<table>
<thead>
<tr>
<th>Chapter</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>LOCAL AIR QUALITY AND CARBON DIOXIDE EMISSIONS</td>
<td>75</td>
</tr>
<tr>
<td>6.1</td>
<td>Introduction</td>
<td>75</td>
</tr>
<tr>
<td>6.2</td>
<td>Assessment Criteria</td>
<td>75</td>
</tr>
<tr>
<td>6.3</td>
<td>Baseline Environment</td>
<td>76</td>
</tr>
<tr>
<td>6.4</td>
<td>Construction Impacts</td>
<td>88</td>
</tr>
<tr>
<td>6.5</td>
<td>Operational Impacts</td>
<td>91</td>
</tr>
<tr>
<td>6.6</td>
<td>Carbon Dioxide Emissions</td>
<td>91</td>
</tr>
<tr>
<td>6.7</td>
<td>Summary and Conclusions</td>
<td>92</td>
</tr>
<tr>
<td>7</td>
<td>TRAFFIC AND TRANSPORT</td>
<td>95</td>
</tr>
<tr>
<td>7.1</td>
<td>Introduction</td>
<td>95</td>
</tr>
<tr>
<td>7.2</td>
<td>Assessment Methodology</td>
<td>95</td>
</tr>
<tr>
<td>7.3</td>
<td>Baseline Environment</td>
<td>97</td>
</tr>
<tr>
<td>7.4</td>
<td>Construction Impacts</td>
<td>99</td>
</tr>
<tr>
<td>7.5</td>
<td>Operational Impacts</td>
<td>100</td>
</tr>
<tr>
<td>7.6</td>
<td>Mitigation Measures</td>
<td>103</td>
</tr>
<tr>
<td>7.7</td>
<td>Summary and Conclusions</td>
<td>105</td>
</tr>
<tr>
<td>8</td>
<td>ECOLOGY AND NATURE CONSERVATION</td>
<td>107</td>
</tr>
<tr>
<td>8.1</td>
<td>Introduction</td>
<td>107</td>
</tr>
<tr>
<td>8.2</td>
<td>Sources of Information</td>
<td>107</td>
</tr>
<tr>
<td>8.3</td>
<td>General Ecological Context</td>
<td>108</td>
</tr>
<tr>
<td>8.4</td>
<td>Designated Sites</td>
<td>109</td>
</tr>
<tr>
<td>8.5</td>
<td>Habitats and Species of Note</td>
<td>113</td>
</tr>
<tr>
<td>8.6</td>
<td>Potential Impacts</td>
<td>125</td>
</tr>
<tr>
<td>8.7</td>
<td>Assessment of Impacts</td>
<td>126</td>
</tr>
<tr>
<td>8.8</td>
<td>Construction Impacts</td>
<td>133</td>
</tr>
<tr>
<td>8.9</td>
<td>Operational Impacts</td>
<td>134</td>
</tr>
<tr>
<td>8.10</td>
<td>Cumulative Impacts</td>
<td>135</td>
</tr>
<tr>
<td>8.11</td>
<td>Summary of Impacts</td>
<td>135</td>
</tr>
<tr>
<td>9</td>
<td>WATER RESOURCES</td>
<td>137</td>
</tr>
<tr>
<td>9.1</td>
<td>Introduction</td>
<td>137</td>
</tr>
<tr>
<td>9.2</td>
<td>Assessment Methodology</td>
<td>137</td>
</tr>
<tr>
<td>9.3</td>
<td>Assessment Criteria</td>
<td>137</td>
</tr>
<tr>
<td>9.4</td>
<td>Baseline Environment</td>
<td>138</td>
</tr>
<tr>
<td>9.5</td>
<td>Potential Impacts</td>
<td>141</td>
</tr>
<tr>
<td>9.6</td>
<td>Mitigation Measures</td>
<td>142</td>
</tr>
<tr>
<td>9.7</td>
<td>Summary and Conclusions</td>
<td>144</td>
</tr>
<tr>
<td>10</td>
<td>ARCHAEOLOGY AND CULTURAL HERITAGE</td>
<td>147</td>
</tr>
<tr>
<td>10.1</td>
<td>Introduction</td>
<td>147</td>
</tr>
<tr>
<td>10.2</td>
<td>Assessment Methodology and Criteria</td>
<td>147</td>
</tr>
<tr>
<td>10.3</td>
<td>Baseline Environment</td>
<td>149</td>
</tr>
<tr>
<td>10.4</td>
<td>Assessment of Significance</td>
<td>154</td>
</tr>
<tr>
<td>10.5</td>
<td>Construction Impacts</td>
<td>157</td>
</tr>
</tbody>
</table>
Annex J - Artist Impressions
Annex K - Contamination Levels
1 INTRODUCTION

1.1 ABOUT THIS DOCUMENT

This document relates to the Waverley Railway (Scotland) Bill introduced in the Scottish Parliament in September 2003. It has been prepared by Environmental Resources Management (ERM) on behalf of Scottish Borders Council to satisfy rule 9A.2.3(c)(iii) of the Parliament’s Standing Orders. The contents are entirely the responsibility of the promoter and have not been endorsed by the Parliament.

It reports in full the findings of an Environmental Impact Assessment (EIA) which has been undertaken. It describes the beneficial and adverse environmental impacts arising from the construction and operation of the development and, where appropriate, the measures designed to mitigate any potential adverse impacts. The route is located generally on the former Waverley Railway line (see Figure 1.1).

ERM is an independent environmental consultancy with extensive experience of undertaking EIAs of major development and infrastructure schemes.

1.2 REQUIREMENT FOR ENVIRONMENTAL IMPACT ASSESSMENT

1.2.1 Scottish Private Bills

The construction of new rail infrastructure projects requires specific statutory authorisation. (This is needed so as to give statutory sanction to what could otherwise be a public or private nuisance and as the only means of authorising compulsory purchase of the land required for the railway.) Prior to devolution, railways in Scotland were authorised by means of provisional Orders made under the Private Legislation Procedure (Scotland) Act 1936, which confers functions on the Secretary of State and the UK Parliament. The Scotland Act 1998 (Modifications of Schedule 5) Order 2002 had the effect of devolving to the Scottish Parliament functions connected with “the promotion and construction of railways which start, end and remain in Scotland”. The 1936 Act therefore no longer applies to railways that come within this description. Such railways must now be authorised by a Private Bill in the Scottish Parliament.

1.2.2 Environmental Impact Assessment (Scotland) Regulations 1999

European legislation (EC Directive 85/337/EEC as amended by EC Directive 97/11/EC) provides the framework for the EIA. In Scotland, this is transposed into domestic law for development projects authorised under planning legislation through the Environmental Impact Assessment (Scotland) Regulations 1999, as amended by the Environmental Impact Assessment (Scotland) Regulations 2002 (SSI 20002/324) (the EIA Regulations). The requirements of the EIA Regulations are applied to the procedures for Scottish Private Bills authorising works by virtue of
Rule 9A.2.3(c)(iii) of the Standing Orders of the Scottish Parliament and the 
Presiding Officer’s determinations as set out in Annexes K to N to the Parliament’s 
Guidance on Private Bills. The findings of the EIA for this study are summarised in 
this Environmental Statement (ES).

1.3 BACKGROUND INFORMATION

In the 1950s Midlothian and the Scottish Borders were served by an extensive 
network of main and branch line railways, but the British Railways Board’s (BRB) 
1963 Beeching Report identified none of the then remaining rail routes (other than 
the East Coast Main Line skirting the eastern edge of the region) as suitable for 
retention. By 1966 only the East Coast Main Line and the Waverley Line remained.

Consent for closure was obtained in 1966. All passenger and through freight 
services were withdrawn in January 1969 with local freight traffic ceasing three 
months later. The track was lifted during 1969 and 1970. Closure of the Waverley 
Line left Midlothian and the Scottish Borders as the only region on the British 
mainline without a railway station (East Coast Main Line trains pass through 
without stopping). Although there have been major road improvements since 1969, 
the rail closure has not been made good by alternative public transport links to 
Midlothian and the Scottish Borders.

1.4 APPROACH TO THE ENVIRONMENTAL IMPACT ASSESSMENT

The EIA has been undertaken following the guidance set out in the EIA Regulations. 
A Scoping Report was issued to all of the statutory consultees in June 2002 which 
identified the scope and methodology for the EIA, based on a consideration of the 
potential environmental impacts and opportunities arising from the construction 
and operation of the proposed scheme. Comments received from the statutory 
consultees are summarised in Section 1.9 and incorporated in this ES.

1.5 SCOPE OF THE ENVIRONMENTAL IMPACT ASSESSMENT

1.5.1 Technical Scope

Overview

The range of environmental topics addressed in the EIA is referred to as the 
technical scope.

Part I of Schedule 4 to the EIA Regulations requires that the ES should describe the 
aspects of the environment likely to be significantly affected by the proposed 
project, including, in particular:

- population;
fauna; flora; soil; water; air; climatic factors; material assets, including the architectural and archaeological heritage; landscape; and the inter-relationship between the above factors.

Paragraph 4 of Schedule 4, Part I requires that the description of the likely significant effects should cover the direct effects and any indirect, secondary, cumulative, short, medium and long-term, permanent and temporary, positive and negative effects of the project, resulting from:

- the existence of the project;
- the use of natural resources; and
- the emission of pollutants, creation of nuisances and elimination of waste.

A scoping exercise has been undertaken to determine whether any environmental issues might be wholly or partially omitted from the EIA on the grounds that they were unlikely to give rise to significant environmental effects (ie ‘scoped out’). The findings of this exercise were reported in a Scoping Report (1). Although the undertaking of a scoping exercise is not a requirement of the EIA Regulations, it is generally recognised as good EIA practice (2) and was fully supported by the promoters of the scheme.

For the purpose of the scoping exercise, the list of issues from the EIA Regulations was refined and adapted with reference to good EIA practice, particularly in the context of heavy rail infrastructure. The refined list is as follows:

- planning policy;
- land use;
- socio-economics;
- traffic and transport;
- noise and vibration;
- air quality;
- landscape/townscape and visual effects;
- ecology and nature conservation;
- aquatic environment;
- archaeology and cultural heritage; and
- contaminated land and waste.

The issues set out in Table 1.1 below, reproduced from the Scoping Report, form the technical scope that has been addressed in the EIA and reported in the ES.

Table 1.1  
Environmental Issues Included in the Scope of the EIA

<table>
<thead>
<tr>
<th>Issue</th>
<th>Construction</th>
<th>Operation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Significant effect unlikely</td>
<td>Significant effect possible</td>
</tr>
<tr>
<td>Planning</td>
<td>V</td>
<td>V</td>
</tr>
<tr>
<td>Land Use</td>
<td>V-</td>
<td>V +/-</td>
</tr>
<tr>
<td>Noise and Vibration</td>
<td>V-</td>
<td>V +/-</td>
</tr>
<tr>
<td>Landscape and Visual</td>
<td>V-</td>
<td>V +/-</td>
</tr>
<tr>
<td>Traffic and Transport</td>
<td>V-</td>
<td>V +</td>
</tr>
<tr>
<td>Waste Management</td>
<td>V-</td>
<td>V +/-</td>
</tr>
<tr>
<td>Archaeology and Cultural Heritage</td>
<td>V-</td>
<td>V</td>
</tr>
<tr>
<td>Air Quality and Dust</td>
<td>V-</td>
<td>V</td>
</tr>
<tr>
<td>Ecology</td>
<td>V-</td>
<td>V +/-</td>
</tr>
<tr>
<td>Water Resources</td>
<td>V-</td>
<td>V +/-</td>
</tr>
<tr>
<td>Ground Quality and Contamination</td>
<td>V-</td>
<td>V</td>
</tr>
<tr>
<td>Socio-economics</td>
<td>V</td>
<td>V</td>
</tr>
</tbody>
</table>

+ positive impact
- negative impact

1.5.2 Spatial Scope

The geographical scope of the EIA takes into account the following factors:

- the physical extent of the proposed works, defined by order limits;
- the nature of the baseline environment;
- the manner in which the impacts are propagated; and
the pattern of governmental units (local/ regional/ national) which provide the planning and policy context for the project.

For example, any potential effects on archaeology would be confined to those areas physically disturbed by the works, whilst the effects of noise or visual intrusion could potentially be experienced at some distance. The significance of effects also varies spatially - many effects will only be significant locally (ie in the immediate vicinity of the site) whilst others may be significant at a scheme-wide level as described below.

1.5.3 Temporal Scope

The prospective construction timetable for the scheme is projected to be Spring 2005 to 2008 as described in Section 2.7.

For the operational phase, the temporal scope relates to scheme opening in 2008. For certain environmental topics, where effects are dependent on longer term considerations (eg operational noise and operational traffic) the temporal scope is extended beyond the scheme opening to take account of the longer term nature of effects which might occur.

1.6 The Strategic Objectives for the Scheme

The scheme is being promoted as the best way to achieve the following objectives:

- enabling ready access to Edinburgh's buoyant labour market for workers living in the area to be served by the railway;
- providing an incentive to inward investment in the area;
- assisting the City of Edinburgh to manage its demand for housing by spreading commuter pressure southwards; the railway is essential to prevent such movement resulting in longer car commuting journeys;
- helping to improve accessibility of Midlothian and the Borders as a "connected place", thereby increasing the attractiveness of the area as a location for business investment;
- to increase the potential for future commuter trips to Edinburgh to be made by public transport rather than by car and therefore reducing the projected increase in congestion, particularly in the Southern approaches to Edinburgh;
- the promoting of accessibility to and from the Borders and Midlothian to the Capital and Central Belt including the airport;
- stimulating new housing development and assisting in the growth of Midlothian and Borders population including the reversal of the ageing trend of the present population;
increasing local spend in the Midlothian and the Borders to increase the vibrancy and sustainability of the Community; and

• assisting with the retention of population in the Borders by providing efficient transportation, allowing for commuting, to remove the need for those affected by job losses relocating outwith the area to obtain new employment.

1.7 THE OBJECTIVES OF THE ASSESSMENT

1.7.1 Overview

The objectives of the assessment have been to:

• establish and review existing environmental conditions pertaining to the site of the scheme and the surrounding area;

• identify the environmental effects of the activities involved in the construction and operation of the scheme, taking into account the characteristics of the scheme, the local environment and the concerns of interested parties;

• predict and evaluate the extent and significance of these impacts on people and the natural and built environment;

• describe measures that will be taken to minimise or remove these effects to acceptable levels; and

• provide a framework for consultation with public authorities and interested parties.

1.7.2 Determining Significance of Impacts

An important part of the EIA process is establishing the significance of the environmental impacts of the scheme. A common definition of significance has been used in order to ensure consistency of assessment throughout the study. A significant impact is defined as one which should be taken into account in the decision-making process and has been, and will continue to be, addressed in the design process where practicable. This definition has provided a framework within which to predict the significance of impacts for each environmental topic.

Where significant impacts have been predicted, appropriate mitigation measures have been identified and residual impacts determined accordingly.

Significant effects are reported at two levels: site-specific and scheme-wide.

Site-specific effects comprise:
effects which result from a geographically localised impact and which are significant primarily at a neighbourhood or district level; and
cumulatively significant effects which result from the combination of individually non-significant effects between different topics at a specific location.

Scheme-wide effects comprise:
effects which are individually significant at a scheme-wide or regional level, but which are unlikely to be significant locally;
effects which are cumulatively significant at a project-wide or regional level because of the aggregation of significant site-specific effects within an individual topic; and
site-specific effects, or combination of effects, of particular importance.

Following their identification, significant effects will be classified on the basis of their nature and duration, as follows.

Positive effects. Effects that have a beneficial influence on receptors and resources.

Negative effects. Effects that have an adverse influence on receptors or resources.

Temporary effects. Effects that persist for a limited period only, due for example to particular construction activities (e.g. noise from construction plant). Where possible, the likely duration of effects will be identified.

Permanent effects. Effects which result from an irreversible change to the baseline environment (e.g. landtake) or which persist for the foreseeable future (e.g. noise from operation).

Direct effects. Effects which result from the impact of activities that form an integral part of the project (e.g. new infrastructure).

Indirect effects. Effects that arise from the impact of activities not explicitly forming part of the project (e.g. increased road traffic at stations).

Secondary effects. Effects which arise as a result of an initial effect of the scheme (e.g. reduced amenity of a community facility as a result of construction noise).

Cumulative effects. Those which arise from the combination of different effects at a specific location, the recurrence of effects of the same type at different locations and the interaction of different effects over time.
1.7.3 **Identification of Mitigation Measures**

The term mitigation refers to the range of measures which have been incorporated into the scheme in order to avoid, reduce or remedy potential impacts. Throughout the development of the scheme, mitigation measures have been identified to address potentially significant adverse impacts. The mitigation measures referred to in this document have been approved by the promoters and the capital costs have made provision for including them into the scheme.

1.8 **Structure of the Environmental Statement**

The remainder of the ES is structured as follows:

- Section 2 describes the proposed scheme and provides information on the need for the scheme, alternatives that were considered and the assumed construction methodology and programme.
- Section 3 provides the planning context for the scheme, including national and regional policy guidance and local planning policies.
- Sections 4 to 13 present the results of the specific assessments for each environmental topic, including an identification of any significant impacts predicted to arise and mitigation measures which have been developed to remedy or reduce these, as appropriate.
- Section 14 provides a summary of the assessment, highlighting any residual significant impacts that are predicted to remain after mitigation.

The following annexes are included in support of the assessment (Annexes A to K).

- Annex A – Information to be Included in Environmental Statements: contents
- Annex B – Glossary of Terms
- Annex C – List of Consultees
- Annex D – Draft Code of Construction Practice
- Annex F – Heritage Environmental Report
- Annex G – Archaeology
- Annex H – Landscape Character Areas
- Annex I – Photomontages
- Annex J – Artist Impressions
- Annex K – Contamination Levels

1.9 **Consultation**

In accordance with the EIA Regulations, consultation has been undertaken to ensure that statutory organisations are given the opportunity to express an opinion on the
details of the project and the ES. The statutory bodies contacted are outlined in Table 1.2, which also summarises their principal concerns at the time of initial consultation for the EIA. As noted above, a Scoping Report was issued stating the methodology for the EIA and the proposed scheme. Annex C shows all consultation undertaken.

Table 1.2  Summary of Consultation Responses to the Waverley Railway Bill Scoping Report

<table>
<thead>
<tr>
<th>Consultee</th>
<th>Date of reply</th>
<th>Principal Concerns</th>
<th>Where Addressed in ES</th>
</tr>
</thead>
<tbody>
<tr>
<td>HS</td>
<td>30th July 2002</td>
<td>Gives substantial definitions for archaeology, historic environment and cultural heritage. HS identifies that the scheme will raise significant industrial archaeological issues. Generally where the scheme re-uses the original railway corridor it is unlikely to have implications for any of the very many scheduled monuments and archaeological sites located along the route.</td>
<td>Dealt with in Section 10.</td>
</tr>
<tr>
<td>SEPA</td>
<td>2nd August 2002</td>
<td>SEPA does not take issue with the general content of the Scoping Report. However, there are a number of environmental issues which merit further comment and should be reflected in the ES.</td>
<td>Dealt with in Section 9.</td>
</tr>
<tr>
<td>Scottish Water</td>
<td>13th August 2002</td>
<td>Impacts during construction, interference with existing surface drainage routes and the potential impact on existing infrastructure. Would also like to see included effects on demand forecast, impact on Local Development Plans and if there is the requirement for diversion of any services.</td>
<td>Dealt with in Sections 3 and 9.</td>
</tr>
<tr>
<td>Scottish Natural Heritage</td>
<td>16th August 2002</td>
<td>The landscape and visual impacts and the ecology sections are comprehensive in terms of the methodology proposed, the identification of potential impacts as well as the positive approach to mitigation measures.</td>
<td>Dealt with in Section 8 and 11.</td>
</tr>
<tr>
<td>Consultees</td>
<td>Date of reply</td>
<td>Principal Concerns</td>
<td>Where Addressed in ES</td>
</tr>
<tr>
<td>----------------------------</td>
<td>-----------------------</td>
<td>-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>-----------------------</td>
</tr>
<tr>
<td>City of Edinburgh Council</td>
<td>11&lt;sup&gt;th&lt;/sup&gt; September 2002</td>
<td>The study appears to have identified the full range of issues that will need to be addressed in the EIA submission, but the Local Authority can ask the applicant to address additional issues if not considered at the time of the formal submission.</td>
<td>-</td>
</tr>
<tr>
<td>Midlothian Council</td>
<td>24&lt;sup&gt;th&lt;/sup&gt; December 2002</td>
<td>The Council did not have any comment at this stage with the content of the Scoping Report.</td>
<td>-</td>
</tr>
<tr>
<td>Scottish Borders Council</td>
<td>13&lt;sup&gt;th&lt;/sup&gt; November 2002</td>
<td>The Council’s Natural Heritage Officer had a number of comments regarding the ecology survey work. Also concerns regarding the reinstatement of the footpaths to minimise social exclusion. Ecology survey work has been prepared following the guidance stated within Phase 1 Habitat Survey method (NCC 1990, and revised JNCC 1993).</td>
<td>-</td>
</tr>
<tr>
<td>Health and Safety Executive</td>
<td>No response.</td>
<td>Follow-up telephone calls were made to chase a response.</td>
<td>-</td>
</tr>
<tr>
<td>Scottish Executive</td>
<td>No response</td>
<td>Follow-up telephone calls were made to chase a response.</td>
<td>-</td>
</tr>
</tbody>
</table>
2 PROJECT DESCRIPTION

2.1 NEED FOR THE SCHEME

As previously identified the Scottish Borders is one of the most isolated sub regions in Western Europe. Although some significant road improvements have been undertaken since 1969, the dramatic increase in the travel time and reduction in the quality of service of longer distance public transport that resulted from rail closure still persists.

The potential benefits of the new rail line include:

- providing new jobs to replace those lost in the decline of traditional industries;

- increasing availability of housing options in the Scottish Borders and Midlothian, in turn reducing the pressure on Green Belt land around Edinburgh;

- reduction of road traffic on the A7 and / A68 given a direct and time efficient route to and from Edinburgh and the Scottish Borders;

- retention of young people and attracting new people of all ages to the Scottish Borders to live and work;

- improved work and educational access from the Scottish Borders for people without cars; and

- increased opportunities for the transfer of tourists to and from Edinburgh, Midlothian and the Scottish Borders.

There will be significant economic benefits to the Scottish Borders, and the re-establishment of rail links from Edinburgh would be a positive step in the wider regeneration plans for the region.

2.2 GENERAL DESCRIPTION

2.2.1 Overview

The new railway will run between Newcraighall on the outskirts of Edinburgh and Tweedbank, west of Melrose. The route is shown on Figure 1.1. It is approximately 48km long. The majority of the route will utilise the existing solum with the exception of the section that lies within the South East Wedge (approximately 3km), a section near Falahill (approximately 2km) and a section within Galashiels (approximately 1km). There will be approximately 100 structures, many of which exist already. These comprise road bridges, river bridges, foot bridges, under
passes etc. There will be six new stations: Shawfair, Eskbank, Newtongrange, Gorebridge, Galashiels and Tweedbank.

The assessment is based on the assumption that the railway will be used by a half hourly Class 158 or 170 train service running in each direction between 5.55 am and 12.30 am each day. Each train will have a maximum six carriage length. Trains will be diesel and the scheme does not require overhead lines. Signals and signposts will be installed in line with current safety standards.

The railway will be fenced with 1.8m high palisade or 1.4m high, 7 strand post and wire fencing. This will be positioned at the bottom of embankments or the tops of cuttings, at the edge of the railway owned land. The rails will be set approximately 2m apart and pale grey concrete sleepers will be 2300mm long x 290mm wide x 200mm deep, and they will be positioned 700mm apart along the length of the route. Between the sleepers will be ballast (grey stone material), minimum 75mm in size. There will also be lineside drainage, principally through cuttings.

Within the original twin track railway corridor the single track alignment would predominantly follow one side of the corridor leaving the other side for maintenance access. It has been assumed that the proposed tracks will generally follow the previous vertical alignment except at key constraints such as the A7 crossing at Gorebridge / Shankend where to overcome or minimise these constraints the proposed vertical alignment has been adjusted by generally steepening the track.

The following information provides more detail about the scheme including reference to the Works Number identified on the Parliamentary Plans (see Table 2.1).

Table 2.1  
Boundaries of the Work Numbers Identified on the Parliamentary Plans

<table>
<thead>
<tr>
<th>Works Number</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Railway between Millerhill Marshalling Yard and Old Dalkeith Road</td>
</tr>
<tr>
<td>2</td>
<td>Railway between Old Dalkeith Road and the Butlerfield Industrial Estate</td>
</tr>
<tr>
<td>3</td>
<td>Railway between Butlerfield Industrial Estate and Borthwick Mains Cottages</td>
</tr>
<tr>
<td>4</td>
<td>Railway between Borthwick Mains Cottages and Cowbraehill</td>
</tr>
<tr>
<td>5</td>
<td>Railway between Cowbraehill and Stagebank</td>
</tr>
<tr>
<td>6</td>
<td>Railway between Stagebank and Hazelnah Quarry</td>
</tr>
<tr>
<td>7</td>
<td>Railway between Hazelnah Quarry and Stow</td>
</tr>
<tr>
<td>8</td>
<td>Railway between Stow and Bowland Bridge</td>
</tr>
<tr>
<td>9</td>
<td>Railway between Bowland Bridge and Torwoodlee</td>
</tr>
<tr>
<td>10</td>
<td>Railway between Torwoodlee and Tweedbank</td>
</tr>
</tbody>
</table>
2.2.2 Newcraighall to Sheriffhall  Part of Work No 1

The alignment consists of a new route from the Edinburgh Crossrail service turnback siding south of Newcraighall Station to King's Gate/ Sheriffhall. The horizontal alignment includes the first of three dynamic passing loops and a new Shawfair Station. A number of new overbridges will be constructed as part of the development to carry road traffic across the new rail line. The former Loanhead rail branch line will be bisected, although provision for a later connection off the Waverley Line has been made. A new twin track concrete underbridge will allow the new line and loop to cross under the Edinburgh City By-Pass.

2.2.3 Sheriffhall to Hardengreen  Part of Works Nos 1 and 2

The first loop ends just north of King's Gate bridge. The horizontal track alignment would then follow the centreline of the former route with a new single track. The vertical alignment would also be as before with central headroom below arched bridges being greater than the minimum required. The line would be placed centrally between the former Eskbank station platforms with the new station located further south on the edge of Eskbank and consist of a new single flanking platform.

2.2.4 Hardengreen to Gore Glen Country Park  Part of Work No 2

The horizontal alignment would follow the centreline of the former route, as would the vertical alignment, thus avoiding conflict with existing structures.

2.2.5 Gore Glen Country Park to Gorebridge Part of Work No 3

A new horizontal alignment has been engineered through Gore Glen Country Park, over the A 7 and through Gorebridge. The alignment provides the required speed while minimising land take and earthworks. Through the former/new station area a new curved alignment has been used to ensure the existing steep cutting slopes do not need to be disturbed.

In order to accommodate operational flexibility, a turnback siding for passenger trains will be provided between the A 7 crossing and Gorebridge Station. The siding will have additional capacity for stabling on-track maintenance plant.

2.2.6 Gorebridge to Falahill Part of Works Nos 3 and 4

This section of the former line has the poorest alignment with the line routed in a weaving fashion through deep cuttings and on high embankments east then north and south before curving back to the south and east on the approach to Falahill. The second of the dynamic loops is located in the north end of this section. The steep (1 in 70) gradients are perpetuated in the new vertical geometry as the railway approaches the route's summit at Falahill before the descent to Galashiels.

Through Falahill a new horizontal alignment has been chosen to reduce intrusion to the local residents where the former route passes close to the east (rear) side of their
properties and is now used as an access to their private garages. The A7 road passes close to the west side of the properties and by having a new rail route further west of the A7, intrusion would be minimised. The new route crosses below a realigned A7 by way of a new skewed overbridge. A vertical alignment has been designed to reduce landtake and earthworks with most of it in cutting, which also assists in providing the required headroom to the new road crossing.

2.2.7 Falahill to Gala Bank/Bowshank Tunnel Part of Works Nos 5 to 8

This section of the line crosses over the meandering Gala Water by way of existing underbridges with centre girders which constrain horizontal alignment choice to following the alignment of one of the two former tracks (the eastern side has been chosen to best suit speed). Arched overbridges and Bowshank Tunnel further constrain the alignment elsewhere to a central position. The third of the dynamic loops is located in this section with the south end turnout just north of the constraining Bowshank Tunnel. A minor track re-alignment to the west has been introduced to ensure the turnout is located on a straight and the desired turnout speed achieved. A new embankment will support the alignment and two underbridges will be required to be reconstructed/widened to suit. The vertical alignment follows the former and is on falling gradient towards Galashiels. Existing under and over structures prevent any deviation from the original gradients.

2.2.8 Bowshank Tunnel to Galashiels (west) Work No 9

The horizontal track alignment (single track) is again constrained by existing structures but the desired line speed has been achieved with the chosen design. The vertical alignment follows the original arrangement.

2.2.9 Galashiels (Wheatlands Road) Part of Work No 10

On the western side of Galashiels, Wheatlands Road crosses the former route, the previous underbridge was removed and the road horizontal and vertical geometry improved to the detriment of the rail route. While the chosen horizontal alignment follows the former, the vertical alignment involves re-grading/raising the rail line in order to achieve 5.3 m headroom for road vehicles crossing below the railway by way of a new skewed underbridge.

2.2.10 Galashiels (Station Brae to Glenfield Road East) Part of Work No 10

The agreed horizontal alignment of this section of the route deviates further north and east from the former alignment and suits the proposed new development in central Galashiels. This interfaces with the site of the new Galashiels Station located on Ladhope Vale road. East of this point the new route passes below Station Brae road bridge which will be re-aligned/reconstructed. It is assumed the roadworks will be carried out by others and the timing of the works will satisfy the needs of this project.
Several buildings east and west of Station Brae will be acquired and demolished (including within Currie Road Industrial Estate) to accommodate the new alignment where the railway now skirts the lower edge of a steep hillside slope as it routes southeast before crossing Glenfield Road West then re-joins the former route’s alignment.

Through Currie Road Industrial Estate a new raised embankment is required, supported on both sides by retaining walls in order to minimise land take as the railway gains height to pass over Glenfield Road West. Provision for an additional underbridge (with reduced headroom) to allow access to a rail locked area has been made. On the east side of the new bridge an embankment carries the railway using steeper slopes in order to minimise intrusion onto the road and further east to keep clear of private house gardens along Glenfield Road East’s south side.

2.2.11 Galashiels (Winston Road to Tweedbank) Part of Work No 10

The horizontal alignment generally follows the former alignment, the vertical alignment provides the required headroom below a new bridge to carry Winston Road over the railway. The west approach cutting slopes would be engineered to ensure the north edge of the cutting’s footprint does not impinge on the Winston Place flats property limits. The former horizontal and vertical alignment would be followed over the River Tweed to the lines terminus at the new Tweedbank Station. The layout at the station includes an island platform with a buffer ended single track on both sides.

2.2.12 Highways

In addition to the railway infrastructure, alterations to the highways will be required to accommodate the new transport infrastructure. A number of temporary, new and altered highways works have been progressed to an outline design produced for consideration and outline approval. The major highway works are outlined in Table 2.2.

Table 2.2 Main Highways Works

<table>
<thead>
<tr>
<th>Location and Works Number</th>
<th>Brief Description of Works</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shawfair (Part of Work No 1)</td>
<td>Existing roads bisected by the new rail line have been re-aligned / diverted over the railway by four new bridge structures.</td>
</tr>
<tr>
<td>Edinburgh City Bypass (Part of Work No 1)</td>
<td>Temporary off-line to the south alignment of the A720 to allow traffic lanes to bypass the bridge works.</td>
</tr>
<tr>
<td>Eskbank Station (Part of Work No 2)</td>
<td>A new widened access road with cycleway and footpath will be formed to the new station car park from the A7 / A 694 Bellfield roundabout.</td>
</tr>
<tr>
<td>Newtongrange Station (Part of Work No 2)</td>
<td>The new station car park will be accessed off Murderdean Road.</td>
</tr>
<tr>
<td>Gorebridge Station (Part of Work No 3)</td>
<td>The new station car park will be accessed off Station Road.</td>
</tr>
<tr>
<td>Falahill (Part of Work No 5)</td>
<td>The A7 will be permanently re-aligned to the west by up to 30 m over a distance of 660 m mostly on new embankment.</td>
</tr>
<tr>
<td>Location and Works Number</td>
<td>Brief Description of Works</td>
</tr>
<tr>
<td>---------------------------</td>
<td>-----------------------------</td>
</tr>
<tr>
<td>Heriot (Part of Work No 5)</td>
<td>The former railway at-grade crossing of the B709 / Heriot Way just west of its junction with the A7 will be closed for safety reasons and a new off-line grade separated road to the south provided.</td>
</tr>
<tr>
<td>Hanginshaw (Part of Work No 5)</td>
<td>Former occupation bridge will be replaced by a new structure to carry a new public road from the A7 over the railway to an improved junction with an unclassified public road from the A7.</td>
</tr>
<tr>
<td>Fountainhall (Part of Work No 7)</td>
<td>Former level crossing arrangement of the local village unclassified public road is no longer acceptable for safety reasons and a new road will be provided over the railway.</td>
</tr>
<tr>
<td>Bow (Part of Work No 8)</td>
<td>An unclassified public road will be re-aligned and taken below the railway by way of a new structure.</td>
</tr>
<tr>
<td>Wheatlands Road (Part of Work No 10)</td>
<td>The railway will be raised and taken over the road by way of a new skew structure.</td>
</tr>
<tr>
<td>Station Brae (Part of Work No 10)</td>
<td>Station Brae Road will be significantly changed and re-aligned to provide access to the key buildings such as the health centre.</td>
</tr>
<tr>
<td>Currie Road (Part of Work No 10)</td>
<td>A new access will be provided to the estate just east before Wheatlands Road.</td>
</tr>
<tr>
<td>Winston Road (Part of Work No 10)</td>
<td>A temporary off-line diversion provided while the new railway bridge is constructed.</td>
</tr>
<tr>
<td>Tweedbank Station (Part of Work No 10)</td>
<td>A new roundabout will be provided on Tweedbank Drive to allow access to the new station car park.</td>
</tr>
</tbody>
</table>

2.3 POTENTIAL VARIATIONS TO THE SCHEME

2.3.1 Overview

In addition to the ES, the Bill is accompanied by various other documents. These include the Deposited Plans and Sections, which show, amongst other things, the route, the limits of deviation for the scheme and the land to be acquired or used (including temporary use during construction).

The limits of deviation allow for land (or sub-soil) to be used, within the corridor created by the limits, in order to provide the Contractor with an appropriate level of flexibility in developing the detailed design of the scheme.

In accordance with convention and best practice, the assessment in the ES was undertaken for the route alignment (vertical and horizontal) shown on the plans accompanying the Bill documents. However, the Bill powers which Scottish Borders Council are seeking could, in theory, enable the scheme to be constructed within the limits of deviation but not necessarily along the alignment shown in the ES and accompanying plans.

It is considered appropriate, therefore, to ensure that the environmental assessment work takes into account fully all the potential impacts of the scheme, not only of the plan alignment but also any variations which could feasibly be accommodated within the limits of deviation.
On the whole, the limits of deviation are relatively narrow. This means that there is only limited margin for change, in practice, to the alignment within the limits of deviation. For the purposes of this report, the sections of alignment where deviations within the limits might feasibly be exercised are described for the route at Glenfield Road East, Shawfair and Falahill. There is also the potential that at a number of locations twin tracking could occur, although until detailed design and operations modelling this is unable to be answered definitively. Following information provided by the engineers the passing points are constrained by a number of civil engineering restrictions and therefore it is extremely unlikely that this option will be considered further at this stage. There is also limited potential to variation to the vertical alignment due to the number of structures along the route which the railway needs to tie-in with.

Using the effects described in the ES as a “benchmark”, consideration was given as to whether the potential impacts that might arise from the variants to the route would be noticeably different to those impacts reported in the ES.

2.3.2 Glenfield Road East

There is a short section of the route which passes the residential properties of Glenfield Road East, Galashiels. The limits of deviation have been widened to allow for the potential re-alignment closer to the Gala Water.

Following detailed consultation with the local residents there is the potential for an option to vary the railway alignment between the houses and the Gala Water. The assessment has taken into consideration the alignment closest to the properties. Therefore the assessment has examined the worst case impacts upon the residential properties. If the alignment is closer to the Gala Water the scheme will be built in accordance with SEPA’s requirements under PPG 5 (1) and no impacts will arise.

2.3.3 Shawfair

The Shawfair area is currently subject to a larger housing development and the Waverley Railway has been designed to take this into account to minimise any substantial re-alignment if both schemes are developed.

2.3.4 Falahill

There is potential to vary the railway alignment and the A7 road alignment between the residential properties of Falahill and the Gala Water. The potential impacts which may result regarding the re-alignment are similar to those discussed for Glenfield Road East above. The ES assessed the alignment which is closest to the residential properties although the re-alignment may result in the railway ending up closer to the Gala Water. If the alignment is closer to the Gala Water the scheme will be built in accordance with SEPA’s requirements (PPG 5) and no impacts will arise.

(1) PPG5 Works in, Near or Liable to Affect Watercourses, SEPA and Environment Agency.
2.3.5 Conclusions

Potential changes to the vertical and horizontal alignment of the scheme, within the limits of deviation, are feasible at only a limited number of locations along the route. Where such changes can be made, any differences in the reported environmental impacts will not give rise to significant impacts, over and above what is reported in the ES.

2.4 Scheme Alternatives

2.4.1 Overview

An Options Appraisal Report \(^{(1)}\) was prepared in May 2002 to examine the environmental implications of options regarding length, station locations and alternatives to the alignment. The report reviews the performance of the options in relation to the Scottish Executive's Scottish Transport Appraisal Guidance (STAG) \(^{(2)}\) objective for the environment. Since the railway has closed, a number of obstructions have occurred along the route, resulting in potential deviations from the former railway alignment. At these locations options have been considered to provide an alternative alignment where suitable.

An Appraisal Summary Table (AST) was prepared for each of the alternatives. The overall aim of the appraisal was to identify where one alternative performed better or worse than others with respect to each environmental topic.

2.4.2 Length of the Scheme

There were a number of options under consideration for the scheme length, with a termination point at one of either Galashiels, Tweedbank or Charlesfield. Tweedbank was considered to be the optimum termination point during this first stage of the re-opening of the currently disused line.

The main reason for not continuing the Waverley Line at this stage past Tweedbank was the high capital costs associated with this stretch of the route. However, during the options appraisal a number of significant negative environmental impacts to the surrounding area were also predicted to occur as a result of the scheme. The most notable of these are associated with the Archaeological Scheduled Areas at Melrose and Newstead. The area under consideration at Melrose contains a major medieval abbey and its associated lands. Newstead is a major Roman fort with complex archaeological remains of the same period in close proximity to it. In addition to these specific sites the route passes through an area both rich in archaeological remains and dense in its concentration of listed buildings.

\(^{(1)}\) ERM (2002) Waverley Railway Project Environmental Options Appraisal Report
As well as the archaeological issues associated with the extension the route may also have directly affected areas of ecological interest and areas of landscape value. Newtown St Boswells Wood is internationally designated a Special Area of Conservation (SAC) which was likely to suffer habitat loss. Also the protection of the River Tweed system, designated a candidate SAC, would require careful engineering design to minimise the impact to the watercourses.

A termination point at Galashiels was also discounted due to the lack of space to accommodate the turnaround facilities and to discourage cars from coming in to town to park at the station. The first phase termination at Tweedbank was therefore considered to be the most beneficial due to the availability of land for a park and ride and double track for the turnaround.

### 2.4.3 Station Options

The options appraisal work examined six potential stations and their location within the communities. The locations where stations were considered in detail were Shawfair, Eskbank, Newtongrange, Gorebridge, Galashiels and Tweedbank. Within each of the towns a number of station locations were considered to ensure that the most suitable location for a new station was identified. The choice of stations and, in general, their locations were determined as a result of forecast patronage and engineering capability. Where appropriate, environmental issues were also considered.

The potential of a station at Stow at this stage was not considered further because the current population of Stow is approximately 540, which is unlikely in itself to sustain a station in terms of capital and operational costs. It is also understood that the introduction of a stop in this location could adversely affect the railway timetable.

### 2.4.4 Alternatives to the Alignment

In addition to the main options identified above, there were also a number of sub-options that were considered to reduce the impact of a ‘pinch-point’. The majority of these pinch-points have been created since the closure of the original line as a result of residential properties being constructed or road alterations that have taken place. Table 2.3 provides a brief description of the overall assessment.

#### Table 2.3 Alternatives to the Former Railway

<table>
<thead>
<tr>
<th>Description of the Alternatives</th>
<th>Overall Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glenesk Viaduct</td>
<td>Single track is preferred, as it would require minimal work to the listed structure and surrounding environment.</td>
</tr>
<tr>
<td>(Single track or double track over the viaduct)</td>
<td></td>
</tr>
<tr>
<td>Newbattle Viaduct</td>
<td>Single track is preferred, as it would require minimal work to the listed structure and surrounding environment.</td>
</tr>
<tr>
<td>(Single track or double track over the viaduct)</td>
<td></td>
</tr>
</tbody>
</table>
### Description of the Alternatives Overall Assessment

**The Heriot road / rail interface**

(Four options:

1. Reinstate level crossing
2. Bridge at location of level crossing
3. New road access from A7
4. Skew bridge crossing adjacent to level crossing)

A number of options were considered and the preferred option (new road access from A7) would result in the greatest amount of additional land take and impact to the surrounding environment.

**A house on the solum (Stagebank Crossing cottage)**

(Option 1 would be adjacent to the house and Option 2 would be situated a few metres away.)

A number of options were considered and the preferred option (new road access from A7) would result in the greatest amount of additional land take and impact to the surrounding environment.

**Fountainhall - proximity of Station House**

(Option 1 would be a level crossing and Option 2 would take the road over the railway)

Both options would result in major negative impacts to the adjacent property and mitigation would be required / agreed.

**North of Fountainhall - house adjacent to solum house**

(Option 1 would be a level crossing and Option 2 would take the road over the railway)

Both options would result in major negative impacts to the adjacent property and mitigation would be required / agreed.

**A further house on the solum at Stow**

(Option 1 would remove the house on the solum and option 2 would move the railway to the west of the house)

Both options would result in major negative impacts to the adjacent property and mitigation would be required / agreed.

**Falahill - access to Railway Cottage and new properties**

(Option 1 existing alignment altered to accommodate local road access to new properties and Option 2 follows the existing alignment (severance of local road access new properties.)

The final alignment would take the railway away from the properties to maintain access although there will be minimal difference for noise and vibration and air quality.

**Galashiels alignment to Ladhope Vale**

The number of constraints within Galashiels were high and slight alterations were considered regarding the route through Galashiels.

The alignment will result in a significant noise and vibration impact to a number of sensitive receptors and mitigation measure would be required.

**Galashiels alignment beyond Ladhope Vale**

The number of constraints within Galashiels were high and slight alterations were considered regarding the route through Galashiels.

The alignment will result in a significant noise and vibration impact to a number of sensitive receptors and mitigation measure would be required.

These alternative solutions were determined using both engineering and environmental reasons.

### 2.5 Alternative Transport Options

#### 2.5.1 Overview

Scott Wilson Ltd prepared a report, Scottish Borders Railway Feasibility Study, in January 2000, which examined the re-opening of the former Waverley line from Edinburgh to Carlisle via the Scottish Borders. Within this report a section discusses alternatives to the railway and the relative merits of the proposal.

The main options examined were:

1. improvements to the A7 to benefit public transport;
adaptation of the former rail route to support an innovative transport alternative solution; and

an upgraded bus service.

Each of these possibilities is discussed below, together with the environmental issues associated with them.

The option to consider an alternative railway route not using the former solum was not considered further due to the significant negative impacts that would occur. This option would result in significant capital costs, land take and environmental impacts and therefore was not considered further.

2.5.2 Improvements to the A7

The A7 is single carriageway along its entire length. A previous study by Crouch Hogg Waterman was undertaken in 1993-1994 to investigate the feasibility of upgrading the A7 from Edinburgh City Bypass to Galashiels to dual carriageway standards. The report concluded that the economic return on the investment was likely to be marginal at best. The study also concluded that the environmental impacts of such proposals would be severe, particularly in relation to impacts on agriculture, and the landscape and rural effects.

The study concluded that the proposal to upgrade the A7 to dual carriageway could not be supported.

Scott Wilson Ltd concluded that improvements to the A7 would have little significant impact on the attractiveness of public transport on the route. This option was therefore no longer considered.

2.5.3 Adaptation of the Former Rail Route

Light Rail and Tramway

It was recognised that the provision of a light rail or tramway service running south from Edinburgh may offer some slight advantages in terms of capital and operating costs for the system. However, a key issue was identified as the conflict between heavy and light rail options between Kinnaird Park (or Edinburgh Crossrail) and Waverley.

This option was not considered further by Scott Wilson.

Busway

The option of a busway was also examined to consider a combination of new infrastructure and the existing public road network. This option assumed a fleet of new high quality buses using a dedicated busway following the route of the former Waverley solum between Galashiels and Eskbank. In certain areas, it would use the
public road network between south of Eskbank, but it would be assumed that it would join a new Greenways Corridor from the city bypass to Waverley.

The report concluded that no significant growth in existing travel demand (either from existing residents or due to land use effects) is predicted for this bus-based alternative.

2.5.4 

**Upgraded Bus Service**

This option involved a new fleet of high quality, high frequency buses simply using the existing road network. Even with a significantly improved bus services the report concludes that it is unlikely to attract a large number of new passengers, which would not assist in the economic regeneration of the surrounding area.

This option would not result in significant adverse environmental impacts to the surrounding environment.

2.5.5 

**Summary**

Within the Scott Wilson report a cost-benefit analysis of the bus based options was undertaken and “these options give a net disbenefit, since the operating costs of the new services exceed the net increase in revenue to the public transport operator as a whole and therefore were not examined further”.

In conclusion, although alternative options were examined in previous studies, the cost benefit analysis results show that the re-opening of the former Waverley route provides significant financial benefits to the surrounding area.

2.6 

**Do Nothing Option**

Although the main objective of the scheme is to re-open the Waverley Line, the underlying principal aim is to assist economic development in the Scottish Borders and Midlothian and the City of Edinburgh areas. Without the proposed scheme, greater economic and social interaction and integration by reducing car dependency and providing a railway alternative would not be possible.

2.7 

**Project Timetable**

The planned programme for the Waverley Railway Bill is set out in Table 2.4 below.

**Table 2.4 Programme**

<table>
<thead>
<tr>
<th>Planned Dates</th>
<th>Project Development</th>
</tr>
</thead>
<tbody>
<tr>
<td>September 2003</td>
<td>Formal introduction of the Bill in Scottish Parliament</td>
</tr>
<tr>
<td>September 2003 to End 2004</td>
<td>Parliamentary proceedings to Royal Assent.</td>
</tr>
<tr>
<td>Planned Dates</td>
<td>Project Development</td>
</tr>
<tr>
<td>------------------------</td>
<td>----------------------------------------------------------</td>
</tr>
<tr>
<td>November 2001 to March 2004</td>
<td>Obtain Funding for the Scheme</td>
</tr>
<tr>
<td>March 2005</td>
<td>Commencement of construction</td>
</tr>
<tr>
<td>2008</td>
<td>Re-opening of a passenger service on the Waverley Railway Line</td>
</tr>
</tbody>
</table>

2.8 CONSTRUCTION STRATEGY

2.8.1 Overview

A strategy has been compiled by Scott Wilson to identify how the works are expected to be carried out. The detailed design of the scheme will be prepared by the contractors but the following information demonstrates the manner in which the works will be implemented. Because of the long narrow ‘construction site’ and the large volume of civil engineering works necessary, the works are expected to be started route-wide at a number of locations to ensure effective use of resources and the construction of the works within the required timescale. A combination of carefully planned simultaneous and sequential operations is seen as the way forward.

2.8.2 Enabling Works

Enabling works are considered necessary to facilitate follow-on construction works. These enabling works would include:

- temporary fencing and accesses / work compounds;
- temporary repairs to under bridge decks to allow use by (approved) construction vehicles;
- devegetation / clearance of railway corridor;
- public utility diversion and protection works;
- undertrack crossings (protection of services eg utility pipes, which cross under the track);
- temporary roadworks / road diversions / erection of temporary bridges;
- river bank / flood protection works;
- closure of footpaths and cycle ways; and
- demolition of buildings and houses identified as obstructing the corridor (as shown in Box 2.1)
## Box 2.1 Buildings to be Demolished

<table>
<thead>
<tr>
<th>Building Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>The outbuilding at Scot Way Business Centre, Newton Village (one building).</td>
</tr>
<tr>
<td>1 – 8 Harvieston Villas, Gorebridge.</td>
</tr>
<tr>
<td>Farm shed on solum at Hangingshaw Farm, Heriot.</td>
</tr>
<tr>
<td>Stagebank Crossing Cottage, Heriot.</td>
</tr>
<tr>
<td>41 Station Road, Stow.</td>
</tr>
<tr>
<td>Outbuildings to 41 Station Road, Stow.</td>
</tr>
<tr>
<td>No 10-13, 14 and 16 Wheatlands Road (three buildings).</td>
</tr>
<tr>
<td>1 to 27 (odds) Beechbank Place (14 buildings).</td>
</tr>
<tr>
<td>Beechbank Mill, Currie Road, Galashiels.</td>
</tr>
<tr>
<td>Station Yard, Currie Road Industrial Estate, Galashiels.</td>
</tr>
<tr>
<td>Henderson Grass Machinery Limited Depot, Currie Road Industrial Estate, Galashiels.</td>
</tr>
<tr>
<td>Langhaugh House, Langhaugh Industrial Estate, Galashiels.</td>
</tr>
<tr>
<td>Unit 1 Langhaugh Industrial Estate, Galashiels.</td>
</tr>
<tr>
<td>Langhaugh Mill, Langhaugh Industrial Estate, Galashiels (3 units).</td>
</tr>
</tbody>
</table>

## 2.8.3 Construction Traffic

Access to the former rail corridor by construction vehicles will be necessary from a large number of points making use of local roads, lineside routes and along the former lines solum. The key road serving the route and its construction accesses is predominantly the A7, with the only exceptions being at Shawfair/ Sheriffhall and in the Borthwick/ Tynehead areas. Between Heriot and Bowland an unnumbered narrow public road which follows the rail corridor on its west side would be a key access to certain works.

Construction traffic volumes and frequency have been assessed for the ES, based on information provided by Scott Wilson. In Galashiels where there are three major work sites, special care would be required on the routing of construction vehicles to minimise intrusion and traffic disruption. This will form part of the CoCP / and construction traffic management plan.

## 2.8.4 Major Work Sites

There are a number of major work sites (Shawfair, Edinburgh City Bypass bridge, Hardengreen A7 bridge, Gore Park A7 Bridge, Falahill A7 bridge/ road, Wheatlands Road bridge, Station Brae, Currie Road/ Glenfield Road bridge and Winston Road Bridge) each of which is likely to have a construction duration of around 12 months and with enabling works required at each site, an early start is seen as essential at these specific locations. With the A7 not just carrying the majority of the construction traffic but also having three major work sites on/ over the carriageway, great care will be taken with the overall traffic management at each of these worksites to ensure no unreasonable road traffic delay is experienced when travelling on this key Borders artery. The placing of bridge superstructures across the A7 will be fully planned with all interested parties.

During the earlier stages of the works, route wide enabling works would be started thus allowing (approved) vehicular access to and along the solum. The solum
would be used for sections of construction route for lineside works and the repairs and reconstruction of existing structures. This will focus on being able to access the larger existing bridge work sites to allow their early repair followed by any construction vehicle weight restrictions being removed. Allowance has been made within the Limits of Land to be Acquired or Used (LLAU) for temporary access to bridges from public roads/ farm tracks and along the edge of the corridor over fields thus allowing lineside works to be progressed on either side of bridge works and accessed along the solum.

A number of works are considered to be “season sensitive”. The construction works programme will therefore take account of the following:

- devegetation over the summer period will be avoided;
- earthworks will be avoided between late autumn and early spring;
- gas and electricity supplies will not be interrupted over the winter; and
- riverbank and existing structure underwater repairs will be avoided during prolonged heavy rain.

2.8.5 Target Timescales

The target timescales for the implementation of the works are a start date of March 2005 and completion to allow the new train service to operate from May 2008. The majority of the heavy civil engineering works would therefore take place in 2005 to 2006 with track laying, signalling works, testing and driver route training taking place in 2007 and 2008.
3 PLANNING POLICY

3.1 INTRODUCTION

This section appraises the proposed Waverley Railway in relation to planning policy. It sets out an overview of policy at three levels:

- national policy as set out in the Transport White Paper, Travel Choices for Scotland (complementary to the UK White Paper, A New Deal for Transport: Better for Everyone) and the National Planning Guidance and Advice Notes;

- regional level; and

- local level, as set out in the relevant structure plans and local plans – the route crosses two planning authorities, Midlothian Council and Scottish Borders Council.

3.2 NATIONAL PLANNING POLICY

3.2.1 Transport White Paper: Travel Choices for Scotland, 1998

This White Paper is complementary to the UK White paper, A New Deal for Transport: Better for Everyone, of 1998, which was the first comprehensive Government statement on transport in about 20 years. Travel Choices for Scotland sets out the Government’s integrated transport policy for sustainable transport choices to ensure that transport does not restrict a society but serves it.

Transport should be integrated with land use planning, the environment, other forms of transport and health and education policies. In this way the Government hopes to reduce road traffic congestion and reduce air pollution, thereby improving the environment. This includes improvements to rail transport.

3.2.2 National Planning Policy Guidelines

NPPG5 - Archaeology and Planning

NPPG 5(1) states that

"Archaeological remains are a finite and non-renewable resource, and should therefore be regarded as a part of the environment to be protected and managed. The primary policy objective are that they should be preserved wherever feasible and that, where this proves not to be possible, procedures should be in place to ensure proper recording before destruction, and subsequent analysis and publication".

(1) National Planning Policy Guideline 5 “Archaeology and Planning” January 1994
NPPG14 – Natural Heritage

NPPG 14 states that

"...the presence of a protected species or habitat is a material consideration in the assessment of development proposals. Planning authorities should take particular care to avoid harm to species of habitats protected under the 1981 Act or European Directives or identified as priorities in the UK Biodiversity Action Plan."

In addition,

"...planning authorities should seek to prevent further fragmentation or isolation (of habitats) and identify opportunities to restore links which have been broken." Article 10 of the Habitats Directive requires Member States to encourage the appropriate management of features of the landscape which are of major importance for wild flora and fauna. The features concerned are those which because of their linear and continuous structure or their function as ‘stepping stones’ or ‘wildlife corridors’ are essential for migration, dispersal or genetic exchange. Features which may be of value in the development of habitat networks include areas of woodland, rivers and burns, lochs, ponds and wetlands, traditional field boundaries such as dykes or hedgerows, unimproved grasslands and herb rich meadows, heaths and peatland and coastal habitats..."

NPPG 17 - Transport

The Government is committed to putting sustainable development at the heart of policy making. A key goal of integrated transport policy is to promote the creation of sustainable patterns of development through joint consideration of transport, land use, economic development and the environment. The policies that seek to achieve this are:

1. to meet Government commitments and targets on greenhouse gases and local air quality;
2. to maintain and enhance the quality of urban life, particularly the vitality and viability of town centres;
3. to reinforce the rural economy and way of life;
4. to maintain and enhance the natural and built environment, through restricting adverse environmental impacts, minimising environmental intrusion and retaining, improving and enhancing areas for biodiversity;
5. to support sustainable economic development within a pattern of land use and integrated transport which serves the economy and communities, promotes genuine choice of transport mode, facilities a reduction in car use, and supports more use of walking, cycling and public transport; and
to ensure that the impact of development proposals on transport networks does not compromise their safety or efficiency.

NPPG18 – Planning and the Historic Environment

NPPG18 (1) states that

"In the determination of an application for listed building consent or for planning permission for development affecting a listed building or its setting, the planning authority is required to have special regard to the desirability of preserving the building or its setting, or any features of special architectural or historic interest which it possesses."

In addition,

"In the determination of any application for planning permission for development affecting a Conservation Area, the planning authority is required to pay special attention to the desirability of preserving or enhancing the character or appearance of the relevant designated area". Also, "The effect of proposed development on an historic garden or designed landscape is a material consideration in the determination of a planning application. Planning authorities must consult with the Secretary of State and Scottish Natural Heritage on any proposed development that may affect a site contained in the Inventory".

However, the Guidance Note also states that

"Maintaining and enhancing the economic and social fabric of the historic environment is also vital if the variety, quality and special characteristics of this resource is to be sustained for future generations. Avoiding the neglect and loss of built fabric and promoting the efficient use and reuse of land and buildings within the historic environment are two ways in which the planning system can contribute in a practical way toward sustainable development".

3.2.3 Planning Advice Note: PAN 57 - Policy Approach to Integrated Transport and Land Use Planning

This Planning Advice Note accompanies NPPG 17. It gives good practice advice on measures planning authorities may consider in fulfilling their integrated land use and transport planning responsibilities in a sustainable manner.

3.3 Regional Planning Policy

3.3.1 Lothian Structure Plan 1994 - Written Statement

The Structure Plan has been influenced by three overriding aims:

(1) National Planning Policy Guideline 18 "Planning and the Historic Environment" April 1999
improve the quality of life by enhancing the built and natural environment;
encourage economic development and spreading its benefits; and
make the most effective use of infrastructure.

The transport strategy is based on the reduction of traffic levels in key urban areas below those existing today, giving preference to pedestrians. The objectives that have been identified for the rail network include that there is sufficient capacity to re-introduce passenger services on the Edinburgh South Suburban railway.

The Structure Plan strategy accords with the principles of NPPG17. In relation to the Local Plan area, it indicates that high quality public transport facilities and infrastructure should be promoted, with lay-outs and densities which favour public transport, cycling and walking.

The reopening of the railway has scope to enhance the currently partially degraded former railway corridor, and will include mitigation measures such as planting which will further enhance the environment along the corridor.

3.3.2 Lothian Structure Plan 2015

The Finalised Structure Plan defines the long-term vision for the development of land in Edinburgh and the Lothians for the period to 2015, focusing on a need to integrate land use and transport.

The Lothian Councils have joined with five neighbouring councils to form SESTRAN, a regional transport partnership for South East Scotland. In February 2001, SESTRAN approved an Interim Regional Transport Strategy (RTS) as a consultation document that builds on individual members’ Local Transport Strategies (LTS). The finalised Structure Plan is based on the preferred strategy in the SESTRAN RTS of major improvements to public transport infrastructure. The Waverley rail route is identified as a safeguarded key transport investment proposal under policy TRAN 1. Both the development strategy of the Structure Plan and the Action Plan that accompanies it, highlight the importance of the Waverley Route. The Development Strategy identifies the A7/ A68/ Waverley Line as a Core Development Area on the basis of the potential for enhanced accessibility, including the re-opening of the rail line. A new settlement is to be considered to the west of Gorebridge but is dependent upon a funding commitment to the Waverley Railway Project. The aims of the 2015 Structure Plan will be implemented through a review of the Midlothian and Shawfair Local Plans. The Waverley line will form the focus of the site selection of housing and economic sites to meet the Structure Plan development strategy requirements, as a means to reduce out-commuting by Midlothian residents. The Development Strategy cannot go ahead unless key transport projects including the Waverley line are delivered.
3.3.3 The Scottish Borders Structure Plan 2001-2011 (The New Way Forward)

Overview

The Structure Plan (which was approved by Scottish Ministers in September 2002) provides an important link between national policy and guidance on the one hand and the site specific land allocations and policies of Local Plans and the context for development control on the other.

The Structure Plan and the Local Plan together form the Development Plan for the Scottish Borders. The Structure Plan sets out the strategic policy framework and the Local Plan supply the site specific detail and more local policies and proposals.

The existing Local Plans are now out of date and are currently being reviewed in accordance with the Structure Plan. A single document Draft Local Plan is due to be published by Spring 2004, for detailed consultation.

“The economy of the Scottish Borders has, over a long period and particularly since the 1980s, been experiencing the effects of structural employment change. Reliance on agricultural, textiles and more recently electronics has meant that job losses in these sectors have caused significant social and economic difficulties for the affected communities.”

The restoration of the Waverley railway is a key element of the Development Strategy.

“The re-opening of the Borders railway would be likely to improve the climate for investment and the prospects for economic growth.”

Principle S3 Development Strategy

The development strategy provides growth targets and a locational strategy for development which is guided by the Plan’s Principal Aim. Within this strategy it is acknowledged that great benefits could occur with the re-opening of the former Waverley line and new growth will take advantage of this future rail link. The policy supports the Waverley line not just between Edinburgh and the Central Borders but extending in the future south to Carlisle.

Policy N3 National Sites

“Development proposals which will have an adverse effect, either directly or indirectly on a Site of Special Scientific Interest (SSSI) will not be permitted unless:
(i) the development will not adversely affect the integrity of the site, and
(ii) the development offers substantial benefits, including those of a social or economic nature, that clearly outweighs the national nature conservation value of the site.

Where the site concerned is a National Nature Reserve, particular regard will be paid to the site’s national importance.”
Mitigation measures will be put in place to ensure that minimal impact occurs to the SSSI's and other sites of nature conservation value (see Section 8).

Policy N4 Precautionary Principle

Development may not be permitted in cases where there are good grounds for believing that it could result in significant irreversible damage to designated or proposed Natura 2000 sites, Ramsar sites or SSSI (subject to consideration in terms of Policy N2 or N3).

The LBAP provides a developing framework for the assessment of the requirements of biodiversity in the wider landscape and provides the basis for the identification and enhancement of a conservation network beyond the protected sites.

As noted above mitigation measures will be incorporated into the scheme to ensure minimal damage occurs (see Section 8).

Policy N5 Local Biodiversity Action

"Development likely to have an adverse effect, either on a locally important wildlife site, or on habitats or species identified for conservation action in the Local Biodiversity Action Plan, will only be permitted if it can be demonstrated that the benefits of the proposal will clearly outweigh the intrinsic nature conservation value of the site, feature or area and its role in contributing to the development of regional habitat networks."

As noted above mitigation measures will be incorporated into the scheme to ensure minimal damage occurs (see Section 8).

Policy N7 Protection of Nature Conservation Interest

A policy designed to minimise any impacts of a development on the nature conservation value of a site or feature. Conditions may be attached which maintain habitats or mitigate the effects of damage to habitats.

As noted above mitigation measures will be incorporated into the scheme to ensure minimal damage occurs (see Section 8).

Policy N8 River Tweed System

Development which is considered likely to have an adverse effect on the Tweed Resource, will be subject to rigorous examination under the Structure Plan's nature conservation policies.

The Waverley line follows the Gala Water which forms part of the River Tweed system. The route also crosses the Tweed between Galashiels and Tweedbank. SEPA pollution prevention guidelines will be followed to minimise any damage to this resource.
Policy N9, N10, N11 and N13 Landscape Character

Development will not be permitted if the proposals compromise the landscape quality of the surrounding area.

The existing railway solum (1) is a man made feature, currently largely in a state of disrepair except where it has been turned into a cycleway/footpath. Its restoration allows the potential for landscape and townscape enhancement.

Policy N14 - N19 Archaeology and Cultural Heritage

“Development proposals, which would destroy or adversely affect the appearance, fabric or setting of Scheduled Ancient Monuments or other nationally important sites not yet scheduled will not be permitted unless:

(i) the development offers substantial benefits, including those of a social or economic nature, that clearly outweigh the national value of the site,
(ii) there are no reasonable alternative means of meeting that development need, and
(iii) the proposal includes a mitigation strategy acceptable to the Council.

Development which will adversely affect archaeological and / or cultural heritage features (including Listed Buildings and Conservation Areas) will only be permitted if it can be demonstrated that the benefits of the proposal will clearly outweigh the archaeological value of the site or feature.”

An assessment has been undertaken of archaeology and cultural heritage (see Section 10)

Policy C6 - Open Space

“The Council will seek to safeguard amenity open space, including informal recreational areas, and encourage new provision.”

Where possible areas of open space will be replaced if lost as a result of the railway line. Replacement footpaths are explained in Section 7.

Policy I2 - Rail Services

“The Council supports the principle of re-establishing rail links between the Scottish Borders and the national rail network, and will work towards the development of passenger and freight services between Edinburgh and the Central Borders.”

(1) Solum - the former railway track bed.
Policy I3 - Protection of Former Railway Routes

"Wherever practicable and appropriate the Council will seek to safeguard the routes of former railway lines for future transport or recreational routes."

Policy I5, I6 and I7 – Cycling and Walking

The Council will support facilities for cycling and walkers and this infrastructure should be integrated into local facilities to maximise the benefit to local residents and tourists.

Wherever practicable and appropriate the project team will seek to maintain footpaths and cycleways within the proposed scheme.

Policy I13, I14, I15 and I16 – Water and Flood Areas

"The Council will seek to protect watercourses and Flood Risk areas from adverse development to minimise the risk of damage."

Consultation with SEPA will aim to minimise the impacts to the water quality and the floodplain.

Policy I18 - Contaminated land

"The Council will encourage and seek to facilitate the redevelopment of contaminated sites in accordance with Part IIA of the Environment Protection Act 1990."

Contamination assessment and ground investigations are being undertaken to ascertain the conditions of the ground quality and the potential disposal / re-use options available to the project.

3.3.4 South East Wedge Joint Development Study

This study presents proposals by the City of Edinburgh and Midlothian Councils for development in the South East Wedge. The South East Wedge is defined as the open land to the south of Craigmillar and Niddrie, east of little France and north and east of Danderhall. This area extends to 1,370 hectares and is bounded by three major roads, the A1 Musselburgh Bypass, the A720 City Bypass and the A7 Old Dalkeith Road and also by the South Suburban railway line to the north of Craigmillar.

The development of the area raises special challenges and opportunities to introduce more acceptable forms of transport and innovative design concepts; to determine how the remaining Green Belt and open areas can best serve surrounding communities; and to consider how new development can support and stimulate regeneration initiatives in these communities.
The Joint Development Study safeguards the former Waverley line for reuse as a passenger railway. This route, together with the Edinburgh South Suburban route, is being actively promoted by the two Councils.

3.4 LOCAL PLANNING POLICY

3.4.1 Finalised Shawfair Local Plan (Consolidated with Proposed Pre-Inquiry Modifications) - September 2002

Overview

The Shawfair Local Plan covers the larger part of the area referred to as the South East Wedge in the Lothian Structure Plan, and relates to that part of the Wedge that is within the administrative boundaries of Midlothian Council. The South East Wedge is identified in the Structure Plan as part of a "core location", one of three within which the majority of new housing and economic development land for the region is to be located.

The development strategy of the Shawfair Local Plan is based on the need to move towards a more sustainable pattern of development that assists in reducing private car use, and is more reliant on public transport, walking and cycling. Midlothian Council recognises the contribution that rail can make to more sustainable travel patterns, and the Local Plan, therefore, promotes the introduction of heavy and / or light rail into the Shawfair area.

TRAN3 New Rail lines, Stations and Park and Ride

The Local Plan supports the development of a rail network in the Local Plan area. Section 2.5.18 states that "Funding has also been made available to progress the Waverley Line to Parliamentary Order stage."

Section 2.5.20 states:

The Proposals Map shows the likely route of the new rail lines and associated stations and park & ride. It should be noted that these are indicative only, and further detailed analysis is required to establish the exact routeing. The main elements are as follows:

- A re-aligned Waverley line with a new station and associated park & ride located within or next to the proposed centrally positioned town centre (see Proposal COMM4). It should be noted that the actual proposed route of the railway will be determined through a separate statutory process from this Local Plan i.e. a Bill will be pursued through the Scottish Parliament to grant powers to construct the line. Consequently, the Local Plan can neither determine the route nor, at this stage, be certain as to what it will be. It is therefore important that development does not prejudice its implementation. The indicative route shown on the Proposals Map reflects the currently preferred alignment and rail...
station location being considered by the Waverley Group (comprising representatives from Midlothian, Scottish Borders and City of Edinburgh Councils). A key objective of the Local Plan is to ensure that the residents of Shawfair have easiest possible access to a train station, and the current alignment provides for this.

COMM 1 - Residential Development

This proposal sets the physical limits for the new residential areas and specifies the number of houses required. It has been identified that within the Shawfair areas 115 ha to accommodate up to 3,500 houses has been set aside.

The currently proposed Shawfair Masterplan has been taken into account during the assessment process of the Waverley line. It is not envisaged that the Waverley line will prejudice the implementation of these proposals.

COMM 4 Town Centre (Proposal)

The following provision shall be made in the town centre
E) A site for a rail halt and associated park and ride shall be safeguarded (See Policy TRAN 3) the location of which should maximise accessibility.

RP 1 Protection of the Countryside and Green Belt

"Development in the countryside will only be permitted if it is essential for the furtherance of agriculture, forestry, countryside recreation or tourism. Development complying with the terms of Policy DEV 1 will also be permitted. Maintaining the landscape setting of the City and Midlothian Towns is an objective."

As the Waverley line is otherwise supported by this local plan, it is not considered that it represents a significant departure from this policy, subject to the proposed mitigation measures being implemented.

RP 2 City Bypass Corridor

"Development which harms the visual character of the land to the north of the City Bypass will not be permitted."

As the Waverley line is otherwise supported by this local plan and is being promoted along the route indicated in the plan. It is not considered to have any unacceptable impact, subject to the proposed mitigation measures being implemented.

RP 4 Woodland, Trees and Hedges

"Development will not generally be permitted where it could lead directly or indirectly to the loss of, or damage to, existing woodland, groups of trees, individual trees and hedges which have particular amenity, nature conservation, recreation, landscape character, shelter or other importance."
At the northern end where the development is off line some mature trees (e.g., a line of mature trees at Sherrifhall Mains) will be removed. The effect of the removal of the corridor of trees, which are an important landscape resource, is assessed in Section 11. It is considered that the loss of any trees will be offset by the means of the proposed mitigation measures.

RP5 Landscape Character

All development shall respect the quality of local landscape character, and contribute towards its maintenance and enhancement.

The Waverley line is supported by the Local Plan along the route being promoted. In this context, the proposed mitigation measures is considered to contribute towards its maintenance and enhancement.

RP6 Species Protection

“Development will not be permitted where it could adversely affect a species protected by law.”

The Waverley line is supported by the Local Plan. Mitigation measures are proposed within Section 8 to minimise the impact to any protected species present along the route.

RP7 Habitat Protection

“Development will not be permitted where it could adversely affect habitats important for nature conservation, unless every opportunity has been taken to avoid damaging the conservation value of the site.”

RP10 Listed Buildings

“Within the context of the development promoted in this Local Plan, development will not be permitted which would adversely affect the character of a listed building or its setting.

Development within the curtilage of a listed building or its setting will only be permitted where it complements its special architectural or historic character.”

Mitigation measures are proposed within Section 10 to minimise the impact to any listed structures present along the route.

RP11 Scheduled Ancient Monuments (Policy)

“Development which could have an adverse effect on a Scheduled Ancient Monument or the integrity of its setting will not be permitted unless there are exceptional circumstances.”
The Waverley line is supported by the local plan. It is not considered that development would have an adverse effect on a SAM or its setting.

RP12 Other Important Archaeological or Historic Sites (Policy)

“Development will not be permitted where it could adversely affect an identified regionally or locally important archaeological or historic site or its setting unless the applicant can show that:

- there is a significant public interest to be gained from the proposed development which outweighs the archaeological importance of the site;
- there is no alternative location for the proposal; and
- the siting and design of the proposal has been carried out to minimise damage to the archaeological resource.”

The Waverley line is supported by the local plan. It is not considered that development would have an adverse effect on a SAM or its setting.

RP13 Site Assessment, Evaluation and Recording (Policy)

“Where any development proposal could affect a known site of archaeological importance, the applicant will be required to provide an assessment of the archaeological value of the site and the impact of the proposal on the archaeological resource.

Such an assessment will, unless the Council is satisfied to the contrary, require a field evaluation of the site to determine the:

- character and extent of the archaeological remains
- likely impact of the proposed development on the features of archaeological interest; and
- ways in which the proposed development can be accommodated to preserve the archaeological resource.

Where the development is considered to be acceptable and it is not possible to preserve the archaeological resource in situ, the developer may be required to make arrangements for a full archaeological investigation, excavation and recording, prior to the start of development, followed by analysis and publication of the field data. Planning conditions will be used an agreements sought to secure these arrangements.”
Finalised Midlothian Local Plan, February 2000

Overview

In line with the 1994 Lothian Structure Plan the Finalised Midlothian Local Plan duplicates a number of the policies identified within 3.4.1. However, additional policies which are relevant to the Waverley Railway Bill have been identified below:

The supporting text seeks to protect sites for potential railway stations to serve Eskbank Newtongrange and Gorebridge and these are identified.

TRAN3 Former Rail Safeguards

“Development will not be permitted on former railway lines, principally the Edinburgh - Galashiels (Waverley) and Millerhill - Loanhead lines, that would prejudice the reopening of these lines for public transport or cycle use.”

NPPG17 emphasises the need for a transport policy framework which encourages the community to consider the environmental consequences of their individual transport decisions. The encouragement of walking and cycling and improved public transport have a role to play in helping to change existing transport trends. The Local Plan is consistent with this approach and TRAN3 enhances this by encouraging the safeguarding of former rail lines for future transport use - either for rail or cycleways.

RP8 Water Environment

“Development will not be permitted which could adversely affect the water environment.”

The scheme will be developed following SEPA’s Pollution Prevention Guidelines and will minimise any adverse impact where possible on the water environment.

RP 9, 10, 11, 12 Designated Nature Conservation sites

“Development will not be permitted where it could adversely affect, either directly or indirectly, the integrity of the conservation site of, international, national, regionally or locally important nature conservation sites.”

Ecological and landscape mitigation measures will be incorporated into the scheme to ensure that minimal damage occurs to any sites of ecological interest and where habitats are completely lost compensatory measures should be considered, such as woodland planting or grassland seeding. Indirect loss and / or damage to habitats should be avoided by ensuring the working areas are defined using appropriate fencing (eg plastic barrier fence). Partial habitat loss may also be compensated by habitat creation. In these circumstances it is not considered that there will be any adverse effects.
RP 28 Public Rights of Way and other Access Routes

"Development which could lead to the loss of a right of way, cyclepath, bridleway, or other access route will not be permitted except where the developer makes arrangements for an acceptable alternative access.”

Midlothian Council have recommended a number of alternative routes for the public rights of way, cycleways that will be affected as a result of the scheme.

3.4.3 Ettrick & Lauderdale Local Plan 1995 (Adopted Plan)

Overview

The Ettrick and Lauderdale Local Plan covers the administrative area of Ettrick and Lauderdale District. The Local Plan covers the period up to 2001 and is currently under the process of being updated as part of a single Borders wide Local Plan – with a Consultative Draft due to be published in 2004.

The District can still be described as a rural community with a relatively scattered population. There are a number of physical and infrastructural limitations to growth, particularly where communities have expanded in the narrow margin between steep hillside and the valley bottom.

Policy 18 – Protection of Residential Amenity

In established residential areas there will be a presumption in favour of retaining existing uses. Certain criteria will be require of the proposed development to protect the amenity and character of these areas such as not visually intrusive or unacceptable increase in traffic or noise.

Economic Development

In order to meet the needs of the District’s economy, land for industrial development is required, and the District has focussed on existing industrial areas rather than on new green field sites. Priority will therefore be given to the development and redevelopment of these areas.

Policy 21, 22, 23, 24 and 25

The Regional Council proposes the following allocations of land, which include existing industrial land, for general industrial development in the District over the Local Plan period. Areas identified are:

- Galashiels/ Tweedbank – 8.0 ha;
- Newtown St Boswells – 0.5 ha; and
- Stow – 0.4 ha.

These policies also cover the provision of industrial sites and premises, the retention of industrial uses and the provision of small workshops.
Section 5 The Environment includes a number of policies relevant to the landscape of the area. These include policies on Conservation Areas, Listed Buildings, archaeology, trees, open space, design and landscaping, rural landscape and development in the countryside. A few of them are detailed below, but the majority of policies in this section are relevant in some way to landscape protection.

Policy 60 - Protection of Open Space

"Areas of open space, in and around towns and villages, will be protected from encroachment or loss by development."

Existing areas of open space will not be affected as the line follows the existing solum.

Policy 70 – Landscaping of New Developments

"The Regional Council will ensure that appropriate measures relating to ground works, tree planting and landscaping are built into new developments."

A landscape scheme will be included as part of the development.

Policy 82 – Development in Designated Areas

"Within National Scenic Areas (NSA), Areas of Great Landscape Value (AGLV) and within Heritage Areas in the longer term, the Regional Council, in considering development proposals, will seek to safeguard the heritage significance of the area concerned."

An AGLV covers the eastern part of Galashiels and landscapes to the east and west (see Figure 11.1). This will not be significantly affected by the proposals.

Conservation Areas

Policy 47

"The Regional Council will continue to protect and enhance the special character and appearance of Conservation Areas and will ensure that any development is of a quality and design which is appropriate to the area."

Policy 48

"The Regional Council will pay particular attention to all development within Conservation Areas, including alterations and/or replacements of windows, shop fronts, boundaries and painting; advertisements and satellite dishes."

Policy 49

"The Regional Council will normally only permit the demolition and replacement of buildings in Conservation Areas when it is satisfactorily demonstrated that existing buildings are incapable of rehabilitation and where there are acceptable and detailed plans for the site."
Policy 50
“The Regional Council will promote and facilitate Town Schemes where possible, and Facelift Schemes in Conservation Areas in the District.”

Policy 51
“The Regional Council will continue to encourage the under-grounding of intrusive electricity and telephone cabling in Conservation Areas.”

Listed Buildings
Policy 52
“The Regional Council will seek the preservation of statutorily Listed Buildings, their setting and related fixtures, whether they be in towns, villages or the countryside. Only those alterations to Listed Buildings which maintain or enhance their special architectural or historical qualities will normally be permitted, and then only after full consultation with the appropriate bodies.”

Mitigation measures are proposed within Section 10 to minimise the impact to any listed buildings present along the route.

Archaeology
Policy 53
“The Regional Council will operate a general presumption against development which could result in damage to, or destruction of, sites of archaeological or historic importance, or their setting.”

Policy 54
“The Regional Council will require the undertaking of archaeological investigation and recording prior to the commencement of any development which would permanently cover or destroy an archaeological site.”

Policy 55
“The Regional Council will continue to negotiate access agreements to sites of archaeological interest and to provide interpretative facilities for the benefit of the public. The Regional council will also encourage the provision of such facilities through private enterprise.”

3.5 Summary and Conclusions
The proposed scheme is in accordance with national transport policies and with regional policies, which seek to encourage more sustainable and integrated forms of transport. The importance of, and requirement for, improved public transport is recognised at both national and regional level due to the opportunities it offers as a mechanism for further integration within and between different types of transport. As such, improved public transport promotes more sustainable travel choices and
hence can make a major contribution to reducing the public’s dependence on the motor car.

The proposed scheme also addresses more localised issues of congestion, improved employment opportunities and economic regeneration. The proposed scheme is in accordance with local planning policies which seek to reduce the impact of traffic on the environment and to encourage walking, cycling and the use of public transport.

The scheme will make a positive contribution to the City of Edinburgh, Midlothian and Scottish Borders which is identified in regional and local planning guidance as a single key growth area with regional and national significance.
4 LAND USE AND LAND TAKE

4.1 INTRODUCTION

This section considers the impacts resulting from the construction and operation of the proposed scheme on current and future land use. It identifies:

- existing land use, both along the route and in the surrounding area;
- key potentially sensitive receptors, such as residential properties, community facilities, such as footpaths and listed buildings; and
- the land take impacts of the proposed scheme.

4.2 EXISTING LAND USE

4.2.1 Methodology

A survey of the scheme and an area extending 250 m either side of the route was undertaken in order to establish the existing land use surrounding the proposed scheme. Information on the proposal was obtained from engineering drawings. The Midlothian Local Plan and the Ettrick and Lauderdale Local Plan were consulted to identify designated areas.

4.2.2 Land Use within the Study Area

The proposed scheme is from Newcraighall (outskirts of Edinburgh) to Tweedbank in the Scottish Borders (see Figure 1.1).

The route is approximately 48 km long but only a few tens of metres wide. With the exception of several key constraints, about 46.6 km of the original railway route is largely intact with only minor works needed, albeit affected a long length of the route, to allow re-opening.

The route lies within the administrative boundaries of Midlothian Council and Scottish Borders Council. Midlothian Council covers the northern section of the route which includes the commencement of the route at Newcraighall through to just south of Gorebridge and includes Shawfair, Eskbank, Newtongrange and Gorebridge stations. This section of the route is dominated by residential and commercial land uses. A black path which is used as a public footpath and cycleway links Sheriffhall with Hardengreen. The southern section, within Scottish Borders Council covers the rest of the route. It is dominated by mainly agricultural land use. However, the southern end of this section is predominately urban areas and includes a public right of way, the Black Path and a section of the Southern Upland Way.
The majority of the land use impacts are related to the loss of agricultural land and open land. There are a number of buildings that will be demolished as a result of the scheme (identified in Box 2.1). These properties are located at Gorebridge, Stow and Galashiels. Many sections of the old solum are currently used as footpaths / cycleways, which will be lost as a result of the scheme. Alternative footpaths / cycleways will be provided where possible (see Section 7). There will be six new stations located along the route, Shawfair, Eskbank,Newtonrange, Gorebridge, Galashiels and Tweedbank. There will be situated within the settlements to ensure they are easily accessible and provide associated parking to suit the forecast demand.

4.2.3 Sensitive Receptors

There are a number of significant cultural heritage resources in the proposed route corridor that are listed and non-listed structures which are associated with the former railway. These include a Category A listed structure, the Glenesk Viaduct, Category B listed structures including the Newbattle viaduct and the former Eskbank and Dalkeith Stations, footbridge and platforms, and non-designated structures (further details in Section 10.3) such as historic railway bridges, recorded in the NMRS.

There are also several Conservation Areas in the vicinity of the proposed route corridor, which will suffer slight adverse visual impacts during the construction and operational phase of the proposed scheme.

Many sections of the existing solum are currently used as cycleways and footpaths. Alternative routes will be provided to replace any footpaths / cycleways that will be lost, which have been proposed by the Local Authorities, such as the ‘Black Path’ in Midlothian and Scottish Borders.

4.2.4 Agriculture

The Macaulay Institute for Soil Research (in Aberdeen) grades land on its ability to grow a variety of crops, taking into account such aspects as depth of soil, yield potential, aspect, drainage, type of soil structure and altitude, all of these having an effect on the potential productive capacity of the land. The classes run from 1 for the best quality ground, being capable of growing a wide range of crops with consistently high yields, to Class 5 which is land principally restricted to grass production. Agricultural Land Classification definitions are shown in Table 4.1.

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<th>Classes</th>
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<tr>
<td>Class 1</td>
<td>Cropping is highly flexible and includes the more exacting crops such as winter harvested vegetables (cauliflower, brussel sprouts) There are no or only very minor physical limitations affecting agricultural use.</td>
</tr>
</tbody>
</table>


Classes | Definition
--- | ---
Class 2 | Cropping is very flexible and a wide range of crops can be grown but the land may be unsuited to winter harvested crops. The limitations are always minor in their effects and land in the class is highly productive.
Class 3 | Land in this division is capable of producing consistently high yields of a narrow range of crops (principally cereals and grass) and / or moderate range of a wider vegetables (including potatoes, field beans, root crops). Short grass leys are common.
Class 4 | Land with severe limitations generally suitable only to low input enterprises.
Class 5 | Land which is principally restricted to grass production.

The Institute's land capability plans have been examined and between Millerhill to Gorebridge the railway line passes through 1 km of Class 1 land, 3.5 km of Class 2 land and approximately 3.5 km of Class 3 land. There is also approximately 1.2 km of land in the urban area section of this part of the route which is currently in amenity use. Between Gorebridge to Galashiels there is approximately 5.5 km of Class 3, 20km of Class 4 and 6 km of Class 5 agricultural land through which the railway line runs. There is also approximately 2.4 km of land in the urban area section of this part of the route which is currently in amenity use. From Galashiels to Tweedbank there is also approximately 3.7 km of land in the urban area section of this part of the route which is currently in amenity use.

### 4.3 Proposed Land Take

#### 4.3.1 Introduction

Table 4.2 shows amounts of total land take required along the route. The total amount of temporary and permanent land take is 362 ha. The permanent land take within the Limits of Deviation (LOD) is, in general, in a strip of approximately 10 m wide. Some temporary and permanent rights in land will be acquired for rights of access for construction and maintenance of the railway line, ground stabilisation and works relating to apparatus, including permanent installations.

#### Table 4.2 Total Land Take

<table>
<thead>
<tr>
<th>Type of Land Take</th>
<th>Amount of Land Take</th>
</tr>
</thead>
<tbody>
<tr>
<td>Permanent Acquisition of Land inside LOD</td>
<td>154.5 ha</td>
</tr>
<tr>
<td>Permanent Acquisition of Land outside LOD</td>
<td>25.5 ha</td>
</tr>
<tr>
<td>Acquisition of Rights only outside LOD</td>
<td>31 ha</td>
</tr>
<tr>
<td>Temporary Possession of Land outside LOD</td>
<td>151 ha</td>
</tr>
</tbody>
</table>

#### 4.3.2 Temporary Land Take

There are a number of major works sites that will be required temporarily to facilitate construction along the route (Edinburgh city Bypass bridge, Hardengreen A 7 bridge, Gore Park A 7 bridge, Falahill A 7 bridge / road and within Galashiels). The additional land that will be required at these sites to allow for construction are:
Edinburgh City Bypass – An area of land west of the A720 Bypass (approximately 200m by 70 m) that will be occupied temporarily and a stretch of the A720 Bypass (approximately 300 m by 55 m). On the east side of the A720 the work site extends as far as Kings Gate and is bordered by the A68 and the former railway solum but avoiding Sheriffhall. The impact of the temporary occupation of part of the A720 Bypass will result in traffic impacts on the bypass.

Hardengreen A7 bridge – The land surrounding the A7 / B6392 Hardengreen roundabout with additional land on the north east corner and south west corners will be occupied temporarily.

Gore Park A7 bridge - A large parcel of land surrounding the A7 crossing at Gore Park will be required for construction. The majority of the land required is to the north of the railway (approximately 300 m by 70 m) which will be occupied temporarily.

Falahill A7 bridge / road – A strip of approximately 80 m by 1500 m is required along the railway at Falahill which will be occupied temporarily.

Galashiels – The majority of the obstructions along the former railway occur within Galashiels and to construct bridges / underbridges and to re-align highways, construction sites will be required within Galashiels. A large construction site will be required at the Currie Road and Langhaugh Industrial Estates (which will include the demolition of seven units), an area to the south of Glenfield Road East and an area surrounding the Wheatlands Road bridge. This will result in temporary disruption to residential and commercial properties within Galashiels during construction.

All of the construction sites will result in an impact on the nearby highways and a traffic management plan will be detailed prior to construction to ensure minimal impact occurs.

4.3.3 Permanent Land Take

The land to be permanently acquired consists mainly of the railway corridor itself, within which the railway will be constructed. Land to be permanently acquired within the LOD is also required for the associated new roads and footbridges included in the authorised works. In addition, land outside the LOD will be permanently required for the accommodation of structures associated with the railway, landscaping and road features, access, railway maintenance, apparatus and the provision of a car park at the new station at Shawfair.

4.3.4 Construction Impacts

Overview

- loss of agricultural land for the railway route;
farm unit viability impact;
land severance / access difficulties;
soil damage during storage;
demolition of existing buildings;
damage or disruption to wildlife and / or habitats;
damage or disruption to sites of archaeological interest; and
disruption or contamination of watercourses.

Approximately 84% of the route runs adjacent to agricultural land, much of which is used for storage, access and moving animals.

Each of the major work sites (Shawfair, Edinburgh City By-Pass bridge, Hardengreen A7 bridge, Gore Glen Country Park A7 bridge, Wheatland’s Road bridge, Currie Road/Glenfield Road bridge and Winston Road bridge) is likely to have a construction period of at least 12 months proceeding by enabling works required at each site, and following completion, a maintenance period expected to be 12 months long. With the A7 not just carrying the majority of the construction traffic but also three major work sites on/over the A7, particular care would be required with the overall traffic management, and at each worksite, to ensure no unreasonable road traffic delay is experienced when travelling on this key Borders artery.

4.3.5 Operational Impacts

Formerly agricultural land and open space will become a functioning railway with associated structures and features. The six new stations along the route will also alter the current land use.

4.3.6 Mitigation Measures

Disruption to Farming Activities

There will inevitably be some disruption to farming operations during construction of the railway line. The intention will be to maintain means of access for agricultural users along the route. Other measures include stock-proof fencing, temporary access and temporary supplies or services, where appropriate, and will be agreed with landowners / occupiers prior to construction.

Notifiable Scheduled Diseases

By its nature, a railway has the potential for carrying diseases between fields and farms in a manner not normally possible. Consultation prior to construction will check that there are no instances of known plant or animal diseases within the route corridor and whether there are any statutory restrictions applying to the site.
Alternative Footpaths / Cycleways

Alternative routes have been proposed within Midlothian and Galashiels for the ‘Black Path’ which is a heavily used public amenity along the existing solum. The Black Path (Galashiels) forms part of a National Cycle Route 1 and the Tweed Cycleway. The Southern Upland Way will also be reconnected and accommodated within the proposals. Many footpaths which cross over the proposed route will have footbridges provided to ensure that the amenity remains usable. There are 47 tracks and paths which will be stopped up as a result of the railway and 31 will be replaced with an alternative. Further details can be found within Section 7.

Cultural Heritage Features

A comprehensive Archaeological Evaluation will be undertaken to ensure that an assessment is carried out of the full extent of the resources which will be disturbed during the construction process. The Bill will provide the powers to alter the listed structures associated with the former railway. Further details can be found within Section 10.

4.4 SUMMARY AND CONCLUSIONS

The majority of the scheme constraints are within Galashiels, as a significant amount of development has occurred there since the line closure in 1969. There are several areas of archaeological constraint along the route which will require further archaeological investigation to assess any impacts upon the route options.

The majority of the land use impacts are related to the loss of agricultural land and open land. There are a number of buildings that will be demolished as a result of the scheme. Many sections of the old solum are currently used as footpaths / cycleways, for which the scheme will provide alternatives (see Traffic and Transport Section 7).
5 NOISE AND VIBRATION

5.1 INTRODUCTION

This assessment evaluates noise and vibration impacts arising from the construction and operation of the proposed Waverley line.

Criteria against which the likely future noise levels are assessed have been derived using relevant, recognised national and international guidance. Where the noise and vibration predictions show a potential for noise and/or vibration impacts, mitigation measures are outlined. Any residual impacts remaining are identified.

A glossary of the acoustic terminology used is given in Annex B.

5.2 CONSTRUCTION NOISE

5.2.1 Key Noise Sources

The “construction site” for the Waverley Railway Project can be considered as being 48 km long but only a few tens of metres wide. At varying intervals along its length are major items of civil engineering work such as new viaducts and the realignment of highways. With the exception of several key constraints, about 46.6 km of the route is largely intact with only minor works required, albeit affecting a long length of the route, to allow re-opening.

Materials (particularly rails and stone ballast) will be delivered to 17 level areas that are accessible by road. The former ECML electrification depot at the south end of Millerhill Yard will also be used for the storage of track materials and the loading and marshalling of engineers work trains. Engineers’ trains would pass through the Millerhill/ Niddrie Junctions and the Newcraighall operational area to access the new route via the Newcraighall Station turnback siding.

The key sources of noise along the majority of the route will be:

- chain saws and vegetation shredding machinery;
- earthmoving machinery and screening plant;
- HGVs;
- excavators and drainage plant for cuttings;
- excavators and HGVs unloading and levelling ballast; and
- railroader vehicles, works trains and welding equipment during track laying.

Ballast tamping will be required in the final stages of construction.

A large number of HGV movements may be required since the local quarries will not have sufficient capacity to provide ballast for the route. The number of HGV
movements has not yet been fully developed. However, the key road serving the route and its construction access points is the A7 with the only exceptions being at Shawfair / Sheriffhall and the Borthwick/Tynehead areas.

Works will be required to create six new stations. Existing structures will be repaired or reconstructed and major civil engineering works will also be carried out at existing bridge structures.

At these sites, the following plant may be used:

- equipment for service diversions and protection such as ground stabilisation including demolition of buildings and under-track crossings;
- bored piling plant, spoil removal by HGV, and concreting lorries and equipment;
- earthworks equipment;
- road working equipment; and
- concreting.

Driven piling may be required at some bridgework sites but the need for this will be determined following ground investigation by the contractor. In order to ensure that the worst case conditions have been considered it has been assumed that driven piling will be required at the bridgework sites. The major civil engineering works are each expected to have durations of at least 12 months. Some weekend night-time work will be required where it is necessary to place bridge structures over roads and therefore to close a major road. A number of closures are expected for each new rail overbridge.

Temporary traffic management will be required at the A720 and A7 crossings and permanent traffic diversions will be required at some realigned roads generally related to stations works. Since traffic management will only create temporary effects and details are not available at this stage, it has not been possible to include its effects in this assessment.

Six new stations will be constructed using conventional construction techniques and the contractor will have the freedom to operate within each “trains-free” site. Night-time work is therefore not expected for station works. It is expected that station work will be completed within a period of six months.

**5.2.2 Noise Sensitive Receptors**

The noise sensitive receptors affected by construction noise and vibration will be numerous properties along the route corridor. Since noise from construction will decay with the distance from the proposed alignment worksite, the effects of
construction are only likely within certain distances of the worksites. These
distances are identified in the following sections.

5.2.3 Assessment Criteria

Construction Noise Criteria

Advice and guidelines to local planning authorities and developers on construction
noise in the UK can be found in British Standard BS 5228 (1) and Department of the
Environment (DoE) Advisory Leaflet (AL) 72 (2). AL 72 is out of print, but remains
as a paper giving guidance on acceptable levels of noise.

BS 5228 Part 1 does not specify suitable daytime noise levels from construction sites,
but lists a number of factors that might affect the acceptability of noise and vibration
from construction sites. These factors are:

- site location;
- existing ambient noise levels;
- duration of site operations;
- hours of work;
- attitude to site operator; and
- noise and vibration characteristics of the work.

Although BS 5228 does not propose noise standards for daytime periods, it suggests
that acceptable noise levels in the evening (1900-2200 hours) may need to be 10
dB(A) lower than daytime levels. DoE Advisory Leaflet (AL) 72 gives advice as to
preferred maximum levels of construction site noise at residential locations during
daytime hours (0700 - 1900 hours). Since the criterion of speech interference forms
the basis of the recommendations, they can be taken as applicable to commercial
buildings as well as residential properties. The leaflet states that the noise level
outside the nearest occupied room should not exceed:

- 75 dB(A) in urban areas near to main roads in heavy industrial areas; or
- 70 dB(A) in rural, suburban and urban areas away from main road traffic and
  industrial noise.

These levels are generally taken as being facade $L_{A\text{eq},\text{period}}$ (3). AL 72 also suggests
that in the evening period a level of 10 dB(A) below that during the day may be
appropriate. These levels have been used to assess potential construction noise
impacts. Most of the route is not in urban areas and a noise criterion of 70 dB $L_{A\text{eq},12}$
hour has been adopted for assessment of daytime impacts.

(1) British Standard BS 5228 Noise control on construction and open sites, BSI 1997.
(2) Advisory Leaflet 72 (1976) Noise control on building sites, DoE.
(3) $L_{A\text{eq}}$ is defined as the notional steady sound level which, over a stated period of time, would contain the same amount of
acoustical energy as the A-weighted fluctuating sound measured over that period.
Noise impacts will occur at lower noise levels at night. The noise levels below 45 dB $L_{A_{eq}, 1 hour}$ are unlikely to give rise to significant noise impacts in terms of sleep disturbance at night. This has been adopted as the assessment criterion for this assessment. In practice night-time working will be discussed in detail with Local Authorities before works start. Local authorities have powers under the Control of Pollution Act 1974 to control noise from construction sites. These powers do not refer to fixed noise limits but instead allow for the enforcement of 'best practicable means' (1) to reduce or counteract the effects of the noise. Night working should only be carried out in exceptional circumstances and with prior consent from SBC (Noise section of Environmental Health). It should also be recognised that part of the Council’s Noise Policy precludes night-time, Saturday afternoon and Sunday working (although, exceptional circumstances with prior consent will be considered by Scottish Borders Council and Midlothian Council).

5.2.4 Predicted Noise Levels

Noise levels from the main construction activities during the daytime construction of the alignment are shown in Table 5.1 below. For unobstructed noise propagation the critical distances at which the noise criteria will be just met are also shown.

Table 5.1 Distances from Worksite at which Construction Impacts will be Avoided - Main Route

<table>
<thead>
<tr>
<th>Activity</th>
<th>Sound Power Level SWL (dB(A))</th>
<th>Distance (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vegetation Clearing</td>
<td>114</td>
<td>90</td>
</tr>
<tr>
<td>Earth Works</td>
<td>116</td>
<td>115</td>
</tr>
<tr>
<td>Spoil Movement (loading lorries)</td>
<td>103</td>
<td>8</td>
</tr>
<tr>
<td>Spoil Movement (lorry movements)</td>
<td>108</td>
<td>45</td>
</tr>
<tr>
<td>Ballast Placing</td>
<td>111</td>
<td>60</td>
</tr>
<tr>
<td>Track Work</td>
<td>112</td>
<td>70</td>
</tr>
<tr>
<td>Tamping</td>
<td>115</td>
<td>100</td>
</tr>
</tbody>
</table>

(1) Based on estimate of lorry flows at 1 pass-by per minute at 15 km/h

Table 5.2 Distances from Worksite at which Construction Impacts will be avoided - Structures and Bridgeworks

<table>
<thead>
<tr>
<th>Activity</th>
<th>Sound Power Levels SWL (dB(A))</th>
<th>Distance (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demolition</td>
<td>114</td>
<td>85</td>
</tr>
<tr>
<td>Ground Stabilisation</td>
<td>104</td>
<td>30</td>
</tr>
<tr>
<td>Bored Piling</td>
<td>110</td>
<td>55</td>
</tr>
<tr>
<td>Driven Piling</td>
<td>98</td>
<td>15</td>
</tr>
</tbody>
</table>

(1) Defined in Section 72 of the Control of Pollution Act 1974.
### Activity Sound Power Levels

<table>
<thead>
<tr>
<th>Activity</th>
<th>SWL (dB(A))</th>
<th>Distance (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Earthworks</td>
<td>116</td>
<td>115</td>
</tr>
<tr>
<td>Roadworking</td>
<td>112</td>
<td>65</td>
</tr>
<tr>
<td>Concreting</td>
<td>105</td>
<td>30</td>
</tr>
</tbody>
</table>

The above figures do not include the effect of soft ground absorption or of screening due to any intervening structures, and so will tend to over estimate the impacts.

Although works will generally be conducted during the day, a number of activities may need to take place when the road is closed and it is noted that the lifting into position of new bridge superstructure components by crane is likely to be unsafe unless a total road closure/diversion is in place. This road closure work would be carried out during a quiet period at night at the weekend. A number of closures are foreseen for each new rail over road bridge. The noise from a large crane working at night could potentially give rise to noise impacts at up to approximately 300 m from the work site. The effects of acoustic absorption by acoustically soft ground have been included in this estimate and it has been assumed that night-time background noise levels are low at receptors close to these work sites.

Station work is likely to be carried out during the daytime and will not involve all of the activities above. It is estimated that the noisiest activity that will be required will be similar to the concreting team above and noise impacts are expected up to a maximum distance of approximately 30 m.

The general alignment works will vary along the route. In general, less earth works will be required at locations where the route is to run in the disused rail corridor whereas where fresh excavation or embankment works are being carried out more lengthy construction may be required. The programme for works has not been developed at this stage. Where earthworks are required for a long period noise impacts could be experienced at most unscreened receptors within approximately 115 m.

The clearance of vegetation will take place at all areas where necessary along the route and noise impacts can be expected at most unscreened receptors, but within approximately 90 m, but it is expected that the impacts at each area will be short lived.

Some mobile activities that will involve noise sources passing the receptors at speed such as movement of spoil lorries and use of a ballast tamper during the day are unlikely to cause significant noise impacts except at receptors that are closer than 8 to 10 m from the track. Receptors have been identified at these distances from the track at eight locations along the track. In some cases these may represent a group of properties.

The major works including structures and bridgeworks are described in Table 5.3 below and the key receptors that may be affected are discussed. The representative receptors described above that may be affected by the works are also discussed in
Table 5.3. The receptors chosen are not intended to be an exhaustive list but they give a clear overview of the key areas where noise impacts maybe experienced. Receptors that are also close to the works but are not shown in Table 5.3 may also be affected during other several construction activities. Receptor locations are shown in Figure 5.1.

<table>
<thead>
<tr>
<th>Works Description and Works Nos.</th>
<th>Representative Receptors Affected</th>
<th>Likely Key Work Phases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shawfair Works</td>
<td>R1 and R2</td>
<td>All phases likely to result in impacts.</td>
</tr>
<tr>
<td>Part of Work No. 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Edinburgh City By-Pass Underbridge</td>
<td>R3</td>
<td>Most phases likely to result in impacts. Concreting and ground stabilisation may not cause impacts.</td>
</tr>
<tr>
<td>Part of Work No. 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hardengreen Cutting and New Viaduct Over A7 Roundabout</td>
<td>R8, R9, R10</td>
<td>Receptors some distance from structural works but likely to be affected by all phases where works are on alignment.</td>
</tr>
<tr>
<td>Part of Work No. 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gore Glen Country Park Viaduct Over A7 and Approach Works</td>
<td>R16, R17, R18</td>
<td>R16 and R17 some distance from structural viaduct works. Overbridge works could affect R18.</td>
</tr>
<tr>
<td>Part of Work No. 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Falahill New Bridge and A7 Roadworks</td>
<td>R29</td>
<td>A7 Road works likely to result in noise impacts. Bridgeworks some distance from receptors.</td>
</tr>
<tr>
<td>Part of Work No. 10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Galashiels (Wheatlands's Road) New Embankments, Wall and Various Bridges</td>
<td>R46, R47, R48, R49, R50</td>
<td>Embankment and wall construction likely to affect R47 and R48. Structural bridgeworks also affect R46, R49 and R50.</td>
</tr>
<tr>
<td>Part of Work No 10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Galashiels (Currie Rd/ Glenfield Rd) New Walled Embankments and New Underbridge</td>
<td>R53 to R56</td>
<td>Structural over bridge works likely to affect R53 and R54. R55 and R56 likely to be mainly affected by embankment works.</td>
</tr>
<tr>
<td>Part of Work No 10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Galashiels (Winston Rd) Open-out Cutting and New Overbridge</td>
<td>R48</td>
<td>Winston Rd over bridge construction and cutting works both likely to affect closest receptors.</td>
</tr>
<tr>
<td>Part of Work No 10</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

5.2.5 Mitigation

Since the detailed programming and selection of plant will be carried out by the contractor, specific mitigation has not been developed for the scheme at this stage.
However, in order to reduce noise emissions during the construction phase, the following generic mitigation measures will be adopted:

- Piling and other potentially high noise generating activities will be restricted wherever possible to daytime only (0800-1800 hours) and construction activities will be scheduled to minimise noise;

- Plant will be used in an appropriate manner to minimise noise emissions including regular maintenance of the plant;

- Inherently quiet plant will be used where appropriate;

- Noisy plant will be located as far as possible from sensitive receptors;

- Construction contractors will adhere to the codes of practice for construction working and piling given in BS 5228, and the guidance given therein, for minimising noise emissions from the site;

- The works will be scheduled such that the maximum benefit is obtained from any noise screening measures; and

- The public will be kept informed when construction activities are likely to generate perceptible vibration levels.

5.2.6 Residual Impacts

Daytime residual construction noise impacts are likely at receptors that are sufficiently close to the works on the alignment or close to structures such as bridges. Detailed consideration of noise mitigation will be required by the contractor to ensure that significant construction noise impacts do not result from the scheme. With mitigation in place it is likely that any residual effects from the works along the route will be relatively short term in duration.

Short-term night-time residual noise impacts are likely at those receptors that are close to bridge construction sites during lifting in bridge components. This will be limited to several nights. Residual impacts are therefore not expected to be unacceptable.

5.3 Operational Noise

5.3.1 Sources of Operational Noise

Potential sources of noise impact during operation of the Waverley Railway will be as follows:
movements of trains during the day (0700 – 2300) (1) ;
movements of trains during the night (2300 – 0700);
trains standing in the station during stops; and
operational maintenance activities.

The rail vehicles are expected to be Class 170 “Turbo Star” trains manufactured by Bombardier, although they could also include Class 158. They will operate on ballasted, single-track continuously welded rail with passing places. The maximum operating speed of these trains on the Waverley Railway is expected to be 90 mph. This is only likely to be reached on straight sections of track where no adverse gradient is encountered.

The assessment has been based on an assumed service frequency of two trains each way per hour during the daytime (0700 to 2300 hours) and two trains per hour each way between 2300 and 0030 hours and also between 0555 and 0700 hours. It is possible that fewer movements may be required at night or off peak times so this assessment represents a worst case.

It is anticipated that road traffic changes due to the scheme will be less than 10% and hence will not be sufficient to result in a noticeable change in traffic noise.

Operational maintenance activities are not known in detail at this stage although it is expected that in common with other railways they may lead to some short-term noise disruption on an occasional basis particularly if work is required to maintain ballast or structures at night. Estimates at this stage of the design suggest that ballast tamping may be required at night no more than every two months. The operator will determine the exact requirements for maintenance of the line and it has not been possible to assess the effects of maintenance in this assessment.

5.3.2 Noise Sensitive Receptors

Noise sensitive receptors have been chosen to be representative of various noise sensitive premises, primarily residences, along the route and are listed in Table 5.4. The noise sensitive receptors are also shown in Figure 5.1.

Table 5.4 Receptors Used in Noise Assessment

<table>
<thead>
<tr>
<th>Plan Ref</th>
<th>Receptor Number</th>
<th>Receptor Location</th>
<th>Receptor Name</th>
<th>Distance to Nearest Track (m)</th>
<th>Chainage (m)</th>
<th>Speed (mph)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>R1</td>
<td>Shawfair</td>
<td>Old School House</td>
<td>23</td>
<td>600</td>
<td>40</td>
</tr>
<tr>
<td>2</td>
<td>R2</td>
<td>Shawfair</td>
<td>The Marmalade Cat (Pub)</td>
<td>47</td>
<td>1000</td>
<td>40</td>
</tr>
<tr>
<td>2</td>
<td>R3</td>
<td>Sherrifhall</td>
<td>Sherrifhall</td>
<td>46</td>
<td>3308</td>
<td>40</td>
</tr>
<tr>
<td>3</td>
<td>R4</td>
<td>Eskbank</td>
<td>8 Lasswade Road</td>
<td>13</td>
<td>4946</td>
<td>90</td>
</tr>
<tr>
<td>3</td>
<td>R5</td>
<td>Eskbank</td>
<td>Gilmerton Road</td>
<td>15</td>
<td>4946</td>
<td>90</td>
</tr>
<tr>
<td>3</td>
<td>R6</td>
<td>Eskbank</td>
<td>15 Dundas Crescent</td>
<td>25</td>
<td>5501</td>
<td>90</td>
</tr>
<tr>
<td>3</td>
<td>R7</td>
<td>Eskbank</td>
<td>16 Bonnyrigg Road</td>
<td>28</td>
<td>5501</td>
<td>90</td>
</tr>
<tr>
<td>4</td>
<td>R8</td>
<td>Hardengreen</td>
<td>Hardgreen House</td>
<td>130</td>
<td></td>
<td>90</td>
</tr>
</tbody>
</table>

(1) see Planning Advice Note PAN 56: Planning and Noise
<table>
<thead>
<tr>
<th>Plan Ref</th>
<th>Receptor Number</th>
<th>Receptor Location</th>
<th>Receptor Name</th>
<th>Distance to Nearest Track (m)</th>
<th>Chainage (m)</th>
<th>Speed (mph)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>R9</td>
<td>Hardengreen</td>
<td>The Cottage</td>
<td>90</td>
<td>5861</td>
<td>90</td>
</tr>
<tr>
<td>4</td>
<td>R10</td>
<td>Hardengreen</td>
<td>Dalhousie Mains Farm Cottage No. 3</td>
<td>32</td>
<td>6325</td>
<td>40</td>
</tr>
<tr>
<td>4</td>
<td>R11</td>
<td>Newtongrange</td>
<td>Lodge Cottage Mill</td>
<td>38</td>
<td>6622</td>
<td>40</td>
</tr>
<tr>
<td>5</td>
<td>R12</td>
<td>Newtongrange</td>
<td>Damside Cottage</td>
<td>6</td>
<td>6700</td>
<td>40</td>
</tr>
<tr>
<td>5</td>
<td>R13</td>
<td>Newtongrange</td>
<td>Victoria Gardens No. 25</td>
<td>20</td>
<td>7069</td>
<td>60</td>
</tr>
<tr>
<td>5</td>
<td>R14</td>
<td>Newtongrange</td>
<td>Station Road No. 36</td>
<td>15</td>
<td>7481</td>
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</tr>
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<td>R15</td>
<td>Newtongrange</td>
<td>Jenks Loan No. 14</td>
<td>20</td>
<td>7800</td>
<td>90</td>
</tr>
<tr>
<td>6</td>
<td>R16</td>
<td>Newtongrange</td>
<td>The Slaugh No. 1</td>
<td>203</td>
<td>79000</td>
<td>90</td>
</tr>
<tr>
<td>6</td>
<td>R17</td>
<td>Newtongrange</td>
<td>Scottish Mining Museum</td>
<td>95</td>
<td>80000</td>
<td>90</td>
</tr>
<tr>
<td>6</td>
<td>R18</td>
<td>Newtongrange</td>
<td>Newtonloan No. 122</td>
<td>204</td>
<td>8692</td>
<td>90</td>
</tr>
<tr>
<td>7</td>
<td>R19</td>
<td>Gorebridge</td>
<td>Millbank House</td>
<td>125</td>
<td>10300</td>
<td>90</td>
</tr>
<tr>
<td>7</td>
<td>R20</td>
<td>Gorebridge</td>
<td>Moorfoot View No. 13</td>
<td>38</td>
<td>10500</td>
<td>60</td>
</tr>
<tr>
<td>7</td>
<td>R21</td>
<td>Gorebridge</td>
<td>Public House near St. Margaret's Church</td>
<td>4</td>
<td>30</td>
<td>Close to Station</td>
</tr>
<tr>
<td>7</td>
<td>R22</td>
<td>Gorebridge</td>
<td>Robertson's Bank No.9</td>
<td>41</td>
<td>10606</td>
<td>30</td>
</tr>
<tr>
<td>7</td>
<td>R23</td>
<td>Alderside</td>
<td>Alderside</td>
<td>92</td>
<td>10825</td>
<td>30</td>
</tr>
<tr>
<td>7</td>
<td>R24</td>
<td>Catcune</td>
<td>Catcune House</td>
<td>25</td>
<td>18000</td>
<td>60</td>
</tr>
<tr>
<td>7</td>
<td>R25</td>
<td>Catcune</td>
<td>Catcune Farm</td>
<td>40</td>
<td>22000</td>
<td>60</td>
</tr>
<tr>
<td>7</td>
<td>R26</td>
<td>Borthwick</td>
<td>Borthwick Mains Cottages No. 1</td>
<td>75</td>
<td>35000</td>
<td>60</td>
</tr>
<tr>
<td>8</td>
<td>R27</td>
<td>Tynehead</td>
<td>Station House, Tynehead</td>
<td>23</td>
<td>67000</td>
<td>60</td>
</tr>
<tr>
<td>11</td>
<td>R28</td>
<td>Falahill</td>
<td>Old Railway Cottage</td>
<td>18</td>
<td>97000</td>
<td>85</td>
</tr>
<tr>
<td>11</td>
<td>R29</td>
<td>Falahill</td>
<td>Falahill</td>
<td>20</td>
<td>10400</td>
<td>70</td>
</tr>
<tr>
<td>11</td>
<td>R30</td>
<td>Falahill</td>
<td>Cottage</td>
<td>8</td>
<td>21600</td>
<td>90</td>
</tr>
<tr>
<td>11</td>
<td>R31</td>
<td>Heriot</td>
<td>Station House</td>
<td>6</td>
<td>21600</td>
<td>90</td>
</tr>
<tr>
<td>11</td>
<td>R32</td>
<td>Heriot</td>
<td>Heriot Way</td>
<td>90</td>
<td>21600</td>
<td>90</td>
</tr>
<tr>
<td>11</td>
<td>R33</td>
<td>Heriot</td>
<td>Stagebank Crossing</td>
<td>5</td>
<td>23300</td>
<td>90</td>
</tr>
<tr>
<td>15</td>
<td>R34</td>
<td>Heriot</td>
<td>House 1</td>
<td>46</td>
<td>25100</td>
<td>70</td>
</tr>
<tr>
<td>16</td>
<td>R35</td>
<td>Fountainhall</td>
<td>House 2</td>
<td>37</td>
<td>25290</td>
<td>70</td>
</tr>
<tr>
<td>16</td>
<td>R36</td>
<td>Fountainhill</td>
<td>Crookston Cottage</td>
<td>8</td>
<td>26300</td>
<td>65</td>
</tr>
<tr>
<td>16</td>
<td>R37</td>
<td>Fountainhill</td>
<td>Fountainhill Village</td>
<td>105</td>
<td>27964</td>
<td>90</td>
</tr>
<tr>
<td>16</td>
<td>R38</td>
<td>Fountainhill</td>
<td>Allanshaugh</td>
<td>141</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>R39</td>
<td>Watherston</td>
<td>Watherston Green Cottage</td>
<td>64</td>
<td>60</td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>R40</td>
<td>Stow</td>
<td>Station Road No. 37</td>
<td>9</td>
<td>40000</td>
<td>75</td>
</tr>
<tr>
<td>22</td>
<td>R41</td>
<td>Stow</td>
<td>Overdale, Stagehall</td>
<td>87</td>
<td>43000</td>
<td>65</td>
</tr>
<tr>
<td>25</td>
<td>R42</td>
<td>Stow</td>
<td>Lilac Cottage</td>
<td>18</td>
<td>70</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>R43</td>
<td>Stow</td>
<td>Carnshon</td>
<td>121</td>
<td>89000</td>
<td>70</td>
</tr>
<tr>
<td>27</td>
<td>R44</td>
<td>Galashiels</td>
<td>Torwoodlee Isolated dwelling</td>
<td>45</td>
<td></td>
<td></td>
</tr>
<tr>
<td>27</td>
<td>R45</td>
<td>Galashiels</td>
<td>Torwoodlee Galashiels Wood Street</td>
<td>55</td>
<td>42753</td>
<td>55</td>
</tr>
<tr>
<td>28</td>
<td>R46</td>
<td>Galashiels</td>
<td>Wheatlands (south of track)</td>
<td>19</td>
<td>43172</td>
<td>55</td>
</tr>
<tr>
<td>28</td>
<td>R47</td>
<td>Galashiels</td>
<td>Magdala Terrace No. 181a</td>
<td>45</td>
<td>48000</td>
<td>55</td>
</tr>
<tr>
<td>28</td>
<td>R48</td>
<td>Galashiels</td>
<td>High Buckholmside No. 123</td>
<td>4</td>
<td>50000</td>
<td>55</td>
</tr>
<tr>
<td>28</td>
<td>R49</td>
<td>Galashiels</td>
<td>Robert's Grove No. 8</td>
<td>41</td>
<td>52000</td>
<td>55</td>
</tr>
<tr>
<td>28</td>
<td>R50</td>
<td>Galashiels</td>
<td>High Road (West)</td>
<td>50</td>
<td>55000</td>
<td>55</td>
</tr>
<tr>
<td>28</td>
<td>R51</td>
<td>Galashiels</td>
<td>High Road (East)</td>
<td>49</td>
<td>58000</td>
<td>55</td>
</tr>
<tr>
<td>28</td>
<td>R52</td>
<td>Galashiels</td>
<td>Springwood Bank</td>
<td>16</td>
<td>58000</td>
<td>55</td>
</tr>
</tbody>
</table>
Plan | Receptor Number | Receptor Location | Receptor Name | Distance to Nearest Track (m) | Chainage (m) | Speed (mph)
--- | --- | --- | --- | --- | --- | ---
29 | R53 | Galashiels | Further Education college | 61000 | 50
29 | R54 | Galashiels | Tulley Court | 23 | 64000 | 50
29 | R55 | Galashiels | Glenfield Road East | 13 | 66000 | 50
29 | R56 | Galashiels | Dale Street | 67 | 69000 | 50
30 | R57 | Galashiels | Langlee Drive/ Woodstock Avenue | 40 | 75000 | 80
30 | R58 | Galashiels | Winston Place | 20 | 81000 | 80
30 | R59 | Tweedbank | Haining Drive / Craft Centre | 29 | 86000 | 80
30 | R60 | Tweedbank | Tweedham Drive | 32 | 89000 | 80

Receptors are residential, except where stated otherwise.

5.3.3 Assessment Criteria

Noise from new developments is often assessed in two ways:

- by comparing the levels of noise that are expected to be generated against absolute noise standards, such as those that indicate likely annoyance or disturbance with everyday activities; and/or

- by considering the change in ambient noise that will occur with the development in operation.

This assessment adopts both approaches using the following method.

The guidance in PAN 56, Planning and Noise (1), and the statutory provisions of the Noise Insulation (Railways and other Guided Transport Systems) Regulations (2) 1996 have been referred to in setting assessment criteria. Although the Noise Insulation Regulations do not apply in Scotland, in England and Wales they indicate a higher noise limit at which receptors are sufficiently affected for noise insulation to be required, and the noise levels specified in the regulations therefore indicate unacceptable noise levels. These standards have also been used in PAN 56 to set a threshold equivalent to the level at which insulation would be provided for road traffic noise.

The following free-field standards for absolute (free-field) noise levels can be drawn from them:

**Threshold of noise impacts**
- Day - \(L_{Aeq} (0700-2300 \text{ hours})\) 55 dB
- Night - \(L_{Aeq} (2300-0700 \text{ hours})\) 45 dB

**Unacceptable impact**
- Day - \(L_{Aeq} (0700-2300 \text{ hours})\) 66 dB and above
- Night - \(L_{Aeq} (2300-0700 \text{ hours})\) 59 dB and above

(1) PAN 56 Planning and Noise, Scottish Office, 1999.
(2) Noise Insulations (Railways and Other Guided Systems) Regulations, 1996 England and Wales only.
It should be noted that the threshold levels are not specifically relevant to new rail development and there is statutory requirement to achieve them. Instead they should be considered generally desirable noise levels.

Noise from the railway will thus fall into one of three cases, either below the threshold of noise impacts, in between the threshold and unacceptable levels or above unacceptable levels. The assessment and approach to mitigation used for each of these three cases is as follows.

1. Train noise below threshold criteria - No impact and no mitigation required.

2. Train noise between threshold and unacceptable criteria - Impacts depend on baseline noise level, Waverley Railway Project will adopt all reasonable practicable means to reduce noise levels, preferably to below the threshold of impacts.

3. Train noise above unacceptable criteria - Severe impacts expected depending on baseline noise level. Waverley Railway Project will adopt all reasonable practicable means to reduce noise levels, including noise insulation if necessary.

Clearly if the level of train noise is below ambient noise, train noise will be less noticeable and impacts are less likely. Hence a second tier of assessment is required in Cases 2 and 3. In Case 2 the predicted level of train noise is added to the measured ambient noise level to establish the change in noise that would be expected, and this is assessed using the significance rating given in the Institute of Acoustics and the Institute of Environmental Management and Assessment draft guidance on the Assessment of Environmental Noise, April 2002. In case 3, an increase of 1dB due to the new noise indicates that the new noise is affecting the total noise level and shows that successful mitigation would have an effect on the total noise levels in the area. Maximum pass-by noise levels ($L_{A_{\text{max}}}$, the instantaneous ‘peak’ as the train passes) are assessed against the PAN 56 82 dB free-field noise standard for sleep disturbance. Table 5.5 below summarises the train noise assessment criteria.

Table 5.5 Summary of Noise Assessment Criteria

<table>
<thead>
<tr>
<th>Predicted Train Noise Level $L_{A_{\text{eq}}, \text{period}}$</th>
<th>Increase in Ambient $L_{A_{\text{eq}}}$ Noise</th>
<th>Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Case 1</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Day $&lt; 55$ dB ($0700-2300$ hrs)</td>
<td>N/ A</td>
<td>No Impact</td>
</tr>
<tr>
<td>Night $&lt; 45$ dB ($2300-0700$ hrs)</td>
<td>N/ A</td>
<td>No Impact</td>
</tr>
<tr>
<td><strong>Case 2</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Day $&gt; 55$ dB ($0700-2300$ hrs) $&lt; 66$ dB ($0700-2300$ hrs)</td>
<td>&lt;1 dB</td>
<td>No impact</td>
</tr>
<tr>
<td></td>
<td>1 to 3 dB</td>
<td>Slight impact</td>
</tr>
<tr>
<td></td>
<td>3 to 5 dB</td>
<td>Moderate impact</td>
</tr>
<tr>
<td></td>
<td>5 to 10 dB</td>
<td>Substantial impact</td>
</tr>
<tr>
<td></td>
<td>$&gt; 10$ dB</td>
<td>Severe impact</td>
</tr>
</tbody>
</table>
### Predicted Train Noise Levels $I_{A_{eq, period}}$

<table>
<thead>
<tr>
<th>Impact</th>
<th>Increase in Ambient $L_{A_{eq}}$ Noise</th>
</tr>
</thead>
<tbody>
<tr>
<td>No impact</td>
<td>&lt;1 dB</td>
</tr>
<tr>
<td>Slight impact</td>
<td>1 to 3 dB</td>
</tr>
<tr>
<td>Moderate impact</td>
<td>3 to 5 dB</td>
</tr>
<tr>
<td>Substantial impact</td>
<td>5 to 10 dB</td>
</tr>
<tr>
<td>Severe impact</td>
<td>&gt;10 dB</td>
</tr>
</tbody>
</table>

### Impact

<table>
<thead>
<tr>
<th>Night &gt;45 dB (2300-0700 hrs) &lt; 59 dB (0700-2300 hrs)</th>
<th>&lt;1 dB</th>
<th>No impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Case 3 Day &gt; 66 dB (0700-2300 hrs).</td>
<td>&gt;1 dB</td>
<td>Significant impact, noise insulation may be required</td>
</tr>
<tr>
<td>Night &gt; 59 dB (0700-2300 hrs) or &gt;1 dB Significant impact, noise insulation may be required</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$L_{A_{max}}$ (2300 – 0030 hrs) &gt;82 $L_{A_{max}}$ &lt; or equal to 82 dB</td>
<td>$L_{A_{max}}$ &gt;82 dB Significant impact</td>
<td></td>
</tr>
<tr>
<td>$L_{A_{max}}$ &gt;82 dB</td>
<td>Significant impact</td>
<td></td>
</tr>
</tbody>
</table>

There is no statutory requirement for mitigation in Case 2 or Case 3, but Waverley Railway Project is committed to adopting mitigation where it is reasonable to do so and where it is within their powers to do so, i.e., by measures to be taken 'at source', particularly where more significant impacts are predicted. It is recognised that a combination of many local factors will determine if noise mitigation is appropriate, including practicability, dis-benefits (including visual impact and severance), numbers of people affected and cost/effectiveness. Noise levels that are less than 3 dB above the lower $L_{A_{eq}}$ noise criteria are not considered significant enough to warrant noise mitigation regardless of baseline noise levels.

In Case 3 noise will need to be mitigated possibly using noise insulation following application of all other reasonable mitigation measures.

### 5.3.4 Predicted Noise Levels

The noise predictions are based on the following assumptions:

- speeds supplied by Scott Wilson Railways;
- distances from plans B1031-PW-D-0054-PO2 to 0083-PO2;
- measured noise data from Bombardier who manufacture the Turbo Star train; and
- adjustments and speed relationships developed from measured data.

Measured noise data has been provided for various operating conditions including stationary trains, trains accelerating at full power (at around 10 mph), and trains running at speeds between 59 mph and 99 mph. The train speeds expected at the chosen receptor locations vary between 30 mph and 90 mph and the measured data.
between 59 mph and 99 mph have been extrapolated using derived speed relationships for speeds as low as 30 mph.

This does not include the effect of trains accelerating from rest under full power, or stationary trains, which will generally occur close to stations. The $L_{A\text{eq}}$ calculations have been based on the prediction method in Calculation of Railway Noise (CRN) except for the speed relationships that are described above. The maximum noise level has been based on adjusting measured information to account for distance from the source and the length of the train. At this stage of the design it has not been possible to account for possible noise screening, for example due to cuttings and embankment edges. Although these effects may not apply to the majority of receptors, they can be significant, and should be studied as part of the consideration of detailed noise mitigation plans when the final track design is developed.

Table 5.6 gives the results of the noise predictions at 60 representative receptors closest receptors to the alignment.

### Table 5.6 Train Noise Predictions at Noise Sensitive Receptors (no screening)

<table>
<thead>
<tr>
<th>Receptor Number</th>
<th>Receptor Name</th>
<th>Distance to Nearest Track (m)</th>
<th>$L_{A\text{eq}}$, 0700 to 2300</th>
<th>$L_{A\text{max}}$</th>
<th>$L_{A\text{eq}}$, 2300 to 0700</th>
<th>Exceedance (dB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>R1</td>
<td>Old School House</td>
<td>23</td>
<td>47.4</td>
<td>72</td>
<td>42.4</td>
<td></td>
</tr>
<tr>
<td>R2</td>
<td>The Marmalade Cat (Pub)</td>
<td>47</td>
<td>44.3</td>
<td>68</td>
<td>39.3</td>
<td></td>
</tr>
<tr>
<td>R3</td>
<td>Sherrifhead</td>
<td>46</td>
<td>44.4</td>
<td>68</td>
<td>39.4</td>
<td></td>
</tr>
<tr>
<td>R4</td>
<td>8 Lasswade Road</td>
<td>12.5</td>
<td>57.1</td>
<td>85</td>
<td>52.1</td>
<td></td>
</tr>
<tr>
<td>R5</td>
<td>Gilmerton Road</td>
<td>15</td>
<td>56.3</td>
<td>84</td>
<td>51.3</td>
<td></td>
</tr>
<tr>
<td>R6</td>
<td>15 Dundas Crescent</td>
<td>25</td>
<td>54.1</td>
<td>82</td>
<td>49.1</td>
<td>2 dB above daytime $L_{A\text{eq}}$ criterion and 7 dB above night-time $L_{A\text{eq}}$ criterion. 3 dB above $L_{A\text{max}}$ criterion.</td>
</tr>
<tr>
<td>R7</td>
<td>16 Bonnyrigg Road</td>
<td>28</td>
<td>53.6</td>
<td>81</td>
<td>48.6</td>
<td>4 dB above night-time $L_{A\text{eq}}$ criterion.</td>
</tr>
<tr>
<td>R8</td>
<td>Hardgreen House</td>
<td>130</td>
<td>47</td>
<td>70</td>
<td>41.9</td>
<td>4 dB above $L_{A\text{eq}}$ criterion.</td>
</tr>
<tr>
<td>R9</td>
<td>The Cottage</td>
<td>90</td>
<td>48.6</td>
<td>73</td>
<td>43.5</td>
<td></td>
</tr>
<tr>
<td>R10</td>
<td>Dalhousie Mains Farm Cottage No. 3</td>
<td>32</td>
<td>46</td>
<td>70</td>
<td>41</td>
<td></td>
</tr>
<tr>
<td>Receptor Number</td>
<td>Receptor Name</td>
<td>Distance to Nearest Track (m)</td>
<td>$L_{A_{eq}}$, 0700 to 2300</td>
<td>$L_{A_{max}}$, 2300 to 0700</td>
<td>Exceedance (dB)</td>
<td></td>
</tr>
<tr>
<td>-----------------</td>
<td>--------------------------------</td>
<td>------------------------------</td>
<td>-----------------------------</td>
<td>-----------------------------</td>
<td>---------------------------------</td>
<td></td>
</tr>
<tr>
<td>R11</td>
<td>Lodge Cottage Mill Cottage</td>
<td>38</td>
<td>45.3</td>
<td>69</td>
<td>40.2</td>
<td></td>
</tr>
<tr>
<td>R12</td>
<td>Damside Cottage</td>
<td>6</td>
<td>51.1</td>
<td>79</td>
<td>46</td>
<td></td>
</tr>
<tr>
<td>R13</td>
<td>Victoria Gardens No. 25</td>
<td>20</td>
<td>51.6</td>
<td>78</td>
<td>46.5</td>
<td></td>
</tr>
<tr>
<td>R14</td>
<td>Station Road No. 36</td>
<td>15</td>
<td>52.8</td>
<td>79</td>
<td>47.8</td>
<td></td>
</tr>
<tr>
<td>R15</td>
<td>Jenks Loan No. 14</td>
<td>20</td>
<td>55.1</td>
<td>83</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5 dB above night-time $L_{A_{eq}}$ criterion and 1 dB above $L_{A_{max}}$ criterion.</td>
<td></td>
</tr>
<tr>
<td>R16</td>
<td>The Slaugh No. 1</td>
<td>203</td>
<td>45</td>
<td>67</td>
<td>40</td>
<td></td>
</tr>
<tr>
<td>R17</td>
<td>Scottish Mining Museum</td>
<td>95</td>
<td>48.3</td>
<td>73</td>
<td>43.3</td>
<td></td>
</tr>
<tr>
<td>R18</td>
<td>Newtonloan No. 122</td>
<td>204</td>
<td>45</td>
<td>67</td>
<td>40</td>
<td></td>
</tr>
<tr>
<td>R19</td>
<td>Millbank House No. 122</td>
<td>125</td>
<td>47.1</td>
<td>70</td>
<td>42.1</td>
<td></td>
</tr>
<tr>
<td>R20</td>
<td>Moorfoot View No. 13</td>
<td>38</td>
<td>48.8</td>
<td>74</td>
<td>43.7</td>
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</tr>
<tr>
<td>R21</td>
<td>Public House near St. Margaret's Church</td>
<td>4</td>
<td>48.6</td>
<td>78</td>
<td>43.5</td>
<td></td>
</tr>
<tr>
<td>R22</td>
<td>Robertson's Bank No. 9</td>
<td>41.3</td>
<td>42.4</td>
<td>77</td>
<td>37.3</td>
<td></td>
</tr>
<tr>
<td>R23</td>
<td>Alderside</td>
<td>91.5</td>
<td>38.9</td>
<td>60</td>
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<td></td>
</tr>
<tr>
<td>R24</td>
<td>Catcune House</td>
<td>25</td>
<td>50.6</td>
<td>77</td>
<td>45.5</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1 dB above night-time $L_{A_{eq}}$ criterion.</td>
<td></td>
</tr>
<tr>
<td>R25</td>
<td>Catcune Farm</td>
<td>40</td>
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<td>74</td>
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</tr>
<tr>
<td>R26</td>
<td>Borthwick Mains Cottages No. 1</td>
<td>75</td>
<td>45.8</td>
<td>70</td>
<td>40.8</td>
<td></td>
</tr>
<tr>
<td>R27</td>
<td>Station House, Tynehead</td>
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<td>51</td>
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<td>45.9</td>
<td></td>
</tr>
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<td></td>
<td>1 dB above night-time $L_{A_{eq}}$ criterion.</td>
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</tr>
<tr>
<td>R28</td>
<td>Old Railway Cottage</td>
<td>18</td>
<td>55</td>
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</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5 dB above night-time $L_{A_{eq}}$ criterion.</td>
<td></td>
</tr>
<tr>
<td>R29</td>
<td>Falahill</td>
<td>20</td>
<td>52.9</td>
<td>80</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3 dB above night-time $L_{A_{eq}}$ criterion.</td>
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</tr>
<tr>
<td>R30</td>
<td>Cottage</td>
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<td>58.1</td>
<td>88</td>
<td>53</td>
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<td></td>
<td>6 dB above $L_{A_{max}}$ criterion, 8 dB above night-time $L_{A_{eq}}$ criterion and 3 dB above daytime $L_{A_{eq}}$ criterion)</td>
<td></td>
</tr>
<tr>
<td>Receptor Number</td>
<td>Receptor Name</td>
<td>Distance to Nearest Track (m)</td>
<td>$L_{A_{eq}}$, 0700 to 2300</td>
<td>$L_{A_{eq}}$, 2300 to 0700</td>
<td>Exceedance (dB)</td>
<td></td>
</tr>
<tr>
<td>-----------------</td>
<td>-------------------------</td>
<td>------------------------------</td>
<td>-----------------------------</td>
<td>-----------------------------</td>
<td>-----------------</td>
<td></td>
</tr>
<tr>
<td>R31</td>
<td>Station House</td>
<td>6</td>
<td>58.1</td>
<td>89</td>
<td>53</td>
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<td>$L_{A_{max}}$ criterion, 8 dB above night-time $L_{A_{eq}}$ criterion and 3 dB above daytime $L_{A_{eq}}$ criterion</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>R32</td>
<td>Heriot Way</td>
<td>90</td>
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<td>73</td>
<td>43.5</td>
<td></td>
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<tr>
<td>R33</td>
<td>Stagebank Crossing Cottage</td>
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<td>58.1</td>
<td>90</td>
<td>53</td>
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<tr>
<td>R34</td>
<td>House 1</td>
<td>46</td>
<td>49.3</td>
<td>75</td>
<td>44.2</td>
<td></td>
</tr>
<tr>
<td>R35</td>
<td>House 2</td>
<td>36.5</td>
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<tr>
<td>R36</td>
<td>Crookston Cottage</td>
<td>7.5</td>
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<td>50.2</td>
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<tr>
<td>R37</td>
<td>Fountainhall Village</td>
<td>105</td>
<td>47.9</td>
<td>72</td>
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<td></td>
</tr>
<tr>
<td>R38</td>
<td>Allanshaugh Watherston</td>
<td>141</td>
<td>46.6</td>
<td>69</td>
<td>41.6</td>
<td></td>
</tr>
<tr>
<td>R39</td>
<td>Green Cottage</td>
<td>63.5</td>
<td>46.5</td>
<td>71</td>
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<tr>
<td>R40</td>
<td>Station Road No, 37</td>
<td>8.8</td>
<td>56.5</td>
<td>85</td>
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</tr>
<tr>
<td>R41</td>
<td>Overdale, Stagehall</td>
<td>86.5</td>
<td>45.9</td>
<td>70</td>
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<tr>
<td>R42</td>
<td>Lilac Cottage</td>
<td>18.2</td>
<td>53.3</td>
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<tr>
<td>R43</td>
<td>Camshron</td>
<td>121</td>
<td>45.1</td>
<td>68</td>
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<tr>
<td>R44</td>
<td>Torwoodlee Isolated dwelling</td>
<td>45</td>
<td>47.3</td>
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<td>42.2</td>
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<tr>
<td>R45</td>
<td>Torwoodlee Galashields Wood Street</td>
<td>55</td>
<td>46.4</td>
<td>71</td>
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<td></td>
</tr>
<tr>
<td>R46</td>
<td>Wheatlands (south of track)</td>
<td>18.5</td>
<td>51.1</td>
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<td>46.1</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>$L_{A_{max}}$ criterion, 1 dB above night-time $L_{A_{eq}}$ criterion</td>
<td></td>
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### Environmenta Resources Management Waverley Railway Project

<table>
<thead>
<tr>
<th>Receptor Number</th>
<th>Receptor Name</th>
<th>Distance to Nearest Track (m)</th>
<th>$L_{A_{eq}}$ 0700 to 2300</th>
<th>$L_{A_{max}}$ 2300 to 0700</th>
<th>Exceedance (dB)</th>
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<tbody>
<tr>
<td>R47</td>
<td>Magdala Terrace No. 181a</td>
<td>44.6</td>
<td>47.3</td>
<td>72</td>
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<tr>
<td>R48</td>
<td>High Buckholmside No. 123</td>
<td>4</td>
<td>53.8</td>
<td>85</td>
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</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3 dB above $L_{A_{max}}$ criterion, 4 dB above night-time $L_{A_{eq}}$ criterion</td>
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<tr>
<td>R49</td>
<td>Robert's Grove No. 8</td>
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<td>73</td>
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<tr>
<td>R50</td>
<td>High Road (West)</td>
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<td>71</td>
<td>41.8</td>
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<tr>
<td>R51</td>
<td>High Road (East)</td>
<td>49</td>
<td>46.9</td>
<td>72</td>
<td>41.9</td>
</tr>
<tr>
<td>R52</td>
<td>Stirling Street/ Chapel St</td>
<td>16</td>
<td>51.8</td>
<td>78</td>
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<td></td>
<td></td>
<td>2 dB above night-time $L_{A_{eq}}$ criterion</td>
</tr>
<tr>
<td>R53</td>
<td>Further Education college</td>
<td>53</td>
<td>N/A</td>
<td>N/A</td>
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<tr>
<td>R54</td>
<td>Tulley Court</td>
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<td>49.4</td>
<td>75</td>
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<td>R55</td>
<td>Glenfield Road East</td>
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<td>52</td>
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<td></td>
<td>2 dB above night-time $L_{A_{eq}}$ criterion</td>
</tr>
<tr>
<td>R56</td>
<td>Dale Street</td>
<td>67</td>
<td>44.7</td>
<td>68</td>
<td>39.7</td>
</tr>
<tr>
<td>R57</td>
<td>Langlee Drive/ Woodstock Avenue</td>
<td>40.3</td>
<td>51</td>
<td>77</td>
<td>46</td>
</tr>
<tr>
<td></td>
<td></td>
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<td></td>
<td></td>
<td>1 dB above night-time $L_{A_{eq}}$ criterion</td>
</tr>
<tr>
<td>R58</td>
<td>Winston Place</td>
<td>20</td>
<td>54.1</td>
<td>81</td>
<td>49</td>
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<td></td>
<td></td>
<td></td>
<td>4 dB above night-time $L_{A_{eq}}$ criterion</td>
</tr>
<tr>
<td>R59</td>
<td>Haining Drive/ Craft Centre</td>
<td>29</td>
<td>52.5</td>
<td>79</td>
<td>47.4</td>
</tr>
<tr>
<td></td>
<td></td>
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<td></td>
<td></td>
<td>2 dB above night-time $L_{A_{eq}}$ criterion</td>
</tr>
<tr>
<td>R60</td>
<td>Tweedham Drive</td>
<td>32</td>
<td>52</td>
<td>78</td>
<td>47</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2 dB above night-time $L_{A_{eq}}$ criterion</td>
</tr>
</tbody>
</table>

During the daytime period the predicted noise levels are 5 dB higher than those in the night, and the threshold limit is 10 dB higher, so night-time noise is more likely/ greater than daytime.

#### 5.3.5 Predicted Noise Impacts

There are 23 receptor locations at which noise levels greater than either the night-time $L_{A_{eq}}$ “threshold” criterion or the $L_{A_{max}}$ criterion or both are predicted. The noise levels exceed the night-time $L_{A_{eq}}$ “threshold” by between 1 and 8 dB. Noise levels are not sufficiently above the threshold criterion to exceed the “unacceptable” criterion.

At seven of these receptor locations impacts are less than 3 dB in excess of the stringent $L_{A_{eq}}$ threshold standards adopted for the night-time assessment (and do exceed the $L_{A_{max}}$ standard). Whilst not desirable, these marginal exceedences are
not considered to be significant impacts. Mitigation is therefore not considered to be necessary at these locations.

At the remaining 17 locations noise levels are more than 3 dB above the stringent $L_{Aeq}$ “threshold” criterion. The degree of impact will depend on baseline noise levels and the impacts at these locations could vary from moderate to severe impact depending on the increase in ambient $L_{Aeq}$ noise level. In all of these cases the potential for noise impact is greatest in the two and a half hours of the night when the service is expected to operate, although daytime impacts are also predicted in some cases, but to a lesser extent.

Whilst residential receptors are more sensitive to noise impacts in these night-time hours (as reflected in the assessment criteria) these impacts will be of lesser duration than the daytime ones and could be considered less significant as a result. Mitigation measures and residual impacts are discussed in Section 5.5.6.

The night-time $L_{A_{max}}$ criterion is exceeded at nine locations by between 1 and 8 dB. At these locations significant impacts are predicted (ie the possibility of sleep disturbance) and noise mitigation will be implemented either by providing barriers or noise insulation. In these cases the $L_{Aeq}$ night-time criterion is also exceeded by 3 dB or more. In cases where background noise is low, the degree of mitigation required will generally be determined by the $L_{Aeq}$ and in cases where high ambient noise levels exist (ie above the threshold criteria) the ambient noise level will determine the degree to which noise insulation is required.

The potential effect of ambient noise will need to be considered at these locations either by further inspection of the situation or by ambient noise surveys.

In addition noise generated by audible announcements could potentially be disturbing at receptors in the vicinity of the proposed stations and the system will need to be designed to account for the noise sensitivity of noise receptors in the surrounding area so as to minimise impacts whilst meeting railway safety standards.

Train drivers are required to sound the train’s horn to warn of their approach under certain situations. As a result horns will be routinely sounded as trains approach the entrance or exit to tunnels. Under railway safety requirements trains with a maximum speed of up to 160 kph are required to have horns that produce noise levels of at least 94dB in the frequency range 311 to 317 dB (89dB in soft mode) at a distance of 100m in front of the train. Hence communities local to tunnels portals may hear the horn depending on local screening effects, other ambient noise levels, weather conditions and other factors.

There are two tunnels where train horn noise can be expected:

- Torwoodlee Tunnel (just north of Galashiels) – residents of Buckholm and scattered dwellings in the vicinity are likely to hear train horns; and
Bowshank Tunnel (approximately 5km north of Galashiels) – residents in Bowshank, Fernhirst and surrounding areas are likely to hear train horns. Given the vital safety requirements of train horns it is not considered feasible to mitigate this noise source except through the use of noise insulation if necessary to prevent sleep disturbance (i.e. if the $L_{A_{max}}$ 82 dB standard is exceeded once the railway is on operation).

Ballast tamping activities may cause short-term noise impacts at night every few months during operation of the route. Exact maintenance activities schedules will need to be determined and where possible tamping at night near to residential areas should be avoided.

5.3.6 Mitigation

If local conditions permit, and practicable cost effective mitigation measures are available, the significant night-time impacts should preferably be mitigated. Where the $L_{A_{max}}$ 82 dB standard for sleep disturbance is exceeded, there should be a strong preference for noise mitigation at source, otherwise noise insulation should be provided to protect against possible sleep disturbance. Mitigation measures and residual impacts are discussed below.

Noise bunds and barriers will be an effective measure in some cases. However, it should be noted that the use of barriers is not necessarily appropriate for various reasons including:

- Track safety: There is an HMRI requirement to limit structures close to railway tracks so as to allow room for escape. This means that a noise barrier can be located no closer than approximately 3m from the track. This may make barriers impracticable, for example on embankments or where other railway structures are needed.

- Train driver sight line requirements: On curves noise barriers could compromise line of sight ahead, and so may be impracticable.

- Visual impact: In highly visible locations noise barriers may not be desirable.

- Creation of crime havens: In built up areas, such as near stations noise barriers could create areas where criminal activity could be hidden from view and thus be facilitated.

- Construction and maintenance difficulties: Noise barriers may require deep foundations or be unstable on sloped land, they may interfere with access for maintenance, and they can attract graffiti in unfavourable locations.
It will therefore be essential that all local factors are taken into account in deciding the suitability of noise barriers or bunds on the basis of a careful value judgement in each deserving case.

It will be necessary to update this assessment when the detailed design of the system has developed so that refined noise predictions can be made, for example accounting for screening effects due to cutting profiles and final speed profiles. The baseline noise levels should also be checked in those areas where impacts are likely. Hence this assessment can only give an indication of the likely noise barriers that will be required.

In this assessment, impacts of more than 3 dB above the stringent $L_{A_{eq, period}}$ assessment criteria are considered sufficiently significant to warrant the consideration of noise barriers. That is not to say noise barriers will necessarily be suitable in all these situations, but rather that they should be built in these locations if they are. Based on the assessment described above the following noise barriers may be required, subject to further detailed consideration and detailed consultation, including with the Local Authorities regarding local circumstances. Based on this assessment it is expected that mitigation will need to be considered as part of the design at receptors R4, R5, R6, R7, R15, R28, R29, R30, R31, R33, R36, R40, R42, R48, R52, R55, and R58.

Ballast tamping activities may cause short-term noise impacts at night every few months during operation of the route. Exact maintenance activities schedules will need to be determined and where possible tamping at night near to residential areas should be avoided.

**5.3.7 Residual Impacts**

It is anticipated that noise barriers will offer a solution in many of the locations identified. Some potential train noise impacts will be masked by ambient noise. There may, however, be certain locations where local conditions do not permit noise barriers and residual impacts cannot be avoided. The level of residual noise impact will be quantified following further work regarding the practicality of including noise barriers in the design of the railway.

**5.4 Vibration During Construction**

**5.4.1 Key Construction Vibration Sources**

Construction vibration sources may include compaction works on embankments, and tamping ballast. Any vibration impacts are likely to be limited to temporary perceptible vibration at the closest receptors and this has not been considered in detail in this assessment.

Driving sheet piles may be required at a limited number of structures. Although vibration from this source could be perceptible at distances of up to about 100 m the
extent of this temporary work is expected to be limited and any effects are likely to be restricted to vibration being perceptible intermittently for a few days. The effects of piling vibration are not considered in detail in this assessment.

In general the typical mobile plant and lorries that will be the most common form of equipment on site will not generate levels of vibration that will be perceptible outside of the site boundary. Access roads will be kept in good condition to minimise vibration during vehicle movements.

5.4.2 Vibration Criteria

Ground vibration is potentially perceptible above peak particle velocities (PPVs) of 0.1 mm/ s, but higher levels are often experienced from other sources, and will often be acceptable.

There may also be concern that vibration from train vehicles could damage building structures, particularly in the case of listed buildings. Vibration levels above which damage may potentially occur are as follows:

- reinforced or framed buildings 50 mm/ s PPV; and
- un-reinforced or light framed buildings 15 mm/ s PPV.

5.4.3 Predicted Vibration Impacts

The expected levels of ground vibration are below the criteria given above, which relate to the structural integrity of buildings. Consequently, no impacts on buildings located adjacent to the scheme are expected to occur. Vibration may be perceptible at some locations intermittently over short periods.

5.4.4 Mitigation

Mitigation will include keeping site access roads in good conditions.

5.4.5 Residual Impacts

No significant residual impacts are expected although vibration may be perceptible at some locations intermittently over short periods.

5.5 Vibration During Operation

5.5.1 Key Sources of Operational Vibration

The movement of the operating trains could potentially give rise to perceptible levels in adjacent occupied properties.
5.5.2 Criteria

Vibration Dose Value (VDV) is a measure of the accumulated level of ground vibration over a period and, through the application of BS6472, is the standard metric for predicting the likelihood of adverse comments from effected building occupants. The standard gives the following VDV levels at or below which the probability of adverse comments is low:

- day (0700-2300 hours) 0.4 m/ s$^{1.75}$; and
- night (2300-0700 hours) 0.1 m/ s$^{1.75}$.

In addition to human perception of accumulated vibration, the movement of trains could potentially give rise to disturbing levels of ground vibration or groundborne noise for the brief period while the train passes by particularly sensitive properties. Ground vibration is potentially perceptible above peak particle velocities (PPVs) of 0.1 mm/ s, but higher levels are often experienced from other sources, and will often be acceptable.

There may also be concern that vibration from train vehicles could damage building structures, particularly in the case of listed buildings. Vibration levels above which damage may potentially occur are as follows:

- reinforced or framed buildings 50 mm/ s PPV; and
- un-reinforced or light framed buildings 15 mm/ s PPV.

Groundborne noise (i.e., noise radiating from the ground within a receptor as a result of ground vibration) from the train system will generally be at levels below noise arriving via the conventional airborne path, and for this reason is generally more of a concern for underground railways where airborne noise is absent. However, particularly sensitive buildings that may be well insulated against external airborne noise sources could potentially be effected. A noise standard of $L_{A_{max}}$ 40 dB is often adopted on underground railways, but may not be appropriate for special buildings housing particularly noise-sensitive uses.

5.5.3 Predicted Vibration Levels

Experience of other rail projects suggests that train services such as that proposed, when running on continuously welded rail (CWR) and ballasted track, do not result in vibration levels above the guidance levels in BS 6472, even at locations close to the line.

A detailed study of the vibration effects of the railway is not appropriate at this stage since the following uncertainties exist at this stage of the project:

- the vertical and horizontal alignments may be refined as detailed design progresses;
- track bed design may vary resulting in changes in ballast depth or sleeper design and rail fastening;

- the locations of points are not finalised;

- detailed speed profiles have not been developed; and

- ground conditions may be modified and have not been established adequately to enable adjustments to be made to vibration propagation data gathered at other sites (noting that ground conditions may be receptor specific over the track length).

Groundborne noise is also not expected to be a significant issue given the levels of airborne noise that will be expected from the at-grade railway and the absence of receptors above the two short tunnel sections. Even at locations where noise barriers may be specified, airborne noise is expected to be dominant. Properties that are close to the line and which have habitable basements may be more sensitive to ground-borne noise but these will need to be identified and considered on a case-by-case basis during detailed design.

5.5.4 Predicted Vibration Impacts

Based on experience of other rail projects it is not expected that significant vibration impacts will be experienced at adjacent receptors. Groundborne noise is not expected to give rise to impacts at the receptors that have been considered in this assessment.

5.5.5 Mitigation

Despite the conclusions above it would be appropriate for the issue of vibration to be reviewed as the design develops and the need for vibration mitigation should be re-assessed at that time. Should vibration mitigation become necessary it is likely to take the form of a modified trackform at approximately eight locations along the route that are close to the track. The key receptors are likely include R12 (Damside Cottage), R21 (Public house Close to St Margaret's Church), R30 (A Cottage), R31 (Station House), R33 (Stagebank Crossing Cottage), R36 Crookston Cottage, R40 (Station Road No 37), and R48 (N o 123 High Buckholmside).

5.5.6 Residual Impacts

No significant residual vibration effects are expected assuming trackform design is kept under review during detailed design of the scheme and modified if necessary in limited areas.
5.6 **Summary and Conclusions**

There are likely to be daytime construction noise impacts at receptors that are sufficiently close to the works on the alignment or close to structures such as bridges. Detailed consideration of noise mitigation will be required by the contractor to ensure that significant construction noise impacts do not result from the scheme. A draft CoCP has been provided (Annex D) with specific criteria identified for the contractor which will be finalised with the local authorities prior to construction. With mitigation in place it is likely that any residual effects from the works along the route will be relatively short term in duration (see Table 5.7 for a summary of impacts, mitigation and significant residual effects).

It is anticipated that some potential train noise impacts will be reduced by ambient noise, and for others noise barriers will offer a solution. There may, however, be certain locations where local condition do not permit noise barriers and residual impacts cannot be avoided.

It is not expected that significant vibration impacts will be experienced at adjacent receptors.
<table>
<thead>
<tr>
<th>Key Potential Impacts (without mitigation)</th>
<th>Mitigation</th>
<th>Residual Effects</th>
<th>Means by which mitigation will be delivered</th>
</tr>
</thead>
<tbody>
<tr>
<td>Noise impacts during construction are anticipated along the route.</td>
<td>piling and other potentially high noise generating activities will be restricted wherever possible to daytime only (0800-1800 hours) and construction activities will be scheduled to minimise noise;</td>
<td>Mitigation measures will reduce noise emissions and any residual effects will be relatively short term in duration.</td>
<td>CoCP</td>
</tr>
<tr>
<td></td>
<td>plant will be used in an appropriate manner to minimise noise emissions including regular maintenance of the plant;</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>inherently quiet plant will be used where appropriate;</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>noisy plant will be located as far as possible from sensitive receptors;</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>construction contractors will adhere to the codes of practice for construction working and piling given in BS 5228, and the guidance given therein, for minimising noise emissions from the site;</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>the works will be scheduled such that the maximum benefit is obtained from any noise screening measures; and</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>the public will be kept informed when construction activities are likely to generate perceptible vibration levels.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Trackside noise barriers will reduce noise levels experienced at receptor locations.</td>
<td>Predicted train noise impacts will be reduced by ambient noise and for other e noise barriers will offer a solution.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Subject to further detailed consideration and detailed consultation, including with the Local Authorities regarding local circumstances.</td>
<td></td>
</tr>
</tbody>
</table>
6

LOCAL AIR QUALITY AND CARBON DIOXIDE EMISSIONS

6.1 INTRODUCTION

The local air quality impacts of the emissions to atmosphere from the proposed scheme are assessed in this section. Existing monitoring data have been used in order to establish the background air quality. Sources of these data include UK nitrogen dioxide (NO₂) national diffusion tube survey and maps of pollutant concentrations. These concentrations are compared with the assessment criteria detailed in the following section.

Local Air Quality Management has been addressed in the impact assessment of this project. Any Air Quality Management Areas designated in the vicinity of the scheme are identified at this stage.

6.2 ASSESSMENT CRITERIA

The EC Air Quality Framework Directive (1996) identified 12 pollutants for which limit or target values have or will be set in subsequent Daughter Directives. The first of these Daughter Directives (1), relating to sulphur dioxide (SO₂), fine particles (PM₁₀), oxides of nitrogen (NOₓ) and lead (Pb), was formally adopted April 1999 and came into force on 22 April 2001. The second Daughter Directive (2), concerned with benzene (C₆H₆) and carbon monoxide (CO), must be complied with by member states by 13 December 2002.

These Directives have been implemented in Scotland through the Air Quality (Scotland) Regulations 2000, that have since been amended by the Air Quality (Scotland) Amendment Regulations 2002. They are an important part of the Government’s strategy for improving air quality as set out in the Air Quality Strategy (AQS) published by the Department for Environment, Food and Rural Affairs (DEFRA). The AQS, published in January 2000, set objectives for eight pollutants. More recently a consultation draft was published in September 2001 concerning proposals for four pollutants (particles, benzene, carbon monoxide and polycyclic aromatic hydrocarbons (PAHs)). The proposals for particles and benzene have already been introduced in Scotland by the Air Quality (Scotland) Amendment Regulations 2002.

This section presents all the relevant air quality standards and guidelines and includes proposals published in September 2001 to update the existing objectives for certain pollutants.

### Table 6.1  UK Air Quality Strategy Objectives

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Concentration</th>
<th>Measured as</th>
<th>Date to be achieved by</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nitrogen dioxide (NO₂)</td>
<td>200 µg m⁻³</td>
<td>1 hour mean not to be exceeded more than 18 times a year (99.79%ile)</td>
<td>Dec 31, 2005</td>
</tr>
<tr>
<td></td>
<td>40 µg m⁻³</td>
<td>Annual mean</td>
<td>Dec 31, 2005</td>
</tr>
<tr>
<td>Sulphur dioxide (SO₂)</td>
<td>266 µg m⁻³</td>
<td>15 minute mean not to be exceeded more than 35 times a year (99.90%ile)</td>
<td>Dec 31, 2005</td>
</tr>
<tr>
<td></td>
<td>350 µg m⁻³</td>
<td>1 hour mean not to be exceeded more than 24 times a year (99.73%ile)</td>
<td>Dec 31, 2004</td>
</tr>
<tr>
<td></td>
<td>125 µg m⁻³</td>
<td>24 hour mean not to be exceeded more than 3 times a year (99.18%ile)</td>
<td>Dec 31, 2004</td>
</tr>
<tr>
<td>Carbon monoxide (CO)</td>
<td>10 mg m⁻³</td>
<td>Maximum Daily Running 8 hour mean</td>
<td>Dec 31, 2003</td>
</tr>
<tr>
<td>Lead (Pb)</td>
<td>0.5 µg m⁻³</td>
<td>Annual mean</td>
<td>Dec 31, 2004</td>
</tr>
<tr>
<td></td>
<td>0.25 µg m⁻³</td>
<td>Annual mean</td>
<td>Dec 31, 2008</td>
</tr>
<tr>
<td>Benzene</td>
<td>16.25 µg m⁻³</td>
<td>Running annual mean</td>
<td>Dec 31, 2003</td>
</tr>
<tr>
<td></td>
<td>3.25 µg m⁻³</td>
<td><strong>Scotland</strong>: Annual Mean</td>
<td>Dec 31, 2010</td>
</tr>
<tr>
<td>1,3-Butadiene</td>
<td>2.25 µg m⁻³</td>
<td>Running annual mean</td>
<td>Dec 31, 2003</td>
</tr>
<tr>
<td>Ozone (O₃)</td>
<td>100 µg m⁻³</td>
<td>Proposed 8 hour mean, no more than 10 exceedances.</td>
<td>Dec 31, 2005</td>
</tr>
<tr>
<td>PAH</td>
<td>0.25 ng m⁻³</td>
<td>Proposed Annual mean</td>
<td>Dec, 31, 2010</td>
</tr>
<tr>
<td>Particulate Matter (PM₁₀)</td>
<td>50 µg m⁻³</td>
<td>24 hour mean not to be exceeded more than 35 times a year (90.41%ile)</td>
<td>Dec 31, 2004</td>
</tr>
<tr>
<td></td>
<td></td>
<td>not to be exceeded more than 7 times a year (98.08%ile)</td>
<td>Dec 31, 2010</td>
</tr>
<tr>
<td></td>
<td>50 µg m⁻³</td>
<td><strong>Scotland</strong>: 24 hour mean (not to be exceeded on more than 7 days per year)</td>
<td>2010</td>
</tr>
<tr>
<td></td>
<td>40 µg m⁻³</td>
<td>Annual mean</td>
<td>Dec 31, 2004</td>
</tr>
<tr>
<td></td>
<td>18 µg m⁻³</td>
<td><strong>Scotland</strong>: Annual mean</td>
<td>2010</td>
</tr>
</tbody>
</table>

### 6.3 Baseline Environment

#### 6.3.1 Overview

This section presents a description of the ambient air quality in the region of the scheme.

Concentrations of ambient pollutants vary according to both time and location. Many factors, the most significant being the size, number and location of the sources of emissions and the prevailing weather, affect pollutant concentrations.

Given the large degree of variation of pollutant concentrations, both with time and location, it is desirable to have measurements over a period of time that is...
long enough to ensure that a complete range of meteorological conditions have been experienced.

The baseline air quality for the Waverley Railway project presented in this section draws on the following sources of information:

- the national NO\textsubscript{2} diffusion tube survey; and
- maps of pollutant concentrations.

Edinburgh has automated monitoring sites that are part of the UK Automated Urban and Rural Network (AURN), but these are not representative of the area surrounding the proposed scheme and have therefore not been included in this study.

Comparison has been made to air quality standards from the following:

- the Air Quality Strategy (AQS) objectives; and
- WHO guidelines where relevant.

In each case the monitoring data are presented in the same statistical form as the air quality standard unless stated otherwise.

**Nitrogen Dioxide (NO\textsubscript{2})**

National Nitrogen Dioxide Survey Data

There are several sites around Midlothian and Scottish Borders councils which monitor NO\textsubscript{2} concentrations as part of DEFRA’s National Nitrogen Dioxide Diffusion Tube Survey.

Figure 6.1 shows the locations of the NO\textsubscript{2} diffusion tube monitoring sites.

The results of monitoring at these locations during 1996 to 2001 are presented in Table 6.2.
Table 6.2 National Nitrogen Dioxide Survey Annual Average Results for 1996 – 2001 (µg m⁻³) (Source: NETCEN)

<table>
<thead>
<tr>
<th></th>
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<th></th>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Kerbside Sites</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dalkeith 1N</td>
<td>17.5</td>
<td>-</td>
<td>48.6(a)</td>
<td>50.5</td>
<td>46.6(a)</td>
<td>41.4(a)</td>
</tr>
<tr>
<td>Galashiels 1N</td>
<td>27.2(a)</td>
<td>-</td>
<td>23.5</td>
<td>29.1</td>
<td>31.1</td>
<td>-</td>
</tr>
<tr>
<td>Hawick 1N</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>22.3(a)</td>
<td>-</td>
</tr>
<tr>
<td>Hawick 2N</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>42.7</td>
<td>-</td>
</tr>
<tr>
<td>Hawick 4N</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>38.9(a)</td>
<td>-</td>
</tr>
<tr>
<td>Hawick 5N</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>11.7</td>
<td>-</td>
</tr>
<tr>
<td>Hawick 6N</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>27.2(a)</td>
<td>-</td>
</tr>
<tr>
<td>Kelso 1N</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>23.3</td>
<td>-</td>
</tr>
<tr>
<td>Peebles 5N</td>
<td>17.5(a)</td>
<td>-</td>
<td>11.7(a)</td>
<td>25.3</td>
<td>27.2</td>
<td>-</td>
</tr>
<tr>
<td>Penicuik 3N</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>25.5(a)</td>
</tr>
<tr>
<td>Intermediate Sites</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dalkeith 3N</td>
<td>15.5(a)</td>
<td>-</td>
<td>15.5(a)</td>
<td>17.5</td>
<td>15.5(a)</td>
<td>-</td>
</tr>
<tr>
<td>Background Sites</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dalkeith 2N</td>
<td>21.4(a)</td>
<td>-</td>
<td>17.5(a)</td>
<td>17.5</td>
<td>19.4(a)</td>
<td>14.2(a)</td>
</tr>
<tr>
<td>Galashiels 2N</td>
<td>20.1(a)</td>
<td>-</td>
<td>11.7(a)</td>
<td>11.7</td>
<td>11.7</td>
<td>-</td>
</tr>
<tr>
<td>Hawick 3N</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>9.7</td>
<td>-</td>
</tr>
<tr>
<td>Kelso 2N</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>9.7</td>
<td>-</td>
</tr>
<tr>
<td>Melrose 1N</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>11.7</td>
<td>-</td>
</tr>
<tr>
<td>Peebles 6N</td>
<td>11.7(a)</td>
<td>-</td>
<td>11.7</td>
<td>9.7</td>
<td>11.7</td>
<td>-</td>
</tr>
<tr>
<td>Penicuik 2N</td>
<td>11.9(a)</td>
<td>-</td>
<td>9.7(a)</td>
<td>7.8</td>
<td>9.7(a)</td>
<td>7.4(a)</td>
</tr>
<tr>
<td>AQS Objective</td>
<td>40</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(a) Annual Average calculated with data from 9 or less of the 12 months

The diffusion tube results indicate that the NO₂ concentration at most locations meet the annual mean objective. The exceptions are the kerbside site Dalkeith 1N in 1999. Pollutant concentrations can vary greatly with season and thus it is impossible to draw any solid conclusions from the 2001 data until an entire year’s worth of data has been collated and validated. Data for 2002 are not available yet.

Local Authority Data

Midlothian and Scottish Borders Councils have confirmed that there are no NO₂ diffusion tubes that are representative of the area surrounding the proposed Waverley Railway development.

Maps of Pollutant Concentrations

Figure 6.2 below shows the predicted NO₂ concentration for 2001 in the area surrounding the proposed scheme. The data for this map have been generated by a combination of monitoring and modelling. The data were taken from the NETCEN website and recreated as a contour map to show the concentrations of nitrogen dioxide in the region of the Waverley Railway, which has been marked in red below.
The estimated NO$_2$ concentration in the region of the proposed scheme is approximately 7-23 µg m$^{-3}$. This is within the relevant standards.

Figure 6.3 below shows the predicted NO$_2$ concentration for 2005 in the area surrounding the proposed scheme (Waverley Railway has been marked in red).
Predicted NO₂ concentrations in the region of the Waverley Railway project for 2005 are 6-19 µg m⁻³, which is within the objectives for 2005.

Figure 6.4 below shows the predicted NO₂ concentration for 2010 in the area surrounding the proposed scheme (Waverley Railway has been marked in red).

**Figure 6.3** Map of Predicted Nitrogen Dioxide Concentrations in 2010 (µg m⁻³)  
(Data Source: NETCEN)

Predicted NO₂ concentrations in the region of the Waverley Railway project are between 5-17 µg m⁻³, which is within the relevant objectives for 2005.

**Particulate Matter (PM₁₀)**

Maps of Pollutant Concentrations

Figures 6.5 below shows the estimated and predicted concentrations of particulate matter in the region of the scheme. The 2001 estimated concentrations, and the 2004 and 2010 predicted concentrations are displayed in gravimetric units. The data were taken from the NETCEN website and recreated as a contour map to show the concentrations of PM₁₀ in the region of the Waverley Railway, which has been marked in red below.
The estimated annual mean PM$_{10}$ concentration in the region of the Waverley Railway is approximately between 13-16.5 µg m$^{-3}$, which is within the relevant objectives for 2004 and 2010.

Figure 6.6 below shows the predicted particulate matter concentration for 2004 in the area surrounding the proposed scheme (Waverley Railway has been marked in red).
The predicted PM$_{10}$ concentrations for the region surrounding the Waverley Railway project are 13-17.5 µg m$^{-3}$, this is within the relevant objectives.

Figure 6.7 below shows the predicted PM$_{10}$ concentrations for 2010 in the area surrounding the proposed scheme (Waverley Railway has been marked in red).

![Map of Predicted Annual Mean PM$_{10}$ Concentrations in 2010 (µg m$^{-3}$, gravimetric) (Data Source: NETCEN)](http://www.airquality.co.uk)

The predicted PM$_{10}$ concentrations for the region surrounding the Waverley Railway project are between 12-16.5 µg m$^{-3}$; this is within the proposed standard for Scotland in 2010.

**Sulphur Dioxide (SO$_2$)**

Local Authority Data

Midlothian and Scottish Borders Councils have confirmed that there are no sulphur dioxide diffusion tubes that are representative of the area surrounding the proposed redevelopment of the Waverley Railway. Their monitoring sites are located in busy town centres.

Active Maps of Pollutant Concentrations

Maps of pollutant concentrations available on the NETCEN website (1) show estimated pollutant concentrations throughout the UK. The maps are derived from interpolations of monitoring data, emissions inventories and modelling. The maps available are reproduced for the central and southern Scotland region.

(1) http://www.airquality.co.uk
in 1996 in Figure 6.8 below. These interactive maps also have a function where the pollutant concentrations are reported for several Ordnance Survey coordinates within each local authority.

**Figure 6.7** Map of Estimated Annual Mean Sulphur Dioxide Concentrations in 1996 (ppb)  
(Source: NETCEN)

![Map of Estimated Annual Mean Sulphur Dioxide Concentrations in 1996 (ppb)](image)

The estimated SO₂ concentration in the region of the Waverley Railway in 1996 is between 1.3-3.1 ppb (3.5-8.4 µg m⁻³). There are no objectives in the Air Quality Strategy for annual mean sulphur dioxide concentrations, although the range quoted above meets the World Health Organisation (WHO) guideline of 50 µg m⁻³.

**Carbon Monoxide (CO)**

**Local Authority Data**

Midlothian and Scottish Borders Councils have confirmed that there are no data that are representative of the area surrounding the proposed redevelopment of the Waverley Railway.

**Maps of Pollutant Concentrations**

Figure 6.9 below shows the estimated carbon monoxide concentrations in 1996 in central and southern Scotland. Carbon monoxide concentrations are also available for several grid references within the region of the proposed site.
The estimated CO concentration for 1996 in the region of the Waverley Railway is approximately 0.16-0.22 ppm (0.19-0.26 mg m\(^{-3}\)). There is no objective for the annual mean carbon monoxide concentration.

**Lead**

**Local Authority Data**

Midlothian and Scottish Borders Councils have confirmed that there are no data that are representative of the area surrounding the proposed redevelopment of the Waverley Railway.

**Maps of Pollutant Concentrations**

Figure 6.10 below shows the estimated concentrations of lead in 1996 in central and southern Scotland.
The estimated lead concentration based on grid references within the region of the Waverley Railway is approximately between 6-15 ng m\(^{-3}\) (0.006-0.015 µg m\(^{-3}\)). This is within the annual mean objective for lead.

**Benzene**

**Local Authority Data**

Midlothian and Scottish Borders Councils have confirmed that there are no data that are representative of the area surrounding the proposed redevelopment of the Waverley Railway.

**Maps of Pollutant Concentrations**

Figure 6.11 below shows the estimated benzene concentrations in the central and southern Scotland region in 1996.
The estimated Benzene concentrations in the region of the Waverley Railway is between 0.14-0.28 ppb (0.46-0.92 µg m⁻³). The benzene concentrations quoted here meet the annual mean objective for benzene for 2003 and 2010.

1,3-Butadiene

Local Authority Data

Midlothian and Scottish Borders Councils have confirmed that there are no data that are representative of the area surrounding the proposed redevelopment of the Waverley Railway.

Maps of Pollutant Concentrations

The 1,3-Butadiene maps have been removed from the NETCEN website. 1,3-Butadiene is not a pollutant of great abundance in rural areas and it is almost certain that relevant objectives were met in the study area.

6.3.2 Summary

Below is a summary of the estimated and predicted pollution concentrations for Grid Reference 334500 East, 661500 North, approximately 200 m from Gorebridge Station, on the Waverley Railway proposed scheme.
### Table 6.3 Estimated Pollutant Concentrations at Grid Reference 334500 East, 661500 North. Source: NETCEN

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Year</th>
<th>Annual Mean Estimated Pollutant Concentration (unless stated otherwise)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nitrogen dioxide</td>
<td>2001</td>
<td>16 µg m(^{-3})</td>
<td>Within the objective for 2005</td>
</tr>
<tr>
<td></td>
<td>2005</td>
<td>15 µg m(^{-3})</td>
<td>Within the objective for 2005</td>
</tr>
<tr>
<td></td>
<td>2010</td>
<td>12 µg m(^{-3})</td>
<td>Within the objective for 2010</td>
</tr>
<tr>
<td>Particulate matter</td>
<td>2001</td>
<td>17 µg m(^{-3}) (Gravimetric units)</td>
<td>Within the objective for 2004</td>
</tr>
<tr>
<td></td>
<td>2004</td>
<td>16 µg m(^{-3}) (Gravimetric units)</td>
<td>Within the objective for 2004</td>
</tr>
<tr>
<td></td>
<td>2010</td>
<td>15.5 µg m(^{-3}) (Gravimetric units)</td>
<td>Within proposed objective for Scotland in 2010.</td>
</tr>
<tr>
<td>Sulphur dioxide</td>
<td>1996</td>
<td>7.2 µg m(^{-3})</td>
<td>Within the WHO guideline of 50 µg m(^{-3}).</td>
</tr>
<tr>
<td>Carbon monoxide</td>
<td>1996</td>
<td>0.2 mg m(^{-3})</td>
<td>There is no objective or guideline for annual mean carbon monoxide</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>concentrations.</td>
</tr>
<tr>
<td>Benzene</td>
<td>1996</td>
<td>0.4 µg m(^{-3})</td>
<td>Within the objective for England for 2010.</td>
</tr>
<tr>
<td>1,3 Butadiene</td>
<td>1996</td>
<td>n/a</td>
<td>Within the objective for 2003.</td>
</tr>
<tr>
<td>Lead</td>
<td>1996</td>
<td>6 ng m(^{-3})</td>
<td>Within the objectives for 2004 and 2008.</td>
</tr>
</tbody>
</table>

The predicted pollutant concentrations at 334500 East, 661500 North, approximately the central point of the scheme, indicate that all relevant objectives are met at the proposed site.

#### 6.3.3 Air Quality Management Areas (AQMAs)

Both Midlothian and Scottish Borders Councils have completed the review and assessment process and have not declared any AQMAs.
6.4 CONSTRUCTION IMPACTS

6.4.1 Overview

The impacts on air quality, which may arise as a consequence of the construction of the proposed scheme, are principally associated with emissions of dust and the potential for these emissions to cause soiling and poor visibility, and emissions from construction traffic.

Construction activities of concern could include excavation, drilling, sanding, piling, movement and deposition of materials around the site, stockpiling building materials and vehicle movements. These activities have the potential to generate dust and/or emissions to air.

Construction vehicles and plant employed on the site will emit exhaust gases in the vicinity of the proposed development site. Exhaust emissions from construction vehicles could cause a local deterioration in air quality, although
these emissions are likely to be insignificant. Therefore, for the purposes of the
assessment of the air quality impacts as a result of construction activities for this
scheme, only emissions of dust are considered further in this assessment, and
emissions of exhaust gases have been scoped out at this stage.

The emission of dust from construction activities is, by its nature, very variable,
depending as it does on the type of activity, the state of the ground and the
prevailing wind speed. Consequently, methodologies for predicting dust
impacts are not straightforward. For this reason, a qualitative assessment has
been undertaken for the potential for nuisance from dust emissions during
construction.

6.4.2 Impacts From Construction Dust

Dust becomes airborne due to the action of winds on material stockpiles and
other dusty surfaces, or when thrown up by mechanical action, for example the
movement of tyres on a dusty road or activities such as sanding or drilling. The
quantity of dust released during construction depends on a number of factors,
including the type of construction activities occurring (e.g., crushing, grinding),
volume of material being moved, the moisture and silt content of the materials,
the distance travelled on unpaved roads, the mitigation measures employed and
the area of exposed materials.

There are many types of particulate matter that are included in the definition of
dust, including variations in terms of size and chemical composition. The dust
emitted from the construction areas will have a broad size distribution but less
compositional range.

The ability of a particle to remain suspended in the air depends on its size, shape
and density. Larger particles tend to be deposited close to the source, the
majority being deposited within 100 m. Fine light particles remain suspended for
longer and hence travel further than the large heavy particles. Large particles
(100 µm diameter) are likely to settle within 6 m to 10 m of their source under a
typical mean wind speed of 4 m s\(^{-1}\), and particles between 30 and 100 µm
diameter are likely to settle within 100 m of the source. Smaller particles,
particularly those below 10 µm in diameter, are more likely to have their settling
rate retarded by atmospheric turbulence and to be transported further from their
source.

Dust emissions are exacerbated by dry weather and high wind speeds. The
impact of dust depends on the wind direction and the relative location of the
dust source and receptor.

The primary consideration with respect to emissions of dust is one of soiling at
nearby residential properties. There are, however, no legal standards relating to
acceptable levels of deposited dust.
A study (1) has shown that at least half the people living within 50 m of the site boundary of a road construction scheme were seriously bothered by construction nuisance due to noise, vibration, dust or loss of amenity due to the presence of heavy construction traffic, but that beyond 100 m less than 20% of the people were seriously bothered. The nearest residential property to the proposed scheme is 4 m away.

6.4.3 Mitigation Measures

It is not possible to eliminate emissions of dust from construction activities completely. In order to minimise the impacts of construction, a construction programme will be developed and the following “good site practices” will be incorporated which will reduce the risk of dust impacts:

- water suppression or dust extraction will be fitted to drilling and grinding equipment;
- drilling and excavation surfaces will be wetted, where appropriate;
- surfaces will be damped down prior to clearing;
- debris piles will be kept watered as necessary so that no dust nuisance may be caused to residential properties;
- all containers will be totally enclosed or covered by tarpaulins / nets to prevent escape of dust or waste materials during loading and transfer from site; and
- lorries will be sheeted during transportation of construction materials and spoil export.

6.4.4 DEFRA Guidance on Control of Dust from Construction and Demolition Activities

The Department of the Environment, Food and Rural Affairs (DEFRA) has funded a four year project to produce guidance (2) on the control of dust from construction and demolition activities. The document was due to be formally released in July 2002 although it had not been published at the time of issue of this document (April 2003). This guidance will be adhered to, where applicable and practical.

(2) Guidance on the Control of Dust from Construction and Demolition Activities, Buildings Research Establishment website (www.bre.co.uk).
6.4.5 Residual Impacts

By adhering to all the mitigation measures recommended the impacts at nearby receptors should be minor.

6.5 Operational Impacts

It is predicted that there will be a slight reduction in traffic flows along the A7 as a result of the Waverley Railway. This is due to a modal shift from private car to rail. The decrease in traffic flows is less than 10%. Although this will result in a slight decrease in vehicle emissions along the A7, the changes in pollutant concentrations at sensitive receptors are likely to be negligible.

The proposed trains are will be modern adhering to the most recent emission standards (EURO 2) and considering the low frequency of the train it is not expected to have an impact to air quality.

6.6 Carbon Dioxide Emissions

6.6.1 Estimated CO₂ Emissions from Road Transport

The DMRB methodology (1) has been used to predict the change in emissions of carbon dioxide as a result of the proposed scheme. Carbon dioxide (CO₂) is a gas with potential for global warming. The calculations carried out included traffic travelling along the A7 between Shawfair and Tweedbank.

The results are shown in Table 6.4 below.

<table>
<thead>
<tr>
<th>Scenario</th>
<th>CO₂ Emissions (tonnes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do Minimum 2008</td>
<td>22,874</td>
</tr>
<tr>
<td>Do Something 2008</td>
<td>22,430</td>
</tr>
<tr>
<td>Difference</td>
<td>Decrease in 444 tonnes</td>
</tr>
</tbody>
</table>

There is a predicted decrease in CO₂ emissions from road traffic on the A7 as a result of the proposed Waverley Railway scheme. This is due to the reduction in traffic using this road due to a modal shift on to the railway.

6.6.2 Estimated CO₂ Emissions from the Proposed Rail Scheme

Emission factors for diesel trains have been used to estimate annual CO₂ emissions from the proposed Waverley Railway scheme. An emission factor of 22 grams CO₂ as carbon per passenger kilometre has been used (2).

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http://www/ inrets.fr/ infos/ cost319/ MEETDeliverable17.pdf
The total predicted annual passenger kilometres to be travelled on the Waverley Railway scheme is 31,089,827. This is predicted to produce 2,500 tonnes of CO₂ per annum. This is less than 0.03% of the CO₂ emissions from the Scottish transport sector in 1999 (1).

6.7 Summary and Conclusions

The main impacts on air quality, which may arise as a consequence of the construction of the proposed scheme, are principally associated with emissions of dust and the potential for these emissions to cause soiling and poor visibility, and emissions from construction traffic. To minimise the impacts of construction, a construction programme will be developed and a number of “good site practices” will be incorporated into the scheme, such as watering of debris piles, tarpaulins over containers etc (see Table 6.5 for a summary of impacts, mitigation and significant residual effects).

There are no predicted impacts to local air quality as a result of the scheme. Although traffic flows, and therefore vehicle emissions, along the A7 decrease slightly it is unlikely that this will cause an impact to air quality.

Overall, the scheme is estimated to result in an increase in CO₂ emissions of 2,056 tonnes. The Scottish transport sector generated 8343 Megatonnes (Mt) of carbon dioxide in 1998 (2). The quantity of CO₂ emissions produced by this scheme is equivalent to 0.025% of the 1999 emissions from the transport sector in Scotland.

(2) The Scottish Executive (2001) Key Scottish Environment Statistics
Table 6.5 Impacts, Mitigation and Significant Residual Effects

<table>
<thead>
<tr>
<th>Key Potential Impacts (without mitigation)</th>
<th>Mitigation</th>
<th>Residual Effects</th>
<th>Means by which mitigation will be delivered</th>
</tr>
</thead>
</table>
| Emissions of dust from construction and the potential for these emissions to cause soiling and poor visibility, and emissions from construction traffic. | The construction programme will be developed and the following “good site practices” will be incorporated which will reduce the risk of dust impacts:  
- Water suppression or dust extraction will be fitted to drilling and grinding equipment;  
- Drilling and excavation surfaces will be wetted, where appropriate;  
- Surfaces will be damped down prior to clearing;  
- Debris piles will be kept watered as necessary so that no dust nuisance may be caused to residential properties;  
- All containers will be totally enclosed or covered by tarpaulins / nets to prevent escape of dust or waste materials during loading and transfer from the site; and  
- Lorries will be sheeted during transportation of construction materials and spoil export. | No significant residual impacts. | CoCP |
7 TRAFFIC AND TRANSPORT

7.1 INTRODUCTION

This section of the ES looks at potential environmental impacts of the traffic generated by the construction and operation of the Waverley rail scheme.

7.2 ASSESSMENT METHODOLOGY

7.2.1 Construction

Construction traffic is likely to be generated by the following activities:

- construction workers accessing and egressing worksites;
- the supply of construction materials;
- the removal of waste;
- the mobilisation of plant, which may include abnormal loads; and
- other activities, including visitors and service vehicles.

Generated construction traffic can lead to impacts in terms of:

- changes in traffic conditions (in particular, where works also require temporary road/ lane closures);
- changes in traffic-related noise levels and air quality (discussed in Sections 5 and 6);
- access to private and commercial properties; and
- changes in conditions for pedestrians and cyclists.

The overall objective of the assessment is to estimate the impact of changes in traffic resulting from the construction of the scheme. Criteria used to assess construction traffic impacts are outlined in Box 7.1.
Box 7.1 Construction Assessment Criteria

Traffic Conditions

Estimates of traffic generation have been applied to baseline flows to give an indication of the potential magnitude of change likely during construction of the scheme.

Pedestrian and Cyclist Conflicts

The number of HGVs travelling to and from each worksite has been identified and assessed for pedestrian and cyclist conflicts. Locations of potential disruption to pedestrian and cyclist routes have broadly been identified.

Traffic-related Air Quality and Noise

The number of HGVs travelling to and from each worksite has been identified and qualitatively assessed for potential noise and air quality impacts. The guidelines (1) state that where receptors exist, environmental effects are unlikely to occur unless generated HGVs increase baseline HGV flows by more than 30%. This criteria is typically applied to long term impacts so the magnitude and time period of impact will also be considered when assessing likely impacts.

7.2.2 Operation

During operation, changes in traffic flows may arise due to a modal shift from private car to the proposed scheme and also due to parking demand at new stations. The overall objective of this assessment is to provide estimates of the positive and negative impacts of changes in traffic flow brought about by the operation of the scheme.

The change in traffic flow could impact on local noise and air quality and also on pedestrians and cyclists. The assessment criteria used to identify significant impacts arising from changes in traffic are described in Box 7.2, below.

(1) Institute of Environmental Assessment (1993) Guidelines for the Environmental Assessment of Road Traffic, Guidance Notes No. 1, IEA
**Box 7.2 Operational Assessment Criteria**

**Traffic Conditions**

Qualitative assessments of possible impacts from changes in traffic flow at stations has been undertaken. Quantitative assessment of changes in traffic flow along the A7 has been undertaken by calculating the magnitude of change.

**Pedestrian and Cyclist Conflicts**

For the purposes of this assessment, it has been assumed that changes in traffic flow as a result of railway operation of less than 30% are unlikely to have significant impacts on pedestrian and cyclist movements. This criterion is based on extensive studies examining the relationship between traffic flow and conflicts between motor vehicles and pedestrians and cyclists in a variety of road conditions (1). Additionally, severed footpaths are identified with associated mitigation measures.

**Traffic-related Air Quality and Noise**

The assessment of traffic-related environmental impacts is based on Institute of Environmental Assessment (IEA) guidance (2). The guidance asserts that only relatively large changes in traffic are likely to result in environmental impacts. The guidelines state that where receptors exist, environmental effects are unlikely to occur unless generated traffic increases baseline flows on highway links by more than 30%.

### 7.3 Baseline Environment

#### 7.3.1 Traffic Flows

The relevant road network for the Waverley Rail scheme was considered to be the A7 and local roads that will provide access to the stations.

Cordon counts were carried out in mid February 2002 to ascertain the characteristics of the A7 near to Falahill between 0630 hours and 1830 hours. Details are given in Tables 7.1 and 7.2.

#### Table 7.1 Baseline Northbound Traffic Flows on A7

<table>
<thead>
<tr>
<th>Time Period</th>
<th>Class / No of Vehicles</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cars</td>
</tr>
<tr>
<td>0630-0730</td>
<td>293</td>
</tr>
<tr>
<td>0730-0830</td>
<td>310</td>
</tr>
<tr>
<td>0830-0930</td>
<td>188</td>
</tr>
<tr>
<td>0930-1030</td>
<td>119</td>
</tr>
<tr>
<td>1030-1130</td>
<td>117</td>
</tr>
<tr>
<td>1130-1230</td>
<td>128</td>
</tr>
<tr>
<td>1230-1330</td>
<td>137</td>
</tr>
<tr>
<td>1330-1430</td>
<td>89</td>
</tr>
<tr>
<td>1430-1530</td>
<td>127</td>
</tr>
</tbody>
</table>


(2) Institute of Environmental Assessment (1993) op.cit
Table 7.2  
Baseline Southbound Traffic Flow on A7

<table>
<thead>
<tr>
<th>Time Period</th>
<th>Class / No of Vehicles</th>
</tr>
</thead>
<tbody>
<tr>
<td>1530-1630</td>
<td>137 4 2 0 0</td>
</tr>
<tr>
<td>1630-1730</td>
<td>148 2 1 3 0</td>
</tr>
<tr>
<td>1730-1830</td>
<td>108 2 0 0 0</td>
</tr>
</tbody>
</table>

To obtain a two-way traffic flow for the AM peak hour the number of vehicles from northbound 0730-0830 and 0830-0930 have been halved and added to the southbound 0800-0900 flow giving a total of 417.

Other counts have been undertaken on the A7 at Harvieston Mains in March 2000. These counts identify a two-way flow of 607 vehicles in the AM peak hour.

The roads surrounding the station locations will generally have a low flow due to small populations. For example, within 800 m of Eskbank Station, Eskbank has a population of 1,938 and within the same distance from Tweedbank station is a population of 1,394.

Pending the final traffic assessment being prepared it is assumed that there are a number of smaller towns that will be near the locations of stations which will have a less pronounced peak hourly traffic flow, such as Melrose and Dalkeith. This is implied by the demographic characteristics of the area as detailed below:

- the Scottish Borders has a higher proportion of population who are retired (65+) than City of Edinburgh and Midlothian District (19% compared to 15%), and Scotland as a whole (16%); and

- the proportion of population of working age in the Borders is 63% which is below the Scottish average of 66% due to a concentration of retirement / care homes and social housing, leading to a larger dependent population.

The demographics show that there are fewer people who need to get to work or indeed have work to go to. However, there is still a high level of car ownership in the Borders when compared to the Scottish average.
7.3.2 Pedestrian and Cycle Routes

There are numerous footpaths and some dedicated cycle paths in the area of the Waverley Railway line. Those that are permanently affected have been identified in the operational impacts section.

7.4 Construction Impacts

7.4.1 Traffic Generation

Traffic generated from construction is expected to peak at 200 vehicle movements in the AM peak hour on the A7 (peak construction is expected to be a period of four months in early 2006 given the current programme). This is based on the assumption of an even split over a six day week and a 10 hour day. A worst case scenario of all 200 vehicle movements passing both traffic count locations has been used to demonstrate potential worst case impacts (it should be noted that construction worksites will be at different locations along the A7 and therefore it is unlikely that all 200 vehicle movements will pass both traffic count locations).

At the Falahill traffic count location an additional 200 vehicle movements in the AM peak hour would give rise to an increase of approximately 48%. At the Harvieston Mains traffic count location an additional 200 vehicle movements in the AM peak hour would give rise to an increase of approximately 33%.

A Transport Assessment is being prepared to assess the potential impacts upon congestion and delay along the A7.

There is the potential for significant impacts on the A720 as a result of the constructing an overbridge below the Edinburgh City Bypass just east of Sheriffhall roundabout. Construction traffic is likely to cause significant congestion and delays within this area and the Transport Assessment will assess the potential temporary impact in further detail.

Additionally, there is potential for significant impact on the small roads that will provide access to a number of worksites off the A7. These roads will typically have a very low traffic flow and just a few additional vehicles could give rise to capacity problems. Capacity problems are not envisaged to occur as a result of the number of vehicles but because of the size of vehicles. For example, this could have implications for turning into and out of worksites.

7.4.2 Pedestrian and Cyclist Conflicts

The temporary increases in traffic flow on the A7 outlined above can be expected to impact on pedestrians and cyclists in terms of loss of amenity.
Many worksites require access via small, rural roads with a very low flow. HGVs passing along these roads could have implications for pedestrian and cyclist safety, depending on the road characteristics. For example, the road may be narrow or have poor visibility around corners so pedestrians and cyclists are put at risk.

During construction it may be necessary to close parts of the A7 for construction of the viaduct over the A7 and a number of local streets temporarily to allow the station construction works to take place. A set of footpath diversions will be agreed between the contractor and the local authority so that wherever possible attempts will be made to provide alternative routes. However, this will not always be possible for all paths, particularly the more rural and isolated paths. This is not expected to have a significant impact due to the low pedestrian usage of these rural paths. Efforts will be made to maintain access to premises, car parks and shops and to allow for pedestrian and cyclist movements by the shortest and simplest reasonable route. The diversion measures will require agreement from the relevant local highway authorities.

Cyclists will be affected to a lesser degree as the majority of road closures affect streets not used much by cyclists. There will generally be an alternative route available for cyclists by using adjacent streets or other shared pedestrian/cycle facilities.

**7.4.3 Air Quality and Noise Impacts**

The temporary increases in traffic flow on the A7 outlined above can be expected to impact on air quality and noise. Impacts of construction generated traffic on air quality and noise have been examined in the relevant sections of the ES (Sections 5 and 6).

**7.5 Operational Impacts**

**7.5.1 Introduction**

The introduction of heavy rail infrastructure connecting Edinburgh to Border towns and the resulting impact on road traffic flows can have effects on traffic-related noise and air quality and conditions for pedestrians and cyclists.

**7.5.2 Traffic Flow**

*Overview*

In advance of a detailed Transport Assessment being prepared, it has been assumed that access roads to stations in the small towns along the Waverley Railway route currently have low flows. The highest demand for parking at each station is expected to occur in peak hours. It is envisaged that approximately 70% of demand will occur during the AM peak hour. Using this estimate Table
7.3 shows the expected number of vehicles accessing each station car park in the AM peak.

Table 7.7.3  AM Peak Demand

<table>
<thead>
<tr>
<th>Station</th>
<th>Demand for Parking in the AM Peak in Opening Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tweedbank</td>
<td>140</td>
</tr>
<tr>
<td>Galashiels</td>
<td>0</td>
</tr>
<tr>
<td>Gorebridge</td>
<td>70</td>
</tr>
<tr>
<td>Newtownrange</td>
<td>35</td>
</tr>
<tr>
<td>Eskbank</td>
<td>105</td>
</tr>
<tr>
<td>Shawfair</td>
<td>84</td>
</tr>
</tbody>
</table>

Tweedbank

Access to Tweedbank Station will be from a new access road via a new priority junction off Tweedbank Drive (Works No 10L). Tweedbank Drive currently provides access to the housing estate. Site observations and the typical characteristics of housing estate access roads generally indicate a low traffic flow. With Tweedbank being the end of the line the parking demand will be high as shown in Table 7.3. In the opening year an additional 140 vehicles are expected to travel via Tweedbank Drive to access the car parking facilities at Tweedbank Station in the AM peak hour. There is potential for this to have a significant increase in traffic flow in percentage increase terms. Therefore, it is possible that the increase will result in an impact in terms of noise and air quality and on pedestrians and cyclists. However, the overall level of traffic flow is not expected to be high given the existing low flow. Therefore, minimal impacts on air quality, noise, pedestrians and cyclists are expected.

Galashiels

Galashiels Station will be located off the A7. There is currently no provision in the Waverley Railway proposal for parking at Galashiels Station. Passenger drop off at the station is not expected to be of sufficient levels to generate impacts in terms of noise and air quality and pedestrian and cyclist conflict.

Gorebridge

The access route to Gorebridge Station currently has a low flow (based on observations). Therefore, an additional 70 vehicles generated through parking demand could potentially give rise to impacts on local air quality and noise and pedestrian and cyclist conflicts. However, the resulting overall traffic flow is not expected to be high given the existing low flow indicating minimal impacts.

Newtongrange

Newtongrange Station is located off a minor road which links to the A7. An additional 35 vehicles travelling this road in the AM peak hour would not be
expected to give rise to air quality and noise impacts and pedestrian and cyclist conflicts given the existing low flow.

**Eskbank**

A new road is to be constructed to provide access to Eskbank Station (Work no 2B). The expected 105 vehicles accessing the car park in the AM peak hour could potentially give rise to air quality and noise impacts to any sensitive receptors located along the new road. However, as the road does not currently exist there can be no existing pedestrian and cyclist users. Pedestrians and cyclists requiring access to the station are not expected to be disturbed by 105 cars in the peak hour.

**Shawfair**

The impacts that may occur as a result of traffic travelling to Shawfair Station were examined for a separate planning application (Shawfair Development) and were detailed in a Transport Assessment and Environmental Statement written for that development.

There is currently no parking provision for Shawfair Station in the Waverley Railway proposal as this forms part of the Shawfair development remit. However, there is an anticipated demand of 105 vehicles in the AM peak hour. Purely based on the demand at the station this is not considered to be sufficient to cause significant adverse noise, air quality, pedestrian or cyclist impacts given that the roads will be newly constructed for the residential development.

**A7:** Traffic using the A7 to get to the stations will not result in significant increases in existing traffic flows. The majority of scheme generated traffic is expected to be local traffic and is not expected to use the A7 to any significant degree. However, some traffic will use the A7. Of all the stations Tweedbank Station is expected to receive the highest level of traffic from outside the local area. It has been assumed that traffic needing to travel further than 2 km will use the A7. 50% of traffic going to Tweedbank Station is expected to travel further than 2 km. In the AM peak hour this equates to 70 vehicles. An additional 70 vehicles on the A7 will result in an increase in traffic levels of approximately 15% (1). This level of increase is not seen as a significant impact. Therefore, no detrimental effects are expected to occur to air quality, noise levels and pedestrians and cyclists.

Whilst localised points along the A7 may receive an increase in traffic, as demonstrated above, overall a reduction is expected. As a result of modal transfer from private car to rail a decrease in the number of car journeys made along the A7 of approximately 2% is expected.

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(1) Based on traffic counts undertaken on the A7 near Falahill.
7.6 Mitigation Measures

7.6.1 Construction

Each temporary transport infrastructure alteration will be mitigated through a number of appropriate mitigation measures. These include the following:

- general traffic diversion routes where roads are closed;
- maintaining footways where possible;
- pedestrian and cyclist diversion routes when construction prevents access;
- maintaining local residential access at all times;
- new temporary pedestrian crossing facilities if required; and
- temporary parking restrictions if required.

Standard good practice measures for construction sites will also be implemented, including for example the sheeting of HGVs to minimise the generation of dust and the regular removal of mud from roads.

All temporary traffic management measures will be agreed with the Roads Authority in advance of works commencing.

7.6.2 Operation

The re-opening of the Waverley Railway line and construction of new stations and access roads will result in the permanent severance of some existing cycle paths. To minimise impacts on users of these facilities a series of permanent diversions have been developed following consultation between Sustrans, Esk Valley Trust and Midlothian Cycle Officer. Scottish Borders Council have also identified an alternative route through Galashiels to replace the lost Black Path. Conclusions from these discussions are shown in Figure 7.1.

7.6.3 Footpath/Cycleway Diversions

A68 at Sheriffhall to Hardengreen

Midlothian Council currently has funding from the Scottish Executive to construct a footbridge/cycle bridge over the A720 immediately east of Sheriffhall roundabout. This would connect to the black path from the A68 close to Sheriffhall Farm. With the reinstatement of the railway this link will be lost. A number of alternatives were considered and the following agreed as providing the best solutions although it was accepted that none fully provided the benefits currently offered by the black path.

The most direct diversion for cyclists would be along a short length of the A68 King’s Gate where the Scottish Executive are examining the possibility of installing traffic lights at the junction and including a pedestrian/cycle route. From here the route would be via the A6106 Melville Gate Road, the B6392 Gilmerton Road to Eskbank Toll. From here the route would continue along the
B6392 Dalhousie Road until it meets the new link path from Eskbank station. This would link over the station bridge through the station car park to join the original path near K&I Coachworks.

Sustrans requested a variation to this where the route would be similar to the previous suggestion as far as Eskbank Toll but then directly access the A6094 Bonnyrigg Road or use the A768 Lasswade Road and then either Station Road or Dundas Road to access the A6094. From here access to Eskbank station/ Tesco would be via Westfield Park and Hardengreen Lane.

An alternative route giving more ‘off-road’ sections would be via the A68 to King’s Gate, crossing via the signalised junction (mentioned above) along a new path within the field east of the new railway to link up with the network of paths currently within Ironmills Park. From here users would have a choice of accessing Dalkeith via Ironmills Road to Old Edinburgh Road or to cross the existing footbridge to Cemetery Road. Here users would have a choice of continuing on to the A6094 or following the existing black path behind Glenesk Crescent until it reaches the new railway line just south of the Esk viaduct before returning via Avenue Road or Glenesk Crescent to the A6094. The suggested route from the A6094 would be via Waverley Road, Park Road and the B703 Newbattle Road as far as Ancrum Bank. From here users could access Eskbank station via the Jewel and Esk Valley College road and new footpath links to the station.

Uncertainty over the cost and structural capabilities suggest that fixing a structure suitable for pedestrian / cycle use on the side of the Glenesk Viaduct (Category A listing) would not be possible.

Black Path to Newtongrange

There is currently a section of black path linked to Victoria Gardens, Newtongrange through to the Bowling Club. This would be closed between Moffat’s Builders Yard and the link to Redwood Walk with residents using the existing footway link between Victoria Road and Redwood Walk. A footbridge crossing the new railway would link Redwood Walk with Station Road, Newtongrange allowing access to the main village. In addition there would be a new black path linking this footbridge with another new bridge at the Bowling Club. From here an existing path behind Dean Park housing estate can be used to access the A7 adjacent to the road/ rail bridge. A signalised crossing for this location is being investigated.

Access from Jenks Load to the new station would be via a ramp on to the A7 using the existing A7 footpath to cross the line before linking in to the station by steps/ ramp.
Gore Park to Gorebridge

The paths in the area of the existing car park will be re-instated/linked by a new footbridge.

A new footbridge will be required linking the path network to the Millbank House road where the railway severs the existing path. A replacement path will be required alongside the turnback siding linking this bridge to Moorfoot View. The existing unmade path from here past Harvieston Villas will be closed.

South of Gorebridge

A new footbridge will be provided linking the unmade path just south of Gorebridge.

Galashiels

The Black Path (also forms part of National Cycle Route 1 and the Tweed Cycleway) through Galashiels is currently situated on the former railway line and therefore will need to be diverted to allow for the railway to be re-opened. The route proposed by Scottish Borders Council follows a similar route through Galashiels however often diverted onto roadways and existing footpaths (Figure 7.1 shows the two black path diversion routes). The Southern Upland Way is a major trans Border walking route which will require minor diversion and re-inclusion at Winston Road and will be accommodated beside rail route across ‘red viaduct’ over the River Tweed.

7.7 Summary and Conclusions

Where access roads to construction worksites and stations currently have a low flow there is potential for adverse impacts on sensitive receptors in terms of increases in noise levels and a reduction in air quality, although these will only be short term during construction. Any pedestrians or cyclists using these roads may also suffer from a reduction in amenity, particularly during construction where high proportions of HGVs are expected in the short term. It is not envisaged that severance during construction will be a significant issue as access will be maintained or alternatives provided wherever possible. Severance during operation is not envisaged as being a significant issue as alternatives will always be provided. Therefore, impacts on pedestrians and cyclists in terms of severance are minimal.

A reduction in traffic flow on the A7 is expected due to a fall in the number of car journeys. This will arise through modal transfer from car onto rail.
8 ECOLOGY AND NATURE CONSERVATION

8.1 INTRODUCTION

This chapter assesses the ecological impacts that may result from the Waverley Railway Project proposals. The baseline nature conservation interests of the route corridor are described, mitigation measures listed and residual impacts, taking these measures into account, reported. Permanent impacts from land take are considered as well as those relating to the construction and operation of the scheme.

A more detailed account of the survey methodologies and findings is reported in Annex F: Heritage Environmental Ltd, Ecological Impact Assessment, February 2003. A study corridor of approximately 100 m width along the line of the proposed railway has been used for this assessment.

8.2 SOURCES OF INFORMATION

The following sources of information have been used for the assessment:

- consultations with statutory and non-statutory bodies, to identify statutory and non-statutory sites of nature conservation interest in proximity to the proposals and any other known habitats or species of note including:
  - Borders Bat Group;
  - Edinburgh and Lothians Badger Group;
  - Lothians Bat Group;
  - Lothian Wildlife Information Centre (LWIC);
  - Midlothian Council Planning Department;
  - Royal Society for the Protection of Birds (RSPB);
  - Scottish Badgers;
  - Scottish Borders Biological Recording Centre (SBBRC);
  - Scottish Borders Council Planning Department;
  - Scottish Natural Heritage (SNH); and
  - Scottish Wildlife Trust (SWT).

- a Phase 1 Habitat Survey undertaken using standard methodology (JNCC 1993) (1) by Heritage Environmental Ltd (HEL) between May and September 2002;

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specialist animal surveys including for badger (1), otter (2) and birds undertaken by Heritage Environmental Ltd between May and September 2002;

assessment of bat (3), reptile, amphibian and water vole (4) habitat;

relevant published information including Local Plans (see Section 3), Local Biodiversity Action Plan (LBAPs), local bird report etc;

aerial photographs of the route;

Ordnance Survey Mapping at 1:25,000 and 1:10,000 scales; and

scheme plans at 1:2500 scale supplied by Scott Wilson.

8.2.1 Survey Limitations

Access was denied by landowners to a 3 km section of the route in the Tynehead area. Survey was only possible using binoculars.

Detailed surveys for species including bats, water vole, amphibians and reptiles were not undertaken although records were made of any observations and from consultations.

8.3 General Ecological Context

The Waverley line was closed and the tracks removed in the early 1970s. Since that time much of the track bed has reverted to semi-natural vegetation, predominantly neutral grassland developing on the basic slag ballast of the former trackway. The cutting slopes have remained unmanaged except locally where these have been incorporated into adjacent pastures, have been planted with trees or have been developed as domestic and commercial buildings, or utilised as cycle ways.

In the northernmost section of the route, from Dalkeith to Gorebridge, the line follows the broad lowland valley of the River South Esk with a landscape of large fields of arable and pastoral agriculture divided by towns and roads, amenity areas and riverside woodlands. Through this landscape the disused railway line provides a linear feature with woodlands interspersed with small stands of

(1) Fully protected under the Protection of Badgers Act, 1992.
(2) Protected under Annex IIa and IVa of the EC Habitats Directive (92/43/EC) and applied in the UK under Conservation (Natural Habitats &c.) Regulations 1994. Also a Schedule 5 species, receiving full protection under the Wildlife and Countryside Act, 1981 and amendments.
(4) Protected under the Wildlife and Countryside Act 1981 and amendments, Section 9 (4) only. This protects the water vole's places of shelter but does not safeguard the animal itself. Legal protection makes it an offence to intentionally damage, destroy or obstruct access to water vole burrows and nests or to disturb them while they are being used.
scrub, ruderal vegetation and species-poor unmanaged grasslands and forms a wildlife corridor of unmanaged habitats.

South of Gorebridge the Waverley line enters a landscape of open farmland increasingly of upland character as it follows the narrow valley of the Gala Water. The narrow Gala Valley is predominantly improved pasture, often grazed to the edge with few riparian habitats. The wider landscape up the slopes from the river valley is one of impoverished hill pasture with scattered conifer plantations. To this landscape the railway line adds a range of habitats including unmanaged tussocky neutral grasslands, successional communities such as secondary woods, scrub and ruderal communities. Many cutting slopes have escaped agricultural improvement and are less intensively grazed and provide small areas of semi-improved grasslands with a greater species-richness than the surrounding agricultural fields. The former track bed often retains the steelworks slag ballast used as a base for the railway line. This provides a well drained base-rich/neutral substrate for a diverse neutral grassland community that would not otherwise be present. Very locally the basic slag is flooded and has allowed a diverse marshy grassland community.

8.4 DESIGNATED SITES

8.4.1 Statutory Designations (see Figure 8.1)

SNH has advised that there are 10 sites designated for their national importance for nature conservation within 5 km of the route corridor; these are summarised below. Of these, only the River Tweed Site of Special Scientific Interest (SSSI) (1)/candidate Special Area of Conservation (cSAC) (2) is thought likely to be affected by the proposals (see Section 8.8 below).

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(1) A site notified by Scottish Natural Heritage (SNH) under the provisions of the Wildlife and Countryside Act, 1981 and subsequent amendments as of national nature conservation or geological importance.

(2) Candidate SACs are sites pending designation under the European Directive on the Conservation of Natural Habitats and Wild Flora and Fauna (79/409/EEC) (known as the Habitats Directive) to protect sites that are considered rare because of their habitats or the species contained within them. Enacted in the UK through the Conservation (Natural Habitats &c) Regulations, 1994. These sites afford the same protection as if formally designated.
River Tweed cSAC and SSSI (Scottish Borders District) includes the River Tweed and its tributary, the Gala Water. The railway corridor follows the Gala Water NT 396557 to its confluence with the river Tweed at NT 511348. The railway corridor crosses the River Tweed at NT 515354. The Tweed and its tributaries are clean river systems of high conservation and ecological value that support a diverse range of plant and animal species. Its European importance is for the presence of river lamprey (1), brook lamprey (2), sea lamprey (3), otter (4), Atlantic salmon (5) and as a river that supports characteristic communities of Ranunculus spp (water-crowfoot).

1. **Dalkeith Oakwood SSSI** (Midlothian District) approximately 700m east of the route at NT 338674 comprises 6.5ha of Quercus robur (pedunculate) and Quercus petraea (sessile oak) Ancient Woodland (6).

2. **Crichton Glen SSSI** (Midlothian District) borders the corridor to the north at NT 382606. The site is an example of lowland river habitats and comprises a mixture of ancient woodland, herb rich calcareous and neutral grasslands and fen.

3. **Fala Flow SSSI** (Midlothian District) is approximately 3.5 km to the east of the corridor at NT 432586. The site is an area of blanket bog with characteristic plant species of this habitat. The site is of international importance for the number of pink-footed geese (Anser brachyrhynchus) it supports in winter and is the most important roost for the species in the Lothians.

4. **Moorfoot Hills SSSI and cSAC** (Scottish Borders District) is at a minimum distance of approximately 1.25 km to the west of the corridor at NT 370460. The site consists of flat-topped, rounded hill ridges with steep valleys and is the largest area of intact blanket mire in the Lothians and Borders Regions. It supports a diverse moorland, breeding bird community with over 40 species present. European priority interests include blanket bogs and European dry heaths, both of which are considered to be among the best areas in the UK.

5. **Faldonside Loch SSSI** (Scottish Borders District) is approximately 2.5km to the southwest of the route at NT 505328 and is approximately 6.2ha. This is the lowest altitude marl- Loch of the series of such lochs in this district and in Roxburgh, which are relatively unusual in Scotland. A eutrophic, highly alkaline water body with localised marling and fen communities. Of local importance as a winter wildfowl roost and one of the few Borders lochs used regularly by wintering smew.

(2) Protected under Annex Ila of the EC Habitats Directive (92/43/EC) applied in the UK under Conservation (Natural Habitats &c.) Regulations 1994.
(4) Protected under Annex Ila and IVa of the EC Habitats Directive (92/43/EC) and applied in the UK under Conservation (Natural Habitats &c.) Regulations 1994. Also a Schedule 5 species, receiving full protection under the Wildlife and Countryside Act, 1981 and amendments.
(5) Salmon and sea trout are protected under Annex IIa, Va in freshwater only of the EC Habitats Directive (92/43/EC) applied in the UK under Conservation (Natural Habitats &c.) Regulations 1994.
Avenel Hill and Gorge SSSI (Scottish Borders District) is approximately 1.5 km to the north of the corridor at NT 522374. The site consists of a stream gorge and west-facing hill slope which support a varied range of relic upland woodland and scrub types. The green hairstreak butterfly *Callophrys rubi* occurs here at one of only three post 1960 Border localities.

Gattonside Moss SSSI (Scottish Borders District) is approximately 3 km to the north-east of the corridor at NT 548368. The site is a relatively deep, elongated basin mire consisting of medium-rich fens. The fen includes nationally and regionally rare sedges (*Carex diandra, C. limosa* and *C. lasiocarpa*) and supports an outstanding diversity of water beetles.

Tweedwood-Gateheugh SSSI (Scottish Borders District) is approximately 4.5 km to the east of the route at NT 583342 comprising 29.5 ha. This is one of the few remaining ancient woodlands of any appreciable size in the Borders Region, surrounded by sections of long-established woodland. It has high species diversity in the ground flora including some species that are rare or uncommon in the Borders and Scotland. There is entomological interest, particularly beetles, with two national rarities and 24 species of restricted Scottish distribution.

Central Borders Environmentally Sensitive Area (ESA) (Scottish Borders District) abuts the southern end of the corridor at Tweedbank.

8.4.2 Non-Statutory Designations (see Figure 8.2)

There are a number of non-statutory designated sites in proximity to the route corridor including Wildlife Sites (2) and Ancient Woodland (3).

Wildlife Sites/ Listed Wildlife Sites (4) as identified during consultation with the Scottish Wildlife Trust, include the following:

- **Borthwick Glen Wildlife Site**, 200m to the south of the route at NT 375595. A steep sided valley of Middleton South Burn, covered with long-established woodland of semi-natural origin, a mature plantation of broadleaves and conifers.

- **Middleton House Pond Listed Wildlife Site**, 2 km to the south of the route at NT 369582. A eutrophic pond with breeding amphibians and dragonflies and uncommon aquatic plants. Habitats present are pond, marshy areas and mixed deciduous woodland.

- **Newbattle Woods Wildlife Site** (NT 335660), adjacent to the route where the railway crosses the River South Esk. Immediately to the south of Dalkeith, Midlothian, the site is a complex of woodlands representing the major remnant of the ancient broadleaved forest that occupied the valley of the River Esk. Although the tree cover

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(1) Land is designated an ESA by The Department of Environment, Food and Rural Affairs (DEFRA) when it is of particularly high landscape, wildlife or historic value. Under the scheme (introduced in 1987) farmers and land owners are offered incentives to adopt agricultural practices which would safeguard and enhance these areas.

(2) Non-statutory designation for areas of nature conservation importance which have been assessed by Scottish Wildlife Trust (SWT) using the ‘Wildlife Sites System’ methodology including Phase 2 surveys.

(3) Woodland with a proven continuity of cover for at least 230 years, identified by Nature Conservancy Council in Scotland (now SNH) in Inventory of Ancient and Long-established Semi-natural Woodland (NCC, 1989 and 1991).  

(4) Areas designated by SWT in the 1980s, under review as Wildlife Sites (see previous footnote).
has been much altered by felling and planting over the centuries, the site retains a very fine assemblage of herbs characteristic of ancient woodland.

- **River South Esk Listed Wildlife Site** NT 324650. The line crosses the South Esk at NT 325649, a river with variety of habitats on its banks including woodland and grassland.

- **Aitkendaran Glen Wildlife Site** NT 322622. Approximately 400m west of the route, the site consists of two strips of semi-natural broadleaved woodland with a rich ground flora, along the banks of the River South Esk.

- **Gore Glen Provisional Wildlife Site** NT 331620 would be crossed by the route at NT 333619 for a length of approximately 800m. This wooded Country Park includes Ancient and Long Established Woodland.

- **Waverley Railway Listed Wildlife Site** NT 325649. Varied grassland and scrub habitats with rich flora. Habitats present are base-rich and neutral grasslands and scrub.

Ancient Woodland and Long Established Woodland (1) is found in several areas adjacent to the route, as follows:

- Dalkeith Country Park – Long Established Woodland adjacent to route at NT 322677 and NT 323675 and at the River North Esk crossing at NT 324672.

- Newbattle Woods – Ancient and Long Established woodland within and adjacent to rail corridor at NT 326649.

- Gore Glen Country Park/Shank Bridge Area – Ancient and Long Established Woodland within and adjacent to rail corridor at NT 331620 and NT 340613.

- Crichton Glen/Borthwick Area – Ancient Woodland within and adjacent to route at NT 385603.

- Tynehead Area – Long Established Woodland within the route corridor at NT 395585.

- Buckholm and Torwoodlee Area – Ancient and Long Established woodland within and adjacent to route corridor at NT 475384.

No trees protected by tree preservation orders (TPOs) (2) have been identified along the route.

All non-statutory nature conservation designations are shown on Figure 8.2.

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(1) Semi-natural woodland with a proven continuity for at least 120 years (NCC, 1989 and 1991).

(2) A TPO is an order made by the local planning authority which in general makes it an offence to cut down, top, lop, uproot, willfully damage or willfully destroy a tree without the planning authority’s permission, as defined in the Town and Country Planning (Scotland) Act, 1997.
8.5 **HABITATS AND SPECIES OF NOTE**

8.5.1 **Protected Species**

A number of protected animal species were recorded during the surveys undertaken between May and September 2002, as follows:

- **Otter**
  Over 30 sprainting sites and two lying up sites were recorded from watercourses that run underneath or adjacent to the railway line, including River North Esk, Cakemuir Burn, Gala Water and the River Tweed. There are historical records of otter on the River South Esk.

- **Badger** *(1)*
  Extensive badger activity was identified along much of the length of the line. A number of setts were identified within the rail corridor including a main sett, two annexe or subsidiary setts, eight active outlying setts and a further nine currently inactive outlying setts. There was also evidence of foraging areas and badger paths along and crossing the line.

- **Bats** *(2)*
  Consultation suggests that six species of bat occur within 10km of the route; Daubenton’s bat, both species of pipistrelle, whiskered bat, natterer’s bat and brown long-eared bat. Consultation identified one probable bat roost in a railbridge column near Borthwick. The walkover bat surveys identified one Daubenton’s bat roost within a culvert near Torwoodlee. One bat, thought to be a pipistrelle was seen flying during the day near Craigneuk. There are numerous suitable roost sites in particular in bridge structures, tunnels and culverts and abundant foraging habitat in many locations along the route.

- **Kingfisher** *(3)*
  Recorded on Gala Water.

- **Common lizard** *(4)*
  Recorded in the Fountainhall Area.

Consultation identified three additional protected species known from the area that were not recorded during the 2002 surveys, as follows:

- **Water vole** is known to be present in the River Tweed catchment (including the Gala Water) (Strachan & Jeffries, 1993) *(5)*.

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*(1) Protected under the Protection of Badgers Act, 1992.*

*(2) Protected under the Wildlife and Countryside Act 1981 and amendments and the Conservation (Natural Habitats, & c) Regulations 1994.*

*(3) Protected under Schedule 1 of the Wildlife and Countryside Act (1981) and amendments.*

*(4) Receives partial protection under the Wildlife and Countryside Act (1981) and amendments which makes it an offence to deliberately kill, injure or sell the animal.*

Barn owl (1) is known to occur in the area and it is thought that they may breed in proximity to the proposals (pers comm SBBRC, 2002).

Slow worm (2) has been identified within 500 m of the site at Whin Wood, William Law.

8.5.2 National Biodiversity Action Plan (BAP) Habitats

The Convention of Biological Diversity was signed by 159 governments at the Earth Summit, Rio de Janeiro in June 1992 to provide a legal framework for biodiversity conservation. This was enacted in the UK as the Biodiversity: the UK Action Plan, 1994 with national action plans developed by the Government and its advisors to help conserve habitats that are threatened and species which are in significant decline.

National BAPs (3) have been developed for six habitats found along the route corridor, as follows:

- Woodland;
- Arable and Horticulture;
- Lowland dry acid grassland (unimproved and diverse examples of semi-improved acid grassland falls in this category);
- Lowland Meadows (unimproved and diverse examples of semi-improved neutral grassland falls in this category);
- Fens, Marsh and Swamp;
- Urban.

National Species Action Plans are reflected in the LBAPs described below.

8.5.3 Local Biodiversity Action Plan (LBAP) Habitats and Species

Local authorities have drawn up Local Biodiversity Action Plans (LBAPs) to reflect the aims and objectives of the national plans for the habitats and species found in the local area.
LBAP priority habitats that have been recorded in the route corridor, and the relevant action plan/audit that they are identified in are listed in Table 8.1.

**Table 8.1 Priority Habitats**

<table>
<thead>
<tr>
<th>Priority Habitat</th>
<th>Local Action Plan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scrub</td>
<td>Midlothian</td>
</tr>
<tr>
<td>Lowland Scrub</td>
<td>Midlothian</td>
</tr>
<tr>
<td>Midlothian</td>
<td></td>
</tr>
<tr>
<td>Lowland Dry Acid Grassland (including unimproved and diverse examples of semi-improved acid grassland).</td>
<td>Midlothian</td>
</tr>
<tr>
<td>Scottish Borders</td>
<td></td>
</tr>
<tr>
<td>Midlothian</td>
<td></td>
</tr>
<tr>
<td>Lowland Meadows (including unimproved and diverse examples of semi-improved neutral grassland).</td>
<td>Edinburgh</td>
</tr>
<tr>
<td>Midlothian</td>
<td></td>
</tr>
<tr>
<td>Scottish Borders</td>
<td></td>
</tr>
<tr>
<td>Boundary and Linear Features (including wildlife corridors)</td>
<td>Edinburgh</td>
</tr>
<tr>
<td>Midlothian</td>
<td></td>
</tr>
<tr>
<td>Scottish Borders</td>
<td></td>
</tr>
<tr>
<td>Farmland</td>
<td>Edinburgh</td>
</tr>
<tr>
<td>Midlothian</td>
<td></td>
</tr>
<tr>
<td>Scottish Borders</td>
<td></td>
</tr>
<tr>
<td>Wetlands and Open Water (including lochs and ponds)</td>
<td>Edinburgh</td>
</tr>
<tr>
<td>Midlothian</td>
<td></td>
</tr>
<tr>
<td>Scottish Borders</td>
<td></td>
</tr>
<tr>
<td>Fen, Carr, Marsh, Swamp, Bog and Reedbed</td>
<td>Edinburgh</td>
</tr>
<tr>
<td>Scottish Borders</td>
<td></td>
</tr>
<tr>
<td>Rivers and Burns</td>
<td>Edinburgh</td>
</tr>
<tr>
<td>Midlothian</td>
<td></td>
</tr>
<tr>
<td>Scottish Borders</td>
<td></td>
</tr>
<tr>
<td>Built Environment and Amenity Areas</td>
<td>Edinburgh</td>
</tr>
<tr>
<td>Midlothian</td>
<td></td>
</tr>
<tr>
<td>Scottish Borders</td>
<td></td>
</tr>
<tr>
<td>Enclosed Grasslands</td>
<td>Scottish Borders</td>
</tr>
<tr>
<td>Woodlands</td>
<td>Edinburgh</td>
</tr>
<tr>
<td>Scottish Borders</td>
<td></td>
</tr>
</tbody>
</table>

LBAP priority species that have been recorded in the corridor or identified during consultation, and the relevant action plan/audit that they are identified in, are listed in Table 8.2.

**Table 8.2 Priority Species**

<table>
<thead>
<tr>
<th>Priority Species</th>
<th>Local Action Plan</th>
<th>Recorded Location within the Route Corridor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scrophularia umbrosa (green figwort)</td>
<td>Midlothian, Edinburgh</td>
<td>Found within the route corridor at NT 3265.</td>
</tr>
<tr>
<td>Priority Species</td>
<td>Local Action Plan</td>
<td>Recorded Location within the Route Corridor</td>
</tr>
<tr>
<td>------------------</td>
<td>-------------------</td>
<td>---------------------------------------------</td>
</tr>
<tr>
<td>Gnaphalium sylvaticum (heath cudweed)</td>
<td>Midlothian Edinburgh</td>
<td>Found around Crichton Glen at NT 3860.</td>
</tr>
<tr>
<td>Dianthus deltoids (maiden pink)</td>
<td>Scottish Borders Edinburgh</td>
<td>Found within the area of a proposed access road at NT 411527.</td>
</tr>
<tr>
<td>Helianthemum nummularium (common rock-rose)</td>
<td>Scottish Borders Edinburgh</td>
<td>Found around Whin Wood at NT 4739.</td>
</tr>
<tr>
<td>Trollius europaeus (globe-flower)</td>
<td>Scottish Borders</td>
<td>Found within the route corridor at NT 5135.</td>
</tr>
<tr>
<td>Galeopsis speciosa (large-flowered hemp-nettle)</td>
<td>Scottish Borders</td>
<td>Found in the Tweedbank area at NT 5235.</td>
</tr>
<tr>
<td>Otter</td>
<td>Edinburgh Midlothian Scottish Borders</td>
<td>Watercourses including River North Esk, Cakemuir Burn, Gala Water and the River Tweed. There are historical records of otter on the River South Esk.</td>
</tr>
<tr>
<td>Badger</td>
<td>Edinburgh Midlothian Scottish Borders</td>
<td>Extensive badger activity was identified along much of the length of the line.</td>
</tr>
<tr>
<td>Bats</td>
<td>Edinburgh Midlothian Scottish Borders</td>
<td>One Daubenton’s bat roost was recorded within a culvert near Torwoodlee. Consultation identified a probable roost near Borthwick. There are numerous suitable roost sites and abundant foraging habitat in many locations along the route.</td>
</tr>
<tr>
<td>Water vole</td>
<td>Edinburgh Midlothian Scottish Borders</td>
<td>Known from the River Tweed catchment (including the Gala Water).</td>
</tr>
<tr>
<td>Common frog</td>
<td>Midlothian Scottish Borders</td>
<td>Recorded in a ditch north of the rail line near to Shank Bridge at NT 33777 61481 and a small pond at NT 337826 600400. Several other standing water bodies may support amphibians.</td>
</tr>
<tr>
<td>Common toad</td>
<td>Edinburgh Midlothian</td>
<td>Several standing water bodies along the route have the potential to support amphibians.</td>
</tr>
<tr>
<td>Kingfisher</td>
<td>Edinburgh Scottish Borders</td>
<td>Recorded on Gala Water.</td>
</tr>
<tr>
<td>Bullfinch</td>
<td>Edinburgh Midlothian Scottish Borders</td>
<td>Found occasionally throughout the corridor, but more frequently in the Galashields area.</td>
</tr>
<tr>
<td>Priority Species</td>
<td>Local Action Plan</td>
<td>Recorded Location within the Route Corridor</td>
</tr>
<tr>
<td>------------------</td>
<td>-------------------</td>
<td>---------------------------------------------</td>
</tr>
<tr>
<td>Grey partridge</td>
<td>Edinburgh, Scottish Borders</td>
<td>A single record of a small group of birds in the Sandyknowe area.</td>
</tr>
<tr>
<td>Linnet</td>
<td>Edinburgh, Midlothian</td>
<td>Occasional records along the corridor.</td>
</tr>
<tr>
<td>Reed bunting</td>
<td>Edinburgh, Midlothian, Scottish Borders</td>
<td>Occasionally recorded in association with scrub, swamp and tall ruderal vegetation, particularly in the Stagebank area.</td>
</tr>
<tr>
<td>Skylark</td>
<td>Edinburgh, Midlothian, Scottish Borders</td>
<td>Occasional records.</td>
</tr>
<tr>
<td>Song thrush</td>
<td>Edinburgh, Midlothian</td>
<td>Occasional along the route corridor.</td>
</tr>
<tr>
<td>Spotted flycatcher</td>
<td>Edinburgh, Midlothian, Scottish Borders</td>
<td>Recorded in a few locations.</td>
</tr>
<tr>
<td>Tree sparrow</td>
<td>Edinburgh, Midlothian, Scottish Borders</td>
<td>Locally present in the Borthwick area and a single record in the Shank Bridge area.</td>
</tr>
<tr>
<td>Swift</td>
<td>Edinburgh, Midlothian, Scottish Borders</td>
<td>Recorded foraging overhead.</td>
</tr>
<tr>
<td>Barn owl</td>
<td>Midlothian, Edinburgh, Scottish Borders</td>
<td>Known from the area.</td>
</tr>
<tr>
<td>Yellowhammer</td>
<td>Scottish Borders, Midlothian</td>
<td>Occasional along the route corridor.</td>
</tr>
<tr>
<td>Lapwing</td>
<td>Scottish Borders, Edinburgh</td>
<td>Occasional records along the route.</td>
</tr>
<tr>
<td>Curlew</td>
<td>Scottish Borders</td>
<td>Recorded in the Falahill/Stagebank area only.</td>
</tr>
<tr>
<td>House sparrow</td>
<td>Scottish Borders</td>
<td>Recorded foraging and breeding in buildings along the route.</td>
</tr>
<tr>
<td>Great spotted woodpecker</td>
<td>Edinburgh</td>
<td>Two records from woodland in the Bowshank/Stow area.</td>
</tr>
<tr>
<td>Sand martin</td>
<td>Edinburgh</td>
<td>Recorded foraging overhead.</td>
</tr>
</tbody>
</table>
8.5.4 Other Species of Note

The Phase 1 Habitat Survey did not record any plant species of particular nature conservation importance.

Consultation has identified six nationally scarce plant species (1) within 500m of the route corridor. Exact locations are not known but these plants could be found on or in proximity to the railway corridor. None of these species have been identified on the line of the route to date. They are:

- Fumaria densiflora (dense-flowered fumitory);
- Scrophularia umbrosa (green figwort);
- Gnaphalium sylvaticum (heath cudweed);
- Potentilla argentea (hoary cinquefoil);
- Dianthus deltoids (maiden pink); and
- Gagea lutea (yellow star-of-Bethlehem).

Two plant species listed on Schedule 9, Part II of the Wildlife and Countryside Act 1981 and amendments were recorded along the route: Heracleum mantegazzianum (giant hogweed) and Fallopia japonica (Japanese knotweed). Both are aggressive alien species and under Section 14 of the Act it is an offence to release or allow them to escape into the wild.

Red List bird species of conservation concern (2) recorded during the bird surveys between May and September 2002, include:

<table>
<thead>
<tr>
<th>Bullfinch</th>
<th>Skylark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grasshopper warbler</td>
<td>Song thrush</td>
</tr>
<tr>
<td>Grey partridge</td>
<td>Spotted flycatcher</td>
</tr>
<tr>
<td>House sparrow</td>
<td>Starling</td>
</tr>
<tr>
<td>Linnet</td>
<td>Tree sparrow</td>
</tr>
<tr>
<td>Reed bunting</td>
<td>Yellowhammer</td>
</tr>
</tbody>
</table>

8.5.5 Baseline Ecology

The following sections describe the baseline ecology of the route corridor, including habitat descriptions and animal records. Further information is included in Annex F: Heritage Environmental Ltd, Ecological Impact Assessment, February 2003 and on the Phase 1 Habitat maps, Sheet 1-9 and accompanying Target Notes in the same annex.

8.5.6 Semi-natural Broadleaved Woodland

Broadleaved woodland covers approximately 163 ha within the study corridor.

(1) Listed by Joint Nature Conservancy Council as 'pink data species', native vascular plants occurring in between 16 and 100 ten-km squares (Stewart A, Pearman D A & Preston C D (1994) Scarce Plants in Britain. JNCC, Peterborough).
(2) A species whose population or range is rapidly declining, recently or historically or of global conservation concern. (RSPB et al (2002) The population Status of Birds in the U K. RSPB)
Mature woodland usually of *Quercus petraea* (sessile oak), *Fraxinus excelsior* (ash) *Acer pseudoplatanus* (sycamore) and *Ulmus glabra* (wych elm) is largely confined to areas adjacent to the line. The best examples include the areas described in Target Notes (TN) 20 beside the roundabout at Newbattle, TN 46 near Arniston in the valley at the confluence of the Gore Water and the River South Esk, and TN 207 beside the Gala Water just north of Galashiels. All of these areas have a well developed ground flora with typical species including, *Mercurialis per Ennis* (dog’s mercury), *Circe lutetium* (enchanter’s-nightshade) *Ribes uva-crispa* (gooseberry), *Hyacinthoides non-scripta* (bluebell) *Galium odoratum* (woodruff), *Viola riviniana* (common dog-violet) *Brachypodium sylvaticum* (false brome), *Geranium robertianum* (herb robert), *Geum urbanum* (wood avens), *Allium ursinum* (ramsons) *Sanicula europaea* (sanicle) and *Dryopteris filix-mas* (male fern).

Woodland on the old track bed and on cuttings and embankments slopes is all secondary woodland. Scrubby pioneer woodlands of *Salix caprea* spp (goat willow), *Betula pendula* (silver birch) and *Acer pseudoplatanus* (sycamore) with shrubs including *Crataegus monogyna* (hawthorn) and *Sambucus nigra* (elder) occur frequently along the line and in rough or neglected areas adjacent to the line. These generally have a species-poor ground flora including *Hedera helix* (ivy), *Rubus fruticosus agg* (bramble), *Drynaria filix-mas* (male fern), ruderal herbs such as *Urtica dioica* (nettle), *Chamerion angustifolium* (rosebay willowherb) and *Cirsium arvense* (creeping thistle), and a range of common grasses.

Several common bird species were recorded from the woodland habitats along the route corridor, including, blackbird, blue tit, buzzard, chaffinch, chiffchaff, collared dove, dunnock, great tit, goldcrest, great spotted woodpecker, greenfinch, long-tailed tit, pheasant, robin, rook, tawny owl, tree creeper, woodpigeon, willow warbler and wren. Bullfinch (a Red List species, see Section 8.5.4) was also recorded. Badger setts and signs of foraging were recorded in association with woodland and a number of areas of excellent potential bat foraging habitat were identified.

### 8.5.7 Broadleaved, Coniferous and Mixed Plantations

Plantation woodland covers approximately 159 ha within the study corridor.

These plantations are largely confined to areas adjacent to the line. Some of the most mature broadleaved plantations have developed a characteristic woodland ground flora, for example TN 21 on the Pittendriech Burn beside the roundabout at Newbattle. This has a mature canopy of *Acer pseudoplatanus* (sycamore) and *Fagus sylvatica* (beech) and a ground flora of many of the woodland herbs mentioned above.

Many small linear broadleaved or mixed plantations have been planted along the cutting slopes for landscaping purposes. These are concentrated in the more urban/suburban areas. Such plantations have rank grasses or ruderal herbs.
dominant between the trees. Larger conifer and mixed plantations also occur adjacent to the line, but not over the line.

A similar range of common woodland bird species to those listed above was recorded from the plantation woodlands. In addition, species more typical of coniferous woodlands were recorded, including coal tit, siskin and goldcrest.

8.5.8 Scrub

Scrub covers approximately 50 ha within the study site.

A large proportion of the cutting and embankment slopes, and small areas of the track bed are occupied by scrub, usually of Crataegus monogyna (hawthorn) with Salix caprea (goat willow) and Sambucus nigra (elder), with regenerating Acer pseudoplatanus (sycamore), Fraxinus excelsior (ash) and Betula pendula (silver birch). These tend to be either dense with little ground flora, or open with tall ruderal vegetation.

A number of common bird species were recorded associated with scrub habitats, including blackcap, chaffinch, chiffchaff, coal tit, dunnock, great tit, goldcrest, long-tailed tit, reed bunting, siskin and willow warbler. Tree sparrow was recorded in association with scrub and farmland areas.

8.5.9 Acid Grassland

Acid grassland covers approximately 5 ha within the study site.

Two significant patches of unimproved or semi-improved acid grassland were found. The largest patch (TN 49) at Millbank House just west of Gorebridge consists of neglected pasture fields on a low sandy ridge adjacent to the line. This has a sward of Festuca ovina (sheep’s fescue), Festuca rubra (red fescue), Agrostis capillaris (common bent) and characteristic herbs such as Rumex acetosella (sheep’s sorrel), Hypochoeris radicata (common cat’s-ear) and Centaurium erythraea (common centaury). This area also supports small heath butterflies.

Another area of acid grassland occurs on a very high and steep cutting slope (TN 86) and is very diverse, with abundant herbs including Veronica officinalis (heath speedwell), Potentilla erecta (tormentil), Lotus corniculatus (common bird’s-foot trefoil), Galium saxatile (heath bedstraw), Galium verum (lady’s bedstraw) and Thymus praecox (wild thyme).

8.5.10 Neutral Grassland

Neutral grassland covers approximately 147 ha within the study site.

The most species-rich patches of neutral grassland occur as localised fragments on some steeper cutting banks and short lengths of track bed where basic steelworks slag remains having been used as ballast. Examples of this habitat are
very restricted in extent and distribution, for example TN 65 at Catcune Mills. These tend to have a short sward of fine-leaved grasses, particularly Festuca rubra (red fescue), Agrostis capillaris (common bent) and Cynosurus cristatus (crested dog’s-tail) and a suite of characteristic herbs including Lotus corniculatus (common bird’s-foot trefoil), Centaurea nigra (common knapweed), Veronica chamaedrys (germander speedwell), Rumex acetosa (common sorrel), Plantago lanceolata (ribwort plantain), Euphrasia sp (eye-bright) and Galium verum (lady’s bedstraw).

Many similar but less species-rich grasslands were identified as semi-improved neutral grassland, these include TN 75 at Borthwick Mains, TN 88 near Tynehead and TN 118 at the south end of Shankend Wood beside Gala Water. However, most of semi-improved neutral grassland identified in the route corridor is not species-rich, but dominated by tussock-forming species such as Arrhenatherum elatius (false oat-grass) (typical unmanaged road/ rail verge grassland), or Deschampsia cespitosa (tufted hair-grass) in damper conditions. Herbs associated with these habitats are tall or scramblers and include Filipendula ulmaria (meadowsweet), Centaurea nigra (common knapweed), Lathyrus pratense (meadow vetchling) and Heracleum sphondylium (hogweed).

8.5.11 Improved Grassland

Improved pasture covers approximately 1065 ha within the study site.

This is the predominant habitat of pasture fields adjacent to the line. The sward is composed of a few agricultural grass species, mainly Lolium perenne (perennial rye-grass) and Agrostis capillaris (common bent) with few herbs dominated by Trifolium repens (white clover). In some areas the line has been incorporated into adjacent pastures, or the line is used as a farm track and becomes incidentally improved by dunging.

8.5.12 Marshy Grassland

Marshy grassland covers approximately 22 ha within the study site.

This habitat is infrequently found as damp patches within pasture fields such as in the valley of the Gala Water at Heriot (TN 104 & TN 102) and at Killochyt (TN 166), where the sward is dominated by Juncus effusus (soft rush) or Deschampsia cespitosa (tufted hair-grass) and is grazed. It also occurs beside ditches and Burns where Filipendula ulmaria (meadowsweet) and Phalaris arundinacea (reed canary-grass) often form subsidiary components to the vegetation in transitions to marginal or swamp vegetation. Very locally the railway line itself is marshy, the best example being in the cutting at Tynehead (TN 89), which has a diverse mix of rushes, marginal aquatic plants and damp meadow species. However, most damp areas on the line itself are very localised and species-poor.
EHL recorded this area as of potential interest for amphibians and water vole but none were recorded during the field surveys.

**8.5.13 Poor Semi-improved Grassland**

Poor semi-improved pasture covers approximately 169 ha within the study site.

Many pasture fields adjacent to the line are not fully improved or have reverted to a more natural composition but remain species-poor. These tend to be dominated by *Agrostis capillaris* (common bent) with *Holcus lanatus* (Yorkshire fog), *Cynosurus cristatus* (crested dog's-tail) and *Trifolium repens* (white clover) but with few other herb species. Areas of cutting slope and track bed have often been partially improved by grazing and dunging and support this low grade, species-poor agricultural sward.

Birds recorded from grassland fields adjacent to the route corridor include curlew, oystercatcher, grey partridge and skylark (1). A common lizard was recorded in an area of rough grassland near Fountainhall.

**8.5.14 Bracken**

Continuous bracken covers approximately 3.5 ha within the study site.

This habitat occurs rarely within the study area and only as very small areas. These are usually at the edge of woods or as open patches in scrub where *Pteridium aquilinum* (bracken) spills out from adjacent woods. Characteristically *Pteridium aquilinum* (bracken) dominates to the exclusion of other species.

**8.5.15 Tall Ruderal Vegetation**

Ruderal vegetation covers approximately 103 ha within the study site.

This is a major habitat type within the study area. Many sections of the cutting slopes, track bed and other neglected areas adjacent to the line are dominated by *Urtica dioica* (common nettle), *Chamerion angustifolium* (rosebay willowherb) and *Cirsium arvense* (creeping thistle) with a few other common tall ruderal herb species. The invasive alien species *Fallopia japonica* (Japanese knotweed) and *Heracleum mantegazzianum* (giant hogweed) also occur in the study corridor.

**8.5.16 Swamp**

Swamp covers approximately 7 ha within the study site.

Only very small, localised areas of swamp occur within the study area. These occur in low lying areas beside streams and in deep hollows and are dominated by *Carex rostrata* (bottle sedge) or *Phalaris arundinacea* (reed canary-grass) with

(1) Red List bird species (see Section 8.5.4).
few other species. Examples occur at TN 98 Heriot, TN 150 Galabank just north of Killochyett and TN 183 near Bowland Bridge.

Sedge warbler and reed bunting were recorded in the swamp area at Stagebank/Tynehead.

8.5.17 Marginal and Inundation Vegetation

Marginal/inundation vegetation covers approximately 0.24 ha within the study site.

This habitat occurs as scattered and very localised fragments along river and stream margins, and in occasional permanent puddles along the line itself. The vegetation generally consists of a few scattered plants of Phalaris arundinacea (reed canary-grass), Sparganium erectum (branched bur-reed), Glyceria fluitans (floating sweet-grass), Iris pseudacorus (yellow flag) and M yosotis scorpioides (water forget-me-not).

8.5.18 Standing Water

Standing water covers approximately 2 ha within the study site.

Several very small and apparently temporary pools occur along or adjacent to the line. These tend to be predominantly bare mud with swamp/marginal species scattered within them such as Glyceria fluitans (floating sweet-grass) and M yosotis scorpioides (water forget-me-not).

Common frog and toad adults and tadpoles were recorded from these areas of standing water.

8.5.19 Running Water

Running water covers approximately 41 ha within the study site.

The line crosses the River Tweed and River South Esk and follows Gala Water for a considerable distance, as well as crossing numerous small burns and ditches. The Tweed and Gala Water are clean river systems of high conservation and ecological value and are designated as an SSSI and a candidate SAC (see Section 9).

The vegetation shows a natural succession from mineral-poor upland streams through to species that are typical of mineral-rich lowland rivers and includes several Nationally Scarce species of Potamogeton spp (pondweed) and Ranunculus spp (water-crowfoot).
Otter signs were recorded from the majority of watercourses in proximity to the route corridor (see Section 8.5.1). Kingfisher (1), dipper, grey heron, grey wagtail, mallard and moorhen were recorded on Gala water. Habitat suitable for water vole was also identified by EHL as well as excellent potential bat foraging habitat along the lower stretches of the Gala water but none were recorded in the field surveys or from consultations.

The River Tweed is one of the major salmon rivers of Scotland and has an international reputation both as a famous salmon river and an excellent brown trout water. The River Tweed has had its own salmon legislation for a long time and the protection of the salmon and sea trout has been the responsibility of the River Tweed Commissioners since their creation under an Act of 1830. The Salmon and Freshwater Fisheries (Protection) (Scotland) Act 1951 and the Freshwater and Salmon Fisheries (Scotland) Act 1976 now protect the watercourse and fisheries. It also supports river, brook and sea lamprey, also European protected species.

Whilst the Tweed is justly world renowned for its salmon, sea trout and brown trout fishing there are some 16 other recorded species of fish such as grayling, salt water fish such as flounder and the ubiquitous eel.

8.5.20 Arable Cropland

 Arable fields cover approximately 171 ha with the study site, scattered along the study area adjacent to the line.

Lapwing, skylark and curlew were recorded from arable fields in proximity to the route corridor.

8.5.21 Amenity Grassland

Amenity Grass covers approximately 54 ha within the study site.

This is regularly mown improved and species-poor grassland of recreation grounds, along roadsides, on roundabouts and in gardens.

8.5.22 Ephemeral/Short Perennial Vegetation

Ephemeral/short perennial vegetation covers 22 ha within the study site.

Fragmentary vegetation most often found on the ballast of the track bed where it is used as a track for vehicles preventing the development of much vegetation. It also occurs on waste ground, similarly disturbed, adjacent to the line. The flora of this habitat is often a fragmentary version of surrounding pastures or the early developmental stages of neutral grassland over ballast of basic steelworks slag. Species include fine leaved grasses such as Agrostis capillaries (common bent),

(1) A protected species (see Section 8.5.1).
Festuca rubra (red fescue), agricultural species such as Lolium perenne (perennial rye-grass), Trifolium repens (white clover), and weeds such as Ranunculus repens (creeping buttercup) and Cirsium arvense (creeping thistle).

8.5.23 Introduced Shrub

This habitat covers approximately 5 ha of the study site where Symphoricarpos albus (snowberry) forms locally extensive stands.

8.5.24 Hedges

Although relatively few hedges occur in the open agricultural landscape of the Borders, with a general increase in their occurrence in Midlothian, 20% of species rich hedgerows in Scotland occur in the Scottish Borders. The hedges are species-poor and dominated by Crataegus monogyna (hawthorn).

8.5.25 Bare Ground

This habitat covers 30 ha within the study site and occurs locally as unsurfaced tracks and other disturbed places on waste ground.

8.6 Potential Impacts

Impacts that could result from the proposals that have been considered include:

- permanent loss of habitat or species due to permanent or temporary landtake for the proposals;
- permanent loss of habitat or species due to construction works on existing structures within rail corridor (especially loss of actual and potential bat roosting sites in bridges/ culverts);
- creation of barriers to the movements of animals, especially mammals, amphibians and invertebrates and plants with limited powers of dispersal;
- fragmentation of habitat or severance of wildlife corridors between isolated habitats of ecological importance;
- disturbance or damage to adjacent habitat and species (movement of vehicles and personnel, artificial lighting, dust, spillage of fuels and chemicals, emissions and noise);
- impacts on habitats caused by alterations to drainage regimes;
- impacts on species caused by permanent alterations in night time light conditions;
introduction of and spread of alien species during the construction works;

creation of new habitats and introduction of species as a result of reinstatement works, habitat enhancement proposals and landscaping;

temporary severance of wildlife corridors; and

discharge of rail run-off, which may be contaminated with oil etc.

8.7 ASSESSMENT OF IMPACTS

8.7.1 Evaluation Criteria

An overview of the criteria used to assess the impacts predicted on ecology and nature conservation is provided below. A more detailed account of the evaluation criteria used in the assessment is provided in Annex E.

The significance of ecological effects is assessed according to the following primary criteria.

1. The magnitude of the effect, as determined by its intensity and extent in space and time. This takes into account the vulnerability of the habitat or species to the change caused by the development and its ability to recover.

2. The value, in nature conservation and ecological contexts, of affected receptors including species, populations, communities, habitats and ecosystems.

Significance is determined by the interaction of these primary criteria, being high for large effects on receptors of high value, and lower or insignificant for smaller effects on receptors of lower value.

Habitats are assessed according to the widely accepted criteria of which the most important are naturalness, extent, rarity and diversity; these and others are described in extensive literature. Existing statutory and non-statutory designations for the nature conservation importance and amenity value of the sites are also taken into consideration. In addition it is now generally considered that special importance be attached to ancient semi-natural habitats that depend for their survival upon traditional kinds of land management, for example, ancient coppice woodlands or meadows. These support special plant and animal communities that cannot be recreated quickly (if at all) and have suffered large reductions in the post-war period due to development and agricultural intensification.

Species are similarly assessed according to accepted criteria and the extent to which they are under threat. The importance of species to wider communities is considered. Protection of species by the relevant legislation including the Wildlife and Countryside Act, 1981 and amendments and the Conservation (Natural Habitats &c) Regulations, 1994 and non-statutory guidance are taken into account.

In the urban context several specific criteria are also relevant. These broadly relate either to the social and amenity value of the sites or to the ecological importance that may accrue to particular sites as a result of the general fragmentation of urban wildlife habitat.
Reference has been made also to the Draft Guidelines for Ecological Evaluation and Impact Assessment produced by the Institute of Ecology and Environmental Management's (IEEM) (1).

8.7.2 Agreed Mitigation Measures

A range of mitigation measures has been approved by the promoters of the Waverley Railway (Scotland) Bill and will be implemented to reduce the risk of significant impacts to habitats and species of nature conservation importance. Specific measures are described in relation to particular locations in the following sections, but the following general principles will be adopted. Further consultation on these measures will take place with Scottish Borders Council as well as SNH prior to adoption.

- Habitat loss will be limited to the minimum needed for safe implementation of the works.

- In line with planning policies in relation to nationally and locally important areas for nature conservation (cSACs, and SSSIs), the development will aim for a high quality design and landscaping that will protect the local environment and integrity of the sites and provide habitat creation/site enhancement elsewhere, where appropriate, to compensate for any negative impacts to these areas. SNH will be consulted in relation to any potentially damaging operations in a SSSI.

- Best site management practices will be adopted during construction to minimise the risk of secondary impacts to adjacent habitat (including direct incursions, pollution, draining of adjacent wet habitats etc).

- Culverts will be designed to allow the safe passage of wildlife, including fish, otter and water vole, following best practice guidance (2)(3).

- Invasive alien species listed on Schedule 9, Part II of the Wildlife and Countryside Act 1981 and amendments will be removed from site at the start of works following best practice guidance to ensure they are not spread inadvertently along the site.

- The site will be surveyed for the presence of protected species (eg otter, water vole, bats, amphibians, reptiles and badger) at appropriate times of year prior to work commencing and appropriate mitigation measures will be agreed with SNH and implemented if any protected species are identified prior to or

(2) Including River Crossings and Migratory Fish Design Guidance. A Consultation Paper, Scottish Executive, 2000 and
during construction. If any protected species will be affected, a licence application will be made to the Scottish Executive Environment and Rural Affairs Department (SEERAD) (1).

- A further check will be made for pearl species of interest along the corridor prior to construction and if any are identified appropriate measures agreed and SNH implemented wherever possible clearance will take place outwith of the bird nesting period.

- Appropriate mitigation (such as badger tunnels and fencing) will be incorporated in the final scheme design to reduce the impacts to local animal populations in any areas where casualties are likely to occur.

- All mature and dead trees, tunnels, bridges, culverts and buildings or other built structures to be affected by the scheme, will be checked for bats prior to construction at appropriate times of year and appropriate mitigation measures agreed with SNH and SEERAD and implemented if bats are found.

- All woodland, scrub, bridge structures and other habitat will be checked for nesting birds before removal if it has to take place in the bird-nesting season. If any are identified appropriate mitigation measures will be agreed with SNH and implemented.

- The mitigation of impacts to wildlife will be consistent with species and habitat priorities set out in the LBAPs.

- Opportunities will be taken to enhance existing habitats of nature conservation interest that are retained and to create new habitats of value within the site landscaping proposals.

- New planting (other than in areas where ornamental and specimen tree planting is included in the Landscape Design, will be undertaken using native species typical of the area, obtained from local sources if possible.

- Topsoil and subsoil from little and non-contaminated sites will be stripped and stored separately and reinstated appropriately.

8.7.3 Assessment

Overview

The mitigation measures and assessment were based on the findings of the Phase 1 survey and additional badger, otter and bird surveys. It was not possible to survey all the corridor due to access restrictions (see Section 8.2.1). The surveys are considered to have provided a good understanding of the nature conservation interests of the corridor in most areas and have been sufficient to

(1) Wildlife and Habitats Unit.
identify habitats and species where further detailed survey will be required prior to construction to ensure that the generic mitigation measures, listed above, can be developed to protect the specific interests of different areas of the corridor. The following sections include the assessment of residual impacts assuming all mitigation measures are in place.

Habitat Loss

Reinstatement of the railway and associated new development will result in the loss of approximately 361 ha (1) of habitat along the route corridor. For the purposes of this assessment it has been assumed that all vegetation could be lost within the land made available for construction. There will be extensive new landscape planting including trees, shrubs and grassland at the edge of the railway line following the works, within the constraints of the railway regulations. Where appropriate this will be undertaken using native species typical of the area, preferably obtained from local sources. This will help mitigate the loss of habitats in the longer term. A summary of the habitats lost and the new habitats that will be created is given below.

The majority of habitat that will be lost is neutral grassland developing on the basic slag ballast of the former trackway. Other areas of habitat to be lost include marshy grassland, acid grassland and woodland parcels, scattered trees and scrub along the embankments and in the areas to be affected outwith the route corridor. Virtually all the woodland that will be lost to the development is immature secondary woodland, mainly Betula spp (birches) and Salix spp (willows). These habitats, although of no particular ecological importance, will provide habitat for a number of bird and other animal species. Habitat creation will include new landscape planting along the rail corridor including native trees, scrub and grassland. In the long term as the new planting matures it will compensate in part for that lost during construction.

Areas of particular nature conservation importance that will be affected by construction of the scheme are described below.

Designated Areas

The Gala Water, part of the River Tweed cSAC/ SSSI is of importance as a clean river system supporting several European protected species including river, sea and brook lamprey, Atlantic salmon and otter (see Section 8.4). The river crosses the railway corridor at NT 515354 and it will also be affected in several other areas during construction, particularly during bank strengthening works. Potential impacts include loss of riparian habitat and the risk of direct and indirect deposition of silt and pollution incidents. To reduce the risk of impacts to the interests of the cSAC, the in-river works will be timed for late summer

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(1) For the purposes of this assessment or worst case scenario has been assumed i.e. that all habitats within the working width of the corridor will be lost. In reality it is likely that at least some areas will be safeguarded and not directly affected by the works.
when salmon reds (1) will not be occupied and fry will be sufficiently mobile to move out of construction areas. This will minimise the risk of potential disruption of, or damage to, salmonid (2) eggs and alevins (3). Prior to construction, the riverbanks will be surveyed for otter holts and if any are identified mitigation measures will be agreed with SNH and implemented.

Crichton Glen SSSI borders the railway corridor at NT 382606. There will be some loss of trees and other vegetation from the Ancient Woodland within the SSSI.

SNH will be consulted at the earliest opportunity to agree on best practice and mitigation measures that will reduce the impacts to these sites to the minimum necessary for the safe completion of the works and to ensure the integrity of the sites is maintained.

A number of sites designated for their local nature conservation interest are in close proximity to the proposals (see Section 8.4.2). The line crosses the River South Esk and Newbattle Woods at NT 325649 via the existing Newbattle Viaduct. Best site management practices will be adopted during the works, to minimise the risk of secondary impacts on the river and woodland along its banks (see Section 8.8) and no long term or permanent impacts are predicted.

Gore Glen Provisional Wildlife Site would be crossed by the route at NT 333619 for a length of approximately 800m. There will be some removal of vegetation from the edges of the site to clear the railway corridor and to construct a new viaduct over the A7, including Ancient and Long Established Woodland. Habitat removal will be restricted to the minimum necessary for the construction of the works and best site management practises will be adopted.

The Waverley Railway line is itself a Listed Wildlife Site (NT 325649). The railway presently provides a significant wildlife corridor of unmanaged wildlife habitat uncommon in the local area. Construction of the scheme will reduce the railway’s effectiveness as a little disturbed wildlife corridor, however, the landscaping and habitat creation will go some way to compensating for this loss by providing new, diverse habitats of native species of local provenance that have the opportunity to enhance improve local biodiversity in the long term.

There will be some loss of the edges of Ancient Woodland through which the railway passes, including at Newbattle Woods, Gore Glen, Crichton/ Maggie Bowies Glen, Tynehead Area and at Buckholm and Torwoodlee Area. This habitat loss will be limited to that necessary for construction and best site management practices will be implemented to avoid incursions into adjacent woodland. The integrity of these woodlands will not be affected in the long term.

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(1) Areas disturbed or "cut" by fish for depositing eggs during spawning.
(2) Migratory fish including Atlantic salmon and sea trout.
(3) Young fish.
Other Habitats of Interest

There are eight LBAP habitats that will be impacted by the proposals. These are:

- woodland;
- scrub;
- acid grassland;
- lowland meadows;
- farmland;
- swamp;
- boundary and linear features (including wildlife corridors); and
- rivers and burns.

These habitat types are of local nature conservation value and mitigation measures will be implemented so that amount of habitat removed during construction is reduced to the minimum necessary for the works and to reduce the risk of secondary impacts during construction.

Substantial areas of neutral grassland will be lost on reinstatement of the railway, particularly at Eskbank, Borthwick, Falahill, Heriot, Stagebank, Hoppringle, Hazelbank, Watherston, Galabank and Bowland.

Small areas of acid grassland will be lost, particularly at Shank Bridge/ Gore Glen and Crichton Glen.

Some areas of broadleaved woodland will be lost or damage, most significantly at Gore Glen, Crichton/ Maggie Bowies Glen and Torwoodlee (see above).

Species of Note

Several species of note are known from the corridor and construction could result in significant impacts. Mitigation measures described in the following paragraphs will minimise where possible, the significance of these impacts.

Signs of badger have been recorded along much of the length of the line. A number of setts were identified within the rail corridor including a main sett, two annexe or subsidiary setts, eight active outlying setts and a further nine currently inactive outlying setts. There was also evidence of foraging areas and badger paths along and crossing the line. Prior to construction at an appropriate time of year the corridor will be resurveyed for badgers and appropriate mitigation measures will be agreed with SNH and implemented prior to construction beginning (1). A number of setts are likely to be lost, that will require licensed exclusion and the construction of several artificial setts may also be required.

(1) The exact locations of protected species will be determined following further survey prior to construction, as the location of the species may change.
Mitigation measures such as badger fencing and tunnels will be incorporated in the final scheme design in appropriate locations to reduce impacts to a minimum.

Signs of otter were recorded from the River North Esk, Cakemuir Burn, Gala Water and the River Tweed. The River Tweed catchment is considered to be one of the strongholds of otter in the UK. There are historical records of otter on the River South Esk. Suitable water vole habitat was identified during the Phase 1 habitat survey in a number of areas that will be directly affected by the proposed development. Prior to construction at an appropriate time of year an otter and water vole survey will be completed along the banks of the watercourses that will be affected by the proposals to check for the presence of holts or burrows. If any are found necessary mitigation will be agreed with SNH and implemented. A licence will be applied for from SEERAD for disturbance to or loss of any otter resting up sites. Where culverts are required on watercourses along the scheme, these will be designed to allow the safe passage of wildlife following best practice guidance.

Consultation suggests that six species of bat occur within 10 km of the route. One Daubenton’s bat roost was recorded within a culvert near Torwoodlee and the consultation identified a probable roost in a bridge near Borthwick. There are numerous suitable roost sites and abundant foraging habitat in many locations along the route. Any mature trees that will be lost will be checked for bat interest prior to felling and all properties, bridges, tunnels, culverts and other built structures will be checked for their use by bats prior to demolition or construction works. The check will be undertaken at appropriate times of year to assess the use of these sites throughout the year including for maternity roosts, hibernation sites and non-breeding roost sites. Further details are provided in Annex F: Heritage Environmental Ltd, Ecological Impact Assessment, February 2003. If any potential impacts are identified, measures to mitigate these will be agreed with SNH and implemented prior to construction. The loss, disturbance or damage to a roost site will require a licence from SEERAD.

Kingfisher was recorded on the Gala Water and barn owl is known from the area. The areas to be affected will be checked for the presence of these and other important bird species prior to work commencing and appropriate mitigation measures will be agreed with SNH and implemented if any are identified prior to or during construction.

Twelve Red List bird species were recorded along the route (see Section 8.5.4). There will be a moderate impact on these species through habitat removal along the route. Appropriate habitat creation will go some way to mitigate for these losses in the long term. Where possible, construction work will be programmed outwith the bird nesting period (March to July), or if the contract allows, vegetation will be removed over the winter prior to construction beginning. If work has to be undertaken within the breeding bird season, buildings and trees, scrub and other vegetation will be checked for all nesting birds before removal. If any are identified appropriate mitigation measures will be agreed with SNH and implemented.
All areas that have been identified in the baseline as being of potential interest to reptiles will be surveyed prior to construction at an appropriate time of year. Common lizard was recorded during the surveys and there are records of adder and slow worm in the area. There will be some impact on reptiles through the loss of habitat. Mitigation measures will ensure that the impacts are reduced to the minimum necessary.

Amphibians (common frog and toad, which are both LBAP species) have been recorded during the Phase 1 survey at a number of locations some of which will be lost to the development. Further detailed survey will be completed at an appropriate time of year prior to construction and appropriate mitigation measures will be put in place in agreement with SNH. This may involve habitat creation and translocation.

Surveys for nationally scarce plant species will be undertaken prior to construction and appropriate mitigation measures will be put in place in agreement with SNH if required.

The potential spread of the invasive alien species Heracleum mantegazzianum (giant hogweed) and Fallopia japonica (Japanese knotweed) along the site will be minimised by early removal from all known locations following best practice guidance.

### 8.8 Construction Impacts

Potential impacts on habitats and species from the construction activities include:

- disturbance or damage to adjacent habitat through construction activities (including movement of vehicles and personnel, artificial lighting, dust, spillage of fuels and chemicals, emissions and noise);

- disturbance to or displacement of species as a result of construction activities; and

- temporary severance of wildlife corridors.

Construction activities will be confined to the minimum areas required for the works. Implementation of best practices will ensure that the risk of disturbance or damage to adjacent habitats is minimised.

There will be some disturbance to fauna in close proximity to the construction site, including badger, otter and bats. Best site management practices will be adopted to ensure these impacts are kept to a minimum. Where disturbance to protected species is predicted, appropriate mitigation measures will be agreed with SNH and implemented and a licence applied for from SEERAD if appropriate.
Traffic flows on local roads may increase for short periods during the works (see Section 7) and this may increase the barrier effect of a particular road to wildlife. It is assumed the greatest increase in flows are likely to occur during peak times and most wildlife movements are likely to be at night and the effect is not considered to be significant based on available information.

During the construction of the watercourse crossings and the installation of the discharge points, contractors will be required to minimise the length of bank affected and to reinstate the remaining habitats following construction in accordance with current recognised aquatic habitat restoration techniques and initiatives. Where possible, works will be timed to avoid disturbance to migratory fish species (see Section 9) – although some stages of the life history of the migratory fish are present throughout the year. No significant impacts on aquatic ecology are therefore predicted.

8.9 Operational Impacts

Some animals may be killed or injured crossing the railway but no species that would be particularly vulnerable have been identified from field surveys or in consultations apart from badger, otter and possibly bats. Appropriate mitigation measures will be implemented to protect these species interests if required (see Section 8.7.2).

Birds, amphibians, and other fauna using the habitats adjacent to the railway may also become casualties. The species recorded in the area are generally common species in the district and no significant impacts are predicted, based on available information.

The increase in noise along the route of the railway could result in reduced densities of birds and other animals in areas adjacent; however, this will at least in part be off-set by new planting which will create new habitats for birds and other fauna. It is likely that some wildlife will become habituated to the regular noise from the railway. The only species of note identified which is considered to be particularly vulnerable to increased noise or air pollution are bats.

New habitats will be created with the potential to provide ecological benefits in the longer term. Disturbance from future maintenance operations, including noise and human presence, is likely to be temporary and restricted to the road corridor. Possible damage to habitats associated with watercourses as a result of maintenance activities will be kept to a minimum through restricting access to the immediate area of works. Disturbance will be infrequent and no significant impacts to wildlife are predicted.
8.10 **Cumulative Impacts**

In the preceding sections, the permanent and temporary impacts for individual components of the scheme have been assessed. In this section cumulative impacts of the development are considered. These can take several forms (English Nature 1996) including the following:

- impacts arising from more than one development affecting the same resources;
- the accumulation of impacts at one location;
- the accumulation of impacts over a period of time;
- induced and indirect impacts where secondary development is stimulated by the project.

For this assessment the cumulative impact of the whole scheme over time has been considered. Impacts from secondary developments have not been assessed because no details are known.

The proposals will result in the loss of approximately 361 ha of habitat, mainly neutral grassland developing on the basic slag ballast of the former trackway. This linear feature presently provides a significant wildlife corridor of unmanaged wildlife habitat uncommon in the local area, dominated by farmland of low nature conservation interest. Construction of the scheme will reduce the railway’s effectiveness as a wildlife corridor, however, the landscaping and habitat creation will go some way to compensating for this loss by providing new, diverse habitats of local provenance that will improve local biodiversity in the long term.

8.11 **Summary of Impacts**

- Gala Water (part of the River Tweed cSAC/ SSSI) will be affected during construction through loss of riparian habitat and the risk of direct and indirect deposition of silt and pollution incidents.
- There will be some loss of ancient woodland from Crichton Glen SSSI.
- There will be some habitat loss from Gore Glen Provisional Wildlife Site, the Waverley Railway Line Listed Wildlife Site and some areas of Ancient Woodland. Habitat loss from these areas will be limited to the minimum necessary for safe implementation of the works and best site management practices will be adopted.

Several protected species including badger, otter, bat and possibly water vole, kingfisher and barn owl will be affected by the scheme. Further survey work will be undertaken prior to construction and appropriate mitigation measures will be agreed with SNH and implemented to reduce these impacts, and licence applications made to SEERAD if appropriate.

Eight LBAP habitats will be impacted by the proposals.

29 LBAP species have been identified within the railway corridor that will potentially be affected by the scheme.

Twelve Red list bird species have been identified within the railway corridor that will potentially be affected by the scheme.

Reinstatement of the railway and associated new development will result in the loss of approximately 361 ha of habitat along the route corridor, predominantly neutral grassland, tall ruderal vegetation, scrub and woodland habitat.

The railway’s function as a wildlife corridor will be reduced. However the landscaping proposals will go some way to mitigating these impacts in the long term as vegetation establishes along the embankments.

New habitats will be created with the potential to provide ecological benefits in the longer term.
9 WATER RESOURCES

9.1 INTRODUCTION

This section assesses the impacts of the proposed Waverley Line on the aquatic environment. This includes an assessment of impacts to both ground and surface waters, as well as land drainage and flood defence.

9.2 ASSESSMENT METHODOLOGY

The assessment of impacts on surface water and groundwater is based on a desktop study. To determine the significance of aquatic impacts, reference is made to information derived from the following sources:

- relevant European Union (EU) legislation;
- the requirements of SEPA, including relevant water quality standards and objectives and pollution Prevention Guidelines;
- policies relating to groundwater; and
- the degree and nature of use of the groundwater for potable or other abstraction.

9.3 ASSESSMENT CRITERIA

9.3.1 Surface Water

The water quality of the UK’s watercourses is classified by the EA and SEPA under the General Quality Assessment (GQA) Scheme. It provides a means of assessing and reporting environmental water quality in a nationally consistent and objective way. The chemical grades for rivers introduced in 1994 uses BOD, Ammonia and Dissolved Oxygen limits for water quality with A & B (Good); C & D (Fair); E (poor) and F (Bad).

9.3.2 Groundwater

The vulnerability of groundwater pollution is dependent on the presence and nature of the overlying soils and drift deposits, the geology and the depth to the water table. This will determine the rate at which a contaminant can migrate into the water. Consequently, groundwater abstractions in the UK have designated inner and outer protection zones, defined according to the above criteria. SEPA’s
9.3.3 Aquatic Species and Habitats

Criteria for the conservation of aquatic species and habitats are embodied in the Wildlife and Countryside Act 1981 and the Conservation (Natural Habitats, etc) Regulations 1994. These instruments set out lists of priority habitats and species which require the protection (directly or by the designation) of appropriate nature conservation sites.

9.4 Baseline Environment

9.4.1 Surface Water

There are a number of main watercourses along the route of the proposed scheme: the North and South Esks, the Gore Water, the Dalhouise Burn, the Park Burn, the Middleton North and South Burns, Cairney Burn, Gala Water and the River Tweed. The Tweed is the second largest river basin in Scotland with approximately 4300 km² in Scotland and approximately 680 km² in England. Of this area Gala Water is one of its major tributaries and has a catchment approximately 207 km². SEPA carries out regular biological and chemical monitoring at various points on some of these watercourses. SEPA’s river classification system is based on chemistry and biology results.

The proposed scheme follows the Gala Water for a significant proportion. Results from the 2000 classification scheme show that water quality in the Gala Water is good (as shown in Table 9.1).

Table 9.1 Gala Water Classification

<table>
<thead>
<tr>
<th>Site (1)</th>
<th>Overall</th>
<th>Overall Biology</th>
<th>Overall Chemistry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gala Water at Foot</td>
<td>A2</td>
<td>A2</td>
<td>A1</td>
</tr>
<tr>
<td>Gala Water at Gala Gauging Station</td>
<td>A2</td>
<td>A2</td>
<td>A1</td>
</tr>
<tr>
<td>Gala Water 300m Below Galahaugh Fish Farm</td>
<td>A1</td>
<td>A1</td>
<td></td>
</tr>
<tr>
<td>Gala water just above Lugate Water Foot</td>
<td>A1</td>
<td>A1</td>
<td></td>
</tr>
<tr>
<td>Gala Water at Stow</td>
<td>A1</td>
<td>A1</td>
<td></td>
</tr>
<tr>
<td>Gala Water 100m Below Heriot Septic Tank outfall</td>
<td>A1</td>
<td>A1</td>
<td></td>
</tr>
</tbody>
</table>

The Overall Class of A1/ A2 indicates that it is capable of sustaining a salmonid fish population although the ecosystem may be modified by human activity. The other main watercourse marked within the map is a stretch of the River Tweed, with an overall class A2. There are also numerous smaller tributaries of the Gala Water and River Tweed which are not monitored directly.

(1) PPG1 General Guide to the Prevention of Pollution, SEPA
Water Quality Classification has also been given for the watercourses in Midlothian as shown in Table 9.2.

### Table 9.2 Water Classification for Remaining Main Rivers

<table>
<thead>
<tr>
<th>Watercourse</th>
<th>Overall</th>
<th>Overall Biology</th>
<th>Overall Chemistry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Middleton North Burn downstream</td>
<td>A2</td>
<td>A2</td>
<td>A1</td>
</tr>
<tr>
<td>North Middleton</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dalhouse Burn at confluence with South</td>
<td>B</td>
<td>B</td>
<td></td>
</tr>
<tr>
<td>Esk</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Park Burn downstream Gilmerton Bing</td>
<td>C</td>
<td>C</td>
<td></td>
</tr>
<tr>
<td>Cairnie Burn at confluence with Esk</td>
<td>B</td>
<td>B</td>
<td></td>
</tr>
<tr>
<td>Gore Water downstream of Gorebridge STW</td>
<td>B</td>
<td>B</td>
<td>A2</td>
</tr>
<tr>
<td>River North Esk at Dalkeith Palace</td>
<td>C</td>
<td>A2</td>
<td>C</td>
</tr>
<tr>
<td>(Gauging Station)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>South Esk at Dalkeith</td>
<td>C</td>
<td>C</td>
<td>A2</td>
</tr>
</tbody>
</table>

According to the Scottish Borders Council Byelaws for the prevention of pollution and for the regulation of use of water gathering zones, there are potentially four source protection zones within the area of interest. Three of these are surface water protection zones (shown in Table 9.3) and one is a groundwater protection (as discussed in Section 9.4.2).

### Table 9.3 Surface Water Protection Zones

<table>
<thead>
<tr>
<th>Grid Reference</th>
<th>Site</th>
</tr>
</thead>
<tbody>
<tr>
<td>NT 405 420</td>
<td>Catchment areas of Caddon Water intake and Glentanner Burn Intake near Clovenfords.</td>
</tr>
<tr>
<td>NT 420 480</td>
<td>Catchment area of Pirntaton Burn Intake and protection zone of Fountainhall Spring, Fountainhall.</td>
</tr>
<tr>
<td>NT 475 440</td>
<td>Catchment area of Muirhouse Burn Intake and protection zones of Stow Springs, Stow.</td>
</tr>
</tbody>
</table>

#### 9.4.2 Groundwater Protection

Groundwater plays a fundamental role in the environment. It not only provides over one-third of all drinking water but it also maintains the flow in many watercourses. Groundwater is a significant source of water which is put to a variety of uses, including water supply, irrigation and flow augmentation of major rivers.

The only groundwater protection zone within the study area is the Protection Zone of Heriot boreholes, the Wellhead protection zone 90m radius, the site is located at NT 389 525.

#### 9.4.3 Fisheries

The River Tweed is one of the major salmon rivers of Scotland and has an international reputation both as a famous salmon river and an excellent brown trout water. The River Tweed has had its own salmon legislation for a long time and the protection of the salmon and sea trout has been the responsibility of the
River Tweed Commissioners since their creation under an Act of 1830. The Salmon and Freshwater Fisheries (Protection) (Scotland) Act 1951 and the Freshwater and Salmon Fisheries (Scotland) Act 1976 now protect the watercourse and fisheries.

Whilst the Tweed is justly world renowned for its salmon, sea trout and brown trout fishing there are some 16 other recorded species of fish such as grayling, salt water fish such as flounder and the ubiquitous eel.

9.4.4 Flooding

SEPA holds mapping showing the Institute of Hydrology 1 in 100 flood envelope floodplain maps, which also includes the Gala Water. It is now common practice that any flood risk assessment for a railway will require use of a 1 in 200 year return period flood envelope. This is a response primarily to the changing climate, through global warming. Further flood studies will be undertaken by Scott Wilson regarding the location of the railway within the floodplain and potential flood risk.

9.4.5 Public and Private Abstractions

There is no formal regulation over surface water abstractions in Scotland at present, hence the SEPA Borders office does not hold formal records. SEPA can only licence abstractions in designated catchments where SEPA has applied for, and the Scottish Executive has issued a 'Control Order'. The information on abstractions that the SEPA Borders area team holds is limited to informal records of surface water used for crop irrigation.

There is no comprehensive groundwater level monitoring network and the groundwater quality monitoring that has been carried out is to fulfil very specific regulatory requirements such as around landfill sites and to fulfil the requirements of the Nitrates Directive and Groundwater Regulations 1998.

9.4.6 Wildlife

There are a number of designated sites, protected species, ancient woodland etc within the study area. These are discussed in Section 8. The River Tweed and Gala Water are both designated as SSSIs, the River Tweed under the 1991 Wildlife and Countryside Act and Gala Water under the 1949 Act.

The River Tweed has also been recommended as a Possible Special Area of Conservation (SAC) because it contains habitat types and / or species which are rare or threatened within a European context (River Tweed cSAC qualifying interest are Ranunculion fluitantis and Callitrich -Batrachion vegetation, otter, Atlantic salmon, sea, river and brook lamprey). The River Tweed is designated as a result of the floating beds of Water Crowfoot (Ranunculus species) on the lower river being of particular importance. A rich insect fauna is associated with riverine and adjacent habitats. Large migrations of salmon and sea-trout as well
as the resident brown trout population support a major sport fishery. The Tweed is an important habitat for otters and supports significant populations of birds typical of riverine habitats. Associated with the river are adjacent habitats of high nature conservation importance including rough grassland, wetland, riparian and floodplain woodland. Further nature conservation information is contained within Section 8.

9.5 Potential Impacts

9.5.1 Overview

There are a number of ways in which potential impacts could arise from the construction and operation of the development, as follows:

- pollution of surface water arising from run-off during construction;
- pollution of surface and/or groundwater arising from accidental spills during construction;
- changes to water flow or levels of surface and/or groundwater;
- construction in the floodplain of the Gala Water, River Tweed etc; and
- additional structures crossing the watercourses and altering the drainage regimes during construction.

9.5.2 Potential Construction Impacts

There are a number of construction activities which may result in impacts to the aquatic environment. These include activities associated with both infrastructure provision and subsequent construction of the railway line including the following:

- site preparation;
- establishment of site compound areas requiring both potable water supply and foul water drainage;
- the construction of impermeable areas will lead to increased surface water runoff;
- the provision of temporary drainage systems and dewatering; and
- construction plant causing compaction and affecting water flows.

The most important environmental issues arising from construction of the proposed scheme relate to the protection of the surface water groundwater.
quality. This is implicitly linked with issues relating to the management of surface water drainage during construction.

The operation of construction vehicles and general construction activities gives rise to the potential for runoff to be contaminated with hydrocarbons and silt. Site drainage could impact upon surface waters and groundwater, potentially affecting their chemical and biological quality.

The concentration of suspended solids in site run-off may increase as a result of construction. If run-off containing high suspended solids are allowed to enter the local watercourses, this may have potentially damaging effects such as the following:

- fish spawning behaviour may be impaired by elevated concentrations of suspended solids. Furthermore, the survival of fish eggs and fry may be reduced;
- high levels of suspended solids may affect fish migration behaviour. Adult fish may also be physiologically affected at very high concentrations;
- smothering may also reduce the survival of aquatic plants by reducing photosynthesis;
- the success of angling may be reduced due to increased turbidity; and
- the amenity value of waterways may be reduced through impaired visual appearance.

9.5.3 Operational Impacts

Dust, oil and grease are the principal pollutants released into the atmosphere and onto the land immediately adjacent to the scheme during the normal operation of the railway line.

The introduction of additional areas of hardstanding (ie station car parks) may locally increase the run-off coefficient and reduce infiltration, ultimately affecting groundwater recharge.

The potential for impacts to the aquatic environment from the operation of the railway is likely to be negligible.

9.6 Mitigation Measures

9.6.1 Mitigating Construction Impacts

All surface water discharges during construction will pass through sediment traps in order to reduce suspended solids prior to discharge. Similarly
decontaminating filters and oil separators will be incorporated into the site drainage systems in order to minimise the risk of contamination to surface waters (PPG1 – General Guide to the Prevention of Water Pollution).

All construction site works will be undertaken in accordance with the SEPA / Environment Agency Pollution Prevention Guidelines and in particular PPG6 'Working at Construction and Demolition Sites'. Construction vehicles will be maintained to reduce the risk of hydrocarbon contamination and will only be active when required. Other construction materials will be managed in such a way as to effectively minimise the risk posed to the aquatic environment.

Fuels, oils or chemicals will be sited on impervious bases and surrounded by impervious bund walls. The volume of the bunded compound will be at least equivalent to 110% of the capacity of the largest tank or 25% of the compound capacity of all tanks, whichever is greater. All filling points, vents, gauges and sight glasses will be located within the bund. The drainage system of the bund will be sealed with no discharge to any watercourse, land or underground strata. Associated pipework will be located above ground and protected from accidental damage. All filling points and tank overflow pipe outlets will be detailed to discharge downwards into the bund.

Adoption of Good Construction Practice and appropriate SEPA Pollution Prevention Guidelines will help to ensure that the risk of pollution during construction is minimised and that the quality of surface runoff during construction does not impact upon the local watercourses.

A number of locations have been identified within the Scott Wilson Implementation Report (1) where protection works are expected in order to remove / prevent scour and erosion. Where the Gala Water kisses the rail corridor and where the corridor crosses over the river, protection works would be implemented. At riverbanks, graded armour stone, possibly with additional geotechnical reinforcement mesh, would be introduced into the riverbank to strengthen it. At bridge abutments and piers the extent of the work is still to be identified by underwater inspection but it is anticipated a unique solution would be chosen to suit each bridge's particular needs. These works may include river mattresses, gabions, armour stone, sheet piling, additional concrete works including aprons and buttressing, concrete filled bagwork, grouting and river bed reshaping.

The works would be carried out within the scope of each bridge contract and covering repairs to the sub-structure and superstructure. Adverse river flow and water levels would prevent / postpone the works and it could be unsafe for divers to work. If significant, this would impact on completion of the above water level works. At UB87 and UB92 the riverbound works are major items and the Gala Water at this southerly point is on a curve and is deep and fast flowing.

Temporary sheet pile cofferdams and placing of concrete by tremie pipe may be necessary and the works may impact on downstream infrastructure. The environmental implications of adopting SEPA guidelines will have a significant influence on the solution and methodology adopted. Scour at existing piers and abutments may be significant. Raising the superstructure of UB95 over the Gala Water for the new Wheatlands Road bridge will involve significant river bound works to the existing sub-structure abutments, wing walls and piers.

9.6.2 Sustainable Urban Drainage

Sustainable urban drainage systems (SUDS) is a relatively new concept that focuses decisions about drainage design, construction and maintenance on the quality of the receiving environment and people. SUDS are physical structures built to receive surface water runoff. They typically include ponds, wetlands, swales and porous surfaces. They may also provide treatment for water prior to discharge using the natural processes of sedimentation, filtration, adsorption and biological degradation.

A sustainable drainage system will be provided which maximises the practical use of overland and subsoil flow. As a consequence, this will increase the attenuation, increase the replenishment of the soil moisture content, allow natural processes of biodegradation to improve the quality of the water and provide more varied conditions to assist in developing a more varied flora and fauna on the site, particularly around the perimeter. SEPA have recommended that drainage should be designed in accordance to SUDS, where possible.

The car park construction has been altered as recommended in the Sustainable Urban Drainage Systems design manual. The philosophy behind this is to allow precipitation, and contaminants, to infiltrate through the porous (block paving) car park surface and onto the subgrade thus avoiding the pollution of nearby watercourses. This is more expensive than the conventional ‘black top’ construction, although there are considerable environmental benefits.

The SUDs outfalls will generally tie into an existing pipe system and/or the proposed track drainage. The use of the filtration through the proposed porous car park surfaces obviates the need to use settlement ponds within the scheme design.

Consultation will be undertaken with SEPA in developing the detailed design of the scheme in respect of drainage measures.

9.7 Summary and Conclusions

A number of watercourses will be crossed as a result of the scheme and in particular the Gala Water and River Tweed which are both designated. Impacts to the rivers can be minimised during construction provided that appropriate measures are put in place to prevent the discharge of site effluent and drainage
into the river and contamination of groundwater. Consultation with SEPA prior to any construction will be mandatory to agree construction methodology to ensure minimal impact occurs to the river systems (see Table 9.4 for a summary of impacts, mitigation and significant residual effects).

The potential for impacts to the aquatic environment from the operation of the railway is likely to be negligible.
<table>
<thead>
<tr>
<th>Key Potential Impacts (without mitigation)</th>
<th>Mitigation</th>
<th>Residual Effects</th>
<th>Means by which mitigation will be delivered</th>
</tr>
</thead>
<tbody>
<tr>
<td>The introduction of additional areas of hardstanding (e.g. station car parks) may locally increase the run-off coefficient and reduce infiltration, ultimately affecting groundwater recharge.</td>
<td>Sustainable drainage systems will be provided which maximises the practical use of overland and subsoil flow. Consultation with SEPA will be undertaken in developing the drainage measures.</td>
<td>No significant effects are anticipated.</td>
<td>CoCP</td>
</tr>
<tr>
<td>Potential impacts to the aquatic environment from pollution during construction.</td>
<td>Adoption of good Construction Practice and appropriate SEPA pollution Prevention guidelines will help to ensure that the risk of pollution during construction is minimised and that the quality of surface runoff during construction does not impact upon the local watercourses.</td>
<td>No significant effects are anticipated.</td>
<td>CoCP</td>
</tr>
<tr>
<td>Concentration of suspended solids in site run-off may increase during construction.</td>
<td>All surface water discharges during construction will pass through sediment traps in order to reduce suspended solids prior to discharge.</td>
<td>No significant effects are anticipated.</td>
<td>CoCP</td>
</tr>
</tbody>
</table>
10 ARCHAEOLOGY AND CULTURAL HERITAGE

10.1 INTRODUCTION

Archaeology can be defined as the study of the material remains of the past. This includes both surface and buried structures, artefacts and deposits. The concept of cultural heritage includes archaeology, but extends to all elements of the historic environment, which has been described as

"historic buildings and townscapes, parks and gardens, designed landscapes, ancient monuments, archaeological sites and landscapes. It also includes the wider setting of these features and areas as well as places important for their historic associations"\(^{(1)}\).

This section identifies the results of a preliminary desk-based assessment of the potential impacts on archaeology and cultural heritage as a result of the proposed reopening of the Waverley railway line between Newcraighall and Tweedbank, using existing documentary and cartographic information. Where potential impacts have been identified, mitigation measures to ameliorate the impact have been recommended.

10.2 ASSESSMENT METHODOLOGY AND CRITERIA

10.2.1 Background

For the purpose of this assessment, initial identification of features of archaeological and historical importance has been carried out in a corridor approximately 500 m in width, centred on the proposed route. However, sites or monuments of particular significance within the wider locale are included in this assessment. Annex G provides information regarding all of the archaeology and cultural heritage features within the study area.

10.2.2 Archaeology

The initial assessment of archaeology has been undertaken in accordance with NPPG5\(^{(2)}\). This advocates a desk top study of existing information to assess the potential archaeological sensitivity of the proposed options and their environs. Impacts are considered on all aspects of the archaeological record, including standing monuments, in situ deposits and find spots. These resources may have a statutory designation, for example Scheduled Ancient Monuments (SAM), whereas others may be identified by Local Authorities as of local significance, which may not have a statutory designation.

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\(^{(1)}\)National Planning and Policy Guidance Note 18 “Planning and the Historic environment” 1994.

10.2.3 Cultural Heritage

The assessment of listed and historic buildings and Conservation Areas has taken account of the advice given in NPPG18. Impacts are considered on the overall character of the historic environment, including Conservation Areas, and also on individual historic buildings and structures and their settings. Historic buildings and structures include statutorily listed buildings, and other buildings or structures identified by the local authorities as of historic interest, which may not have a statutory designation. The historic environment also includes World Heritage Sites, designed landscapes, historic battlefields and the wider historic landscape.

10.2.4 Sources of Information

The following sources of information have been consulted:

- South East Edinburgh Local Plan;
- Midlothian Local Plan;
- Ettrick and Lauderdale Local Plan;
- the National Monuments Record for Scotland (NMRS);
- Historic Scotland lists for Listed Buildings;
- Historic Scotland lists for Scheduled Ancient Monuments; and
- The Inventory of Historic Gardens and Designed Landscapes in Scotland.

10.2.5 Assessment Criteria

Archaeology

A desk-based study has been carried out to examine the extent, character, date, integrity, state of preservation and relative quality of potential archaeological resources, with the aim of identifying and evaluating the potential impact of the proposed scheme on the known or potential archaeological resource.

The assessment of archaeology is based on the following criteria:

- the presence of known archaeological features (e.g. Scheduled Ancient Monuments) within a 500 m corridor (route corridor) along the proposed route for which mitigation would immediately be recommended; and

- the proximity of archaeological features or historic buildings which might suggest the presence of further features of archaeological interest.

Once the likelihood of an archaeological presence has been established, the long term and permanent effects of the scheme will be determined based on the extent to which potential archaeological remains and their settings are affected:

- as a result of construction works;
- by secondary means, for example, dust and construction vibration; and
- during the operational phase.
The magnitude of impact will be determined by professional judgement taking into account form, survival, condition, complexity, context and period.

Cultural Heritage

Assessment of the historic environment is based on the following criteria:

- the presence of known, nationally important (listed) buildings within a 500 m corridor (route corridor) along the proposed route;
- the designation of these buildings (i.e., Category A, B or C(S) (1));
- the presence of known locally important (non-listed) buildings within a 500 m corridor along the proposed route; and
- the presence of designated Conservation Areas within a 500 m corridor along the proposed route.

Once the presence of historic (listed) buildings or other cultural heritage resources has been established, the effects of the scheme are determined using the following criteria:

- the extent to which those buildings may be affected during the construction phase of the proposed development;
- the extent to which those buildings may be affected by the subsequent operational phase of the proposed development; and
- the significance of secondary effects such as noise, vibration and visual effects during both construction and operational phases.

The magnitude of impact is determined by professional judgement taking into account form, survival, condition, complexity, context and period.

10.3 Baseline Environment

10.3.1 Shawfair to Gorebridge

Archaeology

There are four SAMs within 250m of the proposed route between Shawfair Station and Gorebridge Station. There is the Medieval Church, enclosures and field system at Newton. The complex of Elginhaugh Roman camp, which contains two SAMs, is within 250m of the track. Newbyres Castle SAM is in close proximity to the proposed route before Gorebridge station.

(1) Historic Scotland Website www.historic-scotland.gov.uk
This part of Midlothian was transformed from a rural economy to a predominantly industrial one from the late eighteenth century onwards. Underpinning the entire process was the presence of large quantities of minerals - coal, ironstone, limestone, oil-shale and fireclay in this region. The success of local industries depended heavily on the development of railway transport. A railway building boom was fuelled by the ever-extending search for coal and ironstone.

Early editions of Ordnance Survey maps, from the 1850s through to the First World War, illustrate in striking fashion the industrial expansion of that period. Successive editions show an increasingly complex mesh of railways spreading out across the central belt, linking mines, factories and settlements.

Although coal production continued to increase until 1913, it became concentrated in fewer, deeper and more efficient mines, leaving the rest to decay, as exhausted mines and the railways that serviced them closed down.

Limekilns are still a common sight today, such as the limekiln at Gorebridge, but there is little to see of the tile and fireclay industries. The iron industry too has all but vanished. (1)

Newtonrange became Scotland's largest mining village in the 1890s with the sinking of the Lady Victoria Colliery with a shaft over 1600 feet deep. This closed in 1981. It is situated in close vicinity to the proposed Newtongrange Station, and is one of the finest surviving Victorian collieries in Britain. It is now a Mining Museum. Nearby, to the south west, lie the ruins of the 12th Century Cockpen Old Parish Church and the 15th century Dalhousie Castle.

Historic Parks and Designed Landscapes

There are four designed landscapes, which are registered on Historic Scotland's Inventory of Historic Parks and Designed Landscapes, within 250m of the proposed route between Shawfair and Gorebridge. Two are in the vicinity of Eskbank Station: Dalkeith House and Park is to the north east of the proposed route and Melville Castle is to the west. Dalhousie Castle is west of the proposed route between Eskbank and Newtongrange Stations, and Arniston House and Park is to the south west of the proposed route between Newtongrange and Gorebridge stations.

Listed Buildings and Conservation Areas

Listed buildings in this section of the route in general are concentrated in built up areas, particularly around the proposed Eskbank and Newtongrange stations. Many of these are post-Medieval and residential, and are associated with the industrial heritage of the area, such as the miners' cottages in Newtongrange.

(1) British Archaeology Issue No. 39, November 1998, Steve Boyle "All was Change and then Change Again"
The Category A listed Arniston Policies North Lodge and Lion and Elephant gate is in the route corridor of the proposed railway at the periphery of Arniston House and Park.

However, some of the most significant cultural heritage resources in the proposed route corridor are the listed and non-listed structures which are associated with the former railway. These include Category A listed structures such as the Glenesk viaduct, Category B listed structures such as the Newbattle viaduct and the former Eskbank & Dalkeith Station, footbridge and platforms, and non-designated structures such as historic railway bridges, recorded in the NMR, which, although not statutorily designated as listed buildings, require consideration as part of the cultural heritage.

The listed structures present in the route corridor, associated with the former railway, are shown in Table 10.1.

**Table 10.1** Listed Structures Associated with the Railway

<table>
<thead>
<tr>
<th>Description</th>
<th>Grade</th>
<th>Grid Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glenesk Viaduct, Dalkeith</td>
<td>A</td>
<td>NT 3237 6713</td>
</tr>
<tr>
<td>&quot;Station Road, former Eskbank &amp; Dalkeith Station, footbridge and platforms&quot;</td>
<td>B</td>
<td>NT 3239 6667</td>
</tr>
<tr>
<td>Gorebridge Station (Porters Public House)</td>
<td>C</td>
<td>NT 4357 6123</td>
</tr>
<tr>
<td>&quot;Lothian Bridge, Newbattle viaduct&quot;</td>
<td>B</td>
<td>NT 3270 6484</td>
</tr>
</tbody>
</table>

Non-statutorily protected structures, listed in the NMR, which are associated with the former railway, and present in the route corridor are given in Table 10.2.

**Table 10.2** Non-Statutorily Protected Structures

<table>
<thead>
<tr>
<th>Description</th>
<th>NMR Unique ID</th>
<th>Grid Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Railway bridge, between City Bypass and Eskbank</td>
<td>NT36NW 171</td>
<td>NT 3237 6714</td>
</tr>
<tr>
<td>Road bridge, between City Bypass and Eskbank</td>
<td>NT36NW 210</td>
<td>NT 3215 6766</td>
</tr>
<tr>
<td>Road bridge, between City Bypass and Eskbank</td>
<td>NT36NW 214</td>
<td>NT 3236 6681</td>
</tr>
<tr>
<td>Road bridge, between City Bypass and Eskbank</td>
<td>NT36NW 215</td>
<td>NT 3236 6671</td>
</tr>
<tr>
<td>Railway bridge, between City Bypass and Eskbank</td>
<td>NT36NW 216</td>
<td>NT 3236 6669</td>
</tr>
<tr>
<td>Road bridge, between City Bypass and Eskbank</td>
<td>NT36NW 217</td>
<td>NT 3236 6651</td>
</tr>
<tr>
<td>Railway bridge, Hardengreen</td>
<td>NT36NW 219</td>
<td>NT 3243 6506</td>
</tr>
<tr>
<td>Railway, between City Bypass and Eskbank</td>
<td>NT36NW 220</td>
<td>NT 3229 6819</td>
</tr>
<tr>
<td>Railway, between City Bypass and Eskbank</td>
<td>NT36NW 220</td>
<td>NT 3277 6694</td>
</tr>
<tr>
<td>Bowland Bridge</td>
<td>NT445W 4</td>
<td>NT4549 4495</td>
</tr>
<tr>
<td>Railway viaduct, Newbattle</td>
<td>NT365W 41</td>
<td>NT 3270 6484</td>
</tr>
<tr>
<td>Road bridge, between Newtongrange and Gorebridge</td>
<td>NT365W 69</td>
<td>NT 3318 6409</td>
</tr>
<tr>
<td>Road bridge, between Newtongrange and Gorebridge</td>
<td>NT365W 70</td>
<td>NT 3321 6327</td>
</tr>
<tr>
<td>Road bridge, between Newtongrange and Gorebridge</td>
<td>NT365W 71</td>
<td>NT 3322 6260</td>
</tr>
<tr>
<td>Road bridge, between Newtongrange and Gorebridge</td>
<td>NT365W 72</td>
<td>NT 3325 6231</td>
</tr>
<tr>
<td>Road bridge, between Newtongrange and Gorebridge</td>
<td>NT365W 73</td>
<td>NT 3329 6213</td>
</tr>
<tr>
<td>Railway bridge, between Newtongrange and Gorebridge</td>
<td>NT365W 74</td>
<td>NT 3371 6149</td>
</tr>
<tr>
<td>Railway bridge, between Newtongrange and Gorebridge</td>
<td>NT365W 75</td>
<td>NT 3370 6211</td>
</tr>
<tr>
<td>Road bridge, between Newtongrange and Gorebridge</td>
<td>NT365W 76</td>
<td>NT 3322 6293</td>
</tr>
<tr>
<td>Gorebridge Station</td>
<td>NT365W 49</td>
<td>NT 3457 6122</td>
</tr>
</tbody>
</table>
There are also structures associated with the former railway, which are not listed in the NMRS. For example, there is the former station at Tynehead, which has an original stone arched bridge, and tunnels at Bowshank and Torwoodlee.

There are several Conservation Areas in the vicinity of this section of the proposed route corridor. In particular, Eskbank and Ironmills Conservation Area is immediately adjacent to the track at its south western periphery; Newbattle Conservation Area is immediately adjacent to the track at its south western periphery; Newtongrange Conservation Area is immediately adjacent to the track at its south western periphery; Temple and Arniston Conservation Area is immediately adjacent to the track at its extreme northern tip, and the track would also pass through to the east; and Borthwick and Crichton Conservation Area is immediately adjacent to the proposed route at its southern tip.

10.3.2 Gorebridge to Galashiels

Description

The southern part of this route, from Gorebridge to Galashiels, is an upland landscape.

Archaeology

There are seven Scheduled Ancient Monuments within 250m of the proposed route between Gorebridge and Galashiels.

The Romans arrived in the Tweed valley in 79AD and built several forts in the Borders as part of a major military campaign, such as the fort at Hodge Cairn and Shank Wood, which is a SAM. In the 5th century Celtic immigrants from Ireland, called Scots, settled north of the Clyde. In about the 10th century the land came to be known as Scotland.

After the Normans conquered England in 1066, many Anglo-Normans from England settled in the Lowlands of Scotland. Here the Scots gradually adopted English ways. Towns grew, trade increased, and Scotland prospered. This was a period of medieval renaissance.

Gorebridge developed in the 17th and 18th centuries in association with coal mining, limeworks and the manufacture of gunpowder, which was produced at Stobs Mill until 1875. In the 19th century Gorebridge was a popular tourist resort. The last local mine was closed in the 1960s.

There are the remains of prehistoric settlement in this section of the proposed route; in the form of enclosures, standing stones and crop marks, such as the

<table>
<thead>
<tr>
<th>Description</th>
<th>NMR Unique ID</th>
<th>Grid Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heriot Station</td>
<td>NT44SW 1</td>
<td>NT 4065 5470</td>
</tr>
<tr>
<td>Fountainhall Station</td>
<td>NT44NW 33</td>
<td>NT 4272 4978</td>
</tr>
<tr>
<td>Stow Station</td>
<td>NT44SE 28</td>
<td>NT 4562 4463</td>
</tr>
</tbody>
</table>
Cortleferry Scooped Settlement, which is a SAM. There is a cluster of prehistoric sites at Borthwick, near Gorebridge Station, including a pit alignment at Catcune, a possible enclosure at Wright's Houses and a settlement at The Chester's. South of Bowland there is a prehistoric enclosure, which is a SAM, west of Whitelee Farm, located in between the railway and the A7. There are numerous other prehistoric sites and findspots recorded in the NMR along the proposed route corridor.

There are two SAMs in close proximity to the proposed route at Stow: the parish church of St Mary of Wedale and The Old Bridge. St Mary's church originated in the 12th century. The church possessed a relic of St Mary and was one of the few places in Scotland that gave rights of sanctuary to fugitives from justice.

The ruins of the late medieval “palace” or manor house of the Bishops of St Andrews stand behind the Old Parish Church in Stow. The remains date to the 16th century and were probably used as a summer residence for the Bishop or as a dwelling when he attended to church business in the Borders. At Stow there are numerous other historic buildings, including the Old Bridge, a SAM, which is a packhorse bridge which was constructed with a low parapet to allow burdened horses to cross in safety. Other buildings recorded in the NMR include the old railway station, Stow Parish School, and two post-Medieval mills.

Listed Buildings and Conservation Areas

Gorebridge has numerous listed buildings around the proposed route, most of which are nineteenth century and reflect the town’s development during the industrial revolution. Most of these buildings are residential, and are Category B or C(S) listed.

Between Gorebridge and Stow there are various listed buildings within 250m of the railway, most of which are Category B listed.

There are a small cluster of listed buildings at Stow. These include Stow Kirk, Old Stow Church, the Manorhead Hotel and the Old Stow Bridge over Gala Water. All these are Category B listed.

In between Stow and Galashiels there are several listed bridges over Gala Water, including Luggate Water Bridge, Ferniehurst Bridge, Bowland Bridge, all of which are Category B listed.

The proposed route passes in close proximity to Stow Conservation Area at Stow, but the Conservation Area is not immediately adjacent to the track.

10.3.3 Galashiels to Tweedbank

Description

This includes the route from the former station at Galashiels to Tweedbank.
Archeology

There are no Scheduled Ancient Monuments in this section of the proposed route. There are however a number of entries in the National Monuments Record within the proposed route corridor. These include prehistoric find spots, dating from the Mesolithic and Neolithic, which may indicate settlement in this area during these periods. In addition, there is evidence for Roman activity in the region, in the form of the possible route of a Roman road from Newstead to Peebles. Historical conflict is represented by the battle site of "Englishman’s Sike, The Raid Stane". In addition, the NMRS records several post Medieval buildings, both industrial and residential, which, although not listed, still require consideration as part of the more recent cultural environment.

In medieval times there was a hunting tower near the location of modern Galashiels; at the heart of the royal forest of Gala and Leader. Huts or "shiels" by the river are said to have been used by pilgrims on their way to Melrose Abbey. The town of Galashiels developed in association with the industrial revolution and the development of textile mills. By 1882 there were 21 mills in the town, but by the early twentieth century the textile industry was in decline.

Listed Buildings and Conservation Areas

There are a concentration of listed buildings in central Galashiels. These are all Grade B or C(S) listed, and are largely post-Medieval in date. They include residential, industrial, ecclesiastical and commercial buildings. However, these listed buildings will not be affected by the proposed railway line. There are also several non-listed, locally important historic buildings in the immediate vicinity of the proposed route, such as the Comely Bank and Wheatlands Woollen Mills and the Buckholm Corn Mill. There are also the Plumtreehall B dyeworks, and the Lowbuckholms Tweed Mill, amongst others. These buildings reflect the importance of Galashiels as an industrial centre in the nineteenth century.

10.4 Assessment of Significance

10.4.1 Shawfair to Gorebridge

Archaeology

In general, archaeological resources will only prove a constraint to development in areas where the proposed groundworks extend beyond the engineering base of the former railway. Although there are four Scheduled Ancient Monuments within 250 m of the proposed route in this section, none of them are likely to be affected by landtake, and their setting is unlikely to be adversely affected. In situ archaeological deposits may be encountered during groundworks for the new Shawfair station, and at the Hardengreen cutting and new viaduct over the A7 roundabout.

However, archaeological resources are unlikely to prove a significant constraint to development in this section of the proposed route.
Designed Landscapes

In general, the proposed route is not immediately adjacent to the four registered Designed landscapes. Dalkeith Park is briefly adjacent to the track at its extreme south western perimeter. Melrose Castle is buffered by the B704. Dalhousie Castle is briefly adjacent to the track at its extreme northern perimeter. The proposed route runs through the grounds of Arniston House for a short distance.

Works on the Edinburgh City By-Pass underbridge will be in the vicinity of Dalkeith Park and Arniston House will be immediately adjacent to proposed works on the A7 at Hardengreen. However, the Designed landscapes are unlikely to prove a significant constraint to development in this section of the proposed route.

Listed and Historic Buildings and Conservation Areas

The majority of listed buildings within the proposed route corridor are situated within the Shawfair to Gorebridge section. However, most of these buildings, although within 250 m of the proposed railway are unlikely to prove a constraint to development, as they will not suffer adverse impacts. The exception to this is the rich industrial heritage of buildings and other infrastructure resources such as viaducts and bridges which are associated with the old railway line. Although some of these are listed, and therefore have statutory protection, many others are recorded on the NMRS and have no statutory designation. Still others are not yet recorded on the NMRS. Although these resources will not necessarily prove a constraint to development, as one of the principles of NPPG18 is sustainable development through sensitive re-use of the historic environment; they must have paramount importance in the design and construction of the new railway, and in this sense their significance must not be underestimated.

Although the proposed route is immediately adjacent to Eskbank and Ironmills Conservation Area, Newbattle Conservation Area, Newtongrange Conservation Area, and Borthwick and Crichton Conservation Area it only touches the extreme peripheries. The proposed route does run through the eastern part of the Temple and Arniston Conservation Area, but only briefly.

Therefore, listed and historic buildings and Conservation Areas are unlikely to prove a significant constraint to development in this section of the proposed route.

10.4.2 Gorebridge to Galashiels

Archaeology

In general, archaeological resources will only prove a constraint to development in areas where the proposed groundworks extend beyond the engineering base of the former railway. In particular there will be landtake in the vicinity of Falahill where the A7 is to be re-aligned, and in situ archaeological deposits may be encountered during groundworks in this area. There are seven Scheduled
Ancient Monuments within 250 m of the track in this section of the proposed route. However, none of these will be affected by landtake, and, they are sufficiently far away from the proposed route that their setting is unlikely to be adversely affected.

Archaeological resources are unlikely to prove a significant constraint to development in this section of the proposed route.

**Listed and Historic Buildings and Conservation Areas**

Although there are clusters of listed buildings in Gorebridge and Stow, and occasional listed buildings located along the upland section of the proposed route, these are unlikely to prove a constraint to development. As elaborated above, the significance of any surviving infrastructure associated with the old railway (particularly the bridges over Gala Water) must not be underestimated as the Waverley Line itself is a historic monument.

The proposed route passes in close proximity to the Stow Conservation Area, but it is not immediately adjacent.

Therefore, listed and historic buildings and Conservation Areas are unlikely to prove a significant constraint to development in this section of the proposed route.

**10.4.3 Galashiels to Tweedbank**

**Archaeology**

There is a dense concentration of entries in the NMRS in the vicinity of Galashiels. However, many of these record post medieval, non-statutorily listed buildings in the town centre, which reflect the nineteenth century industrial heritage of Galashiels. There is a Roman road in the vicinity of the track near Tweedbank Station. However, it is considered unlikely that archaeological resources will prove a significant constraint to development in this section of the proposed route.

**Listed and Historic Buildings and Conservation Areas**

Although there are significant numbers of listed buildings in Galashiels, these are not in sufficiently close proximity to prove a constraint to development. There are several non-listed historic buildings recorded on the NMRS in close proximity to the proposed railway line, but these also should not prove a constraint to development. However, as elaborated above, the significance of any surviving infrastructure associated with the old railway in this section of the route must not be underestimated as the Waverley Line itself is a historic monument.

However, listed and historic buildings and Conservation Areas are unlikely to prove a significant constraint to development in this section of the proposed route.
10.5 CONSTRUCTION IMPACTS

10.5.1 Shawfair to Gorebridge

Archaeology

With certain key constraints, 48 km of the proposed project to re-open the Waverley railway will involve only minor engineering works and considerable devegetation of the existing railway corridor. Therefore, for most of this section of the route, the potential for adverse impacts on archaeological deposits is predicted to be negligible.

However, if during construction of the new Waverley railway, groundworks are required which extend beyond the engineering base of the old railway line, either on a small scale, such as new lineside drainage (principally through cuttings), or on a larger scale, such as new station buildings and their associated car parks, archaeological deposits may be disturbed by these engineering works.

In addition to the construction impact of the railway itself, impacts caused by alterations to existing services affected by the groundworks must also be taken into consideration. These may occasion considerable additional disruption to surviving archaeological deposits.

In particular, there are prehistoric enclosures recorded in the NMRS at Newton and Millerhill, which are in the area where the new Shawfair station is to be constructed. Therefore, there is a possibility that prehistoric archaeological deposits may be encountered during groundworks at this location.

Another major engineering project in this section of the proposed route is the Hardengreen cutting and new viaduct over A7 roundabout. Due to the location of these proposed works in relation to the SAM at Hardengreen, it is considered likely that there is potential for adverse impacts to archaeological deposits during the construction process at this location.

The proposed railway line also runs in close proximity to the complex of Roman remains at Elginhough, and therefore, it is considered possible that there is potential for adverse impacts to in situ Roman archaeological deposits in this section of the proposed route.

Any impact on an archaeological deposit which occurs during the construction process will be a permanent impact. This can be because the archaeological deposit will be directly truncated during groundworks. Alternatively, the burial environment will be affected (for example, soil moisture content will change) which will directly and adversely affect the preservation of that archaeological deposit.
Historic Parks and Designed Landscapes

The railway line passes in the vicinity of four Designed Landscapes, Dalkeith Park, Melrose Castle, Dalhousie Castle and Arniston House. Where the track alone is being re-constructed, no permanent adverse impacts are envisioned on these landscapes. However, the proposed Edinburgh City By-Pass underbridge is in the immediate vicinity of Dalkeith House, and the Gore Park viaduct over the A7 and approach works is in the vicinity of the Designed Landscape at Arniston. These schemes may create a permanent very slight adverse visual impact on the setting of the parks.

Listed and Historic Buildings and Conservation Areas

It is proposed (1) that seven bridges associated with the former railway will be removed as they are no longer required because they are unsafe and / or a clearance constraint. The report does not specify which bridges will be affected, but clearly this is a major adverse impact on historical structures, which may be recorded in the NMRS.

In addition, structural repairs and possible strengthening work will be required on the Newbattle Viaduct and the Glenesk Viaduct(2). The Glenesk Viaduct is Category A listed, whilst Newbattle Viaduct is Category B listed. Newbattle Viaduct is structurally in poor condition and significant repairs will be required. Glenesk Viaduct is a high arch bridge, which has recently been refurbished and appears to be in reasonable condition.

Construction of the new Shawfair station will take place in the vicinity of the Monktonhall Colliery, which is recorded in the NMRS. This and other listed buildings and historic in the immediate vicinity of the route may be vulnerable to permanent impacts during the construction and operational phase of the proposed scheme due to vibration and settlement, and their setting will also be permanently affected.

Proposed works on the Edinburgh City By-Pass underbridge are in the vicinity of the Category B listed Sheriffhall Farmhouse and Dovecot. The setting of these buildings may suffer slight adverse visual impact during the construction phase of the project.

The Category A listed King's Gate and Lodge to Dalkeith House are also in close proximity to the proposed route. Their setting and ambience may also suffer slight adverse visual impact during the construction phase of the project.

The proposed Gore Park viaduct over the A7 and approach works is in the vicinity of a number of buildings recorded in the NMRS. The setting of these buildings may suffer slight adverse visual impact during the construction phase of this project. There may also be a short term adverse visual impact on the setting of the listed and non-statutorily locally listed buildings in the vicinity of

(1) Stage 2 Engineering Summary Report (March 2003)
the proposed route during the construction phase of the proposed scheme. The setting of the Eskbank and Ironmills, Newbattle, Newtongrange, Borthwick and Crichton, and the Temple and Arniston Conservation Areas will also suffer short term adverse visual impact during construction works.

10.5.2 Gorebridge to Galashiels

Archaeology

With certain key constraints, most of the proposed project to re-open the Waverley railway will involve only minor engineering works and considerable devegetation of the existing railway corridor. Therefore, for most of this section of the route, the potential for adverse impacts on in situ archaeological deposits is predicted to be negligible.

It is proposed that the A7 will be re-aligned off-line to the west at Falahill, with a new skewed overbridge over the railway, associated approach embankments and new access road connections. Due to the location of these proposed works in relation to the cultivation terraces at Cakemuir Hill, a possible enclosure at Cakemuir Burn, and a settlement at Falahill, it is considered likely that there is potential for adverse impacts to archaeological deposits during the construction process in this area.

Listed and Historic Buildings and Conservation Areas

There will be a short term adverse visual impact on the setting of the listed and non-statutorily locally listed buildings, and on the Stow Conservation Area in the vicinity of the railway during the construction phase of the proposed scheme.

The Old Station Building in Gorebridge (now The Porters Public House) is Category C(S) listed, and is immediately adjacent to the proposed new station platforms. Therefore, it may be vulnerable to permanent impacts during the construction and operational phase of the proposed scheme due to vibration and settlement, and its setting will also be permanently affected.

The former rail corridor and the meandering Gala Water run together for some 16 miles with the line crossing the river 19 times. There are several railway bridges which cross Gala Water, which are recorded in the NMRS. Some of these bridges are statutorily listed, whilst others are not. Among the works proposed to upgrade these bridges are: re-decking, cross and main girder replacement or repair, bearing replacements, ballast walls and repairs to abutments.

In addition, there are two historic tunnels in this section of the proposed route which are associated with the old railway. The 60m long Torwoodlee Tunnel is through rock and has a brick lining in poor condition suffering from water ingress. The 200 m long Bowshank Tunnel again has a lining in poor condition with major distortions to its shape and a long history of faults and repairs. Both tunnels require further investigation and repair.
10.5.3 Galashiels to Tweedbank

Archaeology

With certain key constraints, most of the proposed project to re-open the Waverley railway will involve only minor engineering works and considerable devegetation of the existing railway corridor. Therefore, for most of this section of the route, the potential for adverse impacts on archaeological deposits is predicted to be negligible.

However, the following major construction projects are planned in this section of the proposed route at Galashiels:

- Wheatland’s Road: new embankments, walls and various bridges;
- Currie Road./ Glenfield Road: new walled embankments, new underbridge; and
- Winston Road: open-out cutting and new overbridge.

Therefore, it is possible that during construction groundworks will be required which extend beyond the engineering base of existing modern development, and archaeological deposits may be disturbed during these engineering works.

In addition to the construction impact of the railway itself, impacts caused by alterations to existing services affected by the groundworks must also be taken into consideration. These may occasion considerable additional disruption to surviving archaeological deposits.

Listed and Historic Buildings and Conservation Areas

There will be a short term adverse visual impact on the setting of non-statutorily listed historic buildings, such as the Comely Bank and Wheatlands Woollen Mills and the Buckholm Corn Mill, recorded in the NMRS during the construction phase of the proposed scheme.

10.6 Operational Impacts

10.6.1 Shawfair to Gorebridge

Historic Parks and Designed Landscapes

The railway line passes in the vicinity of four Designed Landscapes, Dalkeith Park, Melrose Castle, Dalhousie Castle and Arniston House in this section of the route. The railway may create a permanent very slight adverse visual impact on the setting of the parks.

(1) Stage 2 Engineering Report Summary (March 2003)
Listed and Historic Buildings and Conservation Areas

Proposed works on the Edinburgh City By-Pass underbridge are in the vicinity of the Category B listed Sheriffhall Farmhouse and Dovecot. The setting of these buildings may suffer permanent slight adverse visual impact.

The Category A listed King's Gate and Lodge to Dalkeith House are also in close proximity to the proposed route. Their setting and ambience may also suffer permanent slight adverse visual impact.

The proposed Gore Park viaduct over the A7 and approach works is in the vicinity of a number of buildings recorded in the NMRS. The setting of these buildings may suffer permanent slight adverse visual impact.

The setting of the peripheries of the Eskbank and Ironmills, Newbattle, Newtowngrange, Temple and Arniston and Borthwick and Crichton Conservation Areas will suffer slight adverse visual impacts during the operational phase of the proposed project.

10.6.2 Gorebridge to Galashiels

Listed and Historic Buildings and Conservation Areas

The setting of the periphery of the Stow Conservation Area will suffer slight adverse visual impacts during the operational phase of the Waverley Railway.

10.6.3 Galashiels to Tweedbank

Listed and Historic Buildings and Conservation Areas

In the area of Galashiels town centre the Church of our Lady and St Andrew on Market Street, which is Category B listed, is close to the proposed new station site, but unlikely to be adversely affected.

There are numerous buildings, many of which reflect the industrial heritage of Galashiels, recorded in the NMRS, in the close vicinity of the proposed route.

The proposed route is not in the vicinity of the proposed Galashiels Conservation Area.

10.7 Mitigation Measures

10.7.1 Archaeology

It is likely that prior to development, a comprehensive Archaeological Evaluation process, following a specification agreed with Midlothian Council and Scottish Borders Council, will be undertaken in the proposed route corridor, to assess the full extent of those resources which will be disturbed during the construction
process. As Midlothian Council does not have a curatorial archaeologist, consultation with Historic Scotland is also strongly recommended.

It is expected that this Archaeological Evaluation process will commence with a Desk Based Assessment of all records for archaeological presence in the vicinity of the proposed development. On completion of this assessment further specification for fieldwork will be agreed with Midlothian Council and Scottish Borders Council.

If the results of the desk based assessment indicate that an excavation is not required, it is anticipated that an archaeological watching brief will be carried out during groundworks in the construction phase of the project.

Full excavation rather than a watching brief would be required where known archaeological deposits are present and a watching brief would be used to monitor areas of unknown potential, especially in the vicinity of the A 7 road re-alignment.

It is envisaged that during the process of an archaeological watching brief the following procedures will be adhered to:

1. a specification for the field work will be agreed by Midlothian Council and Scottish Borders Council;

2. an archaeologist recognised by Midlothian Council and Scottish Borders Council will be present on the development site during or prior to construction to establish the presence or absence of archaeological features;

3. if an archaeological presence is established, a further specification for field work will be agreed with Midlothian Council and Scottish Borders Council; and

4. if there is an absence of archaeological features a final report detailing the results will be lodged with Midlothian Council and Scottish Borders Council.

Such mitigation measures will be undertaken by a suitably qualified organisation, recognised by Midlothian Council and Scottish Borders Council, and, if possible, registered with the Institute of Field Archaeologists.

10.7.2 Listed and Historic Buildings and Conservation Areas

Due to the nature of industrial archaeology, many of the extant features associated with the infrastructure of the railway line, although not statutorily listed, or even recorded on the NMRS, may none the less be considered to be important cultural heritage resources. The Waverley line itself is a historic monument and impacts on any surviving original features must also be mitigated for. It is also important that appropriate mitigation is in place to deal with any features which arise during any operations subsurface disturbance. Therefore, a walk-over survey by a suitably qualified industrial archaeologist,
who will identify all features (including those not identified in the NMRS) which may be impacted upon by the proposed scheme will be a fundamental requirement. The walk over survey will be supplemented by standing buildings recording of all features associated with the former railway which are still present in the route corridor. This walk over survey and standing buildings recording will inform a more detailed mitigation strategy for the industrial archaeology on this section of the route.

The potential visual and structural impact on all structures, both listed and unlisted, which are associated with the former railway (such as the Torwoodlee and Bowshank tunnels), or which are in the immediate vicinity of the proposed route, is an issue which should be considered during the detailed design stage of the proposed scheme.

Section 34 of the Bill will provide the powers for any works required to the listed buildings associated with the former railway for which construction activity is planned (specific operations are detailed in Schedule 9 of the Bill) (Table 10.3 shows all works to listed structures and within conservation areas). This will include the Glenesk Viaduct, the Newbattle Viaduct and the Eskbank and Dalkeith Station and associated footbridge and platforms. Early consultation with Historic Scotland on this matter is strongly recommended.

<table>
<thead>
<tr>
<th>Table 10.3</th>
<th>Works to Listed Buildings and Conservation Areas</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Structures to be Demolished or Altered</strong></td>
<td><strong>Limit of Authorised Demolition or Alteration</strong></td>
</tr>
<tr>
<td>Glenesk Viaduct, Dalkeith</td>
<td>Structural repairs to the spandrels and wingwalls. Provision of cantilevered walkway.</td>
</tr>
<tr>
<td>Former Eskbank and Dalkeith Station Platforms</td>
<td>Re-pointing and masonry repairs.</td>
</tr>
<tr>
<td>Former Eskbank and Dalkeith Station, Footbridge</td>
<td>Demolition of footbridge.</td>
</tr>
<tr>
<td>Edinburgh Road Bridge (Over bridge)</td>
<td>Repairs and re-pointing to masonry and brickwork. Waterproofing works to bridge arch.</td>
</tr>
<tr>
<td>Eskbank Station Road Bridge</td>
<td>Re-pointing of bridge arch ring.</td>
</tr>
<tr>
<td>Bonnyrigg Road (Overbridge)</td>
<td>Re-pointing. Replacement of damaged stonework.</td>
</tr>
<tr>
<td>Dalhousie Mains Bridge (underbridge)</td>
<td>Re-pointing and repairs to abutments and wingwalls. Reconstruction of spandrel wall on east side of bridge. Replacement of handrails. Cleaning and repainting of cantilever supports.</td>
</tr>
<tr>
<td>Newbattle Viaduct, Lothian Bridge</td>
<td>Re-pointing, repairs and replacement bricks.</td>
</tr>
<tr>
<td>Murderdean Road Bridge (Overbridge)</td>
<td>Repairs and re-pointing to masonry. Removal of infill material.</td>
</tr>
<tr>
<td>Redhaugh Farm Bridge (Overbridge)</td>
<td>Repairs and re-pointing to abutments and wingwalls. Shot blast cleaning and painting bridge girders. Construction of parapets to replace existing handrails.</td>
</tr>
<tr>
<td>Spinning Mill Bridge (Overbridge)</td>
<td>Repairs and re-pointing. Waterproofing works to bridge arch.</td>
</tr>
<tr>
<td>Existing Footbridge (Footbridge)</td>
<td>Removal of bridge superstructure.</td>
</tr>
<tr>
<td>Fushiebridge (Overbridge)</td>
<td>Repairs and re-pointing. Waterproofing works to bridge arch.</td>
</tr>
<tr>
<td>Catcune Farm Bridge (Overbridge)</td>
<td>Demolition and replacement of bridge.</td>
</tr>
<tr>
<td>Structures to be Demolished or Altered</td>
<td>Limit of Authorised Demolition or Alteration</td>
</tr>
<tr>
<td>----------------------------------------</td>
<td>-----------------------------------------------</td>
</tr>
<tr>
<td>Catcune Farm Accommodation Bridge</td>
<td>Re-pointing and repairs. Waterproofing works to bridge arch. Removal and replacement of wrought iron handrail.</td>
</tr>
<tr>
<td>(Underbridge)</td>
<td></td>
</tr>
<tr>
<td>Thornie Bridge (Overbridge)</td>
<td>Repairs and re-pointing.</td>
</tr>
<tr>
<td>Borthwick Mains Bridge (Underbridge)</td>
<td>Repairs to masonry. Removal and replacement of wrought iron handrail.</td>
</tr>
<tr>
<td>Halfaw Kiln Bridge (Overbridge)</td>
<td>Demolition and replacement of bridge superstructure. Repairs and re-pointing to bridge.</td>
</tr>
<tr>
<td>Halfaw Bow’s (Overbridge)</td>
<td>Demolition and replacement of bridge deck and parapets. Repairs to masonry.</td>
</tr>
</tbody>
</table>

Provision should be made for protective measures to be undertaken on Listed or unlisted structures if there is a predicted risk of +/- 20mm ground settlement.

It is also recommended that a level survey be undertaken of the structures closest to the proposed development in order to detect any ground settlement as a result of the construction phase.

Mitigation measures will be required to preserve and enhance the setting and important views of the listed structures in this section of the proposed route.

Further consultation on this issue with Historic Scotland and Midlothian Council and Scottish Borders Council will be undertaken.

Adherence to Historic Scotland guidance for the management of Conservation Areas, (1) and full consultation with Historic Scotland and Midlothian Council and Scottish Borders Council will be undertaken.

### 10.8 Summary and Conclusions

This is an area with potential in situ archaeologica deposits from the prehistoric, Roman, medieval and Post-Medieval periods. However, for the majority of the proposed route the impact on these archaeological deposits is predicted to be negligible (see Table 10.4 for a summary of impacts, mitigation and significant residual effects).

Prior to development an archaeological desk based assessment will be undertaken to establish in which locations archaeological deposits might still survive. The steps are:

1. A comprehensive Archaeological Evaluation process, following a specification agreed with Midlothian District Council and Scottish Borders Council, to be carried out to assess the full extent of archaeological deposits which will be disturbed during the construction process.

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When the extent of archaeological presence is established, a further specification for fieldwork to be agreed with Midlothian District Council and Scottish Borders Council, if necessary.

An archaeological watching brief to be undertaken during groundworks in areas with high archaeological potential, in this section of the route.

The proposed development will take place on the periphery of four Designated Landscapes - namely Dalkeith House and Park, Melville Castle, Dalhousie Castle and Arniston House and Park. It will also take place on the periphery of the Eskbank and Ironmills, Newbattle, Newtongrange, Temple and Arniston and Borthwick and Crichton Conservation Areas and in the vicinity of numerous listed buildings.

The proposed development will take place in the immediate vicinity of listed and historic structures associated with the former railway, many of which will be utilized in the new development. For example, the numerous bridges over Gala Water, and the Torwoodlee and Bowland tunnels are to be re-used. In addition, other listed and historic buildings are in the vicinity of the route corridor.

The proposed development take place in the immediate vicinity of listed and historic structures associated with the former railway, many of which will be utilized in the new development, and other listed and historic buildings in the vicinity of the route corridor.

The mitigation for the proposed development regarding listed buildings is summarised as follows:

- full consultation with Historic Scotland and Midlothian District Council and Scottish Borders Council;
- a full walk over survey and standing buildings recording of all infrastructure associated with the former railway which still survives in the rail corridor;
- the potential visual and structural impact on listed and historic buildings (particularly those associated with the former railway), Designed landscapes and Conservation Areas to be considered during the detailed design stage of the proposed scheme;
- the Bill will provide the powers to alter a listed building or within a Conservation Area;
- protective measures to listed buildings where the risk of ground settlement is +/- 20mm; and
- a level survey of listed buildings in the immediate vicinity of groundworks to check for ground settlement.
<table>
<thead>
<tr>
<th>Key Potential Impacts (without mitigation)</th>
<th>Mitigation</th>
<th>Residual Effects</th>
<th>Means by which mitigation will be delivered</th>
</tr>
</thead>
<tbody>
<tr>
<td>Impacts on the setting of listed buildings along the route.</td>
<td>Limited opportunities for mitigation.</td>
<td>Short term adverse impacts are expected to occur on the setting of listed buildings.</td>
<td>CoCP</td>
</tr>
<tr>
<td>Potential archaeological remains found during any invasive works.</td>
<td>Archaeological evaluation should be carried out which may result in an Archaeological Watching brief being carried out during construction works.</td>
<td>No adverse residual impacts after mitigation measures.</td>
<td>CoCP</td>
</tr>
<tr>
<td>Impacts to the former railway.</td>
<td>A full walk over survey and standing buildings recording all of the infrastructure associated with the former railway.</td>
<td>No adverse residual impact.</td>
<td></td>
</tr>
</tbody>
</table>
11 LANDSCAPE AND VISUAL IMPACT ASSESSMENT

11.1 INTRODUCTION

This section considers the landscape of the area and the predicted impacts of the proposed railway upon the landscape character, views and visual amenity, broadly categorised as landscape and visual impacts.

11.2 ASSESSMENT METHODOLOGY

The EIA considers effects\(^{(1)(2)}\) upon:

- landscape resources, including an assessment of the nature and value of any landscape features lost and new landscape features added as a result of the scheme;

- landscape and townscape character\(^{(3)}\) including changes in its aesthetic value; and

- visual amenity, including identification of effects upon potential viewers and viewing groups (receptors\(^{(4)}\)).

The methodology was developed in accordance with Landscape Institute and Institute of Environmental and Management Assessment Guidelines\(^{(5)(6)(7)}\).

The key elements of the methodology were as follows:

- describe the landscape character types identified in relevant landscape character assessments;

- identify the significant landscape features that may be affected by the project;

- identify the key viewpoints and viewers likely to be affected by the project;

- identify the level of significance of impacts on the landscape and on visual amenity; and

\(^{(1)}\) A landscape effect is a change in the elements, characteristics, character and qualities of the landscape as a result of development. The effects can be positive or negative.

\(^{(2)}\) A visual effect is a change in the appearance of the landscape as a result of development. This can be positive or negative.

\(^{(3)}\) Landscape character is the distinct and recognisable pattern of elements that occurs consistently in a particular type of landscape and how this is perceived by people.

\(^{(4)}\) A receptor is a special interest or viewer group that will experience an effect.


• identify the measures to mitigate these impacts.

This was achieved through the following procedures:

• The existing baseline character of the landscape was analysed and an assessment made of topographical structure, key vegetation, key forms of landscape importance (archaeological, ecological, water bodies), its existing condition or quality \(^{(1)}\), value \(^{(2)}\) (reflecting landscape designations), sensitivity to change and capacity \(^{(3)}\) to accept development.

• The existing baseline character of the townscape was analysed in relation to its massing, pattern of built form, enclosure, detailed street design, quality and sensitivity.

• A desk study of the scheme proposals, Ordnance Survey (OS) maps and planning documents was undertaken to identify potential impacts on landscape character, landscape features and visual amenity of viewers during construction and operation of the development.

• A site survey of the area which corresponds broadly with the zone of visual impact (ZVI) \(^{(4)}\) of the development was undertaken. On the basis of the site survey, impacts on landscape character, landscape features and visual amenity were predicted. The level of significance of each impact was assessed.

• Mitigation measures to reduce the identified negative impacts of the development on landscape and townscape character, landscape features and the visual amenity of viewers were developed. The EIA and scheme design occurred in tandem, therefore feedback and input to scheme planning and design at an early stage obviated the need for extensive mitigation at a later stage.

Impacts were identified as permanent, temporary or operational and adverse or beneficial.

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(1) Landscape quality (or condition) is based upon judgements about the physical state of the landscape and about its intactness from visual, functional, and ecological perspectives. It also reflects the state of repair of individual features and elements which make up the character in any one place.

(2) Landscape value is the relative value or importance attached to a landscape (often as a basis for designation or recognition), which expresses national or local consensus, because of its quality, special features including perceptual aspects such as scenic beauty, tranquillity or wildness, cultural associations or other conservation issues.

(3) Landscape capacity is the degree to which a particular landscape character type or area is able to accommodate change without unacceptable adverse effects on its character. Capacity varies according to the type and nature of the change being imposed.

(4) The ZVI is the area within which a proposed development may have an influence or effect upon visual amenity.
11.3 ASSESSMENT CRITERIA

11.3.1 Introduction

Impacts upon landscape, townscape and visual amenity will potentially result from the construction and operation of the development.

The level of significance of landscape and visual effects are assessed as being insignificant, slight, moderate or substantial, depending on the sensitivity\(^{(1)}\) of the landscape or viewer to change and the magnitude\(^{(2)}\) of change.

11.3.2 Receptor Sensitivity

The sensitivity of the landscape depends on its inherent condition or quality, value and capacity to accommodate change, and on specific values (such as landscape designations) that apply. The sensitivity of viewers depends on their occupation and viewing opportunity. Sensitivity is described as low, moderate or high. The definitions outlined in Table 11.1 apply.

<table>
<thead>
<tr>
<th>Sensitivity</th>
<th>Receptor</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>Landscape</td>
<td>A landscape which is not valued for its scenic quality and is tolerant of change.</td>
</tr>
<tr>
<td></td>
<td>Visual</td>
<td>Viewers with a passing interest in their surroundings, eg motorists or workers on the railway.</td>
</tr>
<tr>
<td>Moderate</td>
<td>Landscape</td>
<td>A moderately valued landscape, perhaps a locally important landscape, tolerant of some change.</td>
</tr>
<tr>
<td></td>
<td>Visual</td>
<td>Viewers with a moderate interest in their environment such as users of recreational facilities.</td>
</tr>
<tr>
<td>High</td>
<td>Landscape</td>
<td>A landscape of particularly distinctive character or one which is nationally valued for its scenic quality.</td>
</tr>
<tr>
<td></td>
<td>Visual</td>
<td>Viewers with proprietary interest and prolonged viewing opportunities such as residential receptors.</td>
</tr>
</tbody>
</table>

11.3.3 Impact Magnitude

The magnitude of impact on landscape or visual receptors depends on the nature and scale of the development, and the overall impact within a particular view, which may be very small if it is at some distance. The magnitude of impact is described as being imperceptible, low, moderate or high. The definitions outlined in Table 11.2 apply.

(1) Landscape sensitivity is the extent to which a landscape can accept change of a particular type and scale without unacceptable adverse effects on its character.
(2) Visual sensitivity is the extent to which a visual receptor can accept change without unacceptable adverse effects upon the view.
(3) Magnitude is the a combination of the scale, extent and duration of an effect.
Table 11.2  Magnitude Definitions

<table>
<thead>
<tr>
<th>Magnitude of Impact</th>
<th>Receptor</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Imperceptible</td>
<td>Landscape</td>
<td>A virtually imperceptible change in components of the landscape.</td>
</tr>
<tr>
<td></td>
<td>Visual</td>
<td>Viewers affected by a change which is barely visible, usually at some distance from the development</td>
</tr>
<tr>
<td>Low</td>
<td>Landscape</td>
<td>A small change in components of the landscape.</td>
</tr>
<tr>
<td></td>
<td>Visual</td>
<td>Few viewers affected by minor changes in views.</td>
</tr>
<tr>
<td>Moderate</td>
<td>Landscape</td>
<td>Moderate changes in landscape components.</td>
</tr>
<tr>
<td></td>
<td>Visual</td>
<td>A moderate number of viewers affected by moderate changes in views.</td>
</tr>
<tr>
<td>High</td>
<td>Landscape</td>
<td>A notable change in landscape characteristics over an extensive area.</td>
</tr>
<tr>
<td></td>
<td>Visual</td>
<td>A large number of viewers affected by major changes in view.</td>
</tr>
</tbody>
</table>

11.3.4  Impact Significance

Impact significance is described as being insignificant, slight, moderate or substantial. Impact significance is determined by combining the sensitivity of the landscape or viewer with the magnitude of change expected as a result of the development. Thus a substantial impact will usually occur where both the sensitivity of the landscape or viewer and the magnitude of the impact are high. Each case is assessed on its own merits as other factors also need to be considered (quality or condition of the landscape, landscape value, and its capacity to accommodate development), so the table below is an approximate guide. Professional judgement and experience is used to determine impact significance, definitions of which are set out in Table 11.3.
Table 11.3 Evaluation of Levels of Impact Significance

<table>
<thead>
<tr>
<th>Landscape or viewpoint sensitivity</th>
<th>Magnitude of change in landscape or view</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>High</td>
</tr>
<tr>
<td>Introduction of substantial new features into the landscape or view of the site itself, or obstruction of a substantial part or important elements of views beyond the site</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Moderate</td>
</tr>
<tr>
<td>Introduction of noticeable new features into the landscape or view of the site itself, or obstruction of a noticeable part or elements of views beyond the site</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Low</td>
</tr>
<tr>
<td>Small changes in the landscape or view</td>
<td>No perceptible changes in the landscape or view</td>
</tr>
<tr>
<td></td>
<td>Imperceptible</td>
</tr>
</tbody>
</table>

This table is a guide only. Each case is assessed on its own merits using professional judgement and experience.

Impacts on visual amenity are clearly distinguished from, although closely linked to impacts on landscape character and landscape resources.

11.4 Landscape Designations

11.4.1 Protected Landscapes and Designated Areas Along and Close to the Route

Protected and designated landscapes which are likely to be impacted upon were identified using the structure and local plans listed within Section 3, in addition to local maps and guides, and consultations with the planning authorities and organisations such as the National Trust for Scotland. Figure 11.1 shows the location of these designations.

Designated areas such as those listed below attract visitors as they are frequently tourist attractions, such as designed landscapes or historic buildings. These areas are therefore important visual receptors in addition to being important landscape resources in their own right. In the study area, designated areas include:

- Dalkeith House Designed Landscape, north of Dalkeith and including King’s Gate. The railway will pass close to the western edge of the designed landscape, near Sherriffhall and may have slight impacts upon its setting. Kings Gate is one of the key gateways into Dalkeith House.
- Dalhousie Castle Designed Landscape, which lies to the west of Newtongrange and which will not be affected by the railway.
Mavisbank Designed Landscape, west of Bonnyrigg and Lasswade and which will not be affected by the railway.

Melville Castle Designed Landscape, north of Bonnyrigg and Lasswade and which will not be affected by the railway.

Oxenfoord Castle Designed Landscape, east of Dalkeith and which will not be affected by the railway.

Newbattle Abbey – Scheduled Ancient Monument, Listed Buildings and Designed Landscape, south of Dalkeith and which will not be affected by the railway.

Arniston House Designed Landscape, west of Gorebridge. The railway will pass through the top north-east edge of this landscape, affecting Gore Glen Country Park, with locally moderate impacts upon the affected part of the landscape.

Abbotsford Designed Landscape, south of Tweedbank and which will not be affected by the railway.

Tweedsmuir Area of Great Landscape Value (AGLV), including the Eildon Hills, the edge of which will be affected (Tweedbank). The development will not significantly alter the character of the area.

Eildon and Leaderfoot National Scenic Area (NSA), to the east of Galashiels and the railway route, including the Eildon Hills, and which will not be affected by the development. This area is also part of Central Borders Environmentally Sensitive Area (ESA).

Valley of North Esk AGLV, which will be crossed by the railway, using existing disused railway infrastructure, now used as the Penicuik-Musselburgh Cydeway will require mitigation to ensure the route is maintained during railway operation. The attractive viaduct over the North Esk will be retained as a landscape feature and upgraded to take modern trains.

Valley of South Esk and Moorfoot Hills AGLV, which will be crossed by the railway using existing disused railway infrastructure. The attractive disused viaduct over the South Esk will be retained as a landscape feature and upgraded to take modern trains.

Valley of Upper River Tyne AGLV, which will not be affected.

Fala AGLV, which will not be affected.

Edinburgh Green Belt, within the Shawfair Area, and which will be affected by the routing of the railway through Green Belt land, although the
landscape effects of this are not considered to be very significant, as it is a linear feature rather than infill of a discrete area.

11.4.2 Scottish Natural Heritage Landscape Character Assessment Series

This review series covers the whole of Scotland. The two publications which are relevant to the study area are:


The study area falls into the following landscape character types (LCTs). These are sub-divided into discrete landscape character areas (LCAs) as indicated in Table 11.4 and Figure 11.2. Where no local landscape character types are identified the column is left blank.

Table 11.4 Landscape Character Types and Areas

<table>
<thead>
<tr>
<th>Regional Landscape Character Areas</th>
<th>Regional Landscape Type</th>
<th>Local Landscape Type</th>
<th>Local Landscape Character Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Lothians Landscape Character Assessment 1998</td>
<td>- Lowland River Valleys</td>
<td>-</td>
<td>North Esk</td>
</tr>
<tr>
<td></td>
<td>- Lowland River Valleys</td>
<td>-</td>
<td>South Esk</td>
</tr>
<tr>
<td></td>
<td>- Upland Fringes</td>
<td>-</td>
<td>Gladhouse/ Auchencorth Moorlands</td>
</tr>
<tr>
<td></td>
<td>- Upland Fringes</td>
<td>-</td>
<td>North Lammermuir Platform</td>
</tr>
<tr>
<td>The Borders Landscape Assessment 1998</td>
<td>Lammermuir and Moorfoot Hills</td>
<td>Uplands</td>
<td>Plateau Grassland</td>
</tr>
<tr>
<td>Lammermuir and Moorfoot Hills</td>
<td>River Valley</td>
<td>Pastoral Upland Valley</td>
<td>Gala Water Valley</td>
</tr>
<tr>
<td>Central Southern Uplands</td>
<td>River Valley</td>
<td>Upland Fringe Valley with Settlements</td>
<td>Tweed/ Gala/ Ettrick Confluence</td>
</tr>
</tbody>
</table>

Note that in bringing together the two assessments it has been necessary to rationalise the nomenclature for different units. Where there are gaps the assessments have not classified at these levels.

For each of the landscape types and areas identified key characteristics are described in the documents and guidance provided upon the landscape management and the accommodation of new development in the area. This guidance has been taken into account in the assessment process and in the development of mitigation for the scheme.

The SNH landscape character units are described in Annex H and form the basis of the landscape assessment for the study. This baseline landscape description also utilises the results of further field surveys.
11.5 Scheme Description

11.5.1 Overview

The new railway will run between Newcraighall on the outskirts of Edinburgh and Tweedbank, west of Melrose. The route is shown on Figure 1.1. It is approximately 48km long. The majority of the route will utilise the existing solum with the exception of the section that lies within the South East Wedge (approximately 3km), a section near Falahill (approximately 2km) and a section within Galashiels (approximately 1km). There will be approximately 100 structures, many of which exist already. These comprise road bridges, river bridges, foot bridges, under passes etc. They are described in detail in Chapter 2.

The assessment is based on the assumption that the railway will be used by a half hourly Class 158 or 170 train service running in each direction between 5.55 am and 12.30 am each day. Each train will have a maximum 6 carriage length. Trains will be diesel and the scheme does not require overhead lines. Signals and signposts will be installed in line with current safety standards.

The railway will be fenced with 1.8m high palisade or 1.4m high, 7 strand post and wire fencing which will in itself have a landscape and visual impact, and may block views. This will be positioned at the bottom of embankments or the tops of cuttings, at the edge of the railway owned land. The rails will be set approximately 2m apart and pale grey concrete sleepers will be 2300mm long x 290mm wide x 200mm deep, and they will be positioned 700mm apart along the length of the route. Between the sleepers will be ballast (grey stone material), minimum 75mm in size. There will also be lineside drainage, principally through cuttings.

There are 6 new stations, with some of these requiring new footbridges. Major works will be carried out at the following locations:

- Shawfair works (Works No 1);
- Edinburgh City Bypass Underbridge (works No 1);
- Hardengreen cutting and new viaduct over A7 roundabout (Works No 2);
- Gore Park viaduct over A7 and approach works (Works No 3);
- Falahill new bridge and A7 roadworks (Works No 5);
- Galashiels (Wheatlands Road) new embankments, walls and various bridges (Works No 10);
- Galashiels (Currie Road/ Glenfield Road) new walled embankments and Underbridge (Works No 10); and
- Galashiels (Winston Road) open out cutting and new overbridge (Works No 10).

Trees and scrub will be removed in an 8m wide corridor along the length of the route, as a minimum. Where further slope stabilisation works etc are required this corridor may be wider. The corridor will be kept clear during
the long term operation of the line. Photomontages and artist’s impressions of
the proposed scheme have been provided within Annex I and J (see figure 11.3)

A landscape scheme will be implemented as part of the works. This will
include:

- landscaping of public open space created by the works;
- specimen tree and shrub planting, such as avenues of trees;
- dense tree and shrub planting to provide a screen to views;
- ornamental planting areas, particularly near towns;
- amenity grass; and
- wildflower areas.

Hard landscape works will also be carried out including:

- paved areas, such as alongside stations and car parks;
- seating, bollards, bins and other street furniture; and
- pedestrian bridges.

The principles for the landscape design are identified, along with mitigation
measures in Section 11.10.

A concept landscape design will be developed before the tender is let in
consultation with the Local Authority. This will form part of the Contract
Documentation, together with Employers Requirements which will set out
essential mitigation. This is an important document which will ensure the
Council’s satisfaction with the mitigation strategy. It is anticipated that major
planting works will be required in places such as Galashiels, both as direct
mitigation and as indirect compensation for the significant environmental
losses that will occur along the line.

The magnitude of change in the landscape (see Table 11.2) will be high when it
is looked at a local scale, particularly in the major works areas. It is less than
would be expected if an entirely new railway were to be built, due to the
existing solum, but also due to the open nature of much of the Borders
landscape, where specific landscape resources, such as woodland, trees,
hedges and walls, are more scarce than in smaller scale more intimate
landscapes. Changes due to artificial embankments, cuttings etc are already in
place. The long length of the project means that it is, however, assessed as
being a high magnitude of change, ie there will be a notable change in
landscape characteristics over and extensive area. There will be a significant
impact along certain stretches of the route where the existing railway corridor
has been used as a public footpath / cycleway. These routes currently
provide a strong environmental / landscaped corridor which is an important
community and social amenity. In particular, the loss of the Black Path as a
route for walking, cycling, informal recreation and as a wildlife corridor will
require considerable compensation works in other areas of the town.
11.5.2 Landscape Character

Introduction

Landscape character contributes to Scottish identity and is a resource of value to future generations. Some valuable landscapes are protected by designations, but there are many valuable landscapes which are not designated, and upon which landscape impacts may be equally or more important. The landscape of the area through which the proposed route passes is variable in character. It comprises:

- urban and urban fringe areas of Edinburgh and market towns such as Newtongrange, Gorebridge, Galashiels, Melrose and Newtown St Boswells, where townscape character is important;
- low lying river valley farmland and agricultural areas associated with areas around Gorebridge;
- fringes of the rolling Moorfoot and Lammermuir Hills characterised by improved and semi improved grassland, rough grazing and moorland; and
- open, rural, pastoral valley of Gala Water, and further south, the River Tweed.

11.5.3 Landscape Character Areas and Types

The route passes through the following landscape character areas and types. The text is extracted from relevant sections of the SNH Landscape Character Assessment Series and shown in Annex J. An explanatory Figure 11.2 is also reproduced from the documents.

The landscapes and townscapes through which the railway route runs are of moderate sensitivity (see Table 11.1). Landscapes and townscapes are locally important and likely to be tolerant of some change. They are not nationally valued or designated.

11.5.4 Visual Amenity

Introduction

The existing visual environment in the area is variable in character. Visual receptors are located in the City of Edinburgh, urban fringe areas, market towns (Dalkeith, Newtongrange, Gorebridge, Stow and Galashiels) as well as in a large number of scattered hamlets, isolated farms and cottages.

In the urban areas views are enclosed by the built fabric, by existing woodland and by the landform. The greatest concentrations of residential viewers and workers lie in these areas.
In rural areas landform and woodland limits views, but much of the countryside is very open, with rolling hills providing elevated, longer distance views, and some important viewpoints exist, such as the Eildon Hills. Residential viewers in these areas are more scattered, but are accustomed to a more rural outlook than those in urban areas.

There are numerous recreational routes, scenic drives, tracks, cycle ways and footpaths, both local and long distance paths from which recreational viewers and travellers may be affected by the proposals. Campsites, museums, golf courses, picnic areas, parks etc are all potential receptors, and all are present in the study area.

### 11.5.5 Key Views

The route passes through or near to the following settlements, and there is potential for residents/ workers/ recreational viewers and travellers to experience visual impacts from these areas:

- Edinburgh,
- Eskbank,
- Bonnyrigg,
- Dalkeith,
- Lasswade,
- Mayfield,
- Newtongrange,
- Arniston,
- Gorebridge,
- North Middleton,
- Tynehead,
- Falahill,
- Heriot,
- Brockhouse,
- Fountainhall,
- Burnhouse,
- Torquhan,
- Killochyett,
- Stow,
- Torsonce,
- Bowland,
- Whitelee,
- Buckholm,
- Galashiels,
- Langlee,
- Tweedbank.

In addition there will be visual impacts upon residents of scattered properties lie within the zone of visual influence of the railway line and its associated infrastructure such as stations and car parks.

Key areas of open space including picnic areas, viewpoints, tourist routes, camp sites, museums and other recreational areas, bridal ways, footpaths and cycleways where visual impacts are possible are identified below:

- A7 Tourist Route to Edinburgh;
- Dalkeith Country Park;
- Ironmills Park, Dalkeith;
- Penicuik to Musselburgh Foot and Cycleway;
- footpaths – especially those which currently use the disused railway line (see Section 7 for details on all footpaths);
- Lothian Bridge Caravan Park (west of Newtongrange);
- Scottish Mining Museum (Newtongrange);
Gore Glen Country Park (picnic area, car park and woodland walks west of Gorebridge);

Torwoodlee Golf Course (Galashiels);

Camp site (Galashiels);

Museum (Galashiels);

Southern Upland Way – Galashiels to Melrose, long distance footpath; and

Abbotsford House.

11.6  **Assessment of Permanent Landscape Impacts**

11.6.1  **Introduction**

A moderate landscape and townscape sensitivity (see Table 11.1) is combined with a high magnitude of change (see Table 11.2). The proposed railway and the trains which use it will therefore have a substantial impact upon the existing landscape, especially where it is currently quiet and rural (see Table 11.3). The detailed levels of impact will vary according to exact location. The curves, bridges and cuttings required all have the potential to result in landscape impacts, crossing rivers and valleys, severing hills and adding man-made elements into an often rural, semi-natural landscape. It will not always be possible to avoid sensitive landscape elements and patterns which are easily damaged or fragmented. However, as the existing railway solum will be utilised along the majority of the route, and the train service will be restricted to half hourly, the landscape impacts will not be as great as might be expected for a 48 km long section of line.

Some elements which are fundamental to the character of the landscape such as field boundaries (hedges and dry stone walls), woodland belts and copses will need to be removed. The introduction of alien materials will alter sense of place. Routing will impact upon the natural grain of the land. The existing built environment and townscape character, particularly of Galashiels will also be affected.

Permanent impacts upon landscape and townscape character and visual amenity during operation will result from:

- alteration of the natural landform due to the requirement to build embankments and cuttings along the route of the railway, particularly where the existing solum is not used;

- the loss of landscape and visual resources and features due to the removal of trees and shrubs, stone walls etc;

- the impact on townscape due to the demolition of existing features, for example old buildings, to accommodate the proposed development;

- the introduction of new features within the proposed scheme, such as the railway lines, fencing, barriers, lighting and signage.
Such impacts will be mitigated to an extent by careful design of the development and planting to provide screening.

There will also be beneficial impacts as the proposed development will provide opportunities to enhance the townscape and visual quality of degraded areas. There is also the opportunity to provide visitors to the central Borders with a positive impression of landscape/environmental quality which would result from improvements in the economic well being of the area. New features, such as bridges will provide interest within the built environment if they are of high design standard and high quality materials.

11.6.2 GSMR Masts

As is normal practice, the route will operate with a communication system between the signalman (at Millerhill) and the train driver. The system assumed for the route is GSMR as this is currently being adopted on the network on a national basis. This communication link will require telecommunication masts at frequent locations, approximately every 3-5 km, along the route. The exact location depends on variables such as topography and the technology adopted which at this stage of the project is currently unknown. The structures are generally made from steel and range from heights 15-35 m with a plan dimension of 1 - 2.5 m², although they are relatively high they are not as wide as a 'pylon' type structure.

The relative closeness of the masts, and the anticipated need for them to be sited in open locations, means that at least one will be visible from most locations along the route corridor, with the possibility of adverse impacts on the landscape and on visual amenity. The exact extent of visibility will depend on the detailed siting and design of the structures. The potential landscape and visual impacts of the masts will be taken into account at the detailed design stage. The masts will be sited to avoid breaking the skyline, and to minimise intrusion into sensitive views from homes, recreational sites or hill walks. Colours and other details will be designed to be unobtrusive within the landscape.

11.6.3 Landscape and Townscape Resources

Along Length of Route

The landform will largely be unaffected where the existing solum is used, cuttings will remain cuttings and embankments will remain embankments, although exact levels may change. Where a new alignment is proposed the existing undulating landform will be replaced by a railway embankment, cutting or level at grade section (Shawfair, Falahill and within Galashiels).

The main landscape resource which will be lost by the scheme and replaced with a functioning railway line is a corridor of regenerated semi natural native vegetation along the length of the route. In the majority of areas this comprises scrub and young trees of up to about 30 years in age (the railway
was closed in 1969 and the track lifted in 1970). In some places older and more established mature trees will need to be removed. Specific locations are identified below. Young trees are largely birch, sycamore, ash, hawthorn or blackthorn, with some oak, pine, rowan, holly and other species. Scrub includes blackberry and raspberry. Vegetation will also be lost on rock faces which are to be cleared. This will include smaller species as well as mosses and lichens.

Elsewhere, where the landscape is more open and natural revegetation and colonisation has been hampered by grazing (such as along the majority of Gala Water), the vegetation is dominated by grass and low grazed herb species.

Where the line is adjacent to Gala Water or other rivers and burns there will be some loss of semi-natural river banks to accommodate bank reinforcement works and the prevent erosion and undermining of the railway embankment.

Where the proposed line is along the existing solum the landscape resources that are to be lost do not include old buildings, but where it is off line there is a need to demolished some old stone buildings of landscape or townscape significance. Examples are a farm building on the outskirts of Newton Village, and Beechbank Place in Galashiels.

Other buildings and structures of lesser character will also be demolished (such as industrial units in Galashiels). (See Box 2.1 for full list of demolitions).

The removal of utilitarian modern buildings may benefit townscape character, provided appropriate landscaping mitigation measures are implemented. Existing bridges and structures (tunnels) along the alignment will be repaired so these landscape/townscape resources will be retained and may be enhanced as a result of the development. Where original historic structures which are contemporary with the original railway construction will be retained (eg Glenesk Viaduct).

Retaining structures will be repaired, and some new ones built. In other places former structures, such as redundant platforms will be broken out and removed.

There will also be new embankments, cuttings, bridges and other road works associated with the construction of new or realigned sections of road.

Site Specific

The following list identifies the locations where specific and notable loss of landscape resources is predicted to occur. The scheme is not fully detailed so this list is not exhaustive.

- Removal of scrub and young trees on the disused line south of Whitehill Road.
- Loss of open farmland in off original line section between Whitehill Road and Edinburgh City Bypass.
- Demolition of out buildings on outskirts of Newton Village.
- Removal of a line of mature sycamore trees at Sheriffhall Mains.
- Loss of rolling pasture and woodland between Edinburgh City Bypass and King’s Gate.
- Closure of cycle track at King’s Gate.
- Removal of vegetation on cutting slopes and loss of cycle path between King’s Gate and the Glenesk Viaduct.
- Stopping up of cycle track between Sheriffhall and Hardengreen.
- Removal of existing station footbridge in Eskbank.
- New viaduct to be constructed over A7/ B6392 roundabout.
- Removal of vegetation along embankment and solum east of new viaduct over A7/ B6392 roundabout.
- Closure of footpath along the back of Victoria Road to Old Star Road.
- Removal of mature trees on cutting slope east of bowling green in Newtongrange.
- Road and associated car parks at Newtongrange Station.
- Removal of vegetation on cutting slopes and solum east of Redheugh.
- Removal of dense vegetation on rail corridor in Gore Glen Country Park and along a corridor across a wooded hillside.
- Construction of a new viaduct over the A7 south of Gore Glen Country Park.
- Closure of footpath to Gorebridge north of sewage works.
- Demolition of eight existing buildings 1-8 Havieston Villas, Gorebridge.
- Closure of footpath along solum between Station road and Lady Brae in Gorebridge.
- Removal of vegetation on cutting slopes north east of Gore Water, east of Havieston House.
Cutting to be cleared of mature trees and vegetation west of Catcune Farm.

Mature trees to be removed south of Maggie Bowies Glen. Trees to be cleared from slopes to create a corridor for the works.

Slopes to be cleared of mature trees at Willowburn, north of Tynehead.

Trees to be removed from formation and near slopes near Cowbraehill, east of Cakemuir Burn.

Loss of strip for grazing and change from natural topography to level rail corridor between Cakemuir Burn and Falahill where the new route departs from the existing solum.

New railway overbridge and road south of Heriot.

New railway overbridge and road embankments at Hangingshaw.

Demolition of farm building/shed on solum at Hangingshaw.

Rock face to be stripped of loose material near Crookston Cottage, possible loss of habitat and vegetation.

New railway overbridge and road embankments near Cuddy Bridge.

Loss of short sections of semi-natural river banks of Gala Water, south of Allanshaugh and near Pirn as scour at toe of embankment is to be remedied and riverbank to be protected in various places.

Private house to be acquired and demolished at Stow (Station Road).

Former Stow station outbuildings and platform walls to be acquired and demolished.

Riverbank to be reinforced and protected south of Stow and at Whitelee culvert, near Whitelee House.

New road underbridge and cutting near Bow Bridge.

New tunnel portal area to be devegetated at Bowshank Tunnel.

Riverbank to be reinforced to protect railway south of Bowland Station, with loss of semi-natural river bank.

Riverbank to be reinforced and protected at the fishponds near Whin, loss of semi-natural river bank.
Mature trees to be removed at Torweedlee Road.

Torwoodlee Tunnel approach to be cleared of trees at both ends and rock slopes to be scabbled.

Trees and vegetation on solum and slopes to be cleared at Rye Haugh and between the caravan park on the edge of Galashiels and the railway.

Footpath along railway to be closed and rerouted north of Lee Brae through Galashiels.

Three properties to be demolished along solum at back of Wheatlands Road.

Footpaths to be closed at Kilknowe Bridge.

Plumtreehall Brae/ Gauger’s Lane to be closed off and steel superstructure removed.

Footpath along solum to be closed.

Riverbank to be reinforced south of Magdala terrace.

Footpath access to house on High Buckholmside removed and replaced. Mature trees to be removed.

New crib wall near Bridge Place.

Solum footpath (the Black Path) to be closed east of Bridge Place.

Beechbank Place to be acquired and demolished.

Station Brae Bridge to be demolished and a new road bridge built.

Units in Currie Road Industrial Estate and Langhaugh Industrial Estate to be demolished (seven buildings altogether). Road into estate to be closed.

Existing embankment north of Huddersfield Street and Dale Street to be cleared of trees.

Footpath across existing ‘red’ viaduct to be replaced / rerouted.

Footpaths from Woodstock Avenue to existing solum to be closed.

Footpath along the section of solum east of the River Tweed to be closed. An alternative to be provided.
Trees to be trimmed along solum north of Tweedbank Drive.

New park and ride facility and station to be constructed in field north of Tweedbank Drive.

The overall impact upon landscape resources in the absence of mitigation will be substantial (see Table 11.3), but as the changes are spread out over a 48km route of narrow width, there will be restricted impacts in any one section. The effects upon landscape resources in any one location are therefore diluted to an extent. Impacts upon resources are also considerably reduced by the fact that the railway is already an existing distinctive feature in the landscape, with many beneficial landscape and townscape resources of its own (attractive viaducts etc). Nonetheless a substantial impact is predicted overall.

11.7 ASSESSMENT OF PERMANENT VISUAL IMPACTS

11.7.1 Introduction

It is recognised that the re-opening of the Waverley line will have a significant impact upon the quality of views which people experience due to the introduction of new rail infrastructure, train movements, other transport and people movements in order to reach train stations, and lighting.

Private property will be overlooked by users of the re-opened service and residents in particular may find this intrusive.

Visual impacts will affect receptors at residential properties, private buildings including workplaces, recreational buildings and outdoor locations to which the public have access. In certain cases improvements in views may result, as the new rail infrastructure may enhance the built environment of the currently degraded railway corridor.

In rural areas which are popular for outdoor recreation receptors at key viewpoints will be affected.

11.7.2 Detailed Discussion of Visual Impacts along the Route

Overview

Residential receptors are deemed to be of high sensitivity, recreational receptors of moderate sensitivity, and travellers and workers of low sensitivity (see Table 11.1). Magnitudes of visual change vary according to the distance for the development and the number of viewers affected (see Table 11.2).

Visual receptors are identified and the effects (see Table 11.3) upon them assessed along the length of the route, starting at the northern end and working south.
Newcraighall to the A 68, at King’s Gate

The route begins 0.5km south of Newcraighall (no visual impacts) at Whitehill Road, but it is screened from this residential area and from other areas to the north by the embankments to the A 1(M). To the west is a 2 storey farm called Whitehill Mains (moderate visual impacts), and beyond this a retail park including B & Q, Comet and Wickes, but views from here will be limited as the railway will be in a cutting until it is further away. It passes, in cutting past Shawfair (slight impacts) then runs across gently rolling landscapes to Newton village where visual impacts will be experienced from Harelaw Farm (slight impacts), Newtonvale (bungalow, slight impacts), The Elms (slight impacts), Hope Cottage (substantial impacts), Old School House (substantial impacts), Manse (slight impacts), and large farm sheds at Longthorn (slight impacts).

The route continues south, still in cutting, passing under Millerhill Road (substantial impacts), close to The Cockatoo Public House (moderate impacts here primarily due to the reconfiguration of the road layout). The route passes across Millerhill Road again, continuing to run along the east side this road, and under the Bilston Glen branch line (to be closed, so there will be no visual impacts upon users). It passes within 150 m of Sheriffhall Mains farm, in cutting (substantial visual impacts due to the close proximity and due to the loss of a line of mature sycamore trees along the access road to the farm).

Major works are required to route the railway under the Edinburgh City Bypass, although once the railway is established impacts upon views from this road will be reduced (slight).

Beyond the bypass substantial visual impacts will affect viewers at Sheriffhall, a farm and historic Dovecot, and King’s Gate. In this area the railway will pass along the western edge of Dalkeith Country Park, located within the Dalkeith House Designed Landscape. From the path along the western edge impacts will be moderate as the path is close to the railway route. There will be no views from other paths, deeper in the woodland. King’s Gate is one of the formal entrances into the designed landscape. There will be substantial impacts upon the Penicuilk to Musselburgh Cycleway, which will be closed and rerouted. The railway will pass under the A 68(T) resulting in moderate visual impacts upon its users.

King’s Gate to Eskbank Station

The route now follows the original solum along what is currently the Penicuilk to Musselburgh Cycleway. From here onwards visual impacts will result from the clearance of an 8m wide strip of vegetation, on embankments or in cuttings, to provide sighting distances and a safe operating corridor. Office buildings near Elginhaugh Bridge will not see the railway as they are separated from it by mature vegetation to their east. Along this section the permanent land take is wider to allow for a new footpath which will run parallel to the route. The railway will pass over the existing viaduct, presently carrying the cycle path. The viaduct is an attractive visual feature in the landscape and the
restoration of the railway line will mean that it continues to be so into the future. Various properties (including Ironmills Cottages) will see trains on the viaduct, replacing the pedestrians and bikes they see now. Visual impacts will be slight as the structure is already in place.

The route now follows the existing solum under Gilmerton Road (the B6392, slight impacts) and through the built up area of Dalkeith and Eskbank (moderate visual impacts). Properties and viewers affected include those along Avenue Road, Weir Crescent, Lasswade Road, Station Road, Dundas Crescent, Bonnyrigg Road, Westfield Grove, Westfield Drive, Westfield Bank, Hardengreen Lane, Hardengreen Industrial Estate. Visual impacts will be slight to moderate, as the existing solum is already in place.

At Eskbank, close to Hardengreen, a new station, shelter, platform, footbridge, bus stop, car park and associated road infrastructure will be constructed. There will be moderate local visual impacts due to this new infrastructure, affecting Hardengreen House, The Long Croft and The Cottage.

Eskbank Station to Brewers Bush Bridge

The next major structure is a new 320m long viaduct to be constructed over Hardengreen Junction, the junction of the A7 with the B6392. Slight visual impacts will result upon travellers on the roads. There will not be any residential receptors as the nearest area of housing is screened by woodland.

The route continues along the old solum past Dalhousie Mains Farm Cottages (moderate impacts) and over the River South Esk on the existing Newbattle Viaduct, upon which trains will be visible from Deoflowhill Cottage, Lodge Cottage, Mill Cottage, Craigesk, Damside Cottage, The Sun Inn, Lothian Cottage and Lothian Bridge Caravan Park (slight impacts).

The solum then passes into Newtongrange where it passes alongside the backs of houses on Victoria Gardens, Victoria Road, Redwood Walk and Old Star Road. These are new houses, post dating the operation of the railway. The route of the line here is currently a well used footpath and its closure and replacement with an operational railway line will result in substantial visual impacts to neighbouring houses. The line will be in cutting along this section which will help reduce impacts to an extent.

Old terraced single storey houses along streets to the north (Deanpark), Dean Park Place, Monkswood predate the operational railway. Houses at the southern ends of the streets will be very close to the railway once it is operating (moderate to substantial impacts). Removal of mature trees on the cutting slopes close to a bowling green and pavilion will result in moderate visual impacts.

The route passes under Murderdean Road and alongside new houses on Jenks Loan (substantial impact). The new Newtongrange Station will be located here, behind numbers 21 and 23 Murderdean Road (substantial impact).
Existing properties will be demolished, and a new platform, shelter, footbridge, car park and access road created.

From here the route passes south, still on the old solum, alongside The Scottish Mining Museum at Lady Victoria Colliery, Lady Victoria Business Centre and Industrial Estate (slight impacts) to Brewer’s Bush Bridge under the B704. The railway is in cutting here. Visitors to the museum will experience impacts but a railway is very much part of the industrial heritage so effects will only be slight.

Brewer’s Bush Bridge to Gorebridge

The railway is now in open countryside, and away from the urban fringe. The main visual receptors are at Redheugh Farm, a large 2 storey farm building from which views of the railway in cutting will be available due to the clearance of vegetation (moderate impacts). The railway passes under Povert Road and a track 200m from Kirkhill Terrace, where there are in the order of 12 houses (slight impacts).

From here the route enters woodland at Gore Glen Country Park and Picnic Area, where recreational receptors will experience moderate or substantial impacts. This woodland park is set within the grounds of Arniston Designed Landscape. The existing solum is not apparent so a swath of vegetation will be cleared including mature trees. This swath will cross footpaths and will require the relocation of the existing car park. A new footbridge will also be constructed.

The railway will cross the A7 on a new 230m long viaduct. This will be a substantial new structure which will be visible by road users (slight impacts) and residents of Millbank House (substantial impacts). The removal of a swath of woodland along the side of the hillside will be visible from the A7. The footpath alongside the existing line will be closed, however a footbridge at Millbank and a new footpath linking Gore Glen Country Park with Gorebridge (Moorfoot View) so there will be recreational receptors to experience views from here. Workers at the sewage works may also experience views (slight impacts).

Gorebridge to Fushiebridge

The route continues in a cutting, back on the old solum, past houses in Gorebridge on Millbank Grove, Moorfoot View, Castle View and Station Road (moderate impacts), near the remains of Newbyres Castle. It passes under Station Road and east of this requires the demolition of 8 houses (Harvieston Villas) which are adjacent to the existing solum. The removal of these houses will be apparent from houses to the north of the line (slight impacts) and St Margaret’s Church (moderate impacts). There will be a new station here, including a platform, shelter and car park.

The route passes under Lady’s Brae alongside houses on Robertson’s Bank, and to the north of houses on Powdermill Brae and Robertson’s Bank (Birkenside) on
the far side of Gore Water (slight impacts). The route is in cutting, but the removal of vegetation will open up views.

The route passes on the east side of Gore Water to Fushiebridge. The railway route is east of Harvieston House and its landscaped grounds, Harvieston Farm and Catcune Mills along this section (slight impacts).

Fushiebridge to Tynehead

Visual impacts will result upon residents of Granary Cottage, Catcune House, Catcune Farm (moderate impacts) due to the reintroduction of the railway along the existing solum and the removal of vegetation. The next section is on embankment and runs through open unsettled landscapes on the valley side above Gore Water, to a road bridge at Thorniehill (slight impacts). Here the railway is in cutting once again, and out of view of Borthwick Mains Cottages, Borthwick Mains and Borthwick Castle. It passes under a track at Hallaw Kiln, used by farmers and occasional walkers (slight impacts).

There are no visual receptors, although the clearing of vegetation may be apparent in longer distance views, until a single cottage at Willowburn (moderate impacts) where a new overbridge will be constructed to take a track. Further east, Tynehead Village will experience limited views as the railway is in cutting along the existing solum. Nonetheless, buildings are close so impacts are graded as moderate.

Tynehead to Falahill

Visual receptors continue to be sparse in this open landscape, with views being available from the B6367 as it weaves along the side of Cakemuir Burn. Residents at Cowbraehill will experience views of trains (slight impacts). Snowdrift fencing will be seen in views along here.

The route swings away from the existing solum just before Old Railway Cottage, and passes under the A7, avoiding about 10 houses at Falahill Cottages (moderate to substantial impacts, as a new route will be created in front of the houses and the existing A7 alignment will be altered). The former rail corridor will not be altered along this section. Snowdrift fencing will continue be seen in views along here.

Falahill to Stow

The route now follows Gala Water for a long length, running parallel to the A7, through a relatively unsettled landscape. Visual impacts will result upon travellers on the A7, the B709, the B6368, the B6362, a minor road on the western side of the valley and upon users of paths and tracks connecting settlements. Impacts will be slight to moderate as the existing route is already very prominent along the valley.

Residential receptors will be affected at Robertson’s, Heriot, Heriot House, Station House (where there will be a level crossing), Sandyknowe (where there
will be a new road and bridge linking to the A7, Hangingshaw, Hangingshaw Old Inn (new road and bridge connecting to the A7 and farm building/shed to be demolished), Stagebank (recent extension to be demolished, substantial visual impacts), Halltree Farm, Summervale, Crookston House Lodge, Crookston House, Crookston Cottage, Brockhouse, Ellem Court, Bower, Fountainhall. At Cuddy Bridge visual impacts will result from new road works and a bridge linking the existing minor road to the A7. The former Fountainhall Station House will be acquired and its driveway reconfigured.

The route continues past Still Bridge, Fountainhall Farm, Fountainhall Village (along Old Stage Road), Fountainhall Primary School behind which 30 luxury detached houses are currently being built (substantial visual impacts as very close), Allanshaugh, Burnhouse, Hillside, Plenpoth, Burnfoot, Bankhouse, Pirn House, Torquhan, Waterston, Waterston Cottages, Galabank and Killochyett/Mill Bank. Impacts will vary between slight and substantial with properties closest to the route experiencing the greatest degree of impact, and those further being less affected.

The route will be visible from hillsides and hill tops along this section, but it will not look significantly different to the way it looks at present as the existing solum will be used.

Stow to Galashiels (Torwoodlee Tunnel)

Travellers on the A7, B6362, B710 and A 72 and the minor road at Buckholm will experience impacts as will users of the various tracks and paths which connect settlements. Impacts will be slight to moderate as the existing route is already very prominent along the valley.

Receptors at the following locations in Stow will be affected: Stow bowling green, playing field and play ground, Mill Road, Mill Court, The Mill House, Station Road and Stow Primary School. Just west of the school a private house on the solum will be demolished. Receptors at Townhead, Muirhouse, Hay Park and Stagehall and all other properties in this area will experience visual impacts.

South of Stow receptors at the following locations will be affected: Torsonce, Torsonce Mains, Ferniehurst, Bow (new road and rail bridge over road will cause additional impacts upon Ferniehurst, Bow and an unnamed property on the A 7), Bowshank (impacts reduced as railway is in a tunnel where it is closest to the farm), Lilac Cottage, Dry burn, Bowland Bridge, Cross Lee, Bowland, Casita, School House, Whitelee Toll, Whitelee House, Whitelee Farm, Cringe, The Whin, Buckholm, Torwoodlee golf course, Torwoodlee Mains and estate, St Mary’s and Balance House. Impacts will vary between slight and substantial with receptors closest to the route experiencing the greatest degree of impact, and those further away seeing less.

The route will continue to be visible from hillsides and hill tops along this section, but it will not look significantly different to the way it looks at present as the existing solum will be used.
Galashiels to Tweedbank

The final section of the route is complex and has the greatest potential for visual impacts as it is within the urban area of Galashiels.

From Torwoodlee Tunnel the route passes a campsite/caravan park on the outskirts of Galashiels. Receptors on the north west side of Wood Street will experience close views where the railway is routed along the existing solum. Residents of houses on the north side of Woodlea will be affected, and also those on the south side of Wheatlands Road. Further east users of the allotments will be affected, as well as residents on Wheatlands Road (3 houses to be acquired and demolished), Lea Brae, Plumtreehall Brae, King Street, Gauger’s Lane, Magdala Terrace, and users of and workers at Comely Bank Mill Retail Park. Several footpaths in this area will be closed and rerouted including the footpath / cycleway along the disused railway. Potential severance issues within this area may be potentially severe. Residents in Halliburton will see the railway from above (slight or insignificant impacts).

Continuing south east houses at the back of Wilderhaugh Street will experience slight or moderate visual impacts as vegetation is cleared along the existing line and river bank protection works are carried out. On the north side of the river the railway will be overlooked by residents on Magdala Terrace (substantial impacts upon closest properties) and in Sanderson Court (slight). Properties on the south side of High Buckholmside will experience substantial impacts as the railway will be very close to them. Mature trees will be removed, a new car park for 10 cars created, a new footbridge will be built, a new turning head created, a new path provided and a new high wall built alongside the back of a house adjacent to the railway. Workers at units accessed from Huntersbridge Road will experience moderate impacts. Viewers will see a new overbridge at Buckholmside and a crib wall to support the road.

East of Bridge Place workers at various retail outlets, the police station and St Andrew’s Art Centre on Bridge Street will experience moderate impacts. Houses on the north side of Chapel Street will be very close (substantial impacts), as will those on Stirling Street and Stirling Place (substantial). The realignment of Ladhope Vale Road and a footpath to accommodate a new Galashiels Station and platform, new retaining walls, and a new traffic interchange will result in substantial visual impacts in this area, although with good design and detailing there is scope for the change to be beneficial. Houses along High Road will experience moderate to substantial impacts as they overlook the changes.

East of here the route leaves the existing solum and considerable changes in buildings and road layouts are required, resulting in substantial, although potentially beneficial visual impacts. Beechbank Place will be acquired and demolished, a new roundabout created close to Our Lady and St Andrew Church. Currie Road will be realigned, as will Station Brae. And a new road
bridge will be built. Visual receptors include users of the town, both local residents and tourists at Our Lady and St Andrew Church, Anderson's Chambers, Health Centre, hotel, Gala Lane, Stirling Street, the bus station, Station Brae, High Road, Currie Road and Glenfield Road. Beechbank Mill will be acquired and demolished.

The route enters Currie Road Industrial Estate, requiring the demolition of 3 units here and a further 4 units in Langhaugh Industrial Estate. This whole area will be completely changed. Visual impacts will be experienced from Currie Road and from the footpath along the river, from Langhaugh Lane and houses on the south side of Melrose Road and Langhaugh Crescent. Borders College of Further Education will experience substantial visual changes and will result in a loss of environmental amenity. There will be new raised embankment supporting walls in views. The industrial estates will be redeveloped once the proposed railway is completed.

The railway now rejoins the existing solum, which is on embankment. There will be a new rail bridge over Glenfield Road West. The area for the new embankment will be cleared of trees, and the existing footpath will be closed. Visual receptors along Huddersfield Street, Glenfield Road West and East, Glenfield Avenue, Tulley Court, Larchbank Street, Waverley Place, Netherdale Cemetery, and Netherdale Industrial Estate will see the changes, impacts being substantial for residential viewers whose houses back onto the line, and slight where views are restricted.

The final section of the route continues along the old solum between Langlee Drive (moderate impacts) and Dale Street (slight impacts), north of the river. Receptors in Galashiels University (slight), along Woodstock Avenue (moderate), Winston Place (substantial) and Winston Road (moderate) will be affected. The long distance Southern Upland Way follows the existing solum here and this will be closed and rerouted. The River Tweed will be crossed on the existing 5 span masonry arch, which is an attractive townscape feature. The existing solum is followed east past houses along Tweedbank Drive and Essenside Drive to a new station, platform, shelter, roundabout and road access and sizeable park and ride car park (approximately 285 spaces). This will have substantial impacts upon residents and users along Tweedbank Drive.

11.7.3 Discussion of Visual Impacts

The above discussion indicates that a substantial number of visual receptors will be affected, to some extent. Those who are closest to it will experience adverse impacts, due to the loss of a corridor of vegetation, but those who are further away, and see the railway as a working feature, with views mitigated by tree planting in some places, and structures restored to their former glory may feel that their views have been improved, and that the change is beneficial. This is the case in some areas, such as Victoria Road in Newtongrange, where the old railway and buildings are barricaded and fenced off, and look unsightly at present. There will be a severe impact upon
those who use the present footpath / environmental corridor for employment and community links and leisure activities.

11.8 Construction Impacts

Enabling works are necessary to facilitate follow-on construction works. These enabling works would include:

- temporary fencing and accesses/ work compounds;
- temporary repairs to bridge decks to allow use by approved construction vehicles;
- devegetation/ clearance of the railway corridor;
- public utility diversion and protection works;
- undertrack crossings;
- temporary road works/ road diversions/ temporary bridges;
- river bank/ flood protection works;
- closure of footpaths and cycle ways and removal of lighting; and
- demolition of buildings and houses identified as obstructing the corridor.

Implementation at each of the major work sites will include the following operations:

- establish site compounds/ huts, temporary fencing, machinery and material delivery;
- enabling works including service diversions/ protection;
- establish traffic management control;
- piling including disposal of spoil and supply of concrete (probably ready mixed delivered by road);
- earthworks and disposal of spoil (by road);
- roadworks including laying of coated roadstone (delivered by road);
- erection of prefabricated units (steel and/ or concrete) delivered by road;
insitu concrete works including falsework, shuttering and reinforcement; and

reinstatement, landscape works, and de-mobilisation.

Temporary or medium term impacts (due to the length of construction time) upon landscape character and visual amenity will therefore result from:

- the presence in the landscape or view of exposed, unvegetated earthworks;
- construction plant, mobile cranes, site vehicles, other construction equipment and cleared/disused land;
- temporary site hoarding or structures such as site huts;
- temporary road and path diversions and changes in traffic flows; and
- on site lighting which may intrude into views.

Construction impacts on landscape, townscape and visual character will be adverse but temporary and will only be of any significance where they impact upon the character or views of the surrounding areas and where they are highly visible from residential properties.

Mitigation measures which will be adopted during construction include:

- design to avoid unnecessary tree and other vegetation removal. An 8m wide corridor will need to be cleared for the railway;
- the protection of valued features, particularly trees, during construction, using fencing to keep contractors out of areas where damage may result. British Standards Institute (1991), British Standard 5837: 1991 - Guide for Trees in Relation to Construction will be followed;
- control over working hours to ensure that the periods of greatest construction activity do not continue with the peak periods of open space use;
- control of night time construction lighting so that it does not impinge into sensitive views, such as views from bedroom windows for example;
- the maintenance of tidy and contained site compounds;
- the use of temporary hoarding to screen adverse impacts from view; and
- the spreading of topsoil, reseeding and planting as soon as possible after sections of work are complete.
Operational Impacts

Operational impacts upon landscape character and visual amenity will potentially result from:

- the introduction of new train movements into the landscape (half hourly service between 5.55 am and 12.30am each day);
- the introduction of new or additional road vehicle movements; and
- operational lighting and signalling.

Mitigation Measures and Landscape Design Principles

The baseline analysis undertaken for the EIA has identified the impacts of the proposed development on the landscape and townscape, and upon the visual environment. This has highlighted specific areas of concern where mitigation measures will need to be considered. Mitigation measures include the adoption of the following design principles:

- A high standard of design will be used for all structures, such as bridges and retaining walls, using local stone to reflect the character of existing buildings and structures (eg sandstone).

- There will be detailed design of specific features of the development including the materials used, the finished colours chosen (eg dark reds and greens to reflect the industrial heritage), so that the scheme fits well into the existing landscape/townscape character or enhances it where appropriate.

- There will be rationalisation and design of potentially intrusive new vertical features such as signposting, street lights and posts to encourage a coherent designed approach and minimise visual clutter, which may otherwise intrude upon views (this will be achieved by sharing mounting structures or utilising existing building facades and other structures).

- A distinctive language and bespoke designs will be developed for signage, street furniture etc. This may help in marketing the railway as a tourist route to the Borders, for example.

- Design of lighting for the development will ensure that it is kept to a minimum necessary for security and safety, and that it is appropriately designed to avoid undue intrusion into adjacent residential and rural areas. The design of street lights is also important as they will need to fit in with the existing townscape character.

- Opportunities will be taken to enrich the landscape and visual quality of the area for the future by careful landscape design of pockets of severed
land which have arisen out of the scheme (for example through severance). These will be used as public open spaces in towns or woodlands in rural areas.

- Opportunities will be maximised to expand and rationalise pedestrian and cycle circulation and introduce traffic management and calming schemes. The existing pathways and cycleways which are to be displaced will be re-routed, e.g. the 'Black Path' through Galashiels and into Tweedbank where the path also forms part of the Southern Upland Way.

- Screening to help hide the scheme from view will include tree and shrub planting both on and off the route, the use of earth mounding to screen views or the use of artificial screens in the form of fences and walls.

- Tree and shrub planting will be used to help integrate the scheme into its surrounding landscape, to anchor it and make it part of the landscape structure.

- A concept landscape design and landscape requirements will be developed prior to release of the tender and award of contract with input from the Local Authority. This will be developed by the contactor’s team as part of the tender process, and fully detailed up by professional landscape architects upon award of the contract to the successful bidder.

- Within the railway corridor, it is anticipated that screening works will be particularly required wherever the new railway is higher than the existing solum. The resulting new embankments should, in general, be densely planted. In Galashiels, works adjoining Magdala Terrace, Low Buckholmside, Glenfield Road and Langlee Drive/Woodstock Avenue are all affected.

11.11 Summary and Conclusions

The overall impact upon landscape resources will be moderate with mitigation, although there is the potential for substantial residual impacts in small section of the scheme. The impacts upon resources are also considerably reduced by the fact that the former railway formation is already an existing distinctive feature in the landscape, with many beneficial landscape and townscape resources of its own (attractive viaducts etc). Nonetheless, the overall impact is expected to be moderate but tree and shrub planting will be used to help integrate the scheme into its surrounding landscape.

A substantial number of visual receptors will also be affected as a result of the scheme. Properties closest to the proposed scheme will experience adverse impacts, due to the loss of a corridor of vegetation, but those who are further away, and see the Waverley railway as a working feature, with views mitigated by tree planting in some places, and structures restored to their former glory may feel that their views have been improved, and that the
change is beneficial (see Table 11.5 for a summary of impacts, mitigation and significant residual effects).
<table>
<thead>
<tr>
<th>Key Potential Impacts (without mitigation)</th>
<th>Mitigation</th>
<th>Residual Effects</th>
<th>Means by which mitigation will be delivered</th>
</tr>
</thead>
<tbody>
<tr>
<td>Railway infrastructure as a result of the scheme, including hard landscaping areas such as paved areas, seating, bollards etc.</td>
<td>Concept landscape design will be developed before the tender is let and will form part of the Contract Documentation.</td>
<td>A transport scheme and associated will be introduced into the landscape which will result in adverse impact on views.</td>
<td>Concept landscape design</td>
</tr>
<tr>
<td>Introduction of new rail infrastructure, train movements etc</td>
<td>Design to avoid unnecessary tree and other vegetation removal. It is acknowledged that an 8 m wide corridor will need to be cleared for the railway. The protection of valued features, particularly trees, during construction, using fencing to keep contractors out of areas where damage may result. (BS 5837: 1991 – Guide for Trees in Relation to Construction will be followed). Control over working hours to ensure that the periods of greatest construction activity do not continue with the peak periods of open space use. Control of night time construction lighting so that it does not impinge into sensitive views, such as views from bedroom windows. The maintenance of tidy and contained site compounds. The use of temporary hoarding to screen adverse impacts from view. The spreading of topsoil, reseeding and planting as soon as possible after sections of work are complete.</td>
<td>As above</td>
<td>Concept landscape design</td>
</tr>
<tr>
<td>Existing private spaces will be overlooked by users of the re-opened service.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
12 SOILS AND CONTAMINATED LAND

12.1 INTRODUCTION

Construction works that disturb contaminated land, in the absence of mitigation measures, present a risk of remobilising contaminants and causing additional contamination through drainage (ie surface waters and groundwaters) and to the air. In addition, exposure to contaminated material can potentially present a risk to those in its immediate vicinity.

12.2 ASSESSMENT METHODOLOGY

The study is based upon a review of the existing documents available for the study area including historical maps, geological and groundwater maps, published details of mine workings, previous investigations and testing.

For the purpose of this report the study area has been divided into two main sub-areas: the South East Wedge in the north and the Galashiels and Tweedbank area in the south. It is for these ends of the line that the vast majority of information is available and where potentially contaminative land uses are most well documented.

The area of land between these two extremes is rural in character with a few scattered settlements. It is possible that there may be minor issues of historical/ongoing contamination to the land through this section of the corridor, however, no specific areas of concern are presented in this study.

12.3 BASELINE ENVIRONMENT

12.3.1 Historical Land Use - South East Wedge

An extensive environmental audit of the South East Wedge has been carried out by Ironside Farrar/Carl Bro on behalf of Shawfair Developments Limited. The information in this sub-section is a summary based upon the findings of this audit, reported in September 2002.

The review included Ordnance Survey mapping dating from 1895 to 1995 and identifies several sites that may be sources of potential historical contamination in the South East Wedge.

The 1858 map shows a quarry, labelled as disused to the north of Niddrie Colliery No.11. The quarry is not shown on the 1958 edition and this land is now open land in agricultural use.
The 1895 map shows the site of Northern Niddrie Colliery. This site is identified as disused on the 1958 edition with a small gas works shown in this area. This area is now a disused spoil tip.

Also on the 1895 map is an Iron Works on the site of the present Millerhill Park.

The 1908 map shows Niddrie Eastern Pit No.14 and No 15 as disused. Subsequent editions of 1915, 1932 and 1958 indicate the presence of two small areas of spoil, absent in the 1968 edition. This land is in agricultural use at present.

Also on the 1908 map (and present to the 1966 edition) is Woolmet Colliery with an associated mineral railway system. This area is presently landscaped spoil.

The 1909 map shows New Craighall Colliery. By 1989 this is absent and on the 1995 edition the area is developed as Kinnard Park, it’s present use.

The 1932 map shows Niddrie Colliery, Southern Pit No.11 as being disused. The eastern area of this site being used for skip storage by UK Waste, the area is presently a disused spoil tip.

Also shown on the 1932 map is the Niddrie Brick Works, now open land under agricultural use.

The 1949 map shows several quarries within a 500m radius of Craigmiller Castle. Of these three are labelled as disused. The north-eastern quarry was in use between 1949 and 1955. The largest quarry, to the west, is shown as containing a smithy and a firework factory. This area is presently a site of Civic Amenity.

There is a Works shown in the eastern area of the South East Wedge that was, until the 1962 edition, shown as sewage works.

The 1968 map shows Monktonhall Colliery and associated tip to the north. The colliery is still evident today with the southern part being labelled Depot and a spoil tip still present.

The 1972 map shows a coal store in the eastern area. This remains a coal store on present editions.

The 1976 map shows Millerhill Marshalling Yards, also in the east. The western portion is no longer shown on the 1995 edition, but the eastern portion remains on present editions.

A number of other potential sources of historic contamination were identified, including:
- several breweries and adjoining railway line, now shown as Works and housing;
- a creamery on Niddrie Mains Road, now a depot;
- a former quarry north of Niddrie Mains Road, now open land;
- Niddrie Mill in the central area, still labelled Mill;
- former extensive railway sidings of the Millerhill Marshalling Yard demolished 1995 adjacent to the current sidings in the central area; and
- an electrification yard.

12.3.2 Baseline Conditions – South East Wedge

An assessment of contamination from historic sources has been confirmed, in part, during an additional study carried out by Carl Bro Group. This work was undertaken on land whose historic use was identified as potentially contaminative but which had not undergone subsequent redevelopment.

The areas of greatest concern included those with historic coal mining activities, in particular: Niddrie Colliery, Niddrie Colliery No.11, Niddrie Colliery No.14 & 15, Monktonhall Colliery and Woolmet Colliery.

Other areas of historic industrial usage of concern were: Millerhill Marshalling Yard, the Coal Store and the disused quarries and landfill site in the Craigmillar area.

These activities have been identified as presenting potential sources of historical contamination to shallow soils and groundwater due to the operations presumed to have been carried out at the sites. The expected contaminant groups associated with the sites were as follows:

- Coal Mining – heavy metals in colliery wastes, hydrocarbons from diesel storage, PCBs (polychlorinated biphenyls) from transformers and potentially combustible materials. There is also the possibility of mine gasses being present.
- Railway Ground – hydrocarbons, heavy metals, coal wastes, asbestos.
- Coal Store – potentially combustible material and hydrocarbons from fuel storage.
- Quarries – unknown fill.

Other minor sources of contamination identified included: garages, scrap yards, plant yards, farm buildings and fuel stores, sewage works, and small quarries and spoil heaps.
The confirmatory site investigation exercise carried out by Carl Bro Group was focused on the areas of greatest concern, identified above namely:

- Niddrie Colliery;
- Niddrie Colliery No.11;
- Niddrie Colliery No.14 & 15;
- Monktonhall Colliery; and
- Woolmet Colliery.

The investigations were limited in their scope and included testing of 15 samples for suites of compounds including: elements considered harmful to health (arsenic, cadmium, chromium, lead, selenium and mercury), elements considered to be harmful to plants (phytotoxic) (copper, nickel, zinc, and water soluble boron), a range of inorganic compounds (total sulphate, total cyanide and sulphide), organic compounds (Toluene Extractable Matter, phenols, and total petroleum hydrocarbons) and pH. The results of the tests were compared to guideline values provided by the Interdepartmental Committee on the Redevelopment of Contaminated Land (ICRCL) or where no guidelines were in place the values provided by the Dutch Ministry of Housing (ie for total petroleum hydrocarbons).

A review of the results indicated that for the following analytes the ICRCL threshold level was exceeded in at least one of the locations: arsenic (4 samples), cadmium (1 sample), selenium (4 samples), copper (1 sample), nickel (3 samples), zinc (4 samples), boron (2 samples), total sulphate (4 samples).

It must be noted that no testing was carried out within the actual site of Monktonhall Colliery but that samples were acquired from adjacent land. Nor was any sampling undertaken on the Craighall quarries.

In addition to this testing three samples of spoil from Niddrie Bing were submitted for leachability testing. The results indicated that the material from the bing was acidic and that some metals (particularly arsenic, nickel and zinc) were present in leachable form in these conditions.

The overall assessment of conditions in the areas tested confirmed that anticipated contaminants associated with the historic (and contemporary) site activities were present in the shallow soils. The concentration of the identified contaminants was within the expected range for such activities.

Other, current, potentially contaminative activities that were not identified in the mapping and not investigated include; landfill sites, garages and petrol service stations, farms, scrap yards, waste transfer sites and transport depots.
This subsection of the report has been compiled following a review of the available Ordnance Survey maps of the Galashiels and Tweedbank areas. The area reviewed encompasses a corridor of land some 250 m either side of the railway line, from a point approximately 2 km north of Galashiels centre in the north west to furthest extent of the current Tweedbank Industrial Estate in the south east.

The earliest maps date from 1862 but contain no detail in the study area. The first maps on which detail is depicted are the 1863 editions for Selkirkshire and Roxburghshire. The review includes all available editions up to and including the 2001 Ordnance Survey Plans.

The earliest map shows the railway line entering the study area close to the milepost (MP) 32 miles south of Edinburgh and leaving at the approximate position of the Edinburgh 36 MP. The study, therefore, includes a four-mile section of the railway at its southern extent.

The 1863 map shows the line of the railway as a branch of the North British Railway. The line is carried through a number of cuttings. Galashiels is developed as a small town with a railway station. There are a number of Woollen Mills both along the banks of Gala Water and adjacent to the railway line. Several quarries and small gravel pits are shown along the route. At the entrance to Galashiels there is a burial ground within 70 m on the line. Close to the centre of Galashiels a tannery is shown approximately 150 m south of the line.

The 1899 maps shows the route as the North British Railway, Edinburgh & Carlisle branch, with the Edinburgh, Peebles and Galashiels section entering the study area from the west and running alongside to Galashiels. The number and size of the woollen mills throughout the route has increased with many of the individual mills being named on the map. The size of Galashiels, in general to the south of Gala Water and the railway, has increased significantly. In the centre of town there is a network of railway sidings shown to the south of the station. Directly south of 34 MP, Eastlands Cemetery has been built, on the edge of which (some 250 m from the line) is Eastlands Hospital, marked as a facility for infectious diseases. Between 34 MP and 35 MP, at the bend in the river where Gala Water enters the River Tweed, a Gas Works is shown with associated sidings, centred at 250 m south of the line. A number of gravel pits are shown.

The 1900 map does not cover the Tweedbank area. The details are as the 1899 edition.

The 1924 map shows a Dye Works some 100 m north of the line, approximately 1 km south of 32 MP. The Gravel Pit, some 700 m north of 36 MP, shown on the 1899 edition, immediately adjacent to the railway line, has been expanded to the north and partially in-filled to the south (track-side). A Sewage Works is shown in the triangle of land formed by the confluence of
Gala Water, the River Tweed and the railway line, south of the line, some 500 m south of Selkirk Junction. Otherwise, the mapping shows little change from the earlier edition.

The 1930 map does not cover the Tweedbank area. The railway line (labelled LNER) is shown to be twin track from its emergence from the tunnel 150 m north of 32 MP, through to Kilnknowe Junction. A Gravel Pit is shown some 200 m south of 32 MP, at a distance of approximately 100 m north of the line.

The 1957 map shows the section of twin track has been removed. Additional track has been constructed around the Gas Works. Further, slight in-fill of the gravel pit, 200 m south of 32 MP, is shown adjacent to the track.

The 1967 map covers the east of Galashiels and the Tweedbank section and shows extension to the Works on the south side of the line, close to Selkirk Junction. New housing has been built directly north of Selkirk Junction and a small, new Works is shown on the west bank of the Tweed, some 150 m to the north side of the line, where the railway line crosses the river.

The 1971 map does not cover the east of Galashiels and Tweedbank section. It shows the track from the former Edinburgh, Peebles and Galashiels Branch as having been lifted. The gravel pit 200 m south of 32 MP has been partially in-filled. A former mill, some 750 m south of 32 MP and virtually adjacent to the railway, is labelled as a Depot.

The 1983 map covers the area north of grid line 63500 and shows the railway to be dismantled through the study area. The gravel pit 200 m south of 32 MP has been completely in-filled. Allotments are shown directly to the south of the line, at the site of the former Nursery at Kilnknowe. The railway station at Galashiels is no longer present and the sidings to the south of the station have been removed. The former Gas Works is shown as a Gasholder Station and some of the structures have been removed along with the rail lines which are shown as dismantled. There has been some expansion of the sewage works, at what is now named Galafoot. Directly north of the sewage works an Abattoir is labelled, some 50 m north of the route.

The 1993 map covers the area south of grid line 635000. The area of Tweedbank is shown as housing and in the south easternmost section is Tweedbank Industrial Estate. The former gravel pit, 700 m north of 36 MP, is shown as a disused quarry.

The most recent maps, dated 2001, show a reduction in the size of both the Gasholder Station (not labelled) and the Sewage Works, and a slight extension to the Tweedbank Industrial Estate.
12.3.4 Baseline Conditions - Galashiels and Tweedbank

During the compilation of this report there was no access to the results of any previous investigations carried out through this section of the line. However, a database search of current activities that are potential sources of contaminants was carried out. The baseline conditions, therefore, are estimated by reference to this database and the results of the review of historical maps.

The review revealed that the area had a long history of textile manufacture (from before 1863) and that many of the woollen mills were situated adjacent to the banks of Gala Water and the route of the railway. There is potential for historic contamination of the soil from chemicals used in the manufacture and processing of woollen goods, including bleaches, de-greasing agents and dyes.

There were a number of small quarries and gravel pits noted on the maps during the historical review. Of these, two sites were of particular note:

- Gravel Pit 200 m south of 32 MP (completely in-filled), now on the Wheatlands Industrial Estate. The database search indicates that this is the location of a registered waste treatment or disposal site operating as a scrap yard (see below).

- Gravel Pit 700 m north of 36 MP, currently shown as disused, but partially in-filled in the past.

The details of re-instatement or restoration of many of these quarries and gravel pits is not known and where in-fill has taken place these sites must be considered to be potential sources of contamination.

A number of other sites registered as landfill or waste disposal/transfer facilities were present on the database. These were:

<table>
<thead>
<tr>
<th>Table 12.1</th>
<th>Sites Registered as Landfill or Waste Disposal / Transfer Facilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site</td>
<td>Description</td>
</tr>
<tr>
<td>Sykes Acre (Landfill)</td>
<td>dated 01 February 1986 - authorised waste: builders rubble, excess spoil from public utilities operations, inert demolition waste, stone, soil - licence lapsed/ cancelled/ defunct/ not applicable/ surrendered.</td>
</tr>
<tr>
<td>Winston Road (Transfer)</td>
<td>date 19 June 1999 - authorised waste: oil from transformer and switch gear equipment - may not be working.</td>
</tr>
<tr>
<td>Millpark, Wheatlands Ind. Est. (Treatment or disposal)</td>
<td>dated 06 January 1999 - authorised waste: scrap metal and mineral oil waste - operational.</td>
</tr>
</tbody>
</table>
A search of current trade directories identified a number of commercial/industrial activities that may, potentially, be sources of contaminants. These included: motor vehicle workshops, filling stations (3), car sprayers and paint manufacturers, textile manufacturers, engineering works, an abattoir, meat wholesaler, commercial cleaning, printers and copiers, paint supplier, printed circuit manufacturers, builders merchants, photographic processors, building services and dry cleaners.

12.3.5 Potential Substances associated with Railways

In addition to the potential sources of contamination, both defined by previous investigations and estimated from desk study and historical review, the Department of the Environment has produced an industry profile that identifies a range of contaminants specifically associated with the operation and former operation of railways.

The list of possible substances that may be predicted in such situations is:

- Hydrocarbons (diesel, lubricating and paraffin);
- Polychlorinated Biphenyls (PCBs);
- Polyaromatic Hydrocarbons (PAHs);
- Solvents;
- Creosote;
- Ferrous residues;
- Metal fines;
- Herbicides;
- Asbestos;
- Sulphates;
- Fill Materials - Phenols/ sulphate/ metals, etc; and
- Ethylene glycol.

12.4 GEOLOGY AND HYDROGEOLOGY

12.4.1 Mapping

The Waverley route is included on the 1:50,000 British Geological Survey Maps: Edinburgh (Scotland Sheet 32) (Solid) and (Drift), and Galashiels (Scotland Sheet 25) (Solid) and (Drift).

12.4.2 Geology

Solid Geology

The route traverses a fairly complex sequence of solid geology, particularly in the northern area, both in terms of the different lithologies present and
structure. The rocks are of sedimentary origin; however, minor intrusive igneous rocks are present in the region as a whole.

The solid geology present in the study area (in the general direction north to south) comprises:

Table 12.2 Solid Geology Within the Study Area

<table>
<thead>
<tr>
<th>Type of Solid Geology</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Carboniferous</strong></td>
<td></td>
</tr>
<tr>
<td>Middle Coal Measures</td>
<td>Cyclic sequence of white, grey and brown sandstones and siltstones, dark grey mudstones, and coals and seatclays, several of the coal seams formerly worked. Locally the strata are reddened, with coals destroyed or replaced by carbonate. (Westphalian Coal Measures)</td>
</tr>
<tr>
<td>Lower Coal Measures</td>
<td>Cyclic sequence similar to Middle Coal Measures. Several of the coal seams have been extensively worked. At a few locations the strata are reddened and coals replaced with carbonate. (Westphalian Coal Measures)</td>
</tr>
<tr>
<td>Passage Group</td>
<td>Sandstones, pebbly in places, with mudstones, seatclays, a thick coal in the north-east part of the Midlothian Coalfield, several very thin coals. Thin conglomerates are present in some places and at some localities the strata is reddened. (Namurian Millstone Grit Series)</td>
</tr>
<tr>
<td>Upper Limestone Group</td>
<td>Cyclic sequence of sandstones, siltstones, mudstones, marine limestones, coal and seatclays. Three of the coal seams may have been worked. (Namurian Millstone Grit Series)</td>
</tr>
<tr>
<td>Limestone Coal Group</td>
<td>Cyclic sequence of sandstones, siltstones, mudstones, coals and seatclays with two prominent marine bands and several Ligula bands. The sequence is thickest in the Loanhead area and thins to both the south and east. Many of the coals have been extensively worked. Carbonate beds replace coals in several areas. (Namurian Millstone Grit Series)</td>
</tr>
<tr>
<td>Lower Limestone Group</td>
<td>Cyclic sequence of sandstones, siltstones, mudstones, marine limestones, coal and seatclays; there are three main beds of limestone and three coals have been worked. Decalcification of the limestone has led to local beds of ochre, and solution cavities and swallow holes are present. The group is thickest between Portobello and Loanhead and thins rapidly southwards and less markedly to the east. (Dinantian Carboniferous Limestone Group)</td>
</tr>
<tr>
<td><strong>Ordovician</strong></td>
<td></td>
</tr>
<tr>
<td>Calciferous Sandstone Measures</td>
<td>Purple, red, yellow and white sandstones with pebbly and conglomeratic bands and beds of red, white and green mudstone in the Borthwick-Middleton area and the south-east of the district. (Dinantian Carboniferous Limestone Group)</td>
</tr>
<tr>
<td><strong>Silurian</strong></td>
<td></td>
</tr>
<tr>
<td>Buckholm Grits</td>
<td>Massive grits with greywacke and shales. (Llandovery Gala Group)</td>
</tr>
<tr>
<td>Abbotsford Flags</td>
<td>Purple and grey flaggy sandstones. (Llandovery Gala Group)</td>
</tr>
</tbody>
</table>
Structurally the Lothian Region is characterised by quite strongly folded rocks and strata with greatly varying magnitude and direction of dip. There are a number of significant faults in the region, particularly in the coalfields areas. The Dunbar Gifford Fault is aligned adjacent to the former railway in a cutting to the east of Borthwick Mains. Faulting is less prevalent in the southern part of the route, in the Borders Region, where the sedimentary rocks are also folded with varying dips.

Soil

The natural superficial deposits beneath the route are mainly Glacial Till (Boulder Clay), of well-consolidated, silty clay or sandy clay, containing numerous rounded pebbles and boulders of predominantly local rock and less common exotics. At Eskbank and Galashiels fluvio-glacial sands and gravels are present. Recent alluvial deposits of clay, silt and sand flats are present over the flood plain of Gala Water.

Details of the agricultural classification of soils along the route of the line are contained in The Macaulay Institute for Soil Research, Soil Survey of Scotland, Edinburgh (Sheet 66). The route passes through a wide variety of soil classifications. In general the northern part of the line is within; “Unclassified Land” (Built-up areas, quarries and gravel workings, collieries and bings) and “Land Suited to Arable Cropping” (Capable of producing crops within the range very wide to moderate). The southern part of the route (south of Borthwick) is within; “Land Suited to Arable Cropping” (Capable of producing a narrow range of crops) and “Land Suited Only to Improved Grassland and Rough Grazing”.

Coal Mining

Extensive historic coal mining activities have been identified in the South East Wedge and are detailed in the historical review section. Information from the Coal Authority suggests that mining has been carried out since the late eighteenth century. In some sections the corridor may be undermined by workings, the shallowest of which is believed to be some 73 m below corridor of existing railway. There are records of coal seams in the vicinity of the corridor, at depths of 12-18 m below ground level. Some voids have been recorded during drilling investigations. In addition, the current mining / ground investigation for the proposed route through the South East Wedge encountered workings at depths of 13 m (packed waste).

The majority of coal mining activity was brought to an end in the middle to latter stages of the nineteenth century, however, Woolmet and Monktonhall Collieries continued to work very deep seams until the late twentieth century.

From Millerhill to Gorebridge the main geotechnical risks are associated with former mine workings, the area being extensively mined for coal with both shallow and deep workings which have been left unfilled and abandoned. Uncharted shafts would also be a problem. These risks are considered to be low with respect to the former line of route but where it is proposed to change this (i.e. at South East Wedge) and where major work to structures such as Glensk Viaduct and Newbattle Viaduct may be under, or come within, the
influence of mine working settlement, further ground investigations and structural assessment is recommended. Also scour from their underlying rivers may affect these two structures.

Hydrogeology

Groundwater conditions are expected to vary throughout the study area. The depth to groundwater will be influenced by the surface conditions, the surrounding topography and underlying geology. In addition, the South East Wedge will be influenced by its former coal mining activity and, in some cases, continuing pumping of mine waters (i.e. Monktonhall Colliery).

Groundwater vulnerability along the route of the railway has been assessed by inspection of the British Geological Survey Groundwater Vulnerability Map of Scotland. The classification of groundwater vulnerability varies along the route.

In the most northern part the solid geology is moderately permeable and is overlain by soil generally low or non-permeable drift deposits. Groundwater vulnerability is considered to be low.

Through the coalfields area the solid geology is highly permeable and is overlain by soils with leaching potential that varies from high to low. The superficial drift deposits are generally low permeability but the extent of these in both vertical and lateral extent is not known precisely. Groundwater through this part of the route is considered to vary from high to low vulnerability.

South of the coalfields the route passes through solid geology of weak permeability for a short section, where groundwater vulnerability is low.

For the remainder of the route, south of Falahill, the line generally follows the course of the Gala Water river. Within the corridor of the river the solid geology is moderately permeable. To either side of this narrow strip the solid geology is of weak permeability. Groundwater through this section of the route is of low vulnerability. The former rail corridor and the meandering Gala Water run together for some 16 miles with the line crossing the river 19 times. Associated with the common routing are problems of flooding, scour of bridge sub-structures, erosion of riverbanks/embankments and drainage.

In estimating groundwater sensitivity, assessment must be made of the presence of a contaminative source and a potential receptor, between which a pathway exists. Assessment of the conditions present in the environmental setting of the study area, suggests that groundwater sensitivity within the corridor may be considered as moderate to low.
12.5 **Assessment of Impacts**

12.5.1 **Introduction**

This section describes the potential environmental effects on soil and geology resulting from the activities of both the construction and operation phases of the scheme. In addition, potential impacts of disturbing contaminated land on receptors such as construction workers, building materials and surrounding properties are outlined.

12.5.2 **Construction Impacts**

Construction activities can have a number of adverse impacts on soil and geology. The use of heavy machinery on site, particularly in wet weather, can cause severe soil compaction. This can occur to soils being moved and those being traversed by machinery. Soil compaction can adversely affect the drainage characteristics of the soil, which in turn can result in increased surface run-off and increased transfer of pollutants to surface waters. Deterioration in the physical quality of the soil can also occur through mixing contrasting soil materials or layers, or through contamination by other materials.

There will be a significant volume of soil excavated during the construction activities which, according to the available information, may include contaminated material (criteria of contamination levels shown in Appendix K). This material is likely to have limited potential for re-use within the scheme, and will therefore require disposal.

A number of construction activities have the potential to contaminate soils on and adjacent to the site, either by accidental spillage of materials, or by the mixing of soils with construction materials.

If contaminated soil or groundwater is encountered in the course of the excavation and construction work, the potential exists for a number of impacts as follows:

- excavation of contaminated soil may result in the release of pollutants to groundwater or surface water;
- release if contaminated dust to the air causing a nuisance / health effect to local residents and workers; and
- damage to building materials if certain aggressive pollutants are present.

Potential impacts of construction on geology can include the triggering of ground instability such as subsidence, the alteration of groundwater levels and flow, and impacts on geological features which are designated sites of scientific interest and importance. Piling and other temporary support structures may cause horizontal barriers to groundwater flow, causing
groundwater levels immediately uphydraulic gradient of the works to rise above their natural levels.

12.5.3 Operational Impacts

There is likely to be minimal impact to the soils during the operational phase of the railway.

12.6 Mitigation Measures

The historic and ongoing land use in the study area suggests that there is significant potential for the presence of contaminants in the ground.

Works carried out during the project present a potential risk for the remobilisation of existing contaminants and introduction of new contaminants through site works, in particular by groundwater drainage from new excavations. However, groundwater sensitivity is not high and with the application of good site practice impact to the groundwater should be insignificant.

The concessionaire will be expected as part of the CoCP to undertake site investigations in all areas where environmental setting suggests that contaminated material may be present. The criteria for the investigation must be included at the detail design stage. The results of site investigation shall to be used in the development of the management plan for handling and disposal of contaminated material where present, and shall be used to design measures for the control and prevention of re-mobilised of contaminated material. The plan should, as appropriate, provide methods for the testing of material prior to its re-use or disposal. Excavation material deemed to be contaminated must be disposed to an appropriate licensed facilities (including drainage and discharge water).

Options for the reuse of spoil and / or demolition waste, depending on the condition of the material, may include the following:

- fill material for, for example, for the construction of some of the embankments;
- modifications to site levels; and
- landscaping.

Any surplus spoil will also be recovered and made available to third parties for reuse on local development projects. The reuse of waste ballast may be also appropriate in some circumstances and this will be investigated during the construction programme.
The site investigations must be carried out prior to the commencement of any construction works. Included within the site investigations must be measures to monitor potentially contaminative compounds within both soil and groundwater. Samples of soil and groundwater must be subject to chemical analysis to include an appropriate suite of compounds. The results of testing must be compared to the relevant guidelines (e.g. Contaminated Land Exposure Assessment - CLEA, Interdepartmental Committee on the development of Contaminated Land - ICRCL) for each analyte or subjected to a risk assessment protocol (e.g. American Society for Testing and Materials, Risk Based Protective Action - RBCA, Tier I/II).

The results of groundwater measurements must be used to determine the short-term effect on the existing groundwater regime for any proposed construction methods and to ensure that current groundwater resources are protected from contamination during the period of the works.

Construction methods employed within the scheme must be designed to prevent significant short-term and residual impact to both the groundmass and groundwater conditions at the sites. Where sub-surface structures are constructed, such as piles, the techniques employed should be developed in accordance with the guidance provided in National Groundwater and Contaminated Land Centre report NC/99/73, Piling and Penetrative Ground Improvement Methods on Land Affected by Contamination: Guidance on Pollution and Prevention. The results of the site investigation must be taken into account to ensure that the most appropriate method of construction for each site is designed.

All materials used in the construction must be of clean, inert composition. No material that may be a source of significant potential contamination must be introduced into the sites.

The results of the chemical analysis must be used to develop an appropriate management plan to provide for safe handling and disposal of material arising from the construction works and in the provision of health, safety and welfare documentation prescribing the measures required for personal protection of workers within the project. The management plan must be developed in compliance with the relevant statutory regulations and must ensure that both short and long-term impacts to personnel and the environment due to the re-mobilisation of contaminants are avoided.

12.7 SUMMARY AND CONCLUSIONS

Implementation of the management plan will ensure that residual effect to the ground is minimized. A draft Code of Construction Practice (CoCP) has been developed for the scheme (a copy is provided in Appendix D).

In areas where contaminated land is present, the ground must be treated in such a way as to minimize risk to potential receptors. This may require the
removal of contaminated material, in-situ treatment or encapsulation. The long-term effect of these activities will be to remove or isolate from the immediate environment, an existing source of contamination (see Table 12.3 for a summary of impacts, mitigation and significant residual effects).
<table>
<thead>
<tr>
<th>Key Potential Impacts (without mitigation)</th>
<th>Mitigation</th>
<th>Residual Effects</th>
<th>Means by which mitigation will be delivered</th>
</tr>
</thead>
<tbody>
<tr>
<td>Potential risk for the remobilisation of existing contaminants and introduction of new contaminants through the site works, in particular by groundwater drainage from new excavation.</td>
<td>Development of a management plan for the handling and disposal of contaminated material where present, and shall be used to design measures for the control and prevention of re-mobilised of contaminated material.</td>
<td>Good site practice will ensure that residual effect to the ground is minimised.</td>
<td>Management Plan and CoCP</td>
</tr>
<tr>
<td>No material that may be a source of significant potential contamination must be introduced to the sites.</td>
<td>All materials used in the construction must be of clean, inert composition.</td>
<td>As above</td>
<td>Management Plan and CoCP</td>
</tr>
</tbody>
</table>
13 SOCIO-ECONOMICS

13.1 INTRODUCTION

Experience of other major transport infrastructure investments suggests that significant social and economic effects can be generated through improvements in accessibility and reliability of transport links and generally raising the perceptions and image of an area. Consequently, these factors should stimulate levels of economic activity and employment and improve the economic and social welfare of those living and working in the area of influence of the Waverley line.

13.2 ASSESSMENT METHODOLOGY AND CRITERIA

The evaluation of the socio-economic impacts of the proposed railway line draws on the following reports:

- Economic Activity and Locational Impact Appraisal Report (EALI), Halcrow Group Ltd, 2003; and

The principle results for the socio-economic assessment for the Waverley line is drawn from the DTZ Pieda Consulting report. They were appointed in November 2002 by Scottish Enterprise to undertake a full economic impact assessment of the re-opening of the Borders Railway line. The objectives of the study are to measure the economic development impact of the reinstatement of the Waverley line between Edinburgh and Tweedbank.

The study has involved a combination of desk research, consultations and a case study survey of businesses most likely to be affected by the re-opening of the railway line. This section of the ES provides a brief overview of this report and the key findings.

13.3 BASELINE ENVIRONMENT

13.3.1 City of Edinburgh

- Population of 449,000 in 2001, which represents an increase of almost 7% since 1991.
Relatively high proportion of the population aged 16-24 (14.4%) compared to Scotland as a whole (11.2%).

300,400 people employed in Edinburgh in 2001, which represents growth of 8% since 1998.

The largest sector was banking, finance and insurance accounting for over 32% employment in 2001. Edinburgh has a rate of unemployment which is 2.2% below the Scottish average 3.4% in March 2003.

The Edinburgh workforce is also highly skilled with approximately 37% of the population of working age holding a degree level qualification or higher. The Scottish average is 26%.

13.3.2 Midlothian

The population of Midlothian was 81,000 in 2001, which represents an increase of 2.4% since 1991.

Employment in Midlothian was 24,800 in 2001, which is an increase of over 11% since 1998. The largest sector if public administration, education and health which accounts for over 30% of employment and has grown by 25% over 1998-2001.

Midlothian has a rate of unemployment which is very low (1.8%) by national standards and must represent near full employment.

In terms of qualifications, the proportion of the workforce in Midlothian with degree level qualifications or higher is just below the Scottish average.

13.3.3 Scottish Borders

The population of the Scottish Borders was 107,000 in 2001, which represents an increase of 3% since 1991.

Employment in the Scottish Borders was 41,200 in 2001, which is an increase of 7% since 1998. Employment in the Scottish Borders is dominated by three sectors - public administration, education and health, hotels and restaurants and manufacturing.

The rate of unemployment in the Scottish Borders is relatively low at 2% (2.1% in March 2003) not much above the effective full employment level.

The proportion of the working age population with degree or higher qualifications is equivalent to the Scottish average.
13.3.4 Overview

From the brief overview it is possible to conclude that of the three local economies the Scottish Borders are characterised by a relatively ageing population working in relatively low value industries which is reflected in very low average weekly earnings. One of the key economic development aims for the Scottish Borders is to shift labour from low value/low wage activities into higher value activities.

13.4 Employment Impacts

13.4.1 Construction Impacts

The construction phase will be temporary, lasting for a period of approximately 3 years, and the socio-economic impacts arising during this phase will be relatively short lived. The primary economic impacts relating to employment generated by the construction process result from:

- direct employment on site;
- indirect employment relating to supply of materials and services to the construction process; and
- induced employment generated by the expenditure as discussed above.

In estimating the economic impact of the construction phase, a key consideration is the extent to which local people will benefit from the employment opportunities. Associated with these employment impacts will be the injection of income into the area from construction wages and purchase of goods and services from local suppliers. There might be negative effects on local business if demand for labour during the construction period produces shortages of labour and resultant wage increases. Given the timescale of the construction period, this seems unlikely.

13.4.2 Permanent Job Creation

There will be permanent job creation as a direct result of the railway such as train drivers, train conductors and other railway related operations. This would amount to approximately an additional 30 employees. It is likely that stations will be unstaffed and that any self-service ticket machines at stations would be maintained by a travelling team based in Edinburgh.

It is noted that Scottish Borders Council propose to develop a public transport interchange at Galashiels – with commercial and business potential. The park and ride facility at Tweedbank and associated infrastructure will also provide a stimulus to the existing local economy and increase the potential for wider demand.
It is expected within a few years of the opening of the railway line in 2008, through investment promotion and a “bulking out” of the economy in the Borders, to cater for a growing residential population. We would expect new settling employers to offer competitive wages though these would still be less than those of Edinburgh, to account for travel costs.

The re-opening of the railway line will provide the local population of the Scottish Borders and Midlothian with an alternative means of access to Edinburgh for employment and other trip purposes (ie leisure / visitor etc). This may encourage increased commuting, particularly as there is currently a substantial earnings differential between the Scottish Borders / Midlothian and Edinburgh. Such journeys will also be a 2-way process, enabling visitors based in Edinburgh to visit the Borders.

13.4.3 New Housing

The construction of the Waverley line may permit an increased amount of housing development. In estimating the economic impact of this new housing it is assumed that the occupiers of this housing in the Scottish Borders will be people who would otherwise locate elsewhere in the Edinburgh housing market.

The Scottish Borders Council Structure Plan estimates that additional housing growth of up to 1206 units will be required as a direct consequence of achieving a railway link.

13.5 Economic Impact

The proposed railway line will have employment and income generating effects upon the local economy and will support the employment generating impacts of other regeneration initiatives in the South East Wedge and in the Borders. The nature of the opportunities will enable the local labour force to take advantage of new employment prospects and secure new skills.

For example, potential benefits include:

- development of a modern, balanced economy that is less reliant on traditional manufacturing industries by developing new opportunities, but at the same time building on the area's strengths in the manufacturing sector in order to compete strongly for new business opportunities;

- reduced levels of unemployment; and

- enhancing the image of the local economy to make it more attractive both to inward investment and to its residents.

The DTZ report provides a summary of the potential impact on the key sectors of the local economies and Scotland as a whole, shown in Table 13.1.
<table>
<thead>
<tr>
<th>Year of Assessment To 2015 Sector</th>
<th>Summary of impacts</th>
<th>Local</th>
<th>National</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Gains/Gainers</td>
<td>Losses/Losers</td>
<td>Gains/Gainers</td>
</tr>
<tr>
<td>Manufacturing and processing</td>
<td>Borders: £87,000 to £262,000 gains in productivity.</td>
<td>Zero</td>
<td>Borders: Possible loss of business to Edinburgh retailers.</td>
</tr>
<tr>
<td></td>
<td>Midlothian: Zero</td>
<td></td>
<td>Midlothian: Zero</td>
</tr>
<tr>
<td></td>
<td>Edinburgh: Zero</td>
<td></td>
<td>Edinburgh: Zero</td>
</tr>
<tr>
<td>Locally traded services</td>
<td>Borders: £71,000 to £214,000 gains in productivity.</td>
<td>Borders: Possible loss of business to Edinburgh retailers.</td>
<td>Productivity gains as local.</td>
</tr>
<tr>
<td></td>
<td>Midlothian: Zero</td>
<td></td>
<td>Midlothian: Zero</td>
</tr>
<tr>
<td></td>
<td>Edinburgh: potential increase in businesses from Borders residents.</td>
<td>Edinburgh: Zero</td>
<td></td>
</tr>
<tr>
<td>Externally traded services</td>
<td>Borders: £218,000 to £655,000 gains in productivity.</td>
<td>Zero</td>
<td>Borders: Possible loss of business to Borders</td>
</tr>
<tr>
<td></td>
<td>Midlothian: Zero</td>
<td></td>
<td>16 to 24 jobs</td>
</tr>
<tr>
<td></td>
<td>Edinburgh: £1.9 million to £2.9 million GDP, 80 to 119 jobs.</td>
<td>Edinburgh: Zero</td>
<td>GDP of £384,000 to £576,000</td>
</tr>
<tr>
<td>Inward/mobile investment</td>
<td>Borders: £0 to £1,470,000 GDP, 0 to 85 jobs</td>
<td>Zero</td>
<td>Zero</td>
</tr>
<tr>
<td>Category</td>
<td>Borders</td>
<td>Midlothian</td>
<td>Edinburgh</td>
</tr>
<tr>
<td>----------------</td>
<td>----------------------------------------------</td>
<td>--------------------------</td>
<td>-------------------------</td>
</tr>
<tr>
<td><strong>Tourism</strong></td>
<td>£87,000 to £121,000 gains in productivity.</td>
<td>Minimal impact on one tourism business which is not quantified.</td>
<td>Zero</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Construction</strong></td>
<td>£1.1 million to £2.2 million in income</td>
<td>Zero</td>
<td>Productivity gains as local 3 to 6 additional employees</td>
</tr>
<tr>
<td></td>
<td>61 to 121 man years per year over 2008 to 2012</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Residents</strong></td>
<td>Population increase of 3,300</td>
<td>£11,000 to £18,000 GDP</td>
<td>£19,000 to £31,000 GDP Less than 2 jobs</td>
</tr>
<tr>
<td></td>
<td>£908,000 to £1,813,000 GDP</td>
<td>57 to 112 jobs</td>
<td></td>
</tr>
<tr>
<td></td>
<td>£11,000 to £18,000 GDP</td>
<td>Approximately 1 job</td>
<td></td>
</tr>
<tr>
<td><strong>Total gross impacts</strong></td>
<td>Borders: 64 to 216 jobs £1.6 million to £4.9 million GDP</td>
<td>Midlothian: 1 job £11,000 to £18,000 GDP</td>
<td>Edinburgh: 80 to 119 jobs £1.9 million to £2.9 million GDP</td>
</tr>
</tbody>
</table>
13.6 **Mitigation Measures**

Scottish Borders Council is committed to securing the successful implementation of the proposed railway line and the consequent economic and employment benefits. In addition, the Scottish Borders Council will make every reasonable effort to ensure that any temporary disruption to businesses is minimised. No other socio-economic mitigation measures are required.

13.7 **Summary and Conclusions**

The economic audit undertaken by DTZ reveals that the central and eastern Scottish Borders area has significant potential for economic development beyond that existing at present or during the construction of the railway line to 2008. While suffering from an ageing population, the Borders boasts a well educated population of young people, many of whom go on to Higher Education. However, it is clear that many never return to the Borders since employment opportunities are limited in the absence of a robust and balanced economic structure with a mixture of primary, industrial processing and technology industries.

The greatest impact is on the Scottish Borders economy where 63 to 213 jobs and income of £1.6 million to £4.9 million per year could be created as a result of the project. This excludes the short-term income and employment created in the construction industry as a result of the increased housebuilding which will be a direct consequence of the restoration of the railway. Some 61 to 121 man-years of employment and £1.1 million to £2.1 million of income is estimated to be created in the construction industry per year for a five year period. Within the Scottish Borders, the majority of employment on an annual basis is associated with the expenditure of the increased population arising from the additional houses which are constructed as a result of the railway.

The total value of benefits to the three local authority areas and Scotland over a 30 year period (2008-2037) is shown in Table 13.2 with the present value of these benefits.

| Table 13.2 Value of Benefits Over 30 year Period, 2008 and 2012 - DTZ Pieda Consulting |
|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|
|                                   | Scottish Borders £ million | Midlothian £ million | Edinburgh £ million | Scotland £ million |
| **Total Value**                   | 129.1                        | 6.5                  | 13.4                | 43.2                |
| **Present Value**                 | 64                           | 3.4                  | 6.9                 | 22.2                |

The socio-economic benefits arising from the proposed railway line are potentially considerable. It will hopefully significantly impact on the performance of the local and regional economy. In particular, the proposed line will benefit the Borders economy, through reducing travel times to the
centre of Edinburgh, through improving access for customers and tourists and by improved reliability of public transport services.
The benefits arising from the proposed railway line are potentially considerable. It is expected to significantly impact on the performance of the local and regional economy. In particular, the proposed line will benefit the Borders economy, through reducing travel times to Edinburgh, through improving access for customers and tourists and by improved reliability of public transport services.

The proposed scheme is in accordance with national, regional and local transport policies which seek to encourage more sustainable and integrated forms of transport. It is also in accordance with local planning policies which seek to reduce the impact of traffic on the environment and to encourage walking, cycling and the use of public transport.

The introduction of the proposed railway line will, however, remove a valuable resource from the community. Currently the existing solum is predominantly used between Eskbank to Gorebridge and in Galashiels as a footpath and cycleway, which enables the local communities to travel safely and quickly to places of work and as an amenity. Within the remaining areas, predominantly Gorebridge to Galashiels, the existing solum is predominantly used to access agricultural fields and moving animals and machinery away from local highways. Within the urban sections an alternative route has been proposed by the Local Authority to replace this lost resource and some footbridges and access will be provided along the route in rural areas to minimise severance caused by the scheme.

The scheme is located within a valuable ecological landscape resource providing habitats for a number of protected and rare flora and fauna. The area is dominated by the River Tweed SSSI and cSAC which includes the River Tweed and its tributaries, such as the Gala Water. The Tweed and its tributaries are clean river systems of high conservation and ecological value that support a diverse range of plant and animal species. The presence of otter, badger, reptiles, bats, amphibians and areas of semi-natural habitat have been identified along the route. Mitigation measures, such as badger fencing and habitat creation, will be incorporated into the scheme to minimise any potential impacts.

The previous railway line was built in the 1840s for the key purpose of supporting growing industry (mainly coal mining and textiles) and, therefore, the potential presence of contamination is high within two main areas, the South East Wedge and Galashiels. This ground will be treated in such a way as to minimise risk to sensitive receptors. The implementation of a management plan will ensure that residual effects to the ground are minimised and a draft Code of Construction Practice has been developed for the scheme.
Appendix A

Information to be Included in Environmental Statements
Table A.1  Information to be Included in Environmental Statements

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Where located in ES</th>
</tr>
</thead>
<tbody>
<tr>
<td>11. – (1) An environmental statement submitted in connection with an application shall include:</td>
<td></td>
</tr>
<tr>
<td>(a) a description of the project comprising information on the site, design and size of the proposed works;</td>
<td>Section 2 contains a general project description.</td>
</tr>
<tr>
<td>(b) a description of the measures proposed to be taken in order to avoid, reduce, remedy any significant adverse effects on the environment of the proposed works;</td>
<td>Mitigation measures are discussed in Sections 3 - 13.</td>
</tr>
<tr>
<td>(c) the data required to identify and assess the main effects which the proposed works are likely to have on the environment;</td>
<td>See Sections 3-13 in relation to the various environmental issues considered in the ES.</td>
</tr>
<tr>
<td>(d) an outline of the main alternatives to the proposed works studied by the applicant and an indication of the main reason for his choice, taking into account the environmental effects.</td>
<td>The consideration of alternative modes of transport and alternative routes is described in Section 2.3.</td>
</tr>
</tbody>
</table>

Schedule 4: Information to be Included in Environmental Statements

1. A description of the project, including in particular:

   (a) a description of the physical characteristics of all the works covered by the application and the land-use requirements during the construction and operational phases; | Section 2 contains a general project description. |

   (b) a description of the main characteristics of the production processes, for instance, nature and quantity of the materials used; and | Section 2 for a description of the scheme’s operation. |

   (c) an estimate, by type and quantity, of expected residues and emissions (water, air and soil pollution, noise, vibration, light, heat, radiation and any others) resulting from the operation of the proposed project); | Sections 5 for noise and vibration, Sections 6 for air quality and dust. Section 9 for discharges to water. |

2. An outline of the main alternatives studied by the applicant and an indication of the main reasons for his choice, taking into account the environmental effects. | Section 2.3 |

3. A description of the aspects of the environment likely to be significantly affected by the proposed project, including in particular:

   - population; | Section 13 for socio-economic effects. |

   - fauna; | Impacts on fauna are considered in Section 8. |

   - flora; | Impacts on flora are considered in Section 8. |
<table>
<thead>
<tr>
<th>Requirement</th>
<th>Where located in ES</th>
</tr>
</thead>
<tbody>
<tr>
<td>soil;</td>
<td>Section 12</td>
</tr>
<tr>
<td>water;</td>
<td>Section 9</td>
</tr>
<tr>
<td>air;</td>
<td>Section 6</td>
</tr>
<tr>
<td>climatic factors;</td>
<td>Section 6</td>
</tr>
<tr>
<td>material assets, including the architectural and archaeological heritage;</td>
<td>Section 10</td>
</tr>
<tr>
<td>landscape; and</td>
<td>Section 11</td>
</tr>
<tr>
<td>the inter-relationship between the above factors.</td>
<td>Sections 3-13.</td>
</tr>
</tbody>
</table>

4. A description of the likely significant effects of the proposed project on the environment, which should cover the direct effects and any indirect, secondary, cumulative, short-term, medium-term and long-term, permanent and temporary, positive and negative effects of the project, resulting from:

(a) the existence of the project;  Sections 3 -13.
(b) the use of natural resources;  Sections 3 -13.
(c) the emission of pollutants, the creation of nuisances and the elimination of waste; and  Sections 3 -13.

the description by the applicant of the forecasting methods used to assess the effects on the environment.

5. A description of the measures envisaged to prevent, reduce and where possible remedy any significant adverse effects on the environment.  Mitigation measures are discussed in Sections 3 -13.

6. A non-technical summary of the information provided under paragraphs 1 to 5 above.  A separate non-technical summary has been prepared.

7. An indication of any difficulties (technical deficiencies or lack of know-how) encountered by the developer in compiling the required information.  See relevant methodological sections for each topic.
Annex B

Glossary of Terms
This annex defines the principle generic terms adopted for the Environmental Statement.

**B1.1 ENVIRONMENTAL ASSESSMENT PROCESS**

**Baseline**
- The environmental condition prevailing at the commencement of the project, and against which potential impacts/effects are identified.

**Construction**
- Any activities which take place during the construction phase, including temporary landtake.

**Effect**
- The result of an impact on a particular resource or receptor.

**Enabling Works**
- Construction works which are required to allow the main construction to occur, such as building demolition, public utility diversions etc.

**Environmental Impact Assessment**
- A technique for identifying and evaluating the likely effects of a proposed development on the environment, normally forming part of the consent procedure.

**Environmental Statement**
- A document or series of documents which report the findings of the Environmental Impact Assessment.

**Impact**
- A physical or measurable change to the environment attributable to the project.

**Mitigation**
- Measures adopted to reduce, ameliorate or avoid significant effects.

**Operation**
- Any activities forming part of, or associated with, the operation of the project.

**Receptors**
- All people, buildings and natural resources which may potentially be subject to impact arising from the development.

**Scope**
- The extent of coverage of the Environmental Impact Assessment, including timeframe, geographical area, range of technical topics and level of detail.
B1.2 **TYPES OF EFFECT**

Cumulative Effect  An effect resulting from the accumulation of a number of effects. A cumulative effect may result from:

- the combination of different effects at a particular location;
- the recurrence of effects of the same type at different locations; or
- the interaction of different effects over time.

Direct Effect  An effect arising from an impact attributable to a project component or activity.

Indirect Effect  An effect which does not directly impact upon a resource or receptor.

Long-Term Effect  A temporary effect which is over 5 years duration.

Medium-Term Effect  A temporary effect which is 1-5 years duration.

Negative Effect  An effect which has a detrimental impact upon a resource or receptor.

Permanent Effect  An effect which is irreversible or likely to persist for the foreseeable life of the project.

Positive Effect  An effect which has a worthy effect on a resource or receptor.

Secondary Effect  An effect which may arise as a consequence of a primary effect, particularly between different environmental topics (e.g. reduced amenity of a community facility due to noise disturbance).

Significant Effect  An effect which, in isolation or in combination with other effects is likely - in the opinion of the Environmental Impact Assessment team - to have an influence in the decision making process.

Short-team Effect  A temporary effect which is less than one year duration.
Temporary Effect: An effect which is of limited duration, due to either the cessation of the impact giving rise to it or the ability of the environment to accommodate or recover from it.

B1.3 Acoustic Terminology

- **dB (decibel)**: The scale on which sound pressure level is expressed. It is defined as 20 times the logarithm of the ratio between the root-mean-square pressure of the sound field and a reference pressure (2x10^-5Pa).

- **dB(A)**: A-weighted decibel. This is a measure of the overall level of sound across the audible spectrum with a frequency weighting (i.e. 'A' weighting) to compensate for the varying sensitivity of the human ear to sound at different frequencies.

- **L_{A\text{eq}}**: L_{A\text{eq}} is defined as the notional steady sound level which, over a stated period of time, would contain the same amount of acoustical energy as the A-weighted fluctuating sound measured over that period.

- **L_{A\text{max}}**: L_{A\text{max}} is the maximum A-weighted sound pressure level recorded over the period stated. L_{A\text{max}} is sometimes used in assessing environmental noise where occasional loud noises occur, which may have little effect on the overall L_{eq} noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' sound level meter response.

- **L_{10} & L_{90}**: If a non-steady noise is to be described it is necessary to know both its level and the degree of fluctuation. The L_n indices are used for this purpose, and the term refers to the level exceeded for n% of the time. Hence L_{10} is the level exceeded for 10% of the time and as such can be regarded as the 'average maximum level'. Similarly, L_{90} is the 'average minimum level' and is often used to describe the background noise. It is common practice to use the L_{10} index to describe traffic noise.

- **Facade Level**: Sound field defined 1 metre from a solid, reflecting surface, such as a building. Typically 2.5 dB higher than a free-field level.

- **Free-field**: Sound field determined at a point away from reflective surfaces other than the ground with no significant contributions due to sound from other reflective surfaces. Generally as measured outside and away from buildings.

- **Peak Particle Velocities**: Peak Particle Velocity (PPV) is the peak level of vibration during an event. This parameter is most commonly used when the maximum level of vibration is to be identified.

- **Ballast Tamping**: Compaction of the ballast along the railway line.
Annex C

List of Consultees
The following Consultees Received a copy of the Scoping Report:

- Midlothian Council
- Scottish Borders Council
- Edinburgh City Council
- Scottish Natural Heritage
- Scottish Environment Protection Agency
- Scottish Executive
- Health and Safety Executive
- Scottish Water
- Historic Scotland

In addition to those identified above, an information request was issued to the following bodies:

- RSPB
- Scottish Executive Rural Affairs Department
- Royal Commission of Ancient and Historical Monuments of Scotland
- Botanical Society of Scotland
- Scottish Rights of Way Society
- Sustrans Scotland
- Forestry Commission
- Scottish Wildlife Trust
- National Trust for Scotland
- River Tweed Commissioners
- Railway Paths
Annex D

Draft Code of Construction Practice
CONTENTS LIST

1. Preface
   1.1 General
   1.2 Purpose
   1.3 Applicable Codes, Standards and Acts of Parliament
   1.4 Information and Complaints “Hot Line”
   1.5 The Site

2. Road and Footpaths
   2.1 Temporary and Permanent Closures and Divisions
   2.2 Pedestrian and Cyclist Routes
   2.3 Maintenance and Repair of the Highway
   2.4 Lorry Movements
   2.5 Mud on Roads
   2.6 Traffic Safety and Control (Traffic Safety Measures)
   2.7 Site Access
   2.8 Access Across Site and to Frontages

3. Protection of the Water Environment
   3.1 Waste Water and Groundwater
   3.2 Protection of Aquifers
   3.4 Control and Management of Foul Drainage

4. Noise and Hours of Working
   4.1 Hours of Working
   4.2 Noise Control

5. Vibration

6. Dust and Air Pollution
   6.1 Dust
   6.2 Special Precautions for Asbestos
   6.3 Air Pollution

7. Disposal of Waste and Contaminated Materials
   7.1 Waste
   7.2 Contaminated Land and Materials

8. Ecology
   8.1 Encroachment into Wildlife Areas
8.2 Protection of Breeding Birds
8.3 Protection of Badgers
8.4 Protection of Otters
8.5 Protection of Mature Trees
8.6 Control of Invasive Exotics
8.7 Tree Replacement
8.8 Demolition of Buildings

9. Archaeology
   9.1 Archaeological Features
   9.2 Listed Buildings

10. Site Boundaries/Hoardings
    10.1 Fencing and Hoardings
    10.2 Security
    10.3 Access for Fire Appliances

11. Site Activities
    11.1 Good Housekeeping
    11.2 Living Accommodation
    11.3 Clearance of Site on Completion
    11.4 Pest Control
    11.5 Use of Existing Structures

12. Safety
    12.1 Emergency Contacts Procedures
    12.2 Health and Safety at Work Act 1974
    12.3 Contaminated Materials (Special Precautions)
    12.4 Crane Arcs
    12.5 Use of Explosives
    12.6 Unexploded Bombs

13. Lighting

14. Protection of Existing Installations
    14.1 Information
    14.2 Safeguarding
    14.3 Structure damage assessments before construction of Works
    14.4 Defects survey after construction of Works
    14.5 Condition survey before entering land, buildings or structures

Appendix A Noise Definitions
1. **Preface**

1.1 **General**

Waverley Railway Project is planning to reopen the Waverley Railway line between Edinburgh (Newcraighall) and the Central Borders.

The construction of the line will take approximately three years and will involve the use of a number of major works sites along the route. Subsequent construction works by way of maintenance and renewal of the proposed scheme will occur from time to time.

In developing the outline design of the scheme and undertaking its Environmental Impact Assessment (EIA), a series of measures to minimise the impacts of construction on the environment has been identified and set out in this Code of Construction Practice ("CoCP"). Compliance with the CoCP will be a mandatory requirement of the agreement between Waverley Railway Project and the contractor selected to build and maintain the railway line ("the Concessionaire").

In this CoCP “construction” includes all site preparation, demolition, materials delivery, spoil disposal, materials and waste removal and all related engineering and construction activities.

The CoCP addresses the Concessionaire’s general obligation in so far as its construction activities affect the general public and property alongside the railway route. It does not specifically address the Concessionaire’s responsibility, in such areas as safety, noise levels, etc., to those working on or visiting the site of construction activities.

1.2 **Purpose**

The purpose of the CoCP is to define minimum standards of construction practice acceptable to Waverley Railway Project, and required of the Concessionaire as a responsible employer in so far as they affect the environment, amenity and safety of local residents, businesses, the general public and the surroundings in the vicinity of proposed railway works. Development of the CoCP will be progressed, by the Concessionaire through discussions with the Local Authority and other statutory bodies.
Compliance with this CoCP will not absolve the Concessionaire or its sub-contractors from compliance with all legislation and byelaws relating to their construction activities. In particular, the Concessionaire shall apply for a Section 61 consent to the Local Authority, in accordance with the provisions of the Control of Pollution Act 1974.

1.3 **Applicable Codes, Standards and Acts of Parliament**

There are many Codes, Standards and Acts of Parliament which cover environmental and related matters and these are referred to as applicable in this CoCP. Notwithstanding those references, compliance with them shall not discharge the Concessionaire from complying with any other legislative requirements applicable at the time of construction activities.

1.4 **Information and Complaints “Hot Line”**

The Concessionaire shall provide an information and complaint telephone “Hot Line” staffed at all times during working hours. Information on this facility shall be prominently displayed at all working sites.

1.5 **The Site**

The “Site”, for the purposes of this CoCP, is defined as the land within the various Bill limits shown on the deposited plans and sections relating to the railway.

2. **Roads, Footpaths and Cycleways**

2.1 **Temporary and Permanent Closures and Diversions**

In order to construct the Railway, it will be necessary to close or divert certain specified highways, footpaths and cycleways, either permanently, or temporarily during the construction period.

Details of the locations of the proposed closures and diversions are shown on the deposited plans and sections relating to the Railway. It is the Concessionaire’s responsibility to finalise the arrangements for these closures and diversions with the Local Authority.

After breaking up, closing or otherwise interfering with any street or footpath to which the public has access and also private roads or
paths, the Concessionaire shall make such arrangements with the Local Authority as may be reasonably necessary so as to cause as little interference with the traffic in that street or footpath during construction of the railway works as shall be reasonably practicable.

Except to the extent specified in this CoCP or otherwise provided by the Bill, the Concessionaire shall keep all public and private roads and footpaths that cross the Site and all bridges through which they pass open to traffic to adequate, if not full widths and heights at all times during the construction period, except as may subsequently be agreed otherwise with the Local Authority.

Wherever the Railway works interfere with existing public or private roads or other ways over which there is a public or private right of way for any traffic, the Concessionaire shall construct diversion ways except where the Bill provides for those roads or other ways to be permanently stopped up without provision of a substitute. The standard of construction and lighting shall be suitable in all respects for the class or classes of traffic using the existing ways and the widths of the diversions shall not be less than that of the existing way unless otherwise agreed with the Local Authority and/or the owner of the private road.

Diversion ways shall be constructed in advance of any interference with the existing ways and shall be maintained to provide adequately for the traffic flows.

The Concessionaire shall be responsible for supplying, erecting and maintaining for the requisite periods all statutory and public information notices. The nature and location of such notices shall also comply with the requirements of the Local Authority.

The provisions of this Clause shall not apply to any temporary access or accommodation works, which the Concessionaire may construct for his sole use in the execution of the Railway works. However, the Local Authority would need to be consulted for any temporary access arrangements, particularly from a road safety point of view prior to construction of temporary access or accommodation works.
2.2 Pedestrian and Cyclist Routes

The Concessionaire shall ensure that reasonable pedestrian routes are provided throughout the construction period and in relation thereto shall meet the following requirements, where practicable:

(i) All temporary and diverted footways, which replace footways that are currently accessible to wheelchairs and pushchairs, shall continue to be usable by such users.

(ii) Any temporary footways and carriageways shall have uniform surfaces; there should be no steps and any gradients should be preferably 1 in 20 and no greater than 1 in 12.

(iii) Pavement ramps shall be provided at all junctions of footways with carriageways. Gradients must not exceed 1 in 12 and the base of the ramp must be flush with the carriageway.

(iv) All temporary footways and ramps must be surfaced in non-slip material and kept free of mud and debris.

(v) The existing pavement width along the main roads shall be maintained except where this exceeds 2 metres where the Concessionaire may, with the prior approval of Local Authority, reduce it to not less than 2 metres.

(vi) Clear signing shall be provided at all times for each pedestrian route.

(vii) All openings or obstructions on the carriageways and footway shall be barricaded with a continuous rail (lit at night) strong enough to offer necessary resistance should a blind person walk into it; a tapping rail shall be provided.

(viii) Headroom clearance over footways shall be a minimum of 2.3m. A horizontal clearance of 0.6m shall be provided from the kerbline, where practicable, for any hoarding under 5.1m high, to avoid fouling by vehicles. The minimum headroom beneath any projection over the highway shall be 5.1m.

(ix) All pedestrian routes diverted onto the carriageway shall be clearly defined by continuous barriers.

2.3 Maintenance and Repair of the Highway
The Concessionaire shall take every possible precaution to prevent its operations, whether by carting or otherwise, from damaging the roads and footpaths in the vicinity of the Railway works.

The Concessionaire shall carry out all such maintenance works as are necessary to maintain the roads and footpaths in the vicinity of the works in a serviceable condition to the approval of the Local Authority.

2.4 Lorry Movements

The Concessionaire, its sub-contractors and suppliers moving large and/ or heavy loads, construction plant, materials and spoil (including vehicles used for carrying such when running empty) shall limit the use of public highways as far as is reasonably practicable.

Routes will be agreed with the Local Authority in advance. Vehicles arriving or leaving the Site shall do so during normal working hours as specified in Section 4.1 of this CoCP unless otherwise agreed with the Local Authority.

The Concessionaire shall take all reasonable measures to ensure that delivery vehicles do not park on the highways prior to entering the Site.

The Concessionaire when entering into any sub-contract for the execution of any part of the Railway works or the supply or transport of heavy loads, construction plant, materials or spoil shall incorporate in any such sub-contract provisions requiring the sub-contractor or supplier to comply with the requirements of this Clause.

2.5 Mud on Roads

The Concessionaire shall take strict measures to minimise the spillage of mud on roads arising from excavation works.

These will include, but not necessarily be limited to:

(i) The provision of easily-cleaned hardstandings for vehicles entering, parking and leaving the site.

(ii) The provision of wheel washing facilities including, where practicable, mechanical wheel spinners.
(iii) The use of a mechanical road sweepers and surface flushing apparatus to clean the hardstanding and to remove any mud or debris deposited by site vehicles on roads, footpaths, gullies or drains in the vicinity of the site. The road sweepers or other equipment are to be readily available whenever the need for cleaning arises and shall be properly used and maintained.

(iv) The complete sheeting of the sides and tops of all vehicles carrying mud or debris.

(v) The Concessionaire shall ensure that vehicles are loaded in such a manner as to prevent spoil falling off during their journey.

The Concessionaire shall also comply with the requirements regarding dust outlined in Section 6 of this CoCP.

2.6 Traffic Safety and Control (Traffic Safety Measures)

The Concessionaire shall provide, erect and maintain such traffic signs, road markings, lamps, barriers and traffic control signals and such other measures as may be necessitated by the construction of the Railway works in accordance with the recommendations contained in Chapter 11 of the Traffic Signs Regulations and to the approval of the Local Authority. Compliance with this Clause shall not relieve the Concessionaire of any of its other obligations and liabilities under the Concession Agreement and under the relevant provisions of the Highways Act.

The Concessionaire shall not commence any work that affects the public highway until all traffic safety measures necessitated by the work are fully operational.

The traffic signs, road markings, lamps, barriers and traffic control signals shall be in accordance with the requirements of the Traffic Signs Regulations.

Road danger lamps shall comply with BS 3143, except that the flashing rate for flashing lamps shall be within the range 120-150 flashes per minute. The minimum luminous intensity of the lamps shall be 0.5 candela for steady lamps, 1.0 candela for ripple lamps at their peak and 1.5 candela for flashing lamps at their peak.

Traffic signs and temporary road works signs shall comply with BS873. Signs to diagrams 564, 565, 566, 569.1, 610, 754, 755 and 756
of the Traffic Signs Regulations shall be reflectorised with “high intensity” grade reflective materials (Class I) with the minimum CIL values shown in Table 1 of BS 873: Part 1, 1983.

All traffic signals including temporary signals used at roadworks must be type approved before they can legally be installed on public roads. Portable traffic signals must also comply with the current requirements of Regulation 31(2) of The Traffic Signs Regulations, which lays down the size, colour and type of prescribed traffic signals.

The Concessionaire shall keep clean and legible at all times all traffic signs, road markings, lamps, barriers and traffic control signals and he shall position, reposition, cover or remove them as required by the progress of the works and to the approval of the Local Authority.

2.7 Site Access

All access from the Site onto the highway shall be of sufficient width to accommodate two-way traffic wherever practicable. The Local Authority would need to be consulted for any temporary access arrangements, particularly from a road safety point of view prior to construction of temporary access or accommodation works.

Traffic Signs in accordance with the “Traffic Signs Regulations and General Directions 1994” shall be provided for each access as follows:

(i) As advance warning of the approach the signs shall be as diagram 506.1, 12200mm high with an additional plate as diagram 579.

(ii) For control of traffic leaving the Site, “Give Way” signs as diagram 602, 120mm high, and road markings as diagrams 1003 and 1023. A variant of diagram 565.2 station “Works Traffic Only” shall be mounted on the reverse side of the “Give Way” sign assemblies.

The precise location of each sign shall be determined by the Concessionaire to the satisfaction of the Local Authority.

ENVIRONMENTAL RESOURCES MANAGEMENT
WAVERLEY RAILWAY PROJECT

D9
2.8 Access Across Site and to Frontages

The Concessionaire shall in carrying out the railway works take all reasonable precautions to prevent or reduce any disturbance or inconvenience to the owners, tenants or occupiers of adjacent properties, and to the public generally.

Subject to the provisions of the Bill, the Concessionaire shall maintain any existing right of way across the whole or part of the Site and public and private access to adjoining frontages in a safe condition and to a standard not less than that pertaining at the commencement of the Concession Agreement unless otherwise noted in Section 2.1 herein.

Alternatively, subject to the provisions of Section 2.3, the Concessionaire shall provide acceptable alternative means of passage or access to the satisfaction of the persons affected. The Concessionaire shall provide and maintain any guard rails, fences, gates, lights, bridges, pavings, steps, handrails, etc. needed and they shall be of such size, strength and construction as will be adequate for their purpose.

In carrying out the work immediately adjacent to occupied premises outside the Site, the Concessionaire shall proceed with minimum inconvenience and disturbance to occupiers and users. Access to and from such premises shall be maintained at all times, except as may be essential.

The Concessionaire shall render every assistance to occupiers of premises affected by the railway works to enable them to get materials or goods into or out of their premises.

3. Protection of the Water Environment

3.1 Waste Water and Groundwater

Provisions for construction site drainage along the route of the railway will be achieved via the development and implementation of an appropriate site drainage plan. The plan will include measures to ensure that surface water runoff is contained and managed appropriately, as described below. Such provisions will also prevent washout from temporary construction laydown and storage areas into local watercourses. The Concessionaire will take full account of the requirements of the SEPA / Environment Agency's Pollution Prevention Guidelines (PPGs). This will include
notifying SEPA in advance of all works to allow pollution prevention and emergency procedures to be agreed.

All waste water and site discharges shall only be permitted where the effluent quality and discharge location is acceptable to the SEPA / Scottish Water (as appropriate). Effluent will pass through treatment facilities such as sediment traps and/or settlement lagoons, as appropriate, before being discharged. The Concessionaire will ensure that all treatment facilities are regularly inspected and maintained and that a full record is kept of inspection, maintenance and measures to sustain equipment performance.

Prior to any excavation below the water table, including any site de-watering, the Concessionaire shall inform SEPA of the works to be conducted. Cut-off ditches may be used to prevent water from entering excavations. The de-watering and disposal measures will be agreed with the SEPA.

The Concessionaire shall also comply with BS 6031 : 1981 Code of Practice for Earthworks, regarding the general control of site drainage.

The Concessionaire shall ensure that areas of exposed ground and stockpiles are minimised to reduce silty runoff. Geotextiles will be used as necessary to shield spoil mounds. Water containing silt will not be pumped directly into watercourses. Water must be stored in settlement lagoons or tanks, filtered, or discharged onto a grassy area to soak away, or to foul sewer (with agreement of the local water company and SEPA).

Where contaminated land is identified within the Bill limits, a full management plan will be prepared by the Concessionaire (see Section 7.2) to comply with all relevant handling and disposal legislation (including de-watering discharge from piling operations). Detailed site investigations at all sites where earthworks or piling are planned will be carried out, prior to works commencing, in order that appropriate mitigation can be implemented.

The Concessionaire shall ensure that any water that has come into contact with contaminated materials is disposed of in accordance with the Water Resources Act 1991 and the Water Industry Act 1991 (if disposed to public sewer) to the satisfaction of SEPA and Scottish Water or the Local Authority (as appropriate).
The Concessionaire shall apply for consents and approvals as follows:

(i) A consignment note system shall be applied to all discharges;

(ii) For any discharge into a watercourse, river or soakaway, approval is required from SEPA;

(iii) For any discharge into a sewer, a Trade Effluent Consent is required from Scottish Water or the Local Authority as appropriate.

The Concessionaire shall make provisions to ensure that oil drums and containers or other potential contaminants stored on the Site are controlled in accordance with the Control of Substances Hazardous to Health (COSHH) Regulations 1999 and are properly isolated and bunded and that no oil or other contaminants are allowed to reach watercourses or groundwater, including aquifers. Storage locations for such materials should be positioned away from watercourses and agreed with SEPA. All surface water or other contaminated water which accumulates in the bund will be removed by manually controlled positive lift pumps and not by means of a gravity drain. This water will be removed from site and discharged in public sewer in consultation with the relevant water companies.

Grab packs will be available in the event of a fuel spillage and personnel will be trained in their use.

3.2 Protection of Aquifers

The Concessionaire will have due regard for underlying aquifers and adhere to the SEPA / Environment Agency’s Groundwater Protection Policy. In all instances, appropriate protection of aquifers will be undertaken, following liaison with SEPA regarding the piling and construction techniques to be employed. Details of appropriate measures to prevent groundwater contamination (including monitoring) will be agreed with SEPA, in writing, prior to commencement of the relevant railway works.

3.3 Control and Management of Foul Drainage

Foul water and sewage effluents produced by the construction workforce will be contained by temporary foul drainage facilities to
be installed. All foul water will be disposed of off-site by a licensed contractor.

4. **Noise and Hours of Working**

4.1 **Hours of Working**

The normal hours of working shall be:

Monday – Friday 0730 – 1630
Saturdays 0730 – 1300

These hours of work do not apply to equipment which is required to operate continuously (e.g. for safety reasons) (see Section 4.2c (iii) below).

At certain sites, different working hours shall apply. These will be as agreed between the Concessionaire, Waverley Railway Project and the Local Authority.

Additional or alternative working hours needed for emergency reasons shall be advised to the Local Authority.

4.2 **Noise Control**

The Concessionaire shall have a general duty to take all practicable measures to minimise nuisance from noise. The noise limits specified in this section or which may be agreed with the Local Authority must not be regarded as a licence to make noise up to the allowable limit.

The Concessionaire shall liaise and consult with the Local Authority with regard to permissible levels of noise, and shall apply in good time for a “section 61” consent and take such other steps as may be necessary to enable the railway works to proceed in accordance with the Concession Agreement.

Subject to the specific requirements of the Local Authority, the following minimum requirements must be met: -

(a) (i) During normal working hours, as defined in Section 4.1, the maximum noise levels measured 1 metre from any occupied dwelling or other building used for residential purposes, generated by construction plant and equipment, including the movement of vehicles to and from the Site should not exceed the following limits:
**Period**

Monday to Friday (inc.) dB(A) 75 (12 hr)
Saturday dB(A) 75 (6 hr)

(ii) Outside normal working hours, the following limits shall apply:

<table>
<thead>
<tr>
<th>Period</th>
<th>Hours</th>
<th>dB(A)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monday to Friday (inc.)</td>
<td>1900-2200</td>
<td>65 (3 hr)</td>
</tr>
<tr>
<td>Saturday</td>
<td>1300-2000</td>
<td>65 (9 hr)</td>
</tr>
<tr>
<td>Sunday &amp; Bank Holidays</td>
<td>0700-2100</td>
<td>65 (14 hr)</td>
</tr>
<tr>
<td>Any other period</td>
<td>0700-2100</td>
<td>65 (1 hr)</td>
</tr>
</tbody>
</table>

(iii) The maximum noise levels measured 1 metre from any school, college or other teaching facility resulting from any operation by the Concessionaire on or off the Site and concerned in any way with the Concession Agreement shall not exceed the following limits:

- At any time dB(A) 65 (1 hr)
- Peak Noise Level dB(A) 70 (1 min)

(iv) The maximum noise level measured 1 metre from any office building or other building used for office purposes during normal working hours shall be as defined in subclause (a)(i) above.

(b) If the Concessionaire’s predictions, or actual sound level measurements, indicate that for specific occupied buildings the above noise limits will be exceeded for more than 10 out of any 15 consecutive working days, even with the application of Best Practicable Means (BPM), the Concessionaire shall install appropriate mitigation measures.

Where these measures comprise noise insulation, this shall generally be in accordance with the provisions of the Noise Insulation (Railways and Other Guided Transport Systems) Regulations 1996.

(c) Without prejudice to this Section, the Concessionaire shall comply with the recommendations set out in BS 5228 “Noise...
Control on Construction and Open Sites” and in particular with the following requirements:

(i) All vehicles and mechanical plant used for the purpose of the work shall be fitted with effective exhaust silencers and shall be maintained in good and efficient working order.

(ii) All compressors shall be “sound reduced” models fitted with properly lined and sealed acoustic covers which shall be kept closed whenever the machines are in use, and all pneumatic percussive tools shall be fitted with mufflers or silencers of the type recommended by the manufacturers.

(iii) All machines in intermittent use shall be shut down in the intervening periods between work or throttled down to a minimum. Noise emitting equipment which is required to run continuously shall be housed in a suitable acoustic enclosure (see BS5228 Part 1:1997, Figures B.1, B.2 and B.3).

(iv) Items of plant shall be maintained in good workmanlike condition so that extraneous noises from mechanical vibration, creaking and squeaking are reduced to a minimum.

(v) As far as practicable, demolition shall be carried out using equipment which breaks concrete in bending in preference to percussive methods.

(vi) All pile driving shall be carried out by plant equipped with a noise reducing system or by silent driving systems.

5. Vibration

Subject to the specific requirements of the Local Authority, the following minimum requirements must be met:

(i) To protect residents and users of buildings from nuisance and harm the Concessionaire shall, as far as practicable, not exceed Vibration Dose Values as specified in BS6472:1992 which will result in a “low probability of adverse comment”.

(ii) To protect buildings from physical damage, peak particle velocity levels should not exceed 5mm/ sec except for particularly sensitive buildings where the level should not
exceed 3mm/sec. Those buildings which are to be considered as sensitive shall be agreed with the Local Authority.

6. Dust and Air Pollution

6.1 Dust

The Concessionaire shall take all necessary measures to avoid creating a dust nuisance during both construction and demolition works.

Measures to prevent dust shall include the following practices:

(i) The provision of easily-cleaned hardstandings for vehicles (see Clause 2.5(i)).

(ii) The enclosure of material stockpiles at all times and damping down of dusty materials using water sprays during dry weather.

(iii) The hard surfacing of heavily-used areas which will be kept clean by brushing and water spraying regularly.

(iv) Control of cutting or grinding of materials on site.

(v) The complete sheeting of the sides and top of all vehicles carrying spoil and other dusty materials.

(vi) Watering of unpaved surfaces and roads.

(vii) Limit vehicle speeds on unpaved surfaces to 20 kph.

The Concessionaire shall monitor the level of dust pollution using an objective method of measurement. Baseline levels of dust shall be agreed prior to commencement of construction. The Concessionaire shall also agree action levels of dust pollution with the Local Authority. In the event that these levels are exceeded, the Concessionaire shall take action to ensure that the levels of dust are reduced.
6.2 **Special Precautions for Asbestos**

Special precautions shall be taken if materials containing asbestos are encountered, in accordance with the regulations and guidance set out in Section 7.2.

6.3 **Air Pollution**


The Concessionaire shall comply with the Control of Substances Hazardous to Health Regulations (COSHH) 1999. The Concessionaire will comply with Health and Safety Executive (HSE) Guidance Notes EH 40/90 and EH 40/97 on Occupational Exposure Limits.

The Concessionaire shall comply with the Control of Lead at Work Regulations 1998 (see Section 7.2).

The Concessionaire shall take precautions to prevent the occurrence of smoke emissions or fumes from site plant or stored fuel oils. Plant shall be well maintained and measures shall be taken to ensure that it is not left running for long periods when not directly in use.

7. **Disposal of Waste and Contaminated Materials**

7.1 **Waste**

The Concessionaire will develop a management plan which will identify:

- the waste category and quantities of materials generated;
- opportunities for recycling and/or re-use; and
- disposal routes and licensing requirements.

The plan will include an audit programme to be undertaken by the Concessionaire to demonstrate compliance with statutory requirements.

Spoil arising from the works which is classed as 'acceptable fill' will wherever practicable be used in construction works.
The disposal of waste, including any surplus spoil, will be managed so far as is reasonably practicable to maximise the environmental and development benefits from the use of surplus material and reduce any adverse environmental effects of disposal.

Disposal sites will be identified by the Concessionaire in consultation with relevant local authorities and SEPA.

The Concessionaire will comply with approved guidance and procedures in the identification, handling, storage, recovery and disposal of waste. The Concessionaire will also comply with the measures set out in Section 3.1 regarding discharges to controlled waters and wastewater.

The Concessionaire must make provision for a suitable environmental specialist to identify any “special waste” as defined in the Special Waste (Scotland) Regulations 1997 so that they can be suitably managed and disposed of during works.

7.2 Contaminated Land and Materials

A set of criteria for the site investigation will be developed prior to works commencing. Where site investigation reveals the presence of contaminated land, a management plan will be prepared by the Concessionaire to comply with all relevant handling and disposal legislation.

Any contaminated material encountered will be dealt with in compliance with best practice and statutory guidance; for example the Control of Substances Hazardous to Health (COSHH) Regulations and through the Construction Design and Management (CDM) Regulations 1994.

The Concessionaire will identify those areas within the Site where contaminated land may be encountered. The Concessionaire will be required to:

- carry out appropriate site investigations to the satisfaction of Waverley Railway Project to determine the extent and type of contaminants present on the Site;
- carry out risk assessment evaluations to consider potential sources, pathways and receptors;
liaise with the Local Authority and SEPA with a view to addressing their reasonable requirements and agreeing control or protection measures necessary for dealing with contaminants identified by the risk assessment evaluation;

develop transportation and other management procedures to be followed in the event that contaminated or hazardous materials are discovered on site;

obtain any necessary licences for the storage, treatment and disposal of waste (including dewatering discharge);

use registered waste carriers or seek registration as a waste carrier for the handling of all wastes, including contaminated materials; and

ensure that removal and disposal of contaminated materials complies with a strict consignment note system and that delivery is to appropriately licensed disposal facilities.

Appropriate precautions must be taken if materials containing asbestos are encountered. The Concessionaire will comply with the Control of Asbestos at Work Regulations 1987 (as amended 1999) and will observe the exposure limits and measurement methods for asbestos which are set out in HSE Guidance Note EH 10 1988.

The Concessionaire will comply with HSE Guideline Note MS13 Asbestos 1988, the Health and Safety Commission Approved Code of Practice and Guidance Note Work with Asbestos Insulation and Asbestos Coating 1983 which describe in detail the precautions necessary when working with asbestos insulation etc. The approved Code includes detailed advice on waste disposal.

If materials containing lead are encountered, the Concessionaire will comply with The Control of Lead at Work Regulations 1998 so that contaminated materials are handled and disposed of safely and properly.

In undertaking work on contaminated sites, useful information concerning the safe operation and redevelopment of contaminated sites may be found in HSE Protection of Workers and the General Public during the Development of Contaminated Land 1991.
8. **Ecology**

8.1 **Encroachment into Wildlife Areas**

Many works are in close proximity to SSSI’s, a proposed SAC and other areas of ecological interest such as Ancient Woodland and protected species.

The Concessionaire shall comply with the provisions of the Wildlife and Countryside Act 1981, as amended, and other relevant nature conservation legislation and relevant policy and guidance. The following general principles will be applied where practicable:

(i) Standards of dust and air pollution control, as set out in Sections 6.1 and 6.3, shall be applied to protect adjacent wildlife habitats.

(ii) Habitat loss will be minimised by restricting the working width and extent of worksite areas to a necessary minimum. Removal of habitats and enhancement works will be undertaken as appropriate, in consultation with the Scottish Natural Heritage.

(iii) Suitable precautions shall be taken to prevent the entry of pollutants into any bodies of water and any incidents reported to SEPA and SNH (see also requirements of Section 3) - adjacent habitat will be fenced off and staff given awareness training, where appropriate.

8.2 **Protection of Breeding Birds**

The Wildlife and Countryside Act 1981 protects nesting wild birds, their eggs and their nests. Habitat removal will take place outside the breeding bird season wherever possible (Mid-March to end of June). Where this is not possible, advice on mitigation will be sought from a qualified professional. It may be necessary to hand-search habitat for birds prior to habitat removal. If nesting birds are found, they must not be disturbed until they have left the nest.

8.3 **Protection of Badgers**

All setts to be lost to the development will need to be destroyed under licence. A licence is required to exclude any Badger Sett (whether active or not), and this is applied for from Scottish
Natural Heritage. Licences are not generally issued within the months December to June inclusive.

8.4 Protection of Otters

The loss of a lying up / holt site will require a licence. A licence would be required from the Scottish Executive Environment and Rural Affairs Department (SEERAD) for disturbance to a European Protected Species. Prior to the receipt of the licence it is recommended that a 30 m exclusion zone is established around the site. This should be marked out by a Otter specialist. Stake and orange plastic mesh fencing is recommended. All contractors should be made aware of the exclusion zone and under no circumstances should entry be made into the exclusion zone.

8.5 Protection of Mature Trees

Loss of trees will be avoided wherever possible and prior to any felling of trees within the working corridor, they will be assessed for their suitability as bat roosts by a licensed bat handler and any necessary measures taken, in consultation with SNH and the Local Authority.

Where appropriate, the requirements of BS 5837:1991 shall be complied with.

Adverse effects on all trees whether statutorily protected or not within or in the vicinity of the Site shall be minimised by the adoption of suitable mitigation measures, including, but not limited to the following (where appropriate):

(i) selective removal of lower branches in an approved manner, to reduce mechanical damage by construction plant;

(ii) the use of matting around the root zone to prevent excess soil compaction;

(iii) the use of chestnut paling around the trunk to prevent damage; and

(iv) notwithstanding (ii) above, construction activities shall be controlled in the vicinity of all trees so as to minimise excessive compaction of the ground beneath the entire canopy of the tree. No heavy materials or plant shall be stored, and construction traffic
movements shall be controlled, by fencing or other means, so as to minimise vehicle movement within the areas.

For the purposes of this clause, trees are defined as trees of over 20cm girth at a height of 1.5 m above ground level.

8.6 **Control of Invasive Exotics**

Japanese Knotweed *Fallopia japonica* and Giant hogweed *Heracleum mantegazzianum* where found along the proposed railway line. To comply with the *Wildlife and Countryside Act (1981)* a strategy is required during the construction phase of the development to ensure the control of, and prevent the spread of, Japanese Knotweed *Fallopia japonica* and Giant hogweed *Heracleum mantegazzianum* within the development area and in the wider countryside.

8.7 **Tree Replacement**

Any tree that is damaged or cut down without approval or dies as a consequence of the construction shall be treated or be replaced by a suitably sized transplant to the approval of the Local Authority.

8.8 **Demolition of Buildings**

All buildings and structures will be checked for bats prior to demolition by a qualified bat surveyor. Any mitigation measures will be agreed in advance, and be under licence to, SNH.

9. **Archaeology**

9.1 **Archaeological Features**

Prior to development an archaeological desk based assessment should be undertaken to establish in which locations archaeological deposits might still survive prior to, a comprehensive Archaeological Evaluation process. This specification will be carried out in agreement with the Local Authorities and will assess the full extent of archaeological deposits which will be disturbed during the construction process.

An archaeological watching brief will be carried out during groundworks in the construction phase of the project. The following procedures will be adhered to:
a specification for the field work will be agreed with the Local Authorities, the developer and historic Scotland;

an archaeologist recognised by the Local Authorities will be present on the development site during or prior to construction to establish the presence or absence of archaeological features;

if an archaeological presence is established, a further specification for field work will be agreed with the Local Authorities and Historic Scotland; and

if there is an absence of archaeological features, historic Scotland will be informed and a final report detailing the results will be lodged with the Local Authorities.

9.2 **Listed Buildings**

The Concessionaire shall comply with the requirements of the relevant legislation in respect of listed buildings and Listed Building Consents. Attention is drawn to the Planning (Listed Buildings and Conservation Areas) Act 1990.

10. **Site Boundaries/Hoardings**

10.1 **Fencing and Hoardings**

The Site shall be completely fenced from public ingress. Forms of hoarding are dependent upon location but will include:

(i) A post and chain link/mesh fence, where appropriate for minimum security and noise limitation needs (A).

(ii) A 2.4 m minimum height, plywood faced, timber framed boundary hoarding, of a surface density of not less than 6kg/m² for normal security and noise limitation requirements (B).

(iii) Or other designs where a particular appearance or acoustic rating is needed.

The provisions of the Health and Safety at Work Etc. Act 1974 shall also be followed in all cases.

Hoardings erected so as to cause poorly-lit walkways shall have bulkhead lights fitted.
Gates in the fencing or hoarding should, as far as is practicable, be positioned and constructed to minimise the noise transmitted to nearby noise sensitive buildings from the Site direct or from plant entering or leaving the Site.

10.2 **Security**

Adequate security shall be exercised by the Concessionaire to prevent unauthorised entry to or exit from the Site. Site gates shall be closed and locked when there is no site activity and site security provisions will be set in motion.

Site security cameras, where used, shall be placed in locations which will not cause offence to local residents.

10.3 **Access for Fire Appliances**

The requirements of the Civil Defence (General Local Authority functions) (Scotland) Regulations 1993, SI 1993 No 1774 (S.215) shall be followed in the provision of site access and this will be monitored by the relevant Fire Brigade's local superintendent.

11. **Site Activities**

11.1 **Good Housekeeping**

The Concessionaire shall follow a “good housekeeping” policy at all times. This shall include, but not necessarily be limited to, the following requirements:

- Open fires will be prohibited at all times;
- Rubbish will be removed at frequent intervals and the site kept clean and tidy;
- Hoardings shall be frequently inspected, repaired and re-painted as necessary;
- Adequate toilet facilities shall be provided for all site staff. Toilets shall be kept clean;
- Food waste shall be removed frequently;
- The wheel washing facilities area shall be brushed clean frequently.
Lorries shall enter and exit the Site in a forward direction. Entry/exit conditions shall be subject to prior discussions with the Local Authority before implementation.

All loading and unloading of vehicles shall take place off the public highway wherever this is practicable.

11.2 **Living Accommodation**

No living accommodation will be permitted on the Site except with the approval of the Local Authority. Mess rooms, locker room, toilets and showers will be permitted.

11.3 **Clearance of Site on Completion**

The Concessionaire shall clear up all working areas both within and outside the Site and accesses as work proceeds and when no longer required for the carrying out of the Railway works.

All surplus soil and materials, temporary roads and hardstandings, plant, sheds, offices and temporary fencing shall be removed, post holes filled and the surface of the ground restored as near as practicable to its original condition. See Section 7.1 for detail on waste disposal.

11.4 **Pest Control**

The Concessionaire shall ensure that the risk of infestation by pests or vermin is minimised by adequate arrangements for the disposal of food waste or other material attractive to pests. If infestation occurs he shall take such action to deal with it as required by the Local Authority’s Environmental Health Officer.

11.5 **Use of Existing Structures**

The Concessionaire shall not locate stockpiles for materials, stores, plant or temporary works upon or adjacent to or under existing structures such as bridges, viaducts, walls and embankments in such a way as to endanger these structures.
12. Safety

12.1 Emergency Contacts and Procedures

The Concessionaire shall prepare and maintain an Emergency Contacts Set of Procedures for each work site which shall be displayed prominently at each site. These Procedures shall be followed in any site emergency.

They shall contain emergency phone numbers and the method of notifying local authorities/services for action by the Concessionaire and Waverley Railway Project and its Agent’s site staff. Copies of the Procedures will be issued to the Local Authority, the Fire Brigade, the Police, the Ambulance Service and the relevant statutory authorities.

Emergency telephone numbers for the Concessionaire’s key personnel shall also be included for Waverley Railway Project and its Agent’s use, in an emergency.

12.2 Health and Safety at Work Etc. Act 1974

All site work will be carried out under the provisions of the Act, and to the satisfaction of the local HSE officer.

12.3 Contaminated Materials (Special Precautions)

For those sites at which contaminated material is encountered, the Safety Officer shall ensure that a Workers’ Safety Information Sheet is prominently displayed in rest/mess rooms and wash rooms covering hygiene, work practices, clothing requirements etc.

General provisions concerning disposal of contaminated materials are described in Section 7.

12.4 Crane Arcs

Crane arcs shall be confined within the Site boundaries unless agreed otherwise with the Local Authority and the Police.
12.5 **Use of Explosives**

The use of explosives shall not be permitted except in exceptional circumstances. Prior approval from Waverley Railway Project and the Local Authority shall be obtained.

13. **Lighting**

Lighting to site boundaries shall be provided with illuminations sufficient for the safety of the passing public, including disabled people.

In particular, precautions shall be taken to avoid shadows cast by the site hoarding on surrounding footpaths and roads.

Site lighting shall also be positioned and directed as so to minimise nuisance to residents and to minimise distractions or confusion to passing drivers on adjoining public highways. This provision will apply particularly to sites where night working will be carried out and the Concessionaire shall provide appropriate lighting for these sites.

Arrangements for site lighting shall be subject to the approval of the Local Authority.

14. **Protection of Existing Installations**

14.1 **Information**

The Concessionaire will be required to make his own investigations and to take all appropriate actions concerning existing foundations, buildings, structures, walls, roadways, sewers cables and other services, apparatus and installations.

14.2 **Safeguarding**

The Concessionaire shall properly safeguard all buildings, structures, works, services or installations from harm, disturbance or deterioration during the concession period. The Concessionaire shall take all necessary measures required for the support and protection of all buildings, structures, pipes, cables, sewers, railways and other apparatus during the concession period.
14.3 **Structural damage assessments before construction of works**

Before commencing any piling, foundation excavation, or ground improvement works, the Concessionaire shall prepare a schedule of buildings, structures and major utilities within the zone of influence of the engineering work. The schedule shall identify those properties which may be at risk from ground movement (settlement or heave) or vibration arising from the construction or operation of the railway, based upon the final design and method of construction for the railway works.

The Concessionaire shall, at his own expense, appoint in the joint names of the Concessionaire and the interested party, a reputable firm of Chartered Surveyors or Engineers to prepare a defects survey of each building, structure or major utility which is identified in the schedule of properties within the zone of influence as having a risk of significant damage. Such surveys shall be carried out generally by agreement with the property owner, and by agreement with the SEPA for all such structures within 8 metres of flood defences.

At least one month prior to commencement of the relevant excavation works, a copy of each defect survey shall be provided to Waverley Railway project and the interested party.

14.4 **Structure damage assessments before construction of Works**

Before commencing on any construction works, the Concessionaire shall prepare a schedule of buildings, structures and major utilities within the zone of influence of the engineering work. The schedule shall identify those properties which may be at risk from ground movement (settlement or heave) or vibration arising from the construction or operation of the railway, based upon the final design and method of construction for the railway works.

The Concessionaire shall, at his own expense, appoint in the joint names of the Concessionaire and the interested party, a reputable firm of Chartered Surveyors or Engineers to prepare a defects survey of each building, structure or major utility which is identified in the schedule of properties within the zone of influence as having a risk of damage of Degree 1 or higher. Such surveys shall be carried out generally by agreement with the property owner, and by agreement with the SEPA for all such structures within 8 metres of flood defences.
owner, and by agreement with SEPA for all such structures within 8 metres of flood defences.

14.5  **Defects survey after construction of Works**

After the construction works have been completed and at any time up to two years after the opening of the railway to public traffic, the interested party may, upon providing Waverley Railway Project or the Concessionaire with reasonable evidence of damage, request that a second defects survey is undertaken. This shall take the same form as the first survey and shall be undertaken by the same firm of Chartered Surveyors or Engineers at the Concessionaire’s expense.

14.6  **Condition survey before entering land, buildings or structures**

Prior to entering land, buildings or structures which will be directly affected by the construction of the railway works, the Concessionaire shall at its own expense appoint in the joint names of the Concessionaire and the interested party, who will have the right to comment upon the survey and propose amendments if justified. On completion of the construction and reinstatement works, at the reasonable request of Waverley Railway Project or the interested party and at any time up to two years after the opening of the railway to public traffic, the Concessionaire shall undertake a second condition survey. This shall take the same form as the first survey and shall be undertaken by the same firm of Chartered Surveyors or Engineers.
APPENDIX A

NOISE DEFINITIONS

$L_{Aeq}$ The equivalent continuous sound level (A-weighted)

It is the equivalent steady sound level in dB(A) containing the same acoustic energy as the actual fluctuating sound level over a given period.

$L_{A\text{max}}$ The peak or max. A-weighted noise level over a given period of time.

dB(A) Decibel units (A-weighted).

(A-Weighted) The noise level with a frequency characteristic approximating to that of the human ear.
Annex E

Ecology Evaluation Criteria
E1 EVALUATION CRITERIA

E1.1 GENERAL

The significance of ecological effects is assessed according to the following criteria:

- The magnitude of the effect, as determined by its intensity and by its extent in space and time.
- The value, in nature conservation and ecological contexts, of affected receptors including species, populations, communities, habitats, landscapes and ecosystems.

Significance is determined by the interaction of these primary criteria, being high for large effects on receptors of high value, and lower for smaller effects on receptors of lower value.

In this assessment significant effects are additionally defined as those of sufficient importance to warrant consideration of whether mitigation is feasible in the context of the particular proposals.

E1.2 BIODIVERSITY

Significance is deemed to attach to any effect that clearly results in more than local loss of biodiversity, or any effect that involves the loss of irreplaceable habitat, especially ancient countryside.

High importance attaches to sites and areas having designation by reason of their importance for the maintenance of biodiversity. None of the recognised categories and designations (such as Biosphere Reserves under the UNESCO Man and Biosphere Programme, Sites on the Natural List of the World Heritage Convention under the Convention Concerning the Protection of the World’s Cultural and Natural Heritage 1972, or Natura 2000 sites under the 1992 EC Habitats Directive etc) are relevant to this assessment.

E1.3 INDIVIDUAL SPECIES

Effects on individual species are primarily assessed by combining the following considerations.

- The extent of likely changes in population sizes.
- The rarity of species.
The background of environmental impact on species from sources other than those under consideration in this assessment, including recent historical changes in population sizes, and the extent to which they are currently threatened.

High importance is attached to species that are the subject of statutory protection or non-statutory designation for rarity or vulnerability. Protection categories and designations relevant to this assessment include the following.

- Species protected under the Conservation (Natural Habitats, etc) Regulations 1994 (SI No 2716) (or other instruments giving effect to the EC Habitats and Species Directive (92/43/EEC).
- Species protected under the Wildlife and Countryside Act 1981 and amendments.
- Species included by the World Conservation Union (IUCN) \(^{(1)}\) on the Red Data List for Great Britain.
- Species included in British Red Data Books and subsequent reviews (Wigginton (1999) and Gregory et al (2002)).
- Species native to Great Britain and considered by the World Conservation Monitoring Centre to be threatened at world level and for birds also at a European level (Tucker & Heath, 1994).
- Species considered by Joint Nature Conservation Committee (JNCC) to be endemic to Great Britain.
- Nationally Rare plant species defined by JNCC as those occurring in one to fifteen ten kilometre grid squares in a Nature Conservancy Council (NCC) region, and having no higher category of designation (Nature Conservancy Council, 1989).
- Species listed as Nationally Scarce by JNCC ('pink data species') \(^{(2)}\). For birds Fuller, (1980) suggests nationally rare species are those with a British breeding population of between 1 and 1000 pairs. Batten et al (1990) define a rare breeding bird species as less than 300 pairs. For other animals, national populations are detailed in various publications for example Atlas of Mammals in Britain (Arnold, 1993), Checklist of Protected British Species (Betts, 1998) and also national groups may provide information on population sizes e.g The Mammal Society, Scottish Wildlife Trust etc.

\(^{(1)}\) The criteria used by the World Conservation Union (formerly the International Union for the Conservation of Nature and Natural Resources (IUCN) for assigning species to Red Data categories are widely used for the assessment of rare species in general; full details are given in The World Conservation Union (1994). Besides rarity, other important considerations relate to key species in ecological communities, economically important species, species that are perceived to be exceptionally attractive, and species having special cultural significance.

\(^{(2)}\) Vascular plants occurring in sixteen to one hundred 10 kilometre grid squares (Stewart, Pearman & Preston (1994), NCC (1989)).
Importance may also be attached to regionally and locally rare species, especially those in the following categories:

- County Rarities defined by JNCC as plant species occurring in three or fewer localities (not exceeding 1-km square) in a county or equivalent administrative unit.

- For birds, regional scarcity can be assessed using publications such as The New Atlas of Breeding Birds in Britain and Ireland: 1988-1991 (Gibbons et al., 1993).

- At a regional level specific studies provide information for other animals for example, Otter Survey of Scotland 1991-1994 (Green & Green, 1997).

- At the county level, information is typically available from statutory agencies and local wildlife trusts and other conservation organisations (eg local bird clubs).

Increased importance may attach to local genetic varieties or unusually restricted populations of nationally common species. Greatly reduced significance attaches to alien species (including UK natives that are alien to the district), introduced species (eg garden escapes) and casual ruderals (as distinct from members of ruderal communities indigenous to the district).

Populations of individual species may be deemed important where they exceed certain threshold sizes (usually some percentage of the total world or European population). For example threshold levels for international and national importance for wintering waterfowl bird populations are given in Pollitt et al (2001). Trends in British European bird populations are provided in for example Marchant et al (1990); Gibbons et al (1993) and Tucker & Heath (1994).

E1.4 **Scientific and General Wildlife Interest of Sites**

Sites are assessed according to very well established criteria developed by the Nature Conservancy Council, initially for the selection of a national series of nature reserves (Ratcliffe, 1977) and subsequently modified for Site of Special Scientific Interest (SSSI) selection (Nature Conservancy Council, 1989). These include habitat and population size, diversity, naturalness, rarity, fragility and typicalness as primary criteria, and position in an ecological/ geographical unit, potential value, and intrinsic appeal as secondary criteria. Further details of these and related criteria are given in Usher (1986) and Nature Conservancy Council (1989) and more specifically for birds in Fuller (1980, 1982).
In addition the following considerations are specifically taken into account in assessing the scientific value of sites in the EA process:

¶ The presence of species assemblages, communities and habitat types requiring conservation in their own right, including those listed in Annex I of the EC Habitats and Species Directive (92/43/EEC), examples of rare National Vegetation Classification (NVC) communities and fine examples of other NVC communities having importance for reasons parallel to those discussed in connection with individual species.

¶ The extent to which habitats represented in the site may have declined (in extent or quality) in the countryside at large and the extent to which they continue to be threatened with such decline.

Very high importance is attached to sites that are the subject of statutory protection and high importance to non-statutory designation for their nature conservation importance. Protection categories and designations relevant to this ES include the following:

¶ Special Areas of Conservation (SACs) recommended to the European Commission by the British Government, and other possible candidate SACs identified to the Government by EN through JNCC;

¶ Special Protection Areas (SPAs), designated under the EC Wild Birds Directive (79/409/EEC);

¶ Ramsar Sites, designated under the Convention on Wetlands of International Importance, 1971;

¶ Sites of Special Scientific Interest (SSSIs) under the Wildlife and Countryside Act 1981 and amendments;

¶ National Nature Reserves (NNRs) and Local Nature Reserves (LNRs) designated under The National Parks and Access to the Countryside Act, 1949;

¶ non-statutory nature reserves run by Scottish Wildlife Trust and RSPB;

¶ sites designated for their nature conservation importance by local authorities and mentioned in Structure and Local Plans on that basis.

E1.5 Ancient Countryside

Special importance attaches to ancient semi-natural habitats that owe their character to long-term freedom from major change and usually to the long continuance of traditional kinds of land management as well, eg coppice woodlands, water meadows, lowland heaths, chalk downlands. These habitats cannot be recreated quickly (if at all) or transplanted and neither can the special assemblages of plants and animals they support (including species
not found elsewhere). Most habitats in this category have suffered large-scale reductions in the post-war period due mainly to agricultural intensification. They are discussed in Rackham (1986). There are no widely accepted rules for quantifying the significance of ancient countryside loss, but any such loss would be deemed significant in the context of this assessment.

**E1.6 Amenity**

Consideration is given to the amenity value of sites for purposes connected with the observation and study of wildlife, and for the quiet enjoyment of the natural environment (as distinct from outdoor recreation). The criteria relate to many issues including the following:

- the intrinsic appeal and wildlife content of the site (common and attractive species may be as important as rare species in this context);
- the potential of the site for educational use, especially by schools (habitat robustness may be important in this context);
- whether the site has existing nature conservation use, or potential for such use (having regard to matters such as ownership, imperatives for conservation management, access, ease of movement within the site, and public safety);
- the local demand for amenity sites, having regard to the location of the site relative to areas of population and areas of ecological deficiency.

These criteria were largely developed by the urban wildlife movement, but the need for amenity sites in some rural areas is increasingly recognised. Further details of amenity considerations relevant to the assessment are given in Greater London Council (1985), Greater Manchester Council (1986), Usher (1986), Johnston (1990) and Goldsmith (1991).

**E1.7 Landscape Ecology**

Consideration is given to effects involving the landscape ecology of potentially affected areas. The criteria relate to many issues including the following:

- the severance or other impoverishment of wildlife corridors in intensively farmed landscapes and urban areas;
- fragmentation of areas of natural or semi-natural habitat;
- reductions in the sizes of natural or semi-natural areas below estimated Minimum Critical Areas (MCAs);

(1) The interaction between the structure and distribution of landscape elements and ecology.
disruption or other alteration of patterns of habitat connectivity across landscape-scale habitat mosaics, especially where networks of linear habitats (e.g., hedges, road verges) are involved.

E1.8 REFERENCES


WAVERLEY RAILWAY PROJECT

ECOLOGICAL IMPACT ASSESSMENT

February 2003

A Report to:
Environmental Resources Management

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1 SUMMARY

This report presents the results of an Ecological Impact Assessment (EcIA) for the proposed restoration of the Waverley Line, from Millerhill Junction outside Edinburgh to Tweedbank in the Scottish Borders. The proposed single line track will be approximately 46 kilometres in length and will predominantly follow the original track railway corridor. The location of the new line and associated infrastructure, and the assessment of proposed ecological impact has been assessed using Drawing Nos. B1031-PW-D-0054-PO2 to B1031-PW-D-0083-PO2.

The scope of the ecological appraisal involved a desk study consultation and the survey of: Habitats and Vegetation; Flora; Otter; Birds; Reptiles; and Bats. In addition attention was given to the potential presence of any other species with enhanced statutory protection or species of conservation concern during the above surveys. A separate EcIA has been developed for Badgers (Osborn et al. 2003) given the potential for persecution of this species.

The River Tweed and Gala Water which form part of the River Tweed catchment Site of Special Scientific Interest (SSSI) and candidate Special Area of Conservation (cSAC) occurs within the Study Site. It is considered that there is potential for a significant negative impact on this designated site, in particular during the construction phase of the development. There will be a high risk of a pollution incidence given the close proximity of many of the works to the Gala Water and associated water bodies and the need for some in-stream works. Scottish Natural Heritage (SNH) must be consulted at the earliest opportunity in order to establish an agreed method for testing the significance of effect of the proposals upon the River Tweed cSAC in order to undertake an appropriate assessment, to comply with the National Planning Policy Guidelines/European legislation. In addition, part of the Crichton Glen SSSI occurs within the Study Site. Works within this site will also require prior consents from SNH for potentially damaging operations.

Collectively the habitats of the whole study site (other than the Tweed cSAC/SSSI) have been assessed to be of High Local Value in landscape ecology terms, although individually most parcels of any habitat type were assessed to be of Moderate Local Value or lower. Selected parcels of neutral grassland, acid grassland, broad-leaved woodland and scrub were assessed to be of High Local Value. These have also been identified as priority habitats both Nationally and within the Midlothian and Borders Biodiversity Action Plans (BAPs). Areas of neutral grassland which will be lost includes areas at Eskbank, Borthwick, Falahill, Heriot, Stagebank, Hoppringle, Hazelbank, Watherston, Galabank and Bowland. Areas of acid grassland which will be lost include areas at Shank Bridge/Gore Glen and Crichton Glen. Areas of broad-leaved woodland which will be lost or damaged include areas at Gore Glen, Crichton/Maggies Bowies Glen and Torwoodlee. The Impact Significance of the development proposals on the loss of habitats have been assessed as Moderate. Mitigation should take the form of clearly setting out minimum safe working areas to minimise impacts, and compensatory measures should aim to re-create (and improve upon) lost habitats and maintain the cover of semi-natural habitats within the study site.
No plant species of note were located during the Phase 1 survey. However, a number of records of nationally scarce species were received during the consultation that could potentially be present on the rail line. Further survey is recommended in a number of defined working areas. Although not legally protected, if present, best practice mitigation is likely to involve translocation to nearby habitat. In addition the survey identified the presence of the invasive alien species Giant Hogweed *Heracleum mantegazzianum* and Japanese Knotweed *Fallopia japonica*, both listed on Section 14, Schedule 9 of the Wildlife and Countryside Act. A strategy will be required for the control of these species to prevent their spread into the wider countryside during earthworks.

Otter activity was recorded along many of the river crossings with particularly extensive activity along stretches of the Gala Water. The Tweed catchment is noted as a stronghold of the species in the area. The Otter presence within the study site has been assessed to be of Regional Value. Sprainting sites were recorded at over 30 river and burn crossings. Two lying up sites were identified and at least one of these will be lost. In addition, a number of areas have been identified for further intensive survey at bridging points and along areas of River bank that will be worked on. Further survey will be undertaken in winter months (to avoid problems with dense vegetation) prior to construction. The destruction of a lying up site and disturbance to a lying up site will require a licence from the Scottish Executive Environment and Rural Affairs Department (SEERAD). Other recommended mitigation measures include the provision of suitable ledges in culverts to discourage Otter movement onto the rail line and the retention of bankside vegetation where possible.

The study area for the Waverley Line route encompasses a typical range of bird habitats associated with disused railway lines, including: broad-leaved semi-natural woodland, scrub, unmanaged grasslands and tall ruderal vegetation. These habitats support a diverse suite of birds including a number of species of national conservation concern. There will be a loss of breeding bird habitat associated with the proposed works. Vegetation clearance should be kept to a minimum, and in particular the felling of trees limited. No clearance work should be undertaken within the breeding bird season. Opportunities for the creation of bird habitat should be maximised in the development of the landscaping strategy for the project.

Kingfisher was the only species recorded during the survey that receives enhanced statutory protection under the Wildlife and Countryside Act. In addition, Barn Owl, which also receives enhanced statutory protection, are known to be present in the area and it is considered highly likely that they could be breeding within the study site. Further survey is recommended for Kingfisher along two stretches of the Gala water and for Barn Owl within bridge and other structures along the route.

A walkover Reptile survey was undertaken and a number of areas were identified providing potentially excellent and good habitat suitability that will be destroyed or damaged by the development. One probable sighting was made of a Common Lizard. Further survey has been recommended in these areas and will be undertaken prior to construction. If present, mitigation would involve a capture and translocation programme to areas of nearby suitable habitat unaffected by the development.
Numerous potential Bat roosts were identified along the line during a walkover survey and one Daubenton’s roost site was identified in a culvert and a record was received of a probable roost in a bridge. In addition a sighting was made of bat flying in the day. Potential roost sites include many of the bridges, tunnels, culverts, buildings and mature trees adjacent to the line. Areas of potentially high quality foraging habitat are present along the line, in particular associated with watercourses that cross or run close to the line and areas of woodland and scrub along the line. Further survey is recommended within many of the bridge structures, buildings and trees that will be affected by the works such as during re-pointing and repair. This survey will be intensive and may involve dawn/dusk survey and the use of fibre optic surveys. The destruction of any roost sites can only be undertaken under licence from SEERAD. Recommended mitigation measures include the creation of artificial roost structures within bridges.

A number of areas were identified during the course of the above surveys that provide potentially suitable habitat for Water Vole and Amphibians, including Great Crested Newt. Further survey is recommended in these areas that are to be affected. Recommended mitigation could include habitat creation and translocation.

In summary, the key significant risk of potentially damaging impacts from the proposed development are assessed to be:

- Potential damage to the River Tweed catchment cSAC and SSSI
- Potential damage to Crichton Glen SSS1
- Potential loss of a significant number of Bat roosts

Although a number of other impacts are significant it is considered that if the mitigation proposals recommended are put in place, including the further survey, then impacts can be reduced to an acceptable level.

The proposed mitigation programme must be started well in advance of construction and for some groups (e.g. amphibians) this should be as early as two years prior to the start of construction and for other groups over one year prior to construction. It is recommended that a programme of ecological mitigation works is instigated at the earliest opportunity. It should also be noted that the potential cost of the mitigation works could be high. The mitigation will involve further detailed survey, possible species translocation and extensive habitat creation. The cost of the proposed further bat survey in particular is likely to be high, involving intensive night survey and intensive survey of crevices with many bridge structures.

It is recommended that an Ecological Clerk of Works should be part of the Project Team and that they are closely involved during the planning phase, construction phase and during any restoration or habitat creation phases.
CONTENTS

1 SUMMARY........................................................................................................................................1

2 INTRODUCTION ..............................................................................................................................9
  2.1 TERMS OF REFERENCE AND SCOPE OF STUDY .................................................................9
  2.2 SUMMARY OF DEVELOPMENT PROPOSALS .................................................................9
  2.3 STUDY AREA.......................................................................................................................9

3 APPRAISAL METHODOLOGY ......................................................................................................10
  3.1 CONSULTATION ..................................................................................................................10
  3.2 DESK STUDY ..................................................................................................................10
  3.3 PHASE I HABITAT SURVEY ...............................................................................................10
    3.3.1 Field Methods ..............................................................................................................10
    3.3.2 Limitations ................................................................................................................11
  3.4 OTTER SURVEY ................................................................................................................11
    3.4.1 Field Methods ..............................................................................................................11
    3.4.2 Limitations ................................................................................................................11
  3.5 ORNITHOLOGICAL SURVEYS .............................................................................................12
    3.5.1 Field Methods ..............................................................................................................12
    3.5.2 Limitations ................................................................................................................12
  3.6 PRELIMINARY REPTILE SURVEY .....................................................................................13
    3.6.1 Field Methods ..............................................................................................................13
    3.6.2 Limitations ................................................................................................................13
  3.7 PRELIMINARY BAT SURVEY ..............................................................................................15
    3.7.1 Field Methods ..............................................................................................................15
    3.7.2 Limitations ................................................................................................................15
  3.8 OTHER FAUNA ....................................................................................................................16

4 DESCRIPTION OF ECOLOGICAL RESOURCE .........................................................................17
  4.1 SITE DESIGNATIONS ............................................................................................................17
  4.2 HABITATS AND VEGETATION ............................................................................................19
    4.2.1 General Description .......................................................................................................19
      4.2.1.1 Semi-natural Broad-leaved Woodland .................................................................20
      4.2.1.2 Broad-leaved, Coniferous and Mixed Plantations ............................................20
      4.2.1.3 Scrub ..................................................................................................................21
      4.2.1.4 Acid Grassland ....................................................................................................21
      4.2.1.5 Neutral Grassland ..............................................................................................21
      4.2.1.6 Improved Grassland ..........................................................................................22
      4.2.1.7 Marshy Grassland ............................................................................................22
      4.2.1.8 Poor Semi-improved Grassland .......................................................................22
      4.2.1.9 Bracken ..........................................................................................................22
      4.2.1.10 Tall Ruderal Vegetation ...............................................................................23
      4.2.1.11 Swamp ..........................................................................................................23
      4.2.1.12 Marginal and Inundation Vegetation ...............................................................23
      4.2.1.13 Standing Water ..............................................................................................23
      4.2.1.14 Running Water ...............................................................................................23
      4.2.1.15 Arable Cropland ............................................................................................24
      4.2.1.16 Amenity Grassland ........................................................................................24
      4.2.1.17 Ephemeral/short perennial Vegetation ...........................................................24
      4.2.1.18 Introduced Shrub ............................................................................................24
      4.2.1.19 Hedges ..........................................................................................................24
      4.2.1.20 Bare Ground ...................................................................................................24
      4.2.1.21 New Buildings ...............................................................................................24
      4.2.1.22 Other Habitats ...............................................................................................24
5 EVALUATION OF ECOLOGICAL RESOURCE ................................................................. 37
  5.1 LEVELS OF VALUE ..................................................................................................................... 37
  5.2 HABITATS AND VEGETATION .................................................................................................. 37
    5.2.1 Legislative Overview ........................................................................................................... 37
    5.2.2 Appraisal of Habitats .......................................................................................................... 38
    5.2.3 Evaluation of Habitats ........................................................................................................ 39
    5.2.4 Collective Evaluation of Habitats.......................................................................................... 41
  5.3 FLORA ........................................................................................................................................ 42
    5.3.1 Legislative Overview ........................................................................................................... 42
    5.3.2 Evaluation of Flora ............................................................................................................. 43
    5.3.3 Evaluation of Invasive Exotics ............................................................................................ 44
  5.4 OTTER ....................................................................................................................................... 44
    5.4.1 Legislative Overview ........................................................................................................... 44
    5.4.2 Evaluation of Otter ............................................................................................................. 45
  5.5 BIRDS ....................................................................................................................................... 45
    5.5.1 Legislative Overview ........................................................................................................... 45
    5.5.2 Evaluation of Birds ............................................................................................................. 46
    5.5.3 Summary Evaluation .......................................................................................................... 48
  5.6 REPTILES ................................................................................................................................. 48
    5.6.1 Legislative Overview ........................................................................................................... 48
    5.6.2 Evaluation of Reptiles ........................................................................................................ 49
    5.6.3 Evaluation of Reptile Habitat ............................................................................................. 49
  5.7 BATS ....................................................................................................................................... 49
    5.7.1 Legislative Overview ........................................................................................................... 49
    5.7.2 Evaluation of Bat Habitat .................................................................................................. 50
  5.8 OTHER FAUNA ........................................................................................................................ 50
    5.8.1 Water Vole Arvicola terrestris ............................................................................................ 34
    5.8.2 Amphibians ......................................................................................................................... 35
  5.9 PLANNING POLICY ................................................................................................................. 51

6 EVALUATION OF IMPACTS ................................................................................................. 53
  6.1 HABITATS ............................................................................................................................... 54
    6.1.1 Permanent Impacts: Loss of Habitat ................................................................................... 54
    6.1.2 Temporary Impacts on Watercourses ................................................................................. 55
    6.1.3 Bridge works over watercourses ....................................................................................... 56
### 7 Mitigation Recommendations

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.1</td>
<td>Introduction</td>
<td>67</td>
</tr>
<tr>
<td>7.2</td>
<td>Habitats and Vegetation</td>
<td>67</td>
</tr>
<tr>
<td>7.2.1</td>
<td>Permanent Impacts: Loss of Habitat</td>
<td>67</td>
</tr>
<tr>
<td>7.2.2</td>
<td>Temporary Impacts on Habitats</td>
<td>68</td>
</tr>
<tr>
<td>7.2.3</td>
<td>Cumulative Impacts: Habitat Loss at the Landscape Scale</td>
<td>68</td>
</tr>
<tr>
<td>7.2.4</td>
<td>Impacts on Watercourses and Bridge Works Over Watercourses</td>
<td>69</td>
</tr>
<tr>
<td>7.3</td>
<td>Flora</td>
<td>69</td>
</tr>
<tr>
<td>7.3.1</td>
<td>Potential Loss of Notable Species</td>
<td>69</td>
</tr>
<tr>
<td>7.3.2</td>
<td>Control of Invasive Exotics</td>
<td>70</td>
</tr>
<tr>
<td>7.4</td>
<td>Otter</td>
<td>70</td>
</tr>
<tr>
<td>7.4.1</td>
<td>Loss of Holt and Lying-up Sites</td>
<td>70</td>
</tr>
<tr>
<td>7.4.2</td>
<td>Disturbance to Holt/Lying-up Sites</td>
<td>71</td>
</tr>
<tr>
<td>7.4.3</td>
<td>Loss of Riparian Habitat</td>
<td>72</td>
</tr>
<tr>
<td>7.4.4</td>
<td>Damage to Travelling Routes</td>
<td>72</td>
</tr>
<tr>
<td>7.4.5</td>
<td>Reduction in Foraging Availability or Quality</td>
<td>72</td>
</tr>
<tr>
<td>7.5</td>
<td>Birds</td>
<td>73</td>
</tr>
<tr>
<td>7.5.1</td>
<td>Protected Species</td>
<td>73</td>
</tr>
<tr>
<td>7.5.2</td>
<td>Loss of Breeding Habitat</td>
<td>73</td>
</tr>
<tr>
<td>7.5.3</td>
<td>Timing of Works</td>
<td>73</td>
</tr>
<tr>
<td>7.6</td>
<td>Reptiles</td>
<td>74</td>
</tr>
<tr>
<td>7.6.1</td>
<td>Reptile Translocation</td>
<td>74</td>
</tr>
<tr>
<td>7.7</td>
<td>Bats</td>
<td>75</td>
</tr>
<tr>
<td>7.7.1</td>
<td>Loss of Roost sites</td>
<td>76</td>
</tr>
<tr>
<td>7.7.2</td>
<td>Loss of Foraging Areas and Commuting Routes</td>
<td>77</td>
</tr>
<tr>
<td>7.8</td>
<td>Ecological Watching Brief</td>
<td>77</td>
</tr>
<tr>
<td>7.8.1</td>
<td>Scope of Responsibilities</td>
<td>77</td>
</tr>
</tbody>
</table>

---

**Waverley Railway Project - Environmental Statement: Ecological Impact Assessment**

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H E L

V3: 8/04/03

natural resource consultancy
8 RECOMMENDED FURTHER STUDY ................................................................. 79
8.1 DESIGNATED SITES .................................................................................. 79
8.2 PHASE 1 HABITAT SURVEY ...................................................................... 79
8.3 FLORA ........................................................................................................ 79
8.3.1 Fieldwork Methods ................................................................................ 79
8.3.2 Timing ..................................................................................................... 79
8.4 OTTER ......................................................................................................... 79
8.4.1 Timings .................................................................................................. 80
8.5 BIRDS ......................................................................................................... 80
8.6 REPTILES .................................................................................................. 81
8.6.1 Fieldwork Methods ............................................................................... 81
8.7 BATS .......................................................................................................... 82
8.8 FIELDWORK METHODS .......................................................................... 82
8.8.1 Timing .................................................................................................. 82
8.8.2 Day Visit ............................................................................................... 83
8.8.3 Night Survey ........................................................................................ 83
8.8.4 Health and Safety ................................................................................ 84
8.9 OTHER FAUNA ........................................................................................ 84
8.9.1 Water Vole ........................................................................................... 84
8.9.1.1 Fieldwork Methods ........................................................................... 84
8.9.1.2 Timing and Limitations .................................................................. 84
8.9.2 Amphibians ........................................................................................... 84
8.9.2.1 Fieldwork Methods ........................................................................... 84
8.9.2.2 Timing and Limitations .................................................................. 85
8.9.2.2 Timing and Limitations .................................................................. 85
9 REFERENCES ............................................................................................... 86
10 APPENDIX I: TARGET NOTES ................................................................. 88
10.1 PHASE 1 TARGET NOTES ...................................................................... 88
10.2 OTTER (O) TARGET NOTES ................................................................. 117
10.3 BATS (BT) TARGET NOTES ................................................................. 122
11 APPENDIX II COPIES OF CONSULTATION RESPONSES ...................... 131
12 APPENDIX III – MAPS ............................................................................. 132

TABLE 4-1: DESK STUDY BIRD RECORDS .................................................. 26
TABLE 4-2: STUDY SITE BIRD RESOURCE ................................................... 27
TABLE 4-3: SUMMARY OF EXCELLENT AND GOOD REPTILE HABITAT .... 31
TABLE 4-4 SUMMARY OF POTENTIAL BAT ROOST SITES AND EXCELLENT FORAGING AREAS. .......................................................... 33
TABLE 5-1 VALUE OF ECOLOGICAL RESOURCES (AFTER REGINI 2000). ........ 37
TABLE 5-2 COLLECTIVE APPRAISAL OF PHASE 1 HABITAT TYPES WITHIN THE STUDY SITE . 39
TABLE 5-3 APPRAISAL OF INDIVIDUAL PHASE 1 HABITAT PARCELS WITHIN THE STUDY SITE OF MODERATE LOCAL VALUE AND ABOVE ......................................................................................................................... 40
TABLE 5-4 SUMMARY EVALUATION OF FLORA ......................................... 43
TABLE 5-5 NUMBER OF REPTILE SITES RECORDED WITHIN EACH SUITABILITY CATEGORY . 49
TABLE 6-1: GUIDELINE CRITERIA FOR ASSESSING MAGNITUDE OF IMPACTS. .......................................................... 53
TABLE 6-2: IMPACT SIGNIFICANCE MATRIX - IMPACTS IN RELATION TO SIZE AND VALUE OF FEATURE ......................................................................................................................... 53
TABLE 6-3: GUIDELINE CRITERIA FOR ASSESSING SIGNIFICANCE OF IMPACTS. .......................................................... 53
TABLE 6-4: PERMANENT IMPACTS: LOSS OF HABITAT ................................ 54
TABLE 6-5: FURTHER PERMANENT IMPACTS ON HABITATS .......................... 55
TABLE 6-6: TEMPORARY IMPACTS ON WATER COURSES ......................................................... 55
TABLE 6-7: IMPACTS ON POTENTIALLY SUITABLE REPTILE HABITAT .............................. 61
TABLE 6-8: POTENTIAL BAT ROOSTS OF GOOD AND EXCELLENT SUITABILITY AND
EXCELLENT FORAGING, AFFECTED BY THE DEVELOPMENT. ............................................. 63
TABLE 7-1: LOCATION OF INVASIVE EXOTICS .................................................................... 70
2 INTRODUCTION

2.1 Terms of Reference and Scope of Study

This independent report by Heritage Environmental Ltd. represents an Ecological Impact Assessment (EcIA) for the proposed restoration of 46 km of the Waverley Line from Millerhill Junction outside Edinburgh to Tweedbank in the Scottish Borders.

The study was commissioned by Janet Armitage of Environmental Resources Management (ERM). The scope of the study was defined in consultation with ERM, as follows:

1. To provide detailed ecological appraisal in recognition of both national and local priority species and habitats;
2. To provide an impact assessment of the proposed development on the ecological resource of the study site and environs, with particular reference to species with enhanced statutory protection and of conservation priority;
3. To provide recommendations for ecological mitigation and compensation measures (where required) in order to reduce and/or eliminate any potential negative impacts occurring as a consequence of the restoration of the line.

A separate EcIA has been developed for Badgers (Osborn et al. 2003) given the potential for persecution of this species.

2.2 Summary of Development Proposals

The proposed development is the restoration of the Waverley Railway Line from Millerhill Junction outside Edinburgh to Tweedbank in the Scottish Borders. The proposed single track line will be approximately 46 km in length and will predominantly follow the original twin track railway corridor. The development will also involve the repair/strengthening of structures such as bridges and culverts, or replacement where necessary. In addition, several new structures will be required where the former route has been interrupted by a post-line closure road. New stations will be built at Eskbank, Newtongrange, Gorebridge, Galashiels and Tweedbank. The definition of works is shown in Drawing Numbers B1031-PW-D-0054-P02 to B1031-PW-D-0083-P02.

2.3 Study Area

The Study Site comprises the line of the proposed restored railway corridor, and a distance of 50 m either side (i.e. c. 46 km x 100 m), from Millerhill Junction in Midlothian (NT 325705) to Tweedbank (NT 527347) in the Scottish Borders.
3 APPRAISAL METHODOLOGY

3.1 Consultation
The following Scottish Natural Heritage (SNH) Area Offices and Local District Planning Departments were consulted with regard to the scope and methods of the ecological appraisal:

- SNH Midlothian (Dalkeith Office);
- SNH Borders (Galashiels Office);
- Midlothian Council Planning Department;
- Scottish Borders Council Planning Department.

A copy of their responses is contained in Appendix III.

3.2 Desk Study
The following were consulted during the course of the desk study in order to collate existing information on the ecological resource of the study site:

- SNH Midlothian;
- SNH Borders;
- Lothians Bat Group;
- Borders Bat Group;
- Edinburgh and Lothians Badger Group;
- Scottish Badgers;
- Lothian Wildlife Information Centre (LWIC);
- Scottish Borders Biological Recording Centre (SBBRC).

In addition ERM had previously consulted RSPB, SNH and SWT.

3.3 Phase I Habitat Survey
A comprehensive habitat survey of the study site was required due to the potential presence of habitats and plants of conservation significance, e.g. Priority Habitats and Species listed on the UK and Local Biodiversity Action Plans.

3.3.1 Field Methods
A Phase I Habitat Survey was undertaken within the Study Site boundary. In summary, the Phase 1 Habitat Survey method (NCC 1990, and revised JNCC 1993) involves a standard technique for the ecological surveying of large areas of land, and provides the framework for a consistent national approach to the gathering and recording of land cover information.

This standardised approach was employed to survey all habitat types encountered throughout the study site, ensuring that the survey is carried out to a consistent level of detail and accuracy. The methodology involves a trained surveyor visiting every parcel of land within the survey area and mapping the vegetation present, in terms of
some ninety specified habitat types. The minimum polygon size mapped was approximately 0.1 hectares.

Extensive use was made of target notes in order to provide extra information on sites of rare or localised species and/or interesting habitats. The identification of areas which merit target notes was undertaken by surveyors using the guidelines provided in JNCC (1993). Although a full plant list is not always provided, all species of conservation interest (e.g. National/Regional/Local importance) are recorded when found. Invasive exotics including Japanese knotweed *Fallopia japonica*, Himalayan balsam *Impatiens glandulifera* and Giant Hogweed *Heracleum mantegazzianum* were target noted.

Further information on the faunal interest of a habitat parcel is not included within the habitat target notes, but is instead added to the notes of the relevant faunal group.

3.3.2 Limitations
The survey work was undertaken during mid-late summer 2002. This is within the acceptable period for undertaking Phase 1 Survey in upland and lowland areas in Britain. However, plants which flower earlier in the season may not have been detected. In addition, access was denied to a stretch of line of c. 3 km near Tynehead, as shown in Sheet 4, Maps A and B.

3.4 Otter Survey
A comprehensive Otter survey of the study site was required due to the probable presence of this species which is subject to enhanced statutory protection.

3.4.1 Field Methods
A search within the Study Site boundary was undertaken between June and September 2002 and all evidence of current habitat utilisation by Otter *Lutra lutra* recorded. The locations of any Otter activity, a description, with a 10 figure grid reference, determined using GPS, were marked on a suitable scale map.

The following Otter evidence was recorded:

- Spraints;
- Sign heaps;
- Rolling places;
- Slides;
- Footprints;
- Holts.

The suitability of the habitat for Otter was assessed throughout the study site.

3.4.2 Limitations
The survey was undertaken in mid to late summer 2002 which is within the generally accepted period for undertaking Otter surveys in lowland and upland areas of Britain.
Access was not possible to a number of areas of River bank (e.g. due to deep water, steep banks, difficult access to the River and thick summer vegetation) and in these areas a full survey was not undertaken. Survey effort was concentrated at known areas of impact e.g. bridge structures. Since undertaking the survey, it has become apparent that a number of areas of river bank, in particular along the Gala Water, will require extensive protection works. A detailed survey was not undertaken in all these areas and, therefore, further survey will be undertaken prior to construction.

The Otter resource in the area is likely to change over several years due to its current expansion (Green and Green 1997) and, therefore, the resource may have altered by the time the development works commence in 2005. In addition, Otters are very mobile and have a large home range. Some watercourses may be used infrequently and are unlikely to be the core of the Otter’s *Lutra lutra* range, but they can be an important component of it. Detection of Otters in such areas can be difficult, in particular if only a short stretch of watercourse is surveyed. Further survey will, therefore, be undertaken prior to construction in a number of potentially sensitive areas within or immediately adjacent to the proposed working areas, including areas such as drainage works, which may be outwith the original survey corridor.

3.5 Ornithological Surveys

A comprehensive ornithological survey of the study site was required due to the probable presence of species with enhanced statutory protection (e.g. Kingfisher) and UK and Local Biodiversity Action Plan (BAP) Priority Species.

3.5.1 Field Methods

A systematic search of the entire Study Site, was undertaken in May – September 2002 (inclusive), and all evidence of current habitat utilisation by birds recorded. The locations of all birds, determined using GPS, where necessary, were marked on a suitably scaled map.

Two survey visits of the study site were completed to provide an accurate appraisal of the ornithological resource. No surveying was undertaken in adverse weather conditions, e.g. windy, precipitation, low cloud. To take account of variation in species behaviour surveying was completed both during the morning and evening period. No surveying was undertaken between 12.00 and 14.00 hours when bird activity is at a reduced level, compared to other times of the day. Standard British Trust for Ornithology (BTO) field registration codes were used. Analysis of the field maps from both visits was undertaken in order to produce final distribution maps of birds throughout the study site. Records of birds foraging over the site were also recorded.

3.5.2 Limitations

The initial survey programme was to undertake the survey in May and June, which is within the optimal period for undertaking lowland and upland ornithological surveys in Britain. Due to problems of land owner access the survey period had to be extended, with survey work also being completed during July, August and September. This is outwith the optimal period for undertaking breeding bird surveys, although some
migratory breeding species were still present (e.g. Willow Warbler), together with resident species. Recommendations for further survey, including some further species specific survey are made in Section 8.

3.6 Preliminary Reptile Survey

A preliminary survey of the Waverley Line site was required due to the potential presence of reptile species, with enhanced statutory protection, and/or species listed on the UK and Local Biodiversity Action Plans.

3.6.1 Field Methods

A systematic walk-over of the Study Site, was completed to assess for the presence of reptiles and to assess habitat suitability.

The following survey methodology was used in recognition of the difficulty of surveying reptiles, in particular where a site is extensive, as is the case with the Waverley Line. The survey method was applicable for three reptile species occurring within Scotland potentially present on the site, these being:

- Adder *Vipera berus*,
- Common Lizard *Lacerta vivipara*, and
- Slow worm *Anguis fragilis*

The walkover survey was conducted between June and September 2002. All habitats considered to be capable of supporting reptile species were mapped onto 1:2.500 maps of the site with the aid of a GPS hand unit. Each habitat was ranked into 1 of 2 ‘suitability’ categories for potentially supporting reptile species, these being:

- Good Habitat Suitability, and
- Excellent Habitat Suitability

The ‘suitability’ criterion listed below were used to assess the quality of habitat within the site capable of supporting reptile species. It is important to take into consideration that the quality descriptions below were not used exclusively to assess habitat quality but were used in conjunction with prior reptile survey experience and professional judgement.

**Good Habitat Suitability:**

- Low level of shading by tree or scrub species
- Medium to high occurrence of potential basking sites (open areas of bare ground or vertical structures such as fence posts, piles of wood or low stone walls)
- Low level of human disturbance
- Low level of grazing by domestic livestock
- Medium to high ratio of open/bare ground to structurally varied vegetation
- Medium to high occurrence of tussocky vegetation
- Medium to high ratio of short to long sward of vegetation
Medium to high occurrence of moist/wet vegetation (likely to support invertebrate/vertebrate species)
Presence of suitable hibernacula in general vicinity
Medium to high occurrence of sunny hollows, banks and gullies
Medium to high occurrence of linear ‘habitat linking’ features
Some variation in local topography (contributes to habitat mosaic)
Occurrence of open water within the general vicinity
Presence of south facing banks and slopes
Medium to high occurrence of piles of dead leaves and other vegetation (suitable for burrowing and provides food for common lizard)

Excellent Habitat Suitability:
No shading by tree or scrub species
High occurrence of potential basking sites (open areas of bare ground or vertical structures such as fence posts, piles of wood or low stone walls)
No human disturbance
No grazing by domestic livestock
High ratio of open/bare ground to rank structurally varied vegetation
High occurrence of tussocky vegetation
High ratio of short to long sward of vegetation
High occurrence of moist/wet vegetation (likely to support invertebrate/vertebrate species)
Presence of suitable hibernacula in general vicinity
High occurrence of sunny hollows, banks and gullies
High occurrence of linear ‘habitat linking’ features
Considerable variation in local topography (contributes to habitat mosaic)
Occurrence of open water within the general vicinity
High presence of south facing banks and slopes
High occurrence of piles of dead leaves and other vegetation (suitable for burrowing and provides food for common lizard)
A combination of some or the entire criterion listed above, in conjunction with prior reptile survey experience and a high level of professional judgement.

Due to the fact that reptiles can inhabit a wide range of habitats, e.g. hedgerows, rough grassland, etc., all other habitats are viewed as being of negligible or low habitat suitability.

The Waverley Line has been subject to fly-tipping since its closure in the 1960’s. This presented an excellent opportunity to search for reptile species hiding under suitable dumped material. Reptiles were also actively searched for under natural occurring refugia such as logs and large stones occurring throughout the site.

Roads (especially in close proximity to the site) were checked (when ever possible) for any evidence of reptile road kills. In addition, any local residents encountered during the survey were questioned as to whether they had seen or knew of reptiles occurring within the local area.
3.6.2 Limitations
This preliminary study entailed a single walk-over survey in order to primarily assess habitat suitability for Reptiles. The following limitations were identified with the walkover survey methodology used:

Survey Timing
Reptile surveys are best conducted only during the ‘reptile active season’. The main objective in conducting a reptile survey is to record basking reptiles. Since reptiles spend considerable time basking when the air temperature is low but the sun is shining, the most appropriate key months are April, May and September. April and May additionally lend themselves to being the best month for surveys as this is the height of the reptile mating season and individuals are more likely to be recorded due to reduced observation on part of the reptile species. During June, July and August reptiles are most active because the air temperature is higher, therefore, they do not need to spend so much time basking and thus are less likely to be recorded as part of a survey. Unfortunately, the majority of survey of the Waverley line took place in the middle of this ‘unsuitable’ highly active period, potentially resulting in less basking animals being recorded.

Reptile Ecology
Reptiles have excellent eyesight and hearing and can easily see and feel a surveyor long before the surveyor observes them (especially when they are active during the day), therefore, unless the surveyor is not extremely vigilant at all times, individuals can and will be missed during a walk-over survey.

All reptile species are to a greater or lesser degree well camouflaged, given that basking reptiles are often partially obscured by vegetation, this can further contribute to ‘accidentally’ missing basking reptiles during a walk-over survey.

Reptiles are secretive, shy animals. The only time they are likely to be observed is while they are basking or are in transit between areas of suitable habitat or hiding under refugia. Therefore, the likelihood of recording reptiles during a walkover survey is low. The preferred option for identifying the presence or absence of reptile species within a given site, is by instigating a basic tinning exercise. However, the main aim of this survey was to identify potentially suitable reptile habitat. Where excellent habitat has been identified in a zone of potential impact, further survey is recommended in Section 8 and will be undertaken prior to construction.

3.7 Preliminary Bat Survey
A preliminary Bat survey of the study site was required due to the potential presence of species with enhanced statutory protection and Biodiversity Action Plan (BAP) species.

3.7.1 Field Methods
The following survey method was undertaken in recognition of the difficulty of surveying Bats, particularly where sites are extensive (such as the Waverley Line). The survey method is intended to provide a preliminary study to identify the
presence/absence of key Bat habitats. Day-time walk-over survey was undertaken throughout the study site in May – September with the aim of locating the following:

- Potential roost sites (maternity, hibernation and non-breeding roosts)
- Potential foraging areas
- Potential commuting routes

An assessment of habitat suitability was made by the surveyor throughout the study site. The locations of any key Bat habitats with a 10 figure grid reference (determined using GPS) were marked on suitable scale field map.

Potential roost sites and foraging habitat were graded during the course of the survey into:

1. Excellent Suitability,
2. Good Suitability, and
3. Low Suitability.

The following were used as a guide in conjunction with prior bat survey experience and professional judgement:

**Excellent Suitability:**
Structure with potential roost site (e.g. stone/brick structure with suitable cracks and crevices, mature tree with potential holes) in combination with good quality surrounding foraging. High quality foraging includes deciduous woodland, sheltered scrub and grassland edges, feeding pools surrounded by woodland.

**Good Suitability:**
Structure with some potential for roost sites (e.g. bridge structure with crevices) in combination with lower quality surrounding foraging (e.g. fields with scattered scrub).

**Low Suitability:**
Structure with virtually no potential for roost sites (e.g. metal bridge structure, well pointed bridge with no crevices) in combination with poor quality surrounding habitat (e.g. open fields with little cover and exposed location).

### 3.7.2 Limitations

This preliminary study entailed a single visit during the day to all parts of the study area in order to assess habitat suitability for Bats. In general, no confirmation of the presence/absence of Bats was possible, as this requires intensive survey methods. Where optimal Bat habitat has been identified, further intensive survey (e.g. night visits using ultra-sonic Bat detectors, search of crevices using fibre optics) is recommended in Section 8 and will be undertaken prior to construction.

### 3.8 Other Fauna

All records of other fauna of conservation significance were compiled during the various ecological surveys. These incidental records also relate to the identification of potential habitat for other fauna (e.g. the identification of potential breeding amphibian habitats).
4 DESCRIPTION OF ECOLOGICAL RESOURCE

4.1 Site Designations

Consultation with Scottish Natural Heritage confirmed the following designated sites are within 5 km of the Study Site:

- **Dalkeith Oakwood SSSI** (Midlothian District) is c. 700 m to the east of the Study Site at NT 338674. The site comprises 6.5 ha of Ancient Woodland over 300 years old with Pedunculate Oak *Quercus robur* and Sessile Oak *Quercus petraea*.

- **Crichton Glen SSSI** (Midlothian District) borders and is partly within the Study Site to the north at NT 382606. The site is an example of lowland river habitats and comprises a mixture of ancient woodland, herb rich calcareous and neutral grasslands and fen.

- **Fala Flow SSSI** (Midlothian District) is c. 3.5 km to the east of the Study Site at NT 432586. The site is an area of blanket bog with characteristic plant species of this habitat. The site is of international importance for the number of Pink-footed Geese *Anser brachyrhynchus* it supports in winter and is the most important roost for the species in the Lothians.

- **Tweedwood-Gateheugh SSSI** (Scottish Borders District) is c. 4.5 km to the east of the Study Site at NT 583342. The site has an area of 29.5 ha, is one of the few remaining Ancient Woodlands of appreciable size in the Borders Region and is surrounded by sections of long-established woodland. It has high species diversity in the ground flora and includes species that are rare or uncommon in the Borders and Scotland. There is also entomological interest, particularly beetles, with 2 national rarities and 24 species of restricted distribution in Scotland.

- **Moorfoot Hills SSSI and SAC** (Scottish Borders District) is at a minimum distance of c. 1.25 km to the west of the Study Site at NT 370460. The site consists of flat-topped, rounded hill ridges with steep valleys and is the largest area of intact blanket mire in the Lothians and Borders Regions. It supports a diverse moorland breeding bird community with over 40 species present. European Priority interests include blanket bogs and European dry heaths, both of which are considered to be among the best areas in the UK.

- **Faldonside Loch SSSI** (Scottish Borders District) is c. 2.5 km to the south of the Study Site at NT 505328. The loch is the lowest altitude marl-loch of a series of such lochs which occur in the Scottish Borders District. The loch has an emergent and fringing minerotrophic fen and is of local importance as a winter wildfowl roost.

- **Avenel Hill and Gorge SSSI** (Scottish Borders District) is c. 1.5 km to the north of the Study Site at NT 522374. The site consists of a stream gorge and west-facing hill slope which support a varied range of relic upland woodland and scrub.
types. The Green Hairstreak Butterfly _Callophrys rubi_ occurs here at one of only three post 1960 Border localities.

1. **Gattonside Moss SSSI** (Scottish Borders District) is c. 3 km to the north-east of the Study Site at NT 548368. The site is a relatively deep, elongated basin mire consisting of medium-rich fens. The fen includes Nationally and Regionally Rare Sedges (_Carex diandra, C. limosa_ and _C. lasiocarpa_) and supports an outstanding diversity of Water Beetles.

1. **Central Borders ESA** (Scottish Borders District) abuts the southern end of the Study Site at Tweedbank.

1. **Eildon and Leaderfoot NSA** (Scottish Borders District) also abuts the southern end of the Study Site at Tweedbank. The area comprises part of the middle reaches of the Tweed river valley farmland, plantation woodland and moorland. It also includes the trio of volcanic Eildon Hills.

1. **River Tweed SSSI and cSAC** (Scottish Borders District) includes the River Tweed and its tributary the Gala Water. The Gala Water occurs in much of the study site from NT 396557 to its confluence with the river Tweed at NT 511348. The Study Site crosses the River Tweed at NT 515354. The Tweed and its tributaries are clean river systems of high conservation and ecological value.

The vegetation shows a natural succession from mineral-poor upland streams through to species which are typical of mineral-rich lowland rivers and includes several Nationally Scarce species of Pondweed _Potamogeton_ spp. and Water-Crowfoot _Ranunculus_ spp. Of particular interest is the _Ranunculion fluitantis_ and _Callitricho-Batrachion_ vegetation for which this site is considered one of the best areas in the United Kingdom. These are river channel communities often dominated by floating beds of Water-crowfoot _Ranunculus_ spp. which occur in relatively unpolluted waters. In the middle reaches with reduced gradients and a shift to sandstone geology with higher nutrient levels water-crowfoot forms large beds in shallow sections. Characteristic species include _Ranunculus penicillatus, Ranunculus aquatilis_, Curled Pondweed _Potamogeton crispus_ and Alternate-flowered Water-milfoil _Myriophyllum alternifolium_. Within these middle reaches marginal vegetation is more frequent with stands of Branched Bur-reed _Sparganium erectum_ and Reed Canary-grass _Phalaris arundinacea_. On the stony margins of the middle reaches of river the nationally scarce species Water Figwort _Scrophularia umbrosa_ and Maiden Pink _Dianthus deltoides_ occur.

A rich invertebrate fauna is associated with riverine and adjacent habitats of the Tweed system with nationally important assemblages of Mayflies (Ephemeroptera), Caddisflies (Trichoptera) and Stoneflies (Plecoptera). Marginal shoals of silt, gravel and shingle contain a nationally important assemblage of beetles (Coleoptera).

The fish fauna of the system is particularly diverse with 19 species recorded, including large migrations of Salmon _Salmo salar_ and Sea Trout, together with a resident Brown Trout _Salmo trutta_ population, all of which support a major sport
fishery. Other fish species with European Interest include River Lamprey *Lampetra fluviatilis*, Brook Lamprey *Lampetra planeri* and Sea Lamprey *Petromyzon marinus*. Several mammal species occur, most notably Water Shrew *Neomys fodiens*, Water Vole *Arvicola terrestris* and Otter. The Otter population has been increasing for several years and the Tweed is now regarded as a stronghold for the species.

Consultation with Scottish Wildlife Trust confirmed the following non-statutory designated sites within and in proximity to the Study Site:

- **Borwick Glen**: 400 m to the south of the route at NT 375595.
- **Middleton House Pond**: 2 km to the south of the route at NT 369582.
- **Newbattle Woods**: 1 km to the east of the route at NT 335660.
- **North River Esk**: NT 324650 – the line crosses the North Esk at NT 324672.
- **Waverley Railway**: NT 325649.
- **Catcune Road Verges**: NT 353602.

Ancient Woodlands and Long Established Woodland is located in the following areas adjacent to the route:

- **Dalkieth Country Park**: Long Established Woodland adjacent to the route at NT 322677 and NT 323675 and cuts through at River North Esk crossing at NT 324672.
- **Lothianbridge**: Ancient and Long Established Woodland within and adjacent to the rail corridor at NT 326649.
- **Gore Glen Park/Shank Bridge Area**: Ancient and Long Established Woodland within and adjacent to the rail corridor at NT 331620 and NT 340613.
- **Crichton Glen/Borthwick Area**: Ancient Woodland within and adjacent to the route at NT 385603.
- **Tynehead Area**: Ancient and Long Established Woodland within and adjacent to the rail corridor at NT 475384.

### 4.2 Habitats and Vegetation

#### 4.2.1 General Description

Descriptions of individual habitat parcels and their flora are provided as Target Notes in Appendix I. The location and extent of all habitats are shown on the maps provided in Appendix II.
The Waverley line was closed and the tracks removed in the early 1960’s. Since that time much of the track bed has reverted to semi-natural vegetation and the cutting slopes have remained unmanaged except locally where these have been incorporated into adjacent pastures, have been planted with trees or have been developed as domestic and commercial buildings, or utilised as cycle ways.

The following semi-natural and man-made habitats were identified:

**4.2.1.1 Semi-natural Broad-leaved Woodland**

Broad-leaved woodland covers approximately 163ha within the study site.

Mature woodland usually of Sessile Oak *Quercus petraea*, Ash *Fraxinus excelsior*, Sycamore *Acer pseudoplatanus* and Wych Elm *Ulmus glabra* is confined to areas adjacent to the line. The best examples, such as TN 20 beside the roundabout at Newbattle, TN 46 near Arniston in the valley at the confluence of the Gore Water and the River South Esk and TN 207 beside the Gala Water just north of Galashiels all have a well developed ground flora with many of the following species: Dog’s Mercury *Mercurialis perennis*, Enchanter’s-nightshade *Circaea lutetiana*, Gooseberry *Ribes uva-crispa*, Bluebell *Hyacinthoides non-scripta*, Woodruff *Galium odoratum*, Common Dog-violet *Viola riviniana*, False Brome *Brachypodium sylvaticum*, Herb Robert *Geranium robertianum*, Wood Avens *Geum urbanum*, Ramsons *Allium ursinum*, Sanicle *Sanicula europaea* and Male Fern *Dryopteris filix-mas*.

Woodland on the old track bed and on cuttings and embankments slopes are all secondary woodlands. Scrubby pioneer woodlands of Goat Willow *Salix caprea*, Silver Birch *Betula pendula* and Sycamore *Acer pseudoplatanus* with shrubs Hawthorn *Crataegus monogyna* and Elder *Sambucus nigra* occur frequently along the line and in rough or neglected areas adjacent to the line. These usually have a species-poor ground flora of a few catholic species such as Ivy *Hedera helix*, Bramble *Rubus fruticosus* agg., Male Fern *Dryopteris filix-mas* and common grasses, or of the ruderal herbs Nettle *Urtica dioica*, Rosebay Willowherb *Chamerion angustifolium* and Creeping Thistle *Cirsium arvense*.

**4.2.1.2 Broad-leaved, Coniferous and Mixed Plantations**

Plantation woodland covers approximately 159ha within the study site.

These are largely confined to areas adjacent to the line. Some of the most mature broad-leaved plantations have developed a characteristic woodland ground flora, for example TN 21 on the Pittendriech Burn beside the roundabout at Newbattle. This has a mature canopy of Sycamore *Acer pseudoplatanus* and Beech *Fagus sylvatica* and a ground flora of many of the woodland herbs mentioned above.

Many small linear broad-leaved or mixed plantations have been planted along the cutting slopes for landscaping purposes. These are concentrated in the more urban/suburban areas. Such plantations have rank grasses or ruderal herbs dominant between the trees. Larger conifer and mixed plantations also occur adjacent to the line, but not over the line.
4.2.1.3 Scrub
Scrub covers approximately 50ha within the study site.

A large proportion of the cutting and embankment slopes, and small areas of the track bed are occupied by scrub, usually of Hawthorn *Crataegus monogyna* with Goat Willow *Salix caprea* and Elder *Sambucus nigra*, plus small trees of Sycamore *Acer pseudoplatanus*, Ash *Fraxinus excelsior* and Silver Birch *Betula pendula*. These tend to be either dense with little ground flora, or open with tall ruderal vegetation.

4.2.1.4 Acid Grassland
Acid grassland covers approximately 5ha within the study site.

Just two significant patches of unimproved or semi-improved acid grassland were found. The largest patch (TN 49) at Millbank House just west of Gorebridge consists of neglected pasture fields on a low sandy ridge adjacent to the line. This has a sward of Sheep’s Fescue *Festuca ovina*, Red Fescue *Festuca rubra*, Common Bent *Agrostis capillaris* and characteristic herbs such as Sheep’s Sorrel *Rumex acetosella*, Common Cat’s-ear *Hypochoeris radicata* and Common Centaury *Centaurea erythraea*. This area also supports a colony of Small Heath *Coenonympha pamphilus*.

The other patch occurs on a very high and steep cutting slope (TN 86) and is very diverse with abundant herbs such as Heath Speedwell *Veronica officinalis*, Tormentil *Potentilla erecta*, Common Bird’s-foot Trefoil *Lotus corniculatus*, Heath Bedstraw *Galium saxatile*, Lady’s Bedstraw *Galium verum* and Wild Thyme *Thymus praecox*.

4.2.1.5 Neutral Grassland
Neutral covers approximately 147ha within the study site.

The most species-rich patches of neutral grassland occur as localised fragments on some steeper cutting banks and short lengths of track bed where basic steelworks slag remains having been used as ballast. Examples of this habitat are very restricted in extent and distribution, e.g. TN 65 at Catcune Mills. These tend to have a short sward of fine-leaved grasses, particularly Red Fescue *Festuca rubra*, Common Bent *Agrostis capillaris* and Crested Dog’s-tail *Cynosurus cristatus* and a suite of characteristic herbs including Common Bird’s-foot Trefoil *Lotus corniculatus*, Black Knapweed *Centaurea nigra*, Germander Speedwell *Veronica chamaedrys*, Common Sorrel *Rumex acetosa*, Ribwort Plantain *Plantago lanceolata*, Eyebright *Euphrasia* sp. and Lady’s Bedstraw *Galium verum*.

Many similar but less species-rich grasslands were identified as semi-improved neutral grassland, these include TN 75 at Borthwick Mains, TN 88 near Tynehead and TN 118 at the south end of Shankend Wood beside the Gala Water. However, most of semi-improved neutral grassland identified in the study site is not species-rich, but are dominated by bulky tussock-forming species such as False Oat-grass *Arrhenatherum elatius* (typical unmanaged road/rail verge grassland), or Tufted Hairgrass *Deschampsia cespitosa* in damper conditions. Herbs associated with these habitats are tall or scramblers in order to compete with the grasses and include
Meadowsweet *Filipendula ulmaria*, Black Knapweed *Centaurea nigra*, Meadow Vetchling *Lathyrus pratense* and Common Hogweed *Heracleum sphondylium*.

Many areas of track bed with basic slag ballast have not yet developed a species-rich sward because of the harshness of the environment or because of trampling/grazing pressure.

### 4.2.1.6 Improved Grassland

Improved pasture covers approximately 1065ha within the study site.

This is the predominant habitat of pasture fields adjacent to the line. The sward is composed of a few agricultural grass species with few herbs, mainly Perennial Rye-grass *Lolium perenne*, Common Bent *Agrostis capillaris* and White Clover *Trifolium repens*. In some areas the line has been incorporated into adjacent pastures, or the line is used as a farm track and becomes incidentally improved by dunging.

### 4.2.1.7 Marshy Grassland

Marshy grassland covers approximately 22ha within the study site.

This habitat is infrequently found as damp patches within pasture fields such as in the valley of the Gala Water at Heriot (TN 104 & TN 102) and at Killochyett (TN 166) where the sward is dominated by Soft Rush *Juncus effusus* or Tufted Hair-grass *Deschampsia cespitosa* and is grazed with few other species. It also occurs beside ditches and Burns where Meadowsweet *Filipendula ulmaria* and Reed Canary-grass *Phalaris arundinacea* often form subsidiary components to the vegetation in transitions to marginal or swamp vegetation. Very locally the railway line itself is marshy, the best example being in the cutting at Tynehead (TN 89) which has a diverse mix of rushes, marginal aquatic plants and damp meadow species. However, most damp areas on the line itself are very localised and species-poor.

### 4.2.1.8 Poor Semi-improved Grassland

Poor semi-improved pasture covers approximately 169ha within the study site.

Many pasture fields adjacent to the line are not fully improved or have reverted to a more natural composition but remain species-poor. These tend to be dominated by Common Bent *Agrostis capillaris* with Yorkshire Fog *Holcus lanatus*, Crested Dog’s-tail *Cynosurus cristatus* and White Clover *Trifolium repens* but few herb species. Areas of cutting slope and track bed have often been partially improved by grazing and dunging and support this low grade, species-poor agricultural sward.

### 4.2.1.9 Bracken

Continuous bracken covers approximately 3.5ha within the study site.

This habitat occurs rarely within the study area and only as very small areas. These are usually at the edge of woods or as open patches in scrub where Bracken *Pteridium aquilinum* spills out from adjacent woods. Characteristically Bracken *Pteridium aquilinum* dominates to the exclusion of other species.
4.2.1.10 Tall Ruderal Vegetation
Ruderal vegetation covers approximately 103ha within the study site.

This is a major habitat type within the study area. Many large and small sections of the cutting slopes, track bed and other neglected areas adjacent to the line are dominated by Nettle *Urtica dioica*, Rosebay Willowherb *Chamerion angustifolium* and Common Thistle *Cirsium arvense* with a few other common tall ruderal herb species. The invasive alien ruderal species – Japanese Knotweed *Reynoutria japonica* and Giant Hogweed *Heracleum mantegazzianum* also occur in the study area, as detailed in Table 7-1.

4.2.1.11 Swamp
Swamp covers approximately 7ha within the study site.

Only very small localised areas of swamp occur within the study area. These occur in low lying areas beside streams and in deep hollows and are dominated by Bottle Sedge *Carex rostrata* or Reed Canary-grass *Phalaris arundinacea* with few other species. Examples occur at TN 98 Heriot, TN 150 Galabank just north of Killochyett and TN 183 near Bowland Bridge.

4.2.1.12 Marginal and Inundation Vegetation
Marginal/inundation vegetation covers approximately 0.24ha within the study site.

This habitat occurs as scattered and very localised fragments along river and stream margins, and in occasional permanent puddles along the line itself. The vegetation generally consists of a few scattered plants of Reed Canary-grass *Phalaris arundinacea*, Branched Bur-reed *Sparganium erectum*, Floating Sweet-grass *Glyceria fluitans*, Yellow Flag *Iris pseudacorus* and Water Forget-me-not *Myosotis scorpioides*.

4.2.1.13 Standing Water
Standing water covers approximately 2ha within the study site.

Several very small and possibly temporary pools occur along or adjacent to the line. These tend to be predominantly bare mud with swamp/marginal species scattered within them such as Floating Sweet-grass *Glyceria fluitans* and Water Forget-me-not *Myosotis scorpioides*.

4.2.1.14 Running Water
Running water covers approximately 41ha within the study site.

The line crosses the River Tweed and River South Esk and follows the Gala Water for a considerable distance, as well as crossing numerous small Burns and ditches. The Tweed and Gala Water are clean river systems of high conservation and ecological value and are designated as an SSSI and a candidate SAC (see Section 4.1).

The vegetation shows a natural succession from mineral-poor upland streams through to species which are typical of mineral-rich lowland rivers and includes
several Nationally Scarce species of Pondweed *Potamogeton* spp. and Water-Crowfoot *Ranunculus* spp.

4.2.1.15 Arable Cropland
Arable fields cover approximately 171ha with the study site, scattered along the study area adjacent to the line.

4.2.1.16 Amenity Grassland
Amenity Grass covers approximately 54ha within the study site. This is regularly mown improved and species-poor grassland of recreation grounds, along roadsides, on roundabouts and in gardens.

4.2.1.17 Ephemeral/short perennial Vegetation
Ephemeral/short perennial vegetation covers 22ha within the study site.

Fragmentary vegetation most often found on the ballast of the track bed where it is used as a track for vehicles preventing the development of vegetation. It also occurs on waste ground similarly disturbed adjacent to the line. The flora of this habitat is often a fragmentary version of surrounding pastures or the early developmental stages of neutral grassland over ballast of basic steelworks slag. Species include fine leaved grasses such as Common Bent *Agrostis capillaris*, Red Fescue *Festuca rubra*, agricultural species such as Perennial Rye-grass *Lolium perenne*, White Clover *Trifolium repens*, and weeds such as Creeping Buttercup *Ranunculus repens* and Common Thistle *Cirsium arvense*.

4.2.1.18 Introduced Shrub
This habitat occurs where Snowberry *Symphoricarpos albus* forms locally extensive stands, covering 5ha within the study site.

4.2.1.19 Hedges
Relatively few hedges occur in the open agricultural landscape of the Borders, with a general increase in their occurrence in Midlothian. All hedges encountered were species-poor and dominated by Hawthorn *Crataegus monogyna*.

4.2.1.20 Bare Ground
This habitat covers 30ha within the study site and occurs locally as unsurfaced tracks and other disturbed places on waste ground.

4.2.1.21 New Buildings
This includes buildings not shown on the Ordnance Survey base map, and building sites with work in progress.

4.2.1.22 Other Habitats
This includes bare areas such as unsurfaced car parks, scrap yards etc.
4.3 Flora

4.3.1 Consultation
Consultation with the Lothian Wildlife Information Centre (LWIC) and the Scottish Borders Biological Record Centre (SBBRC) provided records of the following notable native species within 500 m of the Study Site. The potential presence of these species has been considered with reference to their relative habitat requirements and to Smith et al. (2002). Other notable species within 500 m of the line where no suitable habitat is present, or where the record is clearly from outwith the Study Site, are not included.

- Common Rock-rose *Helianthemum nummularium*
- Dense Flowered Fumitory *Fumaria densiflora*
- Globe-Flower *Trollius europaeus*
- Green Figwort *Scrophularia umbrosa*
- Heath Cudweed *Gnaphalium sylvaticum*
- Hoary Cinquefoil *Potentilla argentea*
- Large-flowered Hemp-nettle *Galeipsis speciosa*
- Maiden Pink *Dianthus deltoides*
- Yellow Star-of-Bethlehem *Gagea lutea*

4.3.2 Species Confirmation
The Phase I Habitat Survey did not confirm the presence of any notable species in the Study Site.

4.4 Otter

4.4.1 Desk Study
SBBRC provided a number records of Otter activity on the Gala Water, and an old record (1979) of activity on the Heriot Water. LWIC provided a record of Otter on the River South Esk from 1994.


4.4.2 Field Survey Results
Over 30 sprainting sites were found on watercourses that run underneath or adjacent to the rail line. Otters will use a large number of lying up sites per individual and their low frequency of use can vary making them difficult to identify. Two lying up sites were identified within 30m of the line. A number of other areas were identified with potential for lying up sites in the vicinity of many bridge structures and along sections of burn and river that run close to the line, in particular along stretches of the Gala Water. Potential areas for lying up sites include: areas of thick scrub on the railway embankments; Rabbit *Oryctolagus cuniculus* holes; within dense summer vegetation adjacent to the river; underneath root-plates; and within log-piles formed from flood debris adjacent to the river.
Details of Otter activity recorded are provided in the target notes in Appendix I and as shown on Sheets 1-9.

Otter activity was found along the majority of the watercourses that run under or parallel to the rail line. This includes:

- River North Esk (one crossing under the line)
- Cakemuir Burn (four crossings under line)
- Gala Water (numerous crossings under the line)
- Other small Burns
- River Tweed (one crossing under the line)

In addition, desk study records report Otter on the:

- River South Esk (one crossing under the line)

And the following water bodies have high suitability for Otter:

- Gore Water (runs adjacent to the line for several kilometres)
- Tyne Water (runs adjacent to the line and crosses under)

### 4.5 Birds

#### 4.5.1 Consultation

Consultation with LWIC provided no bird records. Consultation with SBBRC provided records of the following species additional to those confirmed during the Bird Survey. An assessment has been made as to whether they could potentially be breeding on the site based on professional judgement and with reference to Murray et al. (1998).

**Table 4-1: Desk Study Bird Records**

<table>
<thead>
<tr>
<th>Potential Breeding</th>
<th>Wintering/Foraging</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barn Owl Tyto alba</td>
<td>Brambling Fringilla montifringilla</td>
</tr>
<tr>
<td>Common Sandpiper Actitis hypoleucus</td>
<td>Common Gull Larus canus</td>
</tr>
<tr>
<td>Coot Fulica atra</td>
<td>Cormorant Phalacrocorax carbo</td>
</tr>
<tr>
<td>Cuckoo Cuculus canorus</td>
<td>Fieldfare Turdus pilaris</td>
</tr>
<tr>
<td>Goosander Mergus merganser</td>
<td>Goshawk Accipiter gentilis</td>
</tr>
<tr>
<td>Green Woodpecker Picus viridis</td>
<td>Golden Plover Pluvialis apricaria</td>
</tr>
<tr>
<td>Little Grebe Tachybaptus ruficollis</td>
<td>Goldeneye Bucephala clangula</td>
</tr>
<tr>
<td>Mute Swan Cygnus olor</td>
<td>Herring Gull Larus argentatus</td>
</tr>
<tr>
<td>Redpoll Carduelis flammea</td>
<td>Nuthatch Sitta europaea</td>
</tr>
<tr>
<td>Redshank Tringa totanus</td>
<td>Pink-Footed Goose Anser brachyrhynchus</td>
</tr>
<tr>
<td>Teal Anas crecca</td>
<td>Peregrine Falco peregrinus</td>
</tr>
<tr>
<td>Woodcock Scolopax rusticola</td>
<td>Raven Corvus corax</td>
</tr>
<tr>
<td></td>
<td>Redwing Turdus iliacus</td>
</tr>
<tr>
<td></td>
<td>Waxwing Bombycilla garrulus</td>
</tr>
<tr>
<td></td>
<td>Wigeon Anas penelope</td>
</tr>
</tbody>
</table>
4.5.2 Species Confirmation

The ornithological survey confirmed the presence of the following species in the study site:

Table 4-2: Study Site Bird Resource

<table>
<thead>
<tr>
<th>BTO Code</th>
<th>Species</th>
<th>Comments on Distribution and Abundance</th>
</tr>
</thead>
<tbody>
<tr>
<td>BC</td>
<td>Blackcap Sylvia atricapilla</td>
<td>Occasional, low breeding levels associated with scrub and tall ruderal..</td>
</tr>
<tr>
<td>B.</td>
<td>Blackbird Turdus merula</td>
<td>Abundant breeder throughout the site.</td>
</tr>
<tr>
<td>BT</td>
<td>Blue Tit Parus caeruleus</td>
<td>Abundant breeder throughout the site.</td>
</tr>
<tr>
<td>BZ</td>
<td>Buzzard Buteo buteo</td>
<td>Occasional throughout the site and likely to be breeding in nearby woodland.</td>
</tr>
<tr>
<td>BF</td>
<td>Bullfinch Pyrrhula pyrrhula</td>
<td>Occasional throughout, but more locally frequent in the southern half of the site, in the Galashiels area.</td>
</tr>
<tr>
<td>C.</td>
<td>Carrion Crow Corvus corone corone</td>
<td>Frequent forager within and over the site and likely to be breeding in woodland adjacent to the site.</td>
</tr>
<tr>
<td>CH</td>
<td>Chaffinch Fringilla coelebs</td>
<td>Abundant throughout the site associated with scrub and woodland.</td>
</tr>
<tr>
<td>CC</td>
<td>Chiffchaff Phylloscopus collybita</td>
<td>Occasional breeding species within woodland/scrub within the study site.</td>
</tr>
<tr>
<td>CT</td>
<td>Coal Tit Parus ater</td>
<td>Frequent throughout the site associated with scrub and woodland habitats.</td>
</tr>
<tr>
<td>CD</td>
<td>Collared Dove Streptopelia decaocto</td>
<td>Occasional throughout the site associated with woodland and urban areas.</td>
</tr>
<tr>
<td>CU</td>
<td>Curlew Numenius arquata</td>
<td>Rare within the site and recorded in the Falahill/Stagebnak area only. Likely to be breeding in adjacent fields.</td>
</tr>
<tr>
<td>DI</td>
<td>Dipper Cinclus cincus</td>
<td>Recorded frequently on the Gala Water and likely to be breeding in some of the railway bridges.</td>
</tr>
<tr>
<td>D.</td>
<td>Dunnock Prunella modularis</td>
<td>Frequent throughout the site associated with scrub and woodland.</td>
</tr>
<tr>
<td>GT</td>
<td>Great Tit Parus major</td>
<td>Abundant throughout the site, associated with scrub and woodland.</td>
</tr>
<tr>
<td>GC</td>
<td>Goldcrest Regulus regulus</td>
<td>Frequent throughout the site associated with scrub and woodland.</td>
</tr>
<tr>
<td>GO</td>
<td>Goldfinch Carduelis carduelis</td>
<td>Frequent throughout the site and regularly recorded flying over the site.</td>
</tr>
<tr>
<td>GH</td>
<td>Grasshopper Warbler Locustella naevia</td>
<td>Rare and only recorded once within the site.</td>
</tr>
<tr>
<td>GS</td>
<td>Great Spotted Woodpecker Dendrocopus major</td>
<td>Rare – two records both in woodland in the Bowshank/Stow area.</td>
</tr>
<tr>
<td>GR</td>
<td>Greenfinch Carduelis chloris</td>
<td>Occasional throughout the site.</td>
</tr>
<tr>
<td>P.</td>
<td>Grey Partridge Perdix perdix</td>
<td>A single record of a small group of birds in the Sandyknowe area.</td>
</tr>
<tr>
<td>GL</td>
<td>Grey Wagtail Motacilla cinerea</td>
<td>Occasional throughout the site, associated with water bodies in particular the Gala Water.</td>
</tr>
<tr>
<td><strong>H.</strong></td>
<td><strong>Bird Name</strong></td>
<td><strong>Description</strong></td>
</tr>
<tr>
<td>------</td>
<td>----------------</td>
<td>-----------------</td>
</tr>
<tr>
<td><strong>H.</strong></td>
<td>Heron <em>Ardea cinerea</em></td>
<td>Occasionally recorded, in association with the Gala Water. Likely to be breeding in nearby woodland.</td>
</tr>
<tr>
<td><strong>HM</strong></td>
<td>House Martin <em>Delichon urbica</em></td>
<td>Recorded foraging over the site and breeding on buildings within and adjacent to the site.</td>
</tr>
<tr>
<td><strong>HS</strong></td>
<td>House Sparrow <em>Passer domesticus</em></td>
<td>Occasional in association with urban areas and rural buildings.</td>
</tr>
<tr>
<td><strong>JD</strong></td>
<td>Jackdaw <em>Corvus monedula</em></td>
<td>Frequently recorded foraging throughout the site.</td>
</tr>
<tr>
<td><strong>K.</strong></td>
<td>Kestrel <em>Falco tinnunculus</em></td>
<td>Occasional records throughout the site and likely to be breeding in nearby woodland.</td>
</tr>
<tr>
<td><strong>KF</strong></td>
<td>Kingfisher <em>Alcedo atthis</em></td>
<td>Rare, and recorded on sections of the Gala water where it is likely to be breeding.</td>
</tr>
<tr>
<td><strong>L.</strong></td>
<td>Lapwing <em>Vanellus vanellus</em></td>
<td>Rare and likely to be breeding in nearby agricultural fields.</td>
</tr>
<tr>
<td><strong>L.</strong></td>
<td>Linnet <em>Carduelis cannabina</em></td>
<td>Occasional throughout the site.</td>
</tr>
<tr>
<td><strong>LT</strong></td>
<td>Long-tailed Tit <em>Aegithalos caudatus</em></td>
<td>Occasional throughout the site in association with scrub and woodland.</td>
</tr>
<tr>
<td><strong>MG</strong></td>
<td>Magpie <em>Pica pica</em></td>
<td>Occasional throughout the study site.</td>
</tr>
<tr>
<td><strong>MA</strong></td>
<td>Mallard <em>Anas platyrhynchos</em></td>
<td>Occasional and recorded in association with waterbodies, including the Gala Water.</td>
</tr>
<tr>
<td><strong>MP</strong></td>
<td>Meadow Pipit <em>Anthus pratensis</em></td>
<td>Rare within the site, but more locally frequent in the Tynehead/Fountainhall area.</td>
</tr>
<tr>
<td><strong>MH</strong></td>
<td>Moorhen <em>Gallinula chloropus</em></td>
<td>Rarely recorded within the site associated with waterbodies.</td>
</tr>
<tr>
<td><strong>MT</strong></td>
<td>Mistle Thrush <em>Turdus viscivorus</em></td>
<td>Occasional within the site.</td>
</tr>
<tr>
<td><strong>OC</strong></td>
<td>Oystercatcher <em>Haematopus ostralegus</em></td>
<td>Rare within the site, but more locally frequent in the Tynehead/Fountainhall area.</td>
</tr>
<tr>
<td><strong>PH</strong></td>
<td>Pheasant <em>Phasianus colchicus</em></td>
<td>Occasionally recorded in association with woodland and agricultural land.</td>
</tr>
<tr>
<td><strong>PW</strong></td>
<td>Pied Wagtail <em>Motacilla alba</em></td>
<td>Occasionally recorded throughout the site.</td>
</tr>
<tr>
<td><strong>RB</strong></td>
<td>Reed Bunting <em>Emberiza schoenicius</em></td>
<td>Occasionally recorded, in association with scrub, swamp and tall ruderal, in particular in the Stagebank area.</td>
</tr>
<tr>
<td><strong>R.</strong></td>
<td>Robin <em>Erithacus rubecula</em></td>
<td>Abundant breeder throughout the site.</td>
</tr>
<tr>
<td><strong>RO</strong></td>
<td>Rook <em>Corvus frugilegus</em></td>
<td>Frequently recorded foraging on the site and likely to be breeding in woodland within or adjacent to the site.</td>
</tr>
<tr>
<td><strong>SW</strong></td>
<td>Sedge Warbler <em>Acrocephalus schoenobaenus</em></td>
<td>Occasional within the site, but more locally frequent in the Stagebank/Tynehead area in association with swamp, scrub and tall ruderal.</td>
</tr>
<tr>
<td><strong>SK</strong></td>
<td>Siskin <em>Carduelis spinus</em></td>
<td>Occasional and locally frequent within woodland/scrub.</td>
</tr>
<tr>
<td><strong>S.</strong></td>
<td>Skylark <em>Alauda arvensis</em></td>
<td>Rare and likely to be breeding in nearby rough grassland.</td>
</tr>
<tr>
<td><strong>ST</strong></td>
<td>Song Thrush <em>Turdus philomelos</em></td>
<td>Occasional throughout the site.</td>
</tr>
<tr>
<td><strong>SF</strong></td>
<td>Spotted Flycatcher <em>Muscicapa striata</em></td>
<td>Rare within the site and recorded at only a few locations.</td>
</tr>
<tr>
<td><strong>SG</strong></td>
<td>Starling <em>Sturnus vulgaris</em></td>
<td>Occasionally recorded foraging within the site.</td>
</tr>
<tr>
<td><strong>SL</strong></td>
<td>Swallow <em>Hirundo rustica</em></td>
<td>Recorded foraging over the site and breeding on buildings within and adjacent to the site.</td>
</tr>
<tr>
<td><strong>TO</strong></td>
<td>Tawny Owl <em>Strix aluco</em></td>
<td>A single record of a bird in West Wood near Tynehead.</td>
</tr>
<tr>
<td><strong>TC</strong></td>
<td>Treecreeper <em>Certhia familiaris</em></td>
<td>Rare and recorded within woodland.</td>
</tr>
<tr>
<td><strong>TS</strong></td>
<td>Tree Sparrow <em>Passer</em></td>
<td>Locally present in Borthwick area only and a single</td>
</tr>
</tbody>
</table>
### 4.6 Reptiles

#### 4.6.1 Consultation
Consultation with the LWIC provided no reptile records for the study site or within 500 m. Consultation with the SBBRC provided the following reptile record:

- Slow Worm *Anguis fragilis* within 500 m of the Study Site at Whin Wood, Williamlaw (NT 477389).

#### 4.6.2 Species Confirmation
The following reptile sightings were confirmed during the walkover survey:

- Suspected sighting of a Common Lizard *Lacerta vivipara* was made on 10 July approximately 1km south-east of Fountainhall at NT 4405748636, immediately adjacent to an area of rank grassland identified as being of excellent potential for reptile species. The individual did not return to its basking site after being recorded by the surveyor. The location of the above sighting is shown within the GIS data.

No other reptile species were recorded basking during the course of the walk-over survey period. No reptile species were recorded hiding under artificial or natural refuge or basking on risen structures throughout the duration of the walkover survey. No ‘road kills’ were recorded during the course of the walkover survey.
Only one local man reported a possible Adder attack (on a cow) in an area near the site between Stow and Melrose.

4.6.3 Habitat Suitability
Table 4-2 provides a summary of all sites ranked as providing excellent and good reptile habitat suitability, and includes an approximate national grid reference of each site identified. Sheets 1-9 show the location and boundary of each potential reptile site.
### Table 4-3: Summary of Excellent and Good Reptile Habitat

<table>
<thead>
<tr>
<th>Site Identifier</th>
<th>Suitability Category</th>
<th>Approximate Grid Reference</th>
<th>Approximate Chainage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Good</td>
<td>NT 325663</td>
<td>5000-5320</td>
</tr>
<tr>
<td>2</td>
<td>Excellent</td>
<td>NT 325668</td>
<td>5325-5715</td>
</tr>
<tr>
<td>3/4/5</td>
<td>Good</td>
<td>NT 324654</td>
<td>5920-6270</td>
</tr>
<tr>
<td>6</td>
<td>Good</td>
<td>NT 332644</td>
<td>7095-7450</td>
</tr>
<tr>
<td>7</td>
<td>Good</td>
<td>NT 332642</td>
<td>7460-7580</td>
</tr>
<tr>
<td>8</td>
<td>Good</td>
<td>NT 332639</td>
<td>7745-7850</td>
</tr>
<tr>
<td>9</td>
<td>Good</td>
<td>NT 332630</td>
<td>8585-8845</td>
</tr>
<tr>
<td>10</td>
<td>Excellent</td>
<td>NT 338617</td>
<td>10090-10430</td>
</tr>
<tr>
<td>11</td>
<td>Good</td>
<td>NT 338614</td>
<td>10420-10515</td>
</tr>
<tr>
<td>12</td>
<td>Good</td>
<td>NT 339614</td>
<td>10540-10750</td>
</tr>
<tr>
<td>13</td>
<td>Good</td>
<td>NT 353603</td>
<td>12500-12990</td>
</tr>
<tr>
<td>14</td>
<td>Excellent</td>
<td>NT 364600</td>
<td>13750-14650</td>
</tr>
<tr>
<td>15</td>
<td>Excellent</td>
<td>NT 371602</td>
<td>14545-14860</td>
</tr>
<tr>
<td>16</td>
<td>Good</td>
<td>NT 373601</td>
<td>14885-15080</td>
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<td>17</td>
<td>Good</td>
<td>NT 380601</td>
<td>15525-15895</td>
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<td>Excellent</td>
<td>NT 390599</td>
<td>16740-16880</td>
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<td>NT 394588</td>
<td>17685-18315</td>
</tr>
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<td>NT 393574</td>
<td>19420-19590</td>
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<td>23910-24205</td>
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<td>34</td>
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</tr>
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<td>Good</td>
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<tr>
<td>36</td>
<td>Good</td>
<td>NT 423508</td>
<td>27000-27275</td>
</tr>
<tr>
<td>37</td>
<td>Good</td>
<td>NT 423506</td>
<td>27200-27530</td>
</tr>
<tr>
<td>38</td>
<td>Good</td>
<td>NT 414502</td>
<td>27645-28110</td>
</tr>
<tr>
<td>39</td>
<td>Excellent</td>
<td>NT 433492</td>
<td>28935-29420</td>
</tr>
<tr>
<td>40</td>
<td>Good</td>
<td>NT 437490</td>
<td>29510-29610</td>
</tr>
<tr>
<td>41</td>
<td>Good</td>
<td>NT 439489</td>
<td>29625-29805</td>
</tr>
<tr>
<td>42</td>
<td>Good</td>
<td>NT 439487</td>
<td>29930-30800</td>
</tr>
<tr>
<td>43</td>
<td>Good</td>
<td>NT 439487</td>
<td>29985-30070</td>
</tr>
<tr>
<td>44</td>
<td>Excellent</td>
<td>NT 440485</td>
<td>30075-30410</td>
</tr>
<tr>
<td>45</td>
<td>Good</td>
<td>NT 442480</td>
<td>30735-30840</td>
</tr>
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<td>46</td>
<td>Good</td>
<td>NT 443478</td>
<td>30845-31030</td>
</tr>
<tr>
<td>47</td>
<td>Excellent</td>
<td>NT 444476</td>
<td>31033-31185</td>
</tr>
<tr>
<td>48</td>
<td>Good</td>
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<td>31165-31295</td>
</tr>
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<td>31290-31570</td>
</tr>
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<td>Good</td>
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</tr>
<tr>
<td>51</td>
<td>Excellent</td>
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<td>32080-32420</td>
</tr>
<tr>
<td>52</td>
<td>Good</td>
<td>NT 442463</td>
<td>32445-32520</td>
</tr>
<tr>
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<td>Good</td>
<td>NT 442460</td>
<td>32730-32760</td>
</tr>
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<td>Excellent</td>
<td>NT 450452</td>
<td>33900-34275</td>
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<td>38820-39860</td>
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<td>NT 455402</td>
<td>39730-39980</td>
</tr>
<tr>
<td>57</td>
<td>Good</td>
<td>NT 473387</td>
<td>42055-42380</td>
</tr>
</tbody>
</table>
4.7 Bats

4.7.1 Desk Study

Lothians Bat Group (LBG) reported a record they had received of bats emerging on more than one occasion from a railway bridge column at NT 359598 near Borthwick, on more than one occasion, adjacent to the Gore water (Stuart Smith pers. com.). Other potentially suitable roost sites identified by LBG include the viaduct over the River North Esk at NT 36648. No response was received from Borders Bat Group.

SNH (Alan Leitch, Area Officer Lothians) stated that any stone structure with crevices/holes in it has potential for roosting sites. In the Borders Region many stone vaulted structures are used by Bats and railway bridges would seem likely potential roost sites.

Consultation of the Scottish Bats (2000) database which holds records at the 10 km square level, identifies that the following bat species could potentially be found within the geographical range of the Study Site:

- Daubenton’s Bat *Myotis daubentonii*
- Soprano Pipistrelle *Pipistrellus pygmaeus*
- Common or Bandit Pipistrelle *Pipistrellus pipistrellus*
- Whiskered Bat *Myotis mystacinus*
- Natterer’s Bat *Myotis nattereri*
- Brown long-eared Bat *Plecotus auritus*

4.7.2 Walkover Survey Results

Numerous bridge structures, culverts and tunnels and a small number of mature trees were identified with excellent and good suitability for Bat roosts. Most of the potential roost sites identified are suitable as non-breeding roost sites. In general trees along the line are too immature to provide suitable roost sites.

Foraging habitat along the line is very good quality along large sections. In particular, areas close to water bodies, such as the Gala Water, provide excellent foraging opportunities. A number of areas of woodland and sheltered flyways surrounded by woodland, tall ruderal and scrub along the existing rail line provide excellent foraging opportunities. Areas of particularly good potential foraging include around Gore Glen, Critchton Glen and Bowshank to Torwoodlee.

One roost site was identified within a culvert at CH 43150 (TN BT88) near Torwoodlee, that is likely to be used by Daubenton’s Bats *Myotis daubentonii*. A number of droppings were found below the roost site. These were analysed and from a combination of location and size and analysis of the insect remains within the droppings, including Water Boatman and Stonfly, they were assessed to be from Daubenton’s Bats *Myotis daubentonii*. Details of the analysis are provided in Appendix I (BT88).

A sighting was made of a Bat flying during the day (see TN BT 83 – CH. 41250) near Craigneuk. This is likely to have been an immature Bat and probably a Pipistrelle.
Potential good and excellent roost sites and foraging areas of excellent quality are summarised in Table 4-3, detailed in the Target Notes in Appendix 1 and shown on Sheets 1-9.

Table 4-4 Summary of Potential Bat Roost Sites and Excellent Foraging Areas.

<table>
<thead>
<tr>
<th>Target Note</th>
<th>Chainage and Structure</th>
<th>Suitability</th>
</tr>
</thead>
<tbody>
<tr>
<td>BT1</td>
<td>CH 3500 Culvert under old line</td>
<td>Good</td>
</tr>
<tr>
<td>BT3</td>
<td>CH 3800 Mature Beech trees</td>
<td>Good</td>
</tr>
<tr>
<td>BT4</td>
<td>CH 4250 Glen Esk Viaduct UB12</td>
<td>Good</td>
</tr>
<tr>
<td>BT5</td>
<td>CH 4600 Bridge over line OB13</td>
<td>Good</td>
</tr>
<tr>
<td>BT6</td>
<td>CH 4700 Bridge over line OB14</td>
<td>Good</td>
</tr>
<tr>
<td>BT7</td>
<td>CH 4700 Stone out buildings on station platform</td>
<td>Good</td>
</tr>
<tr>
<td>BT8</td>
<td>CH 4800 Bridge over line OB15</td>
<td>Good</td>
</tr>
<tr>
<td>BT9</td>
<td>CH 6400 Bridge under line UB17</td>
<td>Good</td>
</tr>
<tr>
<td>BT10</td>
<td>CH 6660-6830 Newbattle Viaduct UB18</td>
<td>Good</td>
</tr>
<tr>
<td>BT11</td>
<td>CH 7000 Builder’s yard- buildings</td>
<td>Good</td>
</tr>
<tr>
<td>BT16</td>
<td>CH 8520 Stone culvert with burn</td>
<td>Excellent</td>
</tr>
<tr>
<td>BT20</td>
<td>CH 9650 Beech and Lime trees</td>
<td>Good</td>
</tr>
<tr>
<td>BT21</td>
<td>CH9600 – 10900 Woodland</td>
<td>Excellent foraging</td>
</tr>
<tr>
<td>BT23</td>
<td>CH 11200 8 houses to be removed</td>
<td>Good</td>
</tr>
<tr>
<td>BT25</td>
<td>CH 12475 Stone bridge OB29</td>
<td>Good/Excellent foraging</td>
</tr>
<tr>
<td>BT26</td>
<td>CH 12450 House with slate roof</td>
<td>Good</td>
</tr>
<tr>
<td>BT28</td>
<td>CH 12750 Granary House and adjacent buildings</td>
<td>Good</td>
</tr>
<tr>
<td>BT29</td>
<td>CH 13000 Bridge over line OB30</td>
<td>Good</td>
</tr>
<tr>
<td>BT31</td>
<td>CH 13400 Stone bridge under line UB31 (probable roost)</td>
<td>Good</td>
</tr>
<tr>
<td>BT33</td>
<td>CH 141250 Stone bridge over line OB32</td>
<td>Good</td>
</tr>
<tr>
<td>BT36</td>
<td>CH 16200 Stone culvert under line</td>
<td>Good</td>
</tr>
<tr>
<td>BT37</td>
<td>CH 16475 Culvert over burn</td>
<td>Good</td>
</tr>
<tr>
<td>BT38</td>
<td>CH 15250-16150 Mature trees</td>
<td>Good</td>
</tr>
<tr>
<td>BT39</td>
<td>CH 16900 Stone culvert over Tyne Water UB36</td>
<td>Good/Excellent foraging</td>
</tr>
<tr>
<td>BT40</td>
<td>CH 17675 Stone and brick bridge over line OB38</td>
<td>Good</td>
</tr>
<tr>
<td>BT41</td>
<td>CH 18750 Stone culvert with burn UB39</td>
<td>Excellent</td>
</tr>
<tr>
<td>BT42</td>
<td>CH 19230 Stone and brick bridge over line OB41</td>
<td>Good</td>
</tr>
<tr>
<td>BT43</td>
<td>CH 19585 Stone culvert with burn</td>
<td>Good</td>
</tr>
<tr>
<td>BT46</td>
<td>CH 22200 Stone culvert off line</td>
<td>Good</td>
</tr>
<tr>
<td>BT49</td>
<td>CH 25045 Bridge over Gala Water</td>
<td>Good</td>
</tr>
<tr>
<td>BT51</td>
<td>CH 26735 Bridge over Gala Water</td>
<td>Good</td>
</tr>
<tr>
<td>BT52</td>
<td>CH 26800-26950 Mature trees</td>
<td>Good</td>
</tr>
<tr>
<td>BT53</td>
<td>CH 27115 Steel and wood bridge under line UB54</td>
<td>Good</td>
</tr>
<tr>
<td>BT54</td>
<td>CH 27630 Steel and wood bridge under line UB56</td>
<td>Good/Excellent foraging</td>
</tr>
<tr>
<td>BT55</td>
<td>CH 27700 Brick arch culvert</td>
<td>Good</td>
</tr>
<tr>
<td>BT56</td>
<td>CH 28665 Still burn culvert</td>
<td>Good</td>
</tr>
<tr>
<td>BT58</td>
<td>CH 29885 Stone bridge OB59</td>
<td>Good</td>
</tr>
<tr>
<td>BT59</td>
<td>CH 30340 Steel and wood bridge under line UB60</td>
<td>Good</td>
</tr>
<tr>
<td>BT60</td>
<td>CH 30825 Steel and wood bridge under line</td>
<td>Good</td>
</tr>
</tbody>
</table>

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33
### 4.8 Other Fauna

#### 4.8.1 Water Vole Arvicola terrestris

Areas of potential suitable habitat for Water Vole *Arvicola terrestris* were identified within the Study Site during the course of the Otter survey and Phase 1 Survey. Suitable habitat was identified by slow flowing watercourses, suitable banks for burrowing, availability of feeding and suitable vegetation cover (Strachan 1998).
Water Vole are known to be present in the region and the 1989 National Water Vole Survey (Strachan and Jeffries 1993) states that the River Tweed catchment (including the Gala Water) was found to support Water Voles throughout, although positive sites were patchy and localised but nowhere very abundant. Back water sites and ponds held locally good populations.

Potential sites identified are as follows:

1. CH 3500 NT 32097 67793. Dean burn. Potential for Water Vole along the burn, within grazed field. Within area of proposed large temporary compound and potential for damage to the burn.
2. CH 16950 NT 39035 59827. Shallow burn (Tyne Water) with high banks and well developed riparian vegetation providing potential habitat for Water Vole. The adjacent pond marked on the map is dry and is dominated by *Equisetum* swamp. This also provides good potential Water Vole habitat. The area is partly within temporary works compound area.
3. CH 17380 NT 39257 59430. Area of flooded land on base of former rail line supporting tall herb vegetation, potentially suitable for Water Vole. The area will be destroyed by the development.
4. CH 18800 – 20600 Cakemuir Burn along its length (approx. NT 39613 58133 to 39826 55909) Makes several crossings under line and runs parallel. Good habitat suitability for Water Vole *Arvicola terrestris*. Works to the burn are indicated on plans. In addition, the area is partly within a works compound area.
5. CH 21200 – 23000. Upper stretches of Gala Water. Good aquatic vegetation, and banks with potential for burrows. However, extensive Mink *Mustela vison* activity was noted, particularly in the lower stretches. Mink are serious predators of Water vole and can cause local extinction of populations. Extensive works area proposed for some of this area, including bridge over A7. Likely significant impacts along a substantial stretch of the Gala Water.
6. CH 29500 NT 43653 49009. Pirntation Burn. Crosses under the line and runs parallel to the line. Good potential for Water Vole. Fenced off from grazing and dominated by Soft Rush *Juncus effusus*. Some works are proposed to the embankment which may impact on the ditch.

### 4.8.2 Amphibians

Standing water bodies representing potential suitable Amphibian breeding habitat were identified within the Study Site during the course of the Phase 1 habitat survey. These are listed below. No water bodies with confirmed presence of Great Crested Newt *Triturus cristatus* records exist within 1.5 km of the Study site (SNH 1998). However, it is unlikely that the water bodies, listed below, have been previously surveyed for Great Crested Newt *Triturus cristatus*.

1. CH 10460 NT 33777 61481. Adult Common Frog *Rana temporaria* and tadpoles in short stretch of non-flowing ditch just to the north of the rail line, near to Shank Bridge. Within temporary works compound area.
2. CH 15530 NT 337826 60040. Small pond 4 x 4m, just to the north of the line. Numerous froglets seen. Amphibians present and further survey recommended. Area within temporary working area.
3. CH 16900 NT 39089 59878. Standing Water (see Phase 1 Target Note 87). A flooded section of old track bed near Tynehead, which may be a temporary pool as no aquatic plants are present. The pool provides potentially suitable, although marginal, breeding habitat for Amphibians. It will be destroyed by the development.

4. CH 17290 NT 39212 59537. Marshy Grassland (see Phase 1 Target Note 89). A wet area on the base of the former line dominated by species associated with marshy grassland. The wettest area has standing water c. 15 – 30 cm deep, providing potential suitable breeding habitat for Amphibians. It will be destroyed by the development.

5. CH 27200 NT 42331 50768. Standing Water (see Phase 1 Target Note 121). A small pool with an inflow ditch near Fountainhall. The pool contains abundant fen species, providing potential suitable breeding habitat for Amphibians. Within temporary works compound area.

6. CH 32350 NT 44256 46459. Swamp (see Phase 1 Target Note 150). A wet hollow at Galabank near Killochyett containing fen species providing potentially suitable breeding habitat for Amphibians. Potential for amphibians and further survey recommended. Immediately adjacent to works. Breeding habitat not directly affected but potential foraging/hibernation habitat will be lost.

7. CH 34120 NT 45007 45177. Pond 40 x 7m wide. Island with Mallards in the middle. Little aquatic vegetation which may indicate that the pond is temporary since it is dominated by inundation species and no aquatic species are present. Potential for amphibians and excellent foraging and hibernation sites. Immediately adjacent to works. Breeding habitat not directly affected but potential foraging/hibernation habitat will be lost.

8. CH 34450 NT 45347 45017. Small pond 20 x 8m. Very little aquatic vegetation. Dominated by Reed Sweet-grass *Glyceria maxima*. Good surrounding foraging and hibernation. Immediately adjacent to works. Breeding habitat not directly affected but potential foraging/hibernation habitat will be lost.

9. CH 16930 NT 39058 59863 Ponded section of Tyne Water immediately at exit of culvert, approximately 4 x 3m and 0.5m deep. No macrophytes present but numerous Toad *Bufo bufo* tadpoles. Within temporary works compound area.
5 EVALUATION OF ECOLOGICAL RESOURCE

5.1 Levels of Value

In this section each resource is assigned a value. Table 5.1 provides guidelines for Ecological Evaluation adapted from guidelines given by the Institute of Ecology and Environmental Management (Regini, K. 2000).

Table 5-1 Value of Ecological Resources (after Regini 2000).

<table>
<thead>
<tr>
<th>Level of Value</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>International</td>
<td>Internationally designated or proposed sites such as Ramsar Sites, Special Protected Areas, Biosphere Reserves and Special Areas of Conservation, or otherwise meeting criteria for international designation. Sites supporting populations of internationally important species.</td>
</tr>
<tr>
<td>National</td>
<td>Nationally designated sites such as SSSI’s, or non-designated sites meeting SSSI selection criteria, NNR’s, Marine Nature Reserves, NCR Grade 1 sites. Those containing viable areas of any key habitat identified in the UK BAP. Sites supporting viable breeding populations of Red Data Book species (excluding scarce species), or supplying critical elements of their habitat requirements.</td>
</tr>
<tr>
<td>Regional</td>
<td>Sites containing viable areas of threatened habitats of importance within a regional context i.e. SNH West, East or North area, comfortably exceeding SINC criteria, but not meeting SSSI selection criteria. Sites supporting viable breeding populations of Nationally Scarce species or those included in the Regional BAP (if present) on account of their rarity, or supplying critical elements of their habitat requirements.</td>
</tr>
<tr>
<td>High Local</td>
<td>Sites meeting the criteria for a county area designation (such as SINC), which may include amenity and educational criteria in urban areas. Ancient semi-natural woodland. Designated Local Nature Reserves. Sites containing viable areas of any key habitat identified in the County LBAP. Sites supporting viable breeding populations of species known to be county rarities (e.g. included in the county LBAP), or supplying critical elements of their habitat requirements.</td>
</tr>
<tr>
<td>Moderate Local</td>
<td>Undesignated sites, or features or species considered to appreciably enrich the resource within the context of the Parish (i.e. approx. 10km radius from the site).</td>
</tr>
<tr>
<td>Low Local</td>
<td>Undesignated sites, or features considered to appreciably enrich the habitat resource within the immediate environs of the site (e.g a species-rich hedgerow).</td>
</tr>
<tr>
<td>Negligible</td>
<td>Low grade and widespread habitats.</td>
</tr>
<tr>
<td>Negative</td>
<td>Invasive, alien species often scheduled under Section 14, Schedule 9 of the Wildlife and Countryside Act 1981 (as amended).</td>
</tr>
</tbody>
</table>

(Where species or habitats occur in more than one category above, the highest value is applicable).

5.2 Habitats and Vegetation

5.2.1 Legislative Overview

An obligation to conserve certain habitats is laid upon the UK Government by a number of international nature conservation conventions and directives. The most important international legislation concerning the protection of habitats is the EC Habitats & Species Directive. This Directive lists habitats that are important in the EC because they are rare, endangered or vulnerable. In Scotland 52 habitats have been identified as types of EC importance, including 14 “priority” habitats which are particularly threatened in global terms and the EC contains a significant proportion of their natural range.

Protection of habitats under the EC Habitats & Species Directive is secured through the designation of Special Areas of Conservation (SAC), although not all examples are/were designated. Examples of habitats identified within proposed development sites as types of EC importance are not necessarily of International Importance, but require appraisal to assess their nature conservation importance (see Table 5.1).
The protection of habitats of National Importance is provided under the provisions of the *Wildlife & Countryside Act* 1981 (as amended), which designates sites that fulfil the designation criteria as Sites of Special Scientific Interest (SSSI). As with those communities listed in the *Habitats and Species Directive*, examples of habitats identified within proposed development sites as types of National Importance require appraisal to assess their nature conservation importance.

In addition to the above legislation, the UK and Local Biodiversity Action Plans (BAPs) list a number of habitats as *Priority Habitats*.

### 5.2.2 Appraisal of Habitats

The current study has identified the following priority broad habitats types within the study area:

**UK Biodiversity Action Plan Priority Habitats:**

- Woodland
- Arable and Horticulture
- Lowland dry acid grassland (Unimproved and diverse examples of Semi-improved Acid Grassland falls in this category)
- Lowland Meadows (Unimproved and diverse examples of Semi-improved Neutral Grassland falls in this category)
- Fens, Marsh and Swamp
- Urban

**Midlothian Local Biodiversity Action Plan Priority Habitats:**

- Scrub
- Lowland dry acid grassland (Unimproved and diverse examples of Semi-improved Acid Grassland falls in this category)
- Lowland Meadows (Unimproved and diverse examples of Semi-improved Neutral Grassland falls in this category)
- Boundary and Linear Features
- Farmland
- Wetlands and Open Water
- Rivers and Streams
- Built Environment and Amenity Areas

**Borders Local Biodiversity Action Plan Priority Habitats:**

- Lowland dry acid grassland (Unimproved and diverse examples of Semi-improved Acid Grassland falls in this category)
- Lowland Meadows (Unimproved and diverse examples of Semi-improved Neutral Grassland falls in this category)
- Boundary Features, Hedgerows and Arable Margins
- Enclosed Grasslands
- Coniferous Woodland
- Fens, Carr, Marsh, Swamp and Reedbed
- Lochs and Ponds
- Rivers and Burns
5.2.3 Evaluation of Habitats

The criteria for habitat appraisal are those as defined in *A Nature Conservation Review* (Ratcliffe 1977), which allows the habitats to be graded according to their nature conservation interest, as defined in Table 5-1: *Value of Ecological Resources*. Table 5.2 provides a collective evaluation of the habitat types identified within the Study Site.

Table 5.3 provides an evaluation of individual habitat parcels of moderate local value or greater, and their location in terms of chainage from the engineering drawings. The remaining habitats are assessed to be of Low Local Value or of Negligible Value, with the exception of introduced shrub. This habitat, comprising dense stands of Snowberry *Symphoricarpos album*, has been evaluated as Negative Value given the competitive exclusion exerted upon other species by Snowberry *Symphoricarpos album*.

**Table 5.2: Collective appraisal of Phase 1 habitat types within the Study Site**

<table>
<thead>
<tr>
<th>Habitat</th>
<th>Size</th>
<th>Rarity</th>
<th>Diversity</th>
<th>Naturalness</th>
<th>Fragility</th>
<th>Typicalness</th>
<th>Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Broad-leaved Woodland</td>
<td>High</td>
<td>Medium</td>
<td>Medium</td>
<td>Medium</td>
<td>High</td>
<td>High</td>
<td>High Local</td>
</tr>
<tr>
<td>Plantations</td>
<td>High</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Low Local</td>
</tr>
<tr>
<td>Scrub</td>
<td>High</td>
<td>Medium</td>
<td>Medium</td>
<td>High</td>
<td>Medium</td>
<td>High</td>
<td>High Local</td>
</tr>
<tr>
<td>Acid Grassland</td>
<td>Low</td>
<td>High</td>
<td>High</td>
<td>High</td>
<td>High</td>
<td>High</td>
<td>High Local</td>
</tr>
<tr>
<td>Neutral Grassland</td>
<td>Medium</td>
<td>Medium</td>
<td>High</td>
<td>High</td>
<td>High</td>
<td>Medium</td>
<td>High Local</td>
</tr>
<tr>
<td>Improved Grassland</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Medium</td>
<td>Low</td>
<td>Medium</td>
<td>Negligible</td>
</tr>
<tr>
<td>Marshy Grassland</td>
<td>Low</td>
<td>Medium</td>
<td>Medium</td>
<td>Medium</td>
<td>Medium</td>
<td>Medium</td>
<td>Moderate Local</td>
</tr>
<tr>
<td>Poor Semi-improved Grassland</td>
<td>High</td>
<td>Low</td>
<td>Medium</td>
<td>Medium</td>
<td>Low</td>
<td>Medium</td>
<td>Low Local</td>
</tr>
<tr>
<td>Bracken</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Medium</td>
<td>Low</td>
<td>Medium</td>
<td>Negligible</td>
</tr>
<tr>
<td>Tall Ruderal Vegetation</td>
<td>High</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Medium</td>
<td>Negligible</td>
</tr>
<tr>
<td>Swamp</td>
<td>Low</td>
<td>High</td>
<td>Medium</td>
<td>Medium</td>
<td>Medium</td>
<td>Medium</td>
<td>Moderate Local</td>
</tr>
<tr>
<td>Marginal &amp; Inundation Vegetation</td>
<td>Low</td>
<td>Medium</td>
<td>Medium</td>
<td>High</td>
<td>Medium</td>
<td>Medium</td>
<td>Moderate Local</td>
</tr>
<tr>
<td>Standing Water</td>
<td>Low</td>
<td>High</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Low Local</td>
</tr>
<tr>
<td>Running Water</td>
<td>High</td>
<td>High</td>
<td>High</td>
<td>High</td>
<td>Medium</td>
<td>High</td>
<td>International/ National</td>
</tr>
<tr>
<td>Arable Cropland</td>
<td>High</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Negligible</td>
</tr>
<tr>
<td>Amenity</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Negligible</td>
</tr>
</tbody>
</table>
The following provides a summary evaluation of the habitats of the Study Site:

**International/National Value:** The River Tweed and Gala Water are part of the River Tweed catchment SSSI and cSAC.

**Regional Value:** No habitats have been assessed as being of regional value. It is considered that most habitat stands are of insufficient species diversity, and that the most species-rich habitat compartments are too small to qualify.

**High Local Value:**

- **Broad-leaved Woodland:** The total broad-leaved woodland resource is considered to be of High Local Value because of its extent within the Study Site, the range of types present and their overall species diversity. However, when considered individually only the most diverse woods merit High Local evaluation, most woodland patches are small and species-poor and are of Low Local or Negligible Value.

- **Scrub:** The total scrub resource is considered to be of High Local Value primarily because of its extent within the Study Site and given the low cover of scrub in the Midlothian and Scottish Borders areas. However, no single stand of scrub can be said to be more than Low Local Value.

- **Acid Grassland:** Acid grassland is identified as a Priority Habitat both Nationally and within the Local BAPs. The two areas of this habitat although small in extent have been assessed as being of sufficient quality (high species-richness) to qualify and therefore are deemed to be of High Local Value.

- **Neutral Grassland:** Neutral grassland is identified as a Priority Habitat both Nationally and within the Local BAPs. The extensive areas of this habitat which is relatively species-rich is therefore deemed to be of High Local Value in total, however, individual parcels of this habitat can only be regarded as being of Moderate Local Value because of their small areas. Most parcel have been evaluated as low local or negligible value.

**Moderate Local Value:** Marshy grassland, swamp and marginal and inundation vegetation have been evaluated as Moderate Local Value.

Table 5-3: Appraisal of individual Phase 1 habitat parcels within the Study Site of Moderate Local Value and above.

<table>
<thead>
<tr>
<th>TN</th>
<th>Chainage</th>
<th>Habitat</th>
<th>Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>4300</td>
<td>Broad-leaved Wood</td>
<td>Moderate Local</td>
</tr>
<tr>
<td>16</td>
<td>5345-5700</td>
<td>Neutral Grass</td>
<td>Moderate Local</td>
</tr>
<tr>
<td>46</td>
<td>9620-9750</td>
<td>Broad-leaved Wood</td>
<td>High Local</td>
</tr>
<tr>
<td>48</td>
<td>9780-9930</td>
<td>Broad-leaved Wood</td>
<td>Moderate Local</td>
</tr>
</tbody>
</table>
5.2.4 Collective Evaluation of Habitats

In the northernmost section of the route, from Dalkeith to Gorebridge, the disused Waverley line cuts through busy towns and intervening areas of intensive agriculture. It is the broad lowland valley of the River South Esk with a landscape of large fields of arable and pastoral agriculture divided by towns and roads, and punctuated by amenity areas and riverside woodlands. Through this landscape the disused railway line provides a ribbon of secondary woodlands interspersed with small stands of scrub, ruderal vegetation and species-poor unmanaged grasslands. Collectively the habitats along this section of the line contribute to connectivity within the landscape by providing a wildlife corridor of unmanaged habitats.

Beyond Gorebridge the Waverley line enters a landscape of open farmland which becomes increasingly upland in character as it follows the narrow valley of the Gala Water. Through this section, to Galashiels, the railway line adds considerably to the biodiversity of the area by providing additional habitats. The narrow Gala valley is predominantly improved pasture, often up to the edge of the Gala Water leaving little in the way of riparian habitats. The wider landscape up the slopes from the river valley is one of impoverished hill pasture with scattered conifer plantations. To this landscape the railway adds a range of habitats including unmanaged tussocky neutral grasslands, successional communities such as secondary woods, scrub and ruderal communities. Many cutting slopes have escaped agricultural improvement and are less intensively grazed and provide small areas of semi-improved grasslands with a greater species-richness than the surrounding agricultural fields. The former track bed often retains the basic steelworks slag ballast used as a base for the railway line. Patches of this provides a well drained base-rich/neutral substrate for a diverse neutral grassland community that would not otherwise be present. Very locally the basic slag is flooded and provides a diverse marshy grassland community.
Viewing the habitats of the Waverley line as a whole in the context of the local landscape, it is considered that the site would meet the criteria for a county area designation such as SINC or Local Nature Reserve, and that the site contains viable areas of key habitats identified in the Midlothian and Borders Local BAPs. Thus the site meets the definition for High Local Importance as defined in Table 5.1

5.3 Flora

5.3.1 Legislative Overview

An obligation to conserve certain species is laid upon the UK Government by a number of international nature conservation conventions and directives. The most important international legislation concerning the protection of plant species are the Bern Convention, the EC Habitats & Species Directive, the Ramsar Convention, the CITES Convention and the UN Convention on Biological Diversity. Wigginton (1999) provided a review of all plant species for which the UK has international obligations for their protection, and provides the definition here of Internationally Important Species.

Enhanced statutory protection for plant species in Britain is provided under the Wildlife & Countryside Act (1981). Schedule 8 lists 110 vascular plant species that are given special protection throughout Britain, and provides the definition here of Nationally Important Species.

Plant species of nature conservation importance in a British context are reviewed in the British Red Data Book: 1 Vascular Plants (Wigginton 1999). This lists all vascular plants considered to be Red Data Book species on the basis of:

- Critically Endangered, Endangered, Vulnerable, Extinct and Extinct in the Wild species and sub-species as defined by the revised IUCN criteria (i.e. nationally threatened = Red List species)
- Non-Red List Species in the revised IUCN categories Lower Risk (Conservation Dependent), Lower Risk (Lower Risk [near threatened]) and Data Deficient
- Species and sub-species endemic to Britain
- Species included in Schedule 8 of the Wildlife and Countryside Act (1981)
- Species listed in Annexes IIb and IVb of the European Community Habitats & Species Directive
- Other species threatened internationally, or for which Britain has a special responsibility.

Nationally Scarce Species are those that have been recorded from 16-100 10 km squares in Britain (Stewart et al. 1994)

In addition, the UK and Local BAPs for Midlothian and The Scottish Borders have identified a number of plants which are Priority Species. These species provide definition of importance at the local level although many are also of priority or conservation concern at national level.

Japanese Knotweed Fallopia japonica and Giant Hogweed Heracleum mantegazzianum are highly invasive and introduced species scheduled under
Section 14, Schedule 9 of the *Wildlife and Countryside Act* 1981 (as amended). The Act states: “If any person plants or causes to grow in the wild any plant which is included in Part II of Schedule 9, he shall be guilty of an offence.”

**5.3.2 Evaluation of Flora**

**Protected Species:**
No protected species were recorded during the course of the Phase I Habitat Survey and no records of protected species were received through the desk study. It should be noted that Bluebell *Hyacinthoides non-scripta* is present within the site, but is subject to only limited protection under the *Wildlife and Countryside Act* 1981 (as amended) with regard to picking.

**Nationally Scarce Species:**
No Nationally Scarce species were recorded during the course of the Phase I Habitat Survey.

Consultation with the LWIC and SBBRC provided records of the following native Nationally Scarce species within 500 m of the Study Site that it is considered could potentially be present within the Study Site. Those marked * indicates that they are also on a LBAP.

- Dense-Flowered Fumitory *Fumaria densiflora*
- *Green Figwort* *Scrophularia umbrosa*
- *Heath Cudweed* *Gnaphalium sylvaticum*
- Hoary Cinquefoil *Potentilla argentea*
- *Maiden Pink* *Dianthus deltoides*
- Yellow Star-of-Bethlehem *Gagea lutea*

Consultation with the SBBRC provided records of the following additional LBAP Priority Species within 500 m of the Study Site, that it is considered could be potentially present.

- Common Rock-rose *Helianthemum nummularium*
- Globe-Flower *Trollius europaeus*
- Large-flowered Hemp-nettle *Galeopsis speciosa*

Table 5-4, below, presents a summary evaluation of the notable native plants that it is considered could be potentially present within the Study Site.

**Table 5-4 Summary Evaluation of Flora**

<table>
<thead>
<tr>
<th>Midlothian Species</th>
<th>Status</th>
<th>Habitat</th>
<th>Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hoary Cinquefoil <em>Potentilla argentea</em></td>
<td>Nationally Scarce</td>
<td>Waste ground, rocky outcrops, dry grassland</td>
<td>Regional</td>
</tr>
<tr>
<td>Maiden Pink <em>Dianthus deltoides</em></td>
<td>Nationally Scarce</td>
<td>Rough grassland, particularly on volcanic outcrops. Stony margins of</td>
<td>Regional</td>
</tr>
</tbody>
</table>
5.3.3 Evaluation of Invasive Exotics

The presence of Japanese Knotweed *Reynoutria japonica* and Giant Hogweed *Heracleum mantegazzianum* within the site presents the opportunity for the spread of these highly invasive species within the development area and into the wider countryside. Therefore, the Site is evaluated to be of Negative Value, in regard to Japanese Knotweed *Fallopia japonica* and Giant Hogweed *Heracleum mantegazzianum*.

5.4 Otter

5.4.1 Legislative Overview

Enhanced statutory protection for Otter in Britain is provided under Schedule 5 of the *Wildlife and Countryside Act 1981* (as amended). This makes it an offence to kill, injure or take an Otter or to intentionally damage, destroy or obstruct access to any place used for shelter or for breeding. Disturbance to an Otter in its place of shelter also constitutes an offence under the Act.

Britain also has an international responsibility to protect the Otter under the EC *Habitats and Species Directive*. The species is designated a *European Protected Species* under this legislation, and is given an enhanced level of protection beyond that conferred by the *Wildlife and Countryside Act 1981*. It is an offence to deliberately disturb an Otter anywhere (not just in its place of shelter), and to damage or destroy a breeding or resting site whether deliberately or not. This legislation means that Otter is fully protected in Britain, and that any planned activity which might affect Otter requires prior consultation with the appropriate statutory nature conservation organisation (SNH). Licences may be granted for certain purposes that...
would otherwise be illegal; such licences for development work must be applied for from the Scottish Executive.

The Otter is listed as a priority species the UK BAP species, on the Edinburgh, Mid-Lothian and Scottish Borders Local BAPs.

5.4.2 Evaluation of Otter

Watercourses cross the Edinburgh and Midlothian section of the line sporadically and include the North and South Esk and the Tyne Water and Cakemuir Burn. Otter activity was found on the North Esk and Cakemuir Burn and desk study records were obtained for the South Esk. Other water-bodies had good habitat suitability and may support an Otter population. The study site contains small sections of these watercourses which are likely to be within the home range of one or a family group of Otters.

Through the Scottish Borders region, the Otter activity along the watercourses that run close to and cross under the line is extensive. Numerous sprainting sites and two lying-up sites were found and it is likely that a number of other lying up sites and several breeding holts will be present nearby. The Gala Water, which runs along the rail line for approximately 30km, with frequent crossing points and a number of smaller tributaries running into the Gala water had extensive Otter activity along its length. The home range size of an Otter will be between approximately 10km and 40km, with males having a larger home range than females. The stretch of the Gala water within the study site is likely to support at least one and possibly two female Otters potentially with juveniles, and at least one male.

The watercourses including the stretch of the Gala water and associated tributaries and River Tweed, within the study site is assessed to be of Regional Value for Otter.

5.5 Birds

5.5.1 Legislative Overview

The Wildlife and Countryside Act (1981) provides enhanced statutory protection to rare Breeding Birds listed under Schedule 1. It is an offence to disturb a Schedule 1 species while it is building a nest or is in, on or near a nest containing eggs or young. In addition, this Act provides general protection to any wild Bird and their nest and eggs. It should be noted that this will affect the timing of works that can be carried out on site.

Britain has an international obligation to protect certain species of Birds and their habitats under a number of international designations. The importance of British habitats for Birds is recognised by the EU Birds Directive (79/409/EEC) which lays certain obligations on governments of member states to protect populations and habitats of all migratory and some other vulnerable Birds (Annex 1). This protection is achieved through a variety of means, including the designation of Special Protection Areas (SPAs) covering the most important areas throughout Britain for each species.
A number of Bird species have been highlighted as priorities for Bird conservation in the United Kingdom. This includes those listed in The Population Status Of Birds In The UK. Birds of Conservation Concern: 2002-2007 (RSPB 2002) and Priority Species listed in the UK Biodiversity Action Plan. RSPB (2002) assigns all birds according to three categories:

1. Red List Species - those birds whose populations or range is rapidly declining (recently or historically), and those of global conservation concern;
2. Amber List Species - those birds whose populations are in moderate decline, rare breeders, internationally important and localised species and those of an unfavourable conservation status in Europe; and,
3. Green List Species - those other birds occurring in the United Kingdom not included in the Red or Amber Lists above.

For a full account of this appraisal and the evaluation criteria used in this work the reader should consult Gregory et al. (2002).

The Local BAPs for Midlothian and the Scottish Borders have identified a number of birds which are priority species at the local level.

### 5.5.2 Evaluation of Birds

#### Protected Species

The following species are listed on Schedule 1 of the Wildlife and Countryside Act 1981 (as amended), and are therefore subject to enhanced statutory protection:

1. Kingfisher *Alcedo atthis* was recorded at several locations on a 1.5km stretch on the Gala Water between Cuddy Bridge (NT 428497) and Fountainhall Farm (NT 436491), where the rail line is in close proximity with this watercourse. It is considered that Kingfisher *Alcedo atthis* is likely to be breeding in this location, given the suitability of habitat.

Consultation with the SBBRC has provided additional records of the following protected species within 500 m of the Study Site that it is considered could potentially be breeding within the Study Site:

**Species Listed on Schedule 1 of the Wildlife and Countryside Act (1981):**

1. Barn Owl *Tyto alba.*

#### UK Biodiversity Action Plan Priority Species/ Red List Species

The following species are listed on the UK BAP as Priority Species and the Red List, and are therefore of national high conservation concern (those marked * are on the Red List only). It is considered that they are breeding within the Study Site.

1. Bullfinch *Pyrrhula pyrrhula*
1. *Grasshopper Warbler Locustella naevia*
1. Grey Partridge *Perdix perdix*
1. *House Sparrow Passer domesticus*
1. Linnet *Carduelis cannabina*
Reed Bunting *Emberiza schoeniclus*

Skylark *Alauda arvensis*

Song Thrush *Turdus philomelos*

Spotted Flycatcher *Muscicapa striata*

*Starling *Sturnus vulgaris*

Tree Sparrow *Passer montanus*

*Yellowhammer *Emberiza citrinella*

### Amber List Species

The following species are listed on the Amber List, and are therefore of national medium conservation concern. It is considered that they are breeding/likely to be breeding, within the Study Site.

- Curlew *Numenius arquata*
- Dunnock *Prunella modularis*
- Goldcrest *Regulus regulus*
- Grey Wagtail *Motacilla cinerea*
- House Martin *Delichon urbica*
- Kestrel *Falco tinnunculus*
- Kingfisher *Alcedo atthis*
- Lapwing *Vanellus vanellus*
- Meadow Pipit *Anthus pratensis*
- Mistle Thrush *Turdus viscivorus*
- Oystercatcher *Haematopus ostralegus*
- Sand Martin *Riparia riparia*
- Swallow *Hirundo rustica*
- Willow Warbler *Phylloscopus trochilus*

Consultation with the SBBRC has provided additional records of the following Amber List species that it is considered could potentially be breeding within the Study Site.

- Barn Owl *Tyto alba*,
- Cuckoo *Cuculus canorus*,
- Green Woodpecker *Picus viridis*,
- Redpoll *Carduelis flammea*,
- Short-eared Owl *Asio flammeus*,
- Teal *Anas crecca*,

### Local Biodiversity Action Plan Priority Species

The following additional species is on the Midlothian and Borders Local BAP *Priority Species* list, and is therefore of conservation concern at the local level. It was recorded foraging over the Study Site but is unlikely to be breeding.

- Swift *Apus apus*
5.5.3 **Summary Evaluation**

The study area for the Waverley Line route encompasses a typical range of bird habitats associated with dis-used railway lines, including the following main types: broad-leaved semi-natural woodland (often secondary stands), scrub, unmanaged grasslands (mainly neutral) tall ruderal and ephemeral/short perennial.

Within the study site, these habitats support a diverse suite of birds, including lowland species of national conservation concern (see above), which have undergone recent national population declines or retractions in range due to habitat loss amongst other factors. The presence of additional adjacent habitats allows for a range of more specialist birds to be present, e.g. waterbodies provide habitats for wildfowl and riparian birds such as Kingfisher *Alcedo atthis* which is afforded enhanced statutory protection.

The bird assemblage associated with the Waverley line study area is considered to be of **High Local Value**.

5.6 **Reptiles**

5.6.1 **Legislative Overview**

All 6 British reptile species receive a degree of legislative protection that varies depending on their conservation importance.

Rare, endangered or declining species receive ‘full protection’ under the *Wildlife and Countryside Act* 1981 (as amended) as well as protection under the *Conservation (Natural Habitats &c.) Regulations* 1994, which transposed into UK law the *Habitats Directive*. Species that are fully protected include the Smooth Snake *Coronella austriaca* and Sand Lizard *Lacerta agilis*. However, these are not found in Scotland.

Adder *Vipera berus*, Common Lizard *Lacerta vivipara*, Grass Snake *Natrix natrix* and Slow worm *Anguis fragilis* are only ‘partially protected’ under the *Wildlife and Countryside Act* 1981 (as amended) and as such receive the following protection from:

- Deliberate killing and injuring.
- Being sold or other forms of trading.

Hence, because Adder *Vipera berus*, Common Lizard *Lacerta vivipara*, Grass Snake *Natrix natrix* and Slow worm *Anguis fragilis* are a common and widespread species, their habitats are not directly protected. However, because of their partial protection, disturbing or destroying their habitat while they are present may lead to an offence.

As such, legislation requires that where Adder *Vipera berus*, Common Lizard *Lacerta vivipara*, Grass Snake *Natrix natrix* and Slow Worm *Anguis fragilis* are present and likely to be adversely affected by development then appropriate mitigation should be put in place, e.g. to be translocated to a recipient site before their habitat is destroyed or disturbed, prior to development of a site.
The Study Site is within the geographical range of Adder *Vipera berus*, Common Lizard *Lacerta vivipara*, and Slow worm *Anguis fragilis*.

5.6.2 Evaluation of Reptiles

The preliminary walkover study was not designed to allow an evaluation of reptiles species and their populations *per se.*, but to determine the presence of potential high grade reptile habitat, and therefore the requirement for further intensive survey and appraisal.

5.6.3 Evaluation of Reptile Habitat

In total 57 sites were identified throughout the study site as having high potential to support reptile species. Table 5.2 provides a summary of the numbers of each site graded in to the two suitability categories.

<table>
<thead>
<tr>
<th>Suitability Category</th>
<th>Number of Sites Identified</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excellent</td>
<td>11</td>
</tr>
<tr>
<td>Good</td>
<td>46</td>
</tr>
<tr>
<td>Total</td>
<td>57</td>
</tr>
</tbody>
</table>

Given the identified habitat suitability within the study site it is recommended that further detailed survey and appraisal is provided for reptiles. This will be undertaken prior to construction. A recommended method statement is provided in Section 8: Recommended Further Survey.

5.7 Bats

5.7.1 Legislative Overview

All Bat species and their roosts are protected by *The Wildlife and Countryside Act* (1981) and classified as European Protected Species under the *Conservation (Natural Habitats etc.) Regulations* (1994). Any planned activity which might affect Bat roosts, whether they are resident or not, requires prior consultation with the appropriate statutory nature conservation organisation (SNH). Licences may be granted for damage or destruction to a Bat roost; such licences for development work, and must be applied for from the Scottish Executive.

Of the species likely to be found within the development site, the Pipistrelle Bat *Pipistrellus* spp. is listed on the UK BAP Priority Species List.

Daubentons’ Bats *Myotis daubentonii* and Pipistrelle Bats *Pipistrellus* sp. are listed on the Edinburgh City Council BAP. All bat species are listed on the Mid-Lothian Council BAP Priority Species list. The Brown Long-eared Bat *Plecotus auritus* is listed on the Scottish Borders BAP 100 Priority Species list.
5.7.2 Evaluation of Bat Habitat

The walkover survey identified high numbers of potential roosting sites within bridge structures, culverts and mature trees on or adjacent to the rail line that will be impacted upon by the development. One Daubenton’s bats *Myotis daubentonii* roost site was identified during the walkover survey in a culvert. Desk studies identified the presence of a possible further roost site in a stone bridge.

The potential for maternity roost sites was limited. Maternity roost sites are generally found in warm dry structures, in particular within houses, although some species, in particular Daubenton’s bats *Myotis daubentonii* are known to use tree roosts. A number of houses, and in the Galashiels area industrial buildings, are present that could provide maternity roost sites and these will be demolished during the proposed works.

Many of the bridge structures within the site are cold and damp and would not provide suitable conditions for maternity roost sites. However the cool stable conditions found in many bridge crevices are ideal for potential roost sites for non-breeding bats in spring, autumn and summer (Billington and Norman 1997) and for night roosts. Many of the bridges within the study site can provide safety, stable temperatures, high humidity, have nearby drinking water and feeding areas and access to linear habitat features (e.g. rail line, Gala Water) used for commuting. Several tunnels (e.g. Bowshank and Torwoodlee tunnels) and sheltered culverts are also present which may have deep cracks and crevices and be sufficiently isolated from external temperature fluctuations to provide hibernation sites. The most likely species to be found within bridge structures is Daubenton’s bats *Myotis daubentonii* (Billington and Norman 1997).

Excellent potential foraging and commuting areas have been identified along a number of sections of the line in particular in association with water bodies and woodland. Foraging Vespertilionid bats (all those likely to be found within the study site) have been shown to strongly select all fresh water habitats and woodland edges and openings (Walsh et al., 1995).

Given the identified habitat suitability within the study site it is recommended that further detailed survey and appraisal is provided for Bats to all structures and areas that have been assessed to be of Good or Excellent potential. This will be undertaken prior to construction. A recommended method statement is provided in Section 8: Recommended Further Survey.

5.8 Other Fauna

5.8.1 Water Vole

The Water Vole *Arvicola terrestris* is likely to be present within the Study Site. The Water Vole *Arvicola terrestris* is afforded enhanced statutory protection under Schedule 5 - in respect of section 9 (4) only - of the *Wildlife and Countryside Act 1981* (as amended). This makes it an offence to disturb or damage any Water Vole *Arvicola terrestris* resting place or habitat. This legislation means that Water Vole *Arvicola terrestris* habitat is comprehensively protected in Britain, and that any
planned activity which might affect Water Vole *Arvicola terrestris* requires prior consultation with the appropriate statutory nature conservation organisation (SNH). There is no provision for licensing the intentional destruction of Water Vole *Arvicola terrestris* burrows for development. This must be covered by the appropriate defence in the Act, which permits otherwise illegal activities if they are the incidental result of a lawful operation and could not be reasonably avoided. In practice due attention must be paid to the presence of Water Vole *Arvicola terrestris* and appropriate actions taken to safeguard the places they use for shelter. It is therefore essential that appropriate mitigation is put in place and that SNH are in agreement with any proposed mitigation.

The Water Vole *Arvicola terrestris* is listed on the UK BAP as a *Priority Species* and on the Scottish Borders BAP as a *100 Priority Species* and listed as a *Priority Species* on the Midlothian Local BAP.

5.8.2 Amphibians

A number of water bodies offering potential breeding habitat for amphibians have been identified within the Study Site. Geographically, the only species of Amphibian subject to enhanced statutory protection and potentially present is Great Crested Newt *Triturus cristatus*. Great Crested Newt *Triturus cristatus* is a species with enhanced statutory protection under the *Wildlife and Countryside Act* 1981 (as amended) and *The Conservation (Natural Habitats, etc.) Regulations* (1994). This legislation means that the species is fully protected in Britain, including deliberate killing of individuals, the destruction of places used for breeding or resting. Any planned activity which might affect Great Crested Newt *Triturus cristatus* requires prior consultation with the appropriate statutory nature conservation organisation (SNH). Licences may be granted for certain purposes that would otherwise be illegal; such licences for development work must be applied for from the Scottish Executive.

All other Amphibian species likely to occur within the proposed development site are subject to limited protection with regard to collecting and sale only.

The Great Crested Newt *Triturus cristatus* and Common Frog *Rana temporaria* are listed as *100 Priority Species* on the Scottish Borders BAP. The Great Crested Newt *Triturus cristatus*, Common Frog *Rana temporaria* and Common Toad *Bufo bufo* are listed as *Priority Species* on the Midlothian Local BAP.

5.9 Planning Policy

NPPG 14 ‘Natural Heritage’ states that “the presence of a protected species or habitat is a material consideration in the assessment of development proposals. Planning authorities should take particular care to avoid harm to species of habitats protected under the 1981 Act or European Directives or identified as priorities in the UK Biodiversity Action Plan.” In addition “planning authorities should seek to prevent further fragmentation or isolation (of habitats) and identify opportunities to restore links which have been broken.” Article 10 of the requires Member States to encourage the appropriate management of features of the landscape which are of
major importance for wild flora and fauna. The features concerned are those which because of their linear and continuous structure or their function as ‘stepping stones’ or ‘wildlife corridors’ are essential for migration, dispersal or genetic exchange. Features which may be of value in the development of habitat networks include areas of woodland, rivers and burns, lochs, ponds and wetlands, traditional field boundaries such as dykes or hedgerows, unimproved grasslands and herb rich meadows, heaths and peatland and coastal habitats".

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6 EVALUATION OF IMPACTS

The criteria that have been used in this report to assess the magnitude of impacts have been adapted from guidelines for ‘Ecological Evaluation and Impact Assessment’ provided by the Institute of Ecology and Environmental Management (Regini, K. 2000). Table 6.1 provides guidelines for assessing impact magnitude.

The magnitude of the impact is then assessed in conjunction with the assessed value of the resource (see Section 5) to provide an indication of Impact Significance. In some cases the predicted impacts are not entirely clear due to a lack of detailed development proposals or the requirement for further survey.

Table 6-1: Guideline Criteria for assessing magnitude of Impacts.

<table>
<thead>
<tr>
<th>Impact</th>
<th>Guideline Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>A large permanent reduction in numbers or species-richness likely.</td>
</tr>
<tr>
<td>Medium</td>
<td>Medium term-temporary reduction in numbers or species likely; small permanent reduction in numbers or species-richness likely.</td>
</tr>
<tr>
<td>Low</td>
<td>No reduction in numbers or species richness likely, but population made more vulnerable to further impacts; short term, temporary reduction in numbers or species richness likely.</td>
</tr>
<tr>
<td>Negligible</td>
<td>No adverse impacts on a species. Disturbance to species/habitats of a temporary nature not affecting the longer term population viability or carrying capacity of a site.</td>
</tr>
</tbody>
</table>

Table 6-2: Impact Significance Matrix - Impacts in Relation to Size and Value of Feature.

<table>
<thead>
<tr>
<th>Value of Feature</th>
<th>Magnitude of Impact</th>
<th>High</th>
<th>Medium</th>
<th>Low</th>
<th>Negligible</th>
</tr>
</thead>
<tbody>
<tr>
<td>International</td>
<td></td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>National</td>
<td></td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Regional</td>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>High Local</td>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Moderate Local</td>
<td></td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Low Local</td>
<td></td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Negligible</td>
<td></td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Negative</td>
<td></td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

Table 6-3: Guideline Criteria for Assessing Significance of Impacts.

<table>
<thead>
<tr>
<th>Impact Significance</th>
<th>Key</th>
<th>Guideline Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>1</td>
<td>Substantial loss of value on a district scale, regional or national scale. Loss of conservation value on a national scale (i.e. Scotland), international scale (i.e. Europe) or global scale.</td>
</tr>
<tr>
<td>Moderate</td>
<td>2</td>
<td>Substantial loss of conservation value on a local scale, some loss of value on a district or regional scale.</td>
</tr>
<tr>
<td>Low/ Negligible</td>
<td>3</td>
<td>Negligible or no impact on community or species, of no conservation value, and low magnitude impact on community or species of very local value. Loss of conservation value on a very local scale (i.e. immediate environs of study area). Loss of conservation value on a local scale (i.e. within 5-10 km radius).</td>
</tr>
</tbody>
</table>
6.1 Habitats

The impacts on habitats have been evaluated using Drawings with the suffix P02 which include the temporary working areas and work compounds. Impacts of habitat loss are evaluated under four categories:

- Permanent impacts of habitat loss. This considers only those habitat parcels which have been evaluated as being of Moderate Local Value or greater. (The impact on habitats evaluated as being of Low Local Importance or less are not considered individually as their significance is negligible).
- Temporary impacts of habitat loss. This also considers only those habitat parcels, which have been evaluated as being of Moderate Local Value or greater.
- Temporary and permanent impacts on watercourses.
- Cumulative impacts of habitat loss at the landscape scale.

6.1.1 Permanent Impacts: Loss of Habitat

The following habitat parcels are concentrated along the former track bed, which is also the proposed line of the new track. In addition, a few of the habitat parcels fall beneath auxiliary works. The proposals will destroy these habitats permanently. The habitats concerned are mainly neutral grasslands developing on the basic slag used as ballast along the former track bed. The area of marshy grassland has also developed along the track bed, over a periodically flooded area of basic slag. The parcel of acid grassland, the woodland parcels and a few of the neutral grassland areas extend from the track bed onto cutting slopes.

Table 6.1: Permanent Impacts: Loss of Habitat

<table>
<thead>
<tr>
<th>TN</th>
<th>Area</th>
<th>Chainage</th>
<th>Habitat</th>
<th>Loss</th>
<th>Evaluation</th>
<th>Impact Magnitude</th>
<th>Impact Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td>Eskbank</td>
<td>5345-5700</td>
<td>Neutral Grass</td>
<td>100%</td>
<td>Moderate Local</td>
<td>High</td>
<td>Moderate</td>
</tr>
<tr>
<td>49</td>
<td>Gore Glen</td>
<td>10245-10430</td>
<td>SI Acid Grass</td>
<td>50%</td>
<td>High Local</td>
<td>Medium</td>
<td>Moderate</td>
</tr>
<tr>
<td>65</td>
<td>Catcune</td>
<td>12520-12650</td>
<td>Neutral Grass</td>
<td>100%</td>
<td>Moderate Local</td>
<td>High</td>
<td>Moderate</td>
</tr>
<tr>
<td>73</td>
<td>The Chesters</td>
<td>13757-14057</td>
<td>Neutral Grass</td>
<td>100%</td>
<td>Moderate Local</td>
<td>High</td>
<td>Moderate</td>
</tr>
<tr>
<td>75</td>
<td>Borthwick</td>
<td>14544-14871</td>
<td>Neutral Grass</td>
<td>100%</td>
<td>Moderate Local</td>
<td>High</td>
<td>Moderate</td>
</tr>
<tr>
<td>89</td>
<td>Tynehead</td>
<td>17154-17557</td>
<td>Marshy Grass</td>
<td>100%</td>
<td>Moderate Local</td>
<td>High</td>
<td>Moderate</td>
</tr>
<tr>
<td>94</td>
<td>Falahill</td>
<td>21580-21700</td>
<td>Neutral Grass</td>
<td>100%</td>
<td>Moderate Local</td>
<td>High</td>
<td>Moderate</td>
</tr>
<tr>
<td>103</td>
<td>Heriot</td>
<td>22841-22913</td>
<td>Neutral Grass</td>
<td>100%</td>
<td>Moderate Local</td>
<td>High</td>
<td>Moderate</td>
</tr>
<tr>
<td>108</td>
<td>Stagebank</td>
<td>24516-24679</td>
<td>Neutral Grass</td>
<td>100%</td>
<td>Moderate Local</td>
<td>High</td>
<td>Moderate</td>
</tr>
<tr>
<td>125</td>
<td>Hoppingle</td>
<td>27767-28109</td>
<td>Neutral Grass</td>
<td>100%</td>
<td>Moderate Local</td>
<td>High</td>
<td>Moderate</td>
</tr>
<tr>
<td>127</td>
<td>Hazelbank</td>
<td>28428-28526</td>
<td>Neutral Grass</td>
<td>100%</td>
<td>Moderate Local</td>
<td>High</td>
<td>Moderate</td>
</tr>
<tr>
<td>149</td>
<td>Watherston</td>
<td>32380-32400</td>
<td>Neutral Grass</td>
<td>100%</td>
<td>Moderate Local</td>
<td>High</td>
<td>Moderate</td>
</tr>
<tr>
<td>157</td>
<td>Watherston</td>
<td>32778-33230</td>
<td>Neutral Grass</td>
<td>100%</td>
<td>Moderate Local</td>
<td>High</td>
<td>Moderate</td>
</tr>
<tr>
<td>158</td>
<td>Galabank</td>
<td>32778-33230</td>
<td>Neutral Grass</td>
<td>100%</td>
<td>Moderate Local</td>
<td>High</td>
<td>Moderate</td>
</tr>
<tr>
<td>168</td>
<td>Galabank</td>
<td>33934-34267</td>
<td>Neutral Grass</td>
<td>20%</td>
<td>Moderate Local</td>
<td>Medium</td>
<td>Low</td>
</tr>
<tr>
<td>179</td>
<td>Bowland</td>
<td>39705-39885</td>
<td>Neutral Grass</td>
<td>100%</td>
<td>Moderate Local</td>
<td>High</td>
<td>Moderate</td>
</tr>
<tr>
<td>207</td>
<td>Torwoodlee</td>
<td>43190-43256</td>
<td>Broad-leaved Wood</td>
<td>30%</td>
<td>High Local</td>
<td>Medium</td>
<td>Moderate</td>
</tr>
<tr>
<td>239</td>
<td>Whitehall</td>
<td>0-500</td>
<td>Broad-leaved Wood</td>
<td>10%</td>
<td>Moderate local</td>
<td>Medium</td>
<td>Low</td>
</tr>
</tbody>
</table>

Other habitat parcels will suffer loss or disturbance as a result of being within the working area for the construction of the actual line. Other habitats are within areas proposed for pipes and haul roads and other auxiliary works such as the re-profiling of cutting/embankment slopes and selective de-vegetation, including the removal of trees and scrub to provide clear sight-lines. Of particular relevance is the damage to Crichton Glen SSSI. Any works within this area will require consent from SNH.
Table 6-5: Further Permanent Impacts on Habitats

<table>
<thead>
<tr>
<th>TN</th>
<th>Area</th>
<th>Chainage</th>
<th>Habitat</th>
<th>Impact</th>
<th>Evaluation</th>
<th>Impact Magnitude</th>
<th>Impact Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>North Esk</td>
<td>4300</td>
<td>Broad-leaved Wood</td>
<td>Drainage Channel</td>
<td>Moderate</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>46</td>
<td>Gore Glen</td>
<td>9620-9750</td>
<td>Broad-leaved Wood</td>
<td>20% Loss</td>
<td>High</td>
<td>Medium</td>
<td>Moderate</td>
</tr>
<tr>
<td>48</td>
<td>Gore Glen</td>
<td>9750-9930</td>
<td>Broad-leaved Wood</td>
<td>10% Loss</td>
<td>Moderate</td>
<td>Medium</td>
<td>Low</td>
</tr>
<tr>
<td>82</td>
<td>Crichton Glen/West Wood</td>
<td>16075-17006</td>
<td>Broad-leaved Wood</td>
<td>20% Loss</td>
<td>High</td>
<td>Medium</td>
<td>Moderate</td>
</tr>
<tr>
<td>85</td>
<td>Crichton Glen</td>
<td>16700-16890</td>
<td>SI Neutral Grass</td>
<td>De-vegetated</td>
<td>Moderate</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>86</td>
<td>Crichton Glen</td>
<td>16746-16876</td>
<td>Unimproved Acid Grass</td>
<td>De-vegetated</td>
<td>High</td>
<td>Medium</td>
<td>Moderate</td>
</tr>
<tr>
<td>88</td>
<td>Crichton Glen</td>
<td>17154-17358</td>
<td>SI Neutral Grass</td>
<td>Disturbance</td>
<td>Moderate</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>150</td>
<td>Watherston</td>
<td>32300-32355</td>
<td>Swamp</td>
<td>Disturbance</td>
<td>Moderate</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>151</td>
<td>Watherston</td>
<td>32370-32590</td>
<td>SI Neutral Grass</td>
<td>Devegetation</td>
<td>Moderate</td>
<td>Medium</td>
<td>Low</td>
</tr>
<tr>
<td>161</td>
<td>Galabank</td>
<td>33276-33371</td>
<td>SI Neutral Grass</td>
<td>30% Loss</td>
<td>Moderate</td>
<td>Medium</td>
<td>Low</td>
</tr>
<tr>
<td>162</td>
<td>Galabank</td>
<td>33427-33571</td>
<td>SI Neutral Grass</td>
<td>30% Loss</td>
<td>Moderate</td>
<td>Medium</td>
<td>Low</td>
</tr>
</tbody>
</table>

6.1.2 Temporary Impacts on Watercourses

The proposed development runs in close proximity to a number of watercourses and crosses these in numerous places. Of particular importance is the River Tweed Catchment SSSI/cSAC, which includes the Gala Water, which has been evaluated as National/International Value. The Gala Water occurs in much of the study site from NT 396557 to its confluence with the river Tweed at NT 511348. The Study Site crosses the River Tweed at NT 515354. The Tweed and its tributaries are clean river systems of high ecological and conservation value containing pollution sensitive species. Thus the potential for pollution incidents is high and given the sensitivity of the habitat the potential impact could be high. The following provide potential negative impacts on watercourses:

Table 6-6: Temporary Impacts on Water Courses

<table>
<thead>
<tr>
<th>Chainage</th>
<th>Watercourse</th>
<th>Proposed Works</th>
</tr>
</thead>
<tbody>
<tr>
<td>16883</td>
<td>Tyne Water</td>
<td>Temporary works area, Drainage outfall</td>
</tr>
<tr>
<td>16976-19124</td>
<td>Cakemuir Burn</td>
<td>Ditch protection works</td>
</tr>
<tr>
<td>21914-22345</td>
<td>Gala Water</td>
<td>Temporary works area</td>
</tr>
<tr>
<td>22517-22769</td>
<td>Gala Water</td>
<td>Temporary works area</td>
</tr>
<tr>
<td>22760-23070</td>
<td>Gala Water</td>
<td>Temporary works area, Riverbank protection</td>
</tr>
<tr>
<td>23071-23112</td>
<td>Gala Water</td>
<td>New Culvert</td>
</tr>
<tr>
<td>23112-23200</td>
<td>Gala Water</td>
<td>Temporary works area, Vegetation cleared for visibility</td>
</tr>
<tr>
<td>22375-23486</td>
<td>Gala Water</td>
<td>Temporary works area, Riverbank protection</td>
</tr>
<tr>
<td>24340-24550</td>
<td>Gala Water</td>
<td>Temporary works area</td>
</tr>
<tr>
<td>25013-25050</td>
<td>Gala Water</td>
<td>Temporary works area, Bridge Works</td>
</tr>
<tr>
<td>25595-25641</td>
<td>Gala Water</td>
<td>Temporary works area, Riverbank protection</td>
</tr>
<tr>
<td>28211-28458</td>
<td>Gala Water</td>
<td>Temporary works area</td>
</tr>
<tr>
<td>29384-29416</td>
<td>Gala Water</td>
<td>Temporary works area, Riverbank protection</td>
</tr>
<tr>
<td>31152-31223</td>
<td>Gala tributary</td>
<td>Temporary works area</td>
</tr>
<tr>
<td>31203-31260</td>
<td>Gala Water</td>
<td>Temporary works area, Riverbank protection</td>
</tr>
<tr>
<td>31571-31764</td>
<td>Gala Water</td>
<td>Temporary works area, Riverbank protection</td>
</tr>
<tr>
<td>32262-32392</td>
<td>Gala Water</td>
<td>Temporary works area, Riverbank protection</td>
</tr>
<tr>
<td>32744-32790</td>
<td>Gala Water</td>
<td>Temporary works area, Bridge works</td>
</tr>
<tr>
<td>33242-33265</td>
<td>Gala Water</td>
<td>Temporary works area, Bridge works</td>
</tr>
<tr>
<td>33700-33945</td>
<td>Gala Water</td>
<td>Riverbank protection, Drainage outfall</td>
</tr>
</tbody>
</table>
The proposed works listed above all have the potential for negative impacts on watercourses. ‘Temporary works’ is listed above where the watercourse is within or contiguous with temporary working areas (L.L.A.U.) as shown on the engineering drawings (suffix P02). Other works listed are quoted directly from these drawings.

The potential impacts arising from these proposed works are similar throughout and can therefore be considered together. Temporary works areas may include haul roads, site compounds and machine working areas. The main potential impacts are temporary loss of riparian habitats, which provide a buffer between agricultural land and the watercourse; direct and indirect input of silt, and pollution incidents (fuel, paint, cement dust etc). Riverbank protection, drainage outfall construction and culvert construction all have the same potential for siltation and pollution incidents and will certainly result in the loss of bank-side vegetation.

**Temporary Impact Magnitude: Potentially High**
**Temporary Impact Significance: Potentially High**

### 6.1.3 Bridge works over watercourses.

There are numerous bridges over watercourses along the proposed route, all of which will be subject to works of ranging extent. All have the potential for a pollution incident (paint, fuel, chemicals, cement dust etc.) or the input of silt into waterways during construction and subsequent use that could have a severe impact upon the Gala Water. In addition, several new bridges will be built which are likely to require in-stream works in the Gala Water.

**Temporary Impact Magnitude: Potentially High**
**Temporary Impact Significance: Potentially High**

### 6.1.4 Discharge of drainage waters from the railway line into watercourses

The construction of numerous drainage outfalls, as well as the potential impact of construction, has the potential to direct pollutants deposited on the working railway (eg. fuel, oil, human waste) into watercourses through the working life of the railway.

**Permanent Impact Magnitude: Potentially Moderate**
**Permanent Impact Significance: Potentially Moderate**
6.1.5 Cumulative Impacts: Habitat Loss at the Landscape Scale

Collectively, the habitats of the Waverley Line contribute to connectivity within the landscape by providing a wildlife corridor of unmanaged habitats. Therefore, when considered collectively, the habitats of the Waverley Line are considered to be of High Local Value. The reinstatement of the line will partly reduce the effectiveness of the line as a wildlife corridor.

Impact Magnitude: Medium
Impact Significance: Moderate

6.2 Flora

6.2.1 Potential Loss of Nationally Scarce Plant Species

Populations of the following native Nationally Scarce species, considered to be potentially present within the Study Site, may potentially be lost through current development proposals:

- Hoary Cinquefoil *Potentilla argentea* potentially occurring within the proposed workings at NT3660.
- Green Figwort *Scrophularia umbrosa* potentially occurring within the proposed workings at NT3265 and NT3267.
- Maiden Pink *Dianthus deltoides* potentially occurring within the area of a proposed access road at NT411527.
- Yellow Star-of Bethlehem *Gagea lutea* potentially occurring on the river banks at Lothian Bridge.
- Heath Cudweed *Gnaphalium sylvaticum* potentially occurring around Crichton Glen at NT3860.
- Dense-flowered Fumitory *Fumaria densiflora* potentially occurring around Stagehall Farm at NT4445.

Impact Magnitude: Potentially High
Impact Significance: Potentially High

6.2.2 Potential Loss of LBAP species

Populations of the following Local BAP Priority Species, considered to be potentially present within the Study Site, may potentially be lost through current development proposals:

- Globe-Flower *Trollius europaeus* potentially occurring within the area of the proposed workings at NT5135.
- Common Rock-Rose *Helianthemum nummularium* potentially occurring around the Whin Wood at NT4739.
- Large-flowered Hemp-netle *Galeopsis speciosa* potentially occurring around Tweedbank at NT5135.

Impact Magnitude: Potentially High
Impact Significance: Potentially High

6.2.3 Potential Spread of Invasive Exotics
Disturbance of the Site by vehicles offers the potential for the spread of Japanese Knotweed *Fallopia japonica* and Giant Hogweed *Heracleum mantegazzianum* throughout the Site and into the wider countryside. Both of these species are highly invasive, forming dense stands to the exclusion of native flora. In addition, Giant Hogweed *Heracleum mantegazzianum* presents a risk to human health via its sap.

Impact Magnitude: Medium
Impact Significance: Moderate

6.3 Otter

6.3.1 Loss of Holt and Lying up Sites
During the initial survey no breeding holt sites were identified. However, there are a number of areas where further survey is recommended where works are to be carried out to River banks where it is considered there is potential for breeding holt sites.

One lying up site (TN O53) was identified which is likely to be lost, and is within the working area for the construction of Torwoodlee Water bridge UB87. In addition, a number of areas are recommended for further detailed survey where works are to be carried out to River banks, which are considered to have high potential for lying-up sites. An Otter will have a number of lying up sites within its territory (Chanin 1993) and, assuming that there is no Otter death associated with the loss of one of these sites, the impact of the loss is unlikely to be severe.

Impact Magnitude: Medium
Impact Significance: Moderate

6.3.2 Disturbance to Holt and Lying up Sites
SNH (1997) guidelines state that any works within 20 m of a lying up site and 30 m of a breeding holt may cause disturbance. One lying up site (TN O45) was identified within 20 m of works proposed to the River banks and is likely to be negatively affected by proposed works to the River bank in this area.

In addition, there are a number of areas where further survey is recommended where works are to be carried out to River banks where it is considered there is potential for breeding holts or lying up sites.

Noise and disturbance during construction works and increased human activity following construction could affect use of water-bodies. This could potentially deter an Otter from passing through the area and cause stress as it temporarily divides a home range. The affect of disturbance on Otters is not fully known, although females with cubs in particular are very sensitive to disturbance (Chanin 1993).

Impact Magnitude: Medium
Impact Significance: Moderate

6.3.3 Loss of Riparian Habitat
During works to the river banks and rail embankments areas of scrub and tree cover are likely to be lost. This will lead to a loss of cover and reduce the quality of the habitat in affected areas. In general areas to be cleared are a relatively short section of the overall length of river bank. In addition, much of the loss will be temporary.

Impact Magnitude: Low
Impact Significance: Low

6.3.4 Severance of Travelling Routes and Rail Mortality
Watercourses cross under the rail line along its length, in particular the Gala Water. Otter are not able to swim against strong currents and will not tend to swim through culverts where there is no bank or ledge and will come out of the water, and cross the rail line particularly at times of high water. There is then an increased risk of an Otter being killed by a train. A physical barrier e.g. metal grill or weir will have the same effect. Although the risk of this happening is likely to be low, the loss of only one Otter from a local population could have a severe impact on local population levels given the low numbers of Otter that are likely to be present in the area. Many of the wider span bridges have access for Otter on land even at times of high water. The smaller bridges and culverts do not generally have this provision.

Impact Magnitude: Potentially High
Impact Significance: Potentially High

6.3.5 Reduction in Foraging Availability or Quality
There is an increased likelihood of a pollution incident during construction works. This could affect the availability of prey species both in the short and longer term. Some potential pollutants such as spillage of oil could also directly affect the Otters themselves. Chemical and physical (silt deposition) pollution could reduce fish populations that are predated by Otters. In particular extensive works are being carried out along the River banks during bank protection works and during bridge repairs and construction.

Impact Magnitude: Potentially High
Impact Significance: Potentially High

6.4 Birds

6.4.1 Protected Species
The only species with enhanced statutory protection confirmed during the bird survey was Kingfisher *Alcedo atthis*, which is listed on Schedule 1 of the Wildlife and Countryside Act 1981 (as amended). Kingfisher *A. atthis* occurs on the Gala Water where the rail line is in close proximity to potential breeding habitat (although breeding was not confirmed). The proposals in this section of line indicate that the riverbank will be repaired to prevent future erosion of the railway embankment. These works could potentially destroy, damage and/or disturb a breeding site.
The consultation identified the presence of several species with enhanced statutory protection within 500m of the rail corridor, although no detailed information on their exact location or breeding status is available. Of these species, it is quite possible that Barn Owl *Tyto alba*, which is listed on Schedule 1 of the Wildlife and Countryside Act 1981 (as amended), may be breeding in bridges, viaducts or derelict buildings at one or more locations. Identification of breeding sites is often difficult to ascertain, given that the “nest” may be set back in masonry. The proposals indicate that many bridging structures may be subject to works and potentially could destroy, damage and/or disturb a breeding site.

**Impact Magnitude:** Potentially High  
**Impact Significance:** Potentially High

### 6.4.2 Loss of Breeding Habitat

The proposals will result in the permanent loss of breeding bird habitats, as a consequence of the construction of sections of new line, and the modification of existing habitat that have developed particularly since the closure of the railway. There will be a substantial permanent loss of breeding bird habitat resulting from vegetation clearance and earth works, in particular loss of scrub, woodland, unmanaged grasslands and tall ruderal. This includes habitat for 12 UK BAP Priority Species/Red List Species, namely: Bullfinch *Pyrrhula pyrrhula*, Grasshopper Warbler *Locustella naevia*, Grey Partridge *Perdix perdix*, House Sparrow *Passer domesticus*, Linnet *Carduelis cannabina*, Reed Bunting *Emberiza schoeniclus*, Skylark *Alauda arvensis*, Song Thrush *Turdus philomelos*, Spotted Flycatcher *Muscicapa striata*, Starling *Sturnus vulgaris*, Tree Sparrow *Passer montanus* and Yellowhammer *Emberiza citrinella*.

Habitats naturally developing and landscaping on the new line sections will partially compensate for these losses, although the value of these habitats for breeding birds will require time to mature.

**Impact Magnitude:** High  
**Impact Significance:** Moderate

### 6.4.3 Direct Loss of Migratory/Wintering Bird Habitats

The proposals will result in the permanent loss of migratory/wintering bird habitats, as a consequence of the construction of sections of new line, and the modification of existing habitat that have developed particularly since the closure of the railway. The rail line was not surveyed during the winter, and the loss of wintering bird habitat therefore cannot be fully assessed. It is considered that the habitats associated with the dis-used rail line provide wintering habitats for a suite of birds including many of the summer residents and wintering species such as Fieldfare *Turdus pilaris* and Redwing *Turdus iliacus*. In addition, seed-rich habitats are present that currently benefit Red-listed passerines.
Impact Magnitude: Not known
Impact Significance: Not known

6.4.4 Habitat Fragmentation and Isolation

Loss of elements of individual habitats or habitat complexes can reduce the overall habitat available to breeding and wintering birds, leading to habitat fragmentation and isolation with a potential concomitant adverse impact on birds. However, assessing the impact of habitat fragmentation and isolation on birds is difficult to determine, as it requires assessment of minimum viable areas (amongst other factors) to maintain populations. Whilst the proposals involve habitat loss (see above) and potential isolation, it is considered that the overall proposals will not result in the loss of the linear, unbroken corridor of habitats currently present along the length of the dis-used rail line.

Impact Magnitude: Low
Impact Significance: Low/Negligible

6.5 Reptiles

Table 6-7 below lists the impact on each area of suitable reptile habitat (Sites 1-57) when assessed against the engineering layout drawings (suffix P02).

<table>
<thead>
<tr>
<th>Site</th>
<th>Suitability</th>
<th>Grid Reference</th>
<th>Approximate Chainage</th>
<th>Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Good</td>
<td>NT 325663</td>
<td>5000-5320</td>
<td>Lost, to track</td>
</tr>
<tr>
<td>2</td>
<td>Excellent</td>
<td>NT 325658</td>
<td>5325-5715</td>
<td>Lost, new embankment</td>
</tr>
<tr>
<td>3</td>
<td>Good</td>
<td>NT 324654</td>
<td>5920-6270</td>
<td>Lost, temporary works</td>
</tr>
<tr>
<td>4</td>
<td>Good</td>
<td>NT 324654</td>
<td>5920-6270</td>
<td>No impact</td>
</tr>
<tr>
<td>5</td>
<td>Good</td>
<td>NT 324654</td>
<td>5920-6270</td>
<td>30% loss to track</td>
</tr>
<tr>
<td>6</td>
<td>Good</td>
<td>NT 332644</td>
<td>7095-7450</td>
<td>Lost, cutting re-shaped</td>
</tr>
<tr>
<td>7</td>
<td>Good</td>
<td>NT 332642</td>
<td>7460-7580</td>
<td>Lost, cutting re-shaped</td>
</tr>
<tr>
<td>8</td>
<td>Good</td>
<td>NT 332639</td>
<td>7745-7850</td>
<td>Lost, track &amp; other works</td>
</tr>
<tr>
<td>9</td>
<td>Good</td>
<td>NT 332630</td>
<td>8585-8845</td>
<td>20% loss to track &amp; LOD</td>
</tr>
<tr>
<td>10</td>
<td>Excellent</td>
<td>NT 338617</td>
<td>10090-10430</td>
<td>50% loss, temp works</td>
</tr>
<tr>
<td>11</td>
<td>Good</td>
<td>NT 338614</td>
<td>10420-10515</td>
<td>No impact</td>
</tr>
<tr>
<td>12</td>
<td>Good</td>
<td>NT 339614</td>
<td>10540-10750</td>
<td>50% loss, temp works</td>
</tr>
<tr>
<td>13</td>
<td>Good</td>
<td>NT 353603</td>
<td>12500-12590</td>
<td>Lost to track &amp; LOD</td>
</tr>
<tr>
<td>14</td>
<td>Excellent</td>
<td>NT 364600</td>
<td>13750-14050</td>
<td>Lost, track/cutting works</td>
</tr>
<tr>
<td>15</td>
<td>Excellent</td>
<td>NT 371602</td>
<td>14545-14880</td>
<td>Lost to track &amp; LOD</td>
</tr>
<tr>
<td>16</td>
<td>Good</td>
<td>NT 373601</td>
<td>14885-15080</td>
<td>50% loss to track &amp; LOD</td>
</tr>
<tr>
<td>17</td>
<td>Good</td>
<td>NT 380601</td>
<td>15525-15895</td>
<td>Lost, track/slope re-grad</td>
</tr>
<tr>
<td>18</td>
<td>Excellent</td>
<td>NT 390599</td>
<td>16740-16880</td>
<td>Lost, track/slope de-veg.</td>
</tr>
<tr>
<td>19</td>
<td>Good</td>
<td>NT 392594</td>
<td>17155-17670</td>
<td>50% loss to track</td>
</tr>
<tr>
<td>20</td>
<td>Good</td>
<td>NT 394568</td>
<td>17685-18315</td>
<td>50% loss to track</td>
</tr>
<tr>
<td>21</td>
<td>Good</td>
<td>NT 393574</td>
<td>19420-19590</td>
<td>10% loss to temp works</td>
</tr>
<tr>
<td>22</td>
<td>Good</td>
<td>NT 394569</td>
<td>19630-19760</td>
<td>50% loss to track</td>
</tr>
<tr>
<td>23</td>
<td>Good</td>
<td>NT 393571</td>
<td>19790-20140</td>
<td>50% loss to temp works</td>
</tr>
<tr>
<td>24</td>
<td>Good</td>
<td>NT 395569</td>
<td>20000-20565</td>
<td>10% loss, edge disturb</td>
</tr>
<tr>
<td>25</td>
<td>Good</td>
<td>NT 397561</td>
<td>20860-21100</td>
<td>No impact</td>
</tr>
<tr>
<td>26</td>
<td>Good</td>
<td>NT 397557</td>
<td>21100-21470</td>
<td>No Impact</td>
</tr>
<tr>
<td>27</td>
<td>Good</td>
<td>NT 397555</td>
<td>21585-21850</td>
<td>Lost to track</td>
</tr>
<tr>
<td>28</td>
<td>Good</td>
<td>NT 398553</td>
<td>21675-22225</td>
<td>Lost, track &amp; temp works</td>
</tr>
<tr>
<td>29</td>
<td>Good</td>
<td>NT 401551</td>
<td>22235-22500</td>
<td>Lost, track &amp; temp works</td>
</tr>
</tbody>
</table>
### 6.6 Bats

A detailed impact assessment for bats cannot be undertaken at this stage as no detailed survey work has take place. However, a generalised assessment is made of the likely predicted impacts from the results of the walkover survey.

---

**Impact Magnitude:** Potentially High

**Impact Significance:** Not Known

Further survey recommended.
6.6.1 Loss of Roost sites

The walkover survey identified many potential bat roost sites (and one actual bat roosting site) within the bridges, culverts, tunnels, trees and buildings associated with the line. There is likely to be a permanent loss of many of these potential roost sites during construction works, particularly during repairs to bridges/tunnels/culverts and the felling of mature trees.

The Engineering Summary Report indicates that there will be substantial works to bridges. A number of over-bridges require only minor repairs, but this is likely to involve infilling of cracks and crevices. The Newbattle Viaduct and Glenesk Bridge may require more substantial repairs. Seven over-bridges will be removed. The arch type underbridges are generally in a reasonable condition and are likely to be retained. However, waterproofing is required and that is likely to result in the infilling of potential bat roosts. Any cracks or crevices within tunnels are likely to be in-filled.

There are a number of smaller bridges with wrought iron rail-bearer riveted plated girders and timber decks. Many of these are likely to be replaced with a concrete slab. Larger bridges with wooden timber decking and corroded steel girders are likely to require extensive repair or replacement.

Table 6.8 lists those potential roost sites with good or excellent potential, that are likely to be impacted upon by the development and where further survey is recommended.

<table>
<thead>
<tr>
<th>Target Note</th>
<th>Chainage and Structure</th>
<th>Suitability</th>
<th>Affected by Development</th>
</tr>
</thead>
<tbody>
<tr>
<td>BT1</td>
<td>CH 3500 Culvert under old line</td>
<td>Good</td>
<td>Not Known</td>
</tr>
<tr>
<td>BT3</td>
<td>CH 3800 Mature Beech trees</td>
<td>Good</td>
<td>Yes</td>
</tr>
<tr>
<td>BT4</td>
<td>CH 4250 Glen Esk Viaduct UB12</td>
<td>Good</td>
<td>Yes</td>
</tr>
<tr>
<td>BT5</td>
<td>CH 4600 Bridge over line OB13</td>
<td>Good</td>
<td>Yes</td>
</tr>
<tr>
<td>BT6</td>
<td>CH 4700 Bridge over line OB14</td>
<td>Good</td>
<td>Yes</td>
</tr>
<tr>
<td>BT7</td>
<td>CH 4700 Stone out buildings on station platform</td>
<td>Good</td>
<td>Potentially</td>
</tr>
<tr>
<td>BT8</td>
<td>CH 4800 Bridge over line OB15</td>
<td>Good</td>
<td>Yes</td>
</tr>
<tr>
<td>BT9</td>
<td>CH 6400 Bridge under line UB17</td>
<td>Good</td>
<td>Potentially</td>
</tr>
<tr>
<td>BT10</td>
<td>CH 6660-6830 Newbattle Viaduct UB18</td>
<td>Good</td>
<td>Yes</td>
</tr>
<tr>
<td>BT11</td>
<td>CH 7000 Builder’s yard- buildings</td>
<td>Good</td>
<td>Yes</td>
</tr>
<tr>
<td>BT16</td>
<td>CH 8520 Stone culvert with burn</td>
<td>Excellent</td>
<td>Not known.</td>
</tr>
<tr>
<td>BT20</td>
<td>CH 9650 Beech and Lime trees</td>
<td>Good</td>
<td>Yes</td>
</tr>
<tr>
<td>BT21</td>
<td>CH 9600 – 10900 Woodland</td>
<td>Excellent foraging</td>
<td>Yes</td>
</tr>
<tr>
<td>BT23</td>
<td>CH 11200 8 houses to be removed</td>
<td>Good</td>
<td>Yes</td>
</tr>
<tr>
<td>BT25</td>
<td>CH 12475 Stone bridge OB29</td>
<td>Good/Excellent foraging</td>
<td>Potentially</td>
</tr>
<tr>
<td>BT29</td>
<td>CH 13000 Bridge over line OB30</td>
<td>Good</td>
<td>Yes</td>
</tr>
<tr>
<td>BT31</td>
<td>CH 13400 Stone bridge under line UB31 (probable roost)</td>
<td>Good</td>
<td>Yes</td>
</tr>
<tr>
<td>BT33</td>
<td>CH 141250 Stone bridge over line OB32</td>
<td>Good</td>
<td>Potentially</td>
</tr>
<tr>
<td>BT36</td>
<td>CH 16200 Stone culvert under line</td>
<td>Good</td>
<td>Potentially</td>
</tr>
<tr>
<td>BT37</td>
<td>CH 16475 Culvert over burn</td>
<td>Good</td>
<td>Potentially</td>
</tr>
<tr>
<td>BT38</td>
<td>CH 15250-16150 Mature trees</td>
<td>Good</td>
<td>Yes</td>
</tr>
<tr>
<td>BT39</td>
<td>CH 16900 Stone culvert over Tyne Water UB36</td>
<td>Good/Excellent foraging</td>
<td>Potentially</td>
</tr>
<tr>
<td>BT40</td>
<td>CH 17675 Stone and brick bridge over line OB38</td>
<td>Good</td>
<td>Potentially</td>
</tr>
<tr>
<td>BT41</td>
<td>CH 18750 Stone culvert with burn UB39</td>
<td>Excellent</td>
<td>Potentially</td>
</tr>
<tr>
<td>BT42</td>
<td>CH 19230 Stone and brick bridge over line OB41</td>
<td>Good</td>
<td>Potentially</td>
</tr>
<tr>
<td>BT43</td>
<td>CH 19585 Stone culvert with burn</td>
<td>Good</td>
<td>Potentially</td>
</tr>
<tr>
<td>BT46</td>
<td>CH 22200 Stone culvert off line</td>
<td>Good</td>
<td>Potentially</td>
</tr>
<tr>
<td>BT49</td>
<td>CH 25045 Bridge over Gala Water</td>
<td>Good</td>
<td>Yes</td>
</tr>
<tr>
<td>BT51</td>
<td>CH 26735 Bridge over Gala Water</td>
<td>Good</td>
<td>Yes</td>
</tr>
<tr>
<td>BT52</td>
<td>CH 26800-26950 Mature trees</td>
<td>Good</td>
<td>Potentially</td>
</tr>
<tr>
<td>BT53</td>
<td>CH 27115 Steel and wood bridge under line UB54</td>
<td>Good</td>
<td>Yes</td>
</tr>
<tr>
<td>BT54</td>
<td>CH 27630 Steel and wood bridge under line UB56</td>
<td>Good/Excellent foraging</td>
<td>Yes</td>
</tr>
<tr>
<td>BT55</td>
<td>CH 27700 Brick arch culvert</td>
<td>Good</td>
<td>Potentially</td>
</tr>
<tr>
<td>BT56</td>
<td>CH 28665 Still burn culvert</td>
<td>Good</td>
<td>Potentially</td>
</tr>
<tr>
<td>BT58</td>
<td>CH 29885 Stone bridge OB59</td>
<td>Good</td>
<td>Potentially</td>
</tr>
<tr>
<td>BT59</td>
<td>CH 30340 Steel and wood bridge under line UB60</td>
<td>Good</td>
<td>Yes</td>
</tr>
<tr>
<td>BT60</td>
<td>CH 30825 Steel and wood bridge under line UB61</td>
<td>Good</td>
<td>Yes</td>
</tr>
<tr>
<td>BT63</td>
<td>CH 32075 Stone, steel and wood culvert under line UB64</td>
<td>Good</td>
<td>Yes</td>
</tr>
<tr>
<td>BT64</td>
<td>CH 32770 Bridge over Gala Water UB65</td>
<td>Good</td>
<td>Yes</td>
</tr>
<tr>
<td>BT65</td>
<td>CH 33260 Steel and wood bridge under line UB67</td>
<td>Good</td>
<td>Yes</td>
</tr>
<tr>
<td>BT69</td>
<td>CH 36500 Stone, wood and brick bridge and adjacent mature trees UB70</td>
<td>Good</td>
<td>Potentially</td>
</tr>
<tr>
<td>BT71</td>
<td>CH 37820 Stone, steel and wooden Bridge over line UB72</td>
<td>Good</td>
<td>Yes</td>
</tr>
<tr>
<td>BT74</td>
<td>CH 38590 Stone, steel and wooden bridge UB74</td>
<td>Good</td>
<td>Yes</td>
</tr>
<tr>
<td>BT75</td>
<td>CH 38775 Bowshank Tunnel 200 metres long through hill.</td>
<td>Excellent/Excellent foraging</td>
<td>Yes</td>
</tr>
<tr>
<td>BT76</td>
<td>CH 38970 Wood and steel bridge under line UB77</td>
<td>Good</td>
<td>Yes</td>
</tr>
<tr>
<td>BT77</td>
<td>CH 39240 Face of Brick culvert</td>
<td>Good</td>
<td>Potentially</td>
</tr>
<tr>
<td>BT78</td>
<td>CH 39420 Stone bridge over line OB79</td>
<td>Good</td>
<td>Potentially</td>
</tr>
<tr>
<td>BT79</td>
<td>CH 39800 – 39850 Mature Ash trees</td>
<td>Good</td>
<td>Not Known</td>
</tr>
<tr>
<td>BT81</td>
<td>CH 40825 Stone bridge over line OB81</td>
<td>Good</td>
<td>Yes</td>
</tr>
<tr>
<td>BT82</td>
<td>CH 41000 – 42100 Rail corridor</td>
<td>Excellent Foraging</td>
<td>Yes</td>
</tr>
<tr>
<td>BT84</td>
<td>CH 41420 Mature Ash and Alder trees</td>
<td>Good</td>
<td>Not Known</td>
</tr>
<tr>
<td>BT85</td>
<td>CH 41455 Stone and wood bridge with adjacent walls OB83</td>
<td>Good</td>
<td>Yes</td>
</tr>
<tr>
<td>BT86</td>
<td>CH41900 Bridge under line. UB84</td>
<td>Good</td>
<td>Yes</td>
</tr>
<tr>
<td>BT87</td>
<td>CH42550 Large stone Bridge.</td>
<td>Good</td>
<td>Yes</td>
</tr>
<tr>
<td>BT88</td>
<td>CH 43110 Culvert with burn</td>
<td>Roost identified</td>
<td>Potentially</td>
</tr>
<tr>
<td>BT89</td>
<td>CH 43195 UB88 Flood relief culvert.</td>
<td>Excellent</td>
<td>Potentially</td>
</tr>
<tr>
<td>BT90</td>
<td>CH 43285 Brick arch tunnel- Torwoodlee.</td>
<td>Excellent</td>
<td>Potentially</td>
</tr>
<tr>
<td>BT91</td>
<td>CH 43390 Stone culvert – UB90</td>
<td>Excellent</td>
<td>Potentially</td>
</tr>
<tr>
<td>BT93</td>
<td>CH 44025 Stone and brick bridge OB93</td>
<td>Good</td>
<td>Yes</td>
</tr>
<tr>
<td>BT94</td>
<td>CH 44480 UB95 Kilnknowe</td>
<td>Good</td>
<td>Yes</td>
</tr>
<tr>
<td>BT95</td>
<td>CH 45355 Long stone tunnel over line with road over top. OB100</td>
<td>Good</td>
<td>Yes</td>
</tr>
<tr>
<td>BT96</td>
<td>CH 46100 and surrounds Derelict buildings</td>
<td>Good</td>
<td>Yes</td>
</tr>
<tr>
<td>BT98</td>
<td>CH 47675 Concrete pedestrian bridge over line and Gala Water. FB102B</td>
<td>Good/Excellent foraging</td>
<td>Yes</td>
</tr>
<tr>
<td>BT99</td>
<td>CH 48300 Large stone bridge with four</td>
<td>Good/Excellent foraging</td>
<td>Yes</td>
</tr>
</tbody>
</table>
6.6.2 Loss of Foraging Areas and Commuting Routes

Although no night survey has been undertaken to assess the use of the site for foraging bats, desk study records and habitat suitability assessment indicate that bats are likely to use the railway corridor for foraging along much of the route. In addition, watercourses crossing under the line and running adjacent to the line are also likely to be used for foraging.

There will be a permanent loss of some foraging habitat as a consequence of the construction of sections of new line, and the modification of existing habitats that have developed since the closure of the railway. There will be a permanent loss of foraging habitat resulting from vegetation clearance and earth works, in particular loss of scrub, woodland, unmanaged grasslands and tall ruderal. This is likely to lead to a reduction in insect numbers, the main food source of bats.

Habitats naturally developing and landscaping on the new line sections will partially compensate for these losses, although the value of these habitats for foraging bats will require time to mature. Key foraging habitat and commuting corridors such as the River corridors will remain largely intact.

It is predicted that substantial areas along the line are used as commuting corridors that will be affected by loss of vegetation and the running of trains. Table 6-8 identifies those areas of excellent foraging suitability where it is recommended that further survey takes is undertaken.

Impact Magnitude: Potentially Medium
Impact Significance: Not Known
Further survey recommended.

6.6.3 Direct Mortality

It is predicted that there may be a slight increased risk of mortality from direct contact of bats with trains. This is likely to be an issue if there is a roost in a bridge structure that is found over the line, where bats would emerge from the roost directly into the path of the line.

Impact Magnitude: Potentially Medium
Impact Significance: Not Known

6.6.4 Indirect Impacts

There may be a number of other indirect impacts on bats including the provision of lighting in or on bridges. If present close to a roost site this will cause disturbance.
and may lead to the abandonment of the roost. Other potential indirect impacts may include the effect of increased noise on a roost site.

**Impact Magnitude:** Potentially Medium  
**Impact Significance:** Not Known

### 6.7 Other Fauna

#### 6.7.1 Water Vole
The development proposals may result in the direct loss of potential Water Vole habitat, particularly where the line crosses or runs adjacent to water courses. It is recommended that a Water Vole survey is undertaken of potential sites as identified in [Section 4.8.1](#).

#### 6.7.2 Amphibians
The development proposals are likely to result in the direct loss of Amphibian breeding habitat as well as surrounding foraging and hibernation habitat. It is recommended that an Amphibian survey is undertaken of potential sites as identified in [Section 4.8.2](#).
7 MITIGATION RECOMMENDATIONS

7.1 Introduction
The following details recommended mitigation measures in order to reduce impact significance to acceptable levels. The proposed mitigation programmes will need to be started well in advance of construction. For some groups such as amphibians and reptiles this could be over two years prior to the start of construction and for all other groups over one year prior to construction. Given that construction is due to start in 2005, it is recommended that at the earliest opportunity a programme of ecological mitigation works is instigated. It should be noted that the cost of the proposed mitigation measures could be significant for some groups.

7.2 Habitats and Vegetation

7.2.1 Permanent Impacts: Loss of Habitat
Compensatory measures should be considered for habitats lost to the development. Similar habitats could be created in appropriate areas following the cessation of works. Habitats should be created using plants of local provenance, appropriate to the region and habitat, and be subject to a management plan to ensure their long-term viability.

Opportunities for the creation of habitats should be maximised in the development of the landscaping strategy for the project, as this is potentially one of the most significant factors in reducing the impact significance of the proposals. This is considered to be particularly important in areas of newly created rail line, where for example opportunities for planting new boundary features (i.e. hedgerows) would compensate for the loss of scrub habitats. The main habitats which should be created are:

- Neutral grassland. It will not be possible to exactly replicate the communities containing calcicolous species found on the old track bed since the substrate is steelworks slag which is not found naturally in the area. However, a similar community may be created on cutting slopes and other disturbed or waste areas beside the railway line as part of the landscape strategy following construction. The disturbed soils in these areas are suitable for the creation of a lowland species-rich meadow community equating to *Cynosurus cristatus-Centaurea nigra* (MG5) mesotrophic grassland, as described in British Plant Communities (Rodwell, 1992). Native seed mixes which approximate to this community are commercially available.

- Acid Grassland. This community has a strict requirement for base poor substrates with a very low nutrient status and will only be restorable in areas where it currently exists and the underlying soils remain. Areas of this habitat may be restored on appropriate soils (e.g. sandy loams) using a seed mix which approximates to the *Festuca ovina-Agrostis capillaris-Galium saxatile* grassland (U4) as described in British Plant Communities (Rodwell, 1992).

- Broad-leaved Woodland. Virtually all the woodland lost to the development is immature secondary woodland, mainly of birch *Betula* spp. and willow *Salix* spp.
These tend to be floristically poor but provide important habitat structure for associated fauna. Such woodland is readily re-creatable by planting suitable woody species in an approximation of *Quercus robur*-*Pteridium aquilinum*-*Rubus fruticosus* woodland (W10), as described in British Plant Communities (Rodwell, 1991). Ash *Fraxinus excelsior*, alder *Alnus glutinosa* willow *Salix spp.* and birch *Betula pubescens* may also be planted in wet situations. Woodland may be successfully established on former agricultural fields where the nutrient status of the soils will be too high for the creation of species-rich neutral and acid grasslands.

Scrub. Significant areas of scrub and early successional woodland will be lost to the development. This is readily re-created by planting native shrubs. It is recommended that this take the form of mixed hedgerows along boundaries in an approximation of *Crataegus monogyna*-*Hedera helix* scrub W21, as described in British Plant Communities (Rodwell, 1991). Scrub may be successfully established on former agricultural fields where the nutrient status of the soils will be too high for the creation of species-rich neutral and acid grasslands.

The creation along the railway line of significant areas of vegetation approximating to the British plant communities listed above will help to restore the ecology of the area in the medium term. It is recommended that an ecologist be involved in the development of the landscaping strategy for the project, in order to make the most of the opportunities for restoration.

**Residual Impact Significance: Low**

**7.2.2 Temporary Impacts on Habitats**

Indirect loss or disturbance to habitats should be minimised by ensuring that a minimum safe working area is defined using appropriate fencing (e.g. plastic barrier fence). Indirect habitat losses may also be compensated by habitat creation, as noted above.

**Residual Impact Significance: Potentially Low**

**7.2.3 Cumulative Impacts: Habitat Loss at the Landscape Scale**

The overall loss and disturbance of habitats throughout the site has been assessed as being of Moderate Impact Significance. Best practice guidelines (Regini 2000) state ‘if the impact is of moderate significance, the impact will normally only be permitted if there are circumstances of over-riding county or metropolitan social or economic importance and there is no viable alternative which has less significant adverse impacts. Compensation of equivalent value will normally be required’.

Thus mitigation measure should ensure that the range of semi-natural habitats similar to those present should remain a feature of the landscape along or in the vicinity of the line. This can be achieved through habitat creation and management, as outlined in section 7.1.1 above.
Residual Impact Significance: Potentially Low

7.2.4 Impacts on Watercourses and Bridge Works Over Watercourses
The developers should produce Method Statements for all works during and after construction (including post-construction drainage) likely to affect any watercourse, to ensure safe working practices and to meet legal requirements to reduce the probability of pollution incidents and other damage.

Freshwater monitoring programmes should be implemented during all works which have the potential to impact upon water courses. The design of these programmes should be agreed in consultation with Scottish Environmental Protection Agency (SEPA) and SNH. Where no works are to take place on river banks a buffer strip of vegetation should be left to intercept any pollutants and silt in the run-off from working areas. Buffer strips should be at least 5m wide and clearly fenced. Where works affect river banks directly the minimum working area should be clearly fenced. Consideration should also be given to the design of the development to minimise the risk of pollution incidents during the working life of the railway. Reference should be made to Pollution Prevention Guidelines issued by the SEPA, particularly the following guidelines:

- PPG1: General guide to the prevention of water pollution.
- PPG5: Works in, near or liable to affect watercourses.
- PPG23: Maintenance of structures over water.

Since the watercourses, including the Gala Water, likely to be impacted upon form part of the River Tweed SSSI, any operations within this area have the potential to constitute a Potentially Damaging Operation (PDO). Therefore, SNH should be consulted prior to the commencement of any works that have the potential to impact on the SSSI.

With regard to the River Tweed cSAC status, the National Planning Policy Guideline, NPPG 14, states that:

A development which could have an adverse effect on the conservation interests for which a Natura 2000 area has been designated should only be permitted where:

- There is no alternative solution; and
- There are imperative reasons of over-riding public interest, including those of a social or economic nature.

Residual Impact Significance: Potentially Low

7.3 Flora

7.3.1 Potential Loss of Notable Species
Section 6.2 notes impacts of Potentially High Significance a number of notable plant species. However, the potential presence of all of these species has been highlighted through the consultation process and was not confirmed during the Phase
I Habitat Survey. Since some of the records are somewhat dated and/or give imprecise locations, confirmation of presence of the above species within the proposed working area (see Section 8.3) is required before specific mitigation recommendations can be formulated. Recommendations may involve the translocation of plants to an adjacent area of suitable habitat.

**Residual Impact Significance: Unknown**

### 7.3.2 Control of Invasive Exotics

Stands of Japanese Knotweed *Fallopia japonica* and Giant Hogweed *Heracleum mantegazzianum* are found within the site. To comply with the *Wildlife and Countryside* Act (1981) a strategy is required during the construction phase of the development to ensure the control of, and prevent the spread of, Japanese Knotweed *Fallopia japonica* and Giant Hogweed *Heracleum mantegazzianum* within the development area and in the wider countryside. If Japanese Knotweed *Fallopia japonica* and Giant Hogweed *Heracleum mantegazzianum* are eradicated throughout the site, this will lead to a positive enhancement of the site. These species occur in the study area at the following locations. (It should be noted that these populations are likely to increase and further checks should be made prior to construction in 2005):

**Table 7-1: Location of Invasive Exotics**

<table>
<thead>
<tr>
<th>Species</th>
<th>Target Note Number</th>
<th>Grid Reference/Chainage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Giant Hogweed</td>
<td>TN 21</td>
<td>GR: NT 32280 65288</td>
</tr>
<tr>
<td>Giant Hogweed</td>
<td>TN 28</td>
<td>GR: NT 32919 64698</td>
</tr>
<tr>
<td>Giant Hogweed</td>
<td>TN 220</td>
<td>GR: NT 51665 35238</td>
</tr>
<tr>
<td>Japanese Knotweed</td>
<td>TN 217</td>
<td>GR: NT 51535 35239</td>
</tr>
<tr>
<td>Japanese Knotweed</td>
<td>TN 219</td>
<td>GR: NT 51550 35307</td>
</tr>
<tr>
<td>Japanese Knotweed</td>
<td>0 58</td>
<td>CH: 46400</td>
</tr>
<tr>
<td>Giant Hogweed</td>
<td>TN235</td>
<td>GR NT 32108, 70329</td>
</tr>
<tr>
<td>Giant Hogweed</td>
<td>TN236</td>
<td>GR NT 32109, 70406</td>
</tr>
</tbody>
</table>

**Residual Impact: Potential Positive Enhancement**

### 7.4 Otter

#### 7.4.1 Loss of Holt and Lying–up Sites

The loss of the lying up site at TNO53 CH 43225 will require a licence as well as any further lying-up/holt sites found during the recommended further survey. A licence would be required from the Scottish Executive Environment and Rural Affairs Department (SEERAD) for disturbance to a European Protected Species. There is no provision for development as such. However under Regulation 44 (2e) of the *Conservation (Natural Habitats, &c.) Regulations* 1994 licences may be granted for:

- Preserving public health or public safety or other imperative reasons of overriding public interest including those of a social or economic nature and beneficial consequences of primary importance for the environment.
However a licence will not be granted unless importantly under 44 (3) the appropriate licensing authority is satisfied:

a) that there is no satisfactory alternative
b) that the action authorised will not be detrimental to the maintenance of the population of the species concerned at a favourable conservation status in their natural range.

General recommended procedure for Destruction of Holt

Prior to receipt of the licence it is recommended that a 30m exclusion zone is established around the holt site. This should be marked out by the Otter specialist. Stake and orange plastic mesh fencing is recommended. All contractors should be made aware of the exclusion zone and under no circumstances should entry be made into the exclusion zone.

The holt site must only be destroyed under licence from SEERAD and under the direct supervision of the licence holder. Of primary concern is the risk of injuring an Otter within the holt. This can be minimised by destroying the holt site by hand before work commences. It is recommended that vegetation around the holt site is cleared away by hand to open up the site and make it less suitable and then left for a week. Opening up the holt site should allow any Otter using the site at the time of the exclusion to disperse naturally.

Following this, the destruction of the holt site can take place under the direct supervision of the licence holder. Hand tools should be used to dig out the holt site. Care should be taken throughout digging to ensure that no Otters are inside any tunnels. If digging by hand becomes impossible assistance may be required from a JCB. If any Otter cubs are found during the destruction, all work within 30m of this area must be stopped immediately. The Otter specialist along with SNH and SEERAD must be consulted prior to any works recommencing.

In addition, licence conditions may require the construction of one or more artificial holts prior to the destruction of the holt. The design, siting and construction of any artificial holts should be overseen by an Otter specialist.

Residual Impact Significance: Low

7.4.2 Disturbance to Holt/lying-up Sites

Any holt/lying-up sites present within 30 m of the working areas may require a licence from SEERAD as described in section 7.3.1. In addition, SNH should be consulted.

Any holt sites that will not be directly affected should be fenced off with an exclusion zone of at least 30m around them. The fencing should be marked out by the Otter specialist and be subject to regular monitoring. In addition, works in the area should be kept to a minimum and avoided around dawn and dusk.

Currently one lying-up site has been identified within 30m of the proposed working area TN O45, CH 39350 and it is considered that further lying up sites may be identified in the recommended further survey work.
Residual Impact Significance: Low

7.4.3 Loss of Riparian Habitat
The removal of riparian habitat (e.g. trees and scrub) should be kept to a minimum. No riparian vegetation should be removed beyond that required to allow safe working practices to the river banks and a safe minimum corridor along the rail line. Any areas cleared for engineering works, should be replanted where possible, with native shrubs and trees of local provenance. There are areas along the riverbanks that are within the development site but outwith an area of impact that potentially could be enhanced by the planting of bankside vegetation and the retention of buffer strips.

Residual Impact Significance: Low

7.4.4 Damage to Travelling Routes
New bridge construction over water courses should ensure that access (land or ledge) is possible by Otter along at least one bank or that an adjacent underpass (600-900mm concrete tunnel) with suitable fencing is installed. This will apply to new structures UB87 and UB92 and any other new bridges over watercourses.

The majority of current bridge structures over watercourses have at least one bank accessible from the river at times of high flow. It should be ensured that this is maintained following renovation works that are proposed to bridge structures.

A number of smaller bridges and culverts do not currently have suitable access for Otter through them. It is recommended that these are installed with a ledge. As recommended in the Design Manual for Roads Bridges (Highways Agency 2001), any ledge should be at least 500mm wide and must be accessible from the bank by ramps. If this is not possible then an underpass should be installed above flood levels nearby, along with appropriate fencing. The following structures were identified during the course of the survey where a ledge is recommended:

- New culvert over Dean Burn at CH 3500
- Un-numbered culvert. (TN O7) CH 16500
- Willowburn culvert UB36 CH 16900
- Pirntation Burn TN O28 CH 29550
- UB82 Whitlee culvert CH 41450

In addition any additional new culverts should be constructed with a ledge. Larger box culverts are preferable to smaller circular culverts.

Residual Impact Significance: Low

7.4.5 Reduction in Foraging Availability or Quality
Working practices should be followed to minimise the risk of any pollution incidents. Care should be taken to ensure that sediments are not washed into the watercourses. Machinery should only be re-fuelled in a designated safe area away from the burns, ditches and Rivers. Reference should be made to Pollution
Prevention Guidelines issued by the Scottish Environmental Protection Agency (SEPA), particularly the following guidelines:

- PPG1: General guide to the prevention of water pollution.
- PPG5: Works in, near or liable to affect watercourses.
- PPG23: Maintenance of structures over water.

Residual Impact Significance: Low

7.5 Birds

7.5.1 Protected Species

It is currently uncertain whether mitigation is required for birds with enhanced statutory protection. Confirmation is required, by undertaking species specific surveys, to determine whether Kingfisher *Alcedo atthis* and Barn Owl *Tyto alba* are present in areas affected by the proposals. Details of areas and methods for further survey are given in Section 8.5. If a breeding/roosting site is identified, a licence would be required from SNH for disturbance to or destruction of the breeding/roosting site.

Residual Impact Significance: Unknown

7.5.2 Loss of Breeding Habitat

The direct loss of breeding bird habitat is unavoidable given the required engineering works to re-instate the rail line. In order to restrict the loss of habitats it is important that the following practices are instigated:

- Vegetation clearance is kept to a minimum, and in particular the felling of trees is limited.
- Indirect loss and/or damage to bird habitats should be avoided by ensuring the working areas are defined using appropriate fencing (e.g. plastic barrier fence).

Opportunities for the creation of bird habitat should be maximised in the development of the landscaping strategy for the project, as this potentially is the one of the most significant factors in reducing the residual impact significance of the proposals. This is considered to be particularly important in areas of newly created rail line, where for example opportunities for planting new boundary features (i.e. hedgerows) would compensate for the loss of scrub habitats. All tree/shrub planting for wildlife should utilise native species appropriate to the region.

Residual Impact Significance: Potentially Low

7.5.3 Timing of Works

*The Wildlife and Countryside Act* 1981 (as amended) provides general protection to any wild bird and their nest and eggs. In order to comply with this legislation, there should be a restriction on the timing of any site clearance works, particularly for areas of scrub, trees and other semi-natural vegetation, and any demolition or works to buildings or bridges. Site clearance works should take place outwith the main
breeding bird season, i.e., 1 April – 31 July (inclusive), although it should be noted that some birds may start to nest earlier in the season. Should these works be undertaken during the bird breeding season, the area(s) should be checked by an Ecologist prior to the start of works. If any nesting birds are found, then works must be delayed until breeding has finished.

**Residual Impact Significance: Low**

### 7.6 Reptiles

32 potential reptile sites will be lost entirely and 21 sites will be partially destroyed by the development proposals. The impact of these habitat losses on reptile diversity and abundance cannot be assessed without further survey to ascertain the importance of the sites to reptiles. Given that a suspected sighting of a Common Lizard was made, a record of an Adder attack near the site was reported and areas of highly suitable reptile habitat were identified during the preliminary walkover, it is recommended that a Phase II survey should be implemented to confirm presence/absence of reptile populations. Recommendations for the scope and methods of the proposed reptile survey are provided in Section 8 Recommended Further Survey.

However, the impact of the development to reptiles is potentially high and mitigation measures are likely to be required. The reptile species concerned are Common Lizard, Slow-worm and Adder. These are afforded protection under the *Wildlife and Countryside Act* 1981, where it is the animals themselves which are protected, not their habitat. Site threats, such as development proposals, need to consider this protection. Therefore, should significant reptile populations be identified within a site where a legitimate development is permitted, animals will often need to be translocated. Then consideration will have to be given to initiating a reptile translocation program prior to construction works.

#### 7.6.1 Reptile Translocation

When considering translocation there are certain constraints. The law requires reasonable effort to be made to safeguard the animals (i.e. reasonable capture effort), and there is a requirement to find suitable and adequate places for their release. Best practice guidelines from the *Herpetofauna Workers’ Manual* (Gent and Gibson 1998) and *Evaluating Local Mitigation/Translocation Programmes: Maintaining Best Practice and Lawful Standard* (HGBI 1998) have been referred to in providing the following recommendations:

**Stage 1**: A Phase I Survey, identifying potentially suitable reptile habitat has been undertaken. Therefore, Stage 1 should involve a Phase II survey to confirm presence/absence of reptile populations of all ‘excellent sites’. If reptiles are confirmed the survey should extend to also include ‘good sites’.

**Stage 2**: If it is found that there will be a significant impact on reptiles from the development then suitable mitigation for the destruction of the habitat should be put in place.
On-site conservation is favoured over off-site solutions. Therefore suitable quantity and quality of habitat should be retained or provided within the development. Sufficient habitat should be set aside to allow a viable population to persist. If there is insufficient habitat in situ to accommodate the whole population on site then other options should be considered.

Suitable receptor sites should ideally:

- be local and as close as possible to the donor site,
- not currently support (for known reasons) a population of the species to be translocated, but be capable of supporting them given suitable remedial work. If a very small non-viable population is to be moved then the receptor site should have a small extant population to augment numbers,
- not subject to planning or other threats,
- be subject to written, agreed and funded pre- and post-translocation management agreement,
- be subject to written, agreed and funded pre- and post-translocation monitoring programme.

**Stage 3:** The translocation. Sufficient time should be allowed for the capture of animals. Reptiles are relatively hard to catch and often the translocation may need to extend over several seasons to ensure that the whole population is gathered. The most effective method is a combination of tinning, refugia searches, pitfall traps, hand catching and destructive searches. This should ideally be undertaken between late April and late June, and again between late August and late September, in suitable weather. The intensity of trapping is dictated by the size of population as revealed by the Phase II survey in Stage 1. Drift fences may be required to enclose/exclose mitigation areas during the course of the translocation and subsequent development.

**Stage 4:** Post translocation habitat management and reptile monitoring programme should be followed for at least 5 years.

South facing railway embankments/cutting slopes provide ideal opportunities for the creation of reptile habitat. Agreement with the railway operators should be secured to encourage the development of suitable rough habitats and their subsequent management for reptiles following completion of the development. Thus reptile populations within mitigation areas would be able to colonise and expand along the railway line providing excellent connectivity between populations and the wider countryside.

**Residual Impact Significance: Potentially Low**

**7.7 Bats**

It is not possible to recommend specific mitigation measures for Bats as no detailed survey has been undertaken to date. The following gives an indication of predicted generalised mitigation measures.
7.7.1 Loss of Roost sites

Any site that has been identified as having excellent or good potential as a roost site should be thoroughly surveyed prior to any works being undertaken to the area. This includes buildings, bridges, culverts and mature trees. Recommendations for further survey are made in Section 8 Recommended Further Survey.

Re-pointing of Existing Bridges/Culverts, Demolition of Existing Bridge Structures and Buildings

Potentially suitable structures should be thoroughly surveyed prior to works as described in Section 8: Recommended Further Survey.

Any crevices or structures identified as bats roosts should be maintained where possible and the infilling of crevices minimised. If roost sites will be lost a licensed exclusion would be necessary along with suitable mitigation. A licence would be required from the Scottish Executive Environment and Rural Affairs Department (SEERAD) for disturbance to a European Protected Species as described in Section 7.4.1.

The likely method of exclusion would involve the placement of a one-way device over the entrance/exit hole which will be left in place for several weeks. There would be restrictions to the timings when this work can be carried out. It is likely that exclusion would not be licensed during the hibernation (November to March inclusive) or breeding seasons (June to August inclusive).

Loss of Mature Trees

Wherever possible, in accordance with NPPG 14, trees should be retained. Should any bats be found during any tree felling, work should stop immediately and SNH and SEERAD must be consulted. The safest period for tree felling is outside the hibernation season and the nursery season (when pregnant mothers or non-flying Bats may occupy the roosts) i.e. between April-May and September–October. Felling between September and October would also avoid potential problems with any nesting birds. It is recommended that a precautionary approach is taken during the felling of any mature trees, given the likely presence of these European protected species on many areas of site. A licensed bat worker should check any suitable trees prior to felling and oversee the felling.

Creation of Artificial Roost Sites

Provision of artificial roost sites is recommended to compensate for the loss of potential/actual roosting sites. Any new bridges could be designed to incorporate suitable crevices. For example Daubenton’s bats will use a variety of crevices 13-70mm wide and 300 – 500m deep. These could be created between small gaps in concrete joints, brickwork or similar. Ideally these should be incorporated into the Bridge Spans, as this is where most Bat roosts are generally found (Billington and Norman 1997). Alternatively they should be sited as high as possible in the abutment walls.

There are a number of potential designs for artificial roost sites within both new and existing bridges and other structures. Reference should be made to The Bat Workers Manual (Mitchell-Jones and Mcleish 1999) for potential designs. It is
recommended that a Bat specialist has an input into new bridge design and repair to allow incorporation of potential bat roosts into structures.

In addition suitable boxes could be erected in suitable locations on the bridges and other structures. These will not provide the same thermal capacity and micro-climate conditions that could be found deep inside a bridge. However they could still provide important roosting sites and may be used for night roosts and by male or non-breeding female Bats outwith the hibernation season. Schwegler ‘woodcrete’ Bat boxes are recommended. These have very good thermal insulation properties and provide the stable temperature required by Bats. The 1FF design is rectangular in shape and makes it suitable for attaching to the sides of Bridges. It has a narrow crevice like internal space, making it suitable for Daubenton’s and Pipistrelle Bats. The 1FF box does not require any cleaning, as the droppings fall out of the bottom. One supplier of these boxes in the UK is Alana Ecology (Tel. 01588 630173) and they currently cost £34.95 + p&p per box.

Installation should be undertaken by a Bat specialist to ensure their correct positioning. It is recommended that any Bat boxes that are installed are monitored at least annually to assess their effectiveness. If there have not been used after three years they may require repositioning. Once Bats have been found in a box, the boxes should not be disturbed again unless by a licensed Bat worker.

7.7.2 Loss of Foraging Areas and Commuting Routes

The removal of trees, scrub and vegetation should be kept to the minimum to allow a safe corridor along the rail line. Opportunities for the creation of potential bat foraging habitat should be maximised in the development of the landscaping strategy for the project. Habitat of particular importance for Bats includes wetlands, woodland, grassland and linear habitats (JNCC 2001).

7.8 Ecological Watching Brief

It is recommended that an Ecological Clerk of Works is closely involved during the planning phase, throughout the construction phase and during any restoration/habitat creation phases.

7.8.1 Scope of Responsibilities

The following provides a summary of the responsibilities of the Ecological Clerk of Works:

Legislation and Regulations: The Ecological Clerk of Works will advise Contractors on the following environmental legislation and regulations:

1. Wildlife & Countryside Act, 1981 (as amended)
2. Protection of Badgers Act, 1992
3. The Conservation (Natural Habitats & C.) Regulations, 1994

Appraisal of Detailed Plans: The Ecological Clerk of Works should assess plans and make detailed recommendations to minimise impacts on the ecological resource.

Appraisal of Method Statements: Contractors should be required to provide Method Statements for approval two weeks prior to commencement of works. The
Ecological Clerk of Works should appraise all Method Statements with regard to ecological impacts and to advise on alterations to comply with legislative requirements, and to maintain best practice working methods.

**Potentially Damaging Operations:** All operations potentially damaging to the ecology of the site should be assessed and reported by the Ecological Clerk of Works.

**Quality Assurance:** Environmental management works should be supervised by the Ecological Clerk of Works, and will be approved following completion.

**Setting-out:** The boundaries of any buffer zones should be set-out by the Ecological Clerk of Works before site preparation and construction commences.

**Make Good Damage:** Any ecological damage caused by the Contractor should be made good and completed to the satisfaction of the Ecological Clerk of Works.

**Progress Meetings:** The Ecological Clerk of Works should attend all Site Progress Meetings as required, and report on ecological issues to the Project Team.

**Restoration/Habitat Creation:** The Ecological Clerk of Works should provide recommendations for all restoration and habitat creation works.
8 RECOMMENDED FURTHER STUDY

Consultation with the SNH, Scottish Borders Council (SBC) and Midlothian Council (MC) have recommended the following further studies. These have been listed in the recommendations below. However, following the survey work undertaken to date these recommendations have been modified in some cases where it is considered that either more or less further survey work is required.

8.1 Designated Sites

Consultation with the SNH, SBC and MC have recommended the following further studies. The Environmental Impact Assessment will be required to provide survey information for testing the significance of effect of the proposals upon the River Tweed cSAC in order to undertake an appropriate assessment. The River Tweed SSSI is a possible candidate for inclusion within the extension to the Tweed cSAC. Specific survey and evaluation methods for assessment of the riparian habitats and aquatic nature conservation value are required. Detailed discussion is required with SNH to agree the scope of the study and methods of undertaking such an appropriate assessment.

8.2 Phase I Habitat Survey

Consultation with the SNH, SBC and MC included recommendations that the rail corridor considered should be extended to include 500 m either side of the rail line in order to allow contexting of habitats and assessment of impacts. However, we do not consider that a Phase 1 corridor of 500 m along the entire length of the line is necessary. A wider corridor such as this would allow a better appraisal of the landscape impact of the line. However, this is outwith the remit of the EcIA. Survey is recommended in areas where access was denied.

8.3 Flora

Further survey is required to confirm the presence/absence of the notable species listed in Section 6.2:

8.3.1 Fieldwork Methods

Survey should involve a thorough search for the relevant notable species in areas of proposed workings where these coincide with the locations of notable species.

8.3.2 Timing

Surveys for the above notable plant species should occur in the period late Spring to mid Summer.

8.4 Otter

Consultation with the SNH, SBC and MC have recommended that the rail corridor considered should be extended to include 500 m either side of the rail line in order to allow a comprehensive survey and assessment of impacts. However, this wider
corridor is not considered necessary. A good indication of Otter activity levels has already been obtained for the Study Site. It is considered that further survey would be more beneficial in areas of potential impact. Additional detailed survey is recommended in a number of potential sensitive at the following chainages. These are predominately areas where protection works will be undertaken to the banks of the Gala Water. Otter have been identified as present on the Gala Water. In addition, further survey is recommended at least 6 months prior to the start of the development to check for an Otter holts or lying up sites within 50 m of where works are being undertaken to all bridges over water courses or where a drainage outfall is being installed in an areas where the presence of Otter has been confirmed. This includes the following chainages:

22750 to 22900
23200 to 23550
24300 to 24600
25500 to 25750
29300 to 29400
31200 to 31300
31600 to 31750
32250 to 32450
33700 to 34000
34150 to 34350
35650 to 36100
39200 to 39375.
40000 to 40600
41270 to 41400
42150 to 42352
44900 to 45000

8.4.1 Timings
The survey should be undertaken in the winter months to avoid problems with dense vegetation and when the watercourses are not in spate.

8.5 Birds
No additional recommendations were provided regarding the scope, methodology and timings of the Bird Surveys during the consultation process.

Following the initial bird survey work, further species-specific bird survey is recommended to determine whether the following protected species are present in areas affected by the proposals:

1. Kingfisher *Alcedo atthis* – all sections of the Gala Water in close proximity to the rail line (Chainage 28150 – 29550) should be checked for the presence of breeding sites. The survey should be completed during the period May – July (inclusive).

1. Barn Owl *Tyto alba* – all bridges, viaducts, derelict buildings and other structures within the rail corridor should be checked for the presence of breeding and roosting sites. The survey should be completed, ideally in late afternoon, during
the period 1 June – 16 July (inclusive), utilising the methodology listed in Gilbert et al. (1998).

8.6 Reptiles
Following the initial survey work, it is recommended that a detailed reptile survey is undertaken to confirm their presence/absence and to determine the requirement (if any) for mitigation. Potential receptor sites for any future translocation that may be required should also be identified and their reptile populations assessed at this time in order to evaluate future options.

8.6.1 Fieldwork Methods
A description of a standard tinning survey is fully outlined in the *Herpetofauna Workers’ Manual* (Gent and Gibson 1998). In brief, the technique is used to establish the presence or absence of reptiles within a given site. The method involves placing artificial refugia, typically in the form of corrugated tins, roofing felt, wood or black plastic (measuring either 0.5m x 1m or 0.5m x 0.5m) on the ground in areas of suitable reptile habitat. These are then checked at specific times of the day by a trained herpetologist. Tins are required to be put in place approximately 10-15 days prior to the start of monitoring, i.e. in mid-March.

Tinning density, i.e. the number of tins deployed per area, should be approximately 5-10 tins per hectare. The tins provide shelter and heat up quicker than the natural surroundings in the morning and remain warmer than the natural surroundings in the late afternoon/early evening. Reptiles being cold blooded, use the tins to accelerate the raising of their body temperature in the morning and to maintain their body temperature for longer in afternoon/early evening. By checking the tins in the morning (0900 and 1100) and/or afternoon/early evening (1600 and 1900) on suitable sunny warm days, a reptile population that may be present within a site can be identified. Monitoring should take place a minimum of five separate days for each site.

Three possible survey approaches using the Tinning Survey Method are outlined below. The difference between the three tinning options is in terms of cost and time. Option 1 is the least expensive. In comparison, Option 3 is the most expensive but is nevertheless the most thorough method available. If reptile species are identified as part of any of the three tinning options, the next stage in the process would be to consider further more detailed tinning to identify reptile population size within each area identified. Ultimately, should reptiles be identified within a site, consideration is going to have to be given on initiating a reptile translocation program prior to construction works.

**Option 1: Basic Tinning Study**
All areas identified as being of excellent habitat suitability and affected by the development (n=11) in the preliminary survey will be subjected to an intensive tinning exercise to establish the presence or absence of reptiles.

**Option 2: Cascade Tinning Study**
All areas identified as being of excellent habitat suitability and affected by the development (n=11) in the preliminary survey will be subjected to an intensive tinning exercise to establish the presence or absence of reptiles.

Should a population of reptile species be identified within these areas, then those areas identified by the preliminary survey as being of good habitat suitability and affected by the development (n=42) in the preliminary survey should then be subjected to an intensive tinning exercise.

**Option 3: Advanced Tinning Study**

All areas identified as being excellent habitat suitability and good habitat suitability and affected by the development (n=53) in the preliminary survey should be subjected to an intensive tinning exercise to establish the presence or absence of reptiles.

It is recommended that Option 2: Cascade Tinning Study represents the most pragmatic and cost effective approach to providing a comprehensive reptile appraisal.

### 8.7 Bats

Consultation with the SNH, SBC and MC have recommended that an investigation of any structure along the rail corridor should be undertaken to determine the presence/absence of Bat roosts.

Following initial survey work it is recommended that any structures identified as having excellent or good potential as roost sites should be thoroughly surveyed. Over 70 structures have been identified with bat roost potential that are to be affected by the development and this proposed survey is likely to be time consuming and could incur substantial costs.

### 8.8 Fieldwork Methods

Proposed survey methods have been adapted from guidelines in the Bat Workers’ Manual (Mitchell-Jones and McLeish 1999) and The Conservation of Bats in Bridges Project (Billington and Norman 1997).

#### 8.8.1 Timing

The ideal time of survey will depend on the identified suitability of the roost e.g. breeding, non-breeding or hibernation. It is recommended that at least two survey visits and ideally three visits are made to each potential site. Bats are highly mobile and will use a number of different roost sites throughout the year and the survey should aim to identify the seasons that bats use the sites.

Potential breeding sites (e.g. houses) should be surveyed in mid-summer (June-July inclusive).
Potential non-breeding sites (the majority of bridges etc.) should be surveyed in Spring (April-May inclusive) and Autumn (mid-August-mid October). These sites may also be used during the summer including as night-roosts, and therefore a third survey should be made between June and July.

Potential hibernation sites should be surveyed during the hibernation season (November – March inclusive) and ideally in January or February when external temperatures tend to be colder. It should be noted that the identified hibernation sites may also be used as non-breeding roosts at other times of year and therefore additional survey would be required as listed above.

8.8.2 Day Visit
All structures identified should be thoroughly surveyed during a day visit to search for any signs of bats (droppings, staining, audible sounds, feeding remains etc). As described in Section 8.8.2. survey may need to involve confined space entry, the need for scaffolding and in-stream work. Importantly the day visit will also allow surveyors to familiarise themselves with the site prior to night survey work.

Where crevices are identified that are to be in-filled or destroyed that cannot be viewed with the aid of a torch, use of a suitable Fibrescope should be made. Potential roost sites should be marked. This survey should be undertaken by a licensed bat worker. Although a licence is not required to survey any potential roost sites, if bats were found all work would have to be suspended until a licensed bat worker was present.

Further survey with the use of a fibrescope, is likely to be required immediately prior to works (e.g. in-filling of crevices) to check that no bats are present. Bats will move around roost sites throughout the year and the absence of a bat in initial survey work may not rule out its presence at a later date.

8.8.3 Night Survey
Survey should be undertaken during the peak activity time for Bats i.e. periods around dusk and dawn. Bats will often swarm around roosts at dawn before entering, aiding identification of sites.

Night-time surveys should be undertaken using ultra sound detectors and ideally both a heterodyne detector and time expansion or frequency division detector should be used. Recordings should be made from the latter and analysed on the computer to confirm identification.

At potential roost sites a watch should be made for either emerging or returning bats. Counts should be made at any identified or potential roosts. The watch may need to involve a number of surveyors to allow potential access points to be watched.

For foraging areas routes should be walked and timed stops made at points along the route. Recording should continue between stops. The number of Bat passes should be recorded for each species at each stop. A Bat pass is recorded as a flypass of a Bat and therefore although the number of passes recorded is likely to be greater than the number of Bats present it gives a good indication of activity and
allows different sites to be compared. Where possible details should also be taken of the activity of the Bat i.e. foraging or commuting and the direction of travel and time.

8.8.4 Health and Safety

There are a number of health and safety issues to be considered prior to undertaking the bat survey and full risk assessments must be completed prior to all survey. Some structures (e.g. Bowshank and Torwoodlee tunnel) and a number of long culverts survey should involve Confined Space Entry. A thorough survey of other structures (e.g. viaducts) may not be possible without the erection of scaffolding platforms. Liaison with SNH may be required to agree survey methods in light of the current rabies issue. At least two fieldworkers should undertake the survey to conform with safe working practices of working at night and in or near watercourses.

8.9 Other Fauna

8.9.1 Water Vole

Since areas of potential suitable habitat for Water Vole Arvicola terrestris, a species with enhanced statutory protection, were identified within the Study Site, it is recommended that these areas are surveyed.

8.9.1.1 Fieldwork Methods

The recognised methodology for the survey of Water Vole involves the field worker undertaking a thorough search for the following signs:

- Footprints,
- Run-ways in vegetation,
- Burrows,
- Lawns,
- Nests,
- Feeding stations,
- Faeces and latrines.

8.9.1.2 Timing and Limitations

The recognised survey period for Water Vole Arvicola terrestris is April to October (inclusive) when they actively mark their territories by latrines. Surveys performed outwith this period may miss evidence of Water Vole Arvicola terrestris. In addition, surveys performed when the watercourses are in spate may result in evidence not being detected due to destroyed or hidden signs.

8.9.2 Amphibians

Consultation with the SNH, SBC and MC have recommended that an amphibian appraisal, with particular emphasis on the potential presence of Great Crested Newt Triturus cristatus which is afforded enhanced statutory protection under the Wildlife and Countryside Act 1981 (as amended) and the Conservation (Natural Habitats, etc.) Regulations (1994), should be undertaken.
8.9.2.1 Fieldwork Methods

All water bodies identified as providing potential Amphibian breeding habitat should be assessed for Great Crested Newt *Triturus cristatus* and other amphibians during the day. The surrounding habitat should also be assessed for suitability for foraging and hibernation. In addition, this day survey allows for the most appropriate night survey method(s) to be decided.

If conditions at a water-body are judged to be suitable, it should be re-visited during the night and a torchlight count made. Torch counts should be made on 3 separate occasions. If conditions are not suitable for torchlight counts, funnel traps may be required.

Torchlight counts should be conducted between 30-90 minutes after dusk, and entail a count of all Amphibians of the accessible shoreline of each water-body. Each water-body should be worked progressively around whilst scanning with the light beam. The *Clulite* rechargeable 6 volt, 10 amp, 500000 candle power (model GL6) torch or similar should be used.

Each species of Amphibian should be recorded, and for each Newt this should entail defining species and sex (where possible). All counts should be undertaken in favourable weather conditions, i.e. mild, dry, calm nights.

8.9.2.2 Timing and Limitations

The recognised Amphibian survey time is between late February and early June (inclusive) when adult Amphibians are in the ponds. The timing of survey for Amphibians is crucial. At other times of year adults may be in terrestrial habitat and not in ponds, making a reliable survey impossible outwith the spring. Numbers of Frogs, Toads and Newts within water-bodies will peak at different times of the spring and depending on weather conditions, and 3 visits spread out during the spring will allow accurate counts to be made for each species.
REFERENCES


10 APPENDIX 1: TARGET NOTES

10.1 Phase 1 Target Notes

TN1: (GR NT32399, 68282) Mixed Plantation.
Closed canopy to 15m with Beech Fagus sylvatica, Sessile Oak Quercus petraea, Larch Larix sp., Norway Spruce Picea abies, Scots Pine Pinus sylvestris, Wild Cherry Prunus avium and Ash Fraxinus excelsior over a species-poor ground flora in deep shade with abundant Male Fern Dryopteris filix-mas and frequent Bramble Rubus fruticosus agg.

TN2: (GR NT 32336, 68238) Broad-leaved Woodland.
Narrow strip of early successional woodland along the plantation edge and over part of the old railway line. Open canopy to 15m dominated by Silver Birch Betula pendula with occasional to frequent Hawthorn Crataegus monogyna, Wych Elm Ulmus glabra, Ash Fraxinus excelsior and Sessile Oak Quercus petraea over a ruderal ground flora of Nettle Urtica dioica, Rosebay Willowherb Chamerion angustifolium and False Oat-grass Arrhenatherum elatius.

TN3: (GR NT 32298, 68212) Semi-improved Neutral Grassland.
Railway line now a grass track of abundant Common Bent Agrostis capillaris and Red Fescue Festuca rubra, with False Oat-grass Arrhenatherum elatius, Selfheal Prunella vulgaris and Strawberry Fragaria vesca.

TN4: (GR NT 32269, 68167) Broad-leaved Woodland.
Narrow strip of early successional woodland railway line edge with an open canopy to 15m dominated by Silver Birch Betula pendula with frequent Hawthorn Crataegus monogyna and Elder Sambucus nigra over a ruderal ground flora of Nettle Urtica dioica, Rosebay Willowherb Chamerion angustifolium and False Oat-grass Arrhenatherum elatius.

TN5: (GR NT 32175, 67758) Broad-leaved Woodland.
Mature woods with a closed canopy to 25m with abundant Sessile Oak Quercus petraea and frequent Ash Fraxinus excelsior, Sycamore Acer pseudoplatanus, Larch Larix sp., Holly Ilex aquifolium and Hawthorn Crataegus monogyna over a ground flora of abundant Dog’s Mercury Mercurialis perennis, Ivy Hedera helix and grass patches.

TN6: (GR NT 32131, 67763) Broad-leaved Woodland.
Small patch of early successional woodland on cutting slope with an open canopy of Sycamore Acer pseudoplatanus, Silver Birch Betula pendula and Hawthorn Crataegus monogyna over a ruderal ground flora dominated by Nettle Urtica dioica.

TN7: (GR NT 32212, 67539) Broad-leaved Woodland.
Maturing woods with a closed canopy to 20m on cutting slopes, with abundant Sessile Oak Quercus petraea, Silver Birch Betula pendula plus frequent Elder Sambucus nigra and Goat Willow Salix caprea over a ground flora of Nettle Urtica dioica, Bramble Rubus fruticosus agg., Ivy Hedera helix, Male Fern Dryopteris filix-mas and Rosebay Willowherb Chamerion angustifolium. The verges of the cycle path are dominated by Nettle Urtica dioica.

TN8: (GR NT 32328, 67208) Broad-leaved Plantation.
Mature closed canopy to 25m dominated by even-aged Beech Fagus sylvatica with abundant Sycamore Acer pseudoplatanus, Wych Elm Ulmus glabra, and frequent Ash Fraxinus excelsior over a ground flora dominated by Ivy Hedera helix, abundant Dog’s Mercury Mercurialis perennis, Nettle Urtica dioica, Male Fern Dryopteris filix-mas Raspberry Rubus idaeus and Wood Avens Geum urbanum.
TN9: (GR NT 32420, 67095) Broad-leaved Woodland.  
Mature woods on the steep slopes of the river valley with a closed canopy to 25m of abundant Sessile Oak *Quercus petraea*, Ash *Fraxinus excelsior*, Larch *Larix* sp., Sycamore *Acer pseudoplatanus* and Wych Elm *Ulmus glabra* over a sparse shrub layer of Hawthorn *Crataegus monogyna* and Goat Willow *Salix caprea* and a ground flora of abundant Ivy *Hedera helix* and Male Fern *Dryopteris filix-mas* plus frequent Herb Robert *Geranium robertianum* and Dog’s Mercury *Mercurialis perennis*.

TN10: (GR NT 32350, 67076) Broad-leaved Plantation.  
Mature even-aged plantation of abundant European Lime *Tilia x europaea* and Sycamore *Acer pseudoplatanus*, plus frequent Ash *Fraxinus excelsior* and Silver Birch *Betula pendula* over a ground flora of frequent Male Fern *Dryopteris filix-mas*, Herb Robert *Geranium robertianum*, Ivy *Hedera helix* and Wood Avens *Geum urbanum*.

TN11: (GR NT 32369, 67068) Broad-leaved Woodland.  
Small patch of early successional woodland on old railway line with open canopy of Silver Birch *Betula pendula* and Goat Willow *Salix caprea* over Ivy *Hedera helix* and Nettle *Urtica dioica*.

TN12: (GRNT 32345, 66981) Poor Semi-improved Grassland.  
Ex-industrial area with a sparse sward of Common Bent *Agrostis capillaris*, White Clover *Trifolium repens*, Creeping Thistle *Cirsium arvense*, Hop Trefoil *Trifolium campestre*, Dove’s-foot Crane’s-bill *Geranium molle* plus occasional Teasel *Dipsacus fullonum* and Great Mullein *Verbascum thapsus*.

TN13: (GRNT 32331, 66885) Semi-improved Neutral Grassland.  

TN14: (GR NT 32355, 66603) Broad-leaved Woodland.  
Narrow strips of immature secondary woods on cutting slopes with a low closed canopy to 15m of Sycamore *Acer pseudoplatanus* and Silver Birch *Betula pendula* over a species-poor ground flora of Ivy *Hedera helix*, Nettle *Urtica dioica*, Rosebay Willowherb *Chamerion angustifolium* and Bramle *Rubus fruticosus* agg.

TN15: (GR NT 32356, 66104) Semi-improved Neutral Grassland.  
Unmanaged grassland dominated by False Oat-grass *Arrhenatherum elatius* with abundant Cock’s-foot *Dactylis glomerata* and Common Bent *Agrostis capillaris*, plus frequent Red Clover *Trifolium pratense* and Ribwort Plantain *Plantago lanceolata*.

TN16: (GR NT 32345, 65839) Semi-improved Neutral Grassland.  

TN17: (GR NT 32366, 65782) Broad-leaved Plantation.  
Newly planted broad-leaved mix over grassland of TN 16.
TN18: (GR NT 32347, 65415) Broad-leaved Plantation. Recent planting over species-poor False Oat-grass *Arrhenatherum elatius* grassland.

TN19: (GR NT 32378, 65415) Broad-leaved Plantation. Mature even-aged canopy to 25m of Beech *Fagus sylvatica*, Sessile Oak *Quercus petraea*, European Lime *Tilia x europaea*, Ash *Fraxinus excelsior* and Wych Elm *Ulmus glabra* over a shrub layer of sparse Hawthorn *Crataegus monogyna* and a ground flora dominated by False Brome *Brachypodium sylvaticum* with abundant Ivy *Hedera helix* and frequent Bramble *Rubus fruticosus* agg., Wood Avens *Geum urbanum* and occasional Woodruff *Galium odoratum*.


TN23: (GR NT 32396, 65231) Broad-leaved Woodland. Secondary wood with a close canopy to 15m dominated by Sycamore *Acer pseudoplatanus* with frequent Ash *Fraxinus excelsior* and occasional Wych Elm *Ulmus glabra*, Sessile Oak *Quercus petraea*, Goat Willow *Salix caprea*, Scots Pine *Pinus sylvestris* and Larch *Larix* sp. over Ivy *Hedera helix* and Bramble *Rubus fruticosus* agg.

TN24: (GR NT 32526, 64997) Broad-leaved Woodland. Secondary wood with a close canopy to 15m dominated by Sycamore *Acer pseudoplatanus* with frequent Ash *Fraxinus excelsior* and occasional Wych Elm *Ulmus glabra*, Sessile Oak *Quercus petraea* and Goat Willow *Salix caprea* over Ivy *Hedera helix* and Bramble *Rubus fruticosus* agg.
TN25: (GR NT 32861, 64754) Broad-leaved Woodland.  
Secondary wood with a close canopy to 15m with abundant Sycamore Acer pseudoplatanus, Silver Birch Betula pendula, Goat Willow Salix caprea, frequent Ash Fraxinus excelsior and occasional Beech Fagus sylvatica over frequent Hawthorn Crataegus monogyna and a ground flora of Ivy Hedera helix, Nettle Urtica dioica, Male Fern Dryopteris filix-mas.

TN26: (GR NT 32951, 64695) Broad-leaved Woodland.  
Scrubby secondary wood with an open canopy to 8m dominated by Goat Willow Salix caprea with frequent Sycamore Acer pseudoplatanus plus occasional Ash Fraxinus excelsior, Sessile Oak Quercus petraea and Silver Birch Betula pendula over frequent Hawthorn Crataegus monogyna, Dog Rose Rosa canina, Bramble Rubus fruticosus agg., Rosebay Willowherb Chamerion angustifolium, Male Fern Dryopteris filix-mas, False Brome Brachypodium sylvaticum, Ivy Hedera helix, Nettle Urtica dioica, Thistle Cirsium arvense and Common Hogweed Heracleum sphondylium.

TN27: (GR NT 32888, 64704) Broad-leaved Woodland.  
Scrubby secondary wood with an open canopy to 8m dominated by Goat Willow Salix caprea with frequent Sycamore Acer pseudoplatanus plus occasional Ash Fraxinus excelsior, Sessile Oak Quercus petraea and Silver Birch Betula pendula over frequent Hawthorn Crataegus monogyna, Dog Rose Rosa canina, Bramble Rubus fruticosus agg., Rosebay Willowherb Chamerion angustifolium, Male Fern Dryopteris filix-mas, False Brome Brachypodium sylvaticum, Ivy Hedera helix, Nettle Urtica dioica, Thistle Cirsium arvense and Common Hogweed Heracleum sphondylium.

TN28: (GR NT 32919, 64698) Semi-improved Neutral Grassland.  
Open sward over basic slag of railway line, with abundant Red Fescue Festuca rubra, Selfheal Prunella vulgaris, Common Bent Agrostis capillaris, frequent Lesser Trefoil Trifolium dubium, Perforate St. John’s-wort Hypericum perforatum, Black Knapweed Centaurea nigra, Ribwort Plantain Plantago lanceolata, White Clover Trifolium repens, Creeping Buttercup Ranunculus repens, Ragwort Senecio jacobaea, Weld Reseda luteola, Field Forget-me-not Myosotis arvensis and Great Mullein Verbascum thapsus. Giant Hogweed Heracleum mantegazzianum is occasional along the edge of the woodland.

TN29: (GR NT 33173, 64391) Broad-leaved Plantation.  
Recent plantation over species-poor grassland.

TN30: (GR NT 33168, 64355) Poor Semi-improved Grassland.  
Species-poor trampled open sward of Common Bent Agrostis capillaris over old railway ballast.

TN31: (GR NT 33126, 64135) Broad-leaved Plantation.  
Recent plantation over species-poor grassland.

TN32: (GR NT 33115, 64061) Broad-leaved Plantation.  
Recent plantation over species-poor grassland.

TN33: (GR NT 33084, 64128) Amenity Grass.  
Newly seeded species-poor grassland.

TN34: (GR NT 33215, 63954) Broad-leaved Plantation.  
Recent plantation over species-poor grassland.

TN35: (GR NT 33199, 63927) Ephemeral/Short perennial.

TN36: (GR NT 33122, 63858) Broad-leaved Plantation. Recent plantation over species-poor grassland.

TN37: (GR NT 33209, 63654) Ruderal Vegetation. Rank vegetation dominated by Rosebay Willowherb *Chamerion angustifolium* with Nettle *Urtica dioica* and Thistle *Cirsium arvense* along whole section of line. Scattered scrub of Hawthorn *Crataegus monogyna*, Goat Willow *Salix caprea*, Bramble *Rubus fruticosus* agg. and Elder *Sambucus nigra*. Small scrubby patches of broad-leaved plantation with Silver Birch *Betula pendula*, Beech *Fagus sylvatica* and Wych Elm *Ulmus glabra* scattered along edge of line.


TN39: (GR NT 33223, 63089) Broad-leaved Woodland. Scrubby secondary wood with an open canopy to 10m dominated by Goat Willow *Salix caprea* with abundant Silver Birch *Betula pendula*, frequent Elder *Sambucus nigra*, Hawthorn *Crataegus monogyna* and Dog Rose *Rosa canina* agg. The ground flora is dominated by Nettle *Urtica dioica* with abundant Cleavers *Galium aparine* and frequent Herb Robert *Geranium robertianum*, Field Forget-me-not *Myosotis arvensis* and Common Hogweed *Heracleum sphondylium*.


TN42: (GR NT 33228, 62844) Broad-leaved Woodland. Immature secondary woodland to 10-15m of Silver Birch *Betula pendula* with frequent Goat Willow *Salix caprea* and Hawthorn *Crataegus monogyna* and occasional Ash *Fraxinus excelsior* over abundant Rosebay Willowherb *Chamerion angustifolium* and Nettle *Urtica dioica*, plus occasional Sweet Cicely *Myrrhis odorata*, Meadow Crane’s-bill *Geranium pratense* and Hedge Woundwort *Stachys sylvatica*.

TN43: (GR NT 33223, 62679) Ruderal Vegetation. Damp rank vegetation of Nettle *Urtica dioica* and Great Willowherb *Epilobium hirsutum* and Sweet Cicely *Myrrhis odorata* with scattered Goat Willow *Salix caprea* and Hawthorn *Crataegus monogyna*.

TN44: (GR NT 33228, 62471) Broad-leaved Woodland.
Open scratchy woods with abundant Silver Birch Betula pendula and Sycamore Acer pseudoplatanus, frequent Sessile Oak Quercus petraea, Goat Willow Salix caprea, Hawthorn Crataegus monogyna, Elder Sambucus nigra, Dog Rose Rosa canina agg., Bramble Rubus fruticosus agg and occasional Ash Fraxinus excelsior. The ground flora has abundant Rough Meadow-grass Poa trivialis, Nettle Urtica dioica, Cleavers Galium aparine and Rosebay Willowherb Chamerion angustifolium, frequent Buttercup Ranunculus repens, Barren Strawberry Potentilla sterilis, plus occasional Enchanter’s-nightshade Circaea lutetiana, Germander Speedwell Veronica chamaedrys, Strawberry Fragaria vesca, Black Knapweed Centaurea nigra and Crosswort Cruciata laevipes.

TN45: (GR NT 33266, 62233) Broad-leaved Woodland. Immature secondary woods with a closed canopy to 15m of abundant Silver Birch Betula pendula, Wych Elm Ulmus glabra, Hawthorn Crataegus monogyna and frequent Sycamore Acer pseudoplatanus over a ruderal ground flora dominated by Nettle Urtica dioica.


V3: 8/04/03

natural resource consultancy
officinarum, Common Centaury Centaurium erythraea and Heath Wood-rush Luzula multiflora.


TN51: (GR NT 33594, 61548) Broad-leaved Woodland. Closed canopy to 25m on a steep slope dominated by Sycamore Acer pseudoplatanus with frequent Ash Fraxinus excelsior, Wych Elm Ulmus glabra and Wild Cherry Prunus avium, and a ground flora dominated by Dog’s Mercury Mercurialis perennis, frequent Male Fern Dryopteris filix-mas, Enchanter’s-nightshade Circaea lutetiana, Nettle Urtica dioica, Cleavers Galium aparine, Gooseberry Ribes uva-crispa, False Brome Brachypodium sylvaticum and Wood Meadow-grass Poa nemoralis.

TN52: (GR 33772, 61391) Broad-leaved Woodland. Closed canopy to 25m on a steep slope dominated by Sycamore Acer pseudoplatanus with frequent Ash Fraxinus excelsior, Wych Elm Ulmus glabra and Wild Cherry Prunus avium, and a ground flora dominated by Dog’s Mercury Mercurialis perennis, frequent Male Fern Dryopteris filix-mas, Enchanter’s-nightshade Circaea lutetiana, Nettle Urtica dioica, Cleavers Galium aparine, Gooseberry Ribes uva-crispa, False Brome Brachypodium sylvaticum and Wood Meadow-grass Poa nemoralis.

TN53: (GR NT 33815, 61481) Broad-leaved Woodland. Immature secondary woodland with a 10m canopy dominated by Silver Birch Betula pendula and frequent Alder Alnus glutinosa over a species-poor ground flora of Common Bent Agrostis capillaris, False Brome Brachypodium sylvaticum and Yorkshire Fog Holcus lanatus.

TN54: (GR NT 33905, 61406) Scrub. Dense scrub of Broom Cytisus scoparius, Dog Rose Rosa canina and saplings of Silver Birch Betula pendula, Ash Fraxinus excelsior and Alder Alnus glutinosa.

TN55: (GR NT 33967, 61379) Semi-improved Neutral Grassland. Species-poor grassland dominated by False Oat-grass Arrhenatherum elatius.

TN56: (GR NT 34019, 61359) Scrub. Dense scrub dominated by Broom Cytisus scoparius with frequent Dog Rose Rosa canina, Hawthorn Crataegus monogyna, Osier Salix viminalis, Goat Willow Salix caprea and Bramble Rubus fruticosus agg. over ruderal herbs.

TN57: (GR NT 34278, 61342) Semi-improved Neutral Grassland. Species-poor grassland dominated by False Oat-grass Arrhenatherum elatius.

TN59: (GR NT34825, 61034) Ruderal Vegetation. Dominated by Rosebay Willowherb Chamerion angustifolium with frequent Common Hogweed Heracleum sphondylium Black Knapweed Centaurea nigra and Creeping Buttercup Ranunculus repens, plus scattered Hawthorn Crataegus monogyna, Dog Rose Rosa canina and Ash Fraxinus excelsior saplings.


TN61: (GR NT 34965, 60794)Introduced Shrub. A dense stand of Snowberry Symphoricarpos albus.


TN63: (GR NT 35161, 60491) Ruderal vegetation. Dense Rosebay Willowherb Chamerion angustifolium and Nettle Urtica dioica.

TN64: (GR NT 35218, 60393) Broad-leaved Woodland. Secondary wood on cutting slopes with abundant Sycamore Acer pseudoplatanus, Wych Elm Ulmus glabra and Elder Sambucus nigra over dense Rosebay Willowherb Chamerion angustifolium and Nettle Urtica dioica.

TN65: (GR NT 35324, 60219) Unimproved Neutral Grassland. Unmanaged species-rich sward dominated by Red Fescue Festuca rubra with abundant Yorkshire Fog Holcus lanatus, Lesser Trefoil Trifolium dubium, frequent Common Bent Agrostis capillaris, Yellow Oat-grass Trisetum flavescens, Perforate St. John’s-wort Hypericum perforatum, Black Knapweed Centaurea nigra, Yarrow Achillea millefolium, Cock’s-foot Dactylis glomerata, False Oat-grass Arrhenatherum elatius, Sweet Vernal Grass Anthoxanthum odoratum, Hop Trefoil Trifolium campestre, Coltsfoot Tussilago farfara, Strawberry Fragaria vesca, White Clover Trifolium repens, occasional Ribwort Plantain Plantago lanceolata, Ragwort Senecio jacobaea, Eyebright Euphrasia sp., Crested Dog’s-tail Cynosurus cristatus, Field Forget-me-not Myosotis arvensis, Red Clover Trifolium pratense, Common Hogweed Heracleum sphondylium, Common Spotted Orchid Dactylorhiza fuchsii and Mouse-ear Hawkweed Pilosella officinarum. Two scarce peas occur here having been introduced with grain brought to an adjacent granary, these are Broad-leaved Everlasting-pea Lathyrus latifolius and Fodder Vetch Vicia villosa.

TN66: (GR NT 35382, 60134) Semi-improved Neutral Grassland. Rank grass dominated by False Oat-grass Arrhenatherum elatius with Red Fescue Festuca rubra and Black Knapweed Centaurea nigra.

TN67: (GR NT 35458, 60042) Broad-leaved Woodland. Secondary wood on cutting slopes with abundant Ash Fraxinus excelsior and Wych Elm Ulmus glabra plus Sycamore Acer pseudoplatanus and Goat Willow Salix caprea, Hawthorn Crataegus monogyna and Broom Cytisus scoparius over False Oat-grass Arrhenatherum

V3: 8/04/03
elatius, Rosebay Willowherb Chamerion angustifolium, Nettle Urtica dioica, Black Knapweed Centaurea nigra, Sweet Cicely Myrrhis odorata and Common Hogweed Heracleum sphondylium.

TN68: (GR NT 35555, 59946) Ruderal Vegetation.
Nettle Urtica dioica dominates with abundant Rosebay Willowherb Chamerion angustifolium, frequent Black Knapweed Centaurea nigra and Sweet Cicely Myrrhis odorata and occasional Monkshood Aconitum napellus.

TN69: (GR NT 35702, 59842) Improved Pasture.
Species-poor pasture extends from adjacent fields across the line.

TN70: (GR NT 35800, 59790) Scrub.
Hawthorn Crataegus monogyna dominates with scattered Sycamore Acer pseudoplatanus and Ash Fraxinus excelsior over Nettle Urtica dioica.

TN71: (GR NT 35999, 59764) Broad-leaved Woodland.
Secondary wood on cutting slopes with abundant Ash Fraxinus excelsior and Hawthorn Crataegus monogyna over Nettle Urtica dioica.

TN72: (GR NT 36038, 59784) Improved Pasture.
Species-poor pasture extends from the adjacent field across the line with scattered Hawthorn Crataegus monogyna on the cutting slopes.

TN73: (GR NT 36380, 59955) Semi-improved Neutral Grassland.

TN74: (GR NT 36573, 60155) Poor Semi-improved Grassland.

TN75: (GR NT 37033, 60259) Semi-improved Neutral Grassland.
The line itself is dominated by Red Fescue Festuca rubra with abundant Black Knapweed Centaurea nigra, Lesser Trefoil Trifolium dubium, frequent Common Bird's-foot Trefoil Lotus corniculatus, White Clover Trifolium repens, Ribwort Plantain Plantago lanceolata, Germander Speedwell Veronica chamaedrys, Eyebright Euphrasia sp., Crosswort Cruciata laevipes and Yorkshire Fog Holcus lanatus, occasional Red Clover Trifolium pratense and Yarrow Achillea millefolium. The embankment slopes have a rank False Oat-grass Arrhenatherum elatius dominated sward with frequent Nettle Urtica dioica, Thistle Cirsium arvense, occasional Bladder Campion Silene vulgaris and rare Viper's-bugloss Echium vulgare.

TN76: (GR NT 37281, 60171) Ruderal vegetation.
Dominated by Rosebay Willowherb Chamerion angustifolium with abundant Nettle Urtica dioica, Thistle Cirsium arvense, frequent Oxeye Daisy Leucanthemum vulgare, occasional Weld Reseda luteola, Bladder Campion Silene vulgaris, rare Viper's-bugloss Echium vulgare.

TN77: (GR NT 37386, 60142) Semi-improved Neutral Grassland.
Species-poor unmanaged sward over a corner of a pasture field and across the line dominated by Cock’s-foot *Dactylis glomerata* with abundant Yorkshire Fog *Holcus lanatus*, Red Fescue *Festuca rubra* and Nettle *Urtica dioica*.

TN78: (GR NT 37636, 59998) Broad-leaved Woodland. Secondary wood on cutting slopes with abundant Ash *Fraxinus excelsior* and Sycamore *Acer pseudoplatanus*, frequent Hawthorn *Crataegus monogyna*, Blackthorn *Prunus spinosa*, Elder *Sambucus nigra* and Bramble *Rubus fruticosus agg.* over Nettle *Urtica dioica*, Rosebay Willowherb *Chamerion angustifolium* and Bracken *Pteridium aquilinum*.


TN80: (GR NT 38233, 60262) Scrub. Dense scrub of Hawthorn *Crataegus monogyna*, Goat Willow *Salix caprea*, Dog Rose *Rosa canina* and Hazel *Corylus avellana* with frequent small Silver Birch *Betula pendula* saplings. Between this and the line is a strip of continuous Bracken *Pteridium aquilinum*.

TN81: (GR NT 38277, 60212) Semi-improved Neutral Grassland. Rank grass dominated by False Oat-grass *Arrhenatherum elatius* with Red Fescue *Festuca rubra* and Black Knapweed *Centaurea nigra*. The line itself is used as a track and has a low trampled open species-poor sward. Goat Willow *Salix caprea* is scattered over the cutting slopes.

TN82: (GR NT 38530, 60262) Broad-leaved Woodland. Maggie Bowies Glen. Ancient species-rich woodland containing notable species. Fringe of woodland beside the railway line is an immature expansion beyond the fence with abundant Sessile Oak *Quercus petraea* and Silver Birch *Betula pendula* and an understory Hawthorn *Crataegus monogyna* over a ruderal ground flora of Nettle *Urtica dioica* and Bracken *Pteridium aquilinum*.


TN84: (GR NT 38887, 60094) Broad-leaved Woodland. Secondary immature wood on cutting slopes with abundant Silver Birch *Betula pendula*, Goat Willow *Salix caprea* and Hawthorn *Crataegus monogyna* over Nettle *Urtica dioica* and common grasses.

Buttercup *Ranunculus acris*, Germander Speedwell *Veronica chamaedrys* and Sweet Vernal Grass *Anthoxanthum odoratum*.

TN86: (GR NT 39038, 59991) Unimproved Acid Grassland.

TN87: (GR NT 39089, 59878) Standing Water.
Temporary pool without aquatic plants.

TN88: (GR NT 39212, 59606) Semi-improved Neutral Grassland.

TN89: (GR NT 39220, 59539) Marshy Grassland.

TN90: (GR NT 39353, 59231) Semi-improved Neutral Grassland.
Damp cutting slope dominated by False Oat-grass *Arrhenatherum elatius* with locally dominant Meadowsweet *Filipendula ulmaria*, abundant Common Hogweed *Heracleum sphondylium*, frequent Cock’s-foot *Dactylis glomerata*, Red Clover *Trifolium pratense*, Yorkshire Fog *Holcus lanatus*, Tufted Vetch *Vicia cracca* and occasional Bladder Campion *Silene vulgaris*.

TN91: (GR NT 39428, 58968) Semi-improved Neutral Grassland.

TN92: (GR NT 39391, 58937) Ruderal Vegetation.
Dominated by Nettle *Urtica dioica*, Rosebay Willowherb *Chamerion angustifolium* and False Oat-grass *Arrhenatherum elatius* with scattered Ash *Fraxinus excelsior* and Scots Pine *Pinus sylvestris*.

TN93: (GR NT 39744, 55849) Ruderal Vegetation.
Rank vegetation dominated by Nettle *Urtica dioica* and Thistle *Cirsium arvense* with abundant False Oat-grass *Arrhenatherum elatius* and Tufted Hair-grass *Deschampsia cespitosa*.


TN97: (GR NT 39894, 55328) Poor Semi-improved Grassland. Abundant False Oat-grass *Arrhenatherum elatius*, Thistle *Cirsium arvense* and Yorkshire Fog *Holcus lanatus*.

TN98: (GR NT 40012, 55219) Swamp. Dominated by Bottle Sedge *Carex rostrata*, with occasional Meadowsweet *Filipendula ulmaria* and Common Valerian *Valeriana officinalis*.


TN101: (GR NT 40236, 54887) Poor Semi-improved Grassland. Old line dominated by Crested Dog’s-tail *Cynosurus cristatus* with abundant White Clover *Trifolium repens*, Common Bent *Agrostis capillaris* and frequent Yorkshire Fog *Holcus lanatus*.

TN102: (GR NT 40246, 54752) Marshy Grassland. Dominated by Soft Rush *Juncus effusus* and Reed Canary-grass *Phalaris arundinacea* with Meadowsweet *Filipendula ulmaria* along the fringes of the stream plus Floating Sweet-grass *Glyceria fluitans* and Water-cress *Rorippa nasturtium-aquaticum* in the stream.
TN103: (GR NT 40395, 54424) Semi-improved Neutral Grassland. 
Dominated by Red Fescue *Festuca rubra* with abundant Common Bent *Agrostis capillaris*, 
White Clover *Trifolium repens*, Lesser Trefoil *Trifolium dubium* and the moss *Rhytidiadelphus squarrosus*, 
frequent Ribwort Plantain *Plantago lanceolata*, Field Forget-me-not *Myosotis arvensis*, 
Common Mouse-ear *Cerastium fontanum*, False Oat-grass *Arrhenatherum elatius*, 
Cock’s-foot *Dactylis glomerata*, Creeping Buttercup *Ranunculus repens*, 
Crested Dog’s-tail *Cynosurus cristatus* Germander Speedwell *Veronica chamaedrys* and 
Nettles *Urtica dioica* around the edge, plus occasional Lady’s Bedstraw *Galium verum*.

TN104: (GR NT 40412, 54228) Marshy Grassland. 
Wet area of pasture field dominated by tussocks of Soft Rush *Juncus effusus* with abundant 
Yorkshire Fog *Holcus lanatus*, Tufted Hair-grass *Deschampsia cespitosa* and Creeping 
Buttercup *Ranunculus repens*.

TN105: (GR NT 40463, 54223) Poor Semi-improved Grassland. 
Old line with abundant Yorkshire Fog *Holcus lanatus*, Rough Meadow-grass *Poa trivialis*, 
White Clover *Trifolium repens*, Red Fescue *Festuca rubra*, frequent False Oat-grass 
*Arrhenatherum elatius*, Creeping Buttercup *Ranunculus repens*, Germander Speedwell 
*Veronica chamaedrys* and Field Forget-me-not *Myosotis arvensis*.

TN106: (GR NT 40541, 54129) Running Water. 
Small Burn grazed to edge. Abundant Creeping Buttercup *Ranunculus repens*, frequent 
Floating Sweet-grass *Glyceria fluitans*, Water-cress *Rorippa nasturtium-aquaticum*, Water 
Forget-me-not *Myosotis scorpioides*.

TN107: (GR NT 40880, 53400) Marshy Grassland. 
Neglected field dominated of Tussocks of Tufted Hair-grass *Deschampsia cespitosa* with abundant 
Yorkshire Fog *Holcus lanatus*, Cock’s-foot *Dactylis glomerata*, Soft Rush *Juncus effusus* and Creeping 
Buttercup *Ranunculus repens*.

TN108: (GR NT 41239, 52929) Semi-improved Neutral Grassland. 
Grassland over basic slag ballast on old line dominated by Red Fescue *Festuca rubra* with abundant 
Common Bent *Agrostis capillaris*, the moss *Rhytidiadelphus squarrosus*, frequent 
Creeping Cinquefoil *Potentilla reptans*, Lady’s Bedstraw *Galium verum*, Crested Dog’s-tail 
*Cynosurus cristatus*, occasional Black Knapweed *Centaurea nigra* and Meadow Vetchling 
*Lathyrus pratense*.

TN109: (GR NT 41393, 52735) Semi-improved Neutral Grassland. 
Rank grassland dominated by False Oat-grass *Arrhenatherum elatius* with abundant White 
Clover *Trifolium repens*, Yorkshire Fog *Holcus lanatus*, Common Bent *Agrostis capillaris*, 
frequent Germander Speedwell *Veronica chamaedrys*, Creeping Buttercup *Ranunculus repens* 
and Strawberry *Fragaria vesca*.

TN110: (GR NT 41534, 52731) Marshy Grassland. 
Narrow belt along Burn with abundant Soft Rush *Juncus effusus* and Meadowsweet 
*Filipendula ulmaria*. Marginal vegetation of Reed Canary-grass *Phalaris arundinacea* and 
Water-cress *Rorippa nasturtium-aquaticum* along the streamside.

TN111: (GR NT 41708, 52452) Poor Semi-improved Grassland. 
Trampled vegetation along the old line, now used as a track. Abundant Yorkshire Fog *Holcus lanatus*, 
White Clover *Trifolium repens*, Red Fescue *Festuca rubra*, Rough Meadow-grass *Poa trivialis*, 
Common Bent *Agrostis capillaris* and Annual Meadow-grass *Poa annua*, frequent Selfheal *Prunella vulgaris* and Meadow Vetchling *Lathyrus pratense*. Grades to 
abundant False Oat-grass *Arrhenatherum elatius* and Cock’s-foot *Dactylis glomerata* along 
edges.
TN112: (GR NT 41773, 52426) Marshy Grassland.
Wet area with locally dominant Meadowsweet *Filipendula ulmaria*, abundant Reed Canary-grass *Phalaris arundinacea* and Yorkshire Fog *Holcus lanatus*.

TN113: (GR NT 41810, 52397) Broad-leaved Woodland.
Immature secondary woods of Sycamore *Acer pseudoplatanus* and Ash *Fraxinus excelsior* with Elder *Sambucus nigra* over Nettle *Urtica dioica* and bare ground.

TN114: (GR NT 41999, 52182) Ruderal Vegetation.
Cutting slope with abundant Nettle *Urtica dioica*, Rosebay Willowherb *Chamerion angustifolium*, False Oat-grass *Arrhenatherum elatius* and Thistle *Cirsium arvense*.

TN115: (GR NT 42108, 51888) Semi-improved Neutral Grassland.

TN116: (GR NT 42187, 51771) Scrub.
Dense scrub of Hawthorn *Crataegus monogyna* and Goat Willow *Salix caprea* with scattered Sycamore *Acer pseudoplatanus* saplings over a ruderal ground flora.

TN117: (GR NT 42491, 51142) Poor Semi-improved Grassland.
Track and trampled field corners dominated by Common Bent *Agrostis capillaris* with abundant White Clover *Trifolium repens*, Rough Meadow-grass *Poa trivialis*, frequent Germander Speedwell *Veronica chamaedrys*, Yorkshire Fog *Holcus lanatus*, Red Bartsia *Odontites verna*, Selfheal *Prunella vulgaris* and occasional Black Knapweed *Centaurea nigra*.

TN118: (GR NT 42396, 50924) Semi-improved Neutral Grassland.
Track with basic slag ballast dominated by Red Fescue *Festuca rubra* and abundant White Clover *Trifolium repens*, Creeping Buttercup *Ranunculus repens*, the moss *Rhytidiadelphus squarrosus*, frequent Germander Speedwell *Veronica chamaedrys*, Common Bent *Agrostis capillaris*, Yorkshire Fog *Holcus lanatus*, Selfheal *Prunella vulgaris*, occasional Meadow Crane’s-bill *Geranium pratense*, Crosswort *Cruciata laevis* and Black Knapweed *Centaurea nigra*.

TN119: (GR NT 42290, 50817) Marshy Grassland.
Lush vegetation in damp hollows either side of Burn. Abundant Meadowsweet *Filipendula ulmaria*, Rosebay Willowherb *Chamerion angustifolium* and Meadow Crane’s-bill *Geranium pratense*. Small stand of Sallow Willow *Salix cinerea* on island in Burn.

TN120: (GR NT 42359, 50806) Ephemeral/Sort Perennial Vegetation.

TN121: (GR NT 42331, 50768) Standing Water.
Small pool with abundant Reed Canary-grass *Phalaris arundinacea*, Meadowsweet *Filipendula ulmaria* and Sedge *Carex sp.*

TN122: (GR NT 42344, 50747) Semi-improved Neutral Grassland.
Abundant False Oat-grass *Arrhenatherum elatius*, Rough Meadow-grass *Poa trivialis*, Yorkshire Fog *Holcus lanatus* and the moss *Rhytidiadelphus squarrosus*, frequent Selfheal...
Prunella vulgaris, Black Knapweed Centaurea nigra, Creeping Buttercup Ranunculus repens, White Clover Trifolium repens and Field Forget-me-not Myosotis arvensis.

TN123: (GR NT 42326, 50624) Semi-improved Neutral Grassland.
Abundant False Oat-grass Arrhenatherum elatius, Rough Meadow-grass Poa trivialis, Yorkshire Fog Holcus lanatus and the moss Rhytidiadelphus squarrosus, frequent Selfheal Prunella vulgaris, Black Knapweed Centaurea nigra, Creeping Buttercup Ranunculus repens, White Clover Trifolium repens and Field Forget-me-not Myosotis arvensis.

TN124: (GR NT 42324, 50483) Ephemeral/Sort Perennial Vegetation.

TN125: (GR NT 42495, 50061) Semi-improved Neutral Grassland.
Old track line with basic slag ballast. Closed sward dominated by Common Bent Agrostis capillaris with abundant White Clover Trifolium repens, Rough Meadow-grass Poa trivialis, frequent Selfheal Prunella vulgaris, Meadowsweet Filipendula ulmaria, Red Bartsia Odontites verna, Yorkshire Fog Holcus lanatus, Germander Speedwell Veronica chamaedrys, occasional Black Knapweed Centaurea nigra and rare Common Twayblade Listera ovata.

TN126: (GR NT 42566, 49992) Broad-leaved Plantation.
Immature Sycamore Acer pseudoplatanus plantation over a ruderal ground flora of Nettle Urtica dioica, False Oat-grass Arrhenatherum elatius, Rosebay Willowherb Chamerion angustifolium and Cleavers Galium aparine.

TN127: (GR NT 42944, 49595) Semi-improved Neutral Grassland.
Closed grazed sward over old line of basic slag. Dominated by Red Fescue Festuca rubra with abundant White Clover Trifolium repens, frequent Common Bent Agrostis capillaris, Smooth Meadow-grass Poa pratense, Common Cat's-ear Hypochoeris radicata, Eyebright Euphrasia sp., Creeping Cinquefoil Potentilla reptans, Ribwort Plantain Plantago lanceolata, Meadowsweet Filipendula ulmaria, Germander Speedwell Veronica chamaedrys, Common Mouse-ear Cerastium fontanum, Lesser Trefoil Trifolium dubium, Daisy Bellis perennis, occasional Crosswort Cruciata laevipes, Red Clover Trifolium pratense.

TN128: (GR NT 42956, 49635) Broad-leaved Woodland.
Immature woods with an open canopy to 15m dominated by Silver Birch Betula pendula with abundant Goat Willow Salix caprea and Ash Fraxinus excelsior over a ground flora of Nettle Urtica dioica, Bramble Rubus fruticosus agg., Rosebay Willowherb Chamerion angustifolium, plus common Dog-violet Viola riviniana, Germander Speedwell Veronica chamaedrys and Strawberry Fragaria vesca.

TN129: (GR NT 43290, 49241) Poor Semi-improved Grassland.
Species-poor sward of Common Bent Agrostis capillaris, Crested Dog's-tail Cynosurus cristatus, Red Fescue Festuca rubra, White Clover Trifolium repens, Perennial Rye-grass Lolium perenne, Nettle Urtica dioica, False Oat-grass Arrhenatherum elatius and Thistle Cirsium arvense along old line used as a track.

TN130: (GR NT 43374, 49165) Semi-improved Neutral Grassland.
Cutting slopes dominated by rank species-poor False Oat-grass Arrhenatherum elatius dominated grass. The line is species-poor grass of Common Bent Agrostis capillaris and Red Fescue Festuca rubra.
TN131: (GR NT 43611, 49070) Broad-leaved Woodland.
Immature woods along the river bank of Alder Alnus glutinosa, Ash Fraxinus excelsior and Goat Willow Salix caprea over Nettle Urtica dioica and False Oat-grass Arrhenatherum elatius.

TN132: (GR NT 43676, 49001) Broad-leaved Plantation.
Immature plantation of Beech Fagus sylvatica, Ash Fraxinus excelsior, European Lime Tilia x europaea and Alder Alnus glutinosa, and including a couple of very old coppiced Alder Alnus glutinosa, over a grassy ground flora of Common Bent Agrostis capillaris and Yorkshire Fog Holcus lanatus.

TN133: (GR NT 43625, 49018) Poor Semi-improved Grassland.
Old railway track bed, used as a track with Perennial Rye-grass Lolium perenne, Common Bent Agrostis capillaris, Red Fescue Festuca rubra White Clover Trifolium repens, and occasional Ribwort Plantain Plantago lanceolata and Germander Speedwell Veronica chamaedrys. Nettle Urtica dioica and Thistle Cirsium arvense abundant along edges.

TN134: (GR NT 43502, 49002) Conifer Plantation.
Dense canopy of Sitka Spruce Picea stichensis poles with a few Sycamore Acer pseudoplatanus over bare ground.

TN135: (GR NT 43746, 48895) Conifer Plantation.
Mature Scots Pine Pinus sylvestris and Larch Larix sp. plantation with frequent Elder Sambucus nigra over Nettle Urtica dioica, Male Fern Dryopteris filix-mas and Comphrey Symphytum officinale.

TN136: (GR NT 43890, 48827) Broad-leaved Woodland.
Immature Silver Birch Betula pendula woods with frequent Goat Willow Salix caprea over Common Bent Agrostis capillaris and Yorkshire Fog Holcus lanatus.

TN137: (GR NT 43921, 48826) Broad-leaved Plantation.
Dominated by European Lime Tilia x europaea with frequent Sycamore Acer pseudoplatanus, Beech Fagus sylvatica, Horse Chestnut Aesculus hippocastanum and Silver Birch Betula pendula over Common Bent Agrostis capillaris and Thistle Cirsium arvense.

TN138: (GR 43974, 48764) Semi-improved Neutral Grassland.
Rank False Oat-grass Arrhenatherum elatius dominated cutting slopes with frequent Nettle Urtica dioica, Thistle Cirsium arvense and Black Knapweed Centaurea nigra.

TN139: (GR NT 44099, 48533) Semi-improved Neutral Grassland.
Cutting slopes of rank species-poor False Oat-grass Arrhenatherum elatius dominated grass with Cock’s-foot Dactylis glomerata, Common Bent Agrostis capillaris, Nettle Urtica dioica and Thistle Cirsium arvense. The old track bed itself is similar but also has frequent Red Fescue Festuca rubra, Black Knapweed Centaurea nigra, White Clover Trifolium repens, Red Clover Trifolium pratense, Ribwort Plantain Plantago lanceolata and Lesser Trefoil Trifolium dubium.

TN140: (GR 44188, 48436) Semi-improved Neutral Grassland.
Damp riverside grass dominated by Tufted Hair-grass Deschampsia cespitosa with abundant Yorkshire Fog Holcus lanatus, Common Bent Agrostis capillaris plus frequent Common Hogweed Heracleum sphondylium and Black Knapweed Centaurea nigra.

TN141: (GR NT 44217, 48302) Poor Semi-improved Grassland.
Grazed species-poor sward dominated by Common Bent Agrostis capillaris with abundant Yorkshire Fog Holcus lanatus, White Clover Trifolium repens and Common Sorrel Rumex acetosa. The cutting slope has abundant Tufted Hair-grass Deschampsia cespitosa,
Common Bent *Agrostis capillaris* and frequent Nettle *Urtica dioica*, White Clover *Trifolium repens*, Strawberry *Fragaria vesca*, Red Clover *Trifolium pratense* and Selfheal *Prunella vulgaris* plus scattered Willow *Crataegus monogyna*. The line is also species-poor with abundant Red Fescue *Festuca rubra*, Common Bent *Agrostis capillaris*, White Clover *Trifolium repens* and Barren Strawberry *Potentilla sterilis*.

TN142: (GR NT 44325, 48125) Broad-leaved Plantation.
Open, mature Beech *Fagus sylvatica* plantation with occasional Silver Birch *Betula pendula*, Scots Pine *Pinus sylvestris* and Ash *Fraxinus excelsior* over False Oat-grass *Arrhenatherum elatius*.

TN143: (GR NT 49341, 47938) Broad-leaved Plantation.
Open, mature Beech *Fagus sylvatica* plantation with Silver Birch *Betula pendula*, Larch *Larix* sp., Sycamore *Acer pseudoplatanus*, Scots Pine *Pinus sylvestris*, Goat Willow *Salix caprea* and Hazel *Corylus avellana*. The ground flora is of grazed species-poor grass.

TN144: (GR NT 44365, 47754) Semi-improved Neutral Grassland.
Cutting banks of rank False Oat-grass *Arrhenatherum elatius* with frequent Black Knapweed *Centaurea nigra*, Yarrow *Achillea millefolium*, Nettle *Urtica dioica* and Thistle *Cirsium arvense*. The old line is a track bare of vegetation.

TN145: (GR NT 44383, 47527) Broad-leaved Plantation.
Small plantation with an open canopy of European Lime *Tilia x europaea*, Sycamore *Acer pseudoplatanus*, Ash *Fraxinus excelsior* and Beech *Fagus sylvatica* over species-poor False Oat-grass *Arrhenatherum elatius*.

TN146: (GR NT 44442, 47447) Broad-leaved Plantation.
Narrow strip of European Lime *Tilia x europaea* and Silver Birch *Betula pendula* over species-poor grass and Nettle *Urtica dioica*.

TN147: (GR NT 44402, 47044) Improved Grassland.
Old line an improved grassland track of Perennial Rye-grass *Lolium perenne*, White Clover *Trifolium repens* and Common Bent *Agrostis capillaris*. The narrow verges to this are dominated by Nettle *Urtica dioica* and Thistle *Cirsium arvense* with scattered Hawthorn *Crataegus monogyna*.

TN148: (GR NT 44242, 46737) Marshy Grassland.
Damp pasture of species-poor Soft Rush *Juncus effusus* and Tufted Hair-grass *Deschampsia cespitosa*.

TN149: (GR NT 44293, 46543) Semi-improved Neutral Grassland.

TN150: (GR NT 44256, 46459) Swamp.
TN151: (GR NT 44241, 46365) Semi-improved Neutral Grassland.  

TN152: (GR 44108, 46055) Semi-improved Neutral Grassland.  

TN153: (GR NT 44143, 46096) Bare Ground.  
Small area used as a horse jumping course.

TN154: (GR NT 44183, 46087) Scrub.  
Riverside Willow *Salix* spp. scrub, species-poor over Nettle *Urtica dioica*.

TN155: (GR NT 44145, 45977) Semi-improved Neutral Grassland.  
Cutting slopes dominated by rank False Oat-grass *Arrhenatherum elatius* with frequent Rosebay Willowherb *Chamerion angustifolium*, White Clover *Trifolium repens*, Common Hogweed *Heracleum sphondylium*, Raspberry *Rubus idaeus*, plus occasional Black Knapweed *Centaurea nigra* and Ragwort *Senecio jacobaea*.

TN156: (GR NT 44189, 45978) Acid Grassland.  
Fragments of Common Bent *Agrostis capillaris*, Sheep’s Fescue *Festuca ovina*, Heath Bedstraw *Galium saxatile* grassland over rock outcrop exposed by construction of road.

TN157: (GR NT 44159, 45935) Semi-improved Neutral Grassland.  

TN158: (GR NT 44200, 45763) Semi-improved Neutral Grassland.  

TN159: (GR NT 44310, 45539) Broad-leaved Plantation.  
Recent plantation of Ash *Fraxinus excelsior*, Sessile Oak *Quercus petraea* and Wild Cherry *Prunus avium* with a dense understory of Snowberry *Symphoricarpos albus* over species-poor ground flora.

TN160: (GR NT 44379, 45500) Semi-improved Neutral Grassland.
Cutting slope with abundant False Oat-grass *Arrhenatherum elatius*, frequent Black Knapweed *Centaurea nigra*, Crosswort *Cruciata laeves*, Bramble *Rubus fruticosus* agg., occasional Meadow Vetchling *Lathyrus pratense* and rare Common Twayblade *Listera ovata*.

TN161: (GR NT 44478, 45464) Semi-improved Neutral Grassland.

TN162: (GR NT 44550, 45456) Semi-improved Neutral Grassland.

TN163: (GR 44511, 45431) Poor Semi-improved Grassland.
Track bed with species-poor grass of Red Fescue *Festuca rubra*, Rough Meadow-grass *Poa trivialis*, White Clover *Trifolium repens*, Thistle *Cirsium arvense* and Red Bartsia *Odontites verna*.

TN164: (GR 44811, 45295) Broad-leaved Plantation.

TN165: (GR NT 44985, 45227) Introduced Shrub.
Large linear stand of dense Snowberry *Symphoricarpos albus* scrub.

TN166: (GR NT 44943, 45204) Marshy Grassland.
Damp edge to pasture field with abundant Soft Rush *Juncus effusus*, Tufted Hair-grass *Deschampsia cespitosa*, Yorkshire Fog *Holcus lanatus* and Thistle *Cirsium arvense*.

TN167: (GR 45007, 45177) Standing Water.
Temporary pool dominated by Creeping Bent *Agrostis stolonifera* and Jointed Rush *Juncus articulatus* plus bare mud.

TN168: (GR 45011, 45206) Semi-improved Neutral Grassland.
Along the old track bed is a sward dominated by Red Fescue *Festuca rubra* with abundant Common Bent *Agrostis capillaris*, Rough Meadow-grass *Poa trivialis*, frequent White Clover *Trifolium repens*, Yarrow *Achillea millefolium*, Germander Speedwell *Veronica chamaedrys*, Black Knapweed *Centaurea nigra* and Red Bartsia *Odontites verna*. The cutting slope to the south is rank damp grassland dominated by Yorkshire Fog *Holcus lanatus* with abundant Tufted Hair-grass *Deschampsia cespitosa*, Soft Rush *Juncus effusus*, Meadowsweet *Filipendula ulmaria* and Common Bent *Agrostis capillaris* with Nettle *Urtica dioica* and Thistle *Cirsium arvense* frequent along the top.

TN169: (GR NT 45024, 45250) Ruderal Vegetation.
Large stand of riverside ruderal of Butterbur *Petasites hybridus*, Common Thistle *Cirsium arvense* and Nettle *Urtica dioica*, with a marginal fringe of Willow *Salix* spp. along the riverbank.

TN170: (GR NT 45345, 45001) Semi-improved Neutral Grassland.
Damp grassland over cutting slope with abundant Tufted Hair-grass *Deschampsia cespitosa*, False Oat-grass *Arrhenatherum elatius*, Yorkshire Fog *Holcus lanatus*, frequent Meadowsweet *Filipendula ulmaria* and Nettle *Urtica dioica*.

TN171: (GR NT 45359, 45024) Poor Semi-improved Grassland.
Track bed of species-poor grass of Perennial Rye-grass *Lolium perenne*, Red Fescue *Festuca rubra*, White Clover *Trifolium repens* plus frequent Common Thistle *Cirsium arvense* and Creeping Cinquefoil *Potentilla reptans*.

TN172: (GR NT 45406, 45007) Introduced Shrub.
Large linear stands of Snowberry *Symphoricarpos albus* scrub with scattered Hawthorn *Crataegus monogyna* and frequent Common Thistle *Cirsium arvense*.

TN173: (GR 45550, 44788) Semi-improved Neutral Grassland.

TN174: (GR NT 45440, 40974) Semi-improved Neutral Grassland.

TN175: (GR NT 45397, 40955) Ruderal Vegetation.
Large stand of Butterbur *Petasites hybridus* and Nettle *Urtica dioica* with a line of Ash *Fraxinus excelsior* and Sycamore *Acer pseudoplatanus* running through its midst.

TN176: (GR NT 45404, 40829) Broad-leaved Woodland.
Immature scrubby woodland of Willows *Salix* spp., Ash *Fraxinus excelsior* and Wych Elm *Ulmus glabra* over Butterbur *Petasites hybridus* and Nettle *Urtica dioica*.

TN177: (GR NT 45394, 40682) Broad-leaved Woodland.
Immature woods with an open canopy to 10m dominated by Ash *Fraxinus excelsior* with frequent Sycamore *Acer pseudoplatanus* over scattered Hawthorn *Crataegus monogyna* and Common Bent *Agrostis capillaris*, Nettle *Urtica dioica*, Male Fern *Dryopteris filix-mas*, Wood Avens *Geum urbanum*, Strawberry *Fragaria vesca* and Herb Robert *Geranium robertianum*.

TN178: (GR NT 45384, 40708) Semi-improved Neutral Grassland.

TN179: (GR NT 45483, 40289) Semi-improved Neutral Grassland.

TN180: (GR NT 45737, 39948) Broad-leaved Wood.
Narrow strip of immature woods with an open canopy to 15m of abundant Ash *Fraxinus excelsior*, Sycamore *Acer pseudoplatanus* and Hawthorn *Crataegus monogyna* plus locally frequent Wych Elm *Ulmus glabra*, Osier *Salix viminalis* and Snowberry *Symphoricarpos albus* over a ground flora of Nettle *Urtica dioica*, Male Fern *Dryopteris filix-mas*, Rosebay Willowherb *Chamerion angustifolium*, Red Campion *Silene dioica* and Broad-leaved Willowherb *Epilobium montanum*.

TN181: (GR NT 45804, 39891) Poor Semi-improved Grassland.
Track bed with species-poor sward of Common Bent *Agrostis capillaris*, Red Fescue *Festuca rubra* and White Clover *Trifolium repens* with Nettle *Urtica dioica* and Creeping Thistle *Cirsium arvense* along verges.

TN182: (GR NT 45858, 39847) Ruderal Vegetation.
Long section of cutting slope dominated by Nettle *Urtica dioica* and Creeping Thistle *Cirsium arvense* with scattered Ash *Fraxinus excelsior* and Hawthorn *Crataegus monogyna*.

TN183: (GR NT 45897, 39872) Swamp.
Wet area along a ditch dominated by a dense stand of Reed Canary-grass *Phalaris arundinacea*.

TN184: (GR NT 45892, 39772) Marginal Vegetation.
Scattered Osier *Salix viminalis* over Yellow Flag *Iris pseudacorus*, Branched Bur-reed *Sparganium erectum* and Sedge *Carex* sp. along riverbank.

TN185: (GR 46122, 39558) Poor Semi-improved Grassland.

TN186: (GR NT 45980, 39746) Marshy Grassland.
Damp field corner of abundant False Oat-grass *Arrhenatherum elatius* and Meadowsweet *Filipendula ulmaria*.

TN187: (GR NT 46400, 39331) Broad-leaved Woodland.
Closed canopy to 15m of abundant Ash *Fraxinus excelsior* and Sycamore *Acer pseudoplatanus*, frequent Silver Birch *Betula pendula*, plus occasional Wych Elm *Ulmus glabra*, Larch *Larix* sp. and Hawthorn *Crataegus monogyna* over a ground flora of abundant Dog’s Mercury *Mercurialis perennis*, locally abundant Bracken *Pteridium aquilinum*, frequent Male Fern *Dryopteris filix-mas* and locally abundant Nettle *Urtica dioica* with much bare ground.

TN188: (GR NT 46324, 39349) Scrub.
Dense scrub of Hawthorn *Crataegus monogyna*, Elder *Sambucus nigra*, Blackthorn *Prunus spinosa* and Bramble *Rubus fruticosus* agg. plus occasional Hazel *Corylus avellana* over Nettle *Urtica dioica*, Creeping Thistle *Cirsium arvense*, Rosebay Willowherb *Chamerion angustifolium* and Meadowsweet *Filipendula ulmaria*.
TN189: (GR NT 46399, 39293) Broad-leaved Woodland.
Immature canopy of Sycamore Acer pseudoplatanus and Ash Fraxinus excelsior plus Elder Sambucus nigra, Blackthorn Prunus spinosa and Bramble Rubus fruticosus agg., over abundant Nettle Urtica dioica and Rosebay Willowherb Chamerion angustifolium.

TN190: (GR 46623, 39226) Semi-improved Neutral Grassland.
Rank False Oat-grass Arrhenatherum elatius grassland with abundant Common Bent Agrostis capillaris and Yorkshire Fog Holcus lanatus plus frequent Ribwort Plantain Plantago lanceolata, Crosswort Crucia laevipes, Common Hogweed Heracleum sphondylium, Black Knapweed Centaurea nigra, Creeping Thistle Cirsium arvense, Ragwort Senecio jacobaea and Common Sorrel Rumex acetosa.

TN191: (GR NT 46605, 39186) Broad-leaved Woodland.
Early successional woods across track bed and up cutting slopes with Ash Fraxinus excelsior, Wych Elm Ulmus glabra and Alder Alnus glutinosa over a ruderal ground flora.

TN192: (GR NT 46604, 39132) Semi-improved Neutral Grassland.
Small patch of damp rank grassland between river and burn. Species-poor, dominated by False Oat-grass Arrhenatherum elatius and Tufted Hair-grass Deschampsia cespitosa. Lines of Alder Alnus glutinosa along each side.

TN193: (GR NT 46700, 39160) Broad-leaved Plantation.
Mature 20m canopy dominated by Sycamore Acer pseudoplatanus with abundant Alder Alnus glutinosa, Ash Fraxinus excelsior, frequent Beech Fagus sylvatica, occasional Larch Larix sp. and Horse Chestnut Aesculus hippocastanum over a ground flora of abundant Dog’s Mercury Mercurialis perennis, Nettle Urtica dioica and frequent Male Fern Dryopteris filix-mas.

TN194: (GR NT 46734, 39125) Broad-leaved Woodland.
Mature 20m canopy of abundant Sycamore Acer pseudoplatanus, Ash Fraxinus excelsior, occasional Wych Elm Ulmus glabra and Hazel Corylus avellana over a ground flora of abundant Dog’s Mercury Mercurialis perennis, Nettle Urtica dioica and frequent Male Fern Dryopteris filix-mas.

TN195: (GR NT 46807, 39054) Ruderal Vegetation.
Track bed dominated by ruderal species including Nettle Urtica dioica, Rosebay Willowherb Chamerion angustifolium, Creeping Thistle Cirsium arvense, Bramble Rubus fruticosus agg., and small grassy patches with Yorkshire Fog Holcus lanatus, Red Fescue Festuca rubra and Crosswort Crucia laevipes. Short wet section of line with Great Willowherb Epilobium hirsutum, Meadowsweet Filipendula ulmaria and Lesser Spearwort Ranunculus flammula.

TN196: (GR NT 46846, 39048) Scrub.
Linear stands of scrub along both cutting slopes with Hawthorn Crataegus monogyna, Elder Sambucus nigra, Snowberry Symphoricarpos albus, Bramble Rubus fruticosus agg., and occasional small Sycamore Acer pseudoplatanus and Ash Fraxinus excelsior.

TN197: (GR NT 46990, 38961) Semi-improved Neutral Grassland.
Track bed of basic slag supporting a sward with abundant Common Bent Agrostis capillaris, White Clover Trifolium repens, Strawberry Fragaria vesca, Crosswort Crucia laevipes, Daisy Bellis perennis, frequent Oxeye Daisy Leucanthemum vulgare, Ragwort Senecio jacobaea, Selfheal Prunella vulgaris and Yarrow Achillea millefolium.

TN198: (GR NT 47035, 38954) Scrub.
Stand of dense Hawthorn Crataegus monogyna over abundant Bracken Pteridium aquilinum.
TN199: (GR NT 47136, 38964) Scrub.
Stand of dense scrub along river bank with abundant Hawthorn *Crataegus monogyna* and Blackthorn *Prunus spinosa* with a line of Alder *Alnus glutinosa* fringing the river over abundant Butterbur *Petasites hybridus*.

TN200: (GR NT 47223, 38836) Semi-improved Neutral Grassland.
Track bed and southern cutting slope support a sward of abundant Red Fescue *Festuca rubra*, Common Bent *Agrostis capillaris*, White Clover *Trifolium repens*, Yorkshire Fog *Holcus lanatus* and Greater Plantain *Plantago major*.

TN201: (GR NT 47331, 38748) Standing Water.
Series of ponds of a fish farm, interspersed with species-poor grassland.

TN202: (GR NT 47315, 38804) Scrub.
Dense scrub along cutting slope, with Hawthorn *Crataegus monogyna*, Sallow Willow *Salix cinerea*, Dog Rose *Rosa canina* and Wych Elm *Ulmus glabra* regeneration.

TN203: (GR NT 47529, 38550) Broad-leaved Woodland.
Immature secondary woods of Silver Birch *Betula pendula*, Goat Willow *Salix caprea*, Ash *Fraxinus excelsior* and Sycamore *Acer pseudoplatanus* over a predominately ruderal ground flora of Nettle *Urtica dioica* plus frequent Male Fern *Dryopteris filix-mas* and Herb Robert *Geranium robertianum*.

TN204: (GR NT 47586, 38427) Ruderal Vegetation.
Dense Nettle *Urtica dioica* and Rosebay Willowherb *Chamerion angustifolium* plus Meadowsweet *Filipendula ulmaria* and Bramble *Rubus fruticosus* agg. with scattered Hawthorn *Crataegus monogyna*, Goat Willow *Salix caprea* and Sycamore *Acer pseudoplatanus*.

TN205: (GR NT 47562, 38195) Broad-leaved Woodland.

TN206: (GR NT 47601, 38077) Broad-leaved Woodland.

TN207: (GR NT 47516, 37832) Broad-leaved Woodland.
Hedera helix, locally frequent Woodruff Galium odoratum, Raspberry Rubus idaeus, Wood Avens Geum urbanum, occasional red Camion Silene dioica, Sanicle Sanicula europaea, and Greater Stitchwort Stellaria holostea. The old track bed is quite shaded but supports frequent Devil’s-bit Scabious Succisa pratensis, Black Knapweed Centaurea nigra, False Oat-grass Arrhenatherum elatius, Yorkshire Fog Holcus lanatus, Common Bent Agrostis capillaris, Strawberry Fragaria vesca and Selfheal Prunella vulgaris.

TN208: (GR NT 47521, 37784) Broad-leaved Woodland. Open canopy to 20m dominated by Silver Birch Betula pendula with abundant Sessile Oak Quercus petraea, Wych Elm Ulmus glabra and frequent Ash Fraxinus excelsior over abundant Blackthorn Prunus spinosa and frequent Goat Willow Salix caprea and a ground flora dominated by Bearded Couch Elymus caninus and locally abundant Nettle Urtica dioica.

TN209: (GR NT 47517, 37624) Broad-leaved Woodland. Scrubby recent woods developing on old embankment, with a closed 10m canopy dominated by Silver Birch Betula pendula with frequent Sycamore Acer pseudoplatanus, Ash Fraxinus excelsior and Goat Willow Salix caprea over abundant Hawthorn Crataegus monogyna and Dog Rose Rosa canina, frequent Bramble Rubus fruticosus agg. and Broom Cytisus scoparius. The ground flora has frequent Strawberry Fragaria vesca, Common Bent Agrostis capillaris, Bearded Couch Elymus caninus, Black Knapweed Centaurea nigra, and Crosswort Cruciata laevipes.

TN210: (GR NT 47617, 37364) Broad-leaved Woodland. Immature wood with a canopy to 15m dominated by Silver Birch Betula pendula plus abundant Sycamore Acer pseudoplatanus, Goat Willow Salix caprea and Ash Fraxinus excelsior, a sparse understorey of Hawthorn Crataegus monogyna and a ground flora with abundant Dog’s Mercury Mercurialis perennis, Male Fern Dryopteris filix-mas, Nettle Urtica dioica, Creeping Buttercup Ranunculus repens and bare ground.

TN211: (GR NT 48054, 37137) Semi-improved Neutral Grassland. Rank sward of abundant Common Bent Agrostis capillaris, False Oat-grass Arrhenatherum elatius, Perennial Rye-grass Lolium perenne, frequent Common Sorrel Rumex acetosa, Common Hogweed Heracleum sphondylium, Meadow Vetchling Lathyrus pratense, Yarrow Achillea millefolium, White Clover Trifolium repens and Red Clover Trifolium pratense. Rosebay Willowherb Chamerion angustifolium is abundant around the edges.

TN212: (GR NT 48279, 37037) Broad-leaved Woodland. Small patches of immature woodland on either side of the river dominated by Sycamore Acer pseudoplatanus poles with frequent Ash Fraxinus excelsior and Goat Willow Salix caprea over a ruderal ground flora of Nettle Urtica dioica, Rosebay Willowherb Chamerion angustifolium and Bramble Rubus fruticosus agg.

TN213: (GR NT 48433, 36953) Broad-leaved Woodland. Linear strips of immature woodland on cutting slopes dominated by Sycamore Acer pseudoplatanus poles with frequent Ash Fraxinus excelsior and Goat Willow Salix caprea over a ruderal ground flora of Nettle Urtica dioica, Rosebay Willowherb Chamerion angustifolium and Bramble Rubus fruticosus agg. Central path of tarmac.

TN214: (GR NT 48549, 36882) Broad-leaved Woodland. Linear strips of immature woodland on cutting slopes dominated by Sycamore Acer pseudoplatanus poles with frequent Ash Fraxinus excelsior and Goat Willow Salix caprea over a ruderal ground flora of Nettle Urtica dioica, Rosebay Willowherb Chamerion angustifolium and Bramble Rubus fruticosus agg. Central path of tarmac.

TN215: (GR NT 48933, 36653) Broad-leaved Woodland.
Very small patch of open scrubby woods of Sycamore Acer pseudoplatanus and Ash Fraxinus excelsior on steep slope with species-poor ground flora.

TN216: (GR NT 51453, 35269) Scrub. Stand of Hawthorn Crataegus monogyna plus frequent Elder Sambucus nigra over tall ruderal weeds.

TN217: (GR NT 51535, 35239) Ruderal vegetation. Riverbank with abundant Butterbur Petasites hybridus, Nettle Urtica dioica and Japanese Knotweed Fallopia japonica plus a marginal fringe of Reed Canary-grass Phalaris arundinacea in the waters edge.


TN219: (GR NT 51550, 35307) Broad-leaved Woodland. Immature woodland of Sycamore Acer pseudoplatanus and Willows Salix spp. over ruderal weeds including Butterbur Petasites hybridus, Nettle Urtica dioica and Japanese Knotweed Fallopia japonica.

TN220: (GR NT 51665, 35238) Scrub. Dense stand of scrub on cutting slope with abundant Hawthorn Crataegus monogyna, Goat Willow Salix caprea, Broom Cytisus scoparius, Bramble Rubus fruticosus agg. and scattered small Ash Fraxinus excelsior, Scots Pine Pinus sylvestris and Wych Elm Ulmus glabra over Tufted Hair-grass Deschampsia cespitosa, Rosebay Willowherb Chamerion angustifolium and occasional Giant Hogweed Heracleum mantegazzianum.

TN221: (GR NT 51660, 35222) Broad-leaved Woodland. Immature open scrubby woods on cutting slope with abundant Ash Fraxinus excelsior and Hawthorn Crataegus monogyna over Bramble Rubus fruticosus agg. and Nettle Urtica dioica.

TN222: (GR NT 51786, 35209) Mixed Plantation. Closed canopy to 20m dominated by Larch Larix sp. with abundant Sycamore Acer pseudoplatanus, frequent Wych Elm Ulmus glabra and occasional Beech Fagus sylvatica and Ash Fraxinus excelsior, with a scattered understory of Hawthorn Crataegus monogyna and Holly Ilex aquifolium. The ground flora has abundant Ivy Hedera helix, frequent Common Dog-violet Viola riviniana, Wood Avens Geum urbanum, Red Campion Silene dioica, Bramble Rubus fruticosus agg. and Male Fern Dryopteris filix-mas.

TN223: (GR NT 51881, 35214) Broad-leaved Plantation. Recent plantation of Ash Fraxinus excelsior, Sycamore Acer pseudoplatanus, Sessile Oak Quercus petraea etc. over False Oat-grass Arrhenatherum elatius.


TN225: (GR NT 51972, 35092) Ruderal Vegetation. Dense stand of Rosebay Willowherb Chamerion angustifolium on cutting slopes both sides of line, with scattered Sycamore Acer pseudoplatanus and Ash Fraxinus excelsior.
TN226: (GR 51950, 35123) Scrub. dense scrub on cutting slope with broom Cytisus scoparius, common gorse Ulex europaeus, hawthorn Crataegus monogyna, dog rose Rosa canina and Bramble Rubus fruticosus agg. over nettles Urtica dioica and rosebay willowherb Chamerion angustifolium.

TN227: (GR NT 52299, 34954) Mixed Plantation. newly planted mix of trees over species-poor false oat-grass Arrhenatherum elatius sward.

TN228: (GR NT 52338, 34895) Mixed Plantation. very open group of silver birch Betula pendula and Scots Pine Pinus sylvestris with hawthorn Crataegus monogyna, elder Sambucus nigra and Snowberry Symphoricarpos albus over raspberry Rubus idaeus, nettle Urtica dioica and rosebay willowherb Chamerion angustifolium.

TN229: (GR NT 52575, 34769) Broad-leaved Plantation. recently planted with an open 10m canopy of sessile oak Quercus petraea, sycamore Acer pseudoplatanus, wild cherry Prunus avium, norway maple Acer platanoides and goat willow Salix caprea with hawthorn Crataegus monogyna over rosebay willowherb Chamerion angustifolium or bare ground.

TN230: (GR NT 52560, 34837) Semi-improved Neutral Grassland. species-poor false oat-grass Arrhenatherum elatius sward with frequent cock’s-foot Dactylis glomerata and ragwort Senecio jacobaea.

TN231: (GR NT 52696, 34729) Semi-improved Neutral Grassland. species-poor false oat-grass Arrhenatherum elatius sward with frequent cock’s-foot Dactylis glomerata and ragwort Senecio jacobaea.

TN232: (GR NT 31992, 68899) Semi-improved Neutral Grassland. an area of semi-improved neutral grassland comprising; false oat-grass Arrhenatherum elatius, cock’s-foot Dactylis glomerata, common bent Agrostis capillaris, creeping bent Agrostis stolonifera, red fescue Festuca rubra, creeping thistle Cirsium arvense, nettle Urtica dioica, common sorrel Rumex acetosa. a depression within this grassland strip formed a temporary pool.

TN233: (GR NT 31999, 69586) Semi-improved Neutral Grassland. an area of rank, semi-improved, neutral grassland fenced off from improved pasture. species present include: false oat-grass Arrhenatherum elatius, cock’s-foot Dactylis glomerata, common bent Agrostis capillaris, red fescue Festuca rubra, creeping thistle Cirsium arvense, nettle Urtica dioica, broad-leaved dock Rumex obtusifolius, hogweed Heracleum sphondylinum, cow parsley Anthriscus sylvestris, groundsel Senecio vulgaris and common sorrel Rumex acetosa.

TN234: (GR NT 31972, 70103) Semi-improved Neutral Grassland. a section of developing neutral grassland and scrub on nutrient-poor substrate. common bent Agrostis capillaris and red fescue Festuca rubra abundant, with bird’s-foot-trefoil Lotus corniculatus and common vetch Vicia sativa. mosses and other ephemeral vegetation present in patches. Bramble Rubus fruticosus agg. and downy birch Betula pubescens beginning to spread from more dense scrub adjacent to the grassland.

TN235: (GR NT 32108, 70329) Ruderal Vegetation. an extensive stand of giant hogweed Heracleum mantegazzianum around a field boundary.

TN236: (GR NT 32109, 70406) Ruderal Vegetation. a small patch of giant hogweed Heracleum mantegazzianum on grassy verge.
TN237: (GR NT 32160, 70724) Ephemeral Vegetation.
Ephemeral vegetation on ballast along a former railway line. Mosses and small perennial vegetation present, along with scattered Downy Birch *Betula pubescens* and Willows *Salix spp.*

TN238: (GR NT 32180, 70966) Broadleaved woodland.
A secondary woodland developing on a former railway sidings, comprising Silver Birch *Betula pendula*, Downy Birch *Betula pubescens*, Willows *Salix spp.*, and Hawthorn *Crataegus monogyna*. At present the canopy is fairly open allowing a neutral grassland ground flora to flourish. There are scattered glades throughout, maintained by grazing rabbits.

TN239: (GR NT 32099, 71141) Broadleaved woodland.
A maturing secondary woodland with Sycamore *Acer pseudoplatanus* dominant and Birch *Betula spp.* frequent throughout. Dense Bramble *Rubus fruticosus* agg. in the understorey.

TN240: (GR NT 45603, 44391) Semi-improved Neutral Grassland.
Species-poor neutral grassland comprised of a rank False-oat Grass *Arrhenatherum elatius* and Yorkshire-fog *Holcus lanatus* dominated sward, with abundant Nettle *Urtica dioica* and Creeping Thistle *Cirsium arvense*.

TN241: (GR NT 45251, 43148) Running Water.
Ponded section of ditch shown on OS map, approximately 20m long x 3m wide and <30cm deep. There is little aquatic vegetation present (only Water Starwort *Callitriche* sp.), although an algal bloom restricts the area of open water. There is a fringing margin of Reed Sweet-grass *Glyceria fluitans*, Water Speedwell *Myosotis* and Brooklime *Veronica beccabunga*. The ditch itself is dominated by Reed Sweet-grass *Glyceria fluitans*.

TN242: (GR NT 44809, 42165) Semi-improved Neutral Grassland.
Section of line supporting predominantly semi-improved neutral grassland on flat ground associated with the former tracks. Tall ruderal (mainly Nettle *Urtica dioica*) with scattered scrub (mainly Hawthorn *Crataegus monogyna*) occurs on the slopes either side. The surrounding fields are all improved grassland.

TN243: (GR NT 44829, 41980) Running Water.
Channelised section of Gala Water with unmanaged strip either side, supporting tall ruderal and rank False-oat Grass *Arrhenatherum elatius* dominated grassland of limited species diversity. The north bank has scattered willow scrub, including Purple Willow *Salix purpurea* and Grey Willow *Salix cinerea*.

TN244: (GR NT 44840, 41676) Unimproved Neutral Grassland.
Area of damp neutral grassland at base of railway embankment. This is a rank grassland dominated by mixtures of Tufted Hair-grass *Deschampsia cespitosa*, False-oat Grass *Arrhenatherum elatius*, Canary Grass *Phalaris arundinacea* and abundant Meadow-sweet *Filipendula ulmaria*. Associates include Nettle *Urtica dioica*, Crosswort *Galium cruciatum* and Bush Vetch *Vicia sepium*. The bordering scattered trees include mature Ash *Fraxinus excelsior* and mostly semi-mature Sycamore *Acer pseudoplatanus*.

TN245: (GR NT 44865, 41656) Unimproved Neutral Grassland.
Area of rank and unmanaged neutral grassland with apparent encroachment of Rosebay Willowherb *Chamerion angustifolium*. False-oat Grass *Arrhenatherum elatius* and Cock’s-foot *Dactylis glomerata* are dominant, with abundant Black Knapweed *Centarea nigra* and Meadow Vetchling *Lathyrus pratensis*. Associates include Hogweed *Heracleum sphondylium*, Lesser Stitchwort *Stellaria graminea*, Black Medick *Medicago lupulina* and Creeping Thistle *Cirsium arvense*. 

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* natural resource consultancy
TN246: (GR NT 44989, 41559) Unimproved Neutral Grassland. Bed of former rail line formed of ballast with developing neutral grassland. Sward dominated by Red Fescue Festuca rubra and Bent Agrostis sp., with the following associates Dove’s-foot Cranesbill Geranium molle. Restharrow Ononis repens, Harebell Campanula rotundifolia, Black Medick Medicago lupulina and Common St. John’s Wort Hypericum perforatum.

TN247: (GR NT 45280, 41334) Broad-leaved Semi-natural Woodland. Tunnel entrance, now overgrown by secondary broad-leaved woodland dominated by Ash Fraxinus excelsior and Wych Elm Ulmus glabra, with much bare ground and Nettle Urtica dioica below.

TN248: (GR NT 45355, 41162) Unimproved Neutral Grassland. Area of south-facing neutral grassland on slopes above tunnel entrance. This is a rank, unmanaged grassland dominated by False-oat Grass Arrhenatherum elatius and Cock’s-foot Dactylis glomerata, with abundant Black Knapweed Centaurea nigra, Ribwort Plantain Plantago lanceolata and occasional Meadow Vetchling Lathyrus pratensis, Common Sorrel Rumex acetosa, Yorkshire-fog Holcus lanatus, Hogweed Heracleum sphondylium, Lesser Stitchwort Stellaria graminea and Black Medick Medicago lupulina. Scattered scrub Willow Salix sp. and Hawthorn Crataegus monogyna) is present and appears to be encroaching. There is also areas of rock-outcropping and boulders present above tunnel entrance.

TN249: (GR NT 45382, 41093) Broad-leaved Semi-natural Woodland. Open stand of Ash Fraxinus excelsior dominated woodland with Lime Tilia sp. also present on boundary. The understorey is dominated by Rowan Sorbus aucuparia and Goat Willow Salix caprea, with the field layer comprised of ferns (Dryopteris sp.) and tall ruderals.

TN250: (GR NT 49060, 36525) Wall. A high, stepped retaining wall, approximately 6-8m high in good condition with few associated plants, e.g. Wall Rue Asplenium ruta-murcia, and therefore of negligible botanical interest. The flat stepped areas are largely devoid of vegetation, being bare ground and ephemeral/short perennials.

TN251: (GR NT 49214, 36426) Broad-leaved Semi-natural Woodland/Plantation. Steep, south-facing slopes above defunct rail line supporting broad-leaved semi-natural woodland, possibly planted but considered to be semi-natural despite the predominance of exotic species. The stand is dominated by semi-mature Sycamore Acer pseudoplatanus and Ash Fraxinus excelsior, and locally Birch Betula sp. A stand of semi-mature, planted Beech Fagus sylvatica is also present to the east.

TN252: (GR NT 49865, 35789) Broad-leaved Semi-natural Woodland. Stand of secondary woodland, approximately 6-8m high and dominated mainly by Goat Willow Salix caprea, but also including Wych Elm Ulmus glabra and Sycamore Acer pseudoplatanus. The field and ground flora is sparse with much bare ground, but including Wild Strawberry Fragaria vesca, Hogweed Heracleum sphondylium, Bramble Rubus fruticosus agg., Herb-robert Geranium robertianum, Wood Avens Geum urbanum, Nettle Urtica dioica and Ground-elder Aegopodium podagraria.

TN253: (GR NT 49981, 35676) Broad-leaved Plantation. Area of broad-leaved plantation on alignment of defunct rail line planted with a variety of species and probably including some natural regeneration. Trees and shrubs include: Norway Maple Acer platanoides, Sycamore Acer pseudoplatanus, Goat Willow Salix caprea and Snowberry Symphoricarpos rivularis.

TN254: (GR NT 5003, 35622) Broad-leaved Semi-natural Woodland.
The section of woodland along the Gala Water is more natural and includes Common Alder *Alnus glutinosa*, Ash *Fraxinus excelsior*, Wych Elm *Ulmus glabra* and Willow *Salix* spp. The field layer is largely dominated by tall ruderals, but also includes areas with a flora more typical of semi-natural woodland, e.g. Dog’s Mercury *Mercurialis perennis* and Herb-robert *Geranium robertianum* and Wood Avens *Geum urbanum*. Japanese Knotweed *Reynoutria japonica* is frequent along the river bank.

TN255: (GR NT 50251, 35548) Broad-leaved Plantation. Area of woodland considered to be planted with a variety of Willow *Salix* spp., including Purple Willow *Salix purpurea*, Crack Willow *Salix fragilis*, Grey Willow *Salix cinerea* along with Common Alder *Alnus glutinosa* and Grey Alder *Alnus incana*.

TN256: (GR NT 50316, 35520) Semi-improved Neutral Grassland with scattered trees. Flat ground between Gala Water and defunct rail line supporting neutral grassland comprising species-poor sward dominated by False-oat Grass *Arrhenatherum elatius* with abundant Cow Parsley *Anthriscus sylvestris* and Hogweed *Heracleum sphondylium*. Butterbur *Petasites hybridus* and Japanese Knotweed *Reynoutria japonica* both appear to be encroaching from adjacent stands. The scattered trees and shrubs include: Osier *Salix viminalis*, Crack Willow *Salix fragilis* and Common Alder *Alnus glutinosa*.

TN257: (GR NT 50687, 35366) Tall Ruderal. Large stand of Japanese Knotweed *Reynoutria japonica*, which grades into a stand of Butterbur *Petasites hybridus*. 
10.2 Otter (O) Target Notes

O1 CH 3500. Dean Burn runs under a low culvert, approx. 30m long to the east of the proposed line. No signs of Otter noted, but burn had been in spate recently. It flows into the North Esk, where Otter are known to be present. The area will be part of a large temporary compound area, which is largely a grass field. It is recommended that the burn is fenced off with a suitable buffer. No ledge is present in the existing culvert. However, a new bridge/culvert will be built for the new section of line here. There is a possible need for a ledge within the culvert as there is potential for an Otter to come out over the line.

O2 CH 4250. Fresh Otter spraint x 2 on fallen branch, 30m downstream from bridge. UB 12 Glenesk Viaduct. In immediate vicinity of bridge no holt sites and no cover present. Within 30 area of fallen trees are present that could provide lying up sites for Otter. Animal Access is possible under the south side of the bridge at high flow with a bank present. No bank is present on the north side. Plans indicate a drainage outfall pipe entering the downstream side, through an area of woodland. Further rechecking recommended.

O3 CH 4300. Otter footprints in mud near weir. Size 62mm, indicates that of a dog Otter.

O4 CH 6550. River South Esk – Lothian Bridge, UB 18. Potential for Otters on river and for holt sites (desk study records – report Otter on River). Under the viaduct. A thorough survey should be undertaken if works are to be undertaken to the pillar bases, plans indicate that this may be the case. Mink scat found.

O5 CH 11840. Crossing of small burn under rail line through a piped culvert. The water appears to be polluted with iron oxide. Low suitability for Otter. However, given the Gore Water is within several hundred metres and woodland is present that could provide potential lying up sites, it is recommended that a check takes place for any Otter activity 2-3 months before the development work starts. A drainage outfall pipe is being installed.

O6 CH 16250. Culvert under line, more than 50m from line (not checked). Less than 150m from the Tyne Water, where habitat is highly suitable for Otter. Drainage outfall pipe to be installed in vicinity.

O7 CH 16500. Burn set in dense deciduous woodland. Rocky bottom, shallow (no potential for Water Vole, too shaded and no bankside vegetation). The burn is culverted under the current rail embankment. This could act as a barrier to Otter. No sign of Otter noted but very good suitability and within 100m of the Tyne Water and possibility of holt sites within adjacent woodland. Recheck and consider making culvert more suitable for Otter, e.g. with a ledge.

O8 CH 16900. Stone culvert over Tyne water Willowburn Culvert UB36. This has high suitability for Otter, although no evidence was found at the time of the survey. A ledge should be installed in the culvert. A thorough check should be made of the surrounding woodland 2-3 months prior to the development.

O9 CH 18800. Otter spraint on fallen stump in Burn and under bridge. Burn is 2m wide with good vegetation cover and woodland. Bankside good potential for holt sites under roots and fallen trees.

O10 CH 19135. Burn under brick/stone culvert Moss Culvert UB40. Spraint present under bridge. Burn, 2m wide, wooded on the north side, improved pasture on the south side. Roots of Alder trees and fallen trees provide potential lying up sites.
O11 CH 19600. Stone culvert, with small burn. <1m wide (Cakemuir Burn) and shallow, which flows into a second slightly larger burn within 20m. Otter presence confirmed on adjacent burn, and therefore they are likely to use this smaller burn.

O12 CH 19625. Larger culvert than in O11, UB 42 Masonry Arch Culvert, Otter spraint present under bridge and at least 5 separate spraints are present, one very fresh. The Cakemuir burn is very open and there is only very limited potential for holt sites, with little cover present. However, a number of rabbit burrows are present that could be used by Otter. A check is recommended 3-4 months prior to any works taking place. Works to protect stream required.

O13 CH 20050. Old spraint present under culvert. UB43 Cakemuir Culvert. Works to protect stream required.

O14 CH 21925. The Gore Water crosses under the rail line. UB45 to be redecked. A fairly fresh Otter spraint was recorded under the bridge and adult Otter footprints present in mud. Very little potential for holt sites in the immediate vicinity of the bridge.

O15 CH 22200. Gore Water lies parallel to rail line. Gore water flows under a low brick and stone culvert under an adjacent access track, which will be used as an access point. Otter spraint recorded at North side.

O16 CH 22510. Otter spraint present under bridge (wood and steel construction UB 47 to be redecked). The burn runs through Phalaris swamp into agricultural improved fields.

O17 CH 22800. Otter spraint under bridge UB 48 Heriot Culvert. Area to upstream Phalaris swamp and not assessed to have potential for any holt sites. Area downstream (east) contains scrub and swamp and could have potential for temporary lying up sites.

O18 CH 22900. Otter spraint under a very low bridge UB 49 Showstances culvert, to be replaced with a box culvert. Scrub and Phalaris swamp adjacent, no signs of holts. The Gala Water continues to run adjacent to the rail line within 10m for a stretch of several hundred metres. Potential for disturbance impacts. New rail overbridge with extensive works proposed here (former overbridge OB50). Survey recommended along this stretch (22750 to 22900 and 23200 to 23550 and 24300 to 24600) at least 3 months prior to any works.

O19 CH 23050. Old otter spraint and mink scat, on rock in water.

O20 CH 25050. Fresh Otter spraint under low bridge on sign heap on gravel (steel girders and wood). UB52 Little Gala to be redecked.

O21 CH 25525. Old spraints on boulders on corner of River. Potential lying up sites within boulders, approx. 10m from line. Recheck from 25500 to 25750.

O22 CH 26750. UB 53 Crookstone Mill Otter spraint under bridge. 2 old spraints and further fresh spraints on east side.

O23 CH 27150. UB 54 Hollowshank 3 span. Otter spraint under bridge. Upstream the land is grazed to the edge and there are no potential sites for holts. Downstream there is Willow Salix spp. scrub on the west bank with potential for lying up areas. (Dipper nests)

O24 CH 27650. UB 56 Bower Bridge. Extensive sprainting under the bridge, including quite fresh spraints including under adjacent brick arch culvert. A good riparian edge of approx. 10m width is present with tall ruderal and Alder/Willow scrub. There is some potential for lying up sites either side of the bridge.
River – good potential for holt sites. Good habitat – trees, tall ruderal vegetation.

**O25 CH 28650.** UB 58 (to be repaired). Otter spraint under small bridge over Still Burn.

**O26 CH 29300.** Shallow burn – Pirntation Burn, less than 1m wide, running along south edge of line (from CH 28900 to 29550). Fenced off from grazing and dominated by *Juncus effusus*. Potential as an Otter travelling route. Also potential for Water Vole. Plans indicate repairs to banks.

**O27 CH 29450.** Otter spraints on corner on Gala Water on rail-side. This stretch has undercut banks with mature Alder trees. Potential for holts sites under banks and within thick vegetation. Further checking recommended. Plans indicate repairs to banks from 29300 to 29400.

**O28 29550 (32).** Culvert with Pirntation burn under rail line. No signs of Otter but good potential. The culvert is circular (steel pipe) with no ledge and there is potential for rail deaths.

**O29 CH 29450.** Old Otter spraint under bridge UB 60 Plenploth North Water. Mink scats present as well. Bird nests – probably Dipper present in bridge. Upstream there is no potential for holt sites, the area is open with no trees. Downstream within areas of Willow *Salix* spp. and Alder *Alnus glutinosa* there is potential for lying up sites, 20m from bridge in piles of flood debris.

**O30 CH 30850.** UB 61 Torquhan South – 3 span. Bridge with a stone base and steel girders. In immediate vicinity of bridge there is no potential for holt sites upstream or downstream. 50m beyond the bridge downstream there were wooded banks and a wooded slope with potential for holt sites. Works proposed to redeck east side and installation of a drainage channel.

**O31 CH 31150.** UB62 Pirn Cattle creep. Low bridge over burn, stone wall, steel. Mink scat present, potential for Otter. From CH 31200 to 31300 on Gala water works are proposed to river banks.

**O32 CH 31650.** Very old spraint on rock. The River is approx. 10m wide and shallow with a stony substrate. Low banks with very little cover and no obvious potential for holt sites. From CH 31600 to 31750 the River runs within 30m of the line and works are proposed to secure against scour to the banks.

**O33 32100.** UB64 Culvert. Dean Burn runs under bridge. No signs of Otter, could be used as a travelling route.

**O34 CH 32250 - 32450.** Gala Water within 20m of line. Surrounding habitat improved grazed fields and low potential for holt/lying up sites, although the rail embankment is covered in scrub and works proposed to the river banks to be protected here and further survey recommended.

**O35 CH 32800.** UB66 Weatherstone 2 span. Bridge over Gala Water at Ford. No signs of Otter. Some potential for holts sites downstream within Willow scrub. Upstream the banks are grazed and there is little cover.

**O36 CH 33250.** UB67 Galabank. Bridge over Gala water. No signs of Otter. Surrounding habitat is tall ruderal and improved grass. Rail banks covered in dense scrub and survey is recommended in winter to check for the presence/absence of holt sites.
O37 CH 33700 - 34000. The Gala Water runs very close to the rail embankment. The bank is bordered with trees and undercut banks are present with potential for holt sites less than 30m from the rail embankment. Thick Snowberry *Symphoricarpus albus* is present on the banks with numerous rabbit holes. The vegetation on the banks meant that it was too thick to survey in the summer. Works proposed to the riverbanks and the slope to be protected and drainage installed. Survey is recommended in the winter.

O38 CH 34150 – 34350. Gala Water very close to rail line. Thick scrub and Snowberry *Symphoricarpus albus* present. Works proposed to protect the river banks here. Survey is recommended in the winter.

O39 CH 35650 - 36100. The bank on the rail side has very thick vegetation, is steep and has potential for lying up suites. The north side has scattered trees and improved grassland and runs next to the river. Works proposed to protect the banks. Survey is recommended in the winter.

O40 CH 36500. UB70 Lugate Water. Old Otter spraint under bridge. Only very limited potential for holt sites and resting up sites downstream. Set in improved grazed fields and dry span for animals present under the bridge.


O42 CH 38600. UB 74 Bowshank North. Bridge stone brick sides, steel span and wooden planks. Mink scats and footprints.


O44 CH 39300. Railway embankment immediately adjacent to the River. Many Rabbit holes that could be used by Otter. Fresh spraint on tree next to River. Works proposed to River bank between 39200 to 39350.

O45 CH 39350. Lying- up site, approximately 40m from centre of line. Cavity present under Sycamore *Acer pseudoplatanus* tree at bottom of embankment. No tunnels extending back. Spraints present. Other suitable sites present along River and embankment, which are within 30m of the rail line. River bank to be protected in this area – further assessment needed.

O46 CH 40150. Gala Water runs along and parallel to the River at the bottom of a wooded banks with thick tall ruderal vegetation and shrubs, including Snowberry *Symphoricarpus albus*. Impossible to access from bank. Further survey is recommended accessing from the River from 40000 to 40600 where works to the River bank are proposed.

O47 CH 41350. River runs close to rail line. No obvious lying up sites. Some mature Alder *Alnus glutinosa* trees are present along the bank and numerous fresh Otter spraints on tree roots (*Ash Fraxinus excelsior*). Rabbit holes are also present. Further survey from 41270 to 41400 is recommended during the winter. Works to the riverbank to be protected and a drainage outfall proposed here.
O48 CH 41450. UB82 Whittlee culvert. Burn likely to be used by Otter runs under bridge. No ledge present.

O49 CH 41925. UB84 Whin Water. Fresh Otter spraint present just downstream under bridge. Good tree cover both upstream and downstream and potential for lying up sites. None identified. Mink scat present. Drainage pipe proposed here.

O50 CH 42150 - 42352. Section of the Gala Water runs close to the railway. Low suitability for lying up/holt sites. Low banks and grazed. Trees semi-mature Alder *Alnus glutinosa* and no sites seen. Rabbit holes are present within scrub, that could provide lying up sites. Works are proposed to protect the riverbank here.

O51 CH 43100. Old Otter spraint on burn runs through low culvert within woodland. A brick arch drainage outfall pipe is proposed.

O52 CH 43200. Missing bridge. UB 87 Torwoodlee Water. Good potential for Otter holts. Tall vegetation and woodland and rocks on west bank.

O53 CH 43225. Otter lying up site. Strong path out of River. Good lying up area on bank under stone/mud undercut and path coming our of river. No spraints found. Spraint present a further 5m downstream. Lying up site within 5m of bridge. Extensive works proposed in this area due to construction of new bridge.

O54 CH 43600. No bridge over River. UB 92 Ryehaugh. Banks under bridge are built with concrete gabions. Little potential for holts. 10-15m beyond bridge, more suitable habitat exists for lying up areas with thick vegetation and wooded banks. Extensive works proposed.

O55 CH 44450. UB95 Klinknowe 3 span bridge over River. Thick vegetation underneath with potential lying up areas within wooded banks. Access could not be made down to the River. Embankment works proposed in the area.

O56 CH 44900 – CH 45000. Thick vegetation next to the River, which is 20-30m from the line. Could not access fully. Potential for lying up sites. Further survey required from 44900 to 45000, works proposed to protect the river banks.

O57 CH 46350. River runs adjacent to line. Generally works do not appear to come within 20m of the river. However there are extensive earthworks and a number of drainage pipes proposed in the area. Access was difficult and there area was not surveyed fully. Further survey recommended in winter in areas where drainage pipes are proposed.

O58 CH 46400 Large masonry arch viaduct/bridge over River UB104 Red Bridge span. 1x fairly old spraint found on east bank. Could be temporary lying up sites present in tall ruderal vegetation, and Japanese Knotweed *Fallopia japonica* stands. Areas of fallen trees and flood debris are present. Current human disturbance present from fisherman.
10.3 Bats (BT) Target Notes

**BT1 CH 3500.** Culvert with burn through it runs under line. 2m high, brick line with only a few gaps present. Good potential for roosting sites. Well pointed and part stone lined. Good foraging and surrounding habitat of woodland and water. This section will not now be directly affected due to the re-routing of the line.

**BT2 CH 3650.** Stone/brick bridge over line. 30 m long, 8-10m high, and second smaller arch to west – stone, over ephemeral flooded area. Well pointed throughout. Low suitability.

**BT3 CH 3800.** Some large mature Beech trees in woodland. Set back from line, but overhanging that may require felling. Good potential for roost sites. Plans indicate that the slopes are to be de-vegetated.

**BT4 CH 4250.** Bridge over River – Glen Esk Viaduct UB12. Ideal foraging. Very high bridge (40m) stone, with high arches. Exposed and well pointed but good surrounding habitat. Good suitability for roost sites. Mature trees in adjacent woodland potential roost sites.

**BT5 CH 4600.** OB13 Melville Road. Stone pillars and brick arch bridge over line. Well pointed with few gaps in brick work. Gaps present in facing, although stone work generally well pointed. Good suitability.

**BT6 CH 4700.** OB14. Lasswade Road. Stone arch pillars bridge over line. 5m high. Brick in main part. Well pointed. Good suitability.

**BT7 CH 4700** Potential wintering and non-breeding roost in a couple of stone out buildings, damp with cracks and crevices. Present on old station platform which is likely to be removed. Good suitability.

**BT8 CH 4800.** OB15 Bonnryigg Road. Stone bridge over line. 5m high. Few cracks and crevices and well pointed. In stone faces gaps are present, in particular on the south side. Cool and shaded position. Set in low cutting, with some mature deciduous woodland and scrub. Potential foraging and roost sites in surrounding house. Good suitability.

**BT9 CH 6400.** UB17 Dalhouise Mains. Stone Bridge under line with road under bridge. Surrounding habitat woodland and close to River South Esk. Potentially Good suitability.

**BT10 CH 6660-6830.** UB18 Newbattle Viaduct. Large Viaduct. Stone pillars with brick arches. Very few cracks and crevices. Quite exposed. However good surrounding habitat. Good potential for non-breeding roosts.

**BT11 CH 7000.** Builders Yard – Not accessed – fenced off. Concrete shed (corrugated roof) and a house, part derelict and demolished, with a tiled roof. Good potential roost sites within the house e.g. for Pipistrelle. Good surrounding habitat. Further survey., plans indicate these will be acquired and therefore assumed demolished.


**BT13 CH 8100 – 8400.** Good bat foraging habitat, including scrub, woodland and tall ruderal, set in a cutting. Most of the vegetation is likely to be lost.

BT15 CH 8500. Concrete signal box NT 3321863240. Open and exposed and no signs noted. Cobwebs and ivy over any cracks or crevices. Low suitability.

BT16 CH 8520. Low (<2m) stone culvert through the hill (length X m) with small burn running through. Excellent potential for non-breeding and hibernation sites. No through draft and appears to have a fairly stable micro climate and be fairly humid. Temporary access works needed near the entrance, no works shown to tunnel. Excellent Suitability.

BT17 CH 9150. OB21 Redhaugh Farm Road. Stone and steel girders over line. Very few cracks and crevices no signs seen. Low suitability.

BT18 CH 9244. Old concrete signal box. A few crevices are present around the edges. It is very open and exposed. No droppings or signs of bats seen. Low suitability.

BT19 CH 9450. OB22 Povert Road. Bridge over line constructed of stone and brick work which is well pointed and with very few crevices. No signs seen and surrounded by immature woodland and scrub. Low suitability.

BT20 CH 9650. Fairly mature Beech and Lime trees on the route of the line. Good potential for roost sites. Survey recommended. The vegetation and trees are to be cleared to the minimum safe corridor. The bridge here has been filled in, former OB23 which is to be replaced.

BT21 CH 9600 – 10900. Excellent foraging through woodland of Gore Glen Park and on the east side of the A7 crossing. The vegetation and trees are to be cleared to the minimum safe corridor and there will be a loss of trees. In general the trees are to immature to provide suitable roost sites.

BT22 CH 11120. OB 25 Station Road. Brick and steel construction bridge over the rail line. No suitable cracks or crevices identified. Low suitability.

BT23 CH 11200. 8 Houses to be removed for rail car park. These should be checked for bats prior to demolition. Good potential for roost sites.

BT24 CH 11420. Brick lined stone bridge over the rail line. No suitable cracks or crevices identified. Low suitability.

BT25 CH 12475. OB29 Fushiebridge Stone bridge taking road over rail line. Some cracks and crevices present within the stonework. Excellent foraging habitat in the vicinity with sheltered woodland and scrub rich with insects. Good potential as a roost site.

BT26 CH 12450. Stone built house (Standpretty) with a slate roof and hanging tiles providing many potential roost sites. Not directly affected by the development. No further survey recommended.

BT27 CH 12600. Old signal box (NT 35832 60233). Concrete open structure with no doors or windows. Cracks present above the window frames that have some suitability as roost sites, no signs noted. Very low suitability as a maternity roost. Could be used by one or two non-breeding bats at any time of year. Low suitability.

BT28 CH 12750. Granary House and adjacent buildings at Catcune. Very good suitability for bats, complex slate roof providing many cracks and crevices. Adjacent houses also have
good suitability with slate hanging tiles, wooden soffits all providing potential roost sites. The surrounding habitat provides good potential foraging habitat with scrub, woodland, grazed fields, hedgerows and within several hundred metres of the Gore Water. Not directly affected by the development. No further survey recommended.

**BT29 CH 13000.** OB30 To be removed and replaced with an off-line skewed structure. Bridge above line, part in-filled with earth. A very low gap remains between the earth and the ceiling. Cracks and crevices present. Reduced suitability as the drop down for bats out of the roost site is unlikely to be high enough. Could be used for one or two non-breeding bats particularly in autumn/winter. However, surrounding habitat, in particular to north, provides very good foraging potential with sheltered vegetation and tall ruderal vegetation providing a good source of insects. Good suitability.

**BT30 CH 13060.** Farm buildings with slate roofs, that won’t be directly affected by the development. Moderate potential for bat roosts but no further survey recommended.

**BT31 CH 13400.** NT 35919 59750. UB 31 Masonry arch bridge, to be repaired and waterproofed. Stone built arch bridge under railway. Few potential cracks or crevices identified. However, good surrounding habitat and within 150 metres of the Gore Water. Desk Record of bats emerging from column at this bridge. Further survey recommended.

**BT32 CH 13800.** and surrounding area. Good foraging area. Line set in cutting with Hawthorn *Crataegus monogyna* scattered scrub and grassland and close to Gore Water. Potential flyway, in particular for Pipistrelle.

**BT33 CH 141250.** OB 32 Thorniehill Stone bridge over rail line. Some suitable holes. Habitat fairly open. Good to Low potential further survey recommended.

**BT34 CH 14900.** Stone Bridge structure under line. UB 33 Borthwick mains. Very limited bat roost potential with no identified crevices. Low potential.

**BT35 CH 15520.** Bridge over line OB 34. Steel girders, wood. Damp. Low suitability. To be re-decked.

**BT36 CH 16200.** Masonry arch culvert. Culvert under line, more than 50m from line (not checked). Likely good potential for roost sites, further survey recommended.

**BT37 CH 16475.** Culvert over burn with good potential for roost sites.

**BT38 CH 16650.** Bat foraging habitat adjacent to Maggie Bowies Glen. Very good suitability, mature trees and woodland, sheltered in embankment area. Some mature trees to be removed here. Check any mature trees from CH 15250 – 16150.

**BT39 CH 16900.** Stone culvert over Tyne water Willowburn Culvert UB36. Tyne Water runs through stone culvert under rail line. A burn joins from the side. Although the culvert appears to be well pointed with few crevices a thorough search was not made and the culvert was not accessed for safety reasons, as it is at least 100m long. Surrounding habitat suitability is excellent with mature deciduous woodland and riverine habitat. Good potential as a roost site including for night roosts. Further survey recommended.

**BT40 CH 17675.** Tynehead Bridge OB38. Stone and brick construction. Quite a number of gaps within the stonework. No signs of bats noted, but the bridge has good potential. Bridge set in cutting of tall ruderal vegetation, surrounded by grazed and arable fields and scattered scrub and woodland. Good suitability, further survey recommended.

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natural resource consultancy

V3: 8/04/03

124
BT41 CH 18750. UB 39 Cowbradhill masonry brick arch culvert. Low bridge over burn. Very good potential for roosting sites within holes within stone and brickwork. Good surrounding vegetation and woodland for foraging. Habitat to north also provides high quality foraging. Habitat to south is more open and less suitable. Excellent potential for roost sites – further survey recommended.

BT42 CH 19230. OB 41 Old Moss Brick Arch Stone and Brick Bridge above rail line. Numerous holes in brick work providing potential cracks and crevices. Located in a relatively open section of the line with few trees. Good suitability – further survey recommended.

BT43 CH 19585. Low Stone culvert (<2 m high) with burn running under rail line. A good number of cracks and crevices are present and good potential for roosting sites – particular autumn and winter roost sites. Further survey recommended.

BT44 CH 19625. UB 42 Masonry arch culvert. A culvert close to BT43, is very low suitability, is draughty and has virtually no cracks or crevices.

BT45 CH 19995. UB43 Cakemuir culvert. Brick bridge. No cracks or crevices visible that could provide roosting sites, although good surrounding habitat.

BT46 CH 22200. Potential roosting sites (autumn/winter) in brick and stonework in low culvert, off line, but above proposed temporary access route. A number of good cracks and crevices are present. Surrounding habitat is fairly open grazed grassland/moorland with few trees present.

BT47 CH 21600 – 24100. Very open occasional scattered scrub, Hawthorn Crataegus monogyna. Sheep and cattle grazed pasture. Line set on a slight embankment. Low suitability for bat foraging. There are a number of bridges along this stretch over small burns. These are all of low suitability with steel girders and damp wood.

BT48 CH 24250 - 24600. The line is surrounded by scrub and tall ruderal vegetation and areas of wetland/swamp adjacent to the line. Good suitable foraging.

BT49 CH 25045. Bridge over Gala Water. Good potential for non-maternity roost sites.

BT50 CH 25550 – 26650. Section quite exposed, scattered Hawthorn Crataegus monogyna scrub. Water fast flowing. Surrounding habitat includes pockets of deciduous and more extensive coniferous woodland and the Gala water.

BT51 CH 26735. Bridge over Gala water. Water quite fast flowing and grazed up to the edges providing moderate quality foraging. Good potential for non maternity roost sites.

BT52 CH 26800- 26950. Moderate quality foraging. Areas of trees and scrub are present, in cutting surrounded by deciduous woodland. Some mature Beech trees at the top of the embankment. Potential bat roost sites within the trees and should be checked if to be felled.

BT53 CH 27115. UB54 3 span Hollowshank. To be redecked. Bridge with steel girders and wood – damp. Low suitability for summer roost sites. Good potential for autumn or winter roost and night roosts.

BT54 CH 27630. UB56 To be redecked. Bridge with steel girders and damp wood. Low suitability for summer roost sites. Some good potential for autumn or winter roost and night roost sites. Excellent potential foraging habitat along this section of the Gala water.


BT57 CH 29450. Open section, low grade foraging. When line approaches River, the area becomes more wooded and provides more suitable foraging. Trees on line semi-mature European Lime.

BT58 CH 29885. OB59 Plenploth high brick arch. Bridge over line, stone built and generally well pointed, with brick arch. Several good potential holes for bats on north side no evidence seen. Surrounding habitat of woodland, improved grassland adjacent to the River.

BT59 CH 30340. UB60 Plenploth North Water (to be redecked). Bridge steel girders with damp wood planks. Low suitability for maternity bat roosts, although cracks and crevices are present in the stone, providing possible good non-maternity roosts. Over the Gala water providing good foraging. Surrounding area gazed land and scattered scrub.

BT60 CH 30825. UB61 Torquhan South. (to be redecked). Bridge over Gala water, stone base with steel girders and damp wood planks. Low suitability for maternity bat roosts, good potential for non-maternity roosts. Woodland adjacent. Probable Dipper bird nests noted in girders.

BT61 CH 31150. UB62 Pirn cattlecreep. Low bridge stone, wood and steel construction over ditch/burn.

BT62 CH 30900 – 31900. Section on raised embankment, scattered trees and hawthorn scrub. In general low suitability for bat foraging. The most suitable areas are at the river crossings and along the wooded banks. Scattered small blocks of semi-mature woodland are present.

BT63 CH 32075. UB64 Culvert. (to be redecked). Burn runs under line. Stone, steel girder wood construction. No signs of bats noted.

BT64 CH 32770. UB65 Weatherstone. Rail bridge over Gala Water at Ford, to be redecked. Stone, steel girders and wood plank construction. Damp and low suitability for maternity roosts. Potential for night and non-maternity roosts. The river is shallow and fast flowing. Potential for foraging in slower flowing areas.


BT66 CH 33800. Embankment of open and low scattered scrub. Good habitat next to River for foraging, but more limited along line.

BT67 CH 34865. Brick built bridge over the line. Very few cracks and crevices, no signs noted. Low suitability. OB68

BT68 CH 36400. Bridge under line of steel, wood and brick. Low suitability no signs. UB69

BT69 CH 36500. Steel, wood and brick bridge. UB70. Low suitability for maternity roosts. Potential for night and non-maternity roosts. Larger span and more cracks and crevices.
Between BT 68 and BT 69 and beyond, good surrounding habitat of woodland mature Lime trees with some suitability for roosts.

**BT70 CH 37260.** Bridge – farm access. UB71. Stone, brick and steel. Damp. No signs little potential. Surrounding habitat fairly open.

**BT71 CH 37820.** UB72 Bridge – stone pillars, steel girders, wooden planks, damp. No signs of bat roost. Low suitability for maternity roosts. Potential for night and non-maternity roosts. To be redecked.

**BT72 CH 38290.** Small low access (sheep) culvert, stone. Very well pointed. No cracks or crevices. No signs of bats or bats found. Low suitability.

**BT73 CH 38535.** Access sheep tunnel/Flood relief culvert. Stone sides with a concrete roof. No suitable holes identified. Low suitability.

**BT74 CH 38590.** UB74. Bridge over Gala water, stone and brick sides. Steel girders and wooden planks. To be repaired. Some good potential for bats roosts at sides within stone end pillars. Cracks and crevices are present. Very good foraging habitat over River, water slow flowing and still here. Adjacent mature deciduous woodland.

**BT75 CH 38775.** Bowshank Tunnel 200 hundred metres long through hill. Relatively sheltered with a good microclimate for non-breeding roosts and potential for hibernation sites. Surrounding habitat is excellent with mature deciduous woodland, river valley and grazed pasture. The tunnel runs through the hillside and was not accessed for health and safety reasons. It is brick-lined and fairly well pointed. At intervals along the tunnel are a number of alcoves in the side walls. These are brick lined and narrow at the top to provide highly suitable cracks and crevices as potential roost sites. A search of the tunnel was not made as confined space entry is likely to be required. Excellent potential, further survey recommended.

**BT76 CH 38970.** UB77 Bowshank South Bridge over Gala water surrounded by woodland. 2 layers of wood with steel girders – to be repaired. Damp. Some good potential for non-breeding bat roosts, especially given highly suitable surrounding habitat. Further survey recommended.

**BT77 CH 39240.** Good potential for roost sites in face of brick high culvert in dry drainage holes. A number of holes are present in the brick 7cm x 5cm. Close to River and woodland. Further survey recommended.

**BT78 CH 39420.** OB79 Harpers Masonary Arch. Stone bridge over rail line. Several good potential roost holes in north span. Good foraging and commuting habitat along the line. Further survey recommended.

**BT79 CH 39800 – 39850.** A number of mature Ash trees along the line at the bottom of the embankment. Bat survey recommended if these trees are to be felled.


**BT81 CH 40825.** Stone bridge over rail line which is in a cutting. OB81. Whitlee Masonry Arch. Good potential for foraging with wooded banks on one side, grazed pasture the other. Small cracks and crevices in stone with potential for roosts. Further survey recommended.
BT82 CH 41000 – 42100. Excellent bat foraging and commuting along route. Woodland, sheltered tall ruderal vegetation and adjacent cattle grazed land.

BT83 CH 41250. Bat seen flying in day along woodland along rail line. Likely to be a young Pipistrelle sp.

BT84 CH 41420. UB82 Whitlee Culvert. Bridge over Burn. Good surrounding foraging habitat. Wooden planks, steel girders and stone pillars. Damp. A number of mature Ash and Alder trees with potential roost sites. Further survey recommended if these are to be felled.

BT85 CH 41455. UB83 Whin. Bridge over line. Stone pillars, wood. A few gaps present in stone and between wood planks. Quite damp and not suitable for a maternity roost. Good surrounding habitat, woodland continues along the line and is mostly immature Ash and Sycamore. Stone/brick walls are also present along the embankment, again with some potential suitability for bat roosts.

BT86 CH 41900. UB84 Whin Water. Bridge under line - stone, steel wood. Damp and low suitability for maternity roosts, good potential for non-breeding roosts. Good surrounding habitat.

BT87 CH 42550. Large stone viaduct over line. Very high and exposed. Reasonably well pointed and relatively low suitability for bat roosts although a more detailed check is recommended. Potential for non-breeding roosts. Good surrounding habitat including mature trees with potential for roosts. Plans indicate that mature trees are to be removed – further survey and checking recommended.

BT88 CH 43110. Culvert under line over a small burn. Bat roost identified. Culvert <2m high. Stone with steel girders running along the stone. Some cracks and crevices in the stone and also behind the steel girders. Droppings found underneath this, on floor (collected). Probable Daubenton’s bats Myotis daubentonii. Analysis of Bat Droppings. Trichoptera (caddis flies) and Chironomidae (non-biting midges) constituted the bulk of the diet, confirming the droppings were from either Pipistrelle or Daubenton’s bats. There was no evidence of gleaned prey, thus ruling out both long-eared and Natterer’s bats. In addition, the following were also found:-Cyclorrhaphan flies, hemipteran bugs (from several forewings and one entire hind leg which was definitely from a water boatman (Corixidae)), stonefly (Plecoptera) and a few scales from a small moth. The water boatman and the stonefly confirm that the bat species involved is almost certainly Myotis daubentonii.

BT89 CH 43195. UB88 – Masonry arch flood relief span - access tunnel parallel to River. Approx. 2 m high. Some cracks and crevices within stonework. A through draft, fairly open. Good surrounding woodland habitat along River. Excellent potential for night roosts and non-breeding roosts for Daubenton’s bats Myotis daubentonii.

BT90 CH 43285. Brick arch tunnel- Torwoodlee Tunnel. No access – fenced off. Situated in a cutting, surrounded by excellent foraging habitat for bats – mature Oak trees on south embankment - woodland and River. Lining of tunnel to be repaired and cutting to be cleared of trees. Further survey recommended.

BT91 CH 43390. UB90 – Buckholm Mill Lade Masonry Arch culvert. Low 1.5m wide, 20ft long culvert under the rail line - stone. Further survey recommended. Excellent potential for bat roosts. Lots of cracks and crevices and good suitable habitat. Possible roosts for hibernation and non-breeding.
BT92 CH 43470. UB91 Rye Haugh Dry Masonry Arch. High (30ft) stone/brick culvert. Arch exposed and a through draft. A few holes in stonework. Lower suitability.

BT93 CH 44025. OB93 Kinknowe Farm – masonry arch. Bridge, stone pillars and brick arch over line. A few cracks and crevices. No signs. Quite exposed. In low cutting surrounded by woodland and scrub.

BT94 CH 44480. UB95 Kinknowe. Stone pillars and solid steel span over Gala Water. Low suitability for maternity roosts. Access could not be made under the bridge. Potential for night and non-breeding roosts. Good surrounding foraging along track and Gala Water. Surrounded by Sycamore trees and sheltered.

BT95 CH 45355. Stone tunnel (aprox. 100m) over rail line with road over top. OB100 Buckhomsde. Drainage slots in side approx. 6 feet high. Very good potential for roosts although surrounding foraging habitat is not high quality. No signs noted in brief search. Further survey recommended.

BT96 CH 46100. Derelict buildings adjacent to line. Potential for roosting sites. Derelict factory, formerly Gladstone’s K.B. Cloth Finishers, situated in Currie Road Industrial Estate. Main part of factory is now open with some walls missing, and consists of simple concrete construction with stone and wooden finishing on flat roof. Part of building suffered from fire damage. Some limited potential for Bat roosts.

Currie Road Industrial Estate/Langhaugh Industrial Estate – various buildings of varied age and construction contained within these two industrial estates, including modern prefabricated units and traditional stone (sandstone) built buildings with pitched slate roofs. Many potential Bat roosts, with suitable foraging habitat provided by adjacent woodland and Gala Water.

In addition 3 houses to be demolished which may have potential for bat roosts.

BT97 CH 46850. Low bridge under rail line providing pedestrian access. Wood planks with steel girders. Damp. Low suitability. Surrounded by urban, woodland and scrub. Within several hundred metres of the Gala water.

BT98 CH 47675. FB102B. Concrete pedestrian Bridge over line and Gala water – to be altered. No obvious cracks or crevices. Very good habitat and potential for night roosts and for foraging. Gala Water provides potentially excellent commuting route for Bats, and the presence of areas of slow flowing pools may specifically provide foraging habitat for Daubenton’s Bats. In addition, the planted woodland associated with the former rail line and the semi-natural woodland associated with the river corridor provide potential Bat foraging habitat. There is a general lack of mature trees and therefore limited potential tree roosts.

BT99 CH 48300. UB104 – Red Bridge. Large stone bridge with four arches over River. Excellent bat foraging along River with potential for roost in pillars. Bridge appears to be well pointed. Due to very suitable habitat – further survey recommended.

BT100 CH 1130. Broad-leaved woodland edge offering potential Bat foraging/commuting habitat. Trees of insufficient age to offer potential for Bat roosts.

BT101 CH 1600. 2 buildings with old slate roofs with gaps offering potential for Bat roosts. In addition, the old school house has wooden louvres near to the apex of the gable end allowing potential entrance to Bats. Will not be directly affected and therefore no further survey recommended.
BT102 CH 1670. 1960s house with gaps above the lintels of the first storey windows where the cladding has come away, offering potential for Bat roosts. Will not be directly affected and therefore no further survey recommended.

BT103 CH 1810. Building with old, elaborately shaped roof with gaps, offering potential for Bat roosts. Will not be directly affected and therefore no further survey recommended.

BT104 CH 1830. Old farm buildings to be demolished to accommodate new line. Access to these buildings was not possible but these should be checked prior to demolition for potential Bat roosts. Intact, mature hedgerow offering potential Bat foraging/commuting habitat.

BT105 CH 2140. Public house (Cockatoo Inn) with facia boards around the top of the outside walls. There are gaps between these boards and the walls, offering potential for Bat roosts. Will not be directly affected and therefore no further survey recommended.

BT106 CH 2280. Stone constructed, arched railway bridge under the road which will removed to accommodate the new line. The stones are poorly pointed in places with gaps offering potential for Bat roosts.

BT107 CH 2640. Large wooden garage/store with corrugated roof in good condition but with gaps allowing potential access to Bats. Will not be directly affected and therefore no further survey recommended.

BT108 CH 2660. House with facia boards at gable ends. There are gaps between these boards and the walls, offering potential for Bat roosts. In addition, the cladding has fallen away in places offering potential for Bat roosts. Will not be directly affected and therefore no further survey recommended.

BT109 CH 3350. Broad-leaved woodland edge offering potential Bat foraging/commuting habitat. Trees of insufficient age to offer potential for Bat roosts.
11 APPENDIX II COPIES OF CONSULTATION RESPONSES
Annex G

Archaeology
<table>
<thead>
<tr>
<th>Description and Address</th>
<th>Category</th>
<th>NGR</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;Chalfont, formerly Newton Manse&quot;</td>
<td>B</td>
<td>NT 3216 6959</td>
</tr>
<tr>
<td>Sheriffhall Dovecot</td>
<td>B</td>
<td>NT 3204 6792</td>
</tr>
<tr>
<td>&quot;Sheriffhall Farmhouse, including steading and walled garden&quot;</td>
<td>B</td>
<td>NT 320 679</td>
</tr>
<tr>
<td>1-4 Dalhouseie Mains Cottages</td>
<td>C(S)</td>
<td>NT 3250 6508</td>
</tr>
<tr>
<td>&quot;Arminst Polices, Rustic bridge over Gore Water&quot;</td>
<td>B</td>
<td>NT 3312 6188</td>
</tr>
<tr>
<td>Brewers Bush</td>
<td>C(S)</td>
<td>NT 3308 6330</td>
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<tr>
<td>&quot;Dalhousie Mains, farmhouse and steading including gate piers and boundary wall&quot;</td>
<td>B</td>
<td>NT 3236 6498</td>
</tr>
<tr>
<td>&quot;Gorebridge, Engine Road, Emily Bank, including gates, gate piers and boundary walls&quot;</td>
<td>C(S)</td>
<td>NT 3374 6208</td>
</tr>
<tr>
<td>&quot;Kirkhill Hotel, formerly Kirkhill House, including railings&quot;</td>
<td>B</td>
<td>NT 3286 6216</td>
</tr>
<tr>
<td>&quot;Kirkhill Lodge, including gate piers, railings and boundary walls&quot;</td>
<td>C(S)</td>
<td>NT 3346 6207</td>
</tr>
<tr>
<td>&quot;Millbank House, including ancillary structures, walled garden gates, gate piers and boundary walls&quot;</td>
<td>C(S)</td>
<td>NT 3365 6174</td>
</tr>
<tr>
<td>&quot;Newton Grange, 21 &amp; 23 Murderdeen Road&quot;</td>
<td>C(S)</td>
<td>NT 3322 6404</td>
</tr>
<tr>
<td>&quot;Newton Grange, Lady Victoria Colliery&quot;</td>
<td>A</td>
<td>NT 3335 6355</td>
</tr>
<tr>
<td>&quot;Newtonlo, Hunterfield Road, Newtonloan Lodge&quot;</td>
<td>B</td>
<td>NT 3365 6268</td>
</tr>
<tr>
<td>&quot;Newton Loan, Toll House&quot;</td>
<td>C(S)</td>
<td>NT 3342 6309</td>
</tr>
<tr>
<td>Redhouse farmouse and steading including</td>
<td>C(S)</td>
<td>NT 3313 6257</td>
</tr>
<tr>
<td>&quot;Dalkeith, KingÆEs gate and Lodge&quot;</td>
<td>A</td>
<td>NT 3220 6769</td>
</tr>
<tr>
<td>17 Lugton Brae</td>
<td>C(S)</td>
<td>NT 3270 6678</td>
</tr>
<tr>
<td>&quot;19 Lugton Brae Old Parsonage, with boundary wall and gate piers&quot;</td>
<td>B</td>
<td>NT 3268 6766</td>
</tr>
<tr>
<td>&quot;Gilmerton Road, Glenarch, lodge and gate piers&quot;</td>
<td>C(S)</td>
<td>NT 3230 6700</td>
</tr>
<tr>
<td>&quot;Gilmerton Road, Glenarch, summerhouse&quot;</td>
<td>C(S)</td>
<td>NT 3233 6712</td>
</tr>
<tr>
<td>Glenesk Railway Viaduct</td>
<td>A</td>
<td>NT 3237 6713</td>
</tr>
<tr>
<td>&quot;Ironmills Park, Ironmills, cartshed range&quot;</td>
<td>B</td>
<td>NT 3264 6707</td>
</tr>
<tr>
<td>&quot;Ironmills Park, Ironmills, iron mill&quot;</td>
<td>B</td>
<td>NT 3261 6705</td>
</tr>
<tr>
<td>&quot;Ironmills Park, Ironmills, MillerÆEs House&quot;</td>
<td>B</td>
<td>NT 3261 6706</td>
</tr>
<tr>
<td>&quot;Ironmills Park, Memorial Bridge&quot;</td>
<td>B</td>
<td>NT 3268 6702</td>
</tr>
<tr>
<td>&quot;Ironmills Park, Pavillion&quot;</td>
<td>B</td>
<td>NT 3262 6727</td>
</tr>
<tr>
<td>&quot;Eskbank, St DavidÆEs Church (RC), with boundary walls.&quot;</td>
<td>A</td>
<td>NT 3283 6693</td>
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<tr>
<td>&quot;Station Road, former Eskbank and Dalkeith Station, footbridge and platforms&quot;</td>
<td>B</td>
<td>NT 3239 6667</td>
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<tr>
<td>5 and 7 Station Road</td>
<td>C(S)</td>
<td>NT 3241 6663</td>
</tr>
<tr>
<td>&quot;1 Eskbank Terrace, Tor Lodge&quot;</td>
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<td>NT 3279 6662</td>
</tr>
<tr>
<td>&quot;Eskbank, 2 Avenue Road, Strathesk, with boundary walls and gate piers&quot;</td>
<td>B</td>
<td>NT 3255 6678</td>
</tr>
<tr>
<td>&quot;36 Eskbank Road, with boundary walls and gate piers&quot;</td>
<td>C(S)</td>
<td>NT 3265 6690</td>
</tr>
<tr>
<td>&quot;40 Eskbank Road, Elm Lodge, with boundary walls and gate piers&quot;</td>
<td>B</td>
<td>NT 3263 6684</td>
</tr>
<tr>
<td>&quot;42 Eskbank Road, Mayfield Lodge&quot;</td>
<td>C(S)</td>
<td>NT 3260 6682</td>
</tr>
<tr>
<td>&quot;44 Eskbank Road, Woodville&quot;</td>
<td>B</td>
<td>NT 3259 6679</td>
</tr>
<tr>
<td>&quot;46 Eskbank Road, Beochmohr and 1 Avenue Road, Dunmohr, with boundary walls and gate piers&quot;</td>
<td>C(S)</td>
<td>NT 3254 6674</td>
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<tr>
<td>&quot;47 Eskbank Road, Belmont, with boundary walls, gates and gate piers and former coach house&quot;</td>
<td>B</td>
<td>NT 3273 6685</td>
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<tr>
<td>&quot;48 Eskbank Road, Langlands Lodge, with boundary walls and gate piers&quot;</td>
<td>B</td>
<td>NT 3253 6673</td>
</tr>
<tr>
<td>&quot;49 Eskbank Road, The Birks, with boundary walls and gate piers&quot;</td>
<td>B</td>
<td>NT 3268 6682</td>
</tr>
<tr>
<td>&quot;51 Eskbank Road, with boundary walls and gate piers&quot;</td>
<td>C(S)</td>
<td>NT 3266 6680</td>
</tr>
<tr>
<td>&quot;53 Eskbank Road, Gilston Lodge, with boundary walls and gate piers&quot;</td>
<td>C(S)</td>
<td>NT 3266 6677</td>
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<tr>
<td>Description and Address</td>
<td>Category</td>
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<tr>
<td>&quot;51 and 53 Bonnyrigg Road, with boundary wall and gate piers&quot;</td>
<td>C(S)</td>
<td>NT 3217 6680</td>
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<tr>
<td>&quot;55 and 57, Bonnyrigg Road, Pentland View and Beulah&quot;</td>
<td>C(S)</td>
<td>NT 3215 6623</td>
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<tr>
<td>&quot;71 and 73 Bonnyrigg Road, Cragdale and Fernlea&quot;</td>
<td>C(S)</td>
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<tr>
<td>&quot;Bonnyrigg Road, Westfield Park, with gates, railings, gate piers and boundary walls&quot;</td>
<td>B</td>
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<tr>
<td>&quot;Cemetery Road, Bridge&quot;</td>
<td>B</td>
<td>NT 3277 6695</td>
</tr>
<tr>
<td>&quot;Cemetery Road, New Cemetery Lodge, gate piers and gates&quot;</td>
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<td>NT 3274 6700</td>
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<tr>
<td>&quot;10 Dalhousie Road, Parkend House'</td>
<td>C(S)</td>
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<tr>
<td>&quot;9 Park Road, Roseneuk&quot;</td>
<td>C(S)</td>
<td>NT 3272 6669</td>
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<tr>
<td>&quot;11 Park Road, Hollybush&quot;</td>
<td>C(S)</td>
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<tr>
<td>&quot;2 Ancrum Road, Greenore&quot;</td>
<td>B</td>
<td>NT 3267 6643</td>
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<tr>
<td>&quot;18 Ancrum Road, Dalriada House, with boundary walls and gate piers&quot;</td>
<td>B</td>
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<tr>
<td>23 Newbattle Road</td>
<td>C(S)</td>
<td>NT 3281 6652</td>
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<tr>
<td>&quot;12 Melville Road, Linsandel House, with outbuildings, boundary walls, gates and gate piers&quot;</td>
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<tr>
<td>&quot;9 Lasswade Road, Bernafay&quot;</td>
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<td>NT 3244 6667</td>
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<tr>
<td>&quot;13 and 15 Lasswade Road, with boundary walls&quot;</td>
<td>C(S)</td>
<td>NT 3234 6669</td>
</tr>
<tr>
<td>&quot;13 and 15 Park Road, The Liics and Ellon Cottage&quot;</td>
<td>C(S)</td>
<td>NT 3276 6673</td>
</tr>
<tr>
<td>&quot;14 Glenesk Crescent, Eskbank House, with boundary walls and gate piers&quot;</td>
<td>A</td>
<td>NT 3256 6687</td>
</tr>
<tr>
<td>&quot;14 Newbattle Road, Greenend&quot;</td>
<td>C(S)</td>
<td>NT 3265 6656</td>
</tr>
<tr>
<td>&quot;9 Lothian Bank, Mount Lothian, with boundary walls, gate piers and lamp standards&quot;</td>
<td>C(S)</td>
<td>NT 3259 6637</td>
</tr>
<tr>
<td>&quot;6 Newbattle Road, Appin Lodge&quot;</td>
<td>B</td>
<td>NT 3257 6661</td>
</tr>
<tr>
<td>&quot;8 Newbattle Road, Hazelbank&quot;</td>
<td>B</td>
<td>NT 3260 6659</td>
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<tr>
<td>&quot;Gorebridge, 70, 72, 74, Hunterfield Road, Newbyres Row&quot;</td>
<td>C(S)</td>
<td>NT 3432 6182</td>
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<tr>
<td>&quot;Lothian Bridge, Craigesk House including boundary wall and entrance gates&quot;</td>
<td>C(S)</td>
<td>NT 3260 6479</td>
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<tr>
<td>&quot;Lothian Bridge, Newbattle viaduct&quot;</td>
<td>B</td>
<td>NT 3270 6484</td>
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<tr>
<td>&quot;Lothianbridge, The Sun Inn&quot;</td>
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<td>NT 3264 6493</td>
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<tr>
<td>&quot;Newtonrange, 1-12 (inclusive nos) Lingerwood Cottages including boundary wall&quot;</td>
<td>C(S)</td>
<td>NT 3347 6363</td>
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<tr>
<td>&quot;Newtonrange, 37-42 (inclusive nos) Main Street, Monkwood&quot;</td>
<td>C(S)</td>
<td>NT 3334 6427</td>
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<tr>
<td>&quot;Newtonrange, Main Street, Newtonrange Parish Church (Church of Scotland) including Church Hall and boundary wall&quot;</td>
<td>C(S)</td>
<td>NT 3337 6421</td>
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<tr>
<td>&quot;Newtonrange, Main Street, The Dean Tavern&quot;</td>
<td>C(S)</td>
<td>NT 3320 6447</td>
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<tr>
<td>1 &amp; 2 Catcune Farm Cottages</td>
<td>C(S)</td>
<td>NT 3554 5995</td>
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<tr>
<td>1-4 Harvieston Mains Cottages</td>
<td>C(S)</td>
<td>NT 3406 6100</td>
</tr>
<tr>
<td>&quot;Arniston Policies, North Lodge and Loin and elephant gate, including gates and piers&quot;</td>
<td>A</td>
<td>NT 3367 6122</td>
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<tr>
<td>&quot;Borthwick, bridge over Gore Water&quot;</td>
<td>C(S)</td>
<td>NT 3673 5977</td>
</tr>
<tr>
<td>Currie Bridge</td>
<td>C(S)</td>
<td>NT 3710 5971</td>
</tr>
<tr>
<td>&quot;Currie House, including gate piers, gates and boundary wall&quot;</td>
<td>B</td>
<td>NT 3712 5986</td>
</tr>
<tr>
<td>&quot;Currie House, walled garden including sundial&quot;</td>
<td>B</td>
<td>NT 3710 5975</td>
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<tr>
<td>&quot;Gorebridge Post Office, Main Street&quot;</td>
<td>C(S)</td>
<td>NT 3449 6137</td>
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<tr>
<td>&quot;Gorebridge, 13 Hunterfield Road&quot;</td>
<td>C(S)</td>
<td>NT 3448 6154</td>
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<tr>
<td>&quot;Gorebridge, 14 Main Street, Lonach&quot;</td>
<td>C(S)</td>
<td>NT 3448 6145</td>
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<tr>
<td>&quot;Gorebridge, 19 &amp; 21 Main Street&quot;</td>
<td>C(S)</td>
<td>NT 3453 6144</td>
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<tr>
<td>&quot;Gorebridge, 25 Powdermill Brae, including railings&quot;</td>
<td>C(S)</td>
<td>NT 3465 6099</td>
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<tr>
<td>&quot;Gorebridge, 32 &amp; 34 Main Street&quot;</td>
<td>C(S)</td>
<td>NT 3447 6141</td>
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<tr>
<td>&quot;Gorebridge, 34 Hunterfield Road&quot;</td>
<td>C(S)</td>
<td>NT 3444 6166</td>
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<tr>
<td>&quot;Gorebridge, 36, 38 &amp; 40 Main Street&quot;</td>
<td>C(S)</td>
<td>NT 3446 6139</td>
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<tr>
<td>&quot;Gorebridge, 37 &amp; 39 Powdermill Brae, Belvue, including&quot;</td>
<td>C(S)</td>
<td>NT 3467 6068</td>
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<tr>
<td>Description and Address</td>
<td>Category</td>
<td>NGR</td>
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<tr>
<td>&quot;Gorebridge, 43 Powdermill Brae, including railings and piers&quot;</td>
<td>C(S)</td>
<td>NT 3468 6095</td>
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<tr>
<td>&quot;Gorebridge, 47 &amp; 49 Powdermill Brae, Gore Cottage, including&quot;</td>
<td>C(S)</td>
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<tr>
<td>&quot;Gorebridge, Main Street&quot;</td>
<td>C(S)</td>
<td>NT 3447 6136</td>
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<tr>
<td>&quot;Gorebridge, Hunterfield Road, Gorebridge Christian Fellowship, including gates, gate piers and boundary wall&quot;</td>
<td>B</td>
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<tr>
<td>&quot;Gorebridge, Porters (The old station)&quot;</td>
<td>C(S)</td>
<td>NT 3457 6122</td>
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<tr>
<td>&quot;Harvieston Farm, outbuildings&quot;</td>
<td>C(S)</td>
<td>NT 3494 6024</td>
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<tr>
<td>Harvieston House</td>
<td>C(S)</td>
<td>NT 3490 6040</td>
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<tr>
<td>&quot;Harvieston House, walled garden&quot;</td>
<td>C(S)</td>
<td>NT 3497 6027</td>
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<tr>
<td>&quot;Harvieston Lodge, gates, gate piers and boundary walls&quot;</td>
<td>B</td>
<td>NT 3448 6065</td>
</tr>
<tr>
<td>1-4 Harvieston Mains Cottages</td>
<td>C(S)</td>
<td>NT 3407 6096</td>
</tr>
<tr>
<td>&quot;Shank Garden, including walled garden and remains of Shank House&quot;</td>
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<td>NT 3344 6112</td>
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<tr>
<td>Heriot House including outhouses and former stable</td>
<td>B</td>
<td>NT 4025 5425</td>
</tr>
<tr>
<td>3-10 Gala Bank</td>
<td>B</td>
<td>NT 444 457</td>
</tr>
<tr>
<td>&quot;Bankhouse, Old Coach House&quot;</td>
<td>B</td>
<td>NT 4379 4783</td>
</tr>
<tr>
<td>&quot;Bowland Bridge, Gala Water&quot;</td>
<td>B</td>
<td>NT 455 401</td>
</tr>
<tr>
<td>Burn House</td>
<td>B</td>
<td>NT 4381 4920</td>
</tr>
<tr>
<td>Burn House Doocot</td>
<td>B</td>
<td>NT 4396 4919</td>
</tr>
<tr>
<td>&quot;Ferniehirst Bridge, Gala Water&quot;</td>
<td>C</td>
<td>NT 448 416</td>
</tr>
<tr>
<td>Luggate Water Bridge</td>
<td>B</td>
<td>NT 450 433</td>
</tr>
<tr>
<td>New Crookston House</td>
<td>C</td>
<td>NT 4255 5160</td>
</tr>
<tr>
<td>&quot;North Gate, Bowland Policies&quot;</td>
<td>C</td>
<td>NT 454 400</td>
</tr>
<tr>
<td>Old Crookston House</td>
<td>B</td>
<td>NT 4246 5214</td>
</tr>
<tr>
<td>&quot;Old Stow Bridge, Gala Water&quot;</td>
<td>B</td>
<td>NT 4583 4439</td>
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<tr>
<td>Old Stow Church</td>
<td>B</td>
<td>NT 4592 4455</td>
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<tr>
<td>Plenploth farmhouse</td>
<td>C</td>
<td>NT 4384 4858</td>
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<tr>
<td>Stow Kirk (St Mary of Wedale)</td>
<td>B</td>
<td>NT 4590 4438</td>
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<tr>
<td>&quot;Stow, Galashiels Road, Manorhead Hotel including railings to Galashiels Road&quot;</td>
<td>B</td>
<td>NT 459 446</td>
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<tr>
<td>Torquhan House</td>
<td>B</td>
<td>NT 447 477</td>
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<tr>
<td>Valley Mill</td>
<td>C(S)</td>
<td>NT 4945 3598</td>
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<tr>
<td>&quot;Windyknowe Road, Woodlands&quot;</td>
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<td>&quot;Windyknowe Road, Woodlands gate lodge, former coach house, Rose Cottage and entrance gateway&quot;</td>
<td>B</td>
<td>NT 4852 3644</td>
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<tr>
<td>&quot;Workshop, house and boundary walls, Union Street and Roxburgh Street&quot;</td>
<td>B</td>
<td>NT 4886 3640</td>
</tr>
<tr>
<td>&quot;1,3,5,7,9 &amp; 11 Tea Street&quot;</td>
<td>C(S)</td>
<td>NT 4929 3570</td>
</tr>
<tr>
<td>&quot;119-137 High Street and 1-5 Roxburgh Street, former Co-op department store&quot;</td>
<td>B</td>
<td>NT 4893 3640</td>
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<tr>
<td>&quot;22 Abbotsford Road, Rowanlee&quot;</td>
<td>C(S)</td>
<td>NT 4972 3542</td>
</tr>
<tr>
<td>&quot;Aisle and tombstones, Galashiels churchyard&quot;</td>
<td>B</td>
<td>NT 4945 3570</td>
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<tr>
<td>&quot;Albert Place, former George Sutherland &amp; Sons sculptorÆs yard including railings, boundary walls, gate piers and gates&quot;</td>
<td>B</td>
<td>NT 4933 3588</td>
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<tr>
<td>&quot;Bank of Scotland, 3, 5 &amp; 7 Channel Street&quot;</td>
<td>C(S)</td>
<td>NT 4914 3625</td>
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<tr>
<td>&quot;Barr Hill, Galahill House including service wing and stables&quot;</td>
<td>B</td>
<td>NT 4937 3542</td>
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<tr>
<td>&quot;Botany Lane, former Glasite Church, now store&quot;</td>
<td>B</td>
<td>NT 4895 3620</td>
</tr>
<tr>
<td>Burgh Chambers and Clock Tower</td>
<td>B</td>
<td>NT 4930 3594</td>
</tr>
<tr>
<td>Bust of Robert Burns</td>
<td>B</td>
<td>NT 4927 3594</td>
</tr>
<tr>
<td>Bust of Sir Walter Scott</td>
<td>B</td>
<td>NT 4924 3601</td>
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<td>&quot;Channel Street, Douglas Hotel&quot;</td>
<td>C(S)</td>
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</tr>
<tr>
<td>Church Bank (3 dwellings)</td>
<td>B</td>
<td>NT 4929 3583</td>
</tr>
<tr>
<td>&quot;Cornhill Square, and fountain&quot;</td>
<td>B</td>
<td>NT 4924 3594</td>
</tr>
<tr>
<td>Equestrian statue of border riever</td>
<td>B</td>
<td>NT 4930 3583</td>
</tr>
<tr>
<td>&quot;Galashiels Post Office, 1 Channel Street&quot;</td>
<td>B</td>
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<td>&quot;Galashiels Public Library, LawyerÆs Brae&quot;</td>
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<td>&quot;Harrow Inn public house, 22 High Street and Sime Place&quot;</td>
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<td>NT 4908 3627</td>
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<td>&quot;Industrial Bank, 46 &amp; 48 High Street&quot;</td>
<td>B</td>
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<td>&quot;Lodge and gateway, Scott Park, Scott Crescent&quot;</td>
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<td>Lucy Sanderson Cottage Homes</td>
<td>B</td>
<td>NT 5019 3506</td>
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<td>Mercat Cross</td>
<td>B</td>
<td>NT 4927 3577</td>
</tr>
<tr>
<td>Netherdale Mill</td>
<td>C</td>
<td>NT 5064 3529</td>
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<td>&quot;Old Parish and St PaulÆs Church of Scotland and hall, Scott Crescent&quot;</td>
<td>B</td>
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<tr>
<td>&quot;RC Church of Our Lady &amp; St Andrew, Market Street&quot;</td>
<td>B</td>
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<tr>
<td>&quot;St NinianÆs Church of Scotland, High Street&quot;</td>
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<td>&quot;St PeterÆs Episcopal Church, Abbotsford Road&quot;</td>
<td>C(S)</td>
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<td>&quot;Ladhope Tower, Appletreewow&quot;</td>
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### G1.2

**ENTRIES IN THE NMR**

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**G1.3 Historic Parks and Designed Landscapes Within 500m of Route**

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**G1.4 SAMS Within 500m of Route**

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Annex H

Landscape Character Areas
Lowland River Valleys

The well-defined river valley landscapes of the lowlands form a distinctive type. These are distinguished primarily by their landform, and include the incised headwaters of the River Tyne system, and the gorge-like valleys of the North and South Esk. Their steep slopes carry a relatively high proportion of broadleaved woodland cover.

Upland Fringes

Along the northern margins of the upland areas lies a fringe of transitional landscapes. These are differentiated from the true uplands by a more productive range of land cover types including improved grassland, together with arable land and coniferous woodland.

North Esk (Lowland River Valleys)

Running parallel to the eastern flanks of the Pentland Hills, the valley of the River North Esk follows a north-east trend, before converging with the South Esk to the north of Dalkeith. Bands of Carboniferous sedimentary rocks form the dominant underlying bedrock, with more resistant Devonian lavas along the edge of the Pentland Hills. The river follows an extremely confined steep-sided valley cut by the powerful erosive force of glacial melt-water in Pleistocene times. In places, the valley narrows to a precipitous gorge bordered by sheer bluffs of exposed rock. Rising above the valley and opening out to either side, the enclosing slopes of broad smooth undulating ground are broken by numerous small streams originating within higher land.

The steep valley sides are heavily wooded by extensive swathes of mixed and deciduous planting, including oak, ash, beech, elm and sycamore, the ancient woodland of Roslin Glen being of particular note. Towards the head of the North Esk valley and along the fringes of the Pentland Hills, woodland is interspersed with fields of improved pasture, which are replaced by arable farmland further north. Drystone walls are common throughout the pastureland of the south and west, giving way to trimmed hawthorn hedges and post-and-wire fences throughout the fields of crops. The policies and designed landscapes of the several estates within the valley are particularly dominant features. Throughout the farmland, shelter belts are prominent, wide belts of woodland curve around the rounded upper valley slopes, and mature deciduous trees are abundant within hedgerows.

A wealth of farmsteads and dwelling are scattered on the valley slopes, and a number of towns and villages lie adjacent to the river. The largest of these – Penicuik, Bonnyrigg and Loanhead – originated in the 18th and 19th centuries, the core of each town now surrounded by extensive 20th century housing schemes. Small areas of light industry have developed on the urban fringes, creating modern replacements for the once-prosperous papermills.
Occasional bings and reclaimed coalmines, and sand and gravel pits, are generally well-integrated into the valley. Settlement along the valley is further diversified by the variety of imposing castles and mansion houses scattered along the river-slopes, including the red rubble tower of Hawthornden Castle, which dates back to the 15th century, and the early 18th century splendour of Mavisbank and Penicuik House. Part of the policies of Dalkeith House also fall within this character area. The extensive policies of Bush House, sited at the base of the Pentlands, are now being revitalised as the Edinburgh Technopole. The valley is well-served by a network of major and minor roads, the parallel routes of the A701 and A702 feeding into the busy ring-road system which defines the periphery of Edinburgh.

The proximity of the city is evident towards the north of the valley, where the arable farmland is interrupted by roads and pylon lines. Although large stretches of the valley are settled, the dense woodland along the valley slopes is strong factor in integrating dwelling and industry. The great variety of settlement and industry, combined with the heavily wooded farmland, creates a landscape of well-tended and long-inhabited character. The powerful sense of enclosure within the confinements of the valley gives way to more open views towards the bulk of the Pentland Hills and the city beyond.

South Esk (Lowland River Valleys)

As the River South Esk flows northwards from the Moorfoot Hills, it has carved deeply into the underlying Carboniferous sedimentary strata. The narrow river valley is edged by steep sides which, at their most precipitous, are marked by scars of soil slip and exposed glacial deposits. Small level stretches of floodplain are often enclosed by the coiling meanders of the rivercourse along the valley floor. Above the valley the landform grades out into gentle undulating slopes, cut through by several major tributaries, and bordered by higher land to east and west. Within the rolling ground towards the southern part of the valley, Edgelaw Reservoir is concealed by landform and woodland.

Occasional fields of improved pasture across the higher slopes give way to expanses of large arable fields divided by clipped hawthorn hedgerows, and lines of mature hedgerow trees and post-and-wire fences. The influence of the several estates and designed landscapes which are sited along the valley is evident in the extensive shelterbelts, parkland trees, and neat stone walls which define the farmland slopes. Thick fringes of deciduous and mixed woodland define the South Esk valley and larger tributaries, frequently coalescing with the farm and estate woodlands along the valley slopes. A few carefully designed and scaled coniferous plantations occur at the southern end of the valley.

Several roads cut across the valley, the most significant being the A7 trunk road. Superimposed upon the main road network is a pattern of minor roads and farm tracks. The castles and mansion houses which are dotted along the valley include Dalkeith Palace, Dalhousie Castle, Newbattle Abbey and
Arniston House, their visual influence extended by associated estate walls, cottages, lodges, bridges and gateways. Close to the extensive policies and grandiose steadings at Rosebery, a picturesque 14th century church and single street of 18th century cottages comprising the riverside village of Temple. Along the higher crest enclosing the eastern edge of the valley, housing schemes spread out from the intact 19th century core of the mining village of Gorebridge. The well-preserved terraced brick cottages of Newtongrange attest to the industrial origins of the village, on the outskirts of which is sited a mining museum. Traces of past mining activity along the valley are few. Situated close to the junction of the North and South Esk rivers, the burgh town of Dalkeith owes much to the commercial boom of the 18th century and the rebuilding programmes of the 20th century. The well-tended rolling farmland slopes are dominated by both estate landscapes and 19th and 20th century settlement, many developments having originated due to the rich coal seams underlying the valley. Within the wooded steep river valley, views are heavily filtered and strongly confined, giving way to more open views of the Pentland and Moorfoot Hills from the upper valley slopes.

Gladhouse / Auchencorth Moorlands (Upland Fringes)

Bordered in part by the Moorfoot Hills, this area stretches westwards from the steep northern escarpment towards the Pentlands. Broad expanses of near flat or gently undulating ground stretch northwards, gradually merging with the more varied rolling terrain of the lowlands to the north. The sedimentary strata of the underlying Carboniferous rocks, which include marine limestones and shallow-water deltaic deposits, have been eroded by numerous northward flowing streams, which etch deeply into the more pronounced northern slopes of the area. To the west, the River North Esk is enclosed within a steep narrow gorge forming part of a major glacial meltwater channel. Close to the edge of the Moorfoots, Gladhouse Reservoir forms a prominent stretch of open water. In contrast, Roseberry Reservoir is enclosed within the more rolling slopes of the upper South Esk and hidden from view.

The grass and heather moorland which extends across Auchencorth Moss gives way to a predominant land cover of rough and improved pasture, divided by post-and-wire fences into large fields. Along the northern slopes arable fields, divided by low stone walls, hedgerows and scattered hedgerow trees, are more common. Linear woodlands and large shelterbelts of various ages are frequent features throughout the open landscape, coniferous species being predominant. Broadleaved species occasionally fringe the coniferous woodlands along roadsides, and form copses surrounding farmsteads. Marshy areas, dotted with rushes and rough grass, occur in depressions within the flatter expanses of land, giving way to stretches of scrub and bracken along the steeper stream sides.

The small villages of Howgate and Wellington are situated on the main A 701 and A 6094 roads which skirt the eastern edge of Auchencorth Moss. Farmsteads and small rows of cottages are scattered widely across the area,
served by a few minor roads and access tracks. The handsome mansions and walled gardens at Middleton Hall and Newhall date from the early 18th century and are surrounded by mixed woodland. A few isolated industrial developments are interspersed within the surrounding farmland, including a large tipped area along the A6094 road, and a relatively well screened limestone quarry near Middleton.

Sporadic run-down or derelict buildings and some tumble-down walls and fences contribute an atmosphere of decline to some localised areas. The predominantly open aspect of the gentle terrain affords wide views of the surroundings, enclosed by the nearby hills.

**North Lammermuir Platform (Upland Fringes)**

This extensive sweep of hill-slopes from an east-west band stretching along the northern margin of the Lammermuir Hills. Backed by the imposing run of the hills, the long slopes interlock to form a smoothly undulating landform, frequently intersected by small streams. Numerous water courses have cut deeply into the varied sedimentary bedrock to form enclosed V-shaped valleys. Along the northern perimeter of the area, as the hill-slopes begin to merge with the lowland plains, the rolling terrain flattens out to form a more gentle landscape.

The unimproved pasture of good rough grassland of the higher ground which borders the edge of the Lammermuirs, merges with large expanses of arable fields on the lower ground. Accompanying the changing land cover, the stone walls and fences which separate the grassland are replaced by clipped hawthorn and beech hedgerows throughout the arable land. Scrub, rough grassland and woodland dapple some of the steeper burn courses. A wealth of established coniferous and mixed shelterbelts occur throughout the farmland.

Many small roads wind through the slopes, leading to large farmsteads, isolated dwellings or occasional clusters of stone cottages. The only village of note within the area is Crichton, an attractive group of ‘Arts and Crafts’ rubble cottages, which lies at the edge of the Tyne Water Valley. Now converted into a hotel, Borthwick Castle is an impressive 15th century relic. Although a number of pylon lines cut northwards through the hill-slopes, they are generally well-absorbed by the rolling landform and shelterbelts. Signs of more ancient settlement are evident in forts which cap higher ground.

Merging from upland to lowland, the transitional character of the landscape is reflected in the changing land cover. Although in the main focused northwards towards the lowlands the combination of numerous wooded areas with local undulations in landform often create more intimate and enclosed depressions.
Regional Landscape Areas

Lammermuir and Moorfoot Hills

The Lammermuir and Moorfoot Hills form the northern arm of the outer crescent of uplands which surround the Tweed Basin. Bounded to the north by the southern Uplands fault, which separates them from the younger sediments of the Midland Valley, the geology is one of old resistant sedimentary rocks, dominated by greywackes and sandstones of Ordovician and Silurian age. This has been the chief determinant of their elevated relief and characteristic landform of relatively smooth plateaux interrupted by deeply dissected, steep-sided valleys.

The plateau tops are wild open country, characterised by peaty soils, moorland, and unimproved grassland. On the better drained slopes of the valley sides, permanent pastures predominate, with scattered major forestry plantations, particularly in the southern Moorfoots adjacent to the Tweed valley.

While there is widespread and abundant evidence of pre-Roman settlement on the plateau margins, probably reflecting in part a somewhat drier and warmer climate, today the pattern is more restricted, and is mainly confirmed to scattered farm building groups within the sheltered valleys.

Central Southern Uplands

From its northern boundary, defined by the line of the Southern Uplands fault, and separated from the Moorfoots by the deep valley of the middle Tweed, a major belt of high ground extends south along the main watershed with the Clyde and Solway, finally merging with the western extremity of the Cheviot ridge. This is the heart of the major geological region termed the Southern Uplands, and consists of the same old, hard Silurian and Ordovician sedimentary rocks which underline the adjoining Moorfoots and Lammermuirs. Although they share with these areas the characteristic smooth slopes and, subdued, rolling landforms over most of their extent, the highest ground of the Tweedsmuir massif is differentiated by more sculpted shapes of corries; ridges and glaciated valleys deriving from Pleistocene times, when it was an important centre of ice-gathering and dispersal.

The climate is harsh, wet and generally cool, and becomes cold on the highest summits, which constitute the most southerly area of late snow-lie in Scotland. The hills are dominated by heather moor and rough acid grassland, and there are extensive coniferous plantations, particularly in the upper Tweed valley and on the gentler plateaux further south at Craik and upper Teviotdale. Ribbons of improved grassland penetrate into the hills following the major valleys of the Tweed, Yarrow, Ettrick and Teviot.
There is a rich heritage of evidence of ancient settlement on the fringes of the upland valleys, together with Roman military features, medieval bastle houses and tower houses, and more recent drove road routes outlined by impressive double drystone dykes.

Landscape Character Types/Areas

Uplands - Plateau Grassland - Lauder Common

- Large scale, rolling plateau topography with gentle slopes and smooth relief.

- Vegetation cover dominated by coarse grassland with localised patches of heather moorland, rush pasture and scattered small coniferous plantations and shelterbelts.

- Low density settlement with widely dispersed farm buildings.

- Open, panoramic views.

This landscape type occurs as a single character area in the central section of the Moorfoot/Lammermuir plateau, bounded by the valleys of the Gala and the Leader. It is distinguished from the main ‘parent’ type by a slightly lower elevation and a dominance of grassland cover.

The plateau height ranges form 350 m to 400 m, the consistent hills being typically dome-shaped with convex slopes. The large scale landform has subtle variations in relief caused by narrow shallow gullies eroded by minor burns.

Land cover is dominated by coarse acid grassland, with smaller remnants of dry Atlantic heather moor on higher ground, and rushes in poorly drained, low lying areas. The grassland is typically unimproved or semi-improved rough grazing of acid bent fescues. Tree cover is rare, and consists mainly of scattered small coniferous plantation blocks and shelterbelts, often enclosed by drystone dykes, with some larger forestry blocks, the most prominent of which is at Hartside Hill to the north-west of Oxton.

Prior to its enclosure, the plateau was a true Common, its marches demarcated by cairns, and periodically policed by a traditional Common Riding, as elsewhere in the Border grazing lands. Land use on the grasslands is dominated by sheep and cattle grazing in large units defined by drystone dykes. Settlement consists of widely dispersed farm buildings located in sheltered valleys and often protected by topography or associated shelterbelt plantations. The transport network consists of minor roads and farm tracks, together with the B6368 and B6362 which traverse the plateau linking the A7 and A68 Trunk Roads.
On the plateau top the landscape is open, large scale, and exposed in character, with distant and panoramic views often gained over the adjoining landscape types. The infrequency of field boundaries, lack of enclosure at road edges and high levels uniformity of the land cover and large scale of the landform all contribute to an impression of some remoteness. The grassland colours vary between fresh green of early summer through to gold and russet in the late summer to straw coloured in winter. The isolated patches of heather on higher ground create a distinctive contract in colour and texture with the surrounding grassland. The dark green colour and coarser texture of the conifer plantations and shelterbelts is conspicuous against the lighter hues and finer grained texture of the surrounding grassland vegetation, particularly during the winter.

River Valley - Pastoral Upland Valley - Gala Water Valley

- Flat valley floor with smooth moderately sloping sides incised by narrow tributary valleys and enclosed by rolling dissected plateau uplands.
- Land cover of permanent pastures on valley floor and sides with frequent woodlands, merging with unimproved grassland and heather on upper slopes.
- Settlement consists of scattered farms and villages along the valley floor and lower sides typically built around road junctions and river crossings.
- A medium scale enclosed landscape of smooth curves, strongly influenced by the surrounding uplands.

This landscape type is represented by the Eddleson and Gala Water valleys, on the flanks of the Moorfoot plateau. It is generally more open and larger in scale than the ‘Pastoral Floor’ type, and the moderate enclosing slopes typically allow improved pasture to extend high on to the valley sides. The sides may frequently be incised by narrow v-shaped tributary valleys. The valley floor is generally flat and narrow, widening out in areas of less resistant geology. Landform is mainly smooth and large in scale with local undulations and flat terraces. In some areas the rivers have cut steep bluffs at the floodplains edges. Localised areas of scree are prominent on some of the steeper valley sides particularly in the Gala Water. In geological terms, both valleys cut across the regional trend of the rock structure, with the result that differences in resistance to erosion tend to be closely reflected by fluctuations in valley width, alignment and the steepness of side slopes. This quality is more strongly exhibited in the Gala where the Silurian sediments are also frequently interrupted by intrusions of igneous rock. Soils on the valley sides are mainly similar to those of the surrounding upland landscapes. The valley floors are typically underlain by alluvial soils.

Land cover on the river floodplain is mainly improved pasture in medium sized fields with occasional rushes, scrub willow and gorse vegetation. The valley sides typically carry large fields of permanent pasture with some arable land on lower slopes. On the upper edges of the valley the improved pastures...
give way to heather moorland and semi-improved rough hill grazing of acid bent fescues. Fields are divided mainly by drystone dykes and fences. Approaching the watersheds on the north the valleys become noticeably shallower and pastures rougher, eventually merging with coarse upland grasslands of the adjoining plateaux.

Trees form a strong element in this landscape type with mainly broadleaf species on lower slopes and valley floor; typically in small to medium scale mature woodlands with scattered clumps of willow and alder along the river banks and disused and railway lines. Narrow riparian woodlands are also a feature of some of the tributary valleys. In many areas coniferous plantations and shelterbelts extend up the valley sides to the surrounding hills.

The transport network is well developed with major roads generally following the river terraces elevated about the valley floor, and numerous minor roads extending into the surrounding tributary valleys and uplands.

Settlement consists mainly of scattered farms and small villages built around river crossing points and road junctions. Buildings are typically of traditional grey whinstone or harled with slate roofs. In the Gala Water, disused embankment and bridges dating from the time of the ‘Waverley’ line from Edinburgh to Hawick and Carlisle, are a distinctive feature in the valley floor.

This is medium to large scale but strongly enclosed landscape. The upland influence although strong is less dominant than in the ‘pastoral floor’ type valleys where the heather and rough grassland often extend down to the valley floor. Views are typically medium to long in range along the valley corridor, with visual horizons formed by interlocking spurs and woodlands.

The colours of the landscape are dominated by the fresh greens of the permanent pastures, accentuated on the valley sides by dark coloured coniferous plantation and shelterbelts and given texture by broadleaf woodland in the valley floor and the upper valley sides. The regular pattern of smooth green improved pastures contrast with the rough textured mosaic appearance of the heather moorland and coarse grasses.

Gala Water Valley

- Meandering river prominent in valley floor.
- Frequent valley-side woodlands.
- Considerable variation in valley width with alternating open and enclosed sections.
- Scree slopes.
River Valley - Upland Fringe Valley with Settlements - Tweed/Gala/Ettrick Confluence

- Medium to large scale flat bottomed valley, enclosed by undulating upland fringe hills.
- Smooth large scale landform modified in placed by undulating moraine deposits, steep bluffs and terraces cut by meandering river.
- Neat pattern of medium sized arable and pasture fields, divided by hedgerows, often with mature trees.
- Mature broadleaf woodlands and shelterbelts prominent along valley floor and lower slopes.
- Coniferous woodlands on valley sides contrasting with pastures, often well integrated into the landscape.

This landscape type is found at the centre of the region where the Tweed emerges from the uplands to join with two of its major tributaries, the Ettrick and the Gala. Its physical characteristics are those of a broad flat valley, but the essence of its character is defined by its primary importance as the centre of gravity of human population in the Borders. The valley is enclosed by moderate to steep slopes of the surrounding hills. Variations in the erosion resistance of the geology occasionally lead to the valley becoming narrower and more confined. The landform is generally large in scale, although smaller scale local variations occur at the floodplain edges, where the river meanders cut steep bluffs, and along the lower slopes where the glacial action has deposited undulating moraine deposits. The flat river terraces raised above the valley floor, are of both fluvial and glacial origin, and are of particular importance as the sites of roads and building development. The hills which form the valley sides are predominantly smooth with localised rock outcrops and scree.

Farmland on the valley floor forms a neatly ordered pattern of medium sized arable and pasture fields divided by hedgerows, often with mature hedgerow trees. The valley sides mainly carry pastures with occasional arable fields on the lower slopes. Tree cover is a prominent feature of this landscape type. Along the valley floor, hedgerow lines and avenues of mature broadleaf species and policy woodland form frequent intermediate visual horizons. In many areas the sense of enclosure is enhanced by mature birch and beech woodlands on the river steepened bluff slopes. On the lower valley sides numerous deciduous and mixed woodlands and shelterbelts create a strong spatial structure, interspersed with open pastureland. Coniferous plantations are prominent on many of the upper valley sides. These are often well integrated into the landform with irregular edges and a variety of different species.

This landscape has formed the hub or human activity in the Borders since pre-Roman times, initially due to its strategic location at the junction of the Tweed
with the major north-south routes. The invading Romans ousted the native British Selgovae from their stronghold on the Eildon Hills, and established a major fort at Newstead as the nerve centre of their military operations in the Borders. In the more peaceful times of the 11th and 12th centuries rich farming estates supported the building of the magnificent abbey of Melrose. The early cottage-scale textile industry was transformed by the industrial revolution of the 18th century which utilised the water-power of the swiftly-flowing incised rivers to create the original multi-storey mills which have given way to the modern single-storey factories.

The mill towns of Galashiels and Selkirk, the historic town of Melrose and several small outlying settlements are prominent along the valley floor and lower valley sides. The older parts of these settlements are generally sited unobtrusively in the landscape, the muted grey and buff coloured stone buildings blending well with the surrounding farmlands and trees. Many of the buildings in more recent fringe developments along the valley floor and up the valley sides are more obtrusive, their light coloured walls conspicuous against the darker surroundings.

This is densely settled landscape, with the evidence of human activity constantly present, yet nevertheless generally well-integrated with the geography of its setting, to give an impression of well-ordered harmony. Views along the valley corridor are diverse, with longer views available both along the flat valley floor and up to the surrounding hills. However, frequent intermediate visual horizons and enclosure are formed by tree cover and settlements. Although outside the boundary of this character area, the peaks of the Eildon Hills are a dominant feature on the skyline throughout much of this landscape. The celebrated ‘Scott’s View’ from the flanks of Bemersyde Hill, gives a fine panorama, taking in many of the key features which define the character of this landscape.
Annex I

Photomontages
Viewpoint: Newbattle Viaduct

Before

After

Waverley Railway Project
Scottish Borders Council
Figure 12
Photomontage

Viewpoint: Brockhouse, looking east

Before

After

Waverley Railway Project
Scottish Borders Council
Figure 13
Photomontage

Viewpoint: South of Fountainhall, looking east

Before

After

Waverley Railway Project
Scottish Borders Council
Viewpoint: Stow, looking west

Before

After
Figure 15
Photomontage

Viewpoint: Lugate Bridge, looking east

Before

After

Environmental Resources Management

Drawn By: JSI
PM: JA
PD: SP
Date: Oct 2002

Waverley Railway Project
Scottish Borders Council
Before

After

Viewpoint: The Whin, looking south
Viewpoint: High Buckholmside, Galashiels, looking south

Before

After

Waverley Railway Project
Scottish Borders Council
Viewpoint: Bridge over the River Tweed between Galashiels and Tweedbank

Before

After

Figure 19
Photomontage

Waverley Railway Project
Scottish Borders Council
Annex J

Artist’s Impressions
Viewpoint: The Black Path, Eskbank, looking north

Before

After

Figure J1
Artists Impression

Waverley Railway Project
Scottish Borders Council
Before

Viewpoint: Newtongrange

After

Waverley Railway Project
Scottish Borders Council
Figure 3
Artists Impression

Viewpoint: Arniston Public Park, looking west

Before

After

Waverley Railway Project
Scottish Borders Council
Figure J4
Artists Impression

Viewpoint: Borthwick, looking north

Before

After
Figure J5

Artists Impression

Viewpoint: Galabank, looking south

Before

After
Before

Viewpoint: Stagehall, looking south east

After
Figure J7

Artists Impression

Waverley Railway Project
Scottish Borders Council

Viewpoint: Ferniehirst, looking east

Before

After
Viewpoint: Bowland Bridge, looking west

Before

After
Viewpoint: King Street, Galashiels, looking north

Before

After

Figure J9
Artists Impression

Waverley Railway Project
Scottish Borders Council
Viewpoint: Croft Street, Galashiels, looking north

Before

After

Figure J10
Artists Impression

Environmental Resources Management

Waverley Railway Project
Scottish Borders Council
Annex K

Contamination Levels
### Contaminant Levels

<table>
<thead>
<tr>
<th>Contaminant</th>
<th>Residential with plant uptake</th>
<th>Residential without plant uptake</th>
<th>Allotments</th>
<th>Commercial / industrial</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Mg/kg dry weight soil</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Arsenic</td>
<td>20</td>
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<tr>
<td>Chromium</td>
<td>130</td>
<td>200</td>
<td>130</td>
<td>5000</td>
</tr>
<tr>
<td>Lead</td>
<td>450</td>
<td>450</td>
<td>450</td>
<td>750</td>
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<tr>
<td>Inorganic</td>
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<td>15</td>
<td>8</td>
<td>480</td>
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<tr>
<td>Mercury</td>
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<td></td>
<td></td>
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<tr>
<td>Nickel</td>
<td>50</td>
<td>75</td>
<td>50</td>
<td>5000</td>
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<tr>
<td>Selenium</td>
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<td>260</td>
<td>35</td>
<td>8000</td>
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<td></td>
<td>pH6</td>
<td>pH7</td>
<td>pH8</td>
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</tr>
<tr>
<td>Cadmium</td>
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<td>30</td>
</tr>
<tr>
<td></td>
<td>pH6</td>
<td>pH7</td>
<td>pH8</td>
<td>1</td>
</tr>
</tbody>
</table>

**Notes:**

**Arsenic**
1. Based on total inorganic arsenic concentration in the soil.
2. Not applicable to arsenic present primarily in an organic form or where there is a likelihood of arsine gas being generated.
3. Based on intake of arsenic only and compared with oral Index Dose value.
4. Based on sandy soil as defined in CLR10 (DEFRA and Environment Agency, 2002d)

**Cadmium**
1. Based on total cadmium concentration in the soil.
2. Based on sandy soil as defined in CLR10 (DEFRA and Environment Agency, 2002d).
3. For allotments and residential settings, where consumption of homegrown produce is important, the Soil Guideline Values vary accordingly to pH.
4. Based on comparison of oral exposure routes only.

**Chromium**
1. Based on total chromium concentration in the soil.
2. It is assumed that all chromium present in the soil is chromium (VI)
3. Based on intake of chromium only and compared with oral TDSI value.
4. Based on sandy soil as defined in CLR10 (DEFRA and Environment Agency, 2002d).

**Lead**
1. Based on total lead concentration in the soil.
2. Values apply to the geometric mean of the soil concentration across a site.
Inorganic Mercury
1. Based on total mercury concentration in the soil. However, the assessor should note that these Soil Guidelines Values do not apply to elemental mercury and organic mercury compounds.
2. Based on sandy soil as defined in CLR10 (DEFRA and Environment Agency, 2002d).
3. For the allotments and residential settings where consumption of homegrown produce is important, the Soil Guidelines Values vary only slightly according to soil organic matter, and this has not been reported here.
4. Based on comparison of oral TDSI with oral exposure routes.

Nickel
1. Based on total nickel concentration in the soil.
2. Based on sandy soil as defined in CLR10 (DEFRA and Environment Agency, 2002d).
3. Based on comparison of oral TDSI with oral exposure routes.

Selenium
1. Based on total selenium concentration in the soil.
2. Based on sandy soil as defined in CLR10 (DEFRA and Environment Agency, 2002d).
3. Based on comparison of TDSI with oral exposure routes.
Figures Referred to in the Environmental Statement
Figure 1.1 Proposed Route and Stations

1 Shawfair Station
2 Eskbank Station
3 Newtownrange Station
4 Gorebridge Station
5 Galashiels Station
6 Tweedbank Station
Figure 5.1
Location of Noise Assessment Receptors

Proposed Route
Receptor Location

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Figure 6.1
Diffusion Tube Monitoring Locations

- Proposed Route
- Diffusion Tubes

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Figure 7.1 Proposed new footpaths

Proposed Route

- Proposed New Footpaths
- Proposed Stations
  1. Shawfair Station
  2. Eskbank Station
  3. Newtongrange Station
  4. Gorebridge Station
  5. Galashiels Station
  6. Tweedbank Station

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Figure 8.3
Ancient Woodland & Wildlife Sites
Figure 10.1
Cultural Heritage

- Proposed Route
- Historic Gardens
- Scheduled Ancient Monuments
- National Monument Record

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Figure 11.1
Landscape Designations

- Proposed Route
- Green Belt
- Footpaths
- Area of Great Landscape Value
- Historic Parks & Gardens
- National Scenic Area
- Environmentally Sensitive Area

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Figure 11.2
Landscape Character Areas

- Proposed Route
- Coastal Margins
- Uplands
- Upland Fringes
- Urban Area
- Lowland River Valleys
- Lowland Hills & Ridges
- Lowland Plains

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