

9.0 ECOLOGY & NATURE CONSERVATION

9.1 INTRODUCTION

Ecology Consultancy Limited (ECL) was commissioned by Bell Fischer Landscape Architects (and, previous to that, by Drawbridge Securities (Ditton) Limited) to undertake ecological studies and prepare an impact assessment for the proposed High Bay Regional Distribution Centre at Ditton, Widnes.

The local authority, Halton Borough Council, have determined that the development falls within Schedule 2 Part 10c 'Construction of inter-nodal transshipment facilities and of inter-nodal terminals' of the *Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations 1999* and that an Environmental Impact Assessment (EIA) of the proposal is required.

This chapter reports on the baseline ecological studies that have been carried out as part of the environmental assessment work. It provides an assessment of the current ecological status of the site and identifies the likely ecological impacts of the proposed development, both on the site itself and on the nearby Mersey Estuary.

9.2 METHODOLOGY

In order to characterise the site and establish the baseline conditions the following ecological studies were carried out:

- A desk study and data search;
- An extended Phase 1 habitat survey;
- A protected species assessment;
- A bat survey;

- A reptile survey;
- A survey of aquatic invertebrates associated with the Steward's Brook and Ditton Brook; and
- A wintering bird survey covering the site and adjacent parts of the Mersey Estuary.

The methodology employed in each of these components is described below.

9.2.1 Data Search

A data search was carried out to obtain any existing ecological information relating to the site or its environs. The following organisations and individuals were contacted: English Nature (now Natural England) (Cheshire to Lancashire Team), the Local Biological Records Centre at Chester Zoo (record), Cheshire Wildlife Trust, the Cheshire Bat Group and Paul Oldfield, the Halton Borough Council Wildlife & Conservation Officer. In addition, Wetland Bird Survey (WeBs) data for the adjacent part of the Mersey Estuary was obtained from the British Trust for Ornithology.

9.2.2 Habitat Survey

An extended Phase 1 habitat survey of the site was carried out. This followed standard Phase 1 survey methodology (JNCC 1993) was expanded to allow more detailed recording of vegetation and features of ecological interest. The site was traversed on foot and the survey encompassed all internal and boundary features. Habitats within the site were described and mapped, and a list of plant species was compiled, together with an estimate of abundance made according to the DAFOR scale¹.

The principal sources of information for this report were the field surveys, which were carried out in early July and late August 2004 followed by a walkover survey in October 2007 to verify the validity of these surveys and to incorporate any un-surveyed areas resulting from changes to the site boundary (namely the east section of West Bank Dock Site). With the exception of the

¹ The DAFOR scale provides an estimate of the relative abundance of plant species as follows: D = Dominant, A = Abundant, F = Frequent, O = Occasional, R = Rare.

October survey, the surveys were undertaken during the main part of the plant growing season and should therefore provide a reasonably comprehensive record of the variety of plant species associated with the site. However species which complete their life cycle early in the growing season will have been under-recorded.

9.2.3 Protected Species Assessment

Suitable habitat features within the site were examined for evidence of protected species such as water vole, badger, bats, reptiles and breeding birds.

Where required, further more detailed surveys of selected groups were also carried out, as described below.

9.2.4 Bat Survey

The bat survey comprised two separate components, as follows:

- A building survey, to establish whether any of the buildings, deemed to hold potential to support bats, were or had recently been used as roosting sites; and
- Activity surveys, to establish whether the site is used for foraging or other purposes by bats.

Building Surveys

Surveys of buildings were carried out on 15th, 16th, 18th and 24th September 2004. With the exception of those to the south of the West Bank Dock Estate which were not considered to hold potential for bats, all buildings which are to be demolished or otherwise affected by the proposed development were examined.

The surveys of 16th and 24th September involved the examination of buildings during daylight hours for signs of roosting bats. All accessible external and internal areas (including windows, window ledges, door frames, beams and walls) of the buildings were examined for droppings, urine stains, grease stains and other evidence of occupation by bats. A 1,000,000 candlepower torch was used to search shaded or unlit areas. Binoculars were used to view areas which were

remote and inaccessible. Features of each building which were likely to influence roosting behaviour of bats were noted on a proforma survey form.

Emergence surveys were carried out on the 15th and 18th September covering building numbers 1, 3 and 4 (see *Figure 9.2.1*). These were selected as the buildings most likely to accommodate roosting bats as a result of their construction and use, and their location in relation to semi-natural habitats likely to be used for foraging.

- 15th September: Survey of building number 1 from 1750 hrs to 2030 hrs (period either side of sunset).
- 18th September: Survey of building numbers 3 and 4 from 1730 hrs to 2010 hrs (period either side of sunset).

For each of these emergence surveys, surveyors stood outside buildings, ensuring a clear view of likely emergence sites. Batbox Duet and Batbox III detectors were used throughout the surveys, tuned to 45kHz.

Activity Surveys

Bat activity surveys were carried out on the 13th, 15th and 18th September 2004.

Each survey (including the emergence surveys which were carried out on 15th and 18th September) started before or just after sunset and continued until at least two hours after sunset.

Batbox Duet and Batbox III bat detectors were used with headphones. This enabled both heterodyne and frequency division techniques to be employed, to survey for all bat species within detectable limits.

The same pre-determined route was followed around part of the site on each of the three survey sessions. Observations of bats were noted on a proforma survey sheet and a base map when seen and/or heard. The route was chosen to include likely flight lines (tree lines, streams and other linear features) and foraging areas. The route started from a location close to a potential roosting area so that emerging bats could be recorded; this was designed to help with identifying the value of the site as an early feeding or commuting resource.

A note was also made of weather conditions, including temperature. These are known to be key influences on bat behaviour. The methodology is based on that employed by the Bat Conservation Trust for their National Bat Monitoring Programme and is in accordance with the Bat Survey Guidelines (BCT 2007).

The level and pattern of bat activity at a site can change over the year and it is therefore possible that surveys undertaken at different times would have different results. However, it is considered that the results are likely to be reasonably representative of the level of bat activity at the site. In particular, the building inspections were undertaken at a time when any current or recent use of the buildings as roosting structures would have been evident.

9.2.5 Reptile Survey

The reptile survey was carried out during September 2004 and involved a combination of visual searching for reptiles and the use of artificial refugia. The artificial refugia consisted of pieces of roofing felt, approx. 1m x 0.5m in size, which were laid out across those areas of the site that were considered to provide potential reptile habitat i.e. areas of rough grassland, scrub and tall ruderal vegetation (see *Figure 9.2.1*). Refugia were checked on seven occasions during periods of suitable weather conditions (warm with little wind or rain). The type, size and number of refugia used, and the timing and number of surveys conducted, were based on guidelines produced by Froglife (1999).

9.2.6 Aquatic Invertebrate Survey

An aquatic invertebrate survey was carried out to provide baseline information about the fauna present in two watercourses (Steward's and Ditton Brook) that flow through or adjacent to the site and discharge into the Mersey Estuary. Surveys of the invertebrate fauna within Marsh Ditch, which runs alongside Desoto Road, were not undertaken since this was outwith the Development site at the time of survey.

The fieldwork was undertaken on the 11th November 2004. The survey was timed to utilise the morning ebb tide and low water (2.7 metre low at Liverpool at 10.40 am). In total, 10 sampling

stations were examined situated at five sites along the two watercourses representing inter-tidal (submerged on each tide) and sub-tidal (constantly submerged) regimes. These were:

Steward's Brook	Inter-tidal Site (Core Sampled) Sub-tidal Channel (Kick Sampled)
Ditton Brook	Upper Creek; Inter-tidal Site (Core Sampled) Upper Creek; Sub-tidal Channel (Kick Sampled) Mid-creek; Inter-tidal Site (Core Sampled) Mid-creek; Sub-tidal Channel (Kick Sampled) Lower Creek; Inter-tidal Site (Core Sampled) Lower Creek; Sub-tidal Channel (Kick Sampled)
Below confluence of the Brooks	Inter-tidal Site (Core Sampled) Sub-tidal Channel (Kick Sampled)

The locations of these sampling stations are shown on *Figure 9.2.1*. All sites were accessed on foot from the bank. Accurate location of the sites for future monitoring exercises was by means of laser rangefinder measurements taken from fixed landmarks. For each of the inter-tidal shore sites exposed at low tide, core sampling was used to examine the faunal communities. This was carried out using standard corers that provided quantitative samples representing a known area of sediment (100 cm²). Sampling to a depth of 15 cm yielded 1.5 litres of sediment in each core sample. The core samples were transferred to pre-labelled plastic buckets and returned to the laboratory for further processing (see below). Sub-tidal communities present in the permanent creek channels were sampled by means of 1-minute kick net samples using standard ("Environment Agency") 1-mm mesh nets. Individual net samples were transferred to labelled, 2-litre polythene tubs and preserved in the field in formalin fixative (7% aqueous formaldehyde; primary fixation).

In the laboratory, core samples were elutriated and sieved using an up-welling water technique onto 500 micron (0.5 mm) mesh, stainless steel sieves (Endecotts). Residual materials were then sorted by hand in trays under dissecting microscopes at magnifications of up to 60x to remove the denser organisms (e.g. shelled molluscs) that are not removed from the sediment matrix by the elutriation processes. The animals separated from each intertidal core sample were then picked out and sorted into their major taxonomic groups for subsequent identification by the

appropriate group expert. The extremely abundant oligochaete annelid worms present in the samples were returned in water to a gridded tray for counting before secondary fixation in fresh formalin solution (ca. 7% aqueous formaldehyde).

For the kick net samples, the preserved materials from the field were eluted onto 500 micron mesh sieves and re-fixed in 70% industrial methylated spirits (74 O.P., denatured ethanol (IMS) - secondary fixation). Light and coarse fractions from the elutriations were then sorted by hand under stereo dissecting microscopes at magnifications of up to 60x and the species picked out for the relevant taxonomist.

All taxonomic identification of animal material was undertaken using stereo- and high power, compound microscopes (Zeiss, Nikon, Leitz and Olympus systems). Where necessary, comparison was made with reference collections. Standard reference and identification keys (e.g. the Linnean Society Synopses of the British Fauna, the keys of the Freshwater Biological Association and descriptions published in scientific journals) were also used as necessary. Oligochaete annelids were identified to species level using cleared microscope slide preparations and in-house formula mounting media. Head-capsule dissection of chironomid (non-biting midge) larvae, necessary for identification to species level, was not carried out. Instead, these were separated into groups (OTUs) of morphologically similar larvae (termed "morphotypes") and counted.

Animals belonging to each species were counted and the results are quoted as either numbers per species, per square metre of intertidal substrate (core samples) or as numbers per species, per 1-minute kick net sample. Standard community parameters were derived from the final data sets and included species richness values, total densities, diversity indices (Simpson's index) and dominance and co-dominance values.

9.2.7 Wintering Bird Survey

In response to consultation about the scope of ecological baseline studies required for the development site, English Nature (hereafter referred to as Natural England) indicated that it would be useful to assess whether the site is used for feeding or roosting by wintering waterfowl (wildfowl and waders) from the nearby Mersey Estuary.

Accordingly, a wintering bird survey was carried out across the site, concentrating on the two main watercourses (Ditton Brook and Steward's Brook). The adjacent section of the Mersey Estuary was also covered. The survey was based on the British Trust for Ornithology/ Wildfowl & Wetlands Trust methodology for the Wetland Bird Survey (WeBS), specifically that for WeBs low tide counts.

To facilitate the survey, the stream channels within and adjacent to the development site and the Mersey Estuary next to the mouth of the Ditton Brook were divided into a number of count areas (see *Figure 9.2.1* for a survey layout). Two types of data were collected - low tide feeding counts and information on high tide roosts.

Feeding counts were made once per month during the period October 2004 to February 2005 inclusive. The counts were carried out during the period two hours either side of low tide, moving sequentially from one count area to another - taking care to avoid disturbing birds and thus the risk of double counting. All feeding waders and wildfowl were counted and their distribution mapped.

The high tide count was made during the period two hours either side of high tide on the highest spring tide of the month from October 2004 to February 2005 inclusive. All survey areas offering potential roosting sites for water-birds were examined, including the terrestrial parts of the development site. One or a combination of the following count techniques were employed to count birds at high tide roosts (based on Bibby *et al.* 2000): (a) counts of birds as they fly from feeding areas to their roosting sites, starting at least two hours before high water; (b) counts of stationary birds whilst at the roosting site and (c) counts carried out at the turn of the tide as the birds leave their roost sites to return to feed. The preferred method was (b) but the other methods were employed where views were obscured.

9.2.8 Assessment Methodology

The impact assessment has been carried out with reference to the following guidance:

- IEEM (2002) Guidelines for Ecological Impact Assessment: Amended Pilot November, 2002, IEEM, Winchester.

- DETR (1995) Preparation of Environmental Statements for Planning Projects that Require Environmental Assessment: A Good Practice Guide, HMSO, London.
- Treweek, J. (1999) Ecological Impact Assessment, Blackwell Science, Oxford.
- English Nature (2001) Mersey Estuary European marine site - English Nature's advice given under Regulation 33(2) of the Conservation (Natural Habitats &c.) Regulations 1994, as amended. Advice Note.

9.3 BASELINE CONDITIONS

9.3.1 Data Search

Responses obtained from the Local Biological Records Centre at Chester Zoo (record) confirm that the Development site is not designated in any way for its nature conservation interest.

The Mersey Estuary, which is situated about 200 metres to the south of the site, is designated as a Special Protection Area (SPA) under the EU Birds Directive 1979, as a Ramsar Site under the 1971 Convention on Wetlands of International Importance (Ramsar Convention) and as a Site of Special Scientific Interest under the Wildlife & Countryside Act 1981 (as amended). The Estuary comprises large areas of inter-tidal sand and mudflats together with areas of reclaimed marshland, saltmarsh, brackish marshes and boulder clay cliffs with freshwater seepages.

It is one of the key estuaries in the UK for wintering waterfowl. It supports internationally important numbers of five regularly occurring migratory waterfowl in winter: dunlin *Calidris alpina*, redshank *Tringa totanus*, shelduck *Tadorna tadorna*, pintail *Anas acuta* and teal *Anas cracca*. It also supports internationally important numbers of redshank and ringed plover *Charadrius hiaticula* in the autumn. It also qualifies as internationally important for its overall wintering waterfowl assemblage, regularly supporting over 20,000 birds. The following species occur in nationally important numbers in winter; wigeon *Anas penelope*, grey plover *Pluvialis squatarola*, black-tailed godwit *Limosa limosa* and curlew *Numenius arquata*.

The SSSI, SPA and Ramsar site extends eastwards as far as the Runcorn-Widnes Bridge. The Upper Mersey Estuary to the east of the bridge is designated as a Local Nature Reserve (LNR) under the

National Parks & Access to the Countryside Act 1949 and as a non-statutory Site of Importance for Nature Conservation.

Pickerings Pasture Local Nature Reserve is located on the north bank of the Mersey Estuary at Hale Bank. The main part of Pickerings Pasture is some 0.8 km to the south-west, but a narrow tongue of land within the LNR extends north-east along the bank of the estuary to the mouth of the Ditton Brook, which is some 175 metres to the south of the Development site site. A former industrial and domestic waste tip, Pickerings Pasture has been restored and landscaped with wildflower meadows and native tree and shrub planting.

Designated sites in the vicinity of the Development site are shown on *Figure 9.3.1*.

The Development site is located within the Mersey Forest, which is the largest of England's 12 Community Forests. The Forest covers an area of 420 square miles in Merseyside and North Cheshire and is being developed by a Forest Partnership comprising local authorities, the Countryside Agency, the Forestry Commission and others. The aim of The Forest Partnership is to create 8,000 hectares of new community woodlands plus a range of associated environmental, economic and social benefits through sustainable landscape improvements over a 30-year development period.

The Local Biological Records Centre does not hold any species records for the Development site itself. However the following protected species have been recorded from within 1 km of the site:

Common name	Scientific name	Grid ref.	Location	Date
55 Khz Pipistrelle bat	<i>Pipistrellus pygmaeus</i>	SJ482854	Clincton Wood	21/03/2002
Barn Owl	<i>Tyto alba</i>	SJ482853	Clincton Wood	03/06/2003
Barn Owl	<i>Tyto alba</i>	SJ486833	Hale Bank	29/12/2003
Barn Owl	<i>Tyto alba</i>	SJ486850	Widnes	06/01/2001
Fieldfare	<i>Turdus pilaris</i>	SJ488835	Pickerings Pasture	Various
Fieldfare	<i>Turdus pilaris</i>	SJ484832	Hale Sewage Works	06/11/2003
Green Sandpiper	<i>Tringa ochropus</i>	SJ488835		19/08/2000
Green Sandpiper	<i>Tringa ochropus</i>	SJ486833	Pickerings Pasture	05/05/1997
Hobby	<i>Falco subbuteo</i>	SJ488835		09/09/2001
Hobby	<i>Falco subbuteo</i>	SJ488835		29/07/2001
Kingfisher	<i>Alcedo atthis</i>	SJ488835	Pickerings Pasture	08/10/2002
Kingfisher	<i>Alcedo atthis</i>	SJ486833	Pickerings Pasture	10/07/2003
Kingfisher	<i>Alcedo atthis</i>	SJ486833	Pickerings Pasture	16/11/2003
Little Ringed Plover	<i>Charadrius dubius</i>	SJ484832	Hale Sewage Works	13/05/2003
Little Ringed Plover	<i>Charadrius dubius</i>	SJ486833	Pickerings Pasture	1986
Little Ringed Plover	<i>Charadrius dubius</i>	SJ486833	Pickerings Pasture	24/04/1989

Common name	Scientific name	Grid ref.	Location	Date
Marsh Harrier	<i>Circus aeruginosus</i>	SJ488835	Pickerings Pasture	03/08/2002
Marsh Harrier	<i>Circus aeruginosus</i>	SJ488835	Pickerings Pasture	26/08/2002
Marsh Harrier	<i>Circus aeruginosus</i>	SJ488835	Pickerings Pasture	26/08/2002
Merlin	<i>Falco columbarius</i>	SJ505833	No Man's Land	1968 - 1976
Merlin	<i>Falco columbarius</i>	SJ486833	Pickerings Pasture	16/11/2003
Peregrine	<i>Falco peregrinus</i>	SJ488835	Pickerings Pasture	Various
Redwing	<i>Turdus iliacus</i>	SJ481853	Clincton Wood	Various
Redwing	<i>Turdus iliacus</i>	SJ486833	Pickerings Pasture	Various

Marsh Ditch runs parallel with Desoto Road, along the western boundary of the east section of the West Bank Dock Estate. The lower reaches of the banks are largely boarded with wooden planks. Tall ruderal and marginal vegetation extend in a strip along the higher reaches of both banks and species such as hedge bindweed *Calystegia sylvestris*, rosebay willow herb *Chamerion angustifolium*, broadleaved dock *Rumex obtusifolius* cock's foot *Dactylis glomerata* and creeping buttercup *Ranunculus repens* are abundant.

9.3.2 Habitats and Vegetation

To facilitate description the site has been divided into a number of parcels, as indicated on *Figure 9.3.2*. The habitats within each of these parcels are described in turn below. Numbered target notes are used to indicate features of particular interest or note.

Scientific names are given after the first mention of a species, thereafter English names only are used. Nomenclature follows Stace (1997). A full list of the plant species recorded from the site is given in *Appendix 9.1*.

West Bank Dock Estate

The West Bank Dock Estate is divided into two parts (east and west) by the Desoto Road. Planted trees occur along the margins of Desoto Road and Mathieson Road, comprising species such as sycamore *Acer pseudoplatanus*, silver birch *Betula pendula* and common lime *Tilia x europaea*. Elder *Sambucus nigra* is also frequent along the margins of Desoto Road. Bramble *Rubus fruticosus* agg. scrub is intermittent along the tree line on the eastern edge of Desoto Road and tall ruderal species such as common nettle *Urtica dioica* and mugwort *Artemisia vulgaris* are frequent on the roadside verges. At the south eastern end of West Bank Dock Estate, there is a greater proportion of introduced, ornamental shrub species lining the road margins, namely cotoneaster *Cotoneaster* spp. and rose *Rosa* spp. and the scrub is replaced in part by amenity grassland.

The eastern section has been largely cleared of industrial units, leaving a large expanse of bare ground with small patches of ephemeral/short perennial vegetation. A small area of tall ruderal vegetation with scattered willow trees *Salix* spp. projects into the area at the southern edge of the area, north east of Vickers Road.

South west of Vickers Road lies a small area of semi-improved grassland and birch trees surrounded by amenity grassland which runs down to the boundary between the site and the Mersey. Desoto Road curves around to the west at this point and the road margins comprise a mixture of amenity grassland and introduced ornamental shrubs. A line of poplar *Populus* spp. and false cypress *Chamaecyparis* spp. trees form the boundary between the site and the Mersey.

The south western section of the West Bank Dock Estate largely comprises industrial units and hard standing. Scattered sycamore, willow and *prunus* spp. trees are to be found between plots and a small area of semi-improved grassland lies on the eastern edge of this section. Scattered, small areas of tall ruderal and ephemeral/short perennial vegetation can be found around the margins of the yard south of the Mathieson Road carpark.

A high bund runs along the southern edge of the estate and separates it from industrial units to the south. The bund is covered by tall rank grassland dominated by false oat-grass *Arrhenatherum elatius* and couch *Elytrigia repens*, together with ruderal tall herbs such as creeping thistle *Cirsium arvense*, mugwort, nettle and broadleaved dock. Bramble is abundant in places. Tree and shrub planting has been carried out on the bund, including species such as ash *Fraxinus excelsior*, horse chestnut *Aesculus hippocastanum* and pedunculate oak *Quercus robur*, amongst others.

Most of the remainder of the West Bank Dock Estate is covered by warehouses or areas of hard standing used as storage areas, car parks etc. Apart from some small areas of lawn with planted trees and shrubs and small patches of ephemeral and tall ruderal vegetation, these areas are largely un-vegetated.

Steward's Brook

Steward's Brook flows in a south-westerly direction through the site, entering through a culvert under the Liverpool-Warrington Railway Line in the north. Approximately half of the reach within the site area is tidal and the stream backs up during high tides when the tidal flap is closed. At low tide, the channel is generally narrow (1- 2m) and the base is covered in deep silt and, in places, blocky waste material. Water quality is poor, with the stream carrying a heavy load of suspended sediment which imparts a milky appearance. This material is thought to be alkaline in character and adheres to the base and sides of the channel.

There is no submerged aquatic vegetation within the channel itself. A fringe of emergent and salt-marsh vegetation occurs at the waters edge, comprising species such as sea club-rush *Bolboschoenus maritimus*, sea aster *Aster tripolium*, sea arrowgrass *Triglochin maritimum*, saltmarsh rush *Juncus gerardii*, false fox sedge *Carex otrubae*, gypsywort *Lycopus europaeus* and hemlock water dropwort *Oenanthe crocata*.

The western bank of the Steward's Brook is sheet piled in the lower part, with a steep slope above. In the south, adjacent to the Mound, the slope above the steel piles has been planted with dense scrub of gorse *Ulex europaeus* and broom *Cytisus scoparius*. Some young alder *Alnus glutinosa* trees grow at the foot of the slope. Areas of short turf with calcicole (lime-loving) species such as yellow-wort *Blackstonia perfoliata*, hairy St. John's-wort *Hypericum hirsutum*, centaury *Centaureum erythraea* and glaucous sedge *Carex flacca* occur near the culvert under the Foundry Lane access road, where uncapped chemical waste outcrops.

Similar vegetation occurs along the eastern bank of Steward's Brook adjacent to the Hutchinson's Hill or HEDCO site, where common spotted *Dactylorhiza fuchsii* and southern marsh orchids *D. praetermissa* may also be found (see target note 1 below).

North of the access road to the Foundry Lane Site, the western bank of the Steward's Brook is covered by rough grassland dominated by Yorkshire fog *Holcus lanatus* and creeping bent *Agrostis stolonifera*, with abundant colt's-foot *Tussilago farfara*. Calcicole species are again well represented, with yellow-wort, centaury and glaucous sedge all present. Scattered saplings of silver birch, goat willow *Salix caprea* and broom are developing amongst the grassland. Further north towards the railway the channel does a dog-leg and the western bank here is much steeper. As a result it has a sparse vegetation cover, again including calcicole species like

yellow-wort, centaury and purging flax *Linum catharticum*, as well as ruderals such as weld *Reseda luteola*, rosebay willowherb *Chamerion angustifolium*, great mullein *Verbascum thapsus* and bladder campion *Silene vulgaris*. A hawkweed species *Hieracium sp.* is also abundant here.

At the time of survey, a patch of Japanese knotweed *Fallopia japonica*, an invasive species proscribed under Section 14 of the Wildlife & Countryside Act 1981, was present at the southern end of the dog-leg, although it is understood that the site has now been cleared of the species following the implementation of a three year control programme.

The eastern bank of Steward's Brook in the north is largely covered by young broadleaved woodland composed of silver birch, with some grey willow *Salix cinerea*, goat willow and elder. Bracken *Pteridium aquilinum* and male fern *Dryopteris filix-mas* are abundant in the field layer below the trees. Southern marsh orchids occur in open areas to the south of the main block of woodland (see target note 2 below).

Foundry Lane Site

Most of the Foundry Lane Site is either covered in warehousing and railway sidings (the Exel depot) or by hard standing used for container storage. A line of tall Lawson cypress *Chamaecyparis lawsoniana* trees runs along the northern boundary of the Exel warehouse area but apart from this the Foundry Lane Site is largely un-vegetated.

An exception is an area in the north-west corner of the site, adjacent to the Ditton Brook. This consists of a low mound of material that has been placed to form a bund along the western boundary, running from the access bridge over the Ditton Brook to the Liverpool-Warrington railway in the north-west corner of the site.

The bund is mainly covered by rough semi-improved neutral grassland dominated by false oat-grass, couch and other coarse grasses. A variety of herbs are present including yellow-wort, common knapweed *Centaurea nigra*, fleabane *Pulicaria dysenterica*, tufted vetch *Vicia cracca* and hemp agrimony *Eupatorium cannabinum*, as well as ubiquitous tall ruderal species such as nettle, rosebay willowherb and creeping thistle. Several clumps of Japanese knotweed also occur here (see target notes 7 & 8), along with scattered saplings and bushes of goat willow, grey willow and butterfly bush.

The Mound

The Mound or Reclamation Site is a former waste disposal site which was capped and landscaped in the late 1990's. It has the form of a small, flat topped hill. The flanks are covered by recent tree and shrub planting and rough grassland, whilst an area on the flat 'summit' has been seeded as a wildflower meadow.

The tree and shrub planting comprises a mix of mostly native species, including pedunculate oak, silver birch, Scot's pine *Pinus sylvestris*, alder, grey alder *Alnus incana*, white poplar *Populus alba*, elm *Ulmus spp.*, goat willow, guelder rose *Viburnum opulus* and broom, amongst others. The trees and shrubs are still relatively young and the canopy has not yet closed, so that rough grassland covers the ground below and between the trees. This is generally dominated by red fescue *Festuca rubra* and common bent *Agrostis capillaris*, giving way to false oat grass and Yorkshire fog in the more open areas. Associated herbs include creeping thistle, common vetch *Vicia sativa ssp. segetalis*, tufted vetch *V. cracca*, fleabane, creeping buttercup *Ranunculus repens* and self heal *Prunella vulgaris*.

The meadow area is dominated by red fescue, common bent and Yorkshire fog, with frequent perennial ryegrass *Lolium perenne* and occasional smooth meadow grass *Poa pratensis* and tufted hair-grass *Deschampsia cespitosa*. Hard rush *Juncus inflexus* and soft rush *J. effusus* are common and a range of meadow wildflowers are present including common knapweed, meadow buttercup *Ranunculus acris*, oxeye daisy *Leucanthemum vulgare*, ragged robin *Lychnis flos-cuculi*, meadow vetchling *Lathyrus pratensis*, red clover *Trifolium pratense* and large bird's-foot-trefoil *Lotus pedunculatus*.

The south-western part of the Mound adjacent to the Ditton Brook is more gently sloping and has been only partially covered by tree planting. The remainder of the area supports semi-improved neutral grassland dominated by red fescue, Yorkshire fog and common bent. Associated herbs include common centaury, black medick *Medicago lupulina*, bird's-foot-trefoil, hare's-foot clover *Trifolium arvense*, hop trefoil *T. campestre*, meadow vetchling and creeping cinquefoil *Potentilla repens*. Species such as soft rush, conglomerate rush *Juncus conglomeratus* and jointed rush *J. articulatus* occur in damper areas. Of more restricted occurrence is grass-leaved vetchling *Lathyrus nissolia*, which occurs in small quantity towards the north-west corner of the area.

Ditton Brook

Ditton Brook is a broad tidal channel. Areas of inter-tidal mud are exposed on its flanks at low tide, below a fringe of salt-marsh vegetation comprising species such as sea aster, sea beet *Beta vulgaris ssp. maritima*, common salt-marsh grass *Puccinellia maritima* and wild celery *Apium graveolens*. Common reed *Phragmites australis* is also common, especially to the north where it is the dominant waterside vegetation. The upper part of the banks are covered by ruderal tall herbs and coarse grasses such as mugwort, nettle, spear thistle *Cirsium vulgare*, garden angelica *Angelica archangelica*, false oat grass and couch. Scattered elder and bramble also occur.

On the upper part of the bank, adjacent to the Mound, the soil is exposed. This supports a sparse cover of ephemeral/short perennial vegetation, including weld, wild carrot, purging flax, field forget-me-not *Myosotis arvensis*, perforate St. John's-wort and a hawkweed species. Dog lichen *Peltigera sp.* is also common here.

9.3.3 Target Notes

Several target notes are indicated on *Figure 9.3.2*, as follows:

T1 - A grassy track along the western edge of the Hutchinson's Hill site above the Steward's Brook, close to but outside of the Development site boundary. Supports good numbers of southern marsh orchid (150 +) together with common spotted and at least one other marsh orchid species.

T2 - An area on the eastern bank of the Steward's Brook adjacent to the west section of the West Bank Dock Road Estate. Supports 100 + southern marsh orchids growing amongst a low open cover of bramble and other species.

T3 - An area of open sparsely vegetated ground to the north-east of the Foundry Lane Site, adjacent to the Liverpool-Warrington Railway and the Steward's Brook and just outside of the Development site boundary. The vegetation comprises a mix of ephemeral and short-lived perennial species including purging flax, centaury, blue fleabane *Erigeron acer*, weld, mouse-ear hawkweed *Pilosella officinarum*, sticky mouse-ear *Cerastium glomeratum*, annual pearlwort *Sagina apetala*, hoary willowherb *Epilobium parviflorum*, great mullein and common toadflax *Linaria vulgaris*, amongst others.

T4 – At the time of survey in 2004, a small area of Japanese knotweed growing on the upper part of the Steward's Brook bank adjacent to the Foundry Lane Site. As a species listed under Section 14 of the Wildlife & Countryside Act 1981, it is an offence to introduce Japanese knotweed to the wild or to otherwise cause it to grow or spread there. It is understood that the site has now been cleared of this species following the implementation of a three year control programme.

T5 - A damp area at the top of sheet steel piling on the western side of the Steward's Brook adjacent to the Mound. Supports salt-marsh and wetland plants such as common cord-grass *Spartina anglica*, salt-marsh rush, sea arrowgrass, sea club-rush, reed canary-grass *Phalaris arundinacea* and false fox sedge *Carex otrubae*.

T6 - An area of Japanese knotweed growing along the fenceline on the site boundary was present at the time of survey in 2004 but has now been cleared (see T4).

T7 – A clump of Japanese knotweed near to the Ditton Brook bridge. Was present at the time of survey in 2004 but has now been cleared (see T4).

T8 - Further areas of Japanese knotweed on the northern boundary near the Liverpool-Warrington railway were present at the time of survey in 2004 but have now been cleared (see T4).

9.3.4 Fauna & Protected Species Assessment

The scrub, woodland and grassland areas of the site are likely to support a range of breeding birds. Areas of emergent vegetation along the edges of the watercourses plus the various buildings are other possible nesting sites. The following species were noted during the course of the habitat survey and may breed on the site: mallard *Anas platyrhynchos*, wood pigeon *Columba palumbus*, skylark *Alauda arvensis*, swallow *Hirundo rustica*, meadow pipit *Anthus pratensis*, grey wagtail *Motacilla cinerea*, blackbird *Turdus merula*, whitethroat *Sylvia communis*, chiffchaff *Phylloscopus collybita*, blue tit *Parus caeruleus*, great tit *P. major*, goldfinch *Carduelis carduelis*, magpie *Pica pica* and starling *Sturnus vulgaris*. All nesting birds are protected under Section 1 of the Wildlife & Countryside Act 1981 (as amended).

Other species noted flying over or foraging, but which are unlikely to breed, were black-headed gull *Larus ridibundus*, lesser black-backed gull *L. fuscus*, sparrowhawk *Accipiter nissus*, redshank *Tringa tetanus* and grey heron *Ardea cinerea*.

The only terrestrial mammals noted on the site were rabbit *Orytolagus cuniculus* and red fox *Vulpes vulpes*. The margins of the watercourses were searched for evidence of water voles *Arvicola terrestris*, a species given partial protection under Schedule 5 of the Wildlife & Countryside Act 1981 (as amended), however none was found. No evidence of other protected mammal species such as badger *Meles meles* and otter *Lutra lutra* was found on the site, although site security staff report having seen badgers crossing the site. It is likely that badgers visit the site occasionally for foraging purposes, from setts located somewhere off-site.

There are no freshwater wetland habitats on the site suitable for fully protected amphibians such as great crested newt *Triturus cristatus*. The only amphibian species recorded on the site was common frog *Rana temporaria*, which is protected from sale only.

The grassland areas on the site support a range of common butterflies and other invertebrates, including common blue *Polyommatus icarus*, small copper *Lycaena phlaeas*, meadow brown *Maniola jurtina*, peacock *Inachis io*, cinnabar moth *Tyria jacobaeae*, black garden ant *Lasius niger*, dark-lipped banded snail *Cepaea nemoralis* and garden snail *Helix aspersa*.

9.3.5 Bat Survey

Building Surveys

A total of 16 buildings on the site were examined for evidence of roosting bats, as shown on *Figure 9.2.1*. A description of each building is given in *Table 9.3.1* below, together with notes on details such as distance to the nearest semi-natural habitat and any disturbance factors. No evidence of use by bats was found in any of the buildings examined and no bats were recorded emerging from any buildings on the site.

Activity Surveys

Small numbers of bats were recorded on each of the three activity surveys (see *Table 9.3.2* below). Most of the bats encountered were common pipistrelle *Pipistrellus pipistrellus*. A single *Myotis* bat was recorded on the evening of the 15th September. Locations are shown on *Figure 9.2.1*. Most of the activity was concentrated along the watercourses of Ditton Brook and Steward's Brook. No feeding behaviour was observed during the three surveys.

All bat species and their roost sites are given full protection under Schedule 2 of the Conservation (Natural Habitats, & c.) Regulations 1994 (as amended) and Schedule 5 of the Wildlife & Countryside Act 1981. The Regulations and Act together make it an offence to:

- deliberately kill, injure or take (capture) bats
- deliberately disturb any species in such a way as to be likely significantly to affect:
 - (i) the ability of any significant group of animals of that species to survive, breed, or rear or nurture their young; or
 - (ii) the local distribution or abundance of that species
- intentionally or recklessly disturb bats
- damage or destroy a breeding site or resting place
- possess or transport these species or any other part of.
- obstruct access to any place of shelter, breeding or rest
- sell, barter or exchange these species, or parts of.

If a bat roost is to be affected by development activities, a licence from Natural England will need to be obtained in order to derogate from the relevant legislation and enable appropriate mitigation measures to be put in place. Such licences will only be issued for reasons of overriding public interest and where it can be demonstrated that the bats will be maintained at favourable conservation status.

The building surveys indicated that there are no active bat roosts within the Development site site. This is in agreement with an earlier survey of the site carried out for AHC Warehousing Ltd, which examined the timber yard buildings that formerly occupied the Foundry Lane Site (Irwin 2003). This found no evidence of bat roosts in the buildings, but considered that the established woodland and scrub areas, together with the new planting carried out on the Mound, could have value as foraging habitat for bats.

The activity surveys carried out as part of the current study have shown that small numbers of bats do use the site. All of the bats detected were in the vicinity of secondary woodland (along Steward's Brook), tree lines (NW corner of site) or water (Steward's Brook and Ditton Brook). In general, bats which are feeding and commuting tend to be associated with one or a combination of the following habitats:

- Water bodies;
- Individual trees or wooded areas;
- Hedgerows and other linear features such as streams; and
- Mosaics of vegetation which are rich in insect food.

These habitats, especially when found in combination, are important for bats and their conservation.

Key areas for bats at the Development site are the middle section of Ditton Brook, the northern section of Steward's Brook and the NW corner of the site. It is likely that during the summer months, bats will utilise a wider area of the site for commuting and probably also for foraging. Surveys undertaken in September will only give a partial picture of bat activity on the site and it is possible that other bat species will also use the site. Some species are difficult to detect due to their behaviour and echo-location strength.

Foraging activity was not detected, and therefore all bats were recorded as commuting (moving with unknown purpose). Male bats are known to seek females for mating during late summer and autumn, prior to hibernation, and it is likely that at least some of the activity

observed was part of this behaviour. This is particularly likely with the prolonged non-feeding activity recorded over the Steward's Brook and Ditton Brook on the 15th and 18th of September.

Two species of bat were detected during the surveys, a *Myotis* species and common pipistrelle. The latter is widespread and often abundant throughout Britain and is found everywhere from upland areas to inner cities. Within the north-west of England, the common pipistrelle is the most frequently encountered bat species. The species appears to forage within any habitats and landscapes where there is an adequate insect population. Common pipistrelle is the subject of a Species Action Plan in the UK National Biodiversity Action Plan (UK Steering Group 1995). There is also a Species Action Plan for bats in the Local Biodiversity Action Plan for Cheshire (Cheshire Region Biodiversity Partnership (Undated)).

Myotis bats are also widespread in the north-west. Species such as Daubenton's *M. daubentonii* and whiskered *M. mystacinus* are most frequently associated with water bodies. It is most likely that the *Myotis* species observed on the 15th of September was a Daubenton's bat.

Table 9.3.1 - Results of Building Inspections

Building No.	Date of survey	Type	Construction	Storeys	Distance to nearest semi-natural habitats	Disturbance factors	Evidence of use by bats
1	24/09/04	Office	Timber panel + brick	1	15m	Road noise, air pollution	None
2	16/09/04	Warehouse	Metal panel	1	20m	Floodlights, road, air pollution, forklifts	None
3	16/09/04	Disused office	Brick	1	50m	Road, air pollution, bird nests	None
4	16/09/04	Office	Brick	2	10m	Road, air pollution, bird nests	None
5	16/09/04	Warehouse	Metal panel + brick	1	10m	Road, air pollution	None
6	16/09/04	Warehouse	Brick	1	Adjacent	Floodlights, road, air pollution, bird nests, fires outside, forklifts	None
7	16/09/04	Warehouse	Metal panel	1	Adjacent	Air pollution, birds nests, Forklifts	None

Building No.	Date of survey	Type	Construction	Storeys	Distance to nearest semi-natural habitats	Disturbance factors	Evidence of use by bats
8	16/09/04	Warehouse	Metal panel + brick	1	1m	Building lights, road, Forklifts	None
9	16/09/04	Warehouse	Asbestos cladding + fibreglass sheets	1	Adjacent	Road, air pollution, Forklifts	None
10	16/09/04	Warehouse	Breeze block + metal	1	40m	Road, air pollution	None
11	16/09/04	Warehouse	Asbestos sheets	1	50m	Road, air pollution	None
12	16/09/04	Warehouse	Rubberised sheeting	1	5m	Air pollution	None
13	24/09/04	Office	Pebbledash + concrete	1	40m	Floodlighting. Road noise, air pollution	None
14	24/09/04	Portakabin	Wood frame + textured paint	1	40m	Road noise, air pollution	None
15	24/09/04	Warehouse	Metal sheet	1	45m	Floodlighting, road noise, air pollution, forklifts	None
16	24/09/04	Warehouse	Metal sheet	1	40m	Floodlighting, road noise, air pollution, forklifts	None

Table 9.3.2 - Bat Activity Survey Results

Date	Start time	End time	Temperature	Bats observed/detected
13/09/04	2005	2230	14° C	1 common pipistrelle at 2058 hrs along treeline in NW corner of site
15/09/04	2030	2230	13° C	1 <i>Myotis</i> species at 2058 over Ditton Brook 1 common pipistrelle at 2210 in NW corner of site
18/09/04	1930	2215	14° C	1 or more common pipistrelle (multiple bat passes) between 2017 and 2022 hrs over Steward's Brook 1 or more common pipistrelle (multiple bat passes) between 2108 and 2122 over Ditton Brook

9.3.6 Reptile Survey

The results of the reptile survey are detailed in *Table 9.3.3* below. A total of seven survey visits were made to the site to check refugia. No reptiles were recorded on any of these occasions.

Table 9.3.3 - Reptile Survey Results

Date	Number of reptiles observed						
	17/09/0	20/09/0	21/09/0	26/09/0	27/09/0	29/09/0	30/09/0
	4	4	4	4	4	4	4
Area 1	0	0	0	0	0	0	0
Area 2	0	0	0	0	0	0	0
Area 3	0	0	0	0	0	0	0
Area 4	0	0	0	0	0	0	0
Area 5	0	0	0	0	0	0	0
Area 6	0	0	0	0	0	0	0
Area 7	0	0	0	0	0	0	0
Weather	High cloud, Bright 20° C	Sunny spells 18° C	Sunny 21° C	Showers /Sunny spells 18° C	Cloudy/ Sunny spells 18° C	Cloudy/ Sunny spells 17° C	Sunny 19° C

All British reptiles receive protection through their inclusion on Schedule 5 of the Wildlife and Countryside Act 1981 (as amended) and, in the case of sand lizard *Lacerta agilis* and smooth snake *Coronella austriaca*, on Schedule 2 of The Conservation (Natural Habitats, & c.) Regulations 1994 (as amended). The more widespread species (slow worm *Anguis fragilis*, common lizard *Lacerta vivipara*, adder *Vipera berus* and grass snake *Natrix natrix*) receive protection against intentional killing or injury, while the two rarer species (sand lizard and smooth snake) receive full protection, which applies to both the animals themselves and the places they use for breeding, resting, shelter or protection.

The species that could conceivably occur at the Development site include slow worm, common lizard, adder and grass snake. The area is located well outside the extant range for sand lizard and smooth snake. Species Action Plans for adder and slow worm are included in the Local Biodiversity Action Plan for Cheshire (Cheshire Region Biodiversity Partnership (Undated)).

No evidence of reptiles was found on the site during the survey. If slow worm or common lizard were present on the site it is considered that they would have been detected, as these species are relatively sedentary. However, grass snake and adder, which occur at comparatively low densities, could occur in the vicinity and might not have been revealed by the survey. The watercourses in particular may prove attractive to grass snake.

9.3.7 Aquatic Invertebrate Survey

The results of the taxonomic analyses are presented in *Table 9.3.4* (full taxonomic species list) and *Table 9.3.5* (site-by-site results table including community parameters). In total, 27 taxa were identified in the 10 samples derived from the five creek sites examined. The samples revealed typical assemblages of brackish water creek invertebrates augmented by several species that were more characteristic of fresh water habitats. Examples of these included the water hog-louse, *Asellus aquaticus*, a gammarid amphipod shrimp species (most probably *Gammarus lacustris*), a caddisfly species belonging to the family Limnephilidae, the small freshwater naidid oligochaete worm species, *Stylaria lacustris* and some of the tubificid oligochaete worms belonging to the genus *Limnodrilus* (e.g. *L. cervix*, *L. claparedeanus* and *L. udekemianus*). These indicated significant and continuous freshwater inputs from the creek catchments.

Other species provided some evidence of more localised terrestrial inputs. These included the two enchytraeid oligochaete species. Members of this family are more commonly associated with moist, terrestrial habitats such as banks and marshes. Their presence at densities of up to 300 worms per square metre in the intertidal zone could reflect freshwater run-off (see below).

The trophic groups (feeding-types) were dominated by species that thrive on particulate organic materials (i.e. detritivores and deposit feeders). Again, this is typical of brackish water and estuarine communities in accreting, muddy habitats where particulate organic matter present in waters from the catchment flocculates out on contact with saline waters. Two species that did not conform to this feeding type were the extremely large, mermithid nematodes which parasitise arthropods, such as chironomid midges, and the single, unidentified gastropod mollusc (? Hydrobiidae), which most probably browses on the epigrowth that develops on the surface of hard substrata and stable muds (termed Aufwuchs). Whilst snails such as hydrobiids are typical estuarine fauna, the free-living adult stages of parasitic mermithid nematodes are rare in these habitats and are more commonly seen in freshwaters.

The ecological data, although not derived from replicated samples, do provide strong evidence indicating a high degree of environmental stress within the survey area. Reference to *Table 9.3.5* shows that single taxa (species) were recorded from samples collected in the inter-tidal zone at the lower end of Ditton Brook and in the sub-tidal sample collected from Steward’s Brook.

When compared to the middle and upper reach values for Ditton Brook (q.v.), the low species richness values, low densities, low diversity indices and elevated dominance/co-dominance values can be seen to be atypical and aberrant. We have reported similar values in surveys of shores adjacent to landfill sites where we have shown the existence of comparatively high degrees of chemical stress.

Table 9.3.4 - Full taxonomic list for the invertebrate species recorded from Ditton Brook and Steward’s Brook, Ditton, November 2004.

Kingdom Animalia
Phylum Nematoda
Class Adenophorea
Order Mermithida
Family Mermithidae
Mermithid species indet. (adult males and females)
Phylum Annelida
Class Clitellata; Subclass Oligochaeta
Order Tubificida
Family Tubificidae; Subfamily Tubificinae
<i>Heterochaetus costatus</i>
<i>Limnodrilus cervix</i>
<i>Limnodrilus claparedeanus</i>
<i>Limnodrilus hoffmeisteri</i>
<i>Limnodrilus species (spp.) immature</i>
<i>Limnodrilus udekemianus</i>
<i>Tubifex tubifex</i>
Family Naididae; Subfamily Stylariinae
<i>Stylaria lacustris</i>
Order Enchytraeida
Family Enchytraeidae
Enchytraeid species 1 (cf. <i>Lumbricillus sp.</i>)
Enchytraeid species 2
Phylum Mollusca
Class Gastropoda; Subclass Pulmonata
Order Mesogastropoda
?Family Hydrobiidae
Gastropod juvenile
Phylum Uniramia; Subphylum Hexapoda
Superclass Entognatha; Class Pterygota
Order Diptera; Suborder Nematocera; Infraorder

Kingdom Animalia
Culicimorpha
Superfamily Chironomoidea; Family Ceratopogonidae
Ceratopogonidae species larvae
Superfamily Chironomoidea; Family Chironomidae
Chironomid species larva 1
Chironomid species larva 2
Chironomid species larva 3
Chironomid species larva 4
Chironomidae species pupa
<i>Chironomus</i> species 1
<i>Chironomus</i> species 2

Phylum Uniramia; Subphylum Hexapoda (cont.)
Superclass Entognatha; Class Pterygota (cont.)
Suborder Nematocera; Infraorder Psychodomorpha
Superfamily Psychodoidea; Family Psychodidae
Psychodidae species larvae
Psychodidae species pupa
Suborder Nematocera; Infraorder Tipulomorpha
Superfamily Tipuloidea; Family Tipulidae
Tipulidae species larva
Order Trichoptera; Suborder Integrepalpia;
Infraorder Planitentoria
Superfamily Limnepiloidea; Family Limnephilidae
Limnephilid species
Phylum Biramia
Class Malacostraca
Order Isopoda; Suborder Asellota
Superfamily Aselloidea; Family Asellidae
<i>Asellus aquaticus</i>
Order Amphipoda; Suborder Gammaridea
Superfamily Gammaroidea; Family Gammaridae
<i>Gammarus</i> species (? <i>lacustris</i>)
<i>Gammarus</i> species juvenile

Table 9.3.5 - Results of the analyses of faunal samples collected from Ditton Brook and Steward’s Brook, November 2004

Taxon	DITTON BROOK						STEWARD'S BROOK		CONFLUENCE	
	Upper Reach		Middle Reach		Lower Reach		Shore	Channel	Shore	Channel
	Shore	Channel	Shore	Channel	Shore	Channel				
Mermithid species indet.		3				1				
<i>Heterochaetus costatus</i>	136		1300						100	
<i>Limnodrilus cervix</i>		88								

Taxon	DITTON BROOK						STEWARD'S BROOK		CONFLUENCE	
	Upper Reach		Middle Reach		Lower Reach		Shore	Channel	Shore	Channel
	Shore	Channel	Shore	Channel	Shore	Channel				
<i>Limnodrilus claparedeanus</i>		44		20		1				
<i>Limnodrilus hoffmeisteri</i>	340	308		59		2				
<i>Limnodrilus species immature</i>			200	59				100		8
<i>Limnodrilus udekemianus</i>				20						
<i>Tubifex tubifex</i>				98						31
<i>Stylaria lacustris</i>		132				7				189
Enchytraeid species 1	204	88	500			1				
Enchytraeid species 2							800	300		16
Gastropod juvenile		1								
Ceratopogonidae species larvae			100							
Chironomid species larva 1										2
Chironomid species larva 2		2	200					1		
Chironomid species larva 3		1		1						
Chironomid species larva 4		1								
Chironomidae species pupa		1		3		1				1
<i>Chironomus</i> species 1		9		13		8				4
<i>Chironomus</i> species 2					100					
Psychodidae species larvae										1
Psychodidae species pupa										1
Tipulidae species larva							100			
Limnephilid species		1								
<i>Asellus aquaticus</i>		2		2						
<i>Gammarus</i> species (? <i>lacustris</i>)										1
<i>Gammarus</i> species juvenile						1				
Species Richness	3	14	5	9	1	10	2	1	3	8
Total Density*	680	681	2300	275	100	24	900	1	500	252
Diversity (Simpson's Index)	2.632	3.572	2.606	4.309	1	4.645	1.246	1	2.273	1.715

Taxon	DITTON BROOK						STEWARD'S BROOK		CONFLUENCE			
	Upper Reach		Middle Reach		Lower Reach		Shore	Channel	Shore	Channel		
	Shore	Channel	Shore	Channel	Shore	Channel						
Dominance (%)	50	45.228	56.52	2	35.636	100	33.333	88.88	9	100	60	75
Co-dominance (%)	80	64.611	78.26	1	57.091	100	62.5	100	100	100	80	87.302

* Densities quoted as numbers of animals per square metre shore (core samples) and numbers of animals per standard 1-minute kick net sample (permanent sub-tidal channel)

9.3.8 Wintering Bird Survey

A summary of the wintering bird survey results is given in *Table 9.3.6* overleaf, with the full results presented in *Appendix 9.2*. A total of 12 wetland bird species were recorded within the study area during the survey. The following were recorded on the Ditton Brook as well as adjacent sections of the Mersey Estuary: teal, mallard, redshank, moorhen, black-headed gull, lesser black-backed gull and grey heron. Cormorant, curlew, herring gull and greater black-backed gull were only recorded on the Estuary, whilst wigeon were recorded only on the lower part of the Ditton Brook.

Most of the species using Ditton Brook did so only occasionally and in small numbers, but teal, redshank and mallard were regularly recorded. Teal enter the Brook in higher numbers at high tide, with a combined mean count for the Brook as a whole of 30.6 birds compared 16.2 for low tide. The maximum teal numbers were recorded on the last high tide count of the survey on 10th February 2005, when a total of 53 birds were recorded on Ditton Brook. Although teal are partially insectivorous, it may be that the higher water levels at high tide enable easier access to plant matter, on which they mainly feed. At low tide the teal either leave the Brook for the Estuary or roost *in situ*.

Mallard were generally present in low numbers on both high and low tide, but on one occasion 24 birds were noted loafing/roosting along the Brook at low tide. Redshank are attracted by the exposed mud and consequently are slightly more numerous at low tide when they traverse the Brook probing for invertebrates, although the numbers never exceeded five birds.

Teal and redshank occur in internationally important numbers on the Mersey Estuary and the birds using the Ditton Brook belong to this wider population. No other species with internationally important numbers were recorded during the survey. Of the bird species that occur on the

Mersey Estuary in nationally important numbers, the only ones recorded during the study were wigeon and curlew. Wigeon were recorded roosting on the lower (southern) section of the Ditton Brook on one occasion at high tide, whilst three curlew were noted feeding on the Estuary (Area D) during low tide on one occasion.

The birds recorded on the Mersey Estuary in areas D and E only occurred on a thin ribbon of sandbank at the most southerly point of the survey area, across a wide channel of water.

On no survey occasion were any waterbirds recorded along the Steward's Brook (areas F and G). This channel is heavily polluted and generally lacking in aquatic invertebrate and plant life on which birds would feed.

No waterbirds were recorded on the terrestrial parts of the Development site and it is therefore concluded that the development site itself is of little or no importance as a high tide roosting area for birds displaced from the Estuary.

9.4 ASSESSMENT OF IMPACTS AND MITIGATION MEASURES

9.4.1 Ecological Evaluation

The majority of the Development site is either covered by bare, un-vegetated hard standing or is used for warehousing and other industrial uses. Apart from possible use of buildings by nesting birds, these areas are of no intrinsic ecological interest. There is no evidence that any of the buildings are used by roosting bats.

The main features of ecological interest within the site are the Mound and the watercourses Steward's Brook and Ditton Brook.

The Mound, although created comparatively recently, is beginning to develop a good habitat structure and supports a range of bird species including skylark, a UK and Local Biodiversity Action Plan priority species. The meadow area has a moderately diverse flora and may be an important invertebrate habitat.

Table 9.3.6 - Wintering Bird Survey Summary Table

LOW TIDE COUNTS ¹	Teal			Mallard			Redshank					
	Min. count	Max. count	Mean Count	Min. count	Max. count	Mean Count	Min. count	Max. count	Mean Count			
A (Ditton Brook North)	2	13	5.2	0	2	0.4	0	3	1			
B (Ditton Brook Central)	2	20	8.2	0	2	0.4	0	3	1			
C (Ditton Brook South)	0	8	2.8	0	24	5.8	0	2	0.8			
D (Mersey Estuary West of Ditton Brook)	0	19	5.4	0	0	0	0	4	1.4			
E (Mersey Estuary East of Ditton Brook)	0	3	0.6	0	0	0	0	1	0.2			
F (Steward's Brook Central)	0	0	0	0	0	0	0	0	0			
G (Steward's Brook North)	0	0	0	0	0	0	0	0	0			
HIGH TIDE COUNTS ²	Teal			Mallard			Wigeon			Redshank		
Survey section	Min. count	Max. count	Mean Count	Min. count	Max. Count	Mean Count	Min. count	Max. count	Mean Count	Min. count	Max. count	Mean Count
A (Ditton Brook North)	1	12	7.4	0	2	0.4	0	0	0	0	0	0
B (Ditton Brook Central)	12	24	18	0	0	0	0	0	0	0	3	0.6
C (Ditton Brook South)	0	18	5.2	0	4	1	0	16	3.2	0	3	1
D (Mersey Estuary West of Ditton Brook)	0	0	0	0	0	0	0	0	0	0	0	0
E (Mersey Estuary East of Ditton Brook)	0	0	0	0	0	0	0	0	0	0	0	0
F (Steward's Brook Central)	0	0	0	0	0	0	0	0	0	0	0	0
G (Steward's Brook North)	0	0	0	0	0	0	0	0	0	0	0	0

¹ Low tide counts made on the following dates: 26/10/04, 24/11/04, 10/12/04, 13/01/05, 09/02/05

² High tide counts made on the following dates: 13/10/04, 28/11/04, 28/12/04, 11/01/05, 10/02/05

Steward's Brook is heavily polluted (see *Section 17*) and for that reason the ecological value of the watercourse itself is low. It has an extremely impoverished invertebrate fauna and, as a result, is of no importance to wintering birds. Nevertheless it has potential for improvement and plans are being developed to remediate the Golf Course landfill site to the north, which is thought to be the main source of the pollution problem.

The banks and slopes above Steward's Brook support a varied habitat mosaic, including a fringe of saltmarsh/emergent vegetation, areas of grassland, scrub and broadleaved woodland. Saltmarsh is a priority habitat in both the Cheshire and Halton Local Biodiversity Action Plans. The alkaline soils, probably influenced by the presence of gullies, are of particular ecological interest as they support a diverse flora that includes orchids and several calcicole species that are uncommon in the region. Lime beds, another artificial habitat that supports a similar flora, are a priority habitat in the Cheshire Biodiversity Action Plan.

Ditton Brook is a much larger watercourse and, at least in comparison to Steward's Brook, its water quality is better (although the latest Environment Agency data still classify the water quality as Grade E and Poor). A good cover of saltmarsh, reedbed, emergent, tall herb and scrub vegetation occurs along its banks. Saltmarsh and reedbed are priority habitats in the Cheshire and Halton Local Biodiversity Action Plans. Areas of inter-tidal mud are exposed along the channel bottom at low tide. Mudflats are listed as a priority habitat in the Cheshire Biodiversity Action Plan.

Ditton Brook is the largest freshwater feed into the north side of the Mersey basin and as such may be an important factor in the ecology of the Estuary. It supports a typical brackish water creek fauna and is used to a limited extent by water birds from the Mersey Estuary.

9.4.2 Impact Identification & Evaluation

Ecological impacts are divided into those predicted during the construction stage and the operational stage of the project, and are based on a consideration of the baseline studies and the available design information. Ecological receptors or resources have been identified in terms of designated sites, other valuable habitats (i.e. outside of designated areas) and individual species.

Designated Sites

Mersey Estuary SPA, Ramsar Site and SSSI

The nearest part of the development site (the southern part of Site C) is situated some 0.25 km to the north of the Mersey Estuary. The Estuary site is effectively screened from the development site by intervening land uses (Hutchinsons Hill and the Hale Road Industrial Estate). Visible or noise

disturbance effects on birds using the Estuary are therefore likely to be negligible during both the construction and operational phases.

There is some potential for indirect impacts on water quality from runoff entering the Estuary via the Ditton and Steward's Brook. Following diversion of Steward's Brook, a proportion of the surface run-off from the site will enter the Estuary via Marsh Ditch. These issues are dealt with in detail in *Section 17* and summarised below.

Ditton Brook and more particularly the Steward's Brook are already badly polluted (being classed as Grade E 'Poor' under Environment Agency's General Quality Assessment (GQA) scheme), so negative impacts on the ecology of the water courses themselves is unlikely. However, these brooks both discharge into the Estuary and this is of greater concern. The water quality of Marsh Ditch is unknown though is likely to be poor on account of its position and flow rate.

The site development proposals aim to stabilise and/or cap the contaminated land and replace the existing poor land drainage system within the site boundary and thereby remove the existing means by which rainwater can infiltrate into the site and generate contaminated groundwater outflow to the surface water system. In addition, oil interceptors and sediment traps will be placed on the drainage system to remove this source of pollution to the surface water receptors. These measures will remove significant existing pollution source risks for the Estuary and can be considered to be a significant benefit of the development.

There is a risk to the surface water system from spillages and/or sediment outflows from the site during the construction phase. This risk will be managed as part of the Environmental Management plan for the construction operations. There remains a risk that contaminants from construction of the Development site may be mobilised and find their way into the wider Estuary ecosystem via the watercourses, primarily through surface runoff. The levels of such contamination are likely to be low and they will be subject to rapid dilution once they enter the Estuary. The overall magnitude of this negative impact is therefore classed as low.

Wintering bird surveys have determined that teal and redshank utilise Ditton Brook for feeding and roosting purposes. These birds form part of a wider population that winters on the Mersey Estuary in internationally important numbers and for which the Estuary qualifies as an SPA under the EC Birds Directive. There is some potential for disturbance to these and other waterbirds using

sections of the Ditton Brook during the construction and operational phases of the development, particularly to species such as teal which are considered to be relatively sensitive to human disturbance (Sidaway 1990). Comparing the mean low tide counts for the Ditton Brook with those for the Estuary as a whole (WeBS data from winter 1998/99², the last year for which data is available) teal numbers on the Ditton Brook represent some 0.26% of the Estuary population whilst those for redshank represent 0.07%.

The level of the Ditton Brook is several metres below that of the Development site and is separated from it by steep banks covered with reed, tall ruderal and scrub vegetation. As a result the channel is relatively sheltered and it is not directly overlooked other than by the Trans-Pennine Trail footbridge at its southern end and by a bridge entering the Foundry Lane Site between section A and B in the north. Birds using the channel are evidently tolerant of existing levels of noise and visual disturbance from the industrial areas which occupy both banks.

The road bridge is proposed to be closed as part of the new development to all vehicles apart from emergency access and this should reduce disturbance levels during the operational phase of the development. The only potential for additional disturbance as a result of the Development site project will be at the north-western end of the channel (section A), where it is proposed to construct a container storage area in a part of the site that is currently unused. The Foundry Lane site is proposed for development over an eight month period to early 2006.

As teal regularly use this section for roosting and feeding, there is some scope for temporary negative impacts on a small part of an interest feature of international importance. The likely response of the birds to such disturbance will be to move to other sections of the Brook or Estuary, where they may face increased competition for food. However since the numbers of birds are relatively small (*Table 9.3.6*) and the effect temporary, the overall magnitude of the impact on the integrity of the Mersey Estuary SPA/Ramsar Site/SSSI is considered small.

Upper Mersey Estuary Local Nature Reserve and SINC

This is the section of the Estuary to the east of the Runcorn Bridge. It is situated 1.3 km upstream from the mouth of the Ditton Brook. Ecological impacts on this part of the Estuary as a result of the Development site project are therefore considered unlikely.

Pickerings Pasture LNR

The main part of Pickerings Pasture is some 0.8 km to the south-west, but a narrow tongue of land within the LNR extends north-east along the bank of the estuary to the mouth of the Ditton Brook, which is some 150 metres to the south of the Development site boundary. The habitats within Pickerings Pasture are mainly terrestrial (grassland and woodland), with some small areas of saltmarsh along the Estuary frontage. It is separated and screened from the Development site by the Hale Road Industrial Estate. No adverse ecological impacts on Pickerings Pasture are therefore predicted.

Other Habitats

Habitat Loss and Gain

The predicted habitat losses within the Development site site, based on the proposed site plan (Drawing 82 Oct. 2007), are:

- Approximately 0.6ha of semi-improved neutral grassland and birch-dominated woodland along the northern section of Steward's Brook, where development of industrial units is to take place. This development will necessitate the diversion of the northern section of Steward's Brook from its current course, eastwards across the site, eventually emptying into Marsh Brook which runs alongside Desoto Road. As a result, there will be a loss of those areas shown to support high numbers of southern marsh orchid (target note 2).
- An area of approximately 10.2 ha. of semi-improved neutral grassland and recent tree planting which currently forms the Mound. This area is to form a staff car parking area and further industrial units. This area is known to support skylark, a National and Local BAP priority species, as well as locally uncommon plant species such as grass-leaved vetchling.
- The bund along the southern boundary of the West Bank Dock Estate site, amounting to c.0.5 ha., which will be lost to car parking for nearby industrial units. This is covered by rough grassland, tall ruderal vegetation and recent tree planting.

² Mean low tide counts during the winter of 1998/99 for the Mersey Estuary as a whole were teal 6226 and redshank 3967. Corresponding figures for 1997/98 were teal 5534, redshank 4116 and, for 1996/97, teal 6094, redshank 3299. WeBS low tide count data courtesy of the British Trust for Ornithology.

- c. 1.1 ha. of rough, semi-improved neutral grassland with scattered scrub located in the north-west corner of the Foundry Lane Site, which will be lost to the proposed roundabout and associated road network providing access via the west of the site.
- Approximately 1.4 ha. of broadleaved woodland, tall ruderal vegetation, rough grassland and ephemeral/short perennial vegetation in the north-east corner of the Foundry Lane Site, which will be lost to industrial units. This area includes target notes 3 and 4.

The main habitats of ecological interest within and adjacent to the site will be retained, as follows: inter-tidal mudflats along the Ditton Brook, saltmarsh, reedbed and other riparian vegetation along the Ditton Brook and the damp area supporting saltmarsh and wetland plants along the southern reach of Steward's Brook (target note 5)..

The overall magnitude of habitat loss within the site is considered to be moderate.

Habitat Fragmentation

A large proportion of the development will take place on areas that are currently used for warehousing or open storage (i.e. areas which are un-vegetated and are therefore of negligible ecological value). In these areas there is unlikely to be any significant habitat fragmentation. The degree of linkage between those areas of ecological interest along Ditton Brook and the southern section of Steward's Brook will be reduced as a result of the loss of the Mound. This will be further exacerbated by the diversion and effective fragmentation of the northern and southern sections of Steward's Brook. Linkage between the southern section of Steward's Brook and the Hutchinson's Hill site and between Hutchinson's Hill and the Mersey Estuary will remain unchanged.

Whilst the diversion of Steward's Brook will effectively separate the southern and northern sections, thereby fragmenting the watercourse network in the western part of the site, a new connection will be formed in the east of the site as a result of the linkage between the diverted brook and Marsh Ditch along Desoto Road.

Marsh Ditch will be bridged by a road resulting in loss of approximately 0.02ha of tall ruderal and marginal habitat along the banks of the ditch and 0.03ha of the scrub and tree line currently

bounding the road. Ledges will be incorporated into the design plans to maintain connectivity along the ditch.

Species

Breeding Birds

Several bird species are likely to breed within the site and some will be displaced by the development. The main nesting areas are likely to be the denser areas of scrub/recent tree planting and the various buildings.

Skylark, which is a National and Halton BAP priority species, is likely to breed in the open grassland areas of the Mound, with a singing male bird having been noted over the area during the habitat survey. Skylarks have been recorded from 34 sites within Halton Borough (Halton Biodiversity Steering Group 2003). The overall population is not known, but most sites are likely to support only a few pairs. In this context the Development site site, which supports at least one breeding pair, is of Borough-wide importance. Approximately 4.3 ha. of grassland habitat will be lost as a result of the clearance of the Mound as part of the development.

Provided that any tree clearance works are carried out outside of the main bird breeding season (March to July) there should be no significant impact upon nesting birds themselves.

A Schedule 1 protected species, the barn owl, has been recorded in the vicinity, but there was no evidence of the species breeding on the site in 2004.

Bats

Buildings and other structures within the site which showed any potential to support roosting bats were checked for evidence of use, but there was no evidence of bats roosting or hibernating on site. There are therefore no anticipated impacts on bat roosts as a result of this project. The loss of scrub, trees and grassland within the development area as referred to above will result in a small to moderate loss of bat foraging habitat.

The rail freight park will be lit at night, as described in detail in Section 11. Lighting has the potential to disrupt insect behaviour and can act as a barrier to some bat species. Published

work in respect of the effects of lighting on bats suggests that at least some species are attracted by artificial lighting. One study (Blake *et al.* 1994) reported that roads illuminated by white streetlamps attracted three times more foraging bats (mostly pipistrelles) than did roads lit by orange street lamps or unlit roads. The main bat species recorded at the Development site site, the common pipistrelle, is considered unlikely in any case to be negatively affected by night lighting.

New purpose built white lighting will replace the existing ad-hoc lighting systems comprising various types of largely undirected white and orange road and security lights. The new system will incorporate directional control and will be positioned to minimise the impact on the main habitat corridors within the development. The overall effects on bats and other wildlife are therefore predicted to be negligible and may be positive.

Reptiles

The reptile survey produced no evidence of reptiles on the site. However there remains the possibility that species such as grass snake could occur at low densities. There will be a limited loss of potential reptile habitat, but provided that suitable working methods are employed, there should be no direct harm to the animals themselves.

Badgers

There are no badger setts within the Development site site, but it appears that badgers do visit the area for foraging purposes. The main areas that the badgers are likely to use are vegetated areas along the stream corridors and the grassland and planted woodland on the Mound, the latter of which is to be lost as a result of the development. The construction of roads and the erection of security fencing could potentially interfere with or block access routes used by badgers.

Invasive Species

Earthworks and landscaping works could result in the spread of invasive plant species such as Japanese knotweed, which was known to occur in several places on the site at the time of the 2004 surveys. Japanese knotweed is listed under Section 14 of the Wildlife & Countryside Act 1981, which makes it an offence to introduce the plant to the wild or to otherwise cause it to

grow or spread there. However, following implementation of a three year control programme, the species is believed to have now been eradicated from the site.

9.4.3 Mitigation and Compensation Measures

In developing mitigation proposals the need to preserve the integrity of the Mersey Estuary SPA, Ramsar Site and SSSI has been paramount. Consideration has also been given to targets identified in local and regional Biodiversity Action Plans and other policy documents.

The following mitigation measures are proposed:

- The drainage design (*Section 17*) has been designed to remove sediment and oil interceptor systems will be in place and managed through the site management system. These measures will assist in the protection of sensitive habitats and sites such as the Ditton Brook and Mersey Estuary.
- The incorporation of a c. 5 m wide buffer and planting of additional native shrub cover along the upper part of the bank of the Ditton Brook to further reduce the potential for disturbance to waterfowl that feed and roost along the watercourse, particularly in the north-west corner adjacent to the proposed roundabout and associated access road network.
- New planting, including riverine planting along the stretch of the diverted Steward's Brook, will also be carried out along the other boundaries and elsewhere within the site to provide additional screening and landscaping to the development. This will be secured via a Section 106 agreement. The planting will be in character with the existing ecology of the area and will comprise species that are native to and already occur within the vicinity. The site will continue to provide 20%+ tree cover on the site in accordance with the emerging UDP Policy GE26 The Mersey Forest.
- The planting, together with that proposed along the upper bank of the Ditton Brook (above), will as it matures provide additional foraging opportunities for bats and help offset the loss of foraging habitat elsewhere.

- In order to avoid potential impacts on nesting birds, relevant clearance work will be undertaken outside of the bird nesting season, which lasts from mid-March to the end of July. If any vegetation clearance or demolition works need to be carried out within the nesting season, they will be preceded by inspections made by an experienced ecologist to check for the presence of any nesting birds.
- Although the reptile survey produced no evidence of reptiles on the site, there remains the possibility that species such as grass snake could occur at low densities, especially along the stream corridors. As a precautionary measure, vegetation clearance in areas that may support reptiles will be carried out in a manner that ensures that the animals are not harmed. Reptiles will initially be encouraged to leave the affected areas by cutting the vegetation. This will be carried out in two stages, a first cut made to 20cm followed by another to 10cm. All arisings will then be collected and removed. Finally a destructive search of the area will be made under the supervision of an experienced ecologist. Such works will only be undertaken during the period March-October, when reptiles are active.
- Access routes into and around the site will be maintained so that badgers and other animals can continue to gain access to foraging areas (e.g. through the provision of gaps/badger gates in security fencing etc.).
- To eliminate the possibility for re-colonisation and spreading of Japanese knotweed during earthworks or construction, a monitoring and control programme will be put in place prior to works commencing and will remain in place throughout the duration of the works. The emphasis will be on monitoring following the recent successful eradication of the species from the site but control measures will be put in place should re-colonisation be found to occur.
- To account for the loss of approximately 10.2 ha. of open grassland and planted woodland which currently forms the Mound, it has been agreed with Halton Borough Council that financial compensation will be provided to enable off-site compensatory works to be undertaken.
- It is recommended that plans to re-create the habitats above should aim, as a minimum, to replace like for like, and should include long-term management to enhance conservation interest and encourage breeding by skylark. This will involve managing open areas as late

summer meadows, cutting them in August/September and removing the arisings. Care should be taken to ensure that there is no cutting or other form of disturbance during the skylark breeding season, which lasts from late March to the end of July. Since skylark prefer to nest in relatively short grass (<250mm), selected areas of the grassland will also be subject to a late winter cut (late February/early March) to encourage nesting. No additional tree or shrub planting will be carried out in these open areas.

- When diverting the course of Steward's Brook, the existing turf (to an approximate thickness of 20-25cm) will be carefully removed and transplanted along the banks of southern section of the new course where it extends eastwards. Topographic and edaphic features along this stretch are likely to be sufficiently similar to allow the orchid species to continue to thrive. The transplantation site should be prepared in advance of the turf removal to allow transplantation to take place as soon after cutting as possible. Cut turf should not be stacked in order to prevent damage to plants but should be transported on individual pallets to the new site. Areas to be cut should be demarcated when orchids are flowering but turf cutting should not take place until winter.

Monitoring

To ensure the success of the ecological mitigation and enhancement measures it is proposed to carry out an ecological monitoring programme. This will include:

- An ecological watching brief during the site clearance phase, to provide on the ground ecological advice and support to contractors. This will help to ensure that procedures are followed and that impacts on wildlife are minimised.
- Water quality in the Ditton Brook, Steward's Brook, Marsh Ditch, and any standing water within the site, will be monitored throughout the construction phase and into the operational phase. This may include the collection of replicated faunal samples as well as sediment and water samples.
- Winter waterbird counts during the period November-February on the Ditton Brook and adjacent sections of the Mersey Estuary will be carried out during the construction period and for three years post-construction.

9.4.4 Residual Impacts

An assessment of the residual ecological impacts associated with the proposed Development site development has been carried out, taking into account the mitigation and enhancement measures outlined above. Following mitigation, the following residual ecological impacts are predicted:

- Water quality impacts on the Ditton Brook, Steward’s Brook and Marsh Ditch and consequent effects on the Mersey Estuary. These are deemed to be positive during the operational phase; however there remains a risk of negative impact during the construction phase.
- Limited disturbance to teal utilising section A of the Ditton Brook during the construction phase, although there may be positive impacts during the operational phase as road access across Ditton Brook has been removed and screen planting of the site becomes sufficiently well established.
- Loss of c. 4.3 ha. of rough grassland and other habitat within the Development site site.

Positive ecological impacts of the project will include financial compensation to enable active conservation-orientated management of grassland areas re-created off-site to replace the Mound, and the planting of additional areas of native tree, shrub and riverine planting.

The significance of these impacts is assessed in *Table 9.4.1* below, based on the following criteria (i) the value of the ecological receptors, on a scale ranging from international to local, (ii) the magnitude of the impact and (iii) its timescale and reversibility.

Table 9.4.1 - Summary table showing significance of residual ecological impacts

Description of impact	Value of ecological receptor					Magnitude of impact	Nature	Significance
	I	N	R	D	L			
1. Reduction of water quality in Ditton Brook, Steward’s Brook, Marsh Ditch, with possible effects on the Mersey Estuary	*					Low	St, R	Minor negative in construction and positive in operation phases
2. Disturbance to teal along the upper part of Ditton Brook	*					Low	St, R	Minor negative in construction and minor

Description of impact	Value of ecological receptor					Magnitude of impact	Nature	Significance
	I	N	R	D	L			
								positive in operational phases
3. Loss of c. 4.3 ha. of rough grassland and other habitat					*	Low	Lt, Ir	Minor negative
4. Re-creation and enhancement of grassland areas through active conservation management				*		Moderate	Lt, R	Minor positive
5. Creation of additional scrub and woodland habitat through new planting					*	Low	Lt, R	Minor positive

I = International; N = National; R = Regional; D = District; L = Low. St = Short-term; Lt = Long-term. R = Reversible; Ir = Irreversible.

9.5 SUMMARY AND CONCLUSIONS

The Development site is located about 150 metres to the north of the Mersey Estuary, which is designated as a Site of Special Scientific Interest (SSSI), a Special Protection Area (SPA) and as a Wetland of International Importance under the Ramsar Convention. The Estuary comprises large areas of intertidal sand and mudflats together with areas of reclaimed marshland, saltmarsh, brackish marshes and boulder clay cliffs with freshwater seepages. It is one of the key estuaries in the UK for wintering waterfowl. It supports internationally important numbers of five regularly occurring migratory waterfowl in winter, together with other species in nationally important numbers. It is also important for some passage migrants in the spring and autumn. The proximity to the Mersey Estuary is a key issue with respect to the development.

Desk studies and baseline ecological surveys have shown that the Development site is in itself of limited ecological and nature conservation interest. Most of the site is covered by bare, un-vegetated hard standing or is used for warehousing and other industrial uses. Apart from possible use of buildings by nesting birds, these areas are of no intrinsic ecological interest. There is no evidence that any of the buildings are used by roosting bats. The key features of ecological interest within or adjacent to the site are concentrated along the watercourses, Steward’s Brook and Ditton Brook, and on the Mound, a reclamation site that was subject to landscaping in the late 1990’s.

The predicted ecological impacts associated with Development site are:

Effects on the Mersey Estuary SPA/Ramsar Site/SSSI

- A risk of negative impacts water quality impacts on the Ditton Brook, Steward's Brook and Marsh Ditch during the construction phase and minor positive impacts during the operational phase, with consequent effects on the Estuary.
- Temporary disturbance to small numbers of teal using the upper part of the Ditton Brook over the 8 month local construction period. Minor positive impacts during the operational phase. These birds are part of a wider population associated with the Mersey Estuary and one of the interest features for which it is designated as an SPA.

Effects within the Development site

- Loss of c. 4.3 ha. of rough grassland and other habitat.
- A loss of bat foraging habitat in the form of scrub and woodland edge.
- Some habitat fragmentation through diversion of Steward's Brook, but linkage creation between diverted brook and Marsh Ditch.
- Possible displacement of reptiles such as grass snake.
- Possible interference with paths/access routes used by foraging badgers.
- The re-colonisation and spread of Japanese knotweed, an invasive plant listed under Section 14 of the Wildlife & Countryside Act 1981.

Most of these impacts are capable of avoidance or effective mitigation. A range of appropriate mitigation measures are proposed, together with ecological monitoring to assess their effectiveness and provide early warning of any unforeseen impacts. The likely residual negative impacts of the development are: construction phase risks of water quality impacts on the Ditton Brook, Steward's Brook and Marsh Ditch, with consequent effects on the Mersey Estuary; temporary disturbance to teal using the upper part of the Ditton Brook; and the loss of 4.3 ha. of rough grassland and other habitat.

All of these are classed as being of minor significance. Positive ecological impacts of the project will be the enabling of improved, conservation-orientated management of re-created grassland and woodland off-site to compensate for the loss of habitat on the Mound and the creation of additional scrub and woodland habitat through new planting. There will also be longer term minor benefits to water quality and a reduction in teal disturbance levels.

9.6 REFERENCES

Bat Conservation Trust (2007) *Bat Surveys: Good Practice Guidelines*. Bat Conservation Trust, London.

Bibby, C.J., Burgess, N.D., Hill, D.A. & Mustoe, S.H. (2000) *Bird Census Techniques* (2nd ed.), Academic Press, London.

Blake, D., Hutson, A.M., Racey, R.P.A., Rydell, J., and Speakman, J.R. 1994, Use of lamplit roads by foraging bats in Southern England. *J. Zool.*, London (1994) **234**, 453-462.

Cheshire Region Biodiversity Partnership (Undated) *Countdown - the Cheshire region Biodiversity Action Plan*, <http://www.cheshire-biodiversity.org.uk>

DETR (1995) *Preparation of Environmental Statements for Planning Projects that Require Environmental Assessment: A Good Practice Guide*, HMSO, London.

English Nature (2001) Mersey Estuary European marine site - English Nature's advice given under Regulation 33(2) of the Conservation (Natural Habitats &c.) Regulations 1994, as amended. Advice Note.

Gray, R. (2004) *Ditton Site Initial Environmental Report* March 2004, Report to Drawbridge Securities Ltd.

Froglife (1999) *Advice Sheet 10: Reptile Survey. An introduction to planning, conducting and interpreting surveys for snake and lizard conservation*. Froglife, Halesworth.

Halton Biodiversity Steering Group (2003) *Halton's Biodiversity Action Plan*, Halton Borough Council, Runcorn

Halton Borough Council (2001) *Halton Unitary Development Plan* (Revised 2nd Deposit Version), Halton Borough Council, Runcorn

Halton Borough Council (2000) *Halton's Natural Assets Strategy*, Halton Borough Council, Runcorn

HM Government (1994) *Biodiversity – the UK Action Plan* (Cm 2428) HMSO, London.

IEEM (2002) *Guidelines for Ecological Impact Assessment: Amended Pilot* November, 2002, IEEM, Winchester.

Irwin, S. (1993) *AHC Warehousing Ltd., West Bank Dock Estate, Widnes: Inspection and Assessment in Relation to Bats*, Report to AHC Warehousing Ltd.

Joint Nature Conservancy Committee (1993) *Handbook for Phase 1 Habitat Survey – A Technique for Environmental Audit*. Joint Nature Conservation Committee, Peterborough.

Sidaway, R. 1990. *Birds and walkers - A review of existing research on access to the countryside and disturbance to birds*. Ramblers Association, London.

Stace, C. (1997) *New Flora of the British Isles* (2nd ed.). Cambridge University Press, Cambridge.

Treweek, J. (1999) *Ecological Impact Assessment*, Blackwell Science, Oxford.

UK Steering Group (1995) *Biodiversity: The UK Steering Group Report Volume 2: Action Plans*, HMSO, London.