect	Short-term	Short-term	Short-term
Permanent or temporary	Temporary, partly permanent	Temporary	Temporary
Direct or indirect effect	Direct	Direct	Direct
Secondary effect	Change in species composition of the vegetation	None	None
Importance	Moderate	Moderate	Low
Magnitude	Moderate	Moderate	Low
Significance	Moderate	Moderate	Low
Comments Box;	Disturbance to breeding birds would be of negligible magnitude if construction starts outside the breeding season.		

Operational effects

10.17.215 The presence of the bridge will result in shading and interception of rainfall which will suppress the growth of vegetation but both shading and rainfall effects will be lessened by the height of the bridge. This will apply particularly to plant species that require moist and/or sunny aspects, particularly marsh orchids (*Dactylorhiza* species) and Grass Vetchling.

10.17.216 There may be changes in the species composition of the vegetation as a result of shading of the more vigorous grasses and forbs, and as a consequence of permanent changes in soil moisture conditions and decreased permeability (impeded drainage) due to movements of machinery and trampling in the construction phase.

10.17.217 The movements of traffic and noise are unlikely to affect the biological importance of the Ship Canal Bank because its importance is largely botanical.

10.17.218 Fauna including butterflies are likely to be reduced due to the combined effects of shading, sparse vegetation and compacted soil conditions.

10.17.219 The operational effects on the Manchester Ship Canal Bank LWS are summarised in Table 10.59.

Table 10.59 - Assessment of the Operational Effects of the New Bridge on the Manchester Ship Canal Bank LWS.

Receptor 7 - Manchester Ship Canal Bank Local Wildlife Site			
Brief Description of Effect	Presence of the bridge including shading and interception of rainfall.	Compacted and poorly drained soils.	Shading, dry and compacted soils
Effect	Inhibition of plant growth of orchids and other plant species requiring sunny habitats and moist soils	Inhibition of plant growth	Sparse vegetation and poor habitat for invertebrates and other fauna
+ve or –ve or neutral	Negative	Negative	Negative
Timescale of effect	Long-term	Long-term	Long-term
Permanent or temporary	Permanent	Permanent	Permanent
Direct or indirect effect	Direct	Direct	Direct
Secondary effect	Change in species composition and ground cover of the vegetation	Changes in species composition	Changes in species composition
Importance	Moderate	Moderate	Moderate
Magnitude	Moderate	Low	Low
Significance	Moderate	Low	Low
Comments Box	Moving traffic and noise are not expected to have a significant effect on wildlife.		

Assessment of Construction and Operational Effects on Wigg Island Local Wildlife Site and Local Nature Reserve.

10.17.220 The Project crosses Wigg Island LWS and LNR in the eastern part of the Reserve. The route, after crossing the Manchester Ship Canal in the south, crosses the south-western corner of a large woodland area after which it crosses the restored channel of the former Runcorn to Latchford Canal. The route is then aligned to the north-west, passing over woodland and the eastern part of a grassland area before crossing a further wooded area and then crossing Astmoor Saltmarsh.

10.17.221 The crossing of Wigg Island will be at a high level and on four piers because of the elevated crossing of the Manchester Ship Canal in the south and the need to maintain a similar high level as it proceeds over the saltmarsh, also on piers, and then over the River channels and associated inter-tidal habitats on piers and towers.

Construction Effects

10.17.222 Construction effects on Wigg Island will cause localised but fairly limited losses of woodland habitat during the construction of the four pairs of piers and associated bridgeworks. Although the woodland losses are likely to be fairly small, they will be significant because they are part of a managed Local Nature Reserve for which a Management Plan has been prepared and is in the course of implementation. There is a Work Programme prepared by Halton Borough Council which involves the management of habitats including the woodlands and grasslands throughout the period of 2007 until 2011.

10.17.223 Construction disturbance will inevitably affect breeding and other birds as a result of the movements of machines and delivery of construction materials. There will also be construction activities overhead which are likely to disturb tree canopy birds.

10.17.224 Access to Astmoor Saltmarsh will be necessary which may affect the woodlands and other habitats on Wigg Island, depending on the access routes to the saltmarsh.

10.17.225 The construction effects are summarised in Table 10.60.

Table 10.60 - Assessment of the Construction Effects of the New Bridge on Wigg Island LWS and Local Nature Reserve.

Receptor 8 – Wigg Island LWS and Local Nature Reserve				
Brief Description of Effect	Construction activities involving access, movements of machinery and personnel, and storage of materials	Construction activities and presence of the bridge structure	Construction activities	Construction activities and presence of the bridge structure
Effect	Loss of habitat and vegetation. Mechanical and trampling damage to soils, vegetation and plant species.	Disturbance to breeding birds	Damage and losses of butterfly and other invertebrate habitats	Reduction in aesthetic appeal and tranquillity of the Local Nature Reserve
+ve or –ve or neutral	Negative	Negative	Negative	Negative
Timescale of effect	Short-term	Short-term	Short-term	Short-term
Permanent or temporary	Temporary and partly permanent	Temporary and partly permanent	Temporary, possibly some permanent	Temporary and partly permanent
Direct or indirect effect	Direct	Direct	Direct	Direct
Secondary effect	Change in species composition of the vegetation	None	None	None
Importance	High	High	High	High
Magnitude	Moderate	Moderate	Moderate	High
Significance	Moderate	Moderate	Moderate	High
Comments Box;	The importance of the receptor site, the Local Nature Reserve, is assessed as high because of its value to local people and visitors as a wildlife resource, in additional to its intrinsic importance and potential for enhancement through conservation management. Disturbance to breeding birds would be of low magnitude if construction starts outside the breeding season.			

10.17.226 The fourth effect column in the above Table 10.60 assesses the effects of a reduction in aesthetic appeal and tranquillity of the Local Nature Reserve. This relates to the criterion introduced by Ratcliffe (1977) as “intrinsic appeal” which he considered to be “an awkward philosophical point”

10.17.227 However “intrinsic appeal” is considered to be an important attribute of the Local Nature Reserve and is, essentially, an important sub-feature of the site, being a place where the land is used and managed specifically for wild nature. In many respects Wigg Island is an isolated,

remote and undisturbed piece of land, even though it has had an industrial past but which is now long gone, at least in the central and eastern parts of Wigg Island where landfilling has ceased and where natural colonisation has occurred to the extent that the site now has a high degree of naturalness.

10.17.228 The Project construction works and the appearance of the developing bridge structure will be an intrusion into the site where the land-use is now wild nature, and will detract significantly from the site's aesthetic appeal, at least during the bridge construction period.

Operational Effects

10.17.229 The presence of the New Bridge will result in significant shading by the bridge deck, and interception of rainfall which will cause soil dryness and a reduction in the growth of vegetation. Although herbaceous and woody vegetation can persist beneath bridges, depending on the degree of shading, there will inevitably be a reduction in growth and vigour of both types of vegetation. For example, herbaceous vegetation will be sparse and provide a reduced ground cover, depending on the shade-tolerance of the species present, and the height of plants will be reduced due to a spindly habitat and periodic droughting. Trees and shrubs will be particularly weak and spindly, and will not grow to their normal stature and appearance of maturity.

10.17.230 There will be changes in the species composition of the vegetation, with shade-tolerant species being at an advantage. However the combined effects of shading and droughting of the soils will prevent the continued development of the woodland communities developing on those parts of Wigg Island that will be affected by the New Bridge.

10.17.231 The important invertebrate fauna of Wigg Island, particularly the important populations of butterflies, will be reduced but to a minor and probably temporary extent only. The most important butterfly species are Purple Hairstreak and White Letter Hairstreak, both of which use the high canopy of trees and woodland. The life cycles of both species are very largely spent above the ground, in or near the tree canopies, but sometimes the larvae use habitats on the ground. Therefore the existence of the bridge will make woodland beneath or in close proximity to the bridge unfavourable and probably unsuitable habitat.

10.17.232 Traffic movements and associated noise are expected to disturb woodland canopy bird species but there will be significant habituation. Many bird species nest close to major highways including motorways, examples being members of the crow family such as Rook, Carrion Crow, and Magpie. Passerine (perching birds) often nest in roadside hedgerows, examples being thrushes such and finches. It is difficult to give a figure for the extent of significant disturbance away from the road because it depends on many factors but disturbance of most species is unlikely to extend beyond 50 to 100 metres.

10.17.233 Bird species which nest on the ground or in scrub are unlikely to be greatly affected by the presence of the bridge structure or by overhead traffic, particularly after a period of habituation.

10.17.234 The operational effect of the New Bridge on the aesthetic appeal of the Nature Reserve will probably be greater than that of construction because the effect will be permanent. Traffic movements and noise will be largely continuous, in throughout the daytime.

10.17.235 Table 10.61 presents a summary of the operational effects of the New Bridge over and through Wigg Island Local Nature Reserve.

Table 10.61 - Assessment of the Operational Effects of the New Bridge on the Wigg Island LWS and Local Nature Reserve.

Receptor 8 – Wigg Island LWS and Local Nature Reserve				
Brief Description of Effect	Presence of the bridge structure including shading	Interception of rainfall by the bridge structure	Presence of moving traffic, noise and artificial lighting	Presence of moving traffic, noise and artificial lighting
Effect	Inhibition of plant growth of herbaceous and woody species.	Inhibition of plant growth. Poor habitat for invertebrates and other fauna.	Disturbance to resident, breeding, visiting and roosting birds. Disturbance to bats.	Reduction in aesthetic appeal and tranquillity of the Local Nature Reserve
+ve or –ve or neutral	Negative	Negative	Negative	Negative
Timescale of effect	Long-term	Long-term	Long-term	Long-term
Permanent or temporary	Permanent	Permanent	Permanent	Permanent
Direct or indirect effect	Direct and indirect	Direct and indirect	Direct	Direct and indirect
Secondary effect	Change in species composition and ground cover of the vegetation	Change in species composition and ground cover of the vegetation	None	Reduction in visitor numbers to the Nature Reserve
Importance	High	High	High	High
Magnitude	Moderate	Moderate	Moderate	High
Significance	Moderate	Moderate	Moderate	High
Comments Box	The importance of the receptor site, the Local Nature Reserve, is assessed as high because of its value to local people and visitors as a wildlife resource, in additional to its intrinsic importance and potential for enhancement through conservation management. Many birds and bats are likely to fly under the bridge.			

Assessment of the Construction and Operational Effects on Other Local Wildlife Sites

Haystack Lodge LWS

10.17.236 Haystack Lodge LWS is approximately one kilometre east of the route of the New Bridge and will not be directly or indirectly affected by construction or operation of the Project.

Norbury Wood and Marsh LWS, and Oxwoor Wood and Ponds LWS and Local Nature Reserves

10.17.237 Norbury Wood and Marsh LNR, and Oxmoor Wood and Ponds LNR, both of which are Local Wildlife Sites, are approximately two kilometres to the east of the New Bridge. There will be no direct or indirect effects on either of these sites.

Assessment of the Construction and Operational Effects on Sites With no Local Designation

The Bridgewater Canal

10.17.238 There will be no significant construction or operational effects on the Bridgewater Canal, the waterway of which will be kept open for boats and consequently for wildlife movements including birds during the construction and operation of the Project.

St. Michael's Golf Course

10.17.239 St. Michael's Golf Course will be affected by the construction of two Toll Plazas, improvements to Speke Road and the construction of a balancing pond. Part of the ditch on the south side of Speke Road will be culverted.

10.17.240 Although the significant Water Vole population was translocated to Moore Nature Reserve to allow remediation of the contaminated ditch, there is the possibility of Water Vole recolonisation which is discussed later in this Chapter, in Section 10.18.241.

10.17.241 There are no other potentially significant effects on St. Michaels's Golf Course.

Assessment of the Construction and Operational Effects on Bats

Construction Effects

10.17.242 Effects of road alignments generally involve loss or fragmentation of habitat and loss of actual or potential bat roosts. However the effect will vary in relation to which bat species are present because, although all bat species are statutorily protected, the ecological behaviour and distribution of individual species are often very different.

10.17.243 The nocturnal surveys have shown that Common Pipistrelle is most abundant and they have also shown that this species will tolerate and fly over what appears to be a hostile environment for small mammals. The Common Pipistrelle, unlike many other bat species, is very common in built-up areas.

10.17.244 If deep tracts of carriageway vegetation are not removed then little effect will occur but if wide areas are cleared then some effect upon foraging habitat is probable. The loss of potential roost sites is considered not to be significant as most of the buildings within the Land Take are active industrial units with a high percentage of prefabricated structures and tree holes/cavities have, to date, not been identified.

10.17.245 The greatest effect on bats, depending on the level of construction work, is likely to occur at Wigg Island as the habitat is concentrated and therefore easily fragmented with the potential for a high loss.

10.17.246 Crossings over the canals are unlikely to impede flight-lines or feeding areas as long as illumination is controlled to avoid light spillage onto the water surface or bank-side vegetation.

10.17.247 At the Rocksavage Expressway any removal of the vegetation on the west side of the carriageway would result in the loss of varied tree species which in turn would reduce the abundance of invertebrates. Additionally any loss of canopy where Soprano Pipistrelle (*Pipistrellus pygmaeus)* bats are crossing at the north of the roundabout may effect on their commuting route.

10.17.248 In the vicinity of Ditton Junction Common Pipistrelle bats are commuting from the east along sheltered flyways. If this flyway were to be disrupted, it may affect the behaviour of the bats. However this and other survey results show that this species will cross wide and open areas. Nevertheless it is always more beneficial to retain existing flight-lines rather than risk disruption.

10.17.249 In conclusion the effect of the proposals on bats is considered not to be high as most of the route apart from the north and south crossing points over the River follows the existing carriageways and as such loss of habitat can be minimised. Overall the effect will be moderate and negative, in the absence of mitigation.

10.17.250 Table 10.62 summarises the construction effects of the Project on bats.

Table 10.62 - Assessment of the Construction Effects of the Project on bats, including their habitats.

Receptor 8 - Bats including their roosting, foraging and commuting habitats.			
Brief Description of Effect	Construction of the Project including demolition of buildings, felling of trees, crossing of canals and de-linking.		
Effect	Loss of roosts	Fragmentation of foraging habitat	Loss, reduction or deterioration of foraging habitat
+ve or –ve or neutral	Negative	Negative	Negative
Timescale of effect	Long-term	Long-term	Long-term
Permanent or temporary	Permanent	Permanent	Permanent
Direct or indirect effect	Direct	Direct	Direct
Secondary effect	None	Fewer bats	Fewer bats
Importance	High	High	High
Magnitude	Moderate	Moderate	Moderate
Significance	Moderate	Moderate	Moderate
Comments Box	Pre-construction roost surveys, if suspected to be present, will be necessary. Internal inspections of potential roost sites will be carried out prior to site clearance works, leaving time for any necessary licensing.		

10.17.251 The loss of roosts is a construction effect but the effects on foraging habitats including fragmentation as well as losses of habitats are treated as both construction and operational effects. This approach is necessary because construction of the Project has the potential to cause the loss of flyways as a result of vegetation clearance, and the permanent presence and traffic use of the road at dusk and in the night, when bats are active, has the potential to deter bats from using important flyways.

Operational Effects

10.17.252 The addition of lighting schemes in otherwise unlit areas can cause bats to be disorientated and to abandon foraging places, although some species will forage around lights.

10.17.253 There is also the risk of collisions with traffic, particularly if bats are disorientated by static or fast-moving lights.

10.17.254 The operational effects are summarised in Table 10.63.

Table 10.63 - Assessment of the Operational Effects of the Project on bats, including their habitats.

Receptor 8 - Bats including their roosting, foraging and commuting habitats.			
Brief Description of Effect	Operation of the Project including demolition of buildings, felling of trees, crossing of canals and de-linking.		
Effect	Fragmentation of foraging habitat	Loss, reduction or deterioration of foraging habitat	Disorientation due to lighting and collisions with traffic
+ve or –ve or neutral	Negative	Negative	Negative
Timescale of effect	Long-term	Long-term	Long-term
Permanent or temporary	Permanent	Permanent	Permanent
Direct or indirect effect	Direct	Direct	Direct
Secondary effect	Fewer bats	Fewer bats	Collisions with traffic
Importance	High	High	High
Magnitude	Moderate	Moderate	Low
Significance	Moderate	Moderate	Low
Comments Box	There will be sufficient clearance beneath all of the bridges for bats to fly beneath, such along the St. Helen's Canal and along the Bridgewater Canal.		

Assessment of the Construction and Operational Effects on Great Crested Newts

Construction Effects

10.17.255 The only location where there are potential effects on Great Crested Newts (GCNs) is at Rocksavage, in the vicinity of the Weston Link Junction where there is a metapopulation of GCNs due south of the A557, between the Weston Point Expressway and the power station.

10.17.256 None of the GCN breeding ponds will be affected and no GCN habitat will be lost with the exception of unfavourable and hazardous habitat within the existing highway land where newts are at risk of being run over by traffic or being trapped in the highway drainage system. The junction improvement works are estimated to be no closer than 150 metres to the nearest GCN pond of the group of ponds. However it is possible that isolated GCNs could be affected by the work because they can disperse up to at least this distance and beyond up to 500 metres and potentially beyond this distance from the breeding ponds.

10.17.257 It is also possible, and more likely, that GCNs are currently affected by the existing highway system because the A557 Weston Point Expressway passes within 100 metres of the group of ponds. Whilst the construction of a new road or other new built development within this distance of a GCN breeding pond would be illegal without licensed mitigation, there are numerous examples of roads and other developments being within this distance of newt ponds, either because the developments pre-existed the legislation protecting the species, or because the presence of the newts was not known at the time of construction.

10.17.258 Although the potential effect on GCN habitats will be low, the potential effects on the species will be high because of their European protection. This assessment is based on Natural England's advice in *Great Crested Newt Mitigation Guidelines* (English Nature 2001) which classifies the partial destruction, temporary disturbance or temporary destruction of habitat followed by reinstatement at a distance of between 50 and 250 metres from a breeding pond as a low development effect. In this case it is existing highway land that will be affected by the Project, and this is of low value for GCNs foraging and hibernating GCNs but moderate for shelter and protection.

10.17.259 There is a low possibility that one or more GCNs will be injured or killed by the works. However this is assessed as a high magnitude impact because of the strict European protection afforded to the species.

10.17.260 A summary of the potential construction effects on GCNs and their habitats is presented in Table 10.64. This takes full account of the European and UK legislation applied to the species.

Table 10.64 - Assessment of the Construction Effects of the Project on Great Crested Newts (GCNs), including their Habitats

Receptor 9 - Great Crested Newts (GCNs) including their breeding, foraging, sheltering, migratory and hibernation habitats.				
Brief Description of Effect	Improvement of the Weston Link Junction on the A557 Weston Point Expressway			
Effect	Loss of GCN foraging habitat	Loss of GCN habitat used for shelter and protection	Loss of GCN hibernation habitat	Injury or killing of GCNs
+ve or –ve or neutral	Negative	Negative	Negative	Negative
Timescale of effect	Long-term	Long-term	Long-term	Long-term
Permanent or temporary	Permanent	Permanent	Permanent	Permanent
Direct or indirect effect	Direct	Direct	Direct	Direct
Secondary effect	None	None	None	None
Importance	High	High	High	High

Receptor 9 - Great Crested Newts (GCNs) including their breeding, foraging, sheltering, migratory and hibernation habitats.				
Magnitude	Low	Moderate	Low	High
Significance	Low significance	Moderate significance	Low significance	High significance
Comments Box	Mersey Gateway construction will not affect the Great Crested Newt ponds. Whilst the A557 is not a physical barrier to newt migration, it is a hazard to GCNs which attempt to cross the highway.			

Operational Effects

10.17.261 The operational effects on Great Crested Newts and their habitats are examined in Table 10.65.

Table 10.65 - Assessment of the Operational Effects of the Project on Great Crested Newts (GCNs), including their Habitats.

Receptor 9 - Great Crested Newts (GCNs) including their breeding, foraging, sheltering, migratory and hibernation habitats.				
Brief Description of Effect	Traffic Use of the A557 Weston Point Expressway bringing traffic closer to the GCN ponds along part of the Expressway.			
Effect	Loss of GCN foraging habitat	Loss of GCN habitat used for shelter and protection	Loss of GCN hibernation habitat	Injury or killing of GCNs
+ve or –ve or neutral	Negative	Negative	Negative	Negative
Timescale of effect	Long-term	Long-term	Long-term	Long-term
Permanent or temporary	Permanent	Permanent	Permanent	Permanent
Direct or indirect effect	Direct	Direct	Direct	Direct
Secondary effect	None	None	None	None
Importance	High	High	High	High
Magnitude	Low	Low	Low	High
Significance	Low significance	Moderate significance	Low significance	High significance
Comments Box	The Project will not affect the Great Crested Newt ponds. However the Weston Link Junction Improvement will reduce traffic volumes along the A557 in the short to medium terms.			

10.17.262 The Weston Link Junction improvement will reduce traffic volumes along the A557 Expressway with the result that the injury and killing of GCNs by traffic is likely to be reduced. However as annual traffic volumes increase, as is likely, there will be an increase in GCN casualties.

Assessment of the Construction and Operational Effects on Water Voles

Construction Effects

10.17.263 There is a potential effect on Water Voles in the disused St. Michael's Golf Course. The course of Steward's Brook through part of the Golf Course was found by Jacobs Babtie to contain a population of about 20 Water Voles in 2004. As described earlier in this Chapter, the voles were subsequently trapped out and translocated to Moore Nature Reserve near Warrington to

allow the brook to be realigned and remediated.

10.17.264 A survey by Environmental Research & Advisory Partnership in October 2006 revealed a dry burrow in the side of a ditch to the south of the A562 Speke Road which was suspected to be a Water Vole burrow.

10.17.265 The potential construction effect on Water Voles is low because the proposed Mersey Gateway Toll Plazas and road improvements will not result in the losses of ditches or ponds used by Water Voles. However the extreme northern section of the ditch to the south of the A562 Speke Road may be adversely affected by culverting. Whilst this may not restrict the movements of Water Voles, the quality of the habitat for Water Voles will be severely and permanently damaged due to the loss of aquatic vegetation, water-margin vegetation and bankside habitat along the culverted section.

10.17.266 Culverting will eliminate the vegetative food supply of the Water Voles and there will be a loss of above-ground vegetative cover. It is unlikely that the affected section of the ditch will be able to support a single Water Vole territory due to the loss of food supply and the permanently dark or heavily shaded conditions.

10.17.267 The additional loss of watercourse to culverting will be approximately 15m this would be approximately 1% of the distance to the confluence with Ditton Brook which is 1450m downstream of the culverted section. There will be a moderate impact on watervoles due to culverting.

10.17.268 A summary table of the construction effects on Water Voles is provided in Table 10.66.

Table 10.66 - Assessment of the Construction Effects of the Project on Water Voles, including their habitats in St. Michael's Golf Course.

Receptor 10 - Water Voles including their breeding, foraging and sheltering habitats.				
Brief Description of Effect	Construction of Toll Plazas and Associated Highway Works in the Former St Michael's Golf Course and the Culverting of a Section of a Ditch			
Effect	Disturbance to Water Voles	Potential losses of Water Vole burrows	Losses of aquatic and water-margin vegetation (foraging habitat)	Loss of water-margin and bankside vegetation cover
+ve or –ve or neutral	Negative	Negative	Negative	Negative
Timescale of effect	Short-term	Long-term	Long-term	Long-term
Permanent or temporary	Temporary	Permanent	Permanent	Permanent
Direct or indirect effect	Direct	Direct	Direct	Direct
Secondary effect	None	None	None	None
Importance	Moderate	Moderate	Moderate	Moderate
Magnitude	High	Moderate	Moderate	Moderate
Significance	High	High	Moderate	Moderate

Receptor 10 - Water Voles including their breeding, foraging and sheltering habitats.	
Comments Box	There may be increased colonisation by Water Voles before the Project is constructed, which may affect the results of the effect assessment.

Operational Effects

10.17.269 Operational effects are predicted to be lower than construction effects because Water Voles are often found in areas where there is a relatively high level of disturbance such as the close proximity of housing and roads, and areas used for public recreation and angling.

10.17.270 The survival and success of Water Voles in such areas is attributed to the absence of Mink which are a major predator of Water Voles. However Mink, compared with Water Voles, are more sensitive to disturbance and tend not to colonise disturbed areas which may provide suitable burrowing and foraging habitats for Water Voles, as well as protective cover of waterside and bankside vegetation.

10.17.271 Table 10.67 provides a summary of the operation effects on Water Voles.

Table 10.67 - Assessment of the Operational Effects of the Project on Water Voles, including their habitats in St Michael's Golf Course

Receptor 10 - Water Voles including their breeding, foraging and sheltering habitats.				
Brief Description of Effect	Presence of culvert, Traffic movements including noise and light, and use of toll booths in the former St Michael's Golf Course.			
Effect	Disturbance to Water Voles	Potential losses of Water Vole burrows	Losses of aquatic and water-margin vegetation (foraging habitat)	Loss of water-margin and bankside vegetation cover
+ve or –ve or neutral	Negative	None	Negative	Negative
Timescale of effect	Long-term	None	Long-term	Long-term
Permanent or temporary	Permanent	None	Permanent	Permanent
Direct or indirect effect	Direct	None	Direct	Direct
Secondary effect	None	None	None	None
Importance	Moderate	Moderate	Moderate	Moderate
Magnitude	Low	None	Moderate	Moderate
Significance	Low	Not significant	Moderate	Moderate
Comments Box	There may be increased colonisation by Water Voles before the Project is constructed, which may affect the results of the effect assessment.			

10.18 In Combination Effects

10.18.1 In-combination effects on terrestrial and avian ecology are discussed in this section. The requirement to consider in-combination, often also referred to as cumulative effects, is outlined in the *EIA Regulations* and the *Habitats Regulations*.

10.18.2 Chapter 21 comprises the Cumulative Effects Assessment for the project. This section of the Terrestrial and Avian Ecology assessment draws on the information set out in Chapter 21 where a description of the developments discussed below are provided, Figure 21.1 illustrates the location of these projects in relation to the Project area.

Developments in the Vicinity of the Upper Mersey Estuary

Site 1: 3MG (Ditton Strategic Freight Terminal)

10.18.3 This development, on land which has been previously developed, will provide 10,000m^2 of distribution warehousing with a connecting freight park to the A5300 at the southern end. There will be a road system to connect to main sites within the freight park.

10.18.4 The proposed Freight Park is approximately 475 metres north of the boundary of the European Site. The intervening land in the south is an existing chemical works with associated buildings and roads. The intervening land to the south by south-east is mostly open land on either side of Steward's Brook which flows into the Estuary.

10.18.5 This development is too far from the European Site to cause disturbance to birds as a result of traffic movements, freight handling activities and associated works. There is active industrial and built land adjacent to the European Site boundary; the proposed Freight Park will not increase any possible disturbance from the adjacent developments.

10.18.6 The Rail Freight Park will not have 'in combination' effect with the Project because of its distance from the intertidal bird habitats which is well beyond the distance of around 200 metres which could cause disturbance from a localised and fixed source.

Site 3: The Widnes Waterfront Development

10.18.7 This development is an area identified as a Regeneration Action Area in the current Unitary Development Plan. The plan will provide a range of hotel, car parking, leisure and recreational facilities which will be delivered separately and under different planning applications. The site lies on land where there are no protected/designated sites or features of substantive nature conservation importance.

10.18.8 The footprint of the proposed Widnes Waterfront Development ranges from 60-200 metres from the boundary of the Upper Estuary, but the majority of the development is at a considerably greater distance than this and will be screened by the Estuary frontage of the development.

10.18.9 The disused St. Helens Canal and the well-used canal towpath runs along the entire southern boundary of the waterfront development. There is also a hedgerow along the southern side of the towpath along the eastern half of the canal, between the development and the saltmarsh.

10.18.10 The presence of the waterfront development will have no disturbance or other effect on the Upper Estuary. However there may be increased use of the canal towpath for informal recreation and dog-walkers but this is unlikely to cause more than a low level of disturbance to saltmarsh birds such as breeding Skylark and Meadow Pipit. There may also be increased access onto the saltmarsh but this is likely to be concentrated along the sides of the Bower's Brook water channel, and in the area predicted to be disturbed by the New Bridge and associated traffic use.

10.18.11 There are usually "good" numbers of waterfowl and gulls on the standing water habitats in the Spike Island area. It is clear that there has been considerable habituation by birds to the recreational use of this area, and people do not enter the estuarine habitats of this area which consist largely of inter-tidal habitats with no saltmarsh and therefore difficulty of access.

10.18.12 Although the development will be fairly close to the Upper Estuary and will increase the numbers of people in the area, disturbance will have only a low negative impact on the birds in this part of the Upper Estuary. There is likely to be a low in-combination impact, of low significance, with the effects of the New Bridge on the birdlife of the Upper Mersey Estuary. However there will be no negative effect on the habitats, or to birds on the SPA.

10.18.13 There are no in-combination effects on the European Site as a result of this development because it is over two kilometres from the closest boundary, and there will be no indirect effect because the European Site bird populations do not use the Upper Estuary to any significant extent.

Site 5: The Manor Park development

10.18.14 This development, for storage, distribution and industrial activities, is remote the Upper Mersey Estuary and on existing developed land. The site is approximately 2km from the Project and at least 375 metres from the Upper Estuary, with intervening residential development and the Manchester Ship Canal.

10.18.15 There is no potential for any significant direct or indirect in-combination effects with the Project, either on the Upper Estuary or on the European Site, because of the distances involved.

Site 52: Fiddler's Ferry Power Station

10.18.16 This proposed development is for industrial uses, and lies adjacent to the existing power station buildings. They are at least one kilometre from the Upper Estuary and almost three kilometres from the New Bridge crossing of the Upper Estuary. It is isolated from the Estuary by the St. Helens Canal and by the extensive Fiddler's Ferry Power Station Lagoons system.

10.18.17 There is no potential for 'in combination' effects with the Project on the European Site or any other sites of ecological importance. This is because the bird populations in the SPA and the Upper estuary are separate.

Developments in the Vicinity of the Middle Mersey Estuary

Site 2: Halebank Regeneration Area.

10.18.18 This site, on a former Asda supermarket site, is a short distance north-west of the Silver Jubilee Bridge on the north side of the European Site. The proposed residential development, of 200 units initially and possibly more thereafter, extends to the boundary of the Estuary and European Site.

10.18.19 Although there will be no physical intrusion into the European Site, the proposed housing is likely to cause increased disturbance to birds because of increased recreational activity along the waterfront. This is likely to reduce the use of the nearby intertidal habitats by feeding and roosting birds, but the disturbance impact will be significantly reduced by the presence of the river channel along the European Site boundary. However it is possible that the river channel may migrate away from the shoreline with subsequent build-up of intertidal sediment habitats.

10.18.20 There is likely to be a significant negative, low magnitude effect on the European site as a result of the Halebank Regeneration Area Development. However, the Mersey Gateway Project does not result in any significant effects on the bird populations of the European Site and therefore the Project will not result in any in-combination effects on the European Site.

Site 10: Estuary Business Park

10.18.21 The proposed Estuary Business Park and associated warehousing would be on the northern edge of the European Site, a short distance downstream of the Runcorn Gap. The development will replace existing development which extends to the edge of the Estuary.

10.18.22 As at Site 2, the development will have the potential to cause bird disturbance of feeding and roosting wildfowl and waders on the intertidal habitats. However, as also at Site 2, there is an intervening river channel which will reduce disturbance and the use by pedestrians of the Trans Pennine Trail will have already resulted in significant bird habituation to disturbance. The development will result in an increased level of disturbance along an existing fixed route, but the disturbance will be less than that caused by the residential development should it go ahead. It will be significant but of low magnitude.

10.18.23 There is likely to be a significant negative, low magnitude effect on the European site as a result of the Estuary Business Park Development. However, the Mersey Gateway Project does not result in any significant effects on the bird populations of the European Site and therefore the Project will not result in any in-combination effects on the European Site.

Site 11: Blue Lands/Wings Leisure Park

10.18.24 This proposed leisure park is about 450 metres from the European Site boundary and intertidal habitats used by roosting and feeding wildfowl and waders. The intervening land is used by airport runways.

10.18.25 There is no significant potential bird disturbance impact at this distance and the intervening land will not accessible to uses other than aircraft movements. Therefore there will be no bird disturbance to the European Site habitats and no in-combination impacts with the Project.

Site 12: Edwards Lane

10.18.26 The Edwards Lane site is on the north side of the Middle Estuary, approximately 7.5km to the west of the Silver Jubilee Bridge. Direct effects on the European Site are unlikely and therefore there will not be any 'in combination' effects associated with the Project.

Site 13: Blue Lands South

10.18.27 The Blue Lands South development is for light industrial uses, hotel, distribution, car showroom and a day nursery. The site is adjacent to the Blue Lands/Wings Leisure Park and at the same distance from the intertidal bird roosting and feeding habitats of the European Site, with intervening airport grassland and runway land.

10.18.28 As described for Site 11, there will be no bird disturbance to the European Site habitats and no in-combination impacts with the Project.

Site 14: Cressington Heath

10.18.29 This development, for low and high density housing, is 250 metres from the northern boundary of the European Site. It is immediately south of Cressington Station. Most of the land between the site and the coastline is built or enclosed water areas, but some of the land is undeveloped. There are intertidal roosting and feeding areas for birds adjacent to the coastline and river channels which form part of the Garston Channel.

10.18.30

10.18.31 There is the possibility of increased bird disturbance if there is pedestrian access from the new housing to the coastline but disturbance would be of low magnitude due to the intervening water channels. Therefore there is likely to be a significant negative, low magnitude effect on the European site. However, the Mersey Gateway Project does not result in any significant effects on the bird populations of the European Site and therefore the Project will not result in any in-combination effects on the European Site.

Site 15: Evans Road

10.18.32 This site, which is proposed for office, light industrial, industrial and distribution development is well outside the European Site and at least one kilometre from the northern shoreline of the European Site, with the intervening land densely developed with a major highway (A561) and John Lennon Airport. There will be no bird disturbance or other impacts on the European Site and no in-combination effects with the Project.

Site 16: Dunlop Playing Fields

10.18.33 Office and light industrial, distribution, hotel development facilities are proposed here. The site is more than 550 metres from the northern shoreline of the European Site but access is restricted by the intervening John Lennon Airport and runways. There will be no direct or other effects on the European Site and no in-combination effects with the Project.

Site 17: Glaxo Development

10.18.34 This proposal is for office, light industrial and industrial development at a distance of at least one kilometre from the northern boundary of the European Site. The intervening land is densely developed, with housing, the A561 and John Lennon Airport including its coastal-fringe runways. There is no significant potential for direct or other effects on the European Site and no in-combination effects with the Project.

Site 28: Liverpool John Lennon Airport Terminal Extension and Eastern Access Road to Airport from A562.

10.18.35 This Airport Terminal development, on the north side of the European Site, will be approximately 250 metres from the European Site boundary, at the nearest point. The intervening area will remain in use for the airport runway. The proposed Eastern Access Road will be further from the European Site boundary, at a distance of approximately 600 metres.

10.18.36 There are intertidal bird feeding and roosting habitats adjacent to the European Site boundary, within the European Site, but there is no significant bird disturbance potential. There will be no in-combination effects with the Project.

Site 30: Wirrall International Business Park

10.18.37 This proposed development, for a business park, industrial estate ands storage/distribution uses, is on the south-western side of the Estuary and largely outside the European Site. However the seaward boundary of the European Site does change from year to year due to the shifting sandbanks and distribution of the intertidal sediments.

10.18.38 There is the potential of a low and negative impact on the European Site due to bird disturbance, but this is likely to be of low significance, and possibly not significant, in the absence of detailed survey information on the local distribution of the intertidal bird feeding and roosting habitats, and the distribution of the birds themselves.

10.18.39 The position of the river channel, which presently appears to be adjacent to the site, will reduce significant the potential for bird disturbance, but the position of the river channel may change.

10.18.40 It is difficult, in the absence of detailed survey information, to assess the potential significant impacts of this development on the European Site. However, the Mersey Gateway Project does not result in any significant effects on the bird populations of the European Site and therefore the Project will not result in any in-combination effects on the European Site.

Developments Beyond the European Site

Sites 7, 8 & 9: Stonebridge Cross New District Centre, Industrial Estate and Liverpool Science Park

10.18.41 This redevelopment complex is at least 375 metres from the Liverpool waterfront of the Lower Estuary, and at least two kilometres downstream of the seaward boundary of the European Site. There will be no effects on the birdlife of the Estuary and no other significant ecological effects, and therefore no in-combination effect with the Project.

Sites 18, 19 & 29: Paradise Street New Mixed Development, Kings Dock Multi-use Arena including conference, office, retail, residential and leisure facilities, and Woodside small business park and residential units.

10.18.42 Sites 18 and 19 are on or close to the Liverpool Waterfront and at least two kilometres downstream of the seaward boundary of the European Site. Woodside site is on waterfront on the edge of the Lower Estuary at Birkenhead, and also at least two kilometres downstream of the European Site and its intertidal habitats for feeding and roosting birds.

10.18.43 There are no intertidal habitats of substantive importance in this part of the Estuary, outside the European Site. None of these developments will cause significant bird disturbance in an area which is already densely developed along the waterfront. There will be no in-combination effects with the Project.

Site 31: Wirral Waters – Birkenhead Docks

10.18.44 This proposal includes a high density redevelopment of Birkenhead Docks. There will be 15,000 residential units, 30,000 square metres of business development, and 20,000 metres of retail development, comparable to The Trafford Centre, on Bidston Moss.

10.18.45 This is an extensive development which is outside the Mersey Estuary. However there are areas of substantive biological important, notably Bidston Moss Local Nature Reserve and Site of Biological Importance. There are ponds, reedbeds and marshlands with associated scrub and other habitats of importance for passerine birds, water birds and waders including migratory species. Whilst parts of the area were originally saltmarsh, the site is no longer estuarine.

10.18.46 Whilst the development proposals may affect important wildlife habitats and bird populations, the site is at least three kilometres from the European Site and the bird populations of the proposed development site are unlikely to form part of the European Site populations.

10.18.47 There are no predicted in-combination effects of the proposed development with the Project although the possibility of the interchange of some bird species cannot be discounted, but they would not be European Site qualifying species.

10.19 Mitigation, Compensation, Enhancement and Monitoring

Mitigation of Construction Effects of the New Bridge on the Upper Mersey Estuary and on the European Site.

10.19.1 The mitigation of construction effects deals with effects on habitats, birds and other fauna both within the Upper Mersey Estuary which is treated as a pSPA and on the European Site of the Middle Mersey Estuary.

10.19.2 The most sensitive and vulnerable receptors are in the European Site which contains the important bird populations and the most important bird habitats that comprise the grazed saltmarshes and the invertebrate-rich intertidal sand, silt and mudflats.

10.19.3 Mitigation is directed at avoidance and minimisation of effects at source, particularly in the case of potential effects on the sensitive and vulnerable estuarine habitats and important bird populations of the European Site downstream of the New Bridge.

10.19.4 The mitigation measures suggested in this section should be covered by appropriate conditions attached to the planning permission for the Project and/or protective provisions included in the TWA Order.

Construction of stone haul roads across the saltmarshes

10.19.5 The stone haul roads are proposed to be retained for up to three years. This will cause the vegetation and soils to be completely covered, smothered and/or compacted. Under these circumstances appropriate measures should be taken to conserve the viability of the saltmarsh vegetation and soil seedbank, and to restore favourable soil conditions for saltmarsh regeneration.

10.19.6 There are several potential methods of restoring the saltmarsh vegetation and restoring favourable soil and subsoil conditions if conditions become unfavourable. The selection of an appropriate method or combination of methods will depend on the biological condition of the saltmarsh vegetation and seedbank, and the physical condition of the soil and subsoil at the time of removal of the stone access roads.

10.19.7 One potential method which should be considered is the translocation of saltmarsh vegetation (turf) from the road construction route to a suitable holding area followed by its reinstatement on the removal of the stone haul road. This will be necessary to retain the viability and potential for regrowth of the vegetation.

10.19.8 The translocation of saltmarsh vegetation would require the removal of large turfs (macroturfs), during suitable weather and soil moisture conditions. The turfs would need to be cut to an appropriate depth to include the majority of the root zone of the saltmarsh vegetation so that it can establish in the holding area without irrigation. The translocated turfs should be maintained and managed in a suitable holding area, under brackish conditions if saltmarsh species are present, to avoid contamination by inappropriate weed species and to conserve the salt-tolerant species of the plant community.

10.19.9 The management and maintenance of the saltmarsh turves in the holding area may be crucial to success because when this method is used during pipeline and other schemes where reinstatement is necessary, the turf storage time is usually a few weeks at most, but in this case storage for up to three years will be necessary. Therefore the stored turf should be regularly monitored and maintained to prevent desiccation.

10.19.10 Following translocation of the saltmarsh vegetation, it would still be necessary to install a drainage system such as plastic drainage pipes laid laterally beneath the access tracks to ensure that tidal water and rainwater movements across the saltmarsh are not impeded. This would also be necessary to ensure that the underlying saltmarsh soils and sub-soils do not become permanently waterlogged, which could result in permanent damage to the soil and subsoil structure on replacement of the macroturfs.

10.19.11 On the cessation of use of the stone haul road, all the stone cover and geotextile matting should be removed. The underlying saltmarsh soil and subsoil should be examined to determine the extent of compaction and damage to the soil structure, if any. Any significant compaction and structural damage should be treated to restore the original soil conditions by appropriate means. These might include deep ripping with a tracked bulldozer, followed by fixed-tine cultivation. Alternatively there should be a sequence of other appropriate mechanical means to create a soil tilth, followed by the subsequent creation of a substratum for the replacement of the saltmarsh turfs by means of disc harrowing, rotovation and other appropriate cultivation methods to create suitable conditions for plant root growth.

10.19.12 Consideration should be given to the possible application of a slow-release phosphate-based fertiliser with a low nitrogen and potassium content to promote rapid root penetration and early growth.

10.19.13 The saltmarsh turfs should be reinstated using appropriate turf translocation machinery followed by consolidation with a low ground pressure tracked machine during suitable soil moisture conditions to avoid damage to the soil structure including its porosity and drainage.

10.19.14 After replacement of the turfs the restored access tracks should be monitored by a surveillance ecologist to identify any re-establishment problems and advise on appropriate treatment. The surveillance should cover vegetation growth and density, signs of desiccation and impeded drainage, and evidence of any dieback or significant or undesirable changes in plant species composition.

10.19.15 An alternative method of restoration of saltmarsh habitat on removal of the access roads is by seeding with a grass mixture of suitable species, particularly Red Fescue, Creeping Bent-grass, Common Couch-grass. The seeds mixture should preferably consist of salt-tolerant ecotypes (varieties). Although the developing saltmarsh vegetation would probably not consist of the same native species and ecotypes as the existing saltmarsh (such as Sea Couch), early development of the grass cover would stabilise the saltmarsh and natural changes would result in the native saltmarsh species gradually replacing the sown vegetation.

10.19.16 If there is restoration by seeding, it may still be necessary to improve soil and subsoil conditions by ripping and/or other cultivation means, depending on the extent of damage to the soil and subsoil structure. The aim should be to restore the original porosity, drainage and density characteristics of the saltmarsh soil and subsoil.

10.19.17 If compaction and increased density of the saltmarsh soil and subsoil cannot be treated satisfactorily, there will inevitably be a decrease in soil/subsoil volume which may leave a channel on removal of the access roads. If saltmarsh pools form in the channels there may be an increase in biodiversity value, which could be retained provided the channels do not present an erosion risk. Alternatively it may be necessary to infill the channels with saltmarsh subsoils and soils, preferably obtained from pier or other excavation works, to restore the original ground levels.

10.19.18 A further option is to allow natural recolonisation to occur from seed shed from the adjacent saltmarsh vegetation and by vegetative spread from vegetation on both sides of the road routes. However this option will be a slow process, much slower than reseeding and lacking the immediate benefits of turf replacement. Further, natural recolonisation may pose a risk of erosion if the access roads are removed in the autumn with no prospect of recolonisation until the following spring.

Construction of cofferdams, piers and towers

10.19.19 Prior to the construction of cofferdams, in advance of pier construction on the saltmarshes, one potential method for the restoration of saltmarsh habitat is to strip the saltmarsh vegetation from the cofferdam construction sites as described for the access roads. If this method is adopted, the saltmarsh vegetation of the associated working areas should also be stripped and stored as previously described. The stripped vegetation should be translocated to a temporary receptor site, and monitored and maintained as described earlier.

10.19.20 On completion of pier construction and the infilling of the cofferdams with extracted material, or similar material that should be suitable for supporting the growth of replaced saltmarsh vegetation, the saltmarsh vegetation should be stripped from the temporary receptor site(s) and translocated to the restored cofferdam area(s) following ripping and cultivation if necessary. Otherwise the alternative methods of reseeding and natural colonisation should be applied.

10.19.21 Other potential methods are seeding or natural colonisation as outlined for the restoration of saltmarsh following access road removal. The restoration procedures and monitoring should be as described for saltmarsh access track restoration.

Construction of towers

10.19.22 The reinstatement of the tower construction sites to saltmarsh will not be necessary because the towers will be constructed in the intertidal habitats where saltmarsh vegetation is absent. Natural colonisation of the replaced sediments to algae and invertebrates can be allowed to occur.

Movements and noise generated by machinery and personnel

10.19.23 The potential for machinery movements to damage the sensitive and vulnerable saltmarsh habitat, particularly its vegetation, should be minimised by restricting the movements of potentially damaging machinery to access tracks, and by restricting saltmarsh access to tracked machinery and other equipment with a low ground pressure. Machinery should not be allowed onto the saltmarsh when ground conditions are wet and when there is a possibility of rutting, soil shearing and compaction.

10.19.24 Disturbance to breeding, feeding, roosting and loafing birds should be avoided or minimised by the following measures, with implementation by means of an Environmental Management Plan;

a. Saltmarsh access by machinery should be restricted to access tracks and subject to (c) there should be no access by personnel to bird-breeding habitats in the bird-breeding season of March to August inclusive. Fencing and/or other appropriate measures should be used to prevent deliberate or accidental access;
b. The construction and use of access tracks across the saltmarsh should commence before the bird-breeding season, unless measures have been taken before the breeding season to prevent birds breeding in areas which may be disturbed;
c. If the construction and/or use of access tracks across the saltmarsh is required to commence within the bird-breeding season, the saltmarsh vegetation up to 200 metres

from the access track(s) and construction area(s) should be strimmed to 100 mms above ground level in advance and the vegetation removed to deter breeding Skylarks, Meadow Pipits and other ground-nesting birds;

d. Temporary fences should be erected to demarcate and prevent machinery and personnel access to areas of saltmarsh bird-breeding habitat; and

e. There should be ecological monitoring and surveillance of the saltmarsh habitats and breeding birds throughout the construction contract. If temporary access for site investigations or other construction-related activities are necessary, ecological advice and survey information on breeding bird locations should be obtained.

Pollution from release of sediments

Oil and chemical spills from machinery

10.19.25 Facilities should be provided on the construction site for preventing the spillage of oils, chemicals and other potential contaminants, and for preventing the spread of discharges. Such facilities will include physical measures such as containment and removal, and on-site treatment with chemicals or other materials as appropriate. There should be on-site ecological surveillance of treatment and its effects.

Turbidity and other non-toxic contamination

10.19.26 There should be ecological surveillance of turbidity and other potential non-toxic contamination, by visual means, in the construction area, downstream and in the direction of water flows. If necessary, there should be sampling and analysis of waters to identify and determine the concentrations of such contaminants.

Obstruction to bird movements

10.19.27 No significant bird obstruction effects have been identified but there will be a continuing possibility of unforeseen hazards to bird movements such as the attachment of netting to structures which could trap birds.

10.19.28 Such hazards should be identified by ecological surveillance during construction, with advice and appropriate action taken at the time.

Artificial light pollution and shading

10.19.29 The low, negative and temporary effect of artificial lighting on birds should be reduced by the use of directional and screened lighting, and by other measures to avoid glare.

10.19.30 The potential loss of vegetation, or serious damage and possibly irreversible damage to vegetation due to shading by temporary structures, storage of materials and other construction-related activities should be prevented where feasible by avoiding the use of saltmarshes for such activities.

10.19.31 Where temporary use of the saltmarsh is unavoidable for construction and construction-related activities, measures will be necessary to limit the time of covering or shading of the saltmarsh to prevent irreversible damage to plant foliage. Where this is not feasible or where there is a risk of irreversible damage to the vegetation, the vegetation should be translocated to a temporary holding area with subsequent replacement on the affected area, or saltmarsh vegetation should be restored by other satisfactory means.

10.19.32 There should be ecological surveillance to identify any further mitigation requirements for light pollution and shading.

Collisions of birds with structures and machinery

10.19.33 Collisions of birds with structures and machinery are unlikely but there should be ecological surveillance during construction.

Mitigation Measures for the Operational Effects on the Upper Mersey Estuary Local Wildlife Site and the Middle Mersey Estuary

10.19.34 There are some effects that cannot be avoided, the most significant of which is the loss of favourable saltmarsh habitat, partly due to the construction of the Project over saltmarsh habitat, but mainly due to disturbance of the associated breeding, roosting and foraging birdlife over the saltmarsh habitat because of the close proximity of the New Bridge and the likely effects on breeding Skylarks and other ground-nesting birds.

10.19.35 The mitigation possibilities for operational effects are limited because it is impractical to hide the bridge towers and piers, or to reduce their visibility to birds sufficiently for their presence not to be perceived as a threat to their territories. Birds such as Skylark, Meadow Pipit, Curlew and Redshank inhabit wide open spaces of grassland devoid of trees and scrub, and where the land is not built-up or where there are tall structures that may harbour predators.

10.19.36 Birds can tolerate the reasonably close proximity of moving and noisy traffic, for example adjacent to the Coast Road (Marine Drive) at Southport as reported by Environmental Research & Advisory Partnership to North-West Water. Marine Drive was constructed through saltmarsh habitat. The flocks of wildfowl and waders at Southport are inhibited by the presence of the road which is partly on embankment, and it is rare to find large and small flocks of birds, particularly sensitive species of wader, in close proximity to the highway.

10.19.37 Some bird species are very sensitive to disturbance. The following examples are given in Disturbance to Waterfowl on Estuaries (Eds. N. Davidson & P Rothwell August 1993), Wader Study Group Bulletin 68, Special Issue, RSPB, Sandy, Bedfordshire;

a. Distances at which waders take flight if approached on foot ranged from 20-60 metres for Golden Plover to 45-100 metres for Bar-tailed Godwit and 70-120 metres for Curlew and Redshank;
b. Roosting Oystercatchers and Curlews are in the majority of cases studies disturbed at distances of 250 metres;
c. On tidal flats, the presence of people on tidal flats could disturb Curlews at distances of up to 300 metres on one site and up to 550 metres on another site; and
d. One person on a tidal flat could cause Curlew to be disturbed from an area of 50 hectares.

10.19.38 Although some of the above examples are extreme, and birds can habituate to disturbance, there are limits to the success of mitigation in reducing the effect of disturbance from moving traffic and structures, although there will be some degree of habituation to the combined presence of the Project structure and its traffic.

10.19.39 Migrating and commuting birds will avoid the bridge structure and its traffic by flying over or beneath, in most cases over the bridge, or avoiding the bridge by flying over land on either side. Observations at the Second Severn Crossing as well as the present studies of the Upper Mersey Estuary and at the Runcorn Gap, have shown that bird behaviour is influenced by bridges but not to the extent that they are prevented from passing, other than by flying over or under, or avoiding the bridges altogether.

10.19.40 The design of the Project will allow birds to pass under the bridge or between the Cable Stays, without having to ascend to the full height of the towers.

10.19.41 Any disorientation of flying birds and bats caused by artificial lighting can be reduced or potentially eliminated by screening and by directional lighting.

10.19.42 One approach to mitigation is to modify the saltmarshes in close proximity to the New Bridge, by an appropriate change of management, to make the habitat more attractive to feeding and roosting wildfowl and waders. A more attractive habitat is likely to result in earlier and an increased level of habituation.

10.19.43 As described later in this assessment, the cutting and grazing of the tall saltmarsh vegetation, to make the vegetation more palatable to herbivorous and omnivorous wildfowl and waders, is another approach. At the same time the saltmarsh would harbour fewer mammalian predators and birds would have a much better field of view, providing them with greater security and escape routes from predators.

10.19.44 Other habitat enhancement measures, as described later, include the creation of scrapes and pools to provide sources of invertebrate foods.

10.19.45 Given that the above-mentioned habitat modifications will attract birds to use habitats close to the bridge, as observed at the Second Severn Crossing, it is likely that the degree of habituation to the bridge structure and tolerance of traffic noise and movements will be increased to provide more effective mitigation.

10.19.46 The shading effect of the bridge cannot be reduced, but studies of the Second Severn Bridge indicate that the shallow pools beneath the bridge are used by feeding wildfowl and waders. However their use is probably under-estimated and under-exploited to some extent at the Severn Bridge because of disturbance from people and dog walkers, which will not happen under the New Bridge.

10.19.47 The shading-out of saltmarsh vegetation presents an opportunity to create pools beneath the bridge, with the incorporation of rocks for stabilisation purposes and to provide shelter for invertebrates. These and other potential measures could be used to attract birds to habitat beneath and adjacent to the bridge, and thereby increase the degree of bird habituation.

10.19.48 It is likely that if some measures are effective in attracting birds, particularly small flocks, then other birds will follow and flock sizes will increase, reducing even further the effects of the bridge.

Mitigation of Operational Effects of the Project on Habitats and Birds in the Upper Mersey Estuary LWS

Effects on Habitats

10.19.49 The three main residual effects of the operation of the Project arise from the permanence of the entire bridge structure and its use by traffic, the shading of the saltmarsh vegetation by the bridge decks, and the possibility of pollution due to accidental oil or chemical spills.

10.19.50 The permanent loss of saltmarsh and other intertidal habitats due to the presence of the piers and towers cannot be avoided, nor can the effect of shading of the saltmarsh unless artificial lighting and/or reflective lighting is used. However, as indicated by observations at the Second Severn Crossing, the maritime habitats of both saltmarsh and intertidal sand and silt-flats will remain and will continue to function as habitats for some saltmarsh vegetation, where light permits, and as feeding habitats for wildfowl and wading birds.

10.19.51 In the case of the Upper Mersey Estuary, there is no reason why the sandbanks will not remain and continue to respond to the natural hydrodynamic processes that are a feature of the Upper Mersey Estuary.

10.19.52 There are several methods by which the permanent losses of saltmarsh habitat due to the piers, and the degradation of the remaining saltmarsh habitat beneath the bridge caused by shading, can be mitigated, as itemised below;

a. The very small areas of saltmarsh lost to the piers could be replaced by the excavation of mesotrophic grassland on the landward (upper) side of the upper saltmarshes to allow brackish conditions to occur naturally, followed by natural saltmarsh colonisation. This could be implemented in the immediate vicinity of the Project or elsewhere on the margins of the Upper Mersey Estuary; either on Widnes Warth Saltmarsh or on Astmoor Saltmarsh, or on both saltmarshes.
b. It may also be possible to replace the other intertidal habitats lost, at the tower locations, either by the localised removal of saltmarsh and its translocation to suitable estuarine habitats elsewhere in the Upper Estuary, or on the Upper Mersey Estuary margins by excavating land where there is no saltmarsh;
c. Whilst some areas of saltmarsh vegetation beneath the bridge may be lost due to shading, some areas will be suppressed to a lesser extent such that functional saltmarsh vegetation remains, as has occurred beneath the Second Severn Crossing. Although there is likely to be change in the density, height and species composition of the affected saltmarsh plant communities, they will still function as saltmarsh vegetation and provide food for herbivorous wildfowl and waders, and habitats for saltmarsh invertebrates to provide prey for omnivorous and carnivorous wildfowl and wading birds. These habitats could be enhanced by the excavation of pools or scrapes in the shaded areas;
d. The areas of maximum shading, where the saltmarsh growth is totally inhibited, should be excavated to create permanent and seasonal standing waters as habitats for aquatic invertebrates, comparable with the aquatic invertebrate communities of the natural saltmarsh creeks and associated pools. To prevent isolation of the aquatic habitats from sources of invertebrate colonisation, they should be connected to the pools in the natural creek system by the excavation of channels, which would allow the free movement of invertebrates between habitats with different light regimes; and
e. There is also the possibility of using artificial illumination beneath those parts of the bridge where shading is predicted to completely inhibit the growth of saltmarsh vegetation, perhaps in conjunction with safety illumination and an illumination system used for the bridge deck system.

Mitigation Involving the Conversion of Ungrazed Saltmarsh to Grazed Saltmarsh as Habitat for Feeding and Roosting Wildfowl and Waders.

10.19.53 However there may be significant limitations to the first two mitigation proposals, that is a. and b. above. Excavation to create replacement saltmarsh on the margins of the upper saltmarshes would involve translocation to a relatively unfavourable habitat for birds because the locations would be subjected to increased disturbance from people, particularly along the northern margins of Widnes Warth Saltmarsh. The benefits may be very marginal and possibly ineffective, even on Astmoor Saltmarsh.

10.19.54 Instead, implementation of mitigation measures to create greater saltmarsh habitat diversity in proximity to the Project is favoured and is considered here. This approach involves the modification of large areas of the existing saltmarsh by grazing or cutting, or preferably by a combination of the two, and the creation of pools and scrapes together with "islands" of raised and densely vegetated ground, which could be in the form of ridges or areas of higher ground of irregular shape, to provide specialised habitats for invertebrates as well as high tide refuges for small mammals and other terrestrial fauna.

10.19.55 A further advantage of raised saltmarsh terrain in the form of mounds and ridges is that such areas would provide refuges for grazing livestock, small mammals and other wildlife during spring tides.

10.19.56 Essentially, the proposed modification of the saltmarshes can be achieved by a change in management to convert the existing SM24 Sea Couch-grass saltmarsh NVC community to the SM16 Creeping Fescue saltmarsh NVC community which does occur on the upper saltmarshes of North West England. The difference between the SM24 and SM16 NVC communities is that the former is ungrazed, as at present on the Widnes Warth and Astmoor saltmarshes, and the latter is grazed.

10.19.57 Grazing has three very important and fundamental effects on the saltmarshes. They are;

a. Grazing converts the tall and dense SM24 saltmarsh to a short grassy sward which allows wildfowl and wading birds to feed and roost on an area of saltmarsh that gives them a clear and all-round field of view in which predators such as Red Fox cannot hide;
b. Grazing, provided that it is continuous, eliminates the tall and coarse grasses, notably Sea Couch, which is generally unpalatable to herbivorous and omnivorous wildfowl and wading birds. The elimination of reduction of the Sea Couch component of the saltmarsh vegetation allows the palatable grasses favoured by herbivorous and omnivorous wildfowl and waders to increase in abundance. The most palatable of these grasses is Sea Meadow-grass (*Puccinellia maritima*); and
c. Grazing and the maintenance of a short sward have several other important effects on the saltmarsh habitat including a significant change in botanical species composition which favours herbivorous wildfowl, the creation of a more open grassy sward which favours saltmarsh invertebrates that are important prey of carnivorous and omnivorous wildfowl and waders, increases in organic matter content of the saltmarsh surface soils due to cattle and other animal dunging, and increased accessibility of invertebrate prey in the saltmarsh soils for feeding waders such as Curlew, Redshank and Dunlin.

10.19.58 The choice of NVC plant community and NVC plant Sub-community is of considerable importance if the aim is to convert ungrazed saltmarsh to the type of grazed saltmarsh that is most favourable to the bird species in the assemblage of wildfowl and waders that give the Estuary its international importance.

10.19.59 There are six sub-communities of the SM16 Red Fescue community. They are;

a. SM16a Common Saltmarsh-grass sub-community;
b. SM16b sub-community with Saltmarsh Rush (*Juncus gerardi*i) dominant;
c. SM16c Red Fescue-Sea Milkwort sub-community;
d. SM16d Autumnal Hawkbut sub-community;
e. SM16e Glaucous Sedge sub-community; and
f. SM16f sub-community with tall Red Fescue dominant.

10.19.60 The SM16a is the only sub-community in which Common Saltmarsh-grass is of constant occurrence and occurs in great abundance, with a high percentage saltmarsh cover. The other constant species are Saltmarsh Rush, Sea Milkwort, Sea Plantain and Sea Arrow-grass. Although there is usually much Red Fescue, Sea Couch-grass and other coarse grasses are usually absent. There is normally a good assemblage of other saltmarsh plants which include Sea Aster, Hastate Orache and others, most of which are favoured by grazing wildfowl. The mean vegetation height is 7 centimetres.

10.19.61 The SM16b sub-community contains significant amounts of Common Saltmarsh-grass but much less than the SM16a sub-community. Saltmarsh Rush is often dominant and there are similar amounts of Red Fescue to those in the SM16a sub-community, and no couch-grasses. However this sub-community is usually taller than the SM16a sub-community, with a mean height of 26 centimetres. This sub-community can be valuable to grazing wildfowl but the frequent dominance of Saltmarsh Rush makes it less palatable to both grazing wildfowl and grazing livestock, making management more difficult.

10.19.62 The SM16c sub-community contains slightly less Common Saltmarsh-grass than the SM16b sub-community but Red Fescue is very abundant and co-dominant. There is usually a good assemblage of saltmarsh plants. This sub-community is usually slightly taller than the SM16a sub-community, with a mean height of 11 centimetres, and shorter than the SM16b sub-community, with a similar absence of coarse grasses such as Sea Couch-grass.

10.19.63 The SM16d sub-community has similar amounts of Common Saltmarsh-grass to those found in the SM16b and SM16c sub-communities. There is usually more Red Fescue than in the SM16a, b and c sub-communities and a lower proportion of saltmarsh plants which tend to be replaced by a low but significant proportion of mesotrophic grassland plants, sometimes with Common Couch-grass represented. The mean height of the sward is 26 centimetres, the same as the SM16b sub-community.

10.19.64 The SM16e sub-community is usually made up of an abundance of Red Fescue, Saltmarsh Rush, Sea Milkwort and Creeping Bent-grass with a modest assemblage of saltmarsh plants. The sward has a mean height of 10 centimetres but it can reach 50 centimetres. Common Saltmarsh-grass is usually absent. There is usually a significant moss flora in the sward.

10.19.65 Finally, the SM16f sub-community with tall Red Fescue dominant is often dominated by a mixture of Red Fescue and Saltmarsh Rush with no Common Saltmarsh-grass. It is generally a tall and dense sub-community, growing to a mean height of 10 centimetres and sometimes up to 60 centimetres. Although many saltmarsh species may be present, they are usually of reduced frequency, and there can be an abundance of mesotrophic herbs and sometimes Sea Couch-grass.

10.19.66 A detailed analysis of the physiognomy and species composition of the SM16 sub-communities leads one to the inevitable conclusion that the SM16a Common Saltmarsh-grass sub-community is the preferred vegetation type for a modified saltmarsh in parts of the Upper Mersey Estuary, if the aim is to attract an assemblage of migratory wildfowl and wading birds to the Upper Mersey Estuary and to improve the habitat for the bird species already found there.

10.19.67 The advantages of the SM16a sub-community, in terms of wildfowl and wading bird habitat, are;

a. The SM16a sub-community contains more Common Saltmarsh-grass than any of the other sub-communities;
b. The sub-community forms a shorter sward than the other sub-communities;
c. Coarse grasses are absent from the SM16a sub-community and there is less Red Fescue than in the other sub-communities with the exception of SM16b;
d. The mean percentage ground cover is lower than the comparable values of the other sub-communities; and
e. There is a good assemblage of saltmarsh plants, most of which are in substantial quantities.

10.19.68 Based on the preceding considerations, the main objective of mitigation should be to convert the existing SM24 Sea Couch-grass sub-community, in parts of the saltmarshes, to the SM16a Common Saltmarsh-grass sub-community.

10.19.69 Conversion to the SM16a sub-community would maximise the value of the saltmarsh for herbivorous wildfowl, omnivorous wildfowl and waders, and carnivorous waders, and will provide a palatable sward for grazing cattle or other suitable livestock that will be required for management.

Selection of Mitigation Areas of Saltmarsh

10.19.70 Consideration is now given to the selection of the area or areas of saltmarsh to be converted to short-grazed saltmarsh habitat of the SM16a Common Saltmarsh-grass sub-community. There are a few options, as listed below;

a. Conversion of one large area of ungrazed saltmarsh to two or more smaller areas of grazed saltmarsh, either on Widnes Warth Saltmarsh or Astmoor Saltmarsh.
b. Conversion of one or more areas of Widnes Warth Saltmarsh and of Astmoor Saltmarsh to grazed saltmarsh, i.e. at least two areas of conversion on both sides of the Upper Mersey Estuary.
c. Conversion of two or more areas of ungrazed saltmarsh to grazed saltmarsh on one side of the Upper Mersey Estuary only.

10.19.71 Conversion of an area of saltmarsh elsewhere in Halton Borough or outside the Borough, is undesirable and dismissed because this would result in a loss of estuarine habitat from the Upper Estuary ecosystem and a reduction, albeit a relatively small one, in the size of the ecosystem.

10.19.72 This Chapter considers the conversion of ungrazed saltmarsh to mown and or grazed saltmarsh at Widnes Warth and Astmoor saltmarshes in the vicinity of the New Bridge because it is in the New Bridge area that the effects will arise and where the receptors will be most vulnerable. The suitabilities of both saltmarshes are considered and appropriate areas and treatments are examined for each of the two saltmarshes. The assumption is made that areas of either or both saltmarshes will be available for mitigation and/or enhancement.

Consideration of the Prospects for Mitigation at Widnes Warth Saltmarsh

10.19.73 The Project crosses Widnes Warth Saltmarsh at an oblique angle which will affect about 5.5 hectares of saltmarsh due to losses, disturbance and shading. It is assumed that bird disturbance on either side of the New Bridge will extend up to about 300 metres. Other effects such as loss of semi-naturalness and aesthetic appeal have also been taken into account.

10.19.74 It is assumed that the use of Widnes Warth Saltmarsh for mitigation would involve control of at least part of the saltmarsh because the mitigation area would have to be permanent and under the full management control of an appropriate authority or organisation.

10.19.75 Mitigation could be on either or both sides of the New Bridge. As stated earlier, this would have to involve habitat creation and enhancement works by grazing and/or cutting, the excavation of saltmarsh pools and scrapes, the creation of mounds and ridges, and protection by fencing. The areas required would be as follows, including land beneath the New Bridge to link the habitats on either side and to provide some useful maritime habitat as is the case at the Second Severn Crossing;-

a. East of the New Bridge and east of the Bowers Brook water channel which discharges into the Estuary from the north = 17.5 hectares approx; and
b. West of the New Bridge and west of the above-mentioned water channel = 11.25 hectares approx.

10.19.76 Ensuring connectivity between the two areas of saltmarsh is important for two reasons, one being the management of grazing livestock and the second the importance of connectivity to allow birds to move easily from one side of the New Bridge to the other, in the event of disturbance.

10.19.77 In assessing the scope for mitigation, and its feasibility, at Widnes Warth Saltmarsh, it is necessary to consider the implications of loss of a substantial area of ungrazed saltmarsh, and to consider whether or not the location of the mitigation areas would limit their success due to human disturbance, dog walkers, shooters and the presence of features and habitats that may hold predators.

10.19.78 Changes in management of the saltmarsh habitats on both sides of the New Bridge should be directed towards enhancement of the saltmarsh habitat for those wildfowl and wading birds that occur in nationally and internationally important numbers in the European Site. The species are Redshank, Teal, Shelduck, Pintail, Dunlin, Golden Plover, Black-tailed Godwit. However it is improbable that Pintail and Black-tailed Godwit will come so far inland, except on rare occasions.

10.19.79 The proposed changes in management of the saltmarsh habitats on both sides of the New Bridge are intended to enhance the saltmarsh habitat for those wildfowl and wading birds that occur in nationally and internationally important numbers in the Estuary SPA. The species are Redshank, Teal, Shelduck, Pintail, Dunlin, Golden Plover, Black-tailed Godwit. However it is improbable that Pintail and Black-tailed Godwit will come so far inland, except on rare occasions.

10.19.80 The proposed grazing and cutting would reduce the value of the saltmarshes for Skylarks, Meadow Pipits, Reed Bunting and Redshank, and for rare visitors such as Hen Harrier, Marsh Harrier, Buzzard and other raptors in certain areas. For this reason the proposals should involve the retention of large areas of Widnes Warth Saltmarsh in its existing ungrazed condition.

10.19.81 Birds most likely to be deterred by the presence and use of the New Bridge are Skylark, harriers and other sensitive species. The central and eastern parts of Widnes Warth Saltmarsh support good breeding populations of Skylark, Meadow Pipit and Reed Bunting. The conversion of the eastern and central areas of the saltmarsh to a grazing regime would result in the losses of these species, and they would be most unlikely to move to the western areas in the vicinity of the New Bridge if they were displaced, largely because of the existing level of disturbance and disturbance effects of the proposed bridge.

10.19.82 Further, the alignment of the New Bridge crosses the widest part of Widnes Warth Saltmarsh. This and the fact that it crosses the saltmarsh obliquely, at an acute angle, maximises the disturbance effect of the New Bridge. The fact that the saltmarsh tapers to a narrow width in the east, where there is much Common Reed and Reed Canary-grass vegetation, severely limits the scope to create a large and undisturbed area of grazed saltmarsh which could be managed effectively to attract significant numbers of migratory wildfowl and wading birds.

10.19.83 The hedgerow between the St. Helens Canal and Widnes Warth Saltmarsh is likely to deter feeding and roosting wildfowl and waders from using the upper areas of the saltmarsh due to the combined effects of the footpath and the hedgerow. The hedgerow scrub will deter birds because of its perceived use by predators, and in the winter the use of the canal and canal-side footpath by anglers and walkers will deter wildfowl and waders when there is no hedgerow foliage.

10.19.84 For the above reasons the use of Widnes Warth for mitigation has some limitations but they will not prejudice satisfactory mitigation.

Consideration of the Prospects for Mitigation at Astmoor Saltmarsh

10.19.85 The approximate areas of saltmarsh required for management on either side of the New Bridge on both sides of the Astmoor Saltmarsh crossing point are as below and total 23 hectares;

a. East of the New Bridge = 12.0 hectares approx; and
b. West of the New Bridge = 11.0 hectares approx.

10.19.86 These figures are less than those required if Widnes Warth Saltmarsh is used because the New Bridge route is more or less at right angles to the alignment of the saltmarsh and the crossing affects one of the narrowest parts of the saltmarsh. The bridge is also higher at Astmoor Saltmarsh and there will be less shading of the saltmarsh vegetation. Consequently there is predicted to be less disturbance to saltmarsh birds at Astmoor compared with Widnes Warth Saltmarsh.

10.19.87 Astmoor Saltmarsh has further potential as a mitigation area in that:-

a. The existing level of human disturbance is much lower than at Widnes Warth because the saltmarsh is relatively isolated and remote from the central parts of Widnes and Runcorn, and access is difficult except by car to the Nature Reserve Visitor Centre;
b. Access to the central and eastern parts of the saltmarsh is restricted by fencing around the eastern landfill site, and discouraged in the west, with no public footpaths alongside the edge of the saltmarsh;
c. Hides with views over the saltmarsh are provided as part of the visitor centre facilities.
d. Astmoor Saltmarsh is adjacent to the Wigg Island Local Nature Reserve and could be managed and protected in conjunction with the conservation management of Wigg Island; and
e. The conversion of a substantive part of Astmoor Saltmarsh to grazed saltmarsh, to attract wildfowl and wading birds, would be a highly complementary interest feature for the designated Local Nature Reserve, particularly with the benefits of further hides and the existing warden service.

10.19.88 If Widnes Warth Saltmarsh is retained in its existing semi-natural state, effective mitigation for the effects of the New Bridge on the European Site and on the Upper Estuary treated as a potential SPA would involve the conversion of 23 hectares of Astmoor Saltmarsh to grazed saltmarsh.

10.19.89 There are ecological benefits of a large and continuous mitigation area instead of two or more smaller areas. Examples of the main advantages of a single saltmarsh mitigation area are itemised below;

a. A large area would be particularly attractive to large flocks of sensitive wildfowl and waders because they would benefit from a very wide field of view across a large area that would be seen to be free of predators and human disturbance;
b. A large mitigation area is likely to allow flocks of sensitive birds to move away from a source of disturbance on the edge of the area, or within it, without leaving the mitigation area. This would allow important bird flocks to stay within the Upper Estuary, instead of being displaced and forced to move elsewhere;
c. A further advantage of a large mitigation area is that observations by birdwatchers and monitoring of changes in bird numbers in the Upper Mersey Estuary would be relatively easy and the monitoring results would re reliable; and
d. Grazing management and surveillance of livestock should be easier if one large area is provided, particularly in the event of exceptionally high tides when it may be necessary to remove livestock or ensure that they have access to higher ground above the tidal limit.

10.19.90 This proposal would leave a large, remote and relatively inaccessible area, secluded and virtually free of disturbance, of approximately 34 hectares of saltmarsh, for breeding Skylarks, Redshank, and visiting raptors including harriers, in the east. This undisturbed area would continue to benefit from gradual improvements in water quality of the adjacent wetland area along the route of the former Runcorn to Latchford Canal.

10.19.91 Apart from the need for water quality improvement of the former canal, the central to eastern parts of Astmoor Saltmarsh should be left in their existing state as an important and representative example of ungrazed saltmarsh.

Creation of Other Mitigation Features at Astmoor Saltmarsh

10.19.92 The creation of a large and continuous area of grazed saltmarsh would provide more effective mitigation if saltmarsh sub-features were included in the scheme, especially water features that would attract wildfowl and wading birds. This is of crucial importance for the success of mitigation because Astmoor Saltmarsh is upper saltmarsh habitat which contains less aquatic habitat and fewer brackish pools than middle and lower saltmarshes.

10.19.93 There should be creation of shallow scrapes, ranging from several square metres to tens of square metres in area, as habitats for saltmarsh plants and aquatic invertebrates. Shallow scrapes would be very seasonal but deeper scrapes would support a greater species diversity of invertebrates and a higher density of invertebrates, and would be more valuable for feeding waders.

10.19.94 Additionally there should be selective blocking of minor creeks in a manner which creates pools of various lengths and depths without changing the overall drainage regime and drainage pattern of the saltmarsh.

10.19.95 Further diversity should be provided by the construction of low mounds or ridges with subsequent colonisation by grasses and associated herbs of the upper saltmarsh. These would provide refuges for grazing livestock as well as small mammals during spring tides, and habitats for invertebrates.

Mitigation of Construction Effects on the St. Helens Canal LWS

10.19.96 The main effect of construction is the loss of aquatic and water margin vegetation due to temporary infilling of a section of the canal. However this is a temporary effect of moderate magnitude and moderate significance that cannot be avoided. Even if the effect could be avoided, little or nothing would be gained because the vegetation would be significantly and adversely affected by shading by the New Bridge on completion of the works.

10.19.97 There is little to be gained in the removal and storage of the affected vegetation because natural recolonisation will occur where there is sufficient illumination from the north-eastern and south-western ends of the bridge. However a pre-construction botanical survey of the affected section of the canal is necessary to identify any scarce species or species that are restricted to, or concentrated in, the affected section of the canal. These species should be either transplanted directly to unaffected sections of the canal where the habitats are suitable, or transferred to a holding area for re-introduction at a later date.

10.19.98 The temporary disturbance to fauna, particularly birds, which is a short-term and temporary effect of moderate magnitude and significance, cannot be avoided other than by clearance of bird-breeding habitat outside the breeding season, from September to February inclusive. This will be undertaken as pre-contract works or at the beginning of the works if started before the bird-breeding season.

10.19.99 All potential bird-breeding habitat should be removed including terrestrial and emergent woody and herbaceous vegetation along the canal and on the canal banks, including in all areas where there is bird-breeding habitat that would be disturbed by the works. Clearance of bird-breeding habitat should include all habitat within up to 50 metres of the construction and working areas; the distance will be specified following an inspection of the site by an ornithologist.

10.19.100 In addition to the clearance of vegetation, the ornithologist should identify any structures, cavities and other places which may attract breeding birds, and appropriate action should be taken to prevent or deter birds from nesting at such locations.

10.19.101 There should also be a pre-contract survey of the canal banks by an experienced ecologist for evidence of Water Vole activity because the possibility of recolonisation by Water Voles cannot be discounted. If Water Vole presence is detected, there would need to be translocation of the voles to a suitable receptor site.

10.19.102 Temporary fragmentation of the canal habitat is unavoidable and will not be permanent.

Mitigation of Operational Effects on the St. Helens Canal LWS

10.19.103 There will be inevitable shading of the vegetation of the canal by the New Bridge and an associated change to the local environment beneath the bridge in terms of temperatures, humidity and possibly a wind tunnel effect. These long-term and permanent changes will prevent or suppress recolonisation of aquatic and water-margin plants, depending on shade tolerance of individual species, and their associated fauna beneath the central part of the bridge, with suppressed growth at the north-eastern and south-western ends of the bridge. The effects, of moderate magnitude and significance, are unavoidable, but there would be no significant fragmentation effect.

10.19.104 However the disturbance effects of the presence of the bridge and traffic uses will be negligible and not significant.

10.19.105 There will be mitigation of the reduction in biodiversity and wildlife interest of the canal section beneath the bridge by the construction of suitable ponds and linear aquatic habitats on Wigg Island. These new aquatic habitats will be designed to support the types of flora and fauna found in the canal, including aquatic and emergent water-margin plants such as Common Reed, Bulrush, Common Water-plantain and Water Starwort. The ponds will be allowed to colonise naturally to provide breeding habitats for dragonflies and damselflies, Common Toad and associated amphibians, but not fish because coarse and other fish interests of the canal will be less affected by the shading effect of the New Bridge.

Mitigation of the Construction Effects on the Manchester Ship Canal Bank LWS.

Translocation of Important Vegetation and Individual Species including Orchids

10.19.106 The main effect during construction will be mechanical and trampling damage to soils and vegetation, causing adverse changes to soil structure and potential damage to important orchid populations and herb-rich plant communities including the scarce Grass Vetchling.

10.19.107 Where possible, important plant communities and orchid populations should be avoided by protective fencing which will be maintained throughout construction. If avoidance is not feasible, there should be translocation of the plant communities and populations of species affected.

10.19.108 To avoid double handling of the communities and populations of species affected, which increases the risk of losses of plants, the receptor site(s) should be selected at other locations in the Manchester Ship Canal Bank LWS where the vegetation is species-poor but where the soils and ground conditions are suitable. The vegetation of these sites should be stripped and removed to a depth of approximately 50 to 100 mms, as directed by the supervising ecologist, and where necessary the underlying ground material should be loosened by ripping or tilling to remove compaction.

10.19.109 Translocation should be by macroturfing or other suitable mechanical means to a depth of about 100 mm, with direct placement of the translocated turf to the receptor site(s). The translocated material should be lightly consolidated by means of a low ground-pressure tracked machine. Translocation should be carried out during suitable weather and soil moisture conditions, and not when the soils are waterlogged or during rain because such conditions can cause damage to soil structure. Translocation should also avoid times when the surface soils are dry to a depth of approximately 20 mm because this would cause shrinkage of the turves and dieback of the translocated vegetation.

10.19.110 There should also be transplanting by hand, using spades and or trowels, of very small populations of orchids and other plants, and of single plants that are worthy of conservation.

10.19.111 Following the completion of the New Bridge construction works affecting the canal bank vegetation, the ground of the affected areas should be ripped and tined, and cultivated to form a seedbed suitable for natural recolonisation.

10.19.112 Where appropriate there should be manual transplanting of orchids, Grass Vetchling and other important plants to the restored areas. This should involve the translocation of small numbers of plants to each affected area, to avoid significant reductions in the sizes of plant colonies at the donor sites in the LWS. However sufficient numbers of plants should be translocated to each affected area to initiate the development of viable colonies of the species concerned.

Protection of Breeding Birds

10.19.113 Breeding birds should be protected by the clearance and removal from the site of all bird-breeding habitat outside the bird-breeding season as described earlier for the St. Helens Canal LWS. If the contract works are scheduled to start during the breeding season, there should be pre-contract cutting and removal of all bird breeding habitat, of woody and tall-herb vegetation, before March.

Conservation of Breeding Butterflies

10.19.114 The magnitude and significance of effects on butterflies are low. However to protect species such as the Common Blue butterfly and the Burnet moths whose larvae feed on Common Bird's-foot-trefoil, there should be translocation of turf containing an abundance of this species from areas that cannot be protected by fencing. Translocation should be as described for orchid colonies and other species, but using mechanical methods only.

Mitigation of the Operational Effects on the Manchester Ship Canal LWS.

Mitigation of Shading and Rainfall Interception Effects

10.19.115 The most significant operational effect is the combined effect of the shading and rainfall interception effects on vegetation and plant species; this effect is of moderate magnitude and significance. The effect cannot be avoided and there is no feasible mitigation other than the translocation of important vegetation to unaffected parts of the canal bank LWS and enhancement of habitat elsewhere along the canal bank LWS.

10.19.116 Important vegetation affected by shading and rainfall interception should be translocated to other parts of the LWS as described for construction mitigation.

10.19.117 Further mitigation should involve the stripping of further areas of species-poor and unimportant vegetation elsewhere in the canal bank LWS to remove the vegetation that does not contribute significantly to the interest features of the LWS. Stripping should also remove any enriched and superficial soil material, including its seedbank of undesirable species. Recolonisation of the stripped habitat to species-rich vegetation including orchids, Common Bird's-foot-trefoil and calcicolous plants will be encouraged by the application of ground calcitic limestone to the surface of the stripped ground, at a rate in the range of to 10 to 20 tonnes per hectare (1 to 2 kilograms per square metre).

Treatment of Compacted and Poorly-drained Soil Beneath the New Bridge

10.19.118 Areas of compacted ground beneath the New Bridge should be ripped and tined to improve the soil structure as described for the mitigation of construction effects. The areas should be treated with ground calcitic limestone as described above and allowed to recolonise naturally, where shading permits. The natural recolonisation of the shaded area should be monitored after which time the introduction of shade-tolerant herbs and low-growing shrubs should be considered and implemented in the after-management period.

Mitigation of Effects on Invertebrates

10.19.119 The permanent effects of low magnitude and significance on butterflies and other invertebrates should be mitigated by the translocation of vegetation containing larval food plants such as Common Bird's-foot-trefoil as described earlier, and by ground calcitic limestone addition to vegetation and soil-stripped areas to encourage a more diverse flora with more larval food plants for butterflies, and greater species-richness to encourage natural colonisation by other

terrestrial invertebrate species including hoverflies, grasshoppers and ants.

Mitigation of the Construction Effects on Wigg Island LWS and Local Nature Reserve

10.19.120 The loss of woody and herbaceous vegetation during construction will be of moderate magnitude and significance, and probably permanent because its replacement will not be feasible given the operational effects of shading and rainfall interception on completion of the bridge structure.

10.19.121 The woody and herbaceous vegetation lost or damaged during construction activities should be replanted in areas unaffected by subsequent shading and rainfall interception but only limited areas of planting will be feasible beneath the bridge and should be restricted to shade-tolerant species such as Holly and will be successful only in areas beneath the sides of the bridge decking with sufficient light access.

10.19.122 The nature of the mitigation planting scheme should be determined by the need to mitigate the effect of loss of aesthetic appeal, particularly during the operation of the Project. The loss of aesthetic appeal will be of high magnitude and high significance during the operational as well as the construction stages of the Project, and there is an over-riding need for effective mitigation during operation of the Project. The success of mitigation of the aesthetic effect will depend largely on successful tree planting to screen the New Bridge and its traffic from the Local Nature Reserve. This is dealt with in the following section which addresses the operational effects.

10.19.123 As described earlier for the Upper Mersey Estuary and other Local Wildlife Sites, it will be necessary to clear the woody and tall-herb vegetation before the bird-breeding season which starts at the beginning of March, and to clear an area up to 50 metres from the proposed working areas to avoid disturbing birds in nearby habitats.

10.19.124 On the completion of construction, all areas of disturbed and compacted ground should be ripped where necessary and cultivated using tines and other equipment to restore a favourable soil structure for tree planting.

Mitigation of the Operational Effects on Wigg Island LWS and Local Nature Reserve

Tree and Shrub Planting Along Both Sides of the Bridge to Mitigate the Loss of Aesthetic Appeal

10.19.125 Little can be done to mitigate the shading and rainfall interception effects of the New Bridge. Any colonising vegetation beneath the bridge will be poorly developed and species-poor, and of very limited value for birds, butterflies and other invertebrates.

10.19.126 As described in Chapter 12 dealing with Landscape and Visual Amenity, there will be tree and shrub planting on both sides of the 25 metres high New Bridge immediately north of the Manchester Ship Canal crossing point. This planting should be extended north-west across Wigg Island towards Astmoor Saltmarsh where the planting should terminate.

10.19.127 For landscaping reasons as well as ecological reasons the planting along both sides of the bridge should be “broken up”, and planted in a manner that will provide an effective bridge screening effect and a natural “woodland-edge” effect. The design should include tall and fast-growing trees close to the Bridge. Selected tall and the fastest-growing species will form the “core” planting.

The three species described in Table 10.68 below are examples of suitable species for early screening;

Table 10.68 - The Fastest Growing Tree Species for the Core Planting on Both Sides of the New Bridge.

Scientific name	Common name	Attributes
Populus nigra ' italica'	Lombardy Poplar	Fast grower if planted on fertile soil but growth could be stunted by a limited root run so ripping and drainage may help to speed-up growth, plus fertilisation.
Populus nigra	Manchester Poplar	Fast grower that will form a large tree if soil conditions are favourable.
Populus x canadensis 'Serotina'	Black Italian Poplar	Can grow two metres in the first year and be over 30 metres high in 30 years, producing an early landscape effect in conjunction with planting of the preceding species.

10.19.128 Lombardy Poplar can be very fragile if planted in lines so will be planted in groups to cope with the relatively exposed situation.

10.19.129 Manchester Poplar is another fast-growing species that is best planted in groups, as part of the proposed "broken-up" planting design.

10.19.130 The additional species described in Table 10.69 are intended to provide structural and species diversity in the planting, and to act as longer-living trees, although some such as Silver Birch are very fast growers.

Table 10.69 - Additional Tree Species for the Core Planting on Both Sides of the New Bridge.

Scientific name	Common name	Attributes
Betula pendula	Silver Birch	Fast-growing and can grow to 15 metres in 20 years or less.
Alnus glutinosa	Common Alder	Exhibits very rapid growth and can grow 1 metre a year when young, especially if given a moist and fertile soil, preferably with phosphate fertiliser to stimulate root growth and nitrogen fixation.
Quercus ilex	Holm Oak or Evergreen Oak	Will not grow as fast as the preceding species but is suited to coastal or near coastal areas and has the benefit of growing to a large size and is evergreen.
Quercus robur	English Oak	Can grow at a reasonable rate although nothing like the rapidity of the poplars etc, but it is a tree for the longer term to replace the poplars and birches when they start to shed branches or become damaged by wind.

10.19.131 The areas between the core plantings of dense poplars and associated Birch, Alder, Evergreen Oak and English Oak will be planted with tall scrub and shorter trees, such as those listed in Table 10.70.

10.19.132 A further advantage of English Oak and Evergreen Oak is that they are used by the larvae of the Purple Hairstreak butterfly.

10.19.133 Additional species to those listed in Table 10.70 will be planted, particularly Elm (*Ulmus*) species to provide foodplant for the larvae of the White-letter Hairstreak, and Common Buckthorn (*Rhamnus cathartica*) and Alder Buckthorn (*Frangula alnus*) which are the larval foodplants of the Brimstone butterfly.

Table 10.70 - Shorter Tree and Shrub Species to be Planted Between the Core Plantings and on the Outer Margins of the Tall Tree Species.

Scientific name	Common name	Attributes
Acer campestre	Field Maple	Native species that ultimately forms a small to medium-sized tree.
Crataegus monogyna	Hawthorn	Fast-growing dense species good for nesting, feeding and roosting birds.
Malus sylvestris	Crab Apple	Small attractive tree with numerous small apples.
Sorbus aucuparia	Rowan	Attractive berried tree of value to feeding birds.
Corylus avellana	Hazel	Can be coppiced, and of significant longevity.
Ilex aquifolium	Holly	Dense evergreen foliage, good for nesting birds and berries for feeding birds.
Populus tremula	Aspen	Attractive small tree and an interesting feature in a nature reserve.
Prunus spinosa	Blackthorn	Forms very dense of value for breeding, feeding and roosting birds.

Mitigation of the Construction and Operational Effects on other Local Wildlife Sites and Sites of Lesser Importance

10.19.134 There are no effects on Haystack Lodge LWS so mitigation is not required. There are no effects on Norbury Wood and Marsh LWS and on Oxmoor Wood and Ponds LWS, both of which are Local Nature Reserves, so mitigation is unnecessary.

10.19.135 The Bridgewater Canal is also unaffected to a significant extent by adverse effects so mitigation is not anticipated.

10.19.136 In the case of the St. Michael's Golf Course, there is the possibility of a mitigation requirement arising if Water Voles recolonise the site from other parts of Steward's Brook or associated water-courses, following the translocation of all the Water Voles in the golf course to Moore Nature Reserve.

10.19.137 In the event of Water Vole recolonisation before the start of the Project, mitigation will be necessary. However this will be entirely feasible and there are no reasons to doubt its success because the Project works will only affect part of the ditch habitat of the Water Voles and it will be possible to maintain the Water Vole population on the site, but outside the construction area, during the implementation of the works, after which time the animals can be allowed to recolonise the affected habitats.

10.19.138 Mitigation in this case, if required, would also involve the modification of the proposed balancing pond as a new habitat for Water Voles.

Mitigation of the Construction and Operational Effects on Bats

Mitigation of Construction Effects

10.19.139 Although the potential loss of Common Pipistrelle roosts is considered to be not significant, there will be licensed bat surveys of potential roosts in buildings prior to demolition.

10.19.140 In general, mitigation will involve retention of carriageway vegetation, particularly trees and shrubs, wherever possible.

10.19.141 The greatest effect on bats is considered to be on Wigg Island because the habitat is concentrated and easily fragmented. However construction activities will be centred on the four piers to be constructed which will involve limited tree removal and no significant fragmentation of the continuity of the woodland. Further the New Bridge will be 25 metres high making it possible to retain the developing woodland vegetation, subject to pruning and reducing the height of the tree canopy if and where necessary.

10.19.142 At the Rocksavage Expressway the trees and associated woody vegetation including any tall-herb vegetation will be retained because there is active bat foraging and commuting in this area. Tree loss will be avoided at the northern end of the roundabout to safeguard the Soprano Pipistrelles which cross at this location.

10.19.143 At Ditton Junction the sheltered flyway used by Common Pipistrelles will be retained.

Mitigation of Operational Effects

10.19.144 The crossings of the St. Helens Canal, the Manchester Ship Canal and the Bridgewater Canal will be illuminated using direct and screened lighting to avoid light spillage over the water and canal bank vegetation, to avoid disorientation of bats and to reduce collisions with traffic.

Mitigation of the Construction and Operational Effects on Great Crested Newts

10.19.145 The possible injury or killing of Great Crested Newts (GCNs) during construction and operation of the Project is a high negative impact of high significance but the operational effects on GCN habitats are low and not significant.

10.19.146 It will be necessary to carry out licensed GCN mitigation because of the close proximity of the development to the breeding ponds and the established GCN meta-population. There has been a report of a dead GCN in the gutter on the south side of the Weston Point Expressway, in the vicinity of the GCN ponds, indicates the need for newt mitigation and application to Natural England for a GCN Mitigation Licence.

10.19.147 There will be exclusion of newts during the works by the erection of a temporary newt exclusion fence to ensure that there will be no killing or injury of GCNs.

10.19.148 There will have to be licensed removal of GCNs from the junction improvement works at the Central Expressway/Weston Point Expressway Junction at Rocksavage. This will involve pitfall trapping in conjunction with drift newt exclusion fences, and associated capture methods including placement of carpet tiles or other artificial refugia, hand searches amongst vegetation and beneath land surface debris, and destructive searches of below-ground cavities including mammal burrows. Torchlight searches along drift fences at night during warm and humid conditions may also be appropriate.

10.19.149 The GCNs caught by trapping and searching will be translocated to suitable terrestrial habitats in the vicinity of the GCN breeding ponds. Any other amphibians caught by trapping and searching will also be translocated to similar habitats close to the ponds.

10.19.150 In addition, a permanent newt exclusion fence will be erected along the boundary of the highway land to protect Great Crested Newts from injury or killing as a result of existing and increased traffic volumes.

Mitigation of the Construction and Operational Effects on Water Voles

10.19.151 If Water Voles recolonise the St.Michael's Golf Course ditch system prior to Mersey Gateway Project construction, mitigation will be necessary.

10.19.152 The culverting of a section of the ditch system on the south side of Speke Road will make habitat conditions along the affected section unsuitable for Water Voles because of the loss of vegetation that provides cover and foraging habitat. Consequently there will also be loss of suitable burrowing habitat. This loss of habitat cannot be avoided.

10.19.153 However it will be possible to retain the Water Vole population(s) on the site by the construction of replacement habitat.

10.19.154 Compensation for the loss of burrowing and foraging habitat as well as cover will be provided by the excavation of a length of ditch system at least as long and wide as that affected by culverting. This will be provided with suitable banks for burrowing Water Voles based on advice published in the *Water Vole Conservation Handbook* (Strachan & Moorhouse 2006).

10.19.155 The new ditch section will be planted to species that are considered to be important for Water Voles (Strachan & Moorhouse 2006), examples being Reed Canary-grass, Common Reed, Reed Sweet-grass, rush and sedge species, Yellow Iris and various aquatic and water-margin plants.

10.19.156 Strimming will be used to discourage Water Vole colonisation of the ditch section to be culverted. Trapping and translocation will used only if strimming proves to be ineffective. Mitigation will be monitored as advised by Strachan and Moorhouse (2006).

10.19.157 If Water Voles are present and mitigation becomes necessary, a Method Statement will be prepared to provide the results of Water Vole surveys and maps showing their habitats and distribution within the site. This will include plans and sections of the water-courses and their vegetation, and will describe the predicted effects of the development on the Water Voles and their habitats. There will be a full description of the mitigation methods to be employed and subsequent monitoring of the success or otherwise of mitigation.

10.20 Residual Effects

Residual Construction Effects on Habitats in the Upper Mersey Estuary

Stone Access Road

10.20.1 The residual effects of the proposed mitigation are shown in Table 10.71:

a. The permanent damage to soil structure is avoided, the mitigation treatment reducing the effect from permanent to temporary;
b. Erosion due to loss of vegetation and loss of seedbank is avoided either by temporary translocation and replacement of the vegetation or by other methods, and restoring the former soil conditions by appropriate methods to prevent a change in species composition;
c. The magnitudes of the effects are reduced from moderate and low to negligible; and
d. The mitigation also reduces the significance of the effects from moderate or low to not significant or negligible.

10.20.2 Table 10.71 summarises all stages of the proposed mitigation and the overall residual effects.

Table 10.71 - Assessment of the Residual Effects of the Construction and Use of Stone Access Tracks on Habitats across Widnes Warth Saltmarsh and Astmoor Saltmarsh.

Receptor 1 - Widnes Warth Saltmarsh and Astmoor Saltmarsh			
Brief description of residual Effect	Construction and use of stone access tracks	Construction and use of stone access tracks	Construction and use of stone access tracks
Effect of Effect	Loss of vegetation	Loss of seedbank	Damage to soil structure
Mitigation Stage 1	Translocation of saltmarsh vegetation to holding area	Translocation of saltmarsh topsoil to holding area	Piped drains beneath stone access tracks
Mitigation Stage 2	Monitoring of translocated and retained saltmarsh vegetation	Monitoring of seed production of translocated saltmarsh vegetation	Monitoring of drainage of access tracks
Mitigation Stage 3	Removal of stone access tracks	Management of retained saltmarsh vegetation	Removal of piped drainage system
Mitigation Stage 4	Translocation of saltmarsh turf from holding area to restore access track saltmarsh vegetation	Translocation of topsoil with saltmarsh turf to restore seedbank	Ripping and cultivation as necessary to relieve compaction and restore soil structure
Mitigation Stage 5	Monitoring of restored saltmarsh vegetation	Monitoring of saltmarsh regeneration	Monitoring of soil structure and drainage
Mitigation Stage 6	Management of vegetation if necessary	Supplementary seeding if necessary	Ripping and cultivation if necessary
Magnitude of Residual Effects	Negligible	Negligible	Negligible
Significance of Residual effects	None of significance	None of significance	None of significance
Comments Box	The effects are based on the stone access tracks being in place and in use for up to three years. The specified treatments, monitoring and management are designed to mitigate all effects apart from temporary effects.		

10.20.3 The overall effect of the proposed mitigation is that the effects of the construction and use of the stone haul road on saltmarsh will not be significant, and there will be no secondary effects of erosion or changes in species composition of the saltmarsh vegetation.

Cofferdams and working areas for pier construction

10.20.4 The residual effects after mitigation for the construction of the cofferdams and associated working areas are summarised in Table 10.72. The effects of the proposed mitigation are similar to those described for the stone access roads.

Table 10.72 - Assessment of the Residual Effects of Cofferdam Construction and Working Areas for Bridge Pier Construction on Widnes Warth Saltmarsh and Astmoor Saltmarsh.

Receptor 1 – Widnes Warth Saltmarsh and Astmoor Saltmarsh			
Brief Description of Residual Effect	Construction of coffer-dams and working areas for construction of piers	Construction of coffer-dams and working areas for construction of piers	Construction of coffer-dams and working areas for construction of piers
Effect	Loss of vegetation	Loss of seedbank	Damage to soil structure
Mitigation Stage 1	Translocation of saltmarsh vegetation to holding area or other mitigation treatment	Translocation of saltmarsh topsoil to holding area or other mitigation treatment	No mitigation.
Mitigation Stage 2	Monitoring of translocated and retained saltmarsh vegetation, or other mitigation treatment	Monitoring of seed production of translocated saltmarsh vegetation, or other mitigation treatment	No mitigation
Mitigation Stage 3	Infilling of coffer-dams	Management of retained saltmarsh vegetation, or other mitigation treatment	No mitigation
Mitigation Stage 4	Translocation of saltmarsh turf from holding area to restore coffer-dams and working areas, or other mitigation treatment	Translocation of topsoil with saltmarsh turf to restore seedbank, or other mitigation treatment	Ripping and cultivation as necessary to relieve compaction and restore soil structure, or other mitigation treatment
Mitigation Stage 5	Monitoring of restored saltmarsh vegetation	Monitoring of saltmarsh regeneration	Monitoring of soil structure and drainage
Mitigation Stage 6	Management of vegetation if necessary	Supplementary seeding if necessary	Ripping and cultivation if necessary
Magnitude of Residual Effects	Negligible	Negligible	Negligible
Significance of Residual effects	None of significance	None of significance	None of significance
Comments Box	The effects are based on the use of a stone haul road to give access to the cofferdams and working areas but other mitigation methods may be used. The specified treatments, monitoring and management are designed to mitigate all effects apart from temporary effects.		

10.20.5 Of greatest importance is the avoidance of erosion and changes in species composition of the saltmarshes. The magnitudes of effects are reduced from moderate or low to negligible, and the significance of the effects are reduced from moderate to not significant.

10.20.6 There is a residual construction effect of saltmarsh loss arising from the construction of the piers that is not itemised in Table 10.72. However the area of saltmarsh lost at each pier site is less than 20 square metres which is insignificant in relation to the large area of saltmarsh in the Upper Mersey Estuary and the continuing natural process of saltmarsh erosion. The residual construction effect on saltmarsh habitat is negligible and not significant, even if the Upper Estuary is treated as a pSPA. The conclusions in Table 10.72 remain valid.

Direct and indirect effects on intertidal sand, silt and mudflats, including sandbanks

10.20.7 There is limited scope for ecological mitigation on the intertidal habitats outside the saltmarshes, where the bridge towers will be constructed, because of the absence of saltmarsh and other vegetation. Further, there are low concentrations of contaminants in the sands and silts which do not pose a significant pollution threat if they are disturbed, and in any event they are continually being disturbed by the natural hydrodynamic processes in this part of the Upper Mersey Estuary.

10.20.8 The only significant mitigation requirements are the control of excessive sand and silt releases, and the avoidance of excessive bird disturbance. However the latter is not an issue in these areas because there are no breeding birds.

10.20.9 The magnitude and significance of effects were both assessed as low for the use of hovercraft and low ground pressure tractors whereas magnitude and significance were neutral and not significant respectively for construction using piled jetties.

10.20.10 Table 10.73 shows the residual effects of hovercraft and low ground pressure tractors on the intertidal habitats between the two saltmarshes.

Table 10.73 - Assessment of the Residual Effects of Bridge Tower Construction Methods on the Intertidal Sand, Silt, Mudflat and Sandbank Habitats between Widnes Warth Saltmarsh and Astmoor Saltmarsh.

Receptor 2 - Intertidal sand, silt, mud-flat and sandbank habitats between Widnes Warth Saltmarsh and Astmoor Saltmarsh.		
Brief description of residual Effect	Hovercraft	Low ground pressure tractors
Mitigation Stage 1	Use of hovercraft for heavy loads and in areas susceptible to release of silt and high turbidity	Use of tractors for localised operations only, inaccessible to piled jetties and hovercraft
Mitigation Stage 2	Monitoring of turbidity and release of sediments	Monitoring of turbidity and release of sediments.
Mitigation Stage 3	Release of sediments	Release of sediments
Mitigation Stage 4	Use hovercraft with a low ground pressure of 1.0 to 2.0 psi where feasible	Avoid use of tractors where other methods are feasible.
Magnitude of Residual Effects	Negligible	Negligible
Significance of Residual effects	None of significance	None of significance

Receptor 2 - Intertidal sand, silt, mud-flat and sandbank habitats between Widnes Warth Saltmarsh and Astmoor Saltmarsh.	
Comments Box	The effects are based on the conclusions from hydrodynamic studies that the potential effect of any of the methods is minor when compared with the existing sediment dynamics presently experienced in the Upper Mersey Estuary. Mitigation is the use of a combination of methods with the preferred used of hovercraft for heavy loads.

10.20.11 In the preceding Table 10.73 the residual construction effects relating to the permanent losses of intertidal habitat following bridge tower construction are omitted. Although individual towers will result in a greater area of loss of intertidal habitat than individual piers, there are only two towers but numerous piers. Further, the intertidal and water channel habitats are less important than the saltmarshes in the Upper Mersey Estuary. The residual effects are therefore similar to the comparable effects of the towers and are assessed as negligible and not significant.

Residual Construction Effects on Birds in the Upper Mersey Estuary

10.20.12 Table 10.74 shows the residual construction effects on birds in the Upper Mersey Estuary, given treatment as a pSPA. Mitigation avoids the secondary effect of erosion on saltmarsh bird habitat, and reduces the moderate magnitude and significance effects caused by the presence and movements of structures, machinery and personnel, to effects of low magnitude and low significance.

Table 10.74 - Assessment of the Residual Construction Effects of the Project on Birds

Receptor 3 - Birds in the Upper Mersey Estuary			
Brief Description of Residual Effect	Construction of structures and working areas	Presence and movements of structures, machinery and personnel	Noise and pollution produced by machinery, and lighting
Effect	Loss of saltmarsh and intertidal habitats	Disturbance to breeding, roosting, feeding, loafing and migrating birds.	Disturbance to breeding, roosting, feeding, loafing and migrating birds. Oiling of birds.
Mitigation 1	Start construction before bird-breeding season or remove breeding habitat in winter	Restrict machinery, vehicles and personnel to working areas	Restrict machinery, vehicles and personnel to construction areas
Mitigation 2	Prevent access to saltmarshes by fences	Prevent access to saltmarshes by fences	Minimise access to saltmarshes by fencing
Mitigation 3	Monitor construction work and related activities	Monitor construction work and related activities	Monitor construction work and related activities
Magnitude of Residual Effects	Low	Low	Low
Significance of Residual Effects	Low	Low	Low
Comments Box	The effects are based on the access roads being in place and in use for up to three years.		

Residual Construction Effects on Habitats in the Middle Mersey Estuary European Site

10.20.13 Table 10.75 summarises the residual construction effects on the sensitive and vulnerable habitats in the European Site, based on the effects identified earlier in this Chapter. Of note are the following;

a. The magnitude effects of the release of contaminated saltmarsh sediments are reduced from low to negligible and are not significant;
b. Increased sediment release from the Upper Mersey Estuary is reduced, from an effect magnitude of low to negligible, and the effect is not significant; and
c. Oiling and chemical pollution effects from the Upper Mersey Estuary are reduced from a low to negligible magnitude, and are not significant.

10.20.14 Thus there is no significant residual effect on habitats in the European Site from the release of contaminants in the Upper Mersey Estuary.

Table 10.75 - Assessment of the Residual Construction Effects on Habitats in the Estuary European Site.

Receptor 4 – Habitats in the Middle Mersey Estuary European Site			
Brief Description of Residual Effect	Release of contaminants from saltmarsh sediments in Upper Mersey Estuary	Release of sediments from intertidal habitats including silt-flats and sandbanks in Upper Mersey Estuary	Pollution from oil and chemical spillages in Upper Mersey Estuary
Effect	Pollution of saltmarsh and intertidal habitats in the European Site by contaminants	Increased turbidity of river and other tidal waters in the European Site, and deposition of sediments on intertidal habitats	Oiling and chemical contamination of waters and intertidal habitats in the European Site
Magnitude of Residual Effects	Negligible	Negligible	Negligible
Significance of Residual Effects	Not significant	Not significant	Not significant
Comments Box	The effects under examination are pollutants and sediments released in the Upper Mersey Estuary and carried downstream into the European Site.		

Residual Construction Effects on Birds in the Middle Mersey Estuary European Site

10.20.15 The specified mitigation measures during construction will minimise or avoid any potential hazards to the limited numbers of wildfowl and wading birds which enter the Upper Mersey Estuary from the European Site.

10.20.16 The pollution control measures will minimise potential oil and chemical pollution, reducing the potential effect in the European Site from low to negligible.

10.20.17 In the following summary Table 10.76, all the residual effects are negligible and not significant.

Table 10.76 - Assessment of the Residual Construction Effects of the Project on Birds Downstream in the Middle Mersey Estuary European Site.

Receptor 5 – Birds in the Middle Mersey Estuary European Site			
Brief Description of Residual Effects	Presence of structures and machinery	Movements of machinery and personnel	Pollution from oil and chemical spillages in the Upper Mersey Estuary
Effect	Obstruction to bird movements and collisions of birds with structures and machinery	Disturbance to birds and obstruction of bird movements	Oiling of birds and ingestion of chemicals
Magnitude of residual effects	Negligible	Negligible	Negligible
Significance of residual effects	Not significant	Not significant	Not significant
Comments Box	The effects under examination are pollutants and sediments released in the Upper Mersey Estuary and carried downstream into the European Site.		

Assessment of Residual Operational Effects of the Project on Habitats and Birds in the Upper Mersey Estuary LWS

Residual Effects on Habitats

10.20.18 The predictions in the following Table 10.77 are based on implementation of mitigation measures to create greater saltmarsh habitat diversity in proximity to the Project, principally by the conversion of a very large area of ungrazed saltmarsh habitat to short-grazed saltmarsh habitat.

10.20.19 The conversion and subsequent management of the large area of saltmarsh should also involve the enhancement of the saltmarsh as described earlier. The mitigation site should be either Widnes Warth or Astmoor Saltmarsh, or both, and should be achieved by a combination of grazing and cutting, and the creation of pools and scrapes together with “islands or ridges” of raised and densely vegetated ground to provide high-tide refuges for grazing livestock and small mammals, and habitats for invertebrates.

10.20.20 As described earlier, the purpose of the conversion and subsequent management of the saltmarsh will be to attract an assemblage of migratory wildfowl and wading species including species whose populations occur in internationally important numbers in the downstream European Site.

Table 10.77 - Assessment of the Residual Operational Effects of the Project on Habitats in the Upper Mersey Estuary LWS.

Receptors 1 & 2 – Habitats in the Upper Mersey Estuary LWS			
Brief Description of Residual Effect	Presence of piers and towers	Release of oils and other pollutants from traffic	Shading of saltmarsh vegetation
Effect	Loss of saltmarsh and other intertidal	Pollution of saltmarsh and other intertidal habitats, and river channels	Inhibition of growth or dieback of vegetation

Receptors 1 & 2 – Habitats in the Upper Mersey Estuary LWS			
	habitats		
Magnitude	None	Negligible	None
Significance	Not significant	Not significant	Not significant
Comments Box	The effects are assessed on the existing locations and extents of receptor habitats and do not allow for changes in the distribution of saltmarsh vegetation, intertidal habitats and river channels before the Project is completed.		

10.20.21 The residual effect is avoided in terms of magnitude (reduced from low or negligible to none) and in terms of significance from low significance to not significant.

Residual Effects on Birds

10.20.22 The residual effects on birds, shown in Table 10.78, are based on the operational effects described previously.

10.20.23 In Table 10.78 the residual effects of the New Bridge presence, as a result of successful mitigation, are reduced from moderate to low in terms of magnitude and significance. The residual effects of traffic movements, noise and lights are reduced from low to negligible in terms of magnitude, and from moderate to low or not significant in terms of significance.

10.20.24 The different assessments for bridge presence and traffic movements are due to the traffic being elevated above the estuarine habitats where they are not viewed as predators, whereas the bridge structure and its supports are dominant features arising from the estuarine habitat.

Table 10.78 - Assessment of the Residual Operational Effects of the Project on Birds in the Upper Mersey Estuary LWS.

Receptor 3 - Birds in the Upper Mersey Estuary LWS			
Brief Description of Residual Effect	Presence of the bridge structure	Movements of traffic, noise and artificial lights	Pollution for oils and road run-off
Effect	Disturbance to breeding, feeding, roosting and flying birds	Disturbance to breeding, feeding and roosting birds, and disorientation of birds	Oiling of birds
Magnitude	Negligible	Negligible	Negligible
Significance	Not significant	Not significant	Not significant
Comments Box	It is assumed that there will be habituation of birds to the effects but this will differ according to species.		

10.20.25 There will be habituation of birds to both the bridge structure and its traffic, as observed at the Second Severn Crossing, but observations by Environmental Research & Advisory Partnership at Crossens and Marshside Marshes at Southport indicate that the presence of people above the level of the habitat cause far less disturbance than their presence on the habitat. However there is habituation to the presence of hides at bird habitat level but a small bird hide is much less obtrusive and dominating over the habitat than a large bridge.

Assessment of Residual Operational Effects of the Project on Habitats and Birds in the European Site

Residual Effects on Habitats

10.20.26 As shown earlier in this Chapter, there will be no discernable effects of the Project structure, and traffic movements across it, on habitats in the European Site. Mitigation is unnecessary.

10.20.27 The only potential effect of significance on habitats during operation of the bridge is pollution from oil, petrol and chemical spills as a result of normal discharges from traffic and from accidents. This effect is an existing one although it will be increased initially and then over a period of years because of increasing traffic volumes and the cumulative effect due to continued use of the existing bridge.

10.20.28 Given the proposed pollution control measures and measures required by the Environment Agency, and the distance of the sensitive habitats in the European Site downstream from the Project, which will dilute any pollutants, the magnitude of any pollution effect will be reduced from low to negligible and the significance reduced from low to not significant (Table 10.79).

Table 10.79 - Assessment of the Residual Operational Effects of the Project on Habitats in the European Site.

Receptor 4 - Habitats in the Middle Mersey Estuary European Site		
Brief Description of Residual Effect	Presence of piers and towers	Pollution due to release of oils and other contaminants from traffic
Effect	Pollution of intertidal habitats and channels due to increased release of contaminants	Pollution of saltmarsh and other intertidal habitats, and river channels
Magnitude	Negligible	Negligible
Significance	Not significant	Not significant
Comments Box	The pollution effects are an existing effect but consideration has been given to an increase in traffic volumes and continued use of the existing bridge.	

10.20.29 As shown earlier in this Chapter, the magnitude of the effects of bridge presence and traffic use on birds using the European Site are negligible and not significant. The residual effects in Table 10.79 are unchanged. However the oil and other pollution effects from traffic use are reduced from low to negligible magnitude, and from low significance to not significant as a result of the implementation of more effective pollution control measures than those at the existing bridge.

Table 10.80 - Assessment of the Residual Operational Effects of the Project on Birds in the Middle Mersey European Site.

Receptor 5 - Wildfowl and Wading Birds in the Middle Mersey Estuary SPA for Birds			
Brief Description of Residual Effect	Presence of the bridge and traffic movements, noise and artificial light	Presence of fast-moving traffic and associated hazards to birds	Pollution due to release of oils and other contaminants from traffic.
Effect	Disturbance and obstructions to commuting and migrating birds from SPA	Bird collisions with traffic and disorientation of birds	Pollution of birds using the intertidal habitats, and river channels
Magnitude	Negligible	Negligible	Negligible
Significance	Not significant	Not significant	Not significant
Comments Box	It is assumed that bird collisions and pollution of birds can occur at any time and the threat of such effects is permanent.		

Overall Assessment of Construction and Operational Effects on Habitats and Birds in the Upper Mersey Estuary LWS, including Overall Residual Effects

Construction Effects

10.20.30 A summary table of the assessment and comparison of the construction effects and residual construction effects of the Project on the Upper Mersey Estuary LWS habitats and birds is given in Table 10.81.

Table 10.81 - Summary Assessment of the Construction Effects and Residual Construction Effects of the Project on the Upper Mersey Estuary LWS.

Receptors 1, 2 and 3 - All Upper Mersey Estuary habitats and birds			
Brief Description of Effect	Construction and use of stone haul road, cofferdams, piers and working areas on saltmarshes	Hovercraft, low ground pressure tractors, piled jetties in intertidal habitats	Construction activities, presence and movements of structures, machinery, personnel, noise, pollution on all habitats
Effect	Loss of vegetation, seedbank, damage to soil structure and change in species composition	Release of sediments	Disturbance to breeding, roosting, feeding, loafing and migrating birds. Oiling of birds.
+ve or –ve or neutral	Negative	Negative	Negative
Timescale of effect	Short-term	Short term	Short term
Permanent or temporary	Temporary, part permanent	Temporary	Temporary
Direct or indirect effect	Direct	Direct	Direct
Secondary effect	Erosion	Erosion	None
Importance	High	High	High

Receptors 1, 2 and 3 - All Upper Mersey Estuary habitats and birds			
Magnitude without mitigation	Moderate	Low	Moderate
Magnitude after mitigation	Negligible	Neutral	Low
Significance before mitigation	Moderate significance	Low significance	Moderate significance
Significance after mitigation	Not significant	Not significant	Low significance
Comments Box	Importance in all cases is assessed as high because the assessment of all effects is based on the assumption that the Upper Mersey Estuary is a proposed SPA		

10.20.31 The summary assessment in Table 10.81 shows that all the construction effects can be mitigated satisfactorily.

10.20.32 Of note is the reduction in effects of the use of stone access roads to the piers and cofferdam working areas where the magnitude and significance of effects is reduced from moderate in both cases to negligible and not significant respectively.

Operational Effects

10.20.33 A summary table of the assessment and comparison of the operational effects and residual operational effects of the Project on the Upper Mersey Estuary LWS including its habitats and birds is given in Table 10.82.

Table 10.82 - Summary Assessment of the Operational Effects and Residual Operational Effects of the Project on Habitats and Birds in the Upper Mersey Estuary LWS.

Receptors 1 & 2 - All Upper Mersey Estuary habitats and birds				
Brief Description of Effect	Presence of piers, towers and the bridge decks and superstructure	Traffic movements, and release of oils and other pollutants from traffic	Presence of piers, towers and the bridge decks and superstructure	Traffic movements, noise, artificial lighting, and release of oils and other pollutants from traffic
Effect	Erosion of saltmarsh and sediments. Shading and inhibition of vegetation.	Pollution of saltmarsh and other intertidal habitats, and river channels.	Disturbance to breeding, feeding, roosting and flying birds	Disturbance to breeding, feeding and roosting birds, disorientation, collisions and oiling of birds
+ve or –ve or neutral	Negative	Negative	Negative	Negative
Timescale of effect	Long-term	Long-term	Long-term	Long-term
Permanent or temporary	Permanent	Temporary	Permanent	Permanent
Direct or indirect effect	Direct	Direct	Direct	Direct

Receptors 1 & 2 - All Upper Mersey Estuary habitats and birds				
Secondary effect	Erosion of sediments	None	None	None
Importance	High	High	High	High
Magnitude without mitigation	Low	Low	Moderate	Low
Magnitude after mitigation	None	Negligible	Low	Low
Significance without mitigation	Low significance	Low significance	Moderate significance	Moderate significance
Significance after mitigation	Not significant	Not significant	Low significance	Low significance
Comments Box	Importance in all cases is assessed as high because the assessment of all effects is based on the assumption that the Upper Mersey Estuary is a proposed SPA			

10.20.34 As shown in the preceding Table 10.82 there will be no significant residual effects on habitats but there will be a low residual effect on birds but this will be of low significance.

Overall Assessment of Construction and Operational Effects on Habitats and Birds in the Middle Mersey Estuary SPA for Birds, including Residual Effects

Construction Effects

10.20.35 The assessment and comparison of the construction effects and residual construction effects of the Project on the European Site habitats and birds is summarised in Table 10.81.

Table 10.83 - Summary Assessment of the Construction Effects and Residual Construction Effects of the Project on Habitats and Birds downstream in the European Site

Receptors 1, 2 and 3 - All European Site habitats and birds				
Brief Description of Effect in Upper Mersey Estuary	Construction and use of stone access tracks, cofferdams, piers and working areas on saltmarshes	Construction and use of a piled jetty system on saltmarshes	Hovercraft, low ground pressure tractors, piled jetties in intertidal habitats	Construction activities, presence and movements of structures, machinery, personnel, noise, pollution on all habitats
Effect on Habitats and Birds in European Site	Secondary effect of release of contaminated sediments	Secondary effect of release of contaminated sediments	Release of low quantities of sediments with low contamination	Low risk of minor pollution in European Site
+ve or –ve or neutral	Negative	Negative	Negative	Negative
Timescale of effect	Short-term	Short term	Short term	Short term

Receptors 1, 2 and 3 - All European Site habitats and birds				
Permanent or temporary	Temporary	Temporary	Temporary	Temporary
Direct or indirect effect	Indirect	Indirect	Indirect	Indirect
Secondary effect	Deposition of contaminated sediments	Deposition of contaminated sediments	Deposition of contaminated sediments	None
Importance	High	High	High	High
Magnitude without mitigation	Negligible	Negligible	Negligible	Negligible
Magnitude after mitigation	None	None	None	None
Significance without mitigation	Not significant	Not significant	Not significant	Negligible
Significance after mitigation	Not significant	Not significant	Not significant	Not significant
Comments Box	Importance in all cases is assessed as high because the assessment of all effects is based on the assumption that the Upper Mersey Estuary is a proposed SPA			

Operational Effects

10.20.36 Table 10.84 assesses and compares the operational effects and residual operational effects of the Project on the European Site habitats and birds downstream of the construction site.

Table 10.84 - Summary Assessment of the Operational Effects and Residual Operational Effects of the Project on Habitats and Birds downstream in the European Site

Receptor 9 - Habitats, Wildfowl and Wading Birds in the Middle Mersey Estuary European Site			
Brief Description of Effect	Presence of the bridge and traffic movements, noise and artificial light.	Presence of fast-moving traffic and associated hazards to birds	Pollution due to release of oils and other contaminants from traffic.
Effect	Disturbance and obstructions to commuting and migrating birds from SPA	Bird collisions with traffic and disorientation of birds	Pollution of birds using the saltmarshes, other intertidal habitats, and river channels
+ve or –ve or neutral	Negative	Negative	Negative
Timescale of effect	Long-term	Short-term	Short-term
Permanent or temporary	Permanent	Permanent	Temporary
Direct or indirect effect	Direct	Direct	Direct
Secondary effect	None	None	None
Importance	High	High	High
Magnitude without	Negligible	Negligible	Low

Receptor 9 - Habitats, Wildfowl and Wading Birds in the Middle Mersey Estuary European Site			
mitigation			
Magnitude after mitigation	None	Negligible	Negligible
Significance without mitigation	Not significant	Not significant	Low significance
Significance after mitigation	Not significant	Not significant	Not significant
Comments Box	It is assumed that bird collisions and pollution of birds can occur at any time and the threat of such effects is permanent.		

10.20.37 The preceding summary table shows that the magnitude of the effects before mitigation is negligible or low and in all cases the residual effects are no more than negligible and not significant.

Residual Construction and Operational Effects on the St. Helens Canal LWS

10.20.38 As explained in the mitigation section, the construction effects will be temporary because the canal will be restored and realigned after infilling of the canal and the completion of the New Bridge construction works.

10.20.39 The disturbance to birds and other fauna during the operation of the bridge will be of low significance, and fragmentation will be negligible and not significant after construction of the realigned canal channel.

10.20.40 All the temporary effects can be mitigated satisfactorily but there will be an unavoidable shading effect of the New Bridge that will have a permanent effect on the flora and fauna of the realigned canal section. This residual effect can only be mitigated by the construction of a replacement aquatic habitat in the locality or elsewhere.

10.20.41 Whilst it may be feasible to create a similar area of aquatic and water-margin habitat in the locality, there is a strong case for the construction of such habitat on Wigg Island because there are areas of open grassland where similar habitat could be constructed in very favourable surroundings. Moreover there is an abundance of woodland, scrub and grassland on Wigg Island but a deficiency of ponds.

10.20.42 Further, the creation of replacement aquatic habitat on Wigg Island, rather than in the vicinity of the St. Helens Canal, would provide a much safer environment for aquatic life such as amphibians and potentially for Water Voles and Water Shrews. A major problem along the St. Helens Canal is the presence of large numbers of coarse fish and American Mink. In contrast, ponds constructed on Wigg Island will be monitored and managed specifically for wildlife rather than for angling.

10.20.43 Therefore mitigation for the deterioration of the section of the St. Helens Canal affected by the New Bridge shading and a changed environment will involve the construction of one or more ponds on Wigg Island to provide a similar size of aquatic habitat to that lost.

10.20.44 A further advantage of mitigation involving pond construction on Wigg Island is that it will provide habitat for foraging bats and a greater number of amphibian species than that found in the St. Helens Canal. The residual construction and operational impacts on the St. Helens Canal are given in Table 10.85.

Table 10.85 - Assessment of the Residual Construction and Operational Effects of the New Bridge on the St. Helens Canal LWS.

Receptor 6 - St. Helens Canal Local Wildlife Site			
Brief Description of Effect	Temporary infilling of a canal section during Mersey Gateway Bridge construction. Presence of the New Bridge structure	Presence of the bridge and traffic use	
Effect	Shading of the canal vegetation and change to the local environment. Loss of aquatic and water-margin habitats and vegetation.	Disturbance to birds and other fauna	Fragmentation of the canal habitat
Mitigation Stage 1	Replacement of the infilled canal section by construction of a realigned section.		
Magnitude of residual effects without further mitigation	Moderate	Low	Negligible
Significance of residual effects without further mitigation	Moderate significance	Low significance	Not significant
Mitigation Stage 2	Construction of new ponds including linear pond habitats on Wigg Island LNR to compensate for the habitat lost by shading.		
Mitigation Stage 3	Translocation of aquatic and water-margin plants to the Wigg Island ponds.		
Mitigation Stage 4	Encourage natural colonisation of the Wigg Island ponds by conservation management.		
Magnitude of residual effects after further mitigation	None		
Significance of residual effects after further mitigation	Not significant		
Comments Box	It is assumed that the St. Helens Canal will not be restored for boating. If it is restored for boating, there will be negative effects on vegetation and birds.		

Residual Construction and Operational Effects on the Manchester Ship Canal Bank LWS

10.20.45 As described in the Mitigation Section, all the habitats affected during construction can be restored or replaced within the site by translocation of vegetation and species.

10.20.46 However a residual effect will remain in that there will be shading by the New Bridge and effects on soil water content as a result of the interception of rainfall by the Bridge. Whilst all vegetation and species can be translocated to modified and enhanced habitat locations elsewhere within the site where the importance features of the site are absent, there will be a reduction in size of the LWS and therefore a reduced potential for further colonisation because of the shading and water interception effects of the Bridge.

10.20.47 The reduction in size of the LWS will be relatively small and should be mitigated by the creation of similar habitat that could support the important features of the Manchester Ship Canal Bank LWS. This should be achieved by turf and topsoil stripping of a species-poor area of grassland on Wigg Island to remove the vegetation, seedbank and fertile topsoil layer. The stripped area should be covered with either weathered pulverised fuel ash treated with ground calcitic limestone, or covered with infertile subsoil or other nitrogen and phosphate deficient material with a suitable soil structure for the growth of orchids and other plants.

10.20.48 The new habitat should be treated as a receptor site for transplanted orchids and other species such as Grass Vetchling which contribute to the importance of the Manchester Ship Canal Bank LWS.

10.20.49 The design of the new habitat using calcareous pulverised fuel ash or other industrial or subsoil materials with a high level of calcium carbonate and low nitrogen and phosphate status is based on research on the natural colonisation of such materials and successful translocation schemes.

10.20.50 The assessment of residual construction and operational effects on the LWS, together with a summary of the mitigation treatments, is shown in Table 10.86.

Table 10.86 - Assessment of the Residual Construction and Operational Effects of the New Bridge on the Manchester Ship Canal Bank LWS.

Receptor 7 - Manchester Ship Canal Bank Local Wildlife Site			
Brief Description of Effect	Presence of the bridge including shading and interception of railfall.	Compacted and poorly drained soils.	Shading, dry and compacted soils
Effect	Inhibition of plant growth of orchids and other plant species requiring sunny habitats and moist soils	Inhibition of plant growth	Sparse vegetation and poor habitat for invertebrates and other fauna
Mitigation Stage 1	Translocation of important plant communities and species to modified species-poor and unimportant habitats within the LWS		
Magnitude of residual effects without further mitigation	Low	Low	Low
Significance of residual effects without further mitigation	Low	Low	Low

Receptor 7 - Manchester Ship Canal Bank Local Wildlife Site	
Mitigation Stage 2	Construction of new habitats in Wigg Island LNR, in areas of species-poor grassland, for the plant communities and species of importance.
Mitigation Stage 3	Translocation of the important species to the new and managed habitats on Wigg Island.
Magnitude of residual effects after further mitigation	None
Significance of residual effects after further mitigation	Not significant
Comments Box	Moving traffic and noise are not expected to have a significant effect on wildlife.

Residual Construction and Operational Effects of the New Bridge on Wigg Island LWS and Local Nature Reserve.

10.20.51 In the Mitigation Section it is explained why the effect of greatest magnitude and significance is the adverse effect on the aesthetic appeal and tranquillity of the Local Nature Reserve, both of which are important attributes to the quiet study and enjoyment of wild nature. This is the most difficult effect to mitigate and effective mitigation can take a very long time.

10.20.52 Most of the construction effects are temporary and can be mitigated satisfactorily by the treatment of disturbed ground and by replanting of woody vegetation and grassland, and should be effective because only relatively small and localised areas will be affected during pier construction.

10.20.53 The most important consideration is the time taken for the planted trees to grow to a sufficient height and density to screen the majority of the New Bridge from the various parts of the Local Nature Reserve.

10.20.54 There are four main methods by which the time taken for effective screening of the Bridge by the trees will be reduced. They are;

a. Heavy standard trees should be planted with well-developed root systems, using the largest trees available and grown using methods specially designed for the site and timing of planting. It follows that the planting methods will be designed to minimise root disturbance;
b. The areas to be planted on either side of the bridge should be excavated and filled with high quality topsoil to a high specification in terms of moisture retention, humus content and mineral nutrient content (nitrogen, phosphate, potassium). The optimal soil depth to maximise tree development towards the height of the New Bridge should be provided;
c. Other methods available to speed-up the rate of growth without prejudice to stability should be utilised; and
d. There should be an annual tree fertilisation programme using the most successful methods to achieve rapid growth rates.

10.20.55 There should also be an annual monitoring survey of tree growth and tree health, and the need for pruning treatments to maximise the height increase of the trees and the overall density of the tree belt as an effective screen.

10.20.56 Consideration should be given to the planting of belts of similar fast-growing tree species at greater distances from the Bridge alignment to achieve a screening effect at lower tree height, as influenced by the angle of vision.

10.20.57 The planting of evergreen deciduous species such as Evergreen (Holm) Oak for Bridge screening, and fast-growing conifers to achieve winter screening, should be undertaken subject to nature conservation and biodiversity considerations.

10.20.58 Another factor to take into consideration is the long-term potential of Wigg Island Local Nature Reserve. In the long-term, on the cessation of tipping at Randle's Island Landfill Site, there is potential for further habitat creation and enlargement of the Local Nature Reserve.

10.20.59 The long-term potential for nature conservation at Astmoor and Wigg Island should be recognised in addition to its existing interests. There is therefore an ever increasing need to screen the New Bridge crossing of the Local Nature Reserve by tree planting to reduce the visual effects on the Nature Reserve. Table 10.87 sets out the residual effects given the mitigation specified earlier in this Chapter.

Table 10.87 - Assessment of the Residual Construction and Operational Effects of the New Bridge on the Wigg Island LWS and Local Nature Reserve.

Receptor 8 - Wigg Island LWS and Local Nature Reserve				
Brief Description of Effect	Presence of the bridge structure including shading	Interception of rainfall by the bridge structure	Presence of moving traffic, noise and artificial lighting	Presence of moving traffic, noise and artificial lighting
Effect	Inhibition of plant growth of herbaceous and woody species.	Inhibition of plant growth. Poor habitat for invertebrates and other fauna.	Disturbance to resident, breeding, visiting and roosting birds. Disturbance to bats.	Reduction in aesthetic appeal and tranquillity of the Local Nature Reserve
Mitigation Stage 1	Recultivation and tree/shrub planting of disturbed areas with fast-growing native species.			
Magnitude of residual effects without further mitigation	Moderate	Moderate	Moderate	High
Significance of residual effects without further mitigation	Low	Low	Moderate	High
Mitigation Stage 2	Treatment of 25 metres wide planting zones on both sides of the Bridge with a deep and continuous layer of topsoil.		Moderate	High
Mitigation Stage 3	Planting of land on either side of the New Bridge across Wigg Island to fast-growing and tall trees. Planting of other fast-growing trees in belts elsewhere in the Nature Reserve to increase screening.		Moderate	High

Receptor 8 - Wigg Island LWS and Local Nature Reserve			
Mitigation Stage 3	Annual tree fertilisation programme to maximise growth rates.	Low	High
15 years from planting	Continued annual tree fertilisation programme and monitoring of tree growth.	Negligible	Moderate
25 years from planting	Continued annual tree fertilisation programme and monitoring of tree growth.	Negligible	Low
Comments Box	The importance of the receptor site, the Local Nature Reserve, is assessed as high because of its value to local people and visitors as a wildlife resource, in additional to its intrinsic importance and potential for enhancement through conservation management. Many birds and bats are likely to fly under the bridge.		

Residual Effects on other Wildlife Sites and sites with no Statutory or Local Designation.

10.20.60 There are no other wildlife sites of importance that are significantly affected by the Project and therefore there are no residual effects.

Residual Effects on Bats

10.20.61 The predicted effects on bats can all be mitigated by the proposed mitigation described earlier. However there remains the possibility that bat roosts may be found before construction of the Project and even during demolition because the Common Pipistrelle is known to hibernate in extremely small spaces such as within window structures where they cannot be detected during licensed surveys. There is also the possibility of bat occupation of buildings between the recent surveys and the start of construction.

10.20.62 If bat roosts are found it will be necessary to apply to Natural England for a Bat Mitigation Licence and submit a Method Statement which will include details of the survey results and mitigation methods. The issue of a Bat Mitigation Licence will legalise bat mitigation and permit the demolition of buildings and felling of trees which contain roosts. The implementation of licensed mitigation will eliminate all residual effects or reduce the effects to a low level which causes no significant effect on bats and their habitats.

Residual Effects on Great Crested Newts

10.20.63 There will be no residual effect on Great Crested Newts. Instead the existing metapopulation will be afforded greater protection than at present as a result of the installation of a permanent amphibian exclusion fence to prevent access to the expressway and the risk of injury or killing.

Residual Effects on Water Voles

10.20.64 If Water Voles do recolonise the ditch system in St. Michael's Golf Course, the proposed mitigation will eliminate all the effects and there will be no significant residual effects.

10.21 Enhancement Opportunities

Enhancement of the Saltmarsh Habitats

10.21.1 Four of the Key Principles of Planning Policy Statement 9; Biodiversity and Geological Conservation (PPS9) deal with the UK Government's requirement that planning decisions should aim to maintain, enhance, restore and add to biodiversity.

10.21.2 The need to enhance and add to biodiversity is part of Key Principles i, ii, iii and iv. For example Key Principle iv states that there should be incorporation of beneficial biodiversity within the design of development.

10.21.3 This Chapter has described how existing biodiversity is maintained and restored to eliminate most residual effects of the Project. In the following section, the PPS9 requirements of enhancing and adding to biodiversity are addressed.

10.21.4 Potential opportunities for the incorporation of biodiversity within the Project during construction and maintenance include the following;

a. Enhancement of the saltmarsh habitat and vegetation within and along either or both sides of the Project corridor, either by physical enhancement and/or by alteration of the management of the saltmarsh such as by grazing and/or cutting;
b. Enhancement of other habitats and vegetation along the Project corridor which may be affected by construction and access, particularly habitats and vegetation which are related to the saltmarsh habitats and which may be damaged or disturbed, and particularly where restoration and/or management may provide greater or more important biodiversity than previously existed;
c. Planting the Project embankments and other highway land, in conjunction with the landscaping of the scheme, to vegetation consisting of native plant species and to communities of such species that have been identified by the National Vegetation Classification as being characteristic of Britain's natural and semi-natural vegetation; and
d. Designing the after-management of roadside habitats and vegetation established by landscaping with the aim of achieving long-term and sustained enhancement of biodiversity such as by encouraging natural colonisation and increased structural diversity.

10.21.5 There may be further opportunities for the incorporation of biodiversity within construction-related development, such as by providing new habitats during the restoration of on-site and off-site contractors' compounds, off-site storage areas, and other off-site areas used for construction-related activities.

10.21.6 The most important opportunities along the Project are to carry out further enhancements of the saltmarshes and to improve the biodiversity of Wigg Island Local Nature Reserve.

10.21.7 Enhancement by the conversion of ungrazed saltmarsh to grazed saltmarsh, with the incorporation of additional enhancement sub-features, is possible at either Widnes Warth Saltmarsh or at Astmoor Saltmarsh, or at both saltmarshes. Conversion of saltmarsh to a grazing regime would be additional to that carried out for mitigation, and could involve either the expansion of the areas used for mitigation or the conversion of separate areas.

10.21.8 However there are good reasons why large areas of ungrazed saltmarsh should be left largely undisturbed, with no change in saltmarsh management. Enhancement treatments should be concentrated on parts of Widnes Warth Saltmarsh within the area of the Planning Application boundary and on the land required for construction and related activities. The following

enhancements should be implemented during the Project construction works or when the affected land is restored;

a. The creation of shallow scrapes would be positive, ranging from several square metres to tens of square metres in area, as habitats for saltmarsh plants and aquatic invertebrates. Some shallow scrapes should be very seasonal but deeper scrapes should support a greater species diversity of invertebrates and probably a higher density of invertebrates of more greater value for feeding waders;
b. Similar benefits to the above-mentioned scrapes and pools should be achieved by the selective blocking of minor creeks in a manner which creates pools without changing the overall drainage pattern of the saltmarsh;
c. There should be construction of low mounds and ridges with subsequent colonisation by dry grasses and associated herbs of the upper saltmarsh to provide additional botanical and habitat diversity. The advantages of low mounds, up to about 0.5 metre in height, and of several or more square metres in area, would provide refuge areas for small mammals during spring tides and would enhance the value of the saltmarsh for terrestrial invertebrates; and
d. There should be conversion of localised areas of ungrazed saltmarsh to grazed or cut saltmarsh to attract the more sensitive wildfowl and waders for roosting and feeding, particularly for wintering and passage species such as Golden Plover, Dunlin, Redshank, Lapwing and Black-tailed Godwit. This would be appropriate for areas with existing and potentially low densities of breeding Skylarks, such as in the vicinity of the New Bridge where densities of Skylark and other breeding birds on the saltmarshes are likely to be very significantly reduced.

Enhancement of Widnes Warth Saltmarsh

10.21.9 The greatest potential for enhancement of the existing Widnes Warth Saltmarsh is by cutting and/or grazing the saltmarshes on either side of the New Bridge crossing of the saltmarsh.

10.21.10 A long the eastern side of the Widnes Warth Saltmarsh crossing of the New Bridge, a large area of saltmarsh is predicted to be disturbed, as described earlier in the effects section, during construction and, more importantly, during operation of the New Bridge. The latter will be a permanent effect due to the combined effects of the permanent presence of the bridge, traffic noise and movements, and existing disturbance from the adjacent St. Helens Canal towpath.

10.21.11 There will also be effects on birds due to lighting from the bridge and from moving traffic.

10.21.12 The maximum permanent effect on breeding Skylarks is likely to affect an area up to 200-300 metres from the New Bridge but the effect will decrease significantly beyond about 200 metres.

10.21.13 The maximum areas of saltmarsh affected in terms of disturbance to breeding Skylarks are indicated in the following Table 10.88.

Table 10.88 - Areas of Saltmarsh Affected by Disturbance at Different Distances from the Eastern Side of the Project.

Distance from bridge	Maximum area disturbed
200 metres	5.5 hectares
300 metres	11.25 hectares
400 metres	15.0 hectares
500 metres	18.75 hectares

10.21.14 There would be no certain or major benefits to roosting and wintering wildfowl and waders in grazing and/or cutting an area of 5.5 hectares directly adjacent to the New Bridge. Further, such birds would also be deterred from using part of this area because of the adjacent banks on either side of the north-south water channel of Bower's Brook which discharges into the Upper Mersey Estuary.

10.21.15 Grazing and/or cutting a significantly larger area of 11.25 hectares, based on the stand-off up to 300 metres from the bridge, would be much more likely to be used by flocks and significant numbers of wildfowl and waders as a high tide roost and potential feeding area. This size of area would benefit from the inclusion of about 3-5 hectares of saltmarsh habitat with a 100-200 metres stand-off from the bridge, and bounded by the Bower's Brook channel and embankments also in the west, and the St. Helens Canal towpath and hedgerow in the north.

10.21.16 Such an area would give birds a good all-round field of view with an easy flight access to the river channels, sand and siltflats, and estuarine habitats beyond. It is important that birds have an unobstructed and clearly visible route of escape from any disturbance.

10.21.17 Grazing and/or cutting an even larger area of 15.0 hectares based on 400 metres maximum distance of such management from the New Bridge would bring further benefits by providing wildfowl and waders with a significantly larger area free from disturbance. However this would result in the loss of greater numbers of breeding Skylarks due to changed management rather than disturbance from the New Bridge. However it is likely that the increased value of the managed saltmarsh for roosting, feeding and wintering wildfowl and waders would be of greater bird conservation value than the reduction in numbers of breeding Skylarks, particularly as Skylarks can breed on nearby agricultural land whereas most estuarine birds cannot.

10.21.18 However there would probably be little advantage in extending the grazing and/or cutting to 500 metres from the bridge because this will reduce the amount of Skylark breeding habitat even further without gaining significantly increased benefits for wildfowl and waders. This arises from the closer proximity of the canal-side footpath and its associated hedgerow to the extended area which would deter wildfowl and waders from making use of much of the increased habitat.

10.21.19 Additional measures that would enhance the benefits of the grazing and/or cutting of the saltmarsh are itemised below;

a. The erection of fences to prevent human and dog access to the saltmarsh would be necessary to maximise the benefits of management changes, and would be necessary in any event to protect grazing livestock. A fence along the canal side of the area and along the western side of the embankment adjacent to the north-south water channel (Bower's Brook) would be necessary;
b. Consideration should be given to the construction of a low bank along the south side of the hedgerow, south of the canal towpath, to screen the saltmarsh from towpath walkers and from the hedgerow;
c. It would be desirable to manage the hedgerow by trimming, to reduce its height and visibility from the saltmarsh; and
d. The construction of a small hide on the south side of the canal towpath would encourage viewing of wildfowl and waders without causing disturbance.

10.21.20 On the western side of the New Bridge crossing of Widnes Warth Saltmarsh there is much less potential for enhancement because of the smaller area and due to disturbance from three sides.

Enhancement of Astmoor Saltmarsh

10.21.21 Enhancement at Astmoor Saltmarsh is also possible on both sides of the New Bridge. The

greater height of the New Bridge over Astmoor Saltmarsh compared with Widnes Warth will reduce traffic disturbance and reduce the shading effect on the saltmarsh, providing greater potential for enhancement.

10.21.22 Astmoor Saltmarsh is much wider in the east, providing scope for increasing the area converted to grazing management whilst retaining a large undisturbed area for breeding Skylarks and other ground-nesting birds, and hunting habitat for visiting birds of prey.

Wigg Island Local Nature Reserve

10.21.23 There are numerous opportunities for enhancement of existing habitats and habitat creation on Wigg Island Local Nature Reserve. There is plenty of woodland and scrub habitat but small ponds and small lakes are absent, open water habitat being largely confined to the restored channel of the former Runcorn to Latchford Canal.

10.21.24 Habitat creation on Wigg Island should seek to create the following features;

a. Two small lakes should be constructed with associated reedbeds and marginal marsh as habitats for nesting Reed and Sedge warblers, and breeding habitats for dragonflies and damselflies;
b. A group of small ponds should be created with surface water areas in the 300 to 300 square metres range, as habitats for breeding amphibians, dragonflies and damselflies;
c. There should be construction of ponds with different types of water chemistry, some with high pH values and with beds containing ground calcitic limestone to encourage freshwater invertebrate life of alkaline and base-rich waters. Other ponds should have neutral pH values and others should be contain acidic waters influenced by acidic peat and the introduction of *Sphagnum* mosses. Many dragonfly species prefer acidic waters;
d. A range of hibernacula and other habitat piles should be constructed in the area of the ponds to provide cover and hibernation sites for amphibians; and
e. Areas of marshy grassland should be constructed in conjunction with the pond cluster to provide habitat for marsh plant communities and invertebrates of marshland habitats.

10.21.25 There are many other possibilities on Wigg Island for the construction of specialised habitats for wildlife, particularly for invertebrates even though these are already well-represented on Wigg Island.

10.21.26 The design of habitat construction and enhancement on Wigg Island is also based on increasing the bat populations of the site by providing new feeding areas over water and wetland, and the possibility of natural colonisation by further bat species as the woodlands begin to mature.

10.22 Monitoring Requirements

10.22.1 It will be necessary to conduct an ecological monitoring programme during site clearance and throughout the construction programme of the Project. Continued monitoring is desirable for up to five years after completion of construction to ensure that mitigation is effective and that any off-site habitat creation and enhancement works are successful.

10.22.2 After five years the monitoring specification and its duration should be reviewed in the light of the assessment of the monitoring results. If it is concluded that all mitigation has been effective, the frequency and level of monitoring should be replaced by a site inspection programme involving the annual examination of sensitive habitats including the saltmarshes to assess the condition of the vegetation and to identify any evidence of adverse changes such as the early stages of erosion and changes in plant species composition.

10.22.3 Ecological monitoring is necessary for many principal reasons, particularly the following;

a. It will be necessary to comply with wildlife legislation throughout site clearance, throughout construction and during the maintenance and operational periods;
b. It is essential that any unforeseen effects are identified as soon as they occur so that mitigation can be implemented immediately and without any unnecessary delays;
c. Monitoring during construction is essential to ensure that mitigation is effective. If mitigation is ineffective, it will be necessary to take action to modify the mitigation treatment so that it is effective or to replace the proposed mitigation with alternatives; and
d. After the completion of construction it will be necessary for regular monitoring, such as every three months, throughout an initial period of five years, followed by annual monitoring for a further five years to assess the medium and long-term effects of mitigation. If necessary, mitigation should be revised, possibly involving new methods to deal with unexpected ecological changes.

Pre-construction Monitoring

10.22.4 Pre-construction monitoring will be necessary to update the baseline ecological assessment where necessary, particularly if there is a delay in the start of the Project or there are significant changes in saltmarsh erosion.

10.22.5 Protected species may colonise vacant or disturbed land including land which may have been cleared in anticipation of the Project. This applies to Little Ringed Plover and possibly to other fauna which require bare ground for breeding, even in industrial, urban and other types of disturbed land.

10.22.6 Colonisation by alien species such as Japanese Knotweed, small stands of which have been found, may occur rapidly, due to the rooting of detached stem fragments, particularly on vacant, disturbed and tipped land. Very small plants of this species may have been overlooked during the baseline surveys because short stem fragments lying on the ground, and just starting to form roots and leaves, are very difficult to detect.

10.22.7 Detailed pre-construction monitoring will be unnecessary but walkover surveys by an ecologist will be required to identify any major changes that may have occurred since the baseline assessment.

Monitoring During Construction

10.22.8 Ecological monitoring during construction will be required throughout the construction corridor but attention should be focused on the estuarine habitats that are vulnerable to damage or loss, particularly the saltmarshes because of their high level of importance and because of their stabilising effects on the estuarine ecosystem.

10.22.9 Any damage to saltmarsh habitat should be identified at an early stage because of the possibility of secondary and indirect effects on other habitats and birds, such as erosion of pools and loss of roosting and nesting habitat, and because damaged saltmarsh habitat is highly vulnerable to erosion during unusually heavy rainfall and exceptionally high tides.

10.22.10 Monitoring is necessary to ensure compliance with wildlife legislation and good practice, particularly the avoidance of disturbance to breeding wild birds on the saltmarshes but also within other habitats along the construction corridor. Scrub and tall-herb vegetation, and even bare ground as well as trees may be used by breeding birds, and many species breed on or close to the ground.

10.22.11 Legal protection applies to the nests, eggs and young of all wild birds including very small passerine birds such as Wren which may nest in small crevices at or close to ground level and would not be detected other than by an experienced ecologist or ornithologist. In addition, protection against disturbance during nest building, egg incubation and rearing of young, including disturbance to their young, applies to those wild bird species listed on Schedule 1 of the *Wildlife and Countryside Act 1981*.

10.22.12 Monitoring should also cover other protected species such as bats, Great Crested Newts, Badgers, birds protected under Schedule 1 of the *Wildlife and Countryside Act 1981* (as amended), and any species of flora and fauna that are afforded statutory protection by amendments of the *1981 Act* or other legislation during construction of the Project or during the subsequent monitoring programme.

10.22.13 Ecological surveillance is necessary during the Project because construction methods may have to be varied depending on site conditions during construction, difficult weather conditions when working in sensitive and vulnerable habitats, and the necessity in many cases to minimise disturbance to wild birds and protect other important or legally protected fauna and flora by minimising construction times in sensitive areas and habitats.

10.22.14 Ecological surveillance should be undertaken in full collaboration with construction personnel so that unforeseen and potentially harmful activities are avoided or terminated before there is serious and possible irreparable damage to habitats and vegetation. This should be achieved by means of an Environmental Management Plan.

10.22.15 During the Project construction works across the Upper Mersey Estuary there is the potential for greater unforeseen damage and disturbance to habitats, vegetation and species than elsewhere along the Project corridor.

10.22.16 Attention will be focused on this area on the following;

a. Monitoring should seek to detect evidence of the physical instability of saltmarsh habitat caused by mechanical operations, particularly where saltmarsh regeneration may be affected;
b. Surveillance should cover signs of damage to vegetation due to the movements of machinery and personnel, including shading caused by materials or equipment being stored on the vegetation;

c. Any adverse ecological effects of machinery, temporary structures and other construction activities should be identified;
d. Particular attention should be given to disturbance to breeding birds, particularly on the saltmarshes, because there may be long-distance disturbance in some cases due to noise and the possible movements of machinery and personnel outside the construction areas; and
e. Special attention should be given to all residual effects that have been identified, particularly those associated with disturbance.

10.22.17 Monitoring during construction should include observations of the saltmarshes (Widnes Warth and Astmoor saltmarshes), with walkover surveys up to 500 metres from the construction corridor so that information on breeding birds in disturbed areas and in areas up to those that are not expected to be disturbed are obtained.

10.22.18 Walkover transect surveys should be undertaken so that any reduction in breeding bird densities caused by proximity to the working areas can be detected but care needs to be taken to avoid unnecessary bird disturbance caused by the survey itself. It may be necessary to erect a hide or hides at suitable locations to increase the effectiveness of monitoring, and to have the facility to investigate the likely disturbance effects, including their magnitudes and distances, in relation to specific construction operations.

Post-construction Monitoring

10.22.19 Post-construction monitoring should be directed, principally, to the following habitats and bird species;

a. Attention should be focussed on areas of saltmarsh close to the New Bridge where mitigation and enhancement have involved a change in management to cutting and/or grazing;
b. The plant species composition of the cut and grazed saltmarshes should be determined by walkover surveys and by the compilation of plant species lists annually for five years with estimates of the frequencies, abundance, distribution and percentage ground cover of individual species using the methods described in the methodology section for the saltmarshes. The surveys should be directed to detecting decreases in the amounts and percentage cover of Sea Couch and Red Fescue, and increases in the amounts and percentage cover of Sea Meadow-grass and other species preferred by herbivorous and omnivorous wildfowl and waders;
c. There should be quarterly monitoring of usage of the managed saltmarshes by wildfowl and waders using high tide and low tide counts, during spring and neap tides. The locations of bird flocks should be mapped to show their distribution in relation to the New Bridge;
d. The movements of wading and wildfowl species, particularly those species of importance in terms of the European Site designation criteria, should be investigated. These investigations will cover movements of birds upstream and downstream, between the European Site and the Upper Estuary, at the New Bridge;
e. The behaviour of birds in relation to the New Bridge should be examined, to determine if they avoid the bridge and whether or not they fly over or under the bridge. The methodology should follow that described in the methods section of this Chapter; and
f. Monitoring should record rare bird species visiting the Upper Estuary, notably harriers as well as wildfowl and waders using the saltmarshes for roosting and feeding. Monitoring of such species should be conducted for five years, on a quarterly basis.

10.22.20 Additional saltmarsh monitoring should cover the following;

a. The regeneration of saltmarsh vegetation affected by translocation and by damage in situ should be monitored in terms of percentage ground cover, height and density, and species composition;
b. Potential effects on the creek system should be investigated by detailed creek mapping including the width and depths of creeks, changes to existing creeks, and the formation of new creeks;
c. Monitoring should include pools and scrapes created as part of mitigation and enhancement measures, with surveys of their aquatic and water-margin vegetation;
d. Special attention should be given to saltmarsh adjacent to and around the bases of bridge piers;
e. Saltmarsh monitoring should also cover possible changes in the degree and pattern of erosion of the river channel margins of the saltmarshes; and
f. The condition of saltmarsh vegetation beneath the bridge structure should be examined, particularly the influence of shading by the New Bridge.

10.22.21 Elsewhere, outside the Upper Mersey Estuary, monitoring should be focused on the following sites and areas;

a. The St. Helens Canal LWS including the regeneration of canal vegetation at and close to the crossing point;
b. The Manchester Ship Canal Bank LWS, with survey attention directed to the recovery of vegetation, particularly orchids, in the vicinity of the Project crossing point and on receptor sites elsewhere along the canal bank and possibly on other areas that may be used as receptor sites, and
c. Wigg Island habitats and vegetation within 300 metres of the Project.

10.22.22 Apart from birds, species monitoring should cover protected species that are likely to be affected, specifically the following;

a. Bat activity should be monitored at Wigg Island to identify bat movements across the Project between Runcorn and the open land of Wigg Island in the east. All bat species should be monitored in this area, with dusk and dawn nocturnal surveys;
b. Bat activity along the St. Helens Canal, in the vicinity of the bridge crossing point, should be monitored, by nocturnal and dusk surveys as at Wigg Island;
c. Barn Owl movements should also be monitored, including foraging areas and flyways, at Wigg Island along both sides of the Project; and
d. Potential colonisation by other protected species, including Badgers, should be recorded because this has occurred on other highway projects during and after construction.

10.22.23 It is improbable that a Great Crested Newt monitoring programme will be necessary as part of the licensed mitigation, based on the advice in *Great Crested Newt Mitigation Guidelines* (English Nature 2001).

10.22.24 The monitoring programme should be reviewed after five years, in the light of the monitoring information then available.

10.23 Appropriate Assessment for the European Site

10.23.1 *The Habitats Directive* requires defined measures to be taken to ensure that adequate protection is achieved for SPAs and Special Areas of Conservation (SACs). These measures are implemented in Great Britain through *The Conservation (Natural Habitats &c.) Regulations 1994 (SI No 2716).* In *The Regulations*, SPAs (and SACs) are referred to as European sites.

10.23.2 Regulation 48 states:-

A competent authority, before deciding to undertake, or give any consent, permission or other authorisation, for a plan or project which:

(a) is likely to have a significant effect on a European site in Great Britain, either alone or in combination with other plans or projects, and

(b) is not directly connected with or necessary to the management of the site, shall make an appropriate assessment of the implications for the site in view of that site's conservation objectives.

10.23.3 The competent authority, in this case Halton Borough Council, may agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the European site. *ODPM Circular 06/2005* defines integrity as *the coherence of its ecological structure and function, across its whole area, that enables it to sustain the habitat, complex of habitats and/or the levels of populations of the species for which it was classified.*

10.23.4 The UK government has decided that projects that may affect listed Ramsar sites will be subject to a similar assessment procedure.

10.23.5 The term “appropriate assessment” is taken to mean an assessment fully adequate to determine the effects of a plan or project on the objectives of the European site. It need be no more wide-ranging or complex than is necessary for that purpose. However, it must take into account any other plans or projects which, in combination with the scheme being assessed, could have a negative effect on a site.

Consent for a Project with Significant Negative Effects

10.23.6 *Regulation 49* provides that, if the assessment concludes that there will be a significant negative effect on the conservation objectives of the European Site, and the competent authority nonetheless wishes to implement the Project, it must be satisfied that there are imperative reasons of overriding public interest for so doing and that there are no alternative solutions.

10.23.7 If the competent authority gives consent for a project that will damage a European site, the effects must be compensated. Typically, compensation entails work outside the European Site to redress any negative effect. Thus, it could involve management of other land to accommodate the numbers of birds displaced by the actions. Compensation may present significant problems due to land availability, location and quality, and present technical challenges and limitations in ecological knowledge and techniques. The competent authority should consider the practicality of achieving it before deciding to seek consent for actions that will damage a European site. Compensation measures cannot be used as a device to reduce effects in advance of the appropriate assessment which must be related to the baseline conditions.

Focus of This Assessment

10.23.8 The New Bridge will be constructed wholly outside the European Site. However, consideration

needs to be given to the possibility that birds using the European Site may also use the Upper Estuary and therefore may potentially be affected by the construction and operation of the New Bridge. If this is the case, the European Site population of birds may be affected and it will be necessary to determine whether physical effects of the construction and presence of the bridge may affect the habitats on which the European Site bird populations depend.

10.23.9 *ODPM Circular 06/2005* states that effects should be considered in relation to (inter alia) the levels of populations of the species for which the site was classified. As bird populations within a site change over time in response to a variety of factors, this assessment will, so far as data permit, consider effects relative to current population sizes as well as those given in the most recent revision of the SPA citation (2004).

10.23.10 As required under Regulation 33(2) of the *Conservation Regulations*, Natural England has published advice *inter alia* listing those operations that may cause damage to the habitats within the site or negative effects on the species for which it was classified, thereby causing loss of favourable conservation status (English Nature 2001). This assessment has used this listing to guide the identification of potential impacts arising from the Project which could have negative effects upon the European Site. The list of operations identified includes:-

a. Physical loss of habitat;
b. physical damage to habitat;
c. disturbance to birds;
d. toxic contamination;
e. non-toxic contamination (e.g. changes in turbidity); and
f. biological disturbance (e.g. introduction of non-native species).

10.23.11 It is considered that the first five of these six activities could result from the construction and operation of the bridge.

10.23.12 As well as addressing the possibility of effects on the European Site and the bird populations which use it, the assessment also considers potential effects on the bird populations present in the Upper Estuary as a distinct site. As stated in Section 10.1.17 of this Chapter, the Upper Estuary, because of its close proximity to the European Site, is assessed as though it was a proposed SPA and therefore part of the European Site.

Description of the Construction Methods

10.23.13 The length of the New bridge crossing of the Upper Estuary, including the saltmarsh, mudflats/sandbanks and channels, will be 1,935 metres. Of this some 1,005 metres cross mudflats/sandbanks and channels inundated on normal tides, with 525 metres over the northern saltmarsh of Widnes Warth and 405 metres over the southern Astmoor Saltmarsh. The section across Widnes Warth Saltmarsh will be constructed on a curve, with six staggered pairs of concrete piers supporting the New Bridge.

10.23.14 The section across the Astmoor Saltmarsh will be supported by three pairs of piers. The central part of the New Bridge, over mudflats and channels, will be cable-stayed, with four spans suspended from three concrete and steel towers. There will be clearance over the saltmarsh and water of approximately 10 metres at the north side of the Estuary, rising to 20 metres over the south side of the channel. The two outside cable towers will be 130 metres high and the central tower will be 110 metres in height.

10.23.15 The New Bridge will extend beyond the Estuary to the north and south, to connect with the existing road network.

10.23.16 The first construction activity in the New Bridge crossing area of the Estuary will be fence erection and clearance of vegetation but there will be no topsoil strip on the saltmarshes and the existing saltmarsh vegetation will remain. Contractors' site compounds will be constructed, the two main compounds being on the north and south sides of the river, but not on the saltmarshes.

10.23.17 Access roads to the bridge construction sites and associated working areas will be constructed across Widnes Warth Saltmarsh in the north and across Astmoor Saltmarsh in the south to the New Bridge pier and tower construction sites. The access roads will also be used for vehicular and machinery access and as haul roads. The access roads, which will be five metres wide will consist of a 0.5 metre thick layer of stone laid over the saltmarsh vegetation with an intervening geotextile fabric. They will be built to be above the high tide level.

10.23.18 The alignment of the access roads will minimise interference with the natural saltmarsh drainage system of creeks and gullies. Pipes will be laid beneath the geotextile and stone, within the saltmarsh, to allow tidal waters and surface water run-off to flow laterally beneath the tracks so that the natural drainage system of the saltmarsh is retained. The access roads will be retained and used for up to three years.

10.23.19 The roads, which will be used for access and haulage of materials, will give access to all the pier construction sites on the saltmarshes and will terminate at the river channel margins of the saltmarshes where they will connect with piled jetties which will give access to the tower construction sites.

10.23.20 Piled jetties will be constructed across the intertidal habitats, beyond the saltmarshes, to each of the three tower construction sites. Half-tide causeways have been considered but these could interfere with the morphological characteristics of the Upper Estuary and have potential effects downstream in the European Site so are unacceptable. The piled jetties will allow vehicles to move above the level of the intertidal sands and silts, without causing disturbance.

10.23.21 There will be 19 piers across the saltmarshes, each constructed of reinforced concrete with dimensions of 2 metres by 5 metres at saltmarsh level. The working areas required for shaft excavation using an auger-piling rig and sheet piling during cofferdam construction will be 12 metres by 14 metres.

10.23.22 The construction of the towers in the intertidal habitats will involve cofferdams of 30 metres diameter. There will also be a piled base of 10 metres by 10 metres for the Tower Crane plus a vehicle unloading and turning area. The towers will be 11 metres in diameter.

10.23.23 Dredging is not feasible because the channels are not stable and therefore it will be impractical to use barges and floating plant for the delivery of major bridge components to the intertidal zone. Instead, large hovercraft such as a 125 tonnes hover barge will be used to transport large deck units, probably prefabricated, to the tower sites. On the sandbanks, low ground pressure tractors or a system of fixed winches for the delivery of large prefabricated bridge deck components may be used.

10.23.24 Construction of the New Bridge superstructure may involve prefabrication of units off-site and delivered via the Manchester Ship Canal in the south and the St. Helens Canal reception area in the north. Thereafter, the lifting of the bridge deck construction units and other bridge components, or prefabricated units, by tower crane to a gantry or other system, assembly of the bridge will be above the level of the saltmarsh.

10.23.25 Other New Bridge and Project construction methods, including the Project approach roads, junction improvements, embankments, bridges, modifications to existing highways and junctions, and de-linking works, are described in Appendix 2.1.

10.23.26 The entire Project is likely to be completed in about three years. There are five possible impacts on birds which may arise during the construction phase. They are:-

a. Loss of or physical damage to habitat;
b. Disturbance due to human presence, construction noise and temporary lighting;
c. Collision with structures (permanent and temporary);
d. Pollution events affecting the food resources on which birds depend, including release of contaminants from disturbed sediments; and
e. Alterations to hydrological processes, due to the installation of cofferdams within which bridge towers will be constructed, leading to changes in the extent of the intertidal zone and the character of the substrate, in turn altering the composition and abundance of the food resource for birds.

Presence/Operation of the bridge

10.23.27 The impacts that may arise from the presence of the bridge are:-

a. Loss of or physical damage to habitat.
b. Disturbance to birds due to human presence, vehicle noise and movement, and lighting of the bridge.
c. Collision with the structure.
d. Obstruction to bird movements within the Estuary, affecting their ability to exploit habitats upstream or downstream, not adjacent to the bridge.
e. Alterations to hydrological processes in the estuary due to the presence of the bridge piers, affecting the relative proportions and character of the inter-tidal and sub-tidal zones with implications for the infauna which provide food resource for birds.
f. Pollution events e.g. from Road Traffic Accidents, affecting the food resources on which birds depend.

Summary of potential impacts

10.23.28 Taking into account the operations identified by English Nature as potentially harmful to the classified site, impacts that require consideration are therefore:-

a. Physical effects on habitats;
b. Disturbance due to:-
    - human presence during construction and operation of the bridge,

- construction noise,
- vehicle use of the bridge,
- lighting of the bridge.

c. Risk of birds colliding with the bridge structure;
d. Obstruction to bird movements within the estuary;
e. Pollution events affecting the food resources on which birds depend;
f. Alterations to hydrological processes, due to the presence of the bridge piers, in turn altering the composition and abundance of the food resource for birds; and
g. Release of contaminants from sediments due to scouring or dredging, affecting the food resources of birds.

10.23.29 The Effects Assessment has shown that the bird species found in the Upper Estuary are present in low numbers and that this applies particularly to those species which are present in internationally important numbers in the European Site. The differences in bird numbers are attributed to the invertebrate food resources. Whereas the European Site intertidal sediments support high densities of invertebrates on which the birds feed, the numbers of invertebrate species and their densities are much lower in the Upper Estuary due to the constant mobilisation of the sediments.

10.23.30 Although the Upper Mersey Estuary has been treated as a proposed SPA in the Effects Assessment, the population sizes of the wildfowl and wading birds present are well below the national and international thresholds for satisfying the SSSI (National) and SPA (International) designation criteria respectively.

10.23.31 The Effects Assessment has shown that the existing and natural hydrodynamic changes affecting the mobility and distribution of the intertidal sediments and saltmarshes will be unchanged both during construction of the New Bridge and during its operation. Thus the natural changes of saltmarsh erosion and accretion will be unaltered. There will be no physical loss or damage to the important intertidal sediments, saltmarsh and rocky shore habitat sub-features in the European Site which support the invertebrate populations on which the internationally important bird populations feed.

10.23.32 The release of intertidal sediments during construction of the New Bridge may cause minor increases in the levels of contaminants in the European Site but these will be of low magnitude and will be reduced by dilution. Changes in turbidity caused by sediment release, and contaminant release from the mobilised sediments, will be no different to those that occur naturally in the Upper Estuary and in the European Site.

10.23.33 The levels of contaminants are elevated in the surface layers of saltmarsh soils crossed by the proposed access roads. To prevent the release of sediments and their contaminants, measures will be taken to restore the saltmarsh vegetation after access road removal and completion of bridge pier construction, thereby eliminating the potential for erosion, increased turbidity and toxic contamination in the European Site. Thus there will be no release of contaminants that could affect the food resources of the internationally important bird populations.

10.23.34 The Assessment has shown that the bird populations which occur in the Upper Estuary are not part of the internationally important populations that are found in the European Site. There are no significant bird movements between the European Site and the Upper Estuary of any of the internationally important species. Thus the internationally important bird populations of the European Site do not depend on the Upper Estuary for roosting and feeding. The low invertebrate densities in the intertidal sediments of the Upper Estuary explain the absence of bird movements from the European Site.

10.23.35 Disturbance to birds during construction will be localised and temporary, and will be confined to

the Upper Estuary where the numbers of birds are low because of the poor feeding resource. The numbers of birds recorded along the proposed route of the New Bridge over the Upper Estuary were low. Construction disturbance to birds cannot be mitigated effectively but it is a low and temporary impact only.

10.23.36 There will be no disturbance to internationally important birds in the European Site because the New Bridge will be entirely outside the European Site.

10.23.37 Studies of bird movements past the existing bridges at the Runcorn Gap have produced no evidence of obstructions to bird movements. The construction and design of the New Bridge structure will not present barriers to bird movements. The risk of birds colliding with the bridge structure has been assessed as very low and not significant.

10.23.38 Consideration has also been given to In Combination Effects of proposed developments on land adjacent or in close proximity to the Upper Mersey Estuary or which could otherwise produce In Combination effects, section 10.18. Similarly, proposed developments adjacent, or in close proximity to the European Site, have been considered in the Effects Assessment. It has been concluded that there will be no In Combination effects with the Project.

10.23.39 Of prime importance in the Effects Assessment has been to ensure that the conservation objectives for the European Site interest features are met. Therefore the proposed mitigation is designed to maintain in favourable condition the habitats for the internationally important populations of regularly occurring migratory bird species, and the habitats for the internationally important assemblage of waterfowl. These conservation objectives apply particularly to the intertidal sediments, the saltmarsh and the rocky shores.

10.23.40 This Effects Assessment applies particularly to the intertidal sediments and the saltmarshes because it is these two habitat types that will be directly affected by the construction and operation of the Project, and they will be amongst the first habitats to be affected if there are releases of contaminants or turbidity. These two habitats are also the most likely ones to be affected because of their extensive occurrence in the New Bridge area of the Estuary.

10.23.41 Rocky shores do not occur in the Upper Estuary but they are important features of the European Site and have been considered in the context of longer-distance effects, which may occur if contaminants or turbidity are transported by tidal waters.

10.23.42 Because the Effects Assessment has treated the Upper Estuary as a proposed SPA, it will be necessary to implement substantive mitigation, even though there are no significant impacts on the European Site downstream of the New Bridge.

10.23.43 The design of the proposed mitigation is based on the conclusions of the Effects Assessment that there will be permanent losses of small areas of saltmarsh and intertidal habitats in the Upper Estuary due to the piers and towers of the New Bridge structure, and also due to shading by the bridge deck. Disturbance to birds up to approximately 200-300 metres from the New Bridge as a result of the presence of the New Bridge has also been taken into account, as have traffic movements, noise and lighting.

10.23.44 The proposed mitigation involves conversion of adjacent areas of ungrazed saltmarsh at either Widnes Warth or Astmoor, or at both saltmarshes, to grazed and/or cut saltmarsh to create an enhanced upper saltmarsh habitat for roosting and feeding wildfowl and wading birds. The saltmarsh(es) would be enhanced to provide feeding habitat for herbivorous wildfowl and creation of pools and scrapes to encourage an invertebrate fauna for carnivorous and omnivorous wildfowl and waders.

10.23.45 The favourable conservation status of the saltmarsh(es) would also be increased by fencing and other measures to reduce disturbance, and the saltmarsh(es) would be protected from wildfowling. A Management Plan would be prepared and implemented to ensure the maintenance of favourable conservation status.

10.23.46 In conclusion, the Upper Mersey Estuary should not qualify as a proposed SPA because the population of international protected birds in the area falls substantially below the international thresholds. However, owing to the close proximity of the Project to the European Site in the Middle Estuary, a precautionary approach has been adopted for this assessment to the extent that the Upper Mersey Estuary has been treated as a proposed SPA. For the reasons set out in this chapter and on the basis that appropriate mitigation measures are undertaken, it is concluded that the Project will have no significant effect on the European Site or the Upper Mersey Estuary. Consequently, it is also concluded that the Project will have no adverse effects on the integrity of the European Site or the Upper Mersey Estuary.

10.24 Conclusions

10.24.1 The Project crosses the Upper Mersey Estuary which has been designated as a Local Wildlife Site by Halton Borough Council. The Upper Estuary, which is that part of the Estuary between the Runcorn Gap and Fiddler's Ferry, consists of intertidal sand and silt habitats, river channels, and saltmarshes along the north and south sides known as Widnes Warth and Astmoor saltmarshes respectively,

10.24.2 The Middle Mersey Estuary, to the west and immediately downstream of the Runcorn Gap, is of national and international significance for its estuarine habitats which support nationally and internationally important populations of wild birds, most notably wildfowl and waders. In the 1980s the Estuary, based on available information at the time, was claimed to be the most important site in Britain for wintering Pintail and Teal, and in the top seven British estuaries for total numbers of wildfowl. However the sizes of the bird populations and relative importance of the Estuary have changed, with, for example, Pintail numbers declining substantially.

10.24.3 The Middle Mersey Estuary is protected by four nature conservation designations; they are Site of Special Scientific Interest (SSSI), Special Protection Area for Birds (SPA), Ramsar Site and European Marine Site. The three international designations are known, collectively, as *Natura 2000* sites. The internationally important site is referred to as the European Site.

10.24.4 The present European Site (SPA) designation is justified by the internationally important numbers of Shelduck, Teal, Pintail, Dunlin, Black-tailed Godwit and Redshank. Golden Plover occurs in nationally important numbers. The European Site is also designated for its regular usage by 20,000 waterfowl in any season.

10.24.5 This Effects Assessment of the Project has been carried out on the basis that the Upper Mersey Estuary is treated as a proposed Special Protection Area (pSPA).

10.24.6 The Upper Mersey Estuary, including the part of the Estuary that the Project will cross, is an important wildlife site in a local context. In accord with UK Government guidance on nature conservation, it has been designated as a Local Wildlife Site (LWS).

10.24.7 This assessment of the Project has been carried out on the basis that the Upper Mersey Estuary is treated as a proposed Special Protection Area (pSPA).

10.24.8 The Middle Mersey Estuary is of national and international importance because of its extensive areas of intertidal habitat which include saltmarsh, sandbanks and siltflats, mudflats and water channels including river channels and saltmarsh creeks. It is also a very dynamic ecosystem which changes physically and biologically, with a remarkable capacity for recovery in response to environmental changes.

10.24.9 The Upper Mersey Estuary supports a wide range of estuarine birds and contains saltmarshes which hold high densities of breeding Skylarks and Meadow Pipits, with substantial numbers of breeding Reed Buntings in the associated wetland habitats.

10.24.10 The Upper Mersey Estuary is also visited by rare and important birds, with recent visits by Osprey, Buzzard, harriers, Short-eared Owl, Bittern and breeding Long-eared Owl. The adjacent reedbeds and other wetland habitats attract many breeding birds.

10.24.11 However the Upper Mersey Estuary contains much smaller populations of wildfowl and wading birds that the European Site. Many of the seabird species such as Pintail and waders such as Dunlin rarely visit the Upper Mersey Estuary, and then in only very small numbers.

10.24.12 The limited birdlife of the Upper Mersey Estuary is due largely to the very poor invertebrate fauna of the sediments with relatively few species and low densities of marine molluscs, crustaceans and worms. These invertebrates are the main food source of the wildfowl and waders, for which the European Site is of international importance.

10.24.13 The paucity of invertebrates in the Upper Mersey Estuary is due largely to the high frequency and intensity of hydrodynamic action, with the sediments being constantly eroded and redeposited, giving little opportunity for invertebrate communities to develop.

10.24.14 In contrast, the European Site supports a rich invertebrate fauna and extensive areas of saltmarsh, and is less affected by rapid hydrodynamic changes and the constant shifting of sediments which constrains invertebrate biodiversity in the Upper Mersey Estuary.

10.24.15 The baseline surveys have shown that there are very few movements of wildfowl and wading birds between the European Site and the Upper Mersey Estuary. The large and important populations of wildfowl and waders in the European Site do not use the Upper Mersey Estuary to any significant extent, and the much smaller bird populations of the Upper Mersey Estuary do not depend on the European Site habitats for roosting and feeding.

10.24.16 The wildfowl and wading bird populations of the European Site and Upper Estuary are separate populations. This applies particularly to the species whose populations in the European Site are of national and international importance.

10.24.17 Construction of the Project, based on the methods described in Appendix 2.1 may cause losses of saltmarsh habitat or damage to the vegetation and soils as a result of access by machinery, temporary structures, construction materials and personnel. However there are methods by which losses or damage can be avoided, reduced or restored such as by the construction of temporary access tracks designed to protect the saltmarsh habitat from damage. Other possibilities are temporary translocation and revegetation, encouraging natural regeneration and/or by reseeding.

10.24.18 The levels of contaminants in the intertidal sandbanks, sand and siltflats are low and there is no risk of pollution of downstream habitats and birds in the European Site. The levels of organic and heavy metal contaminants beneath the saltmarsh vegetation are higher, but they are retained in a tightly bound and insoluble form with organic matter and stable silt particles, and the saltmarshes are relatively stable habitats, unlike the constantly eroded and bare sand and silt habitats in the intertidal zone. Therefore the risk of downstream pollution is not significant, and methods of access and construction are available to avoid or minimise the release of sediments and associated contaminants from the saltmarshes.

10.24.19 Construction and access activities may disturb feeding, roosting and breeding birds on the saltmarshes and other intertidal habitats. However this will be localised to within a corridor of up to 300 metres width, and will be of a temporary or intermittent nature and not within an area where there are high concentrations of breeding, roosting and feeding birds.

10.24.20 There are methods, such as temporary fencing, to limit construction disturbance to a defined corridor, thereby reducing disturbance. Habituation of birds to construction activities within a specific area is predicted.

10.24.21 There is no evidence that the Project, during construction or thereafter, will interfere with bird movements between the European Site and the Upper Mersey Estuary because such movements, with the exception of gulls, are extremely small and insignificant. Some wildfowl and waders fly beneath the bridges and very large numbers of gulls fly over the existing bridges or pass the bridges on either side of the Runcorn Gap.

10.24.22 Construction and use of the Project approach roads and associated junction improvements will have only minor effects on biodiversity. Protected species, namely bats, Great Crested Newts and Water Voles will be largely or entirely unaffected. The low effects on the St. Helens Canal and the Manchester Ship Canal Bank Local Wildlife Sites can be reduced or mitigated, with off-site compensation on adjacent land or on Wigg Island if necessary.

10.24.23 Construction and use of the Project, given appropriate mitigation, which is feasible, will cause no significant harm to biodiversity or to the habitats and wild bird importance of the Mersey Estuary European Site. The Upper Mersey Estuary and other Local Wildlife Sites will not be adversely affected and all other effects on protected species and biodiversity can be satisfactorily mitigated.

10.24.24 As required by UK Government directives, opportunities will be taken to enhance the biodiversity of the Project corridor, particularly in the vicinity of the Upper Mersey Estuary crossing point, by habitat creation, habitat enhancement and habitat management in conjunction with construction activities.

10.24.25 In conclusion, the Upper Mersey Estuary should not qualify as a proposed SPA because the population of international protected birds in the area falls substantially below the international thresholds. However, owing to the close proximity of the Project to the European Site in the Middle Estuary, a precautionary approach has been adopted for this assessment to the extent that the Upper Mersey Estuary has been treated as a proposed SPA. For the reasons set out in this chapter and on the basis that appropriate mitigation measures are undertaken, it is concluded that the Project will have no significant effect on the European Site or the Upper Mersey Estuary. Consequently, it is also concluded that the Project will have no adverse effects on the integrity of the European Site or the Upper Mersey Estuary.

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