

## 9. Ecology and Nature Conservation

### 9.1. Introduction

This chapter considers the likely environmental impacts of the proposed scheme on habitats and their associated flora and fauna. It identifies and assesses potential construction and operational impacts and formulates an appropriate mitigation strategy.

In summary, the scope of the ecological assessment is to:

- Provide baseline data on the proposed route and adjacent areas;
- Examine and analyse the baseline ecological data with regard to the proposed route;
- Identify the extent, magnitude and significance of any potential direct/indirect impact on the ecology of the proposed route and its immediate environs; and
- Identify appropriate and effective means of mitigating the potential negative impacts arising from the construction and operation of the proposed Glasgow Airport Rail Link development.

The information in this Chapter informs and draws upon information provided in other Chapters, in particular Chapter 7 with respect to landscape mitigation. This Chapter should be read in conjunction with Figure 9.1, Habitat Mapping.

### 9.2. Methods

The assessment methodology follows that contained within the *Guidelines for Ecological Impact Assessment: Amended Pilot, November 2002* published by the Institute of Ecology and Environmental Management (EIEEM). However, reference has also been made to the Design Manual for Roads and Bridges (DMRB) Volume 11 Environmental Assessment – Section 3, Part 4 Ecology and Nature Conservation, June 1993 and Guidance on the Methodology for Multi-Modal Studies, May 2000, (GOMMS) specifically Section 4.10 'The Biodiversity Sub-Objective'.

Survey methodology complies with that published in the *Guidelines for Baseline Ecological Assessment, (1995)* published by the Institute of Environmental Assessment, now the Institute of Environmental Management and Assessment (IEMA). In the first instance, a desk study and an extended Phase 1 survey, based on the methodology outlined by the Nature Conservancy Council in *A Handbook for Phase 1 Habitat Survey, (1990)*, was carried out. Further species-specific survey work was subsequently carried out (see Section 9.2.2).

With regard to habitat, two forms of survey were undertaken, these being a Phase 1 Habitat Survey and protected species survey. The methods used in these surveys are detailed below.

#### 9.2.1. Phase 1 Habitat Survey

A phase 1 habitat survey of the site (see Figure 9.1) was carried out during August 2004 following the criteria set out in the Handbook for Phase 1 Habitat Survey by the Joint Nature Conservation Committee (JNCC 1993).

The site, and where practicable the immediate environs were traversed on foot. Descriptions of the habitats and dominant plant species were made using the above methodology. It should be noted however that some spring and early summer flowering species might not have been identified during this period. Phase 1 mapping on OS based plans was subsequently produced for the site. The results of the habitat survey are summarised in Figure 9.1 and in the following sections.

The habitat categories used in this survey method are based on dominant vegetation, augmented with information on topographic and substrate features. This method results in a representative, but not exhaustive, list of species present on the site to be gathered, allowing the character of the site to be established and to allow the evaluation of the significance of any impact on the ecology from the proposed works. The aim of this survey was to produce current baseline information of the route and to identify all sites and areas of potential wildlife value and to identify those areas where specialist surveys would be required.

Additionally, a site walkover was conducted of areas immediately adjacent to the existing railway line including Hillington, Penilee, and Arkleston to Gilmour Street. This survey was carried out during March 2005 and noted areas of wildlife interest as well as general habitat types that were present. It should be noted that direct access to the rail corridor could not be gained and as a result the rail corridor was viewed from adjacent areas only.

## 9.2.2. Protected Species Surveys

Much of the proposed route is within the existing rail corridor with bridges already in place where the route crosses a watercourse. The only significant watercourse that is crossed is the White Cart, on which it is highly likely that otters and possibly water voles are present. However, there would be no works in or on the river as a major bridge structure is already in place. Consequently no otter or water vole survey was carried out. However it should be noted that mitigation measures would be proposed for the works in this area to prevent impacts on these protected species.

Where new track is proposed on the St James' Park link, there will be no works operation undertaken on, in or near any water body. Consequently no otter or water vole survey has been carried out on this area.

### 9.2.2.1 Badgers

The most effective time of year to carry out a survey for the presence of setts is during the winter when vegetation is less dense. However, surveys of feeding areas and habitual runs are best carried out in the spring, summer and autumn, as the animals are more active.

The survey methodology included searching for setts, dung pits, latrines (groups of dung pits), foraging holes and paths/trails. Survey work was confined to daylight hours. The St James area and the areas immediately adjacent to embankments between Penilee and Arkleston were searched for sign of badger. It should be noted access was not gained to the railway embankments and these were viewed from adjacent areas.

### 9.2.2.2 Bats

Four key areas have been identified where a bat presence survey should be carried out. These being:

- St Andrew's Crescent/Glasgow Airport and Paisley Moss LNR.
- St James' Park/M8 embankment .
- St James Avenue/McFarlane Street/St James' Park.
- Muirdykes Road/Stirrat Street

Each key area was visited by two people arriving at each site no less than 20 minutes prior to sunset. At this time, temperature and humidity were recorded. The bat survey was carried out using a dual functioning heterodyne and frequency division bat detector connected to a recording device, whereby a recording was made and the recording analysed further using Batscan computer software to identify species encountered during the site survey. As various species of bats emerge at differing times after sunset, the probability of a roost being present in the vicinity can be assessed. As a consequence the surveyor remained at each location for approximately 2.5 hours after sunset. The time when bats were encountered was recorded as was the direction from which they emerged, whether they were foraging (as noted by feeding buzzes) or whether they were navigating to other foraging ground.

### 9.2.2.3 Amphibians

An amphibian survey was carried out at the site of the new fuel farm. The site was visited on 20 May 05. This is the best time of year to search for amphibians. Adults and juveniles including great crested newts can be searched for in ponds or in terrestrial locations, larvae from the previous year can be netted for but the most effective way of locating the presence of newts at this time of year, during the day, is by searching for eggs. Newts lay their eggs individually on submerged or floating water plants. The female carefully wraps each egg in the leaf of a water plants and these can be very easy to locate. However, not all plants are suitable. This is regarded as the most efficient (cost effective) method for identifying the presence of great crested newts in a pond.

Great crested newt eggs can be distinguished from other newt eggs, as they are larger, the egg being 2mm in diameter and of clear oval jelly with a 4.5mm lemon-yellow capsule. Smooth and palmate eggs are 1.5mm in diameter, with a capsule 3mm long and dirty yellow or cream in colour.

Two surveyors searched the area of the proposed development for habitat suitable for amphibians. A terrestrial search was made for juvenile and adult amphibians, debris or stones were lifted and the ground below examined. The small areas of open water were examined for larval/tadpole activity. Vegetation in and around these areas was examined for the presence of eggs. Some netting of the areas most likely to hold newts or tadpoles/larvae was also done.

## 9.2.3. Impact Assessment Methods

The stages in the impact assessment are outlined below, of which the four key stages are:

- Evaluating ecological receptors;

- Identifying the types of impacts on these receptors that would occur;
- Describing the changes that these activities would have on receptors and the magnitude of this change; and
- Identifying the significance of the impact taking into account the effectiveness of mitigation measures.

#### 9.2.3.1 Evaluation of Ecological Receptors

For a full assessment it is necessary to have some concept of the value of the site as a whole and the ecological receptors that it comprises. The value of the site can be identified using recognised criteria. In determining the value of ecological receptors, note has been made of the conservation of genetic diversity and people's enjoyment/understanding or health benefits from biodiversity, among others.

The levels of value are shown below in Table 9.1 and are taken from the Draft Guidelines on Ecological Impact Assessment.

**Table 9.1 Ecological Resource Value**

Value of Resource	Selection Criteria
<b>Very High (International)</b>	<ul style="list-style-type: none"> <li>• An internationally designated site or candidate site (SPA, pSPA, SAC, cSAC, and/ or Ramsar site) or an area that Scottish Natural Heritage (SNH) has determined meets the published criteria for such designations, irrespective of whether or not it has yet been notified.</li> <li>• A viable area of a habitat listed in Annex I of the Habitats Directive or smaller areas of such habitat that are essential to maintain the viability of a larger whole.</li> <li>• UK Red data book species or listed as occurring in 15 or fewer 10 km squares in the UK (categories 1 and 2 in the UK BAP), or of uncertain conservation status or global conservation concern in the UK Biodiversity Action Plan (BAP).</li> <li>• A regularly occurring, nationally significant population/number of any internationally important species.</li> </ul>
<b>High (National)</b>	<ul style="list-style-type: none"> <li>• A nationally designated site (e.g. SSSI, NNR, Marine Nature Reserve) or a discrete area that meets the selection criteria for national designation (e.g. SSSI selection criteria) irrespective of whether or not it has yet been notified.</li> <li>• A viable area of a priority habitat identified in the UK BAP or of smaller areas of such habitat, which are essential to maintain the viability of the whole.</li> <li>• Any regularly occurring population of a nationally important species that is threatened or rare in the regional or Council area. A regularly occurring, regionally or Council area significant population/number of any nationally important species.</li> <li>• A feature identified as of critical importance in the UK BAP.</li> </ul>
<b>Medium – High (Regional)</b>	<ul style="list-style-type: none"> <li>• Sites that exceed the Council area level designations but fall short of SSSI selection guidelines, where these occur.</li> <li>• Viable areas of key habitat identified in the Regional BAP or smaller areas of such habitat, which are essential to maintain the viability of the whole.</li> <li>• Viable areas of key habitat identified as being of Regional Value in the appropriate Natural Area profile.</li> <li>• Any regularly occurring, locally significant population of a species listed as being nationally scarce which occurs in 16-100 10km squares in the UK or in a Regional BAP or relevant Natural Area on account of its regional rarity or localisation.</li> <li>• A regularly occurring, locally significant number of a regionally important species.</li> </ul>
<b>Medium (Renfrewshire &amp; Glasgow)</b>	<ul style="list-style-type: none"> <li>• Council area sites and other sites that the designating authority has determined meet the published ecological selection criteria for designation, including Local Nature Reserves selected on Council ecological criteria.</li> <li>• Semi-natural ancient woodland greater than 0.25ha.</li> <li>• A viable area of habitat identified in the Council area BAP.</li> <li>• A regularly occurring, locally significant number of a Council area important species.</li> <li>• Any regularly occurring, locally significant population of a species that is listed in a Council 'red data book' or BAP on account of its regional rarity or localisation.</li> </ul>
<b>Low – Medium (Neighbourhood)</b>	<ul style="list-style-type: none"> <li>• Areas of habitat identified in a Council BAP or in the relevant Natural Area Profile.</li> <li>• Sites/ features which are scarce within the Council or which appreciably</li> </ul>

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Value of Resource	Selection Criteria
	<p>enrich the Council habitat resource.</p> <ul style="list-style-type: none"> <li>• A population of a species listed in a Council BAP on account of its rarity in the locality or in the locality or in the relevant Natural Area profile because of its regional rarity or localisation.</li> <li>• Semi-natural ancient woodland smaller than 0.25ha.</li> <li>• A diverse and/or ecologically valuable hedgerow network.</li> </ul>
<b>Low (Neighbourhood)</b>	<ul style="list-style-type: none"> <li>• Areas of habitat considered to appreciably enrich the habitat resource within the context of the neighbourhood, e.g. species-rich hedgerow.</li> </ul>
<b>Negligible</b>	<ul style="list-style-type: none"> <li>• No significant ecological value</li> </ul>

### 9.2.3.2 Identification of Proposed Activities

The proposed works include the construction of a new length of rail track from Paisley St James station to Glasgow Airport along with some realignment and construction of track in the existing rail corridor from Glasgow Central Station. Where it is required, slewing of track will be carried out by specialist equipment, with no need to encroach beyond the railway corridor. Table 9.2 below summarises the proposed works.

**Table 9.2 Summary of Works**

Route Section	Summary of Works
Glasgow Airport to Paisley St James	New track through Murray Street industrial estate through St James' Park to Glasgow Airport, relocation of existing fuel farm adjacent to Paisley Moss, demolition of buildings adjacent to St Andrews Crescent, temporary construction compound at car park immediately to the east of MSCP No. 2. Temporary construction compound at St James' Park and playing fields adjacent to St Andrews Crescent around area of fuel farm, temporary construction compound at area of land immediately to the south of the Paisley viaduct between Renfrew Road and East Buchanan Street. Signalling relay room (REB) positioned on existing land at Paisley St James Station.
Paisley St James to Wallneuk Junction	No changes to track or adjacent areas. Temporary contractor's compound in area at the junction of the dismantled Arkleston Branch to the north of the main line but within the NR boundary (adjacent to Greenlaw Industrial Estate).
Wallneuk Junction to Gallowhill Road	Changes to existing junction. No works on adjacent land. REB adjacent to Wallneuk Road
Arkleston Junction to South Arkleston Farm	2 tracks changing to 3 tracks - New track between existing tracks. Outside track slewed by means of on track machinery – No track works from adjacent ground. REB adjacent to Arkleston bridge, potential site for contractor's compound on area of land to the south of Arkleston Road bridge next to Barshaw Golf Course.
South Arkleston Farm to Shields Junction	2 tracks changing to 3 tracks - New track in centre of existing tracks. No works on embankments. Potential area for contractor's compound at area to the south of Fifty Pitches Road immediately to the north of Cardonald Junction (with temporary access from Five Pitches Road).
Shields Junction to Glasgow Central Station	No Track Works. Potential contractor's compound on area of land owned by SPT on the same site of a Transco Gas Holder north of the railway (with access from Broomloan Road near the junction with Paisley Road West). A further contractor's compound may be sighted at area of land on the site of an abandoned works adjacent to the railway at Shields Junction (with access from Cornwall Street South)
Central Station	Creation of new platform and temporary contractor's area of Central Station undercroft to the south of Midland Street (using an existing access from this street).

### 9.2.3.3 Effects of Proposed Activities on Ecological Resources

In order to determine the impacts of the scheme on ecological resources, the changes on the site and in the surrounding area have been determined for both the construction and operational phase.

In general terms, negative effects are defined as those considered detrimental to the conservation value and/or health/survival chances of particular components of the ecosystem. Positive effects are beneficial to those qualities of each component.

Direct effects are those that can be linked to some features of the development without the intermediary of a more immediate effect. An example would be the loss of a wooded area under new infrastructure. Where a feature of the development causes an effect that then causes a further effect, the further effect is termed indirect.

The magnitude of the impact on an ecological receptor is described in Table 9.3 below and is taken from the Draft Guidelines on Ecological Impact Assessment.

**Table 9.3 Summary Table of Magnitude of Impact**

Magnitude of Impact	Description
<b>Severe Negative</b>	Landtake of a habitat or feature, if it occurs, may be greater than 20%. Where impacts are indirect, disruption of ecosystem functioning occurs, with loss of species and loss of diversity. Changes may be long lasting or permanent, particularly if loss or major alteration of wildlife habitat occurs. Recovery, if possible, is likely to take more than three years.
<b>Moderate Negative</b>	Landtake of a habitat or feature, if it occurs is 5-20% of the area. Where impacts are indirect, qualitative change occurs. The abundance of some of the more sensitive species may be reduced. Changes in habitat may be longer lasting. Impact is reversible, or nearly so, although recovery of impacts other than landtake may take up to three years following cessation of impact
<b>Minor Negative</b>	Landtake of a habitat or feature, if it occurs, affects less than 5% of the area. Where indirect impacts occur, some changes in species abundance may occur, but the impact is reversible. Full recovery is likely in the short term, probably within a year, following the cessation of impact.
<b>Negligible/</b>	With ecological receptors it is often not possible to state categorically that there would be no impact, but this category is used when the chance of any impact is very low and if it occurs it is well below the level of detection.
<b>Neutral</b>	Where the impact is neither negative nor positive
<b>Positive</b>	The change is likely to benefit the receptor in terms of its conservation status, but not so far as to achieve favourable conservation status.
<b>Major Positive</b>	The change is likely to restore an ecological receptor to favourable conservation status, or to create a feature of recognisable value.

#### 9.2.3.4 Impact Significance

The impacts of this scheme have been determined by considering the value of the resource affected and the magnitude or nature of the impact. To measure magnitude, a quantifiable physical measurement should normally be used. Where possible this would be applied, such as the area or percentage of a habitat affected. However, for both positive and negative effects, the significance would also depend on the duration of the effect. For example, impacts over one and two breeding/growing seasons would have different ecological effects. Mitigation and enhancement measures may be applied to instigate or accelerate changes in scale of effect or site/component value and provide an indication of the residual impact.

The criteria used to define significance of impacts in this section are taken from the Draft Guidelines on Ecological Impact Assessment and are shown in Table 9.4 below. The table provides a range of possible impacts allowing the assessor to make judgements on a case-by-case basis.

The significance criteria are related to levels of importance, which are International, National, Regional, District and Neighbourhood level. These levels of importance apply to both sites and species.

**Table 9.4 Impact Significance Definitions**

Resource Value	International (European Very High)	National (Scotland/ UK - High)	Regional (Glasgow & Inverclyde - Medium)	District (Paisley/ Glasgow - Medium)	Neighbour hood (Low)
Impact Magnitude					
Major Negative	Major	Major	Moderate	Moderate	Minor
Moderate Negative	Moderate	Moderate	Moderate	Minor	Negligible
Minor Negative	Minor	Minor	Minor	Minor	Negligible
Negligible	Minor	Negligible	Negligible	Negligible	Negligible
Neutral					
Positive	Major	Major	Moderate	Minor	Negligible

#### 9.2.3.5 Assumptions and Limitations

The ecological assessment has been based on the following limitations and assumptions:

- For the purposes of the assessment, ecological conditions during construction are assumed to be similar to those when survey works were undertaken (in 2004). However, it may be necessary for

further ecological survey work to be undertaken prior to construction to confirm the ecological status of the area e.g. with respect to bats and otters;

- Access to the rail corridor was not achieved. All land within this corridor was viewed from adjacent areas;
- The assessment is based on preliminary conceptual designs; and
- Contractors that work on the proposed development will adhere to the mitigation measures and best practice outlined in the ES along with the Code of Construction Practice and any other supporting information

### 9.3. Baseline Situation

#### 9.3.1. Site Context

The mainline section of the route travels mainly along an existing rail corridor from the heart of the city outwards towards the airport. The majority of the route passes through highly urbanised areas with residential and industrial premises as well as through a small area of agricultural land and a recreational park.

A new branch line will be constructed across industrial areas, amenity grassland and transport infrastructure to the airport. In addition the scheme involves the relocation of an aviation fuel farm to a site close to Paisley Moss Local Nature Reserve (LNR).

#### 9.3.2. Legal Context

##### 9.3.2.1 Habitats

A variety of sites are designated in the UK under various Conventions, Directives and Regulations for their nature conservation importance and interest. The general aim of these designations is to conserve and protect ecological resources in addition to raising awareness and understanding. Other non-statutory sites are afforded some protection through local plans. Table 9.5 outlines the most common statutory and non-statutory designations.

**Table 9.5 Statutory and Non-Statutory Designations**

Designation	Description
Ramsar Sites	Wetlands of international importance. Ramsar Sites are effectively protected, through the planning system, under the Wildlife and Countryside Act 1981, as amended, and the Countryside and Rights of Way Act 2000, through their notification as Sites of Special Scientific Interest (SSSI) and through other regulatory systems addressing water, soil and air quality.
Special Protection Areas	SPAs are the most important habitats for rare and migratory birds within the European Union. The Birds Directive, adopted by the UK in 1979, provides for the protection, management and control of all species of naturally occurring wild birds in the European territory of Member States, including the UK. The provisions of the Birds Directive are transposed into Scottish law by the Conservation (Natural Habitats &c) Regulations 1994
Special Areas of Conservation	SACs are sites that are chosen to conserve the natural habitat types and species of wild flora and fauna listed in Annex I and II of the Habitats Directive. They are the best areas to represent the range and variety of habitats and species within the European Union. The provisions of the Habitats Directive were transposed into Scottish law by the Conservation (Natural Habitats &c) Regulations 1994.
Sites of Special Scientific Interest	SSSIs are the best sites for wildlife, geological and geomorphological features in the UK. They are designated under the National Parks and Access to the Countryside Act 1949 and protected under the Wildlife and Countryside Act 1981, as amended and the Conservation (Natural Habitats &c) Regulations 1994.
National Nature Reserves	National Nature Reserves or NNRs are nationally important areas of wildlife habitat and geological formations in Britain. NNRs are designated under the National Parks and Access to the Countryside Act 1949 and protected under the Wildlife and Countryside Act 1981, as amended.
Local Nature Reserves	Local Nature Reserves are similar to NNRs but they apply to the local context. They are sites of value to nature conservation and are designated under the National Parks and Access to the Countryside Act 1949.
Ancient Woodland	In Scotland Ancient woodlands are woodlands that have been established since or before 1750AD. They are non-statutory sites and are not legally protected but they are afforded some protection in, for example, structure and local plans.

Designation	Description
Local Sites	These non-statutory sites are sites designated by a local authority as being of local nature conservation value but are not notified as SSSIs. They have a variety of titles dependent upon the designating authority and include: Sites of Importance for Nature Conservation and Urban Wildlife Site.

### 9.3.2.2 Protected Species

In addition to sites, a number of species have now become so rare that they are also afforded protection through international/European and national law. Other species are considered to contribute to our 'quality of life'. Although these species do not benefit from legal protection, they can be key considerations in the planning process. Table 9.6 outlines the key forms of protection afforded to species.

**Table 6.6 Key Protection Afforded to Species**

Form of Protection	Description
The Habitats Directive	Annex II of the Directive lists the European protected species that are afforded special protection under this Directive. The provisions of the Habitats Directive were transposed into Scottish law by the Conservation (Natural Habitats &c) Regulations 1994. Schedule 2 of the Regulations lists the European protected species of animals whilst Schedule 4 lists the European protected species of plants.
The Birds Directive	Bird species listed in Annex I of the Directive regularly occur in Britain but are protected under EEC law. Member countries are required to classify as SPAs the most suitable sites for these species and also for all regularly occurring migratory species.
Wildlife and Countryside Act, 1981, as amended	Bird species listed in Schedule 1, animal species listed in Schedule 5 and plant species listed in Schedule 8 of the WCA 1981, as amended, are protected.
Protection of Badgers Act 1992	The legislation concerning badgers has largely arisen to protect this species against the practice of badger digging. The badger is too common to be included in Schedule 5 of the WCA, 1981, as amended.

The Wildlife and Countryside Act (WCA), 1981, as amended, The Protection of Badgers Act 1992 and the Conservation Regulations are the main legislative frameworks for protection of wild animals in the UK. Schedule 1 of the WCA covers birds, Schedule 5 covers other animals and Schedule 8 covers plants.

Bats, Otters and Great Crested Newts are fully protected under Schedule 5 of the WCA and are also protected in Schedule 2 of the Conservation Regulations. Badgers are protected under their own Act: The Protection of Badgers Act 1992. Development activities affecting protected species must usually be conducted under licence obtained from the appropriate body, which for badgers in Scotland is SNH while European protected species licences are obtained from the Wildlife and Habitats Division of the Scottish Executive.

Proposed development must be able to show that all reasonable measures have been taken to ensure that protected species are not subject to disturbance. The habitats of all Schedule 2 species in the Conservation Regulations, WCA Schedule 1 and some WCA Schedule 5 species are also protected from disturbance and destruction. Again, all reasonable precautions should be taken to ensure that this does not happen.

Additionally, the Conservation (Scotland) Act 2004 places a duty on public bodies and office holders to further the conservation of biodiversity when carrying out their functions. This act also enhances the protection for SSSIs and also makes changes to the protection of individual species.

As noted above, Great crested newts are protected under the Wildlife and Countryside Act 1981 and the Conservation (Natural Habitats &c.) Regulations 1994. Under this legislation it is an offence to intentionally take, possess, disturb, injure, kill or trade in the species. It is also an offence to damage or destroy places of shelter or protection – e.g. breeding sites or resting places. The legislation recognises that it is sometimes necessary to carry out work, which will affect great crested newt populations and their habitats and therefore contains 2 concessions:

- Provided every reasonable step has been taken to protect the newts, then necessary, lawful work which will affect them may go ahead
- Permits licenses to be issued to survey for great crested newts and also to carry out work to protect them.

### 9.3.3. Planning Policy

A summary of planning policy is provided in Chapter 4 of this ES. This includes national, regional and local policy objectives. With respect to wildlife, it is the intention of certain planning policies that sites and species of nature conservation concern are to be protected from development. Where development is allowed that would harm such sites or species, then enhancement and benefit for wildlife should be included.

#### 9.3.3.1 Scottish Planning Policy Guidance

The Scottish Executive has produced National Planning Policy Guidance 14: Natural Heritage (NPPG 14). NPPG 14 stipulates the Government's policy approach for the conservation and enhancement of Scotland's natural heritage. NPPG14 is to be reflected in development plans. The policy provides guidance on the approach to be taken for statutorily designated sites of national and international importance, local and non-statutory designations as well as specifying the "importance of safeguarding and enhancing natural heritage beyond the confines of designated areas". It should be noted that NPPG 14 has implications for both rural and urban environments.

In addition, NPPG 14 is supported by guidance contained in the Scottish Executive's Planning Advice Note 60: Planning for Natural Heritage (PAN 60).

#### 9.3.3.2 Renfrewshire Council and Glasgow City Council Policy

Below is a summary of local planning policy with regard to ecology and nature conservation:

- RDCPL Policy E14 - There will be a presumption against development having an adverse effect upon Designated Local Nature Reserves and other non-statutory sites of local importance for landscape or nature conservation.
- RLP Policy ENV2 - The nature conservation value of Sites of Special Scientific Interest (SSSI) is safeguarded. Development proposals that affect these sites will be determined in accordance with national planning guidance given in NPPG 14, Natural Heritage.
- RLP Policy ENV2 - Sites of Importance for Nature Conservation (SINCs) are protected as wildlife corridors. However some coincide with sites that are regarded as being suitable for development through Local Plan policies. Development proposals for these sites will be assessed against criteria set under this policy.
- RLP Policy ENV4 - Local Nature Reserves (LNRs) identified on the Proposals Map will be protected to ensure "that their nature conservation interest is maintained and that they continue to provide a unique educational and recreational resource."
- RLP Policy ENV7 -Hedgerows, street trees and any other trees considered to contribute to the amenity of the area will be protected.
- GCCCP Policy ENV7 - "There will be a presumption against any development likely to have an adverse effect on the integrity or character of a Corridor of Wildlife and/or Landscape Importance." However proposals will be considered favourably if certain criteria, as set under this policy, are met. For example, "applications for development must be shown in the context of the Corridor of Wildlife and/or landscape character and visual amenity."
- GCCCP Policy ENV13 - Where there are significant trees on the site a detailed tree survey will be required. Protection and management of trees during construction will also be required. These will be done in accordance with the criteria set under this policy.

### 9.3.4. Biodiversity Action Plans

#### 9.3.4.1 The UK BAP

The UK Biodiversity Action Plan (BAP), published in 1994, sets out the UK's response to Article 6 of the Convention on Biological Diversity. There are currently 391 Species Action Plans (SAP) and 45 Habitat Action Plans (HAP) that extends across the UK (The UK Biodiversity Action Plan: Review of the 2002 reporting round, JNCC, May 2003). The production of separate Action Plans for priority species and habitats setting out clear, measurable targets was considered to be fundamental to the process.

Within the UK BAP, habitat loss and degradation (61%) emerged as the issue that affects most UK BAP priority species and habitats with pollution a distant second (18%). Looking in more detail at the underlying causes of habitat loss and degradation it is clear that agriculture is most important, followed by changing management practice and infrastructure developments. Land and freshwater pollution factors, particularly nutrient enrichment from agriculture and agro-chemical usage, contribute 11% of the total and were ranked higher than atmospheric pollution (5%) which includes impacts associated with global warming.

#### 9.3.4.2 Glasgow Biodiversity Action Plan

The Glasgow Local Biodiversity Plan (LBAP) has identified 3 broad habitat types due to their "scarcity and/or importance in the context of the city". These are grassland, wetlands and woodlands with 12

individual habitat action plans having been derived from these 3 broad categories. A further action plan has been produced for Gardens and Built up Areas. Table 9.7 below summarises habitats in the Glasgow City LBAP that have action plans.

**Table 9.7 Glasgow City LBAP Habitat Action Plans**

Wetlands	Grasslands	Woodlands
Marsh	Neutral Grassland	Broadleaved and Mixed Woodland
Reedbeds	Dwarf Shrub Heath	Wet Woodland
Fens	Acid Grasslands	
Swamp	Raised Bogs	
Standing Open Water		
Rivers and Streams		

National Priority species (species which are either globally threatened or rapidly declining in the UK) known to maintain populations in the Glasgow area include, among others:

Pipistrelle bat	Skylark
Nightjar	Great crested newt
Woodlark	Linnet
Bullfinch	Tree sparrow
Reed bunting	Song Thrush
Tree sparrow	

### 9.3.5. Planning Policy Summary

The impact assessment method used in this ES (as detailed in Section 9.2.1) takes into consideration the planning policies and local biodiversity action plans summarised above. This allows an accurate value to be placed on the ecological resources of the area. This then allows the above policies and plans to be considered when an impact on any of the ecological resources is being assessed. Consequently these planning policies and local biodiversity action plans are at the core of the assessment process.

The following sections outline those sites and species that could be potentially affected by the proposed development.

#### 9.3.5.1 Inverclyde, Renfrewshire and East Renfrewshire Biodiversity Plan

The Inverclyde, Renfrewshire and East Renfrewshire Biodiversity Plan was launched on 1 April 2004 and is intended to establish a framework whereby the 3 Local Authorities can address biodiversity. The LBAP provides action plans for 7 habitats and a further 11 action plans for 11 priority species. The habitat and species plans cover the species detailed in Table 9.8:

**Table 9.8 Inverclyde, Renfrewshire and East Renfrewshire LBAP Habitat and Species Action Plans**

Habitat Action Plans	Species Action Plans
Dwarf Shrub Heath	Butterfly Orchids
Mires	Common Juniper
Unimproved Grassland	Spigal
Rivers and Streams	Atlantic Salmon
Standing Open Water	Waxcaps
Broadleaved & Mixed Woodland	Black Grouse
Urban	Hen Harrier
	Brown Hare
	Lesser Whitethroat
	Otter
	Pipistrelle Bat

### 9.3.6. Designated Sites

#### International/National and Regional Sites

There is 1 SPA (The Black Cart Water) within 2km of the proposed route of the Glasgow Airport Rail Link. This area is also an SSSI. No other SSSI or European designated sites are present within 2km of the proposed route. There are 2 Local Nature Reserves (LNR) within 2 km of the proposed route, these being Jennys Well and Paisley Moss. Paisley Moss is within 500m of the proposed route and will be approximately 15m from the boundary of the new aviation fuel farm. Refer to Figure 4.1.

Where proposed works impact on a European designated site, such as a SPA, an Appropriate Assessment would be required. However, on this occasion discussions with SNH indicated that unless

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additional noise or pollution impacted on the Black Cart SPA no Appropriate Assessment would be required. Refer to Appendix to Chapter 3, Consultation Responses for correspondence with SNH on this matter.

The location of the SPA in relation to the proposed works indicates that pollution arising from the proposed works would not reach the SPA. Additional noise will be created in the area of the fuel farm and along the proposed route of the rail line during construction and operation. However the noise will be intermittent in nature and will be of similar to those background ambient levels arising from the adjacent airport and busy M8 road infrastructure. It is unlikely that such noise would result in an impact on the SPA and as such it is considered that an Appropriate Assessment is not required.

### Scottish Wildlife Trust Wildlife Sites / Urban Wildlife Sites/SINCs

There are a number of locally designated sites within 2km of the existing railway corridor as well as the proposed new section of track. These are indicated on Figures 4.1 – 4.5 and listed below:

- Necropolis
- Crookston Plantation
- Disused Railway (King George V Dock)
- Cardonald Place Farm
- The Cunyon
- Pollok Country Park and Pollok Estate
- Black Cart Water
- Inchinnan Road / Porterfield Road Tow
- Walkinshaw Brickworks
- Jetty Area
- Paisley Sewerage Works Grassland
- Boghead Pool
- M8 (St James Interchange) Marsh
- Candren Pool
- Crookston Wood / Cardonald Place Farm
- Jenny's Well - Laundry Site
- Lavern / White Cart Confluence

#### 9.3.6.1 Ancient Woodland Inventory - Long Established Woodland (of plantation origin)

These are woodlands with high nature conservation value. Within 2 km of the proposed route there are 4 woodlands classified as being Ancient Woodland of semi-natural origin and a further 6 Long Established Woodland of plantation origin. Refer to Figures 4.1 – 4.5.

#### 9.3.7. Phase 1 Habitat Survey Results

The phase 1 habitat survey covers the area around St James' Park to Glasgow Airport. Refer to Figure 9.1.

##### 9.3.7.1 St James' Park

This area is a well-used recreational park with a number of football pitches and therefore dominated by amenity grassland. The amenity grassland is typical of such habitats being intensively managed and of low species diversity. The amenity grassland is dominated by perennial rye grass (*Lolium perenne*) with broad leaf plantain (*Plantago major*), dandelion (*Taraxacum officinale* agg.) white clover (*Trifolium repens*) and daisy (*Bellis perennis*) also present.

To the east of St James' Park and adjacent to Greenock Road is an area of amenity grassland, improved grassland and plantation woodlands.

To the south the park is bounded by the A726 road. Between this road and the park is a narrow linear area of introduced shrub and amenity grassland with individual trees. The eastern boundary is also introduced shrub with individual "lollypop trees". Species present in these areas includes horse chestnut (*Aesculus hippocastanum*), beech (*Fagus sylvatica*), cotoneaster (*Cotoneaster horizontalis*), ivy (*Hedera helix* ssp), hedge bindweed (*Calystegia sepium*), creeping thistle (*Cirsium arvense*), laurel, rosebay willowherb (*Chamerion angustifolium*), garden privet (*Ligustrum ovalifolium*), small leaved lime (*Tilia cordata*), bramble (*Rubus fruticosus* agg.), dog rose (*Rosa canina*), copper beech (*Fagus sylvatica* f. *purpurea*) stinging nettle (*Urtica dioica*), elder (*Sambucus nigra*), sycamore (*Acer pseudoplatanus*), silver birch (*Betula pendula*), sow thistle (*Sonchus oleraceus*), rowan (*Sorbus aucuparia*), groundsel (*Senecio vulgaris*), spear thistle (*Cirsium vulgare*), broad leaf dock (*Rumex obtusifolius*) and broom (*Cytisus scoparius*).

To the north of the park is the M8 motorway which is separated from the park by a high fence. Between the fence and the road is an area of plantation woodland with a beech hedge immediately adjacent to the

fence and with a tall ruderal understorey. Safe access to this area could not be gained and was therefore only examined from adjacent areas. Species present include hawthorn (*Crataegus monogyna*), white campion (*Silene latifolia*), bramble, honeysuckle (*Lonicera periclymenum*), raspberry (*Rubus idaeus*) and rosebay willowherb.

A small area of improved grassland is adjacent to the motorway junction to the west of St James' Park. This is dominated by grasses such as creeping bent (*Agrostis stolonifera*), perennial rye grass and occasional Yorkshire fog (*Holcus lanatus*). Hawthorn is beginning to colonise. Other species present include creeping thistle, broad leaf dock, bramble, rosebay willowherb, dog rose, nettle, broom, tufted vetch (*Vicia cracca*), red clover (*Trifolium pratense*), buddleia (*Buddleja davidii*), narrow plantain (*Plantago lanceolata*) and yarrow (*Achillea millefolium*). An area of the improved grassland appears to have impeded drainage with species such as creeping buttercup (*Ranunculus repens*) and soft rush (*Juncus effusus*) being dominant.

The embankments of the motorway and associated roundabouts were not accessed due to safety concerns and were examined from adjacent areas only. These embankments are primarily amenity grasslands with mixed plantation woodlands and small areas of introduced shrub. No species list was compiled for these areas.

The habitat found between the northern side of the A726 and McFarlane Street is a row of mature trees. This merges with a narrow plantation woodland, which runs under the motorway bridges. Species present include sycamore and beech.

Between St James Avenue and the A726 is an area of amenity grassland with individual trees planted around the edge.

Target Note 2 - This grass in this area has been allowed to grow long and informal paths have been mown. Species diversity is very low with the grass dominated by perennial rye grass, however grass cuttings are being removed in what appears to be an effort to create a wildlife/ wildflower area. Tree species are sycamore, ash (*Fraxinus excelsior*) and lime (*Tilia x vulgaris*). A turkey oak (*Quercus cerris*) is also present.

The existing Inverclyde rail line runs behind the properties of St James Avenue with the embankment being dominated by dense scrub with goat willow (*Salix caprea*), hawthorn and silver birch being the main species. There are occasional mature trees present.

Between the railway embankment and the wooded edge of the A726 is an area of tall ruderal which grades into improved grassland under the motorway bridges. In the area immediately adjacent to St James Avenue fly tipping of garden waste has occurred. This has resulted in several garden escapees being present. Other species that are present includes hedge bindweed, Japanese knotweed (*Fallopia japonica*), rosebay willowherb, stinging nettle, great willowherb (*Epilobium hirsutum*), sowthistle, forget-me-not (*Myosotis arvensis*), creeping buttercup, creeping thistle, spear thistle, soft rush, coltsfoot (*Tussilago farfara*) red clover, elder, hawthorn, silver birch, wych elm (*Ulmus glabra*) tufted vetch, fennel (*Foeniculum vulgare*), herb robert (*Geranium robertianum*), bramble, black medic (*Medicago lupulina*), silverweed (*Potentilla anserina*), ground ivy (*Glechoma hederacea*), teasel (*Dipsacus fullonum*) michelmas daisy (*Aster Novi*) and comfrey (*Symphytum officinale*).

To the south west of the railway line is an area of plantation woodland, dense and scattered scrub with the scrub grading into an extensive area of tall ruderal dominated by rosebay willowherb. The railway embankment is dominated by dense scrub.

To the north of the motorway is Paisley Moss Local Nature Reserve. This area is a complex mosaic of open water, emergent vegetation, wet woodland and tall ruderal. Due to the complexity of this site no mapping was carried out during the phase 1 habitat survey. The extensive tall ruderal, which bounds the eastern boundary of the LNR, is dominated by rosebay willowherb which may be outwith the designated site boundary. A narrow footpath/cyclepath and fitness trail skirts the LNR and an area of amenity grassland. A beech hedge and wooden fence separates the amenity grassland and the footpath/fitness trail.

Habitat in the vicinity of the airport is mainly amenity grassland with introduced shrubs and specimen tree planting.

### 9.3.8. Paisley Moss LNR (Target Note 1)

The following information has been obtained through surveys carried out on behalf of the LNR Management Group. Ecological surveys include otter, water vole, common bird census and vegetation survey. However, during these surveys no otters or water voles, or sign of them, were found.

### 9.3.8.1 Vegetation Survey

Paisley Moss is located adjacent to the St James Interchange of the M8 and Glasgow Airport. A vegetation survey was carried out on the site and its immediate vicinity during August 2003. This survey found that the site is a complex mosaic of mainly wetland habitats that can be readily divided into 2 distinct sections (eastern and western sections divided by the cycle/footpath). For a full description of vegetation on the site please refer to the Paisley Moss Vegetation Survey (Watson, 2003) in Appendix to Chapter 9. The eastern section of the site is predominantly tall ruderal habitat with small swamp and grassland areas while the western section is a mosaic of wetland habitats with scrub, grassland margins and tall ruderal. The eastern section falls mainly outwith the LNR designation. The western section of the site is of high nature conservation interest. The vegetation survey found 193 vascular plant species and a further 53 species of Bryophytes present on or immediately adjacent to the site.

### 9.3.8.2 Common Bird Census

The Common Bird Census was carried out during the spring and summer of 2003. This survey found that there was a total of between 48 and 49 breeding territories within the boundary of the LNR comprising 20 breeding species with a further 14 breeding species in adjacent areas.

Of the breeding species found on or adjacent to the moss, 4 are RSPB Red List Species due to their rapid decline in their breeding population in the last 25 years and are also UK BAP Priority Species of Conservation Concern. A further 3 species are RSPB Amber Listed due to the moderate decline (25 to 49%) of the UK breeding population in the last 25 years. The 3 Amber Listed species are also UK BAP Priority Species of Conservation Concern. Refer to Appendix 9 for the Breeding Bird Census.

### 9.3.8.3 Amphibian Survey

The area examined during this survey has previously been disturbed and is quite low-lying in parts. The vegetation is dominated by rose bay willow herb (*Chamerion angustifolium*), hairy willow herb (*Epilobium hirsutum*), with large patches of creeping buttercup (*Ranunculus repens*), sweet canary grass (*Phalaris arundinacea*) with scattered sedge beds (*Carex aquatilis*) and *Cx nigra*, bittersweet (*Solanum dulcamara*) and occasional willows (*Salix sp.*). Small areas of open water occur, associated primarily with the willows, some is of poor quality with iron. Throughout the area ruderal tall herbs form dense patches with nettle (*Urtica dioica*) and creeping thistle (*Cirsium arvensis*) the most notable. The raised area in the north-east corner has quite species rich grassland with some scrub willows, elder and hawthorn, and a wider range of ruderal species including ground elder (*Aegopodium podgaria*) and coltsfoot (*Tussilago farfara*).

From the information in the previous vegetation survey (Watson, 2003) and from the appearance of the vegetation on site it seems likely that many of the areas holding water may do so only on a temporary basis. This can be beneficial for newts as they do not do well in areas that support fish or wildfowl. Providing water is available for long enough for the larvae to reach maturity newts can survive in temporary ponds. Only one small area of open water seemed possibly large enough to hold breeding great crested newts, which require open water to allow them to display.

- One adult frog was seen on site during the survey;
- No adult newts of any species were found;
- No tadpoles were found in any of the areas of open water;
- No larvae were found in any of the areas of open water; and
- No newt eggs were found.

Generally the aquatic habitat was found to be unsuitable for great crested newts, there were few invertebrates found during netting and algae was abundant in all open water suggesting enrichment and choking of ponds later in the summer as water levels fall and temperatures rise. However, physical conditions at the site would suggest that recruitment to the Moss would be unlikely because:

- The site is isolated from other ponds and from known areas occupied by great crested newts; and
- There are large roads on two sides and rivers on the other two sides.

However, this area undoubtedly contributes to the biodiversity of the adjacent LNR and its structural function as a buffer zone for the nature reserve will be lost if development occurs here.

### 9.3.9. Existing Rail Corridor Walkover Survey

The vegetation found along edges of the existing rail corridor has naturally developed to form stands of scattered to dense scrub with areas of open grassland and tall ruderal. This has resulted in the development of a linear wildlife corridor. Due to the narrow scale and complexity of much of this vegetation no separate description or map of each area has been made. Along much of the route of the existing rail line rabbit warrens are fairly common with paths from the rail corridor to surrounding areas. However, no badger activity could be seen from adjacent areas. This does not exclude the presence of badgers but merely indicates that no sign of badger activity was seen during the walkover survey. Key areas of the walkover survey are described below.

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#### 9.3.9.1 Arkleston to Penilee

This section of the existing railway line passes through a deep embankment that cuts through an area of open agricultural fields. Access could not be gained to the embankments but the area was viewed from the immediate vicinity on either side. The vegetation is predominately dense/continuous scrub with small areas of open grassland. Vegetation is dominated by hawthorn with occasional silver birch, gorse and brambles.

To the south of the embankment the adjacent fields had been recently ploughed. Several rabbit paths were found emerging from the rail embankment, however the trails and holes in the fences appeared to be too small to have been made by badger. Due to the recently ploughed field no sign of badger foraging was seen and no badger latrines were seen along the edge of the embankment.

To the north of the rail embankment both agriculture land and a golf course are present. A small conifer woodland lies at the top of the embankment between the golf course and the rail lines. There is a dense canopy with a limited shrub layer and only limited ground cover, which consist mainly of grasses. Many worm casts were present throughout this small woodland but no sign of badger foraging was evident.

Where the proposed contractor's compound is to be located (between the railway line and the adjacent golf course immediately south of Arkleston Bridge, is presently a mix of amenity grassland, broadleaf plantation woodland and scrub. Tree species present include lime, hawthorn and sycamore. The area appears to be managed by the golf course with the grass being cut short.

#### 9.3.9.2 Greenlaw Industrial Estate (Wallneuk Junction)

This area is the connection between the existing and a disused rail corridor where the tracks have been removed, formerly the Arkleston branch. A small triangle of scrub has formed linking the scrubby woodland of the disused rail corridor with the scrub along the edges of the existing rail corridor. This link subsequently increases the wildlife value of this small area of scrub. Species present include silver birch, hawthorn and ash. The understorey appears well developed but no species list was compiled as access could not be gained.

#### 9.3.9.3 Broomloan Road

This is an area of former sidings and rail lines where a contractor's compound has been proposed. The tracks have been removed and no management of the vegetation has been undertaken for a considerable period of time. Consequently, the area has developed into a mix of dense/continuous scrub and broadleaf woodland. There is also an area where surface water has gathered. On the day of the survey the water appeared to be badly polluted with an oily sheen and ferrous pollution also present. There was considerable fly tipping in this area. It should be noted however that a pair of mallard ducks (*Anas platyrhynchos*) were present on the water.

The woodland canopy varies from being very dense in places to being very open. This has resulted in the ground cover also varying from being very dense to being sparse where the canopy is dense. Stinging nettles, brambles or rosebay willowherb dominates the ground vegetation depending on the canopy and ground conditions. The ballast of the rail lines has also been colonised by vegetation.

It should be noted that this site has been significantly affected by human activity with fly tipping and vandalism being common.

This area is suitable habitat for badgers and it is also connected to the main rail corridor which would allow animals to move freely through the area. During the walkover survey of this site attention was paid for sign of badger. No setts, latrines or other sign was recorded, however it should be noted that the vegetation at the time of the walkover survey was very high and dense. This could easily obscure badger sign and prevent badger activity from being recorded. Badgers are also a highly mobile species that periodically establish new territories. As such badgers may be present in this area and further survey work during the appropriate season and prior to the start of construction, should be carried out.

#### 9.3.9.4 Fifty Pitches Road

In recent years this area has been developed with extensive industrial and office units. Adjacent to the rail line, where the contractor's compound has been proposed, the habitat is currently extensive areas of introduced shrub and "lollypop" trees with verges of amenity grassland. On the railway line (access could not be gained and the area was viewed from adjacent areas only) there are several small areas of dense/continuous scrub dominated by silver birch. No ground flora was seen due to poor visibility of the area.

### 9.3.10. Habitat & Walkover Survey Summary

The existing rail corridor provides a valuable wildlife corridor linking many small fragmented habitats to produce a valuable ecological resource. The St James' Park branch comprises predominantly amenity grassland but the planted hedges, street trees, small woodlands and the connection with the existing rail corridor extends the wildlife corridors into the urban area and subsequently increases the value of the small habitat areas found throughout the site.

The Paisley Moss LNR is a complex mosaic of aquatic and terrestrial habitats, which is isolated from other high value habitats due to the adjacent road infrastructure, airport and agricultural land. This increases the value of this area to wildlife.

Broomloan Road area is a valuable wildlife resource as it connects the wildlife habitats found along the existing rail corridor with those that have formed along the disused rail line. The woodland area appears to contain several bird species and is also suitable habitat for badgers and other mammal species.

### 9.3.11. Elderslie Loop

The Elderslie loop is an existing siding that is to be extended. As with much of the rail corridor adjacent areas have become colonised by willow and birch scrub. In areas where the scrub has not colonised, ephemeral vegetation and grasses dominate.

### 9.3.12. Mammals

During the phase 1 survey a number of roe deer (*Capreolus capreolus*) footprints were seen in mud throughout the area adjacent to St James Avenue and the underpass at the rail line. A number of rabbit warrens were located along the rail corridor. No badger activity was recorded in the area of the Broomloan Road site, however due to the timing of the walkover survey when vegetation was high and very dense, badger activity could have been missed. As a consequence additional badger survey is recommended in this area before any works commence.

### 9.3.13. Badger Survey Results

No sign of badger activity was found in either the St James' Park area or the Penilee to Arkleston section of the route. However as access could not be gained to any section of the track, it is highly likely that badger activity could have been missed. As a consequence it is recommended that a badger survey be carried out along the track prior to the commencement of construction.

### 9.3.14. Bat Survey Results

Bat survey was carried out at the four identified key areas. Of those, Paisley Moss was the only site where bats were recorded as being present. Table 9.9 below provides the findings of the bat survey.

**Table 9.9 Bat Survey Findings**

		Comments
Key Area	St Andrew's Crescent/Glasgow Airport and Paisley Moss LNR	<ul style="list-style-type: none"> <li>Weather was mild with a slight breeze blowing intermittently. Cloud cover was overcast clearing at times. When clouds cleared temperature dropped slightly.</li> <li>Several Soprano pipistrelles recorded at one area of Paisley Moss. Many feeding buzzes heard over a prolonged period. Temperature when bats were first recorded (at 22:25 hrs) was 8.3°C with humidity of 75%. Bats were still foraging when temperature dropped to 7.8°C.</li> <li>The timing of the arrival of the bats indicates that their roost may be a considerable distance from the foraging area.</li> <li>Bats were still foraging at the end of the survey at 23:10hrs when temperature had rose to 8.3°C and humidity at 77%.</li> <li>This area appeared to be the last remaining area that was sufficiently dark with suitable vegetation being present for foraging bats.</li> </ul>
Date	06/05/05	
Starting Temp	9.01°C	
Starting Humidity	63%	
End Temp	8.10°C	
End Humidity	76%	
Species Encountered	Soprano Pipistrelle (55hz)	
Key Area	St James' Park/M8 embankment	<ul style="list-style-type: none"> <li>Weather mild with slight swirling wind blowing. Overcast throughout survey with threat of rain. No rain fell during survey period. Climactic conditions were suitable for bats.</li> <li>No bats recorded at this area. Light levels from adjacent street lighting were high especially from the adjacent M8. This has resulted in the area being marginal for navigating or foraging bats.</li> </ul>
Date	05/05/05	
Starting Temp	9.1°C	
Starting Humidity	73%	
End Temp	9.6°C	
End Humidity	72%	
Species Encountered	Nil	
Key Area	St James Avenue/McFarlane Street/St James' Park	<ul style="list-style-type: none"> <li>Weather mild with slight swirling wind blowing. Overcast throughout survey with threat of rain. No rain fell during survey period. Climactic conditions were suitable for bats.</li> <li>No bats recorded at this area. Light levels from adjacent street lighting were high especially from the adjacent M8. This has resulted in the area being marginal for navigating or foraging bats.</li> </ul>
Date	05/05/05	
Starting Temp	9.1°C	
Starting Humidity	73%	
End Temp	9.6°C	
End Humidity	72%	
Species Encountered	Nil	
Key Area	Muirdykes Road/Stirrat Street	<ul style="list-style-type: none"> <li>Weather mild with stiff swirling breeze. Overcast but not threatening rain. Temperature remained stable throughout the survey period.</li> <li>Area dominated by industrial units with several having the appearance of being run down. Good potential for the presence of bat roosts. Streets well lit with orange lighting resulting in the area being insufficiently dark for bats to either forage or navigate.</li> </ul>
Date	04/05/05	
Starting Temp	10.9°C	
Starting Humidity	65%	
End Temp	11.0°C	
End Humidity	67%	
Species Encountered	Nil	

## 9.3.15. Birds

Birds noted during the habitat and walkover survey include: magpie (*Pica pica*), wren (*Troglodytes troglodytes*), robin (*Erithacus rubecula*) blackbird (*Turdus merula*), blue tit (*Parus caeruleus*), great tit (*Parus major*), bullfinch (*Pyrrhula pyrrhula*) (a red list species of conservation concern), starling (*Sturnus vulgaris*) and wood pigeon (*Columba palumbus*). Jack snipe (*Lymnocyptes minimus*) have also been

recorded at Paisley Moss. Refer to Section 9.3.7 for further information on birds at Paisley Moss. It should be noted that Broomloan Road area appears to be valuable wild bird habitat.

The Black Cart Water, over 1km away from the proposed route and from the proposed location of the fuel farm, has an internationally important population of whooper swans (*Cygnus Cygnus*).

#### 9.3.16. Value of Habitats

The value of a habitat depends on the size, connectivity, rarity, fragility and whether they are designated or not. Many of the small habitats along the existing railway corridor are interconnected forming a valuable wildlife corridor, allowing the migration of flora and fauna species over a significant distance. Of particular note is the small scrub area at Greenlaw Industrial Estate at the former Arkleston branch, which connects the habitats along the disused railway line to the habitats found along the operational rail corridor. Using the criteria detailed in Table 9.1 this wildlife corridor is considered to be of medium value.

The area of St James' Park is dominated by intensively managed low species diversity amenity grassland. This area is of negligible value and can be readily replaced with habitats of greater value. However the hedges and tree belts surrounding the park offer locally valuable nesting and foraging sites for birds and insects. These hedges and tree belts, through their connectivity, may also offer navigation routes and foraging for bats although the high light levels found in the area due to street lighting appears to limit this. Using the criteria detailed in Table 9.1 the hedges, tree belts surrounding the park are considered to be of low value.

Paisley Moss is considered to be of high nature conservation interest whilst Broomloan Road site is of medium value.

### 9.4. Construction Impacts

A general overview of the construction works proposed for the scheme is provided in Chapter 2 and Figures 4.1 – 4.5 identify the location of the construction compounds. The following section identifies impacts on<sup>1</sup> ecological resources that would be caused by construction work.

Potential impacts of the works are described briefly and then mitigation measures proposed. The final section sets out residual impacts that would remain after mitigation has taken place. For the purposes of the assessment, it has been assumed that the areas required for construction would be returned to their initial condition once the construction works have been completed. However, where long-term impacts would occur these are assessed as permanent effects. Table 9.9 provides a summary of the residual impacts.

Table 9.2 lists a number of potential sites for use as contractor's compounds where materials and plant may be stored.

#### 9.4.1. Potential Impacts

Potential construction impacts include:

- Dust, noise, and disturbance by humans and machinery along the route corridor;
- Temporary use of land for construction compounds, and activities associated with compounds;
- Disturbance to watercourses resulting from construction; and
- Disruption/pollution of designated areas or habitats with high ecological value.

##### 9.4.1.1 Bats

The impact of lighting on bats can be both positive and negative depending on the species of bat and the type of light used.

The bluish-white light of metal halide and mercury-vapour lamps, emit ultraviolet radiation and attract insects; the source of food for bats in Britain. In contrast, low-pressure sodium lamps, which emit monochromatic orange light, do not attract insects, and high-pressure sodium lamps that include some mercury vapour and hence emit some ultra violet radiation are intermediate in terms of insect attraction (Kunz and Racey 1998<sup>1</sup>).

Studies have shown that some species of bats will forage around lights as a preference and inappropriate lighting can hinder the flight paths or bats access to roosts. However, different species of bat are not likely to be equally affected by the presence of lighting.

The most likely bats to benefit from the insects attracted by lights in Britain are the aerial hawking species such as the Noctule, Serotine and Pipistrelles. On the other hand the Myotis species (Daubenton's,

<sup>1</sup> Kunz, Thomas., and Racey, Paul –Editors. (1998) *Bat Biology and Conservation*. Smithsonian Institution Press.  
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Natterer's, Whiskered and Brandt's and Brown long-eared bats) do not take advantage of lights; these bats are adapted to gleaning. A possible negative effect of lights is that they may attract moths that then become unavailable to these species. Moreover, these bats are less efficient at exploiting insects in open areas and the predation risk in brightly lit conditions in combination with open situations may be too high.

Lit areas can act as barriers to commuting bats. This would especially be the case for linearly lit features such as roads. Studies have shown that *Myotis* species will make detours to avoid passing through lit areas to reach foraging areas and roost sites.

#### 9.4.1.2 Badgers

Badgers are inquisitive animals and would investigate containers and construction material left on site. They can also become trapped in large holes or injured or be accidentally killed or injured by plant. Toxic materials left in inappropriate locations have the potential to poison badgers if eaten and could also result in badgers being killed. During construction the establishment of works compounds would reduce foraging areas.

#### 9.4.1.3 Otters

Otters, similarly to badgers, are inquisitive creatures that can enter work sites and become trapped in excavations, containers or other such materials. They may eat toxic or other inappropriate materials, injuring or killing them. Works near or in watercourses have the potential to cause disturbance or temporarily block the free passage of otters along the route of watercourses.

#### 9.4.1.4 Birds

Construction activities can have significant impacts on birds in and around development sites. This can include the loss of nesting and foraging sites and the loss of cover leading to increased predation. Allied to this, increased noise, dust and vehicular emissions can lead to birds moving from established to other territories where competition for food or nesting sites may result in impacts on adjacent bird populations.

#### 9.4.1.5 Aquatic Ecology/Amphibians

Works in or immediately adjacent to water bodies may disturb sediments and dislodge aquatic invertebrates. This may result in changes to the food chain in the immediate area of the works through increased predation on invertebrates and competition with other invertebrates. In addition, dislodging sediments may change the suitability of the area for invertebrates and plant species alike, temporarily leading to changes in the biodiversity of the area.

Works adjacent to water bodies have the potential to generate dust, either dislodged during dry periods or from the transportation of materials. This dust has the potential to enter water bodies resulting in an increase in turbidity. Increased turbidity could affect the productivity of the plant species and have an indirect impact on macro and micro fauna.

With regard to works in the vicinity of the Paisley Moss LNR, there is the potential that construction activities could change ground water flow patterns. This in turn could reduce the amount of water flowing into the moss and have a significant impact on the ecological diversity and character of the moss.

There is also the potential that leaks from vehicles parked or used in the vicinity of Paisley Moss such as oils and fuels could result in pollution episodes while mechanical failures can result in unexpected pollution. Construction works could also physically damage amphibian habitats.

During construction there may be the need to dewater excavations. Water from excavations often has very high sediment content and when discharged to surface water bodies significantly affects the water quality and ecological resources of that water body. When discharged to land the sediments within the water can build up on the surface and coat vegetation. This would result in the vegetation becoming less productive or dying resulting in changes to the species diversity and character of the area.

#### 9.4.1.6 Flora/Habitats

There is the necessity to remove vegetation to allow the construction of the rail infrastructure, especially in the area from St James' Park to the Airport. There is also the potential that contractor's compounds will require further removal of vegetation. Where permanent loss is identified this is discussed in Section 9.5. Construction activities can lead to changes in the species composition of habitats leading to the character of the habitat changing. Species dominance may change due to compaction levels in soil root zone leading to changes in drainage levels which in turn lead to changes in species composition.

#### 9.4.1.7 Alien/Invasive Species

In the vicinity of St James' Park invasive species (e.g. Japanese knotweed) have become established in several areas bounding the park. If left unchecked these will continue to develop further, excluding other

flora species. There is also the potential that these species could be spread to other areas of the site as well as areas outwith the development site.

#### 9.4.1.8 Designated Sites

Construction activities can impact on the integrity and function of the designated areas. Construction activities can also lead to the loss of those species or habitats that led the area to be designated. Inappropriately placed contractor's compounds can also lead to the fragmentation of designated sites.

#### 9.4.2. Mitigation

A Code of Construction Practice would be adopted for the proposed development. This would include requirements to erect hoardings to restrict the working area, standards of dust and air pollution control to protect adjacent habitats, and suitable precautions to prevent entry of pollutants into any water bodies. Works near watercourses would be carried out following guidance detailed in SEPA Pollution Prevention Guidelines, namely PPG1 and PPG5. Works near or at trees will follow guidance detailed in British Standard BS 5837 Trees in Relation to Construction. It would also include the following general principles:

- Clearance and construction of the development site would be undertaken in stages along the corridor, which would allow the escape of fauna species.
- If practicable, clearance of vegetation along the corridor route would be undertaken during the months October to March. This would avoid the main breeding season for most fauna species. If any clearance of vegetation were required during the breeding season, as the law protects the nests of all birds, then vegetation would be inspected for any nests by a suitably qualified and experienced ecologist before any clearance takes place. Cleared vegetation would be stored in piles near where it originated for up to two days after clearance to allow animals to escape before final disposal.
- Where badger setts have been identified, no clearance of vegetation would be carried out between December 1 and June 31 due to the badger-breeding season. Licences may be required for the clearance of vegetation at badger setts.
- Wherever wildlife habitats remain alongside working areas, provision would be made to prevent encroachment onto valuable ecological areas that are not essentially required for construction. This would include the provision of secure fencing where appropriate.
- Unless otherwise agreed with SPT, GGC and SNH work adjacent to ecologically valuable habitat, including Paisley Moss LNR, would be constrained to the months between September and March when damage to the habitat would be minimised and there would be less likelihood of disturbance to sensitive species and would be outwith the bird breeding season.
- Under no circumstances would water removed from excavations be discharged to surface water bodies. Such water would be discharged to land of high permeability and only through sediment traps.

Mitigation measures for selected species and groups of species are described below.

##### 9.4.2.1 Bats

The area where bats were recorded during the survey was at a small section of Paisley Moss LNR an area where light spillage from the adjacent roads is minimal. Consequently this situation must be maintained. During construction the use of temporary security lighting will be strictly controlled. All lights would require to be pointed away from the moss at all times. The use of bluish-white light metal halide and mercury-vapour lamps would be prohibited in order that the food source of the bats was not drawn away from the darkened areas of the moss. This would reduce the risk of predation on bats from owls as well as maintaining the status quo with regards food source.

It is proposed that property is demolished at St Andrews Crescent and within the Murray I industrial Estate. Prior to demolition, the bat survey must be updated prior to any works commencing. If bat roosts are identified during this survey, a licence would be required from the Wildlife and Habitats Division of the Scottish Executive before any works could commence.

Where temporary construction compounds are to be established and trees removed it is necessary that a bat survey be carried out on all suitable trees or structures that are being removed. If bats are found a licence should be obtained from the Wildlife and Habitats Division of the Scottish Executive.

##### 9.4.2.2 Badgers

Badger activity may well change between the time of the original survey and construction works beginning. It is therefore necessary that a badger survey be undertaken immediately prior to construction to provide up-to-date information on badger activity.

Although badgers have not been found either along or adjacent to the proposed development route, a badger survey would be carried out of the entire route corridor prior to the commencement of construction activities. This would entail walking the route inside the route corridor.

In areas where the potential for badgers to be present exists, construction materials and equipment would be held within badger secure compounds positioned well away from potential sett locations. This would prevent badgers becoming trapped or injured or being accidentally killed by plant. Any large excavations would be left with a means of escape for badgers and other species and this would be as simple as a scaffold board placed in the pit to allow escape.

A badger survey would be required on the proposed Broomloan Road contractor's compound site. This area has suitable habitat present as well as having connectivity between the existing railway corridor and disused rail corridor allowing the migration of badgers throughout the area.

If badgers were found along any part of the proposed route or site of proposed works prior to the start of construction SNH would require to be contacted with regards additional mitigation measures and for licensing requirements.

#### 9.4.2.3 Otters

Although no otter survey was carried out it is assumed that otters are present along the White Cart. Works on the viaduct in this area are unlikely to cause significant impact, however an otter survey will be carried out before the commencement of any construction activities. To prevent further impact the following mitigation measures would be carried out.

Otter proof barriers will be erected at the ends of the bridge structure to prevent otter access. Otters can become trapped in large holes on site or within construction material and equipment. Any large excavations would be left with a means of escape.

Erecting barriers to prevent encroachment of the works into areas where otters are likely to be present, would reduce the potential for impact.

#### 9.4.2.4 Birds

Increased noise and disturbance levels arising from construction activities could result in birds seeking new territories. Displaced birds during any season would increase competition for food resources as well as nesting sites. Vegetation clearance during the bird-breeding season would be minimised and only undertaken after areas to be cleared had been checked for nesting birds.

In the vicinity of Paisley Moss, a 15m wide buffer will be maintained to reduce impacts on birds in this site. A secure and highly visible barrier will be erected to ensure that this buffer is maintained at all times during construction. Vegetation would only be removed outwith the bird breeding season, any vegetation requiring removal during bird breeding season will require checking for nests by a qualified field ecologist.

#### 9.4.2.5 Amphibians

Amphibians on site during the winter months would be unable to escape when clearance and construction begin. Therefore, it is essential that vegetation heaps and other suitable habitat piles are carefully inspected prior to construction commencing.

Any amphibians found along the route of the works would be removed by hand if they were unable to escape to the surrounding non-urban land. However, if substantial populations are encountered it may be necessary to translocate the population to a suitable receptor site. If translocation of a European Protected Species such as great crested newt were to become necessary a licence would be required from Wildlife and Habitats Division of the Scottish Executive. Such a licence would need to be in place before any works commenced.

#### 9.4.2.6 Aquatic Ecology

All works near water bodies (including the White Cart and Paisley Moss LNR) would be carried out following SEPA PPGs, most notably PPG 5, "Works in, near or liable to affect watercourses". All vehicles to be used in the vicinity of watercourses would be checked daily for oil and fuel leaks. All vehicles or plant parked on site would be parked away from watercourses. If parked overnight or for extended periods of time, vehicles would be parked over drip trays. Refer to Chapter 10 for an assessment of the impacts on the water environment during construction.

Where vegetation has been removed adjacent to watercourses, vegetative cover should be reinstated or replaced as soon as possible. This would reduce the potential for increasing sediment loading of the adjacent watercourse.

As noted above, a 15m buffer would be left between the proposed works location and Paisley Moss LNR. This along with the other mitigation noted above would reduce potential impacts arising from the construction of the fuel farm on the aquatic resources of the area.

#### 9.4.2.7 Flora/Habitats

In areas where works are being proposed, preparatory works will follow the Code of Construction Practice procedures and guidelines whereby no aggregates would be stored around the base of trees. Works near trees would follow BS 5837: 1991 Trees In Relation to Construction.

Wherever possible, trees will remain *insitu* and any cutting or removal of branches would be carried out by a qualified tree surgeon. With regard to mature trees, no excavation should be carried out within the confines of the tree canopy and no structures such as port-a-cabins or storage containers should be placed within the confines of the tree canopy. All hedges will, as far as practicable, remain *insitu* to act as screens and to provide habitat for fauna species.

The establishment of the contractors compound between Gallowhill Road and Wallneuk Road would entail the removal of the trees and other vegetation currently on that site. This would result in the fragmentation of the wildlife corridor. If practical a row of trees should be left *insitu* to maintain the connectivity of the habitat with the adjacent disused rail line. This remaining habitat would also act as a screen for adjoining properties.

Where trees have been removed to establish contractor's compounds, planting of native trees of proven local provenance if possible should be carried out to reinstate these areas once the use as compounds have concluded.

In the vicinity of Paisley Moss the planting of a tree/shrub screen should be carried out in advance of works. This will both compensate for the loss of existing vegetation but would also reduce the noise and dust impacts on the adjacent LNR.

#### 9.4.2.8 Alien/Invasive Species

As noted above, there are a number of highly invasive or alien species present in various areas of the proposals. These species include Japanese knotweed, and Himalayan balsam. Removal and destruction of these species will follow recognised guidelines, currently those produced by the Environmental Agency In England but equally relevant in Scotland. Waste from the clearance of invasive species will be disposed of in an appropriate licensed landfill.

#### 9.4.2.9 Designated Sites

Designated areas or areas of ecological note will be protected through the use of barriers to prevent incursion into these areas.

The establishment of the contractors' compound between Gallowhill Road and Wallneuk Road would entail the removal of the trees and other vegetation currently on that site. This would result in the fragmentation of the wildlife corridor. If practical a row of trees should be left *in situ* to maintain the connectivity of the habitat with the adjacent disused rail line. This remaining habitat would also act as a screen for adjoining properties.

Paisley Moss is a designated LNR mainly due to the open water habitat resulting in a number of flora and fauna species being present. The strict compliance with the COCP, recognised guidelines and construction best practice would be stringently enforced.

During operation of the fuel farm there is the potential that security lighting would spill over onto the moss creating additional light pollution. This light pollution may result from directly from lights or from reflective surfaces. Lighting should be designed to mitigate impacts on bats (refer to section 4.9.2.1) whilst wherever possible tanks and other surfaces should be non reflective. Lights should be directional and pointed away from the moss where ever possible.

#### 9.4.3. Residual Construction Impacts

It is likely that noise and dust from construction activities would occur leading to the disturbance of fauna along the route. There would also be disturbance to flora species as a result of access and the establishment of temporary works compounds. However, strict compliance with the Code of Construction Practice would ensure that residual impacts on the ecological resources of the area would be managed.

Disturbance, killing and injury are the greatest potential impacts to wildlife in the proposed development corridor. These may occur through the use of plant, destruction of foraging and or sheltering habitat, trapping and/or poisoning of animals by materials left on site and disturbance and disruption to successful breeding. Residual impacts on selected species and groups of species are assessed below.

#### 9.4.3.1 Bats

If mitigation measures are strictly implemented there would be only negligible impacts on bats as a result on construction. However should these mitigation recommendations not be implemented there could be a significant impact such as increased predation by owls and loss of access to foraging grounds as a result of excess light levels in the vicinity of Paisley Moss LNR.

#### 9.4.3.2 Badgers

Although badgers have not been found along or near to the proposed rail route, there is the potential for animals to travel from outwith the area, either passing through or establishing a new territory. This would be verified through the additional pre-construction survey. However, with the mitigation measures being proposed, the predicted impact on the badger population would be restricted to some disturbance from noise from engineering operations.

#### 9.4.3.3 Otters

There will be negligible impacts on the otter population in this area. Those impacts that may occur will mainly be associated with disturbance due to noise from works on the bridge over the White Cart.

#### 9.4.3.4 Birds

There will be disturbance to birds through increased noise, dust generation and additional vehicular emissions. However these impacts already occur along the current rail corridor with trains running every few minutes at peak times. However temporary and intermittent impacts will result at contractor's compounds where trains currently do not run.

Additional impacts would result from the clearance of vegetation for access and the establishment of compounds. These would include a loss of nesting habitat where tree branches require removal. Indirect impacts of construction could include pressure on other local bird populations as birds from the proposed rail route migrate to other areas of habitat. Other indirect impacts include the increased risk of predation of small birds by raptors and mammals as a result of loss of cover.

Birds would be disturbed in the vicinity of Paisley Moss through the construction of the new fuel farm. This however would be temporary and intermittent in nature and through implementation of the mitigation measures noted above, should result in a minor negative impact. It should be noted that as a result of the disturbance from the construction activities, there is the potential for increased bird movement within the airport perimeter.

Due to the lack of suitable habitat along the route and in the area of the proposed fuel farm location, and the level of disturbance from existing sources, it is unlikely that whooper swans would be found in the vicinity of the works. Consequently, it is highly unlikely that the proposed construction works would impact them.

#### 9.4.3.5 Amphibians

Limited evidence for the presence of amphibians at the site of the proposed relocation of the fuel farm was found during the amphibian survey. Consequently impacts as a result of the construction of the fuel farm on amphibians would be negligible.

#### 9.4.3.6 Aquatic Ecology

The relocation of the fuel farm to the site adjacent to Paisley Moss has the potential for increased sediment loading and pollution of the water body at Paisley Moss LNR. However strict compliance with the mitigation noted above would prevent this from occurring. Consequently it is considered that the residual construction impact on the Paisley Moss LNR would be moderate to minor and negative.

#### 9.4.3.7 Flora/Habitats

Much of the proposed development site has a poor diversity of flora with no nationally scarce or Red Data Book Species known. Dust generated by construction works could affect plant productivity and survival for the duration of construction, however other than where noted this impact would be negligible.

A contractor's compound is proposed between Gallowhill Road and Wallneuk Road. This would result in the loss of most, if not all trees in this area. The significance of this is dependant on whether there is the possibility of trees remaining *insitu* to maintain the connectivity with adjacent habitats. However as a worst case scenario it should be considered that all trees will be lost and the wildlife corridor fragmented.

There are currently stands of invasive Japanese knotweed in several areas of the proposed development. The management/removal of this species would be a positive impact, as it would open up areas for recolonisation by native species and would control the pervasive spread of these alien species.

In the vicinity of the Elderslie Loop there may be the loss of a narrow strip of scrub to allow the establishment of a working area and allow machinery to travel beside the existing rail lines.

A number of contractor's compounds would be established along the route. The impacts are summarised in Table 9.10 below.

**Table 9.10 Summary of Construction Impacts from Contractor's Compounds**

<b>Contractor's Compound</b>	<b>Impact</b>
Playing Fields at St Andrew's Crescent (Glasgow Airport)	Temporary loss of low value intensively managed amenity grassland, high degree of success for reinstatement once works complete
St James' Park	Temporary loss of low value intensively managed amenity grassland, high degree of success for reinstatement once works complete
Area of land immediately to the south of the Paisley viaduct between Renfrew Road and East Buchanan Street	Currently used as car park. No loss of vegetation or impact on wildlife.
Area at the junction of the dismantled Arkleston Branch to the north of the main line (adjacent to Gallowhill Industrial Estate)	Loss of scrub woodland and fragmentation of wildlife corridor. Moderate potential for reinstatement once works completed
Area to the south of Five Pitches Road immediately to the north of Cardonald Junction	Temporary loss of introduced shrub and low value intensively managed amenity grassland. High probability for reinstatement. Potential loss of scrub woodland.
Area of land owned by SPT on the same site of a Transco Gas Holder north of the railway (with access from Broomloan Road near the junction with Paisley Road West)	Loss of unknown area of scrub woodland and small area of improved grassland. Fragmentation of wildlife corridor. Moderate potential for reinstatement
Area of land on the site of an abandoned works adjacent to the railway at Shields Junction	No loss of vegetation or impact on wildlife
Area of land owned by NR to the south of Arkleston Road bridge next to Barshaw Golf Course	Loss of plantation woodland and scrub woodland along with intensively managed low species diversity amenity grassland. High potential for reinstatement

It is noted above that at the proposed Broomloan Road contractor's compound an area of trees would require removal. However it is unclear at this time the scale of removal required but it is assumed that only the area adjacent to the rail line would be used.

#### 9.4.3.8 Alien/Invasive Species

Construction works may contribute to the spread of alien/invasive species. However, assuming that all construction operations (including establishing contractor's compounds and other works locations work sites) are carried out following the proposed mitigation measures, this impact will be negligible. The removal and control of these species would allow new habitats of greater species diversity to establish. This would be a positive impact.

#### 9.4.3.9 Designated Sites

As noted in Section 9.3.5 there are no national or internationally designated areas present within or immediately adjacent to the proposed development site. The rail corridor is considered to be a wildlife corridor and although not an official designation it does receive recognition from the planning authority. It is noted that most works will be carried out along the line of the track and as such works would not enter adjacent areas.

It is proposed to construct the relocated fuel farm adjacent to Paisley Moss LNR. By following the COCP, strict compliance with recognised guidelines and through the implementation of best construction practice there should be a moderate to minor negative impacts on the moss. However, if these guidelines are not strictly adhered to, construction activities could result in major (i.e. significant) impacts to the designated site.

#### 9.4.4. Predicted Impact Significance

Taking the above issues into account, the predicted impact significance on the above noted receptors is summarised in Table 9.11 below.

**Table 9.11 Summary of Construction Impact Significance**

Receptor	Impact Significance
Bats	Negligible
Badger	Negligible
Otter	Negligible
Birds	Minor
Amphibians	Negligible
Aquatic Ecology	Moderate - Minor negative
Flora/Habitats	Minor negative
Designated Sites	Moderate - Minor negative

## 9.5. Permanent and Operational Impacts

### 9.5.1. Potential Impacts

Potential permanent and/or operational impacts relate to long-term effects resulting from construction activities and the day-to-day functioning of the proposed development which include the increased movement of vehicles and the maintenance of rail infrastructure, such as:

- Permanent landtake and loss of habitat;
- Permanent habitat fragmentation;
- Changes in habitat management;
- Creation of new areas of habitat;
- Changes to access arrangements for sites of nature conservation and amenity value; and
- Polluting matter, such as grease, oils or fuel entering watercourses.

### 9.5.2. Mitigation

#### 9.5.2.1 Bats

As with during the construction phase of the proposed development, light levels are crucial. Security lighting for the fuel farm will need to be carefully designed to minimise light spillage onto Paisley Moss and surrounding areas. This could include the use of directional lighting pointing away from the moss along with low reflective cladding on the storage tanks to reduce reflecting light towards the moss. Also metal halide and mercury-vapour lamps should not be used due to the potential for insects to be attracted from the moss into areas where bats could be more open to predation.

#### 9.5.2.2 Badgers

Prior to the commencement of the construction works a badger survey would be carried out to update current knowledge. This survey would form the basis of any permanent mitigation measures such as the location of fencing and tunnels. If badgers were found during this survey the specification of fencing and tunnels would be agreed with SNH prior to commencement.

#### 9.5.2.3 Otters

The increased number of trains operating on the existing viaduct over the White Cart has the potential to cause disturbance to otters through noise and dust. However, it should be noted that the frequency of trains running along this section of the rail line would prevent the build up of soils and other airborne particulates that could contribute towards a dust nuisance. There is also a very slight chance of incidental pollution from oils and grease being deposited on the tracks and adjacent area from the running gear of the trains. This would however be very infrequent and very slight. The use of appropriate drainage and oil traps would reduce the potential for polluting materials to enter adjacent watercourses to negligible.

#### 9.5.2.4 Birds

During the maintenance of trackside vegetation, where practical the clearance of all vegetation would be timed to occur outside the breeding season, March – September inclusive. If any clearance of vegetation is required during the breeding season, as law protects all breeding birds, vegetation should be inspected for any nests beforehand by a suitably qualified ecologist.

Landscape proposals would primarily use native species of proven Scottish provenance, which would provide appropriate cover and foraging habitat for birds as well as other fauna.

Along the proposed new access road to the relocated fuel farm a speed limit would reduce the noise level and dust creation during dry spells from tankers and cars approaching or leaving the fuel farm.

#### 9.5.2.5 Amphibians

The amphibian survey found no evidence for the presence of any newt species and only 1 adult frog found at Paisley Moss LNR. The establishment of the buffer zone between the fuel farm and the LNR along with a suitable means to prevent surface water from the fuel farm entering the moss (as noted below) therefore reducing the probability of pollution, are considered to be adequate to mitigate impacts on amphibians.

#### 9.5.2.6 Flora/Habitats

Wherever practicable mature trees adjacent to St James' Park would be retained. Additional planting, in accordance with good ecological principles, would be carried out in those places where practicable and in accordance with the landscape plan. Wherever possible new planting would consist of native species of proven local provenance. Species would be suited to ground conditions and would, where practical, form ecological continuums between existing habitats.

In the area between the proposed fuel farm and Paisley Moss, a tree and shrub belt should be planted (in accordance with BAA bird hazard guidance). This would reduce the operating impact of the structure on the wildlife found on the moss. It would also create an additional habitat.

#### 9.5.2.7 Aquatic Ecology/Designated Sites

Oil and lubricants such as grease could fall from trains as they run along the proposed route. The installation of oil traps where drainage systems empty into watercourses would reduce the level of pollution entering any watercourse.

The construction of a SUDS has been proposed. At this time no details are available as to where this system would be constructed or details of how it would be constructed. However it should be noted that if constructed in accordance with guidelines, such a drainage system would have a positive impact on local surface water quality and therefore aquatic ecological resources of the area.

There is the potential for fuel to be spilled when being transferred to and from tankers, or from a major leak. In order that the impacts of such an occurrence are mitigated the area would require to be bunded in accordance with SEPA guidelines. The drainage of the site would also require to be designed in such a manner as to cope with low as well as high levels of aviation fuel spillage. Drains would also require to contend with storm surges in order that surface water from impermeable surfaces within the fuel farm are not discharged to surface water bodies. In order that any surface water in the fuel farm, from rain or snow, cannot enter the groundwater, all impermeable surfaces should slope towards appropriately constructed drains and away from Paisley Moss.

### 9.5.3. Residual Impacts

#### 9.5.3.1 Bats

The lighting design of the fuel farm is of critical importance. If the mitigation were followed the impact on bats would be minor with no loss of available foraging sites with no additional lighting affecting foraging routes to and from the moss.

#### 9.5.3.2 Badgers

The impact of the operation of the new train line on badgers is dependant on the findings of the pre construction survey. Currently no badger activity has been found at either St James' Park or between Arkleston Road Bridge and Penilee Road. Works along the track are summarised in Table 9.2. If badgers are present along the proposed route there may be a slight increase in the frequency of trains passing setts. However, badgers are known to be present alongside some of the busiest railway lines in the UK and as such it is considered that the impact of the operation of the new route on badgers would be negligible.

#### 9.5.3.3 Otters

The additional trains using the main line crossing the White Cart would result in a negligible impact on otters. Otters in this area would quickly adapt to the increased intermittent noise.

#### 9.5.3.4 Birds

Although there will be a slight increase in the number of trains operating along parts of the route, it is considered that impacts will be negligible with birds quickly adapting to the impacts resulting from an increased number of trains.

During the Common Bird Census carried out on Paisley Moss LNR and its immediate vicinity, a number of bird breeding territories were identified, some of which close to the proposed fuel farm location. As a

consequence a large proportion of the known nesting and foraging habitat for the following birds would be lost:

- Wren (*Troglodytes troglodytes*)
- Sedge warbler (*Acrocephalus schoenobaenus*)
- Goldfinch (*Carduelis Carduelis*)
- Blackbird (*Turdus merula*)
- Song thrush (*Turdus philomelos*)
- Reed bunting (*Emberiza schorniclus*)
- Dunnock (*Prunella modularis*)
- Whitethroat (*Sylvia communis*)
- Greenfinch (*Carduelis chloris*)

There is limited nesting and foraging habitat outwith the vicinity of the moss, this is due in part to BAA guidelines for bird strike hazard at airports, the adjacent motorway and road infrastructure and the surrounding land being dominated by agriculture. If this section of the moss were lost it would result in a moderate negative impact on birds.

The disturbance that would result from the operation of the fuel farm would add to the vehicle noise already present as a result of the airport and adjacent road network. However, this increased noise level would be intermittent and birds in the vicinity would quickly adapt to their presence. Consequently the increased noise and physical presence of the fuel farm on birds would result in a minor negative impact.

It is likely that the fuel farm would operate at night with security lighting required. The use of security lighting would illuminate both the fuel farm and the adjacent area which could increase the predation level by owls on small rodents.

Due to the lack of suitable habitat along the route and in the area of the proposed fuel farm location, and the level of disturbance from existing sources, it is unlikely that whooper swans would be found in the vicinity of the works. Consequently, it is highly unlikely that the operation of the proposed rail route and fuel farm would impact them.

#### 9.5.3.5 Amphibians

There would be a negligible impact on amphibians at Paisley Moss from the operation of the rail line and from the operation of the fuel farm.

#### 9.5.3.6 Flora/Habitats

The majority of the proposed route is on an existing busy rail corridor. As such no vegetation would be permanently lost as a result of the operation of this new rail service along the existing rail corridor.

There will be a permanent loss of a number of habitats in those areas where the proposed new section of track would be built, namely through Murray Street industrial estate and St James' Park to Glasgow Airport. In Murray Street industrial estate there is limited flora with only very small areas of scrub present. Although some will be permanently lost it is of such low ecological value the loss would not result in a significant impact.

Where the route crosses McFarlane Street and Greenock Road (A726) there would be a loss of approximately 4 to 8 mature street trees. The loss of these trees is not significant in itself, however the fragmentation of the linear feature that these trees create is of increased importance.

In St James' Park there would be a permanent loss of around 5000m<sup>2</sup> of low value amenity grassland. This would be of minor significance as the value of this habitat is very low. At the southern boundary of the park, where the proposed route would cross the M8, there would be the fragmentation of a narrow linear hedge and tree belt.

From the M8 to Glasgow Airport, there would be the loss of small areas of introduced shrub and amenity grassland. This would be of minor significance.

In the vicinity of Paisley Moss there would be a permanent loss of the mosaic of vegetation on the eastern section of the LNR and adjacent area. This includes swamp, tall ruderal and small areas of scrub. Although dominated by tall ruderal habitat, which can readily be recreated, the smaller habitats within the larger area and the ecological interactions between the species can be more difficult to re-create. Consequently this loss would result in a moderate adverse impact. The access road to the fuel farm would cut a beech hedge that runs parallel with the adjacent road. However, this would be of minor significance.

### 9.5.3.7 Aquatic Habitats/Designated Sites

There would be negligible impact on aquatic ecology from the additional trains being operated as a result of this proposal.

In the vicinity of the fuel farm at Paisley Moss there is the potential for surface water to become contaminated with oils and fuel. If allowed to enter the moss this would result in a highly significant impact on both aquatic and terrestrial ecology of the moss. However through the careful design of the fuel farm, incorporating those mitigation measures discussed earlier, and the implementation of best operating procedures, it should be highly unlikely that fuel, oils and such other potentially polluting materials would enter the moss.

As a result the impact on the moss from the operation of the fuel farm would be minor negative.

## 9.6. Summary

Much of the proposed route is contained within the existing rail corridor. From Glasgow Central Station to Paisley St James Station works would be along the track route. As such no vegetation from adjacent areas would be lost as a result of the works. Disturbance to birds and other animals would result from the works but this would be intermittent and temporary.

Badgers may be found along the route on embankments. This would require verification prior to the commencement of works in order to comply with the relevant badger legislation. However it is noted that even if sett entrances were immediately adjacent to the rail lines, the use of temporary fencing to prevent human encroachment onto the setts and to comply with licence conditions, disturbance would be intermittent and temporary and would not result in a significant impact.

From Paisley St James to the airport there would be the loss of low species diversity intensively managed amenity grassland and introduced shrub, lollipop trees and amenity planting. All of which can be readily recreated and replaced with compensatory planting as part of the landscape management plan.

The proposed location for the fuel farm and associated access road, adjacent to Paisley Moss LNR, would result in a moderate negative impact on birds, vegetation and the designated site. The construction and operation of this fuel farm would result in the disturbance of birds and other fauna species. However it is noted that wildlife can readily adapt to changing circumstances such as intermittent noise from construction activities and from vehicles delivering and collecting fuel.

The impacts of the proposed rail development are summarised in Table 9.12 below.

**Table 9.12 Summary of Operational Impacts**

Route Section	Summary of Works	Impact Summary	Impact Significance
Elderslie Loop	Track realignment and extension of sidings	Loss of narrow strip of scrub vegetation,	Minor negative
		Minor disturbance of fauna due to increased train movement	Minor negative
Glasgow Airport to Paisley St James	New track through St James' Park to Glasgow Airport	Permanent loss of low species diversity intensively managed grassland, loss of introduced shrub and "lollipop" trees,	Minor negative
		Loss of low ecological value introduced shrub, lollipop trees and amenity grassland in area of airport,	Minor negative
		Permanent loss of vegetation adjacent to Paisley Moss LNR	Moderate negative
		Loss of nesting and foraging habitat for birds,	Moderate negative
		Increased light levels during night time operation – potential increased killing zone for predators,	Minor negative

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Route Section	Summary of Works	Impact Summary	Impact Significance
		Operational disturbance to birds from operation of fuel farm,	Minor negative
		Operational disturbance to bats at Paisley Moss LNR,	Minor
		Disturbance to amphibians from fuel farm,	Negligible
		Impact from potential polluting matter entering paisley moss from fuel farm.	Minor negative
Paisley St James to Wallneuk Junction	No changes to track or adjacent areas.	No permanent loss of vegetation. Negligible impact on wildlife	Negligible
Wallneuk Junction to Gallowhill Road	Changes to existing junction. No works on adjacent land.	No permanent loss of vegetation. Negligible impact on wildlife	Negligible
Arkleston Junction to South Arkleston Farm	2 tracks changing to 3 tracks - New track in centre of existing tracks. Outside track slewed by means of on track machinery – No works on adjacent ground	No permanent loss of vegetation. Negligible impact on wildlife	Negligible
South Arkleston Farm to Shields Junction	2 tracks changing to 3 tracks - New track in centre of existing tracks. No works on embankments	No permanent loss of vegetation. Negligible impact on wildlife	Negligible
Clifford Street to Glasgow Central Station	Limited Track Works	No permanent loss of vegetation. Negligible impact on wildlife	Negligible

Note: temporary constructor's compounds are not included within this table. The above table summarises operational impacts only.