

9. Nature Conservation

The A720 Sheriffhall Roundabout is expected to result in neutral or slight beneficial residual effects on all ecological features with mitigation in place, except for a moderate adverse residual effect on ancient woodland, arising because tree planting cannot fully compensate for the small predicted losses (0.16ha) to long-established plantation woodland. This must be balanced against the ecological benefits of the more natural geomorphology of the realigned Dean Burn section (which has the main impact on ancient woodland), and benefits of the Landscape Mitigation Plan. The latter, through close collaboration with ecologists, includes planting of native woodland (including wet woodland along the Dean Burn, increasing total native woodland cover by 5.3ha), sowing of species-rich grassland (providing a net increase of 14.7ha), provision of species-rich hedging (containing a customised range of species appropriate to the local area, with a net increase of 412m of hedging that is more diverse than existing hedging), and creation of valuable wetland habitat (including multiple SuDS ponds designed to retain water most of the year, with species-rich sown wetland and surrounding dry grassland). In combination, these measures constitute a locally-significant net gain in biodiversity.

There are no designated sites in the extents of the Scheme, and of those where an impact pathway exists (either pollution of water features or air pollution) there is expected to be no pre-mitigation impact (largely as a result of separation distance and dilution factors) with the exception of Dalkeith Oakwood SSSI, where a risk of contamination with giant hogweed seeds carried down the Dean Burn was identified. However, this risk is expected to be rendered neutral with preparation and implementation of an Invasive Non-Native Species Risk Assessment and Management Plan. Therefore, no effects on designated sites are anticipated.

Minor reduction in size of a pond to the Proposed Scheme Extents will be mitigated by compensatory expansion of this pond. Effects on watercourses are expected to be neutral with implementation SuDS, an Invasive Non-Native Species Risk Assessment and Management Plan, pollution prevention measures and restoration of a short section of realigned stream. There will also be relatively small losses to hedges and woodland, and lower quality grassland, all of which will be mitigated by compensatory tree/scrub planting and use of species-rich neutral grassland seed mixes, and this mitigation will in fact result in slight beneficial effects for native woodland, species-rich neutral grassland, hedgerows and wetland habitat (in terms of both extent and diversity), considered in combination to be locally-significant.

Pre-mitigation species effects are largely neutral with the exception of slight adverse effects on bats, breeding birds, invertebrates and fish, and potential moderate adverse effects on barn owl and otter, relating to potential increased road mortality. However, all adverse species effects will be rendered neutral through the proposed mitigation, including tree planting along carriageways to increase barn owl flight height, construction of the short section of realigned Dean Burn prior to works on the existing section (to maintain a commuting route for otter), general compensatory tree/scrub planting, compensatory expansion of a pond, and standard construction and operational pollution prevention measures including SuDS. Regarding invasive non-native species, there is a significant quantity of giant hogweed in the Proposed Scheme Extent, spread of which will be avoided through preparation and implementation of the Invasive Non-Native Species Risk Assessment and Management Plan.

9.1 Introduction

- 9.1.1 This chapter addresses the potential impacts and effects of the A720 Sheriffhall Roundabout ('the Proposed Scheme') on nature conservation features. Where appropriate it provides details of proportionate mitigation to reduce adverse effects on nature conservation features and/or enhancement measures, with the aim of delivering biodiversity enhancements.
- 9.1.2 A detailed description of the Proposed Scheme can be found in Chapter 5 - The Proposed Scheme. The layout of the Proposed Scheme is illustrated in Figure 5.1 'Proposed Scheme Layout'.
- 9.1.3 This chapter is supported by the following appendices:
- Appendix 9.1 – 'Bat Survey Methods and Results'; and,
 - Appendix 9.2 – 'Great Crested Newt Survey Details'.
- 9.1.4 This chapter is supported by the following figures:
- Figure 9.1 – 'Designated Areas of Conservation Interest';
 - Figure 9.2 – 'Phase 1 Habitat Survey';
 - Figure 9.3 – 'Bat Roost Survey';
 - Figure 9.4 – 'Bat Activity and Static Detector Survey';
 - Figure 9.5 – 'Protected Species Survey Results';
 - Figure 9.6 – 'Breeding Bird Survey Results'; and,
 - Figure 9.7 – 'Invasive Non-Native Species Survey'.
- 9.1.5 This chapter of the Environmental Statement (ES) has been prepared by competent experts with relevant and appropriate experience. The technical lead for the Nature Conservation assessment has 9 years of relevant work experience and is a Member of the Chartered Institute of Ecology and Environmental Management (MCIEEM). Further details are provided in Appendix 1.2 – Table of Expert Competencies.

9.2 Approach and Methodology

General Approach

- 9.2.1 The assessment process in this chapter utilises, in combination with professional judgement, guidance on impact assessment set out in the following documents:
- The Design Manual for Roads and Bridges (DMRB) Volume 11, Section 3, Part 4 'Ecology & Nature Conservation' (The Highways Agency, et al., 1993);
 - DMRB Interim Advice Note (IAN) 130/10 'Ecology and Nature Conservation: Criteria for Impact Assessment' (The Highways Agency, 2010); and,
 - 'Guidelines for Ecological Impact Assessment in the UK & Ireland' published by the Chartered Institute of Ecology & Environmental Management (CIEEM, 2018).
- 9.2.2 Note that although IAN 130/10 has not yet been assessed for use in Scotland, it is the most recent Highways Agency advice concerning ecological impact assessment and aligns more closely than the DMRB with the most recent CIEEM guidelines.

9.2.3 The objective for DMRB Stage 3 assessment is “to undertake sufficient assessment to identify any significant nature conservation impacts likely to arise from construction of the preferred route, and to identify the location, type and importance of all areas of significant nature conservation interest that may be affected” (DMRB Volume 11 Section 3, Part 4, Pg. 7/3).

9.2.4 The specific nature conservation objectives for all stages of DMRB assessment are:

- “The maintenance of the diversity and character of the countryside, including its wildlife communities and important geological and physical features”; and,
- “The maintenance of viable populations of wildlife species, throughout their traditional ranges, and the improvement of the status of rare and vulnerable species.” (DMRB Volume 11, Section 3, Part 4, Pg. 1/1).

Desk Study

9.2.5 A desk study was carried out to identify nature conservation designations and protected and notable habitats and species potentially relevant to the Proposed Scheme. A stratified approach was taken when defining the desk study area, based on the likely zone of influence of the Proposed Scheme on different ecological features and an understanding of the maximum distances typically considered by statutory consultees. Accordingly, the desk study identified any international nature conservation designations within 10km, national statutory sites within 2km and other local non-statutory nature conservations designations within 1km. A search for records of protected and/or notable species within 2km was also carried out.

9.2.6 Species are regarded as notable in the context of the following legislative instruments and guidance documents:

- The City of Edinburgh Council (CEC) or Midlothian Council (MLC) Local Biodiversity Action Plans (LBAP);
- The Scottish Biodiversity List (SBL);
- Schedule 5 of the Wildlife & Countryside Act 1981 (as amended) (‘the WCA’);
- Schedule 2 or 4 of the Conservation (Natural Habitats, &c.) Regulations 1994 (as amended) (the ‘Habitats Regulations’);
- The Protection of Badgers Act 1992;
- Regulation 1143/2014 on invasive alien species (‘EU IAS Regulation’);
- Nationally Rare or Nationally Scarce in the relevant UK Red Data Book/List; and,
- Birds of Conservation Concern (BoCC4) (Eaton, *et al.*, 2015).

9.2.7 The desk study was carried out using the data sources detailed in Table 9-1 ‘Desk Study Data Sources’.

Table 9-1 Desk Study Data Sources

Data Source	Date Accessed	Data Obtained
The Wildlife Information Centre (TWIC)	17 December 2014	<ul style="list-style-type: none"> • Records of species of conservation concern within 2km. • Non-statutory designated sites within 1km.
Scottish Natural Heritage (SNH) SiteLink webpage	17 December 2018	<ul style="list-style-type: none"> • International statutory designations within 10km. • Other statutory designations within 2km.
MLC Local Biodiversity Action Plan	03 September 2019	<ul style="list-style-type: none"> • Locally notable habitats and species.
Scottish Environmental Protection Agency (SEPA) River Basin Management Plan interactive website	17 December 2018	<ul style="list-style-type: none"> • Details of watercourse quality.
CEC Local Biodiversity Action Plan	17 December 2018	<ul style="list-style-type: none"> • Locally notable habitats.

Data Source	Date Accessed	Data Obtained
CEC Local Development Plan (Adopted November 2016)	03 September 2019	<ul style="list-style-type: none"> Details of local planning policy relevant to nature conservation.
MLC Local Plan and Midlothian Proposed Local Development Plan	17 December 2018	<ul style="list-style-type: none"> Details of local planning policy relevant to nature conservation.
Ordnance Survey (OS) 1:25,000 maps and aerial photography	17 December 2018	<ul style="list-style-type: none"> Information on habitats and habitat connections (based on aerial photography) relevant to interpretation of planning policy and assessment of potential protected and notable species constraints.

Field Survey

9.2.8 Field survey areas varied according to survey type, as shown in Table 9-2 'Ecology Field Survey Areas'. The survey areas are shown on Figures 9.2 – 9.7 and all surveys covered an appropriate buffer around the Proposed Scheme Extents for the relevant feature:

- Figure 9.2 – 'Phase 1 Habitat Survey';
- Figure 9.3 – 'Bat Roost Survey';
- Figure 9.4 – 'Bat Activity and Static Detector Survey';
- Figure 9.5 – 'Protected Species Survey Results';
- Figure 9.6 – 'Breeding Bird Survey Results'; and,
- Figure 9.7 – 'Invasive Non-Native Species Survey'.

9.2.9 For the purposes of field survey and subsequent assessment, the Proposed Scheme Extents is defined as the red line boundary which includes direct land take and the working areas required to facilitate construction.

Table 9-2 Ecology Field Survey Areas

Survey	Survey Area (Proposed Scheme Buffer)
Phase 1 habitat	500m
Bat roost suitability and bat activity	50m
Badger <i>Meles meles</i> and red squirrel <i>Sciurus vulgaris</i>	100m
Otter <i>Lutra lutra</i> and water vole <i>Arvicola amphibius</i>	200m
Great crested newt <i>Triturus cristatus</i>	250m
Breeding bird	100m
Barn owl	100m
Invasive non-native species	100m

Phase 1 Habitat Survey

9.2.10 A Phase 1 habitat survey was carried out on 5 July 2017 in accordance with the standard survey method published by the Joint Nature Conservation Committee (JNCC, 2010), by which areas of land are assigned standard habitat types and ecological notes are recorded. The weather was optimal for field survey, being dry and mild with light winds and good visibility.

9.2.11 All habitat types present within the survey area were recorded and mapped, along with any relevant associated ecological features. Where relevant ecological features were present, target notes were recorded and the position of

these mapped. Typical and notable plant species were recorded for different habitat types. Nomenclature for plant species follows that of Stace (2019).

Bat Surveys

Bat Roost Survey

- 9.2.12 The bat roost suitability of all trees and structures within the extents of the Proposed Scheme plus a 50m buffer was assessed following guidance published by the Bat Conservation Trust (BCT) (Collins, 2016). Potential Roost Features (PRF) were identified from the ground and were classified as having 'Negligible', 'Low', 'Moderate' or 'High' bat roost suitability, according to the definitions in Collins (2016). The assessment was conducted on 5 July 2017 (at this time trees were in full leaf; however, this is not considered to have significantly constrained the ability of the surveyors to view and identify PRFs).
- 9.2.13 In late July 2017 a bat was reported within a residential building by the residents of that property south-east of Sheriffhall Roundabout, Sheriffhall Farmhouse, approximately 69m from the Proposed Scheme Extent. No evidence of bats in this dwelling had yet been collected during field survey, and so to investigate further an internal inspection of Sheriffhall Farmhouse and the adjacent barn was carried out on 18 August 2017.
- 9.2.14 In accordance with the BCT guidelines, trees assessed as having Moderate or High bat roost suitability, and structures assessed as having Low, Moderate or High bat roost suitability were subject to dusk emergence and/or dawn re-entry surveys. The number of times a survey was repeated was based on the suitability of the feature, as outlined in Collins (2016). These surveys were carried out between 5 July and 29 August 2017. Surveyors stood in a position which allowed them a view of the identified PRF and watched for bats leaving or returning to a roost. Batbox Duet (with Roland R-05 recorders) and Echo Meter EM3 devices recording to an SD card were used to aid in detection and identification of bats. If any bats emerged/entered a roost, the surveyors noted the roost location, identified the species (using bat detection equipment) and counted the number of bats emerging or entering (where light conditions allowed). General bat activity was also noted during the survey to provide further information on use of the Proposed Scheme area by bats.
- 9.2.15 For further details of bat roost survey methods see Appendix 9.1 - Bat Survey Methods and Results.

Bat Activity Survey

- 9.2.16 A transect route was designed whereby every habitat type present within the Proposed Scheme area was visited, but with a focus on Moderate and High suitability bat habitat (as defined in Collins (2016) (see Figure 9.4 'Bat Activity and Static Detector Survey'). The overall Proposed Scheme Extent was assessed as having Moderate suitability for bat and therefore, as per BCT guidelines (Collins, 2016), the transect was walked on a monthly basis between May and September 2017, inclusive. The transect was walked at dusk, at or during the period shortly after sunset, in suitable weather conditions. Surveys commenced shortly after sunset on most occasions given the open nature of the habitats within the Proposed Scheme Extent and thus the low likelihood that they would be used by several bat species at a time when light levels remained relatively high. The adjusting of start times in this way accords with BCT guidelines. Moreover, all walked activity surveys were completed within three hours of the time of sunset, in accordance with BCT guidelines. Surveyors used 'Batbox Duet' (with Roland R-05 recorders) and 'Echo Meter EM3' devices recording to an SD card to detect, identify and record bats and their calls.
- 9.2.17 For further details of bat activity survey methods see Appendix 9.1 - Bat Survey Methods and Results.

Static Detector Surveys

9.2.18 Wildlife Acoustic SM2+ static bat detectors were placed at three locations within the Proposed Scheme Extents to record general bat activity over an extended period of time during the bat activity season. The three static detector locations were chosen as being representative of the habitats within the Proposed Scheme area and which may be important to local bat populations. The locations at which the static detectors were placed are shown on Figure 9.4 'Bat Activity and Static Detector Survey'. Although BCT guidelines recommend monthly monitoring using static detectors in Moderate suitability bat habitat, given the low levels of bat activity encountered within the Proposed Scheme Extent, the detectors were deployed for a minimum of 14 continuous days on three separate occasions between June and August 2017. The level of static monitoring achieved, in combination with the walked activity transects, was sufficient to establish the levels of bat activity occurring within the survey area and the species of bat present.

Analysis of Sound Files

9.2.19 Analysis of all bat calls recorded during the bat roost, bat activity and static detector surveys was carried out using 'Kaleidoscope Pro' and 'BatSound' software. This allowed identification of calls to species level (or family in the case of *Myotis* species).

Badger Survey

9.2.20 Survey for badger was carried out on 5 July 2017 following the guidelines in Harris, *et al.* (1989). This involved searching in all areas of suitable habitat for evidence of badger activity including setts, spoil heaps, bedding, guard hairs, latrines, footprints, trails, scratch marks and signs of foraging activity. Where possible, setts were classed as main, annexe, satellite or outlier, and holes described as well-used, partially-used or disused. The weather was optimal for field survey, being dry and mild with light winds and good visibility.

Red Squirrel Survey

9.2.21 A walkover survey to search for red squirrel was carried out on 5 July 2017. The survey covered all areas of woodland habitat within 100m of the Scheme. Searches were made for squirrels, their feeding signs and dreys in accordance with Gurnell, *et al.* (2009). The weather was optimal for field survey, being dry and mild with light winds and good visibility.

Otter and Water Vole Survey

9.2.22 Combined survey for otter and water vole was carried out in all areas of suitable habitat (including ponds and watercourses) within 200m of the Proposed Scheme on 17 May 2017. The survey followed guidance in published literature (Chanin, 2003; Liles, 2003; Strachan, *et al.*, 2011) where appropriate to a site survey. Note that although it is recommended to complete two water vole survey visits, including one between July – September, this was not possible due to the abundance of giant hogweed *Heracleum mantegazzianum* within the survey area at this time and the serious health and safety risk this posed to surveyors. Survey was therefore restricted to a single visit carried out before giant hogweed had grown substantially. This level of survey effort was highlighted to Scottish Natural Heritage and was confirmed to be proportionate. Evidence of otter searched for included holts, laying-up areas, spraints, footprints, trails and foraging signs. Evidence of water vole searched for included latrines, droppings, burrows, trails and foraging signs. The weather during survey was favourable, being dry and with low water levels.

Great Crested Newt Survey

- 9.2.23 Following a review of aerial images and previous habitat survey results (from DMRB Stages 1 and 2); all waterbodies within 250m of proposed infrastructure were identified and mapped (as shown on Figure 9.5 'Protected Species Survey Results'). A single additional pond was identified within 500m of the Proposed Scheme Extents, to the south of Dobbie's Garden Centre and approximately 275m from the Proposed Scheme. This water body was not subject to great crested newt survey for a number of reasons, including:
- The pond appears to be highly artificial and is likely to receive run-off from the adjacent shopping centre and plant nursery;
 - There are no records of great crested newt within 1km of the Proposed Scheme;
 - The intervening land use between the pond and the Proposed Scheme is hard-standing in the form of the car park associated with Dobbie's Garden Centre, the A7 and Gilmerton Road. This is likely to present a major barrier to the movement of great crested newts; and,
 - There is very limited terrestrial habitat for this species in the parts of the Proposed Scheme within 500m of the pond. However, there is extensive broadleaved woodland to the south of the pond, in the opposite direction to the Proposed Scheme, which is much more likely to be used by great crested newts.
- 9.2.24 A Habitat Suitability Index (HSI) assessment was carried out on all of these waterbodies, in accordance with the guidance in ARG (2010) to establish their overall suitability for great crested newt.
- 9.2.25 Presence/absence surveys were also carried out. These involved two surveyors (working as agents under Scottish Natural Heritage (SNH) licence number 100470) visiting a pond on four occasions using three separate survey methods to establish great crested newt presence (note that on one survey visit on 22 May 2017, heavy rainfall prevented effective egg searching or torching and survey on this date was limited to bottle trapping). Four visits were undertaken between 9 May and 19 June 2017. Although surveys in April can be valuable, lack of survey in this month is not considered to pose a constraint, particularly as two surveys encompassed the peak survey season (approximately mid-April to mid-May). Survey methods employed on each visit were bottle trapping, torch survey and egg searches. Survey methodologies followed guidance published by English Nature (2001) and Langton, *et al.* (2001).
- 9.2.26 For further details of great crested newt survey methods see Appendix 9.2 - Great Crested Newt Survey Details.

Breeding Bird Survey

- 9.2.27 A modified version of the Common Bird Census (CBC) technique described in Gilbert, *et al.* (1998) was adopted to survey all common breeding birds within suitable habitats in the Proposed Scheme area. Four CBC survey visits were made on 8 May 2017, 24 May 2017, 20 June 2017 and 4 July 2017. It is standard practice to carry out less than the ten visits prescribed by the CBC methodology, and four visits was considered an adequate survey effort to provide a reasonable indication of the numbers and species of breeding birds for this assessment. All surveys were carried out under favourable weather conditions of light winds (below Beaufort Force 5), no continuous or heavy precipitation and good visibility. Surveys were carried out in the morning, starting within 30 minutes of sunrise but avoiding the period of one hour before sunrise.
- 9.2.28 Pre-determined transect routes were walked by an experienced ornithologist which allowed all parts of the survey area to be approached to within 50m – 100m, depending upon the level of visibility afforded by the different habitat types (e.g. in the areas of broadleaved plantation woodland it was necessary to increase coverage when compared with open areas of arable fields and grassland). Binoculars were used to scan all parts of the survey area and surveyors included regular stops to listen for singing or calling birds.

- 9.2.29 All of the birds observed, either by sight or sound, their locations and activity/behaviour were recorded on 1:10,000 scale Ordnance Survey (OS) field maps using standard British Trust for Ornithology (BTO) species codes and behaviour notation, as described in Gilbert, *et al.* (1998).
- 9.2.30 Following completion of the CBC surveys, an ornithologist carried out an analysis in Esri ArcGIS to estimate territory centres of possible or probable breeding birds. A precautionary approach was taken, whereby a single occurrence of a species exhibiting possible breeding behaviour (including territorial singing) in a particular location was treated as evidence of a territory.

Barn Owl Survey

- 9.2.31 Survey for barn owl was undertaken on 5 July 2017 based on guidance described in Hardey, *et al.* (2013). Trees and built structures within 100m of the Proposed Scheme with potential to be utilised by barn owl were inspected for presence of potential nest sites or active roost sites. Evidence searched for included pellets, feathers and actual birds.

Invasive Non-native Species Survey

- 9.2.32 A survey was undertaken on 26 June 2017 to search for invasive non-native species of terrestrial plant. The survey covered the Proposed Scheme area plus a 100m buffer (private dwellings and therefore plants within gardens were not included). Any invasive plant species observed were recorded, with a focus on invasive non-native plant species of UK concern (i.e. those identified in Schedule 9 of the WCA, although this no longer legally applies in Scotland) and Invasive Alien Species of Union concern (as per EU IAS Regulation 1143/2014). The survey was undertaken at the optimal time to record invasive plant species, and weather conditions were good (dry and mild with light winds and good visibility).

Impact Assessment

- 9.2.33 The assessment of potential impacts on ecological features broadly follows the guidelines for Ecological Impact Assessment (EclA) published by the Chartered Institute of Ecology and Environmental Management (CIEEM, 2018) and the DMRB guidance in IAN 130/10. These guidelines have been endorsed by, amongst others, the Institute of Environmental Management and Assessment (IEMA), the Wildlife Trusts, the Association of Local Government Ecologists (ALGE) and SNH. It should be noted that the guidelines in IAN 130/10 were designed to more closely align the DMRB methods for nature conservation impact assessment with the CIEEM approach. Where the guidelines differ in their approach, the matrix-based methodology recommended by the DMRB has been adopted in preference.
- 9.2.34 This impact assessment involves three steps: assignment of importance (equivalent to value/sensitivity in DMRB/IAN130/10 terminology respectively), characterisation of impact, and determination of significance. The principal steps are summarised below:
- Data are obtained on ecological features potentially affected, through targeted desk study and field survey to determine baseline conditions;
 - The importance of identified ecological features is evaluated in a geographic context, and features requiring more detailed assessment are determined;
 - The potential impacts of the project that could affect ecological features are described, accounting for embedded mitigation and legislative requirements;
 - The likely effects on ecological features are assessed and where possible quantified;
 - Measures are developed to mitigate (by avoidance or reduction), or if necessary compensate, for any likely significant adverse effects;

- The significance of residual effects (beneficial or adverse) is reported; and,
- Scope for ecological enhancement is considered.

9.2.35 Throughout the assessment, the professional judgement of experienced ecologists is applied as necessary.

Assignment of Importance

9.2.36 Only those ecological features that are 'important' and could be significantly affected by the Proposed Scheme require detailed assessment – "*it is not necessary to carry out detailed assessment of ecological features that are sufficiently widespread, unthreatened and resilient to project impacts and will remain viable and sustainable*" (CIEEM, 2018). This is consistent with the EIA Regulations, which require the identification, description and assessment of the likely significant effects of the project on biodiversity.

9.2.37 Assignment of importance to ecological features (sites, habitats or species) is subject to professional judgement, based on factors including:

- Rarity, endemism, mobility and geographic range (particularly if this is changing);
- Size/extent (e.g. large populations), rate of decline and vulnerability;
- Typicalness, species-richness, habitat diversity and connectivity /fragmentation;
- Value to other features (e.g. habitat which supports notable species); and,
- Potential for restoration.

9.2.38 Existing data and criteria are considered when determining the importance of ecological features. Where these are lacking, it is necessary to apply professional judgement.

9.2.39 Requirements to comply with legislation are stated during the assessment, but legislative protection and priority listing does not necessarily translate to importance. For example, a transitory roost of a single bat would not be afforded the same importance as a regularly-occurring maternity roost (although legal obligations must still be met), and areas of priority habitat could be unfavourably small or in poor condition and not practically restorable.

9.2.40 The importance of ecological features is described within a geographic scale. For the purposes of this assessment, 'Regional' means the combined SNH Natural Heritage Futures Zones (NHZ) 16, 17 and 20¹ (the Proposed Scheme is located where these zones meet); 'County' means the combined City of Edinburgh and Midlothian Local Authority areas, and 'Local' means an area of 5km radius around the Proposed Scheme boundary. The importance of ecological features as considered on a geographic scale is set out in Table 9-3 'Importance of Ecological Features' below. This is informed by CIEEM guidance (CIEEM, 2018) and IAN 130/10 (Highways Agency, 2010).

Table 9-3 Importance of Ecological Features

Importance*	Examples of Types of Feature (subject to professional judgement)
International (Very High)	<p>Internationally-designated sites including: Special Protection Areas (SPAs); potential SPAs (pSPAs); Special Areas of Conservation (SACs); candidate SACs (cSACs); Wetlands of International Importance (Ramsar sites); Biogenetic Reserves; World Heritage Sites; and Biosphere Reserves.</p> <hr/> <p>Areas meeting the selection criteria for the above designations but not themselves designated, including viable or restorable areas (or parts thereof essential to overall viability) of Annex I habitat.</p> <hr/> <p>Resident or regularly occurring species population (or site supporting one) considered significant at an International or European level where: i) its loss would adversely affect conservation status or distribution on an International/European scale; ii) it forms a critical part of a wider population on an International/European scale; or, iii) the species is at a critical life cycle phase.</p>

¹ <https://gateway.snh.gov.uk/natural-spaces/dataset.jsp?dsid=NHFZ>

Importance*	Examples of Types of Feature (subject to professional judgement)
National (High)	Nationally-designated sites including: Sites of Special Scientific Interest (SSSIs); National Nature Reserves (NNRs); Marine Protected Areas (MPAs); and Marine Conservation Zones (MCZs).
	Areas meeting the selection criteria for the above designations but not themselves designated.
	Viable or restorable areas (or parts thereof essential to overall viability) of Priority habitats or Ancient Woodland identified in the Scottish Biodiversity List or SNH Ancient Woodland Inventory. Resident or regularly occurring species population (or site supporting one) considered significant at National level (e.g. 1% of national resource) or higher level where: i) its loss would adversely affect conservation status or distribution on a national scale; ii) it forms a critical part of a wider population on a national scale; or, iii) the species is at a critical life cycle phase.
Regional (Medium)	Areas of priority habitats identified in the Regional Biodiversity Action Plan (BAP) (if available) or SNH Natural Heritage Future zone.
	Viable or restorable areas (or parts thereof essential to overall viability) of priority habitats identified in the Regional BAP, or of habitats judged to have ecological value at this scale.
	Resident or regularly occurring species population (or site supporting one) considered significant at Regional level (e.g. 1% of regional resource) or higher level where: i) its loss would adversely affect conservation status or distribution on a regional scale; or ii) it forms a critical part of a wider population on a regional scale; or iii) the species is at a critical life cycle phase.
County (Low)	Sites designated at county/unitary authority level including: Local Nature Reserves (LNRs), Local Nature Conservation Sites (LNCSs) and County Wildlife Sites (CWSs).
	Areas meeting the selection criteria for the above designations but not themselves designated.
	Viable or restorable areas (or parts thereof essential to overall viability) of priority habitats identified in the Local BAP, or of other habitats judged to have ecological value at this scale. Resident or regularly occurring species population (or site supporting one) considered significant at County/Unitary Authority level (e.g. 1% of county resource) or higher level where: i) its loss would adversely affect conservation status or distribution on a county/unitary authority scale; ii) it forms a critical part of a wider population on a county/unitary authority scale; or, iii) the species is at a critical life cycle phase.
Local (Negligible)	Areas of habitat or populations of species considered to appreciably enrich the local ecological resource including veteran trees and features of value for migration, dispersal or genetic exchange.

* Importance categories are as per CIEEM (2018) and IAN 130/10 guidelines. Corresponding sensitivity criteria, as defined in DMRB, Volume 11, Section 2, Part 4 LA 104 'Environmental Assessment and Monitoring' are provided in brackets to ensure consistency with other chapters of this EIA.

Characterisation of Impacts

9.2.41 Likely impacts are characterised using those parameters below that are necessary to understand the particular ecological effect:

- Direction – whether the impact will have a beneficial or adverse effect;
- Magnitude – the 'size', 'amount' or 'intensity' of an impact, described in quantitative terms as far possible;
- Extent – the area or distance over which the impact or effect occurs;
- Duration – the time over which an impact is expected to last prior to recovery or replacement (if possible) of the resource or feature. Where appropriate, ecological aspects such as lifecycles are considered. The duration of an effect may be longer than the duration of an activity or impact;
- Timing and frequency – timing is important since an impact might not occur if it avoids critical seasons or life stages. Frequency considers activity repetition, which may have greater impact; and,
- Reversibility – whether the impact is temporary or permanent. A temporary impact is one from which recovery is possible or for which effective mitigation is possible and enforceable. A permanent impact is one from which recovery is either not possible or cannot be achieved within a reasonable timescale (in the context of the feature being assessed).

- 9.2.42 To align with the DMRB Stage 3 methodology employed by other chapters (see Chapter 6 - Overview of Assessment Process for further details), magnitude of impact (accounting for the relevant other parameters above) is described using DMRB terms as detailed in Table 9-4 'Impact Magnitude Criteria'.

Table 9-4 Impact Magnitude Criteria

Magnitude of Impact		Typical Descriptors
Major	Adverse	Loss of resource and/or quality or resource; severe damage to key characteristics, features or elements.
	Beneficial	Large scale or major improvement of resource quality; extensive restoration; major improvement of attribute quality.
Moderate	Adverse	Loss of resource, but not adversely affecting the integrity; partial loss or/damage to key characteristics, features or elements.
	Beneficial	Benefit to, or addition of, key characteristics, features or elements; improvement of attribute quality.
Minor	Adverse	Some measurable change in attributes, quality or vulnerability; minor loss of, or alteration to, on (maybe more) key characteristics, features or elements.
	Beneficial	Minor benefit to, or addition of, one (maybe more) key characteristics, features or elements; some beneficial impact on attribute or a reduced risk of negative impact occurring.
Negligible	Adverse	Very minor loss or detrimental alteration to one or more characteristics, features or elements.
	Beneficial	Very minor benefit to or positive addition of one or more characteristics, features or elements.
No Change		No loss or alteration of conditions, features or elements; no observable impact in either direction.

Source: Table 3.4N, DMRB LA 104 Environmental Assessment and Monitoring

Determining Significance

- 9.2.43 An effect (beneficial or adverse) occurs at the geographical scale of importance assigned to the ecological feature if it affects its ecological integrity (of a site or ecosystem) or conservation status (of a species or habitat). An effect may be considered to occur at a geographic scale lower than that of the importance of the feature if the effect is small (for example, a negligible effect on a species assigned National importance may not affect its overall conservation status).
- 9.2.44 The scale of an effect is largely a product of the interaction between the importance of the ecological feature and the magnitude of impact upon it (accounting for the other impact parameters set out above as necessary), moderated by professional judgement. A matrix guiding the determination of scale of effect using DMRB terminology as used in other chapters is set out in Table 9-5 'Determination of Scale of Effect'.

Table 9-5 Determination of Scale of Effect

Importance of Ecological Feature ²	Magnitude of Impact				
	Major	Moderate	Minor	Negligible	No Change
International (Very High)	Very Large	Large or Very Large	Moderate or Large	Slight	Neutral
National (High)	Large or Very Large	Moderate or Large	Slight or Moderate	Slight	Neutral
Regional (Medium)	Large or Moderate	Moderate	Slight	Neutral or Slight	Neutral
County	Slight or Moderate	Slight	Neutral or Slight	Neutral or Slight	Neutral

² Importance categories are as per CIEEM (2018) and IAN 130/10 guidelines. Corresponding sensitivity criteria, as defined in DMRB, Volume 11, Section 2, Part 4 'LA 104 Environmental Assessment and Monitoring' are provided in brackets to ensure consistency with other chapters of this EIA

(Low)

Local (Negligible)	Slight	Neutral or Slight	Neutral or Slight	Neutral	Neutral
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Source: Table 3.4N, DMRB LA 104 'Environmental Assessment and Monitoring'

- 9.2.45 Initially, the scale of effect does not consider mitigation (avoidance or reduction) or compensation measures. Residual effects take such measures into account, with the aim that, wherever possible, residual effects arising from unmitigated adverse impacts are rendered neutral, less adverse or beneficial with mitigation.
- 9.2.46 Significant effects typically comprise residual effects that are within the moderate, large or very large categories.
- 9.2.47 Professional judgement in the assessment of significance is applied to lower effects (for example, a slight effect may be assessed as significant if it involved a fundamental change to an ecological feature of low importance).

Limitations to the Assessment

- 9.2.48 It is likely that the Proposed Scheme will be procured by means of a Design and Build (D&B) type contract. Under the terms of this contract type, the Contractor will undertake both the detailed design and construction of the Proposed Scheme.
- 9.2.49 It is expected that the construction work would take place within the Scheme Extents as shown on Figure 1.2 'The Proposed Scheme'. The Scheme Extents have informed the land take calculations undertaken for assessment purposes in this ES. The land within the Scheme Extents will be purchased under a CPO.
- 9.2.50 It is possible that the Contractor may require construction compounds to be located out with land identified in the CPO. Should construction compounds be located out with the Scheme Extents it will be the responsibility of the Contractor to assess the environmental impacts of the construction compounds and seek to mitigate these where possible.
- 9.2.51 The construction assessment is based on the construction information that is currently available, with advice being provided by the Highway Design Team. As with all construction assessments, the exact details of construction activities would not be fully known, before a specific contractor is appointed to complete the works, who would determine their exact construction methods and programme during the detailed design stage.
- 9.2.52 As the Proposed Scheme is developed at detailed design any refinements to the design should be subject to environmental review to ensure that the residual effects would not be greater (or significantly different) than those reported in this ES. The findings of any such review should be subject to approval by Transport Scotland (TS) and where necessary opinions should be sought from the statutory bodies.

9.3 Legislative and Policy Framework

Legislation

- 9.3.1 The following legislation is relevant to the Development and has been taken into account:
- Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (the 'Habitats Directive');
 - Directive 2009/147/EC on the conservation of wild birds (the 'Birds Directive');
 - Directive 2000/60/EC establishing a framework for Community action in the field of water policy (the 'Water Framework Directive' (WFD));

- Regulation (EU) No 1143/2014 on the prevention and management of the introduction and spread of invasive alien species ('Invasive Alien Species Regulation');
- Convention on Wetlands of International Importance ('Ramsar Convention');
- Conservation (Natural Habitats, &c.) Regulations 1994 (as amended in Scotland) (the 'Habitats Regulations');
- Wildlife & Countryside Act 1981 (as amended in Scotland) ('WCA');
- Nature Conservation (Scotland) Act 2004 (as amended);
- Wildlife & Natural Environment (Scotland) Act 2011 (as amended) ('WANE Act'); and,
- Protection of Badgers Act 1992 (as amended in Scotland).

National Policy

Scottish Biodiversity List (Scottish Government, 2012)

- 9.3.2 The Scottish Biodiversity List identifies habitats and species that are of principal importance for conservation in Scotland. The priority habitat descriptions are based on those of the former UK Biodiversity Action Plan (UK BAP).

National Planning Framework 3 (NPF3) (Scottish Government, 2014a)

- 9.3.3 The National Planning Framework (NPF3) was published in 2014 by the Scottish Government and is intended to guide Scotland's spatial development priorities for the next 20 to 30 years. Scottish Planning Policy (SPP) (Scottish Government, 2014). The vision set out in NPF3 is divided into four outcomes, one of which (a natural resilient place) is of particular relevance to nature conservation considerations. Paragraph 4.5 recognises that biodiversity in Scotland is rich and varied and key infrastructure corridors and greenspaces within our cities and towns provide important habitats and can together contribute to wider national ecological network

Scottish Planning Policy (SPP) (Scottish Government, 2014b)

- 9.3.4 Scottish Planning Policy (SPP) recognises the environment as a national asset offering opportunities for enjoyment, recreation and sustainable economic activity. The key principles relevant to nature conservation are set out under SPP paragraph 194, and can be summarised as:
- Facilitate positive change while maintaining/enhancing distinctive landscape character;
 - Conserve and enhance protected sites and species, while maintaining the healthy ecosystems and natural processes which provide important services to communities;
 - Protect and improve all parts of the water and soil environment in a sustainable way;
 - Protect and enhance ancient woodland, hedgerows and individual trees with high ecology or landscape value; and,
 - Seek biodiversity benefits from new development where possible, including habitat restoration and avoiding fragmentation.
- 9.3.5 SPP emphasises the biodiversity duty of public bodies (Paragraph 195) and the policy and legislative requirements for protected sites and species (Paragraphs 207-214). This includes Habitats Regulation Appraisal of European sites whereby plans or projects potentially affecting them can only be approved if there will be no adverse effect on site integrity. Derogation is possible only if there are no alternatives and there are imperative reasons of overriding public interest, in which case sufficient compensation is required to maintain coherence of the European site network.

- 9.3.6 SPP also sets out policy for woodland, including ancient woodland and veteran trees (paragraphs 216-219). There is no legislation specifically protecting ancient woodland, but SPP identifies it as an important and irreplaceable national resource that should be protected and enhanced, along with other native and long-established woodlands with high nature conservation value. Scottish ancient woodland is defined as land that is currently wooded and has been continually wooded since 1750 or the mid-1800s, depending on the earliest mapping available. The Ancient Woodland Inventory (AWI), provided by SNH (SNH, undated a) is a provisional guide to the location of ancient woodland in Scotland, which has important biodiversity and cultural value by virtue of its antiquity. It is described as provisional because not all ancient woodland is guaranteed to have been identified, especially small patches. Thus, any woodland not in the AWI that is demonstrably ancient (by presence on early mapping and/or appropriate ecological characteristics) should be treated as ancient woodland
- 9.3.7 Other parts of SPP often relevant to nature conservation include policy on green infrastructure (key principles in paragraph 221), and management of flood risk and drainage (key principles in paragraph 255), including avoidance of culverting, development on floodplains and use of Sustainable Drainage Systems (SuDS).

Regional Policy

- 9.3.8 The Proposed Scheme spans two Local Authority areas: The CEC to the north of the A720 Edinburgh City Bypass ('the A720') (on which Sheriffhall Roundabout is located) and MLC, to the south. For the purposes of defining locally notable features for this assessment, any site, habitat or species included in either Local Authority Development Plan or Biodiversity Action Plan is considered as relevant to the Proposed Scheme as a whole.

South East Scotland Strategic Development Plan (SDP) (SESplan, 2013)

- 9.3.9 Of those policies in the Strategic Development Plan (SDP), Policy 11 – Delivering the Green Network is most relevant to nature conservation. With regard to developments it states that *“Major developments in the SESplan area should contribute positively to the creation, maintenance and enhancement of the green network”* (Pg. 51).

Proposed South East Scotland Strategic Development Plan (SDP2) (SESplan, 2016)

- 9.3.10 The Proposed Strategic Development Plan (SDP2) continues to promote Enhanced Green Networks which includes woodlands, wetlands, flood plains, road verges as well as blue infrastructure such as sustainable drainage systems, ponds, swales, wetlands and rivers. Green and blue networks are noted as providing a range of benefits including *“Opportunities for biodiversity to flourish so that people can experience nature close to where they live”* (Pg.50). The Proposed Scheme is within the 'Edinburgh and East' Strategic Green Network Priority Area, one of ten identified areas for the Strategic Development plan area. These areas indicate broad areas of greatest strategic importance for green network protection and enhancement and represent a significant component of the Central Scotland Green Network identified as a National Development in National Planning Framework 3.
- 9.3.11 As discussed in Chapter 2 – Need for the Scheme, the Proposed SDP (SDP2) was rejected by the Scottish Ministers on the 16 May 2019; however, SDP2 has still been considered within this ES as a draft plan.

Local Policy

Edinburgh Local Development Plan (City of Edinburgh Council, 2016a)

- 9.3.12 CEC's Local Development Plan (LDP) includes the following policies relevant to nature conservation:
- Env13: Sites of International Importance;
 - Env14: Sites of National Importance;

- Env15: Sites of Local Importance;
- Env16: Species Protection;
- Env21: Flood Protection (this includes avoidance of culverting and deculverting); and,
- Des6: Sustainable Buildings (this includes Sustainable Urban Drainage Systems).

Edinburgh Local Biodiversity Action Plan 2019 – 2021 (City of Edinburgh Council, 2019)

9.3.13 The CEC Local Biodiversity Action Plan (LBAP) outlines an extensive series of Habitat and Species Action Plans which detail biodiversity objectives, actions and timescales. LBAP habitats are encompassed under under four broad categories of which the most relevant are Green Networks (e.g. parks and greenspaces, golf courses and cycle ways) and Blue Networks (freshwater, wetland, marine and coastal). Species for which specific action is being undertaken include otter and bats. Other listed species comprise plants and invertebrates which require specialist, species-rich or otherwise good quality habitats that do not exist within the Scheme footprint, and breeding birds which do not occur in the Scheme vicinity.

Midlothian Local Development Plan (Midlothian Council, 2017)

9.3.14 The MLC Local Development Plan includes the following policies relevant to nature conservation:

- DEV5: Sustainability in New Development;
- DEV7: Landscaping in New Development;
- RD1: Development in the Countryside;
- ENV1: Protection of the Green Belt;
- ENV2: Midlothian Green Network;
- ENV10: Water Environment;
- ENV11: Woodland, Trees and Hedges;
- ENV12: Internationally Important Nature Conservation Sites;
- ENV13: Nationally Important Nature Conservation Sites;
- ENV14: Regionally and Locally Important Nature Conservation Sites;
- ENV15: Species and Habitat Protection and Enhancement;
- ENV17: Air Quality; and,
- ENV19: Conservation Areas.

9.3.15 The LDP does not define local sites for nature conservation but refers to independent “*planning guidance on nature conservation*” (Paragraph 5.1.35). The MLC Local Development Plan Main Issues Report 2013: Technical note on Nature Conservation provides information on locally designated sites.

Midlothian Local Biodiversity Action Plan 2019 - 2024 (Midlothian Council, 2019)

9.3.16 The Midlothian LBAP lists a number of actions, of which the following are relevant to the Scheme vicinity: 1 Restoration and creation of flower-rich habitats; 2 Creation of nest boxes and other wildlife homes; 4 Pond and wetland creation and maintenance; 5 Improve ecology of watercourses; 6 Tackling Invasive Non-Native Species in rivers, streams and ponds; 9 Wildlife corridors; and 12 Local priority species. The latter lists four species only, of which only common toad and hedgehog are likely to occur in the Scheme vicinity

9.4 Consultations

- 9.4.1 Consultees relevant to Nature Conservation were Scottish Environment Protection Agency (SEPA), Scottish Natural Heritage (SNH) and East Lothian Biodiversity. A summary of the responses to the 2018 Stage 3 consultation are provided below. Also summarised are consultation responses received in 2015 and 2016 relating to the Stage 2 Options Assessment, where these continue to be relevant. A summary of all consultation is provided in Chapter 7 – Consultation and Scoping and copies of all responses are included in Appendix 7.1 - Consultation Responses.

Scottish Natural Heritage

- 9.4.2 In summary, SNH noted the locations of the proposed SuDS ponds and recommended 'functionally linking' such ponds, where possible, and furthering their use from simply being drainage basins to create wetland habitat networks. This recommendation was made specifically in relation to the ponds between A7 South and A6106 South (Old Dalkeith Road). SNH advocated that roadside verges are managed for nature, and suggested planting with wildflower mixes or that they be allowed to revegetate naturally.
- 9.4.3 Previous consultation responses from SNH noted that protected species should be taken into consideration (particularly otters on the Dean Burn, badgers and breeding birds) and highlighted that one of the notified features of Dalkeith Oakwood SSSI is its lichen community, which is considered highly sensitive to airborne pollution, of which the nearby A720 is a known source. Efforts to measurably improve air quality in this area were encouraged, and it was suggested that in-combination effects with other nearby developments should be taken in to account.
- 9.4.4 Consultation with SNH for Stage 2 specifically stated that "We anticipate no impacts on nearby nature conservation designated sites."

Scottish Environment Protection Agency

- 9.4.5 SEPA responded in 2018 with no further information to their 2016 response. Previous responses highlighted the need to consider vulnerable receptors when extending/replacing culverts, ensuring they are of appropriate size/shape/slope. It was recommended to install SuDS or other bio-retention areas to enhance the local environment (which has been incorporated into the final design). SEPA also highlighted the need to ensure diversions/realignment of watercourses were assessed to understand changes in capacity, velocity and sediment erosion/deposition; and identify all aspects of works that may impact upon the environment and potential pollution risks which should be documented in a Construction Environment Management Plan (CEMP).

Forestry Commission

- 9.4.6 The Forestry Commission stated that compensatory planting should be carried out for loss of woodland, in accordance with SPP. The response gave a figure of 0.71ha, which was referring to a patch of immature broadleaved plantation woodland on the immediate east side of Sheriffhall Roundabout. There are other small amounts of affected woodland, which have been considered in this assessment and for which compensatory planting has also been proposed.

9.5 Baseline Conditions

Desk Study

Statutory Designated Sites

Firth of Forth SPA, Ramsar Site and SSSI

- 9.5.1 The closest point of the Firth of Forth SPA, SSSI and Ramsar site lies on the coast approximately 9.6km to the north of the Scheme. The biological notified features of the SSSI include the vascular plant assemblage, beetle fauna, habitats such as mudflats and sand dunes and a list of 30 breeding and non-breeding bird species (such as non-breeding red throated diver *Gavia stellata*, Slavonian grebe *Podiceps auritus* and lapwing; plus, breeding eider *Somateria mollissima*, shelduck *Tadorna tadorna* and ringed plover *Charadrius hiaticula*). The qualifying interests of the SPA and Ramsar site are wintering and passage bird populations. This is an extremely important international site and is connected to the survey area by the Dean Burn which discharges into the River North Esk. The North Esk meets the South Esk 1.6km east of the proposed works and thereon flows to the sea as the River Esk.

Imperial Dock Lock SPA

- 9.5.2 The Imperial Dock Lock SPA, Leith, is located 10.1km north of the Scheme; it qualifies as a SPA for regularly supporting breeding populations of European importance of common tern *Sterna hirundo*. There is no direct connectivity between the Proposed Scheme and this SPA.

Dalkeith Oakwood SSSI

- 9.5.3 There is one national statutory designated site within 2km of the Scheme. This is Dalkeith Oakwood SSSI which is an area of ancient oakwood listed in the Ancient Woodland Inventory and one of only two ancient park woodlands remaining in Scotland. Both pedunculated oak *Quercus robur* and sessile oak *Q. petraea* are present amongst ash *Fraxinus excelsior* and elm *Ulmus glabra*, with some of the oaks of medieval origin. The age of this woodland and therefore the range of micro-habitats it supports, including deadwood, allows a species-rich beetle fauna and lichen flora to exist. The notified features of this SSSI are: wood pasture and parkland, lichen assemblage (including several scarce and one nationally rare species, *Lecania suavis*) and species-rich beetle fauna (including scarce species).
- 9.5.4 The Proposed Scheme is located 1,050m from the closest boundary of this SSSI (where it ties into the A720 north-east of Sheriffhall), as illustrated on Figure 9.1 'Designated Areas of Conservation Interest'.

Non-Statutory Designated Sites

- 9.5.5 Four non-statutory locally designated sites for nature conservation occur within 1km of the Proposed Scheme as detailed in Table 9-6 'Non-Statutory Designated Sites within 1km of the Proposed Scheme' and illustrated on Figure 9.1 'Designated Areas of Conservation Interest'. In the MLC area, they comprise Local Biodiversity Sites (LBS, formerly known as Local Wildlife Sites) within the CEC area they comprise Local Nature Conservation Sites (LNCS, which are unnamed in the LDP/online interactive proposals map/LBAP).

Table 9-6 Non-Statutory Designated Sites within 1km of the Proposed Scheme

Site	Features of Interest	Location/Connectivity to the Scheme
Dalkeith Estate LBS	Ecologically notable features of this designation include mature woodlands and other semi-natural habitats. The LBS is partially included within the Dalkeith Country Park which supports roe deer <i>Capreolus capreolus</i> , otter, buzzard <i>Buteo buteo</i> , fox <i>Vulpes vulpes</i> , badger and brown hare <i>Lepus europaeus</i> . The Dalkeith Oakwood SSSI is situated within the centre of the LBS, but is not	12m south of the Scheme, the north western boundary of the LBS runs parallel to the arm of the A720 west of Sheriffhall Roundabout.

included within the boundary of the non-statutory LBS designation.

Melville Castle LBS	Ecologically notable features of this designation include mature woodland and other semi-natural habitats including the River North Esk.	215m south/south-east of the Scheme, the LBS encompasses habitat on either side of the southern arm of the A7. Intervening land use comprises some broadleaf plantation woodland, arable land and built-up areas.
River North Esk (Eskbank) LBS	The River North Esk and associate riparian habitats including mature woodland. This site was listed as a "Proposed LBS" in the MLC LDP Technical Note on Conservation (2013) and now appears as a "Regionally and Locally Important Nature Conservation Site" on the MLC LDP interactive map. For the purposes of this Stage 3 assessment, this site will be treated as a LBS.	723m south-east of Proposed Scheme adjacent to the southern arm of the A6106. Intervening land use comprises some broadleaf plantation woodland, arable land, improved fields and built-up areas
Gilmerton Disused Railway LNCS	This site is indicated on the CEC Local Development Plan interactive map as a Local Nature Conservation Site. No further information on this (or any other) site was noted in the LDP or LBAP. A review of aerial imagery and OS mapping indicates this site comprises a cycle path bordered by narrow strips of woodland along a disused railway running from Edgefield in the west to Danderhall in the east. A name for the site could not be found so for the purpose of this report it will be referred to as 'Gilmerton Disused Railway LNCS'.	886m north of the Scheme. Intervening land use is largely arable fields.

Ancient Woodland

- 9.5.6 The Ancient Woodland Inventory indicates there are 133.76 hectares (ha) of ancient woodland within 1km of the Proposed Scheme (as illustrated on Figure 9.1 'Designated Areas of Conservation Interest'). Of this, 32.72 ha is ancient woodland of semi-natural origin (i.e. semi-natural in origin and continuously wooded since 1750 or 1860). Such woodland is limited to Dalkeith Oakwood SSSI (see above) and along the River North Esk. 9.51ha is long-established woodland of plantation origin (plantation origin but continuously wooded since 1750 or 1860). All the ancient woodland in the immediate vicinity of the Proposed Scheme is classified as being long-established of plantation origin. A small area (1.52ha) classified as 'other' (wooded in 1750 but not in 1860 suggesting at least a short break in continuity of woodland) is present within the area of the Melville Castle Hotel, south-west of the Scheme.

Protected and Notable Species

- 9.5.7 The Wildlife Information Centre (TWIC) provided records of 96 notable species within 2km of the Proposed Scheme for the Stage 2 assessment. Records were assessed as notable using the definition provided in Section 9.3 and applying the specifics of their legislative protection (e.g. Schedule 1 species are excluded if occurrences are in winter, since Schedule 1 relates to breeding). Those considered likely to be present in the area affected by the Scheme, given the habitats present, are shown in Table 9-7 'Records of Notable Species within 2km of the of the Proposed Scheme'.
- 9.5.8 A large number of scarce and rare lichen records and scarce invertebrate records are noted in Table 9-7 'Records of Notable Species within 2km of the Proposed Scheme', and are likely to have been recorded in Dalkeith Oakwood SSSI (which is designated, in part, for rare lichens, and contains habitat (such as deadwood) likely to support scarce invertebrates). High quality habitat likely to support such scarce and rare species is lacking within the immediate Proposed Scheme vicinity; however, such species are included in Table 9-7 because of their potential sensitivity to indirect pollution effects.

Table 9-7 Records of Notable Species within 2km of the Proposed Scheme

Taxon	Latin Name	Common Name	Conservation Designation(s) ³
Amphibian	<i>Bufo bufo</i>	Common toad	LBAP
Amphibian	<i>Rana temporaria</i>	Common frog	LBAP
Amphibian	<i>Triturus cristatus</i>	Great crested newt	EPS, SBL
Bird	<i>Alauda arvensis</i>	Skylark	SBL, Red
Bird	<i>Alcedo atthis</i>	Kingfisher	Sch1, SBL, Amber
Bird	<i>Anas platyrhynchos</i>	Mallard	Amber
Bird	<i>Apus apus</i>	Swift	SBL, Amber
Bird	<i>Emberiza citrinella</i>	Yellowhammer	Red
Bird	<i>Emberiza schoeniclus</i>	Reed bunting	Amber
Bird	<i>Larus fuscus</i>	Lesser black-backed gull	Amber
Bird	<i>Linaria cannabina</i>	Linnet	SBL, Red
Bird	<i>Muscicapa striata</i>	Spotted flycatcher	SBL, Red
Bird	<i>Passer montanus</i>	Tree sparrow	SBL, Red
Bird	<i>Perdix perdix</i>	Grey partridge	SBL, Red
Bird	<i>Pyrrhula pyrrhula</i>	Bullfinch	SBL, Amber
Bird	<i>Spinus spinus</i>	Siskin	SBL
Bird	<i>Turdus philomelos</i>	Song thrush	SBL, Red
Bird	<i>Tyto alba</i>	Barn owl	Sch1, SBL, Amber, LBAP
Flowering plant	<i>Anagallis arvensis</i>	Scarlet pimpernel	SBL
Flowering plant	<i>Campanula glomerata</i>	Clustered bellflower	SBL
Flowering plant	<i>Chelidonium majus</i>	Greater celandine	SBL
Flowering plant	<i>Hyacinthoides non-scripta</i>	Bluebell	Sch8
Flowering plant	<i>Lotus corniculatus</i>	Bird's-foot-trefoil	LBAP
Flowering plant	<i>Papaver argemone</i>	Prickly poppy	SBL
Flowering plant	<i>Quercus robur</i>	Pedunculate oak	LBAP
Flowering plant	<i>Silene flos-cuculi</i>	Ragged-robin	LBAP
Flowering plant	<i>Sinapis alba</i>	White mustard	SBL
Flowering plant	<i>Sinapis arvensis</i>	Charlock	SBL
Flowering plant	<i>Vicia bithynica</i>	Bithynian vetch	SBL
Fungi	<i>Geastrum triplex</i>	Collared earthstar	SBL
Insect - beetle	<i>Adalia bipunctata</i>	2-spot ladybird	LBAP
Insect - beetle	<i>Calvia quattuordecimguttata</i>	Cream-spot ladybird	LBAP
Insect - beetle	<i>Cantharis decipiens</i>		LBAP
Insect - beetle	<i>Cantharis pallida</i>		LBAP

³ EPS - European protected species; Sch1 – Schedule 1 of the Wildlife and Countryside Act ; SBL - Scottish biodiversity list; Red/Amber – BoCC lists; LBAP – Local Biodiversity Action Plan(s); Nationally scarce/rare - on relevant species Red Data Book/List.

Taxon	Latin Name	Common Name	Conservation Designation(s) ³
Insect - beetle	<i>Cis bilamellatus</i>		LBAP
Insect - beetle	<i>Elmis aenea</i>		LBAP
Insect - beetle	<i>Hydraena gracilis</i>		LBAP
Insect - beetle	<i>Leptusa fumida</i>		LBAP
Insect - beetle	<i>Limnius volckmari</i>		LBAP
Insect - beetle	<i>Nicrophorus humator</i>		LBAP
Insect - beetle	<i>Oreodytes sanmarkii</i>		LBAP
Insect - beetle	<i>Oxypoda recondita</i>		LBAP
Insect - beetle	<i>Philonthus mannerheimi</i>		LBAP
Insect - beetle	<i>Platambus maculatus</i>		LBAP
Insect - beetle	<i>Pseudotriphyllus suturalis</i>		Nationally scarce
Insect - beetle	<i>Rhagonycha lignosa</i>		LBAP
Insect - beetle	<i>Rhagonycha lutea</i>		Nationally scarce
Insect - beetle	<i>Cercyon melanocephalus</i>		SBL
Insect - butterfly	<i>Anthocharis cardamines</i>	Orange-tip	LBAP
Insect - butterfly	<i>Coenonympha pamphilus</i>	Small heath	SBL
Insect - butterfly	<i>Hipparchia semele</i>	Grayling	SBL
Insect - caddisfly	<i>Hydatophylax infumatus</i>		Nationally scarce
Insect - hymenopteran	<i>Anthidium (Anthidium) manicatum</i>	Wool-Carder Bee	SBL
Insect - moth	<i>Acronicta psi</i>	Grey dagger	SBL
Insect - moth	<i>Agrochola litura</i>	Brown-spot pinion	SBL
Insect - moth	<i>Allophyes oxyacanthae</i>	Green-brindled crescent	SBL
Insect - moth	<i>Entephria caesiata</i>	Grey mountain carpet	SBL
Insect - odonata	<i>Enallagma cyathigerum</i>	Common blue damselfly	LBAP
Insect - odonata	<i>Pyrrhosoma nymphula</i>	Large red damselfly	LBAP
Lichen	<i>Bacidia friesiana</i>		Nationally scarce
Lichen	<i>Biatora veteranorum</i>		SBL, Nationally rare
Lichen	<i>Caloplaca arcis</i>		Nationally scarce
Lichen	<i>Chaenotheca hispidula</i>		Nationally scarce
Lichen	<i>Chaenotheca stemonea</i>		Nationally scarce
Lichen	<i>Chaenothecopsis nigra</i>		Nationally scarce
Lichen	<i>Chaenothecopsis pusilla</i>		Nationally scarce
Lichen	<i>Cladonia chlorophaea</i>		Nationally rare
Lichen	<i>Cladonia cryptochlorophaea</i>		Nationally scarce
Lichen	<i>Heterocephalacria physciacearum</i>		Nationally scarce
Lichen	<i>Lecania cyrtella</i>		SBL, Nationally rare

Taxon	Latin Name	Common Name	Conservation Designation(s) ³
Lichen	<i>Lecania cyrtellina</i>		Nationally scarce
Lichen	<i>Lecania inundata</i>		Nationally scarce
Lichen	<i>Lecania suavis</i>		Nationally rare
Lichen	<i>Lecanora compallens</i>		Nationally scarce
Lichen	<i>Lecanora persimilis</i>		Nationally scarce
Lichen	<i>Lecidea hypopta</i>		Nationally scarce
Lichen	<i>Lecidea nylanderi</i>		Nationally scarce
Lichen	<i>Micarea misella</i>		Nationally scarce
Lichen	<i>Ochrolechia microstictoides</i>		Nationally scarce
Lichen	<i>Opegrapha mougeotii</i>		Nationally scarce
Lichen	<i>Phylloblastia inexpectata</i>		Nationally scarce
Lichen	<i>Protoparmelia oleagina</i>		Nationally scarce
Lichen	<i>Ramonia chrysophaea</i>		SBL
Lichen	<i>Strangospora moriformis</i>		Nationally scarce
Lichen	<i>Strigula taylorii</i>		SBL, Nationally scarce
Lichen	<i>Unguiculariopsis thallophila</i>		Nationally scarce
Lichen	<i>Usnea wasmuthii</i>		Nationally scarce
Lichen	<i>Varicellaria hemisphaerica</i>		Nationally scarce
Lichen	<i>Xanthoria ucrainica</i>		Nationally scarce
Terrestrial mammal	<i>Lepus europaeus</i>	Brown hare	SBL
Terrestrial mammal	<i>Lutra lutra</i>	Otter	EPS, SBL
Terrestrial mammal	<i>Meles meles</i>	Badger	SBL
Terrestrial mammal	<i>Myotis daubentonii</i>	Daubenton's bat	EPS, SBL
Terrestrial mammal	<i>Pipistrellus pipistrellus</i>	Common pipistrelle	EPS, SBL
Terrestrial mammal	<i>Pipistrellus pygmaeus</i>	Soprano pipistrelle	EPS, SBL
Terrestrial mammal	<i>Plecotus auritus</i>	Brown long-eared bat	EPS, SBL

9.5.9 In order to supplement the 2014 data request with more recent data a search was made of the NBN Atlas Scotland for commercially available records on 7 January 2018. This search provided one record of a bat roost (dated 2015) which referred to two soprano pipistrelle roost sites totalling over 255 individuals, located in the 1km square that includes the south-east part of the Scheme.

9.5.10 Also returned were records of invasive non-native species. Seven recent records of grey squirrel *Sciurus carolinensis* were returned, two from 2014 and five from 2017. This species was not present in the TWIC results and although not notable, as defined above, records of grey squirrel are useful in the assessment of habitat potential for red squirrel which is a notable species. Records of New Zealand flatworm *Arthurdendyus triangulatus* were returned, the most recent dated 2014. Although not notable, New Zealand flatworm is a non-native and potentially invasive species that is of ecological interest due to its predation on native earthworms and the consequent effect this can have on biodiversity.

Field Survey

Habitats

- 9.5.11 A map showing Phase 1 habitats within 500m of the Proposed Scheme is provided in Figure 9.2 'Phase 1 Habitat Survey'. The most extensive habitats within the survey area are, in descending order of abundance: arable fields, semi-improved neutral grassland, plantation woodland (including ancient woodland of plantation origin and non-ancient plantation), improved grassland (including amenity areas/golf courses) and commercial/built-up areas. There are much smaller extents of other habitats including tall ruderal ('weed' vegetation), running/standing water and swamp. Most habitat within the Proposed Scheme Extents itself is of relatively low ecological quality for a variety of reasons including low species diversity and the presence of invasive non-native species
- 9.5.12 Table 9-8 'Areas of Phase 1 Habitat Types within the Survey Area and Proposed Scheme Extents' shows the areas of each Phase 1 habitat type within the survey area, and the areas within the extents of the Scheme.

Table 9-8 Areas of Phase 1 Habitat Types within the Survey Area and Proposed Scheme Extents

Phase 1 Habitat Type	Area (ha) within Survey Area	Area (ha) within Proposed Scheme Extents
A1.1.1 Broadleaved semi-natural woodland	0.46	0.22
A1.1.2 Broadleaved plantation	50.94	2.05
A1.2.2 Coniferous Woodland Plantation	0.07	none
A1.3.2 Mixed plantation	41.18	0.01
A2.1 Dense scrub	13.12	1.56
B2.2 Semi-improved neutral grassland	30.16	7.05
B4 Improved grassland	56.68	1.75
B6 Poor semi-improved grassland	28.45	3.27
C3.1 Tall ruderal	1.65	0.37
F1 Swamp	0.05	none
G1 Open water	0.67	0.30
G2 Running water	2.14	0.09
J1.1 Arable	211.65	4.62
J1.2 Amenity grassland	23.37	0.73
J1.3 Ephemeral short perennial	2.98	0.69
J1.4 Exotic shrub	2.12	none
J2.2.2 Species-poor defunct hedge	0.40	0.23
J4 Bare ground	2.84	None
J5 Other (retail /commercial property)	22.17	None

9.5.13 Descriptions of the various habitats are given below.

Woodlands

- 9.5.14 The woodland near the Proposed Scheme is primarily mature plantation, usually broadleaved but mixed in the grounds of Dalkeith Country Park. There is also a small amount of semi-natural broadleaved woodland adjacent to the Dean Burn.
- 9.5.15 The small amount of semi-natural broadleaved woodland by the Dean Burn comprises a scrubby mix of ash and willow *Salix* sp. It also contains two invasive non-native plants: giant hogweed and salmonberry *Rubus spectabilis*. Other species present include wood avens *Geum urbanum*, lady-fern *Athyrium filix-femina*, common male-fern *Dryopteris filix-mas* and scrubby wych elm *Ulmus glabra*.
- 9.5.16 Excluding some very small plantation patches and thin strips of poplar *Populus* sp. north of the A720, all plantation woodland is south of the A720. The plantation south-west of the roundabout is mature and mostly broadleaved. A wide strip is bisected by the A7; the eastern part is primarily mature beech *Fagus sylvatica*, whilst the western part contains both beech and ash. In both cases, and as a result of the beech shading and leaf litter, the ground flora is rather poor and often sparse, but includes honeysuckle *Lonicera periclymenum*, broad buckler-fern *Dryopteris dilatata*, bramble *Rubus fruticosus*, red campion *Silene dioica* and (rarely) enchanter's-nightshade *Circaea* sp. The latter is suggestive of long-established woodland (this woodland is within the SNH Ancient Woodland Inventory). There are also scattered shrubs of sycamore *Acer pseudoplatanus*, holly *Ilex aquifolium* and elder *Sambucus nigra*.

A single yew *Taxus baccata* was noted in the eastern section. The part of the eastern section closest to the A7 includes a power line way-leave occupied by scrub rather than woodland, and although there is some mature beech near the A7 here with abundant dog-violet *Viola riviniana*, adjacent to the road there is mainly immature ash and sycamore supplemented by birch and hawthorn, with a heavy leaf litter and sparse poor flora becoming grassy and scrubby by the road.

- 9.5.17 The large plantation block south of Lugton Bogs Pond (see Water and Swamp section below, and Figure 9.2 – Phase 1 Habitat Survey) is similar to the above-described plantation, but here the dominant beech is supplemented by frequent mature oak *Quercus* sp., and part of the plantation is mapped as mixed where there is also a significant amount of pine *Pinus* sp. In this plantation, there is frequent scattered salmonberry amongst the ferns, and also more enchanter's-nightshade, but the presence of beech results again in a rather impoverished flora.
- 9.5.18 Surveyed plantation woodland within Dalkeith Country Park has been coded as mixed because of the high frequency of larch *Larix* sp. amongst a range of mature broadleaved species including birch *Betula* sp., oak, beech and sycamore. There is frequent holly and young sycamore in the understorey. The ground flora is often grassy (with e.g. common bent *Agrostis capillaris*, Yorkshire fog *Holcus lanatus* and false oat-grass *Arrhenatherum elatius*) with abundant bramble *Rubus fruticosus* agg. and ferns (in particular broad buckler-fern, but also common male-fern). There is frequent enchanter's-nightshade (suggestive of long-establishment – again, this woodland is within the SNH Ancient Woodland Inventory). In damp places, there is yellow pimpernel *Lysimachia nemorum*, bugle *Ajuga reptans*, soft rush *Juncus effusus* and tufted hair-grass *Deschampsia cespitosa*. Other occasional ground flora species include woodland species such as wood brome *Brachypodium sylvaticum*, remote sedge *Carex remota* and wood-sedge *Carex sylvatica*.
- 9.5.19 Mature plantation woodland bordering the River North Esk towards the southern edge of the survey area contains frequent sycamore, ash and lime *Tilia* sp. Again, there is little regeneration or ground flora in most areas, the understorey often containing invasive non-native species such as rhododendron *Rhododendron ponticum*, snowberry *Symphoricarpos alba* and salmonberry. Where this woodland continues north to meet woodland in Dalkeith Country Park, slightly more species-rich areas were recorded, with some native understorey of elder and a slightly better ground flora with species such as broad buckler-fern, ivy *Helix hedera* and lesser celandine *Ranunculus ficaria*.

Grasslands

- 9.5.20 The two main types of grassland in the survey area are semi-improved neutral grassland and improved (agricultural) grassland. The latter is agriculturally-improved grazed grassland, dominated by rye-grass *Lolium* sp. and very species-poor, and of negligible ecological note.
- 9.5.21 Semi-improved neutral grassland occurs in significant patches, most abundantly in agricultural fields that have been abandoned and left unmanaged, but also in strips along some roadsides. Generally, this grassland is not very diverse, but is not agriculturally-improved. Typical dominant grasses include common species such as Yorkshire fog, common bent, rough meadow-grass *Poa trivialis* and red fescue *Festuca rubra*, with scattered common herbs such as white clover *Trifolium repens*, ribwort plantain *Plantago lanceolata*, and broad-leaved dock *Rumex obtusifolius*. Coarser areas, mainly along roads, often contain the larger grasses cock's-foot *Dactylis glomerata* and /or false oat-grass.
- 9.5.22 Two areas of slightly more diverse semi-improved neutral grassland were noted. The first is around and west of the Lugton Bogs Pond just to the south of the A720 towards the west end of the Scheme. This grassland contains indications of disturbance such as creeping thistle *Cirsium arvense* and ragwort *Senecio jacobaea*, but also contains frequent meadow vetchling *Lathyrus pratensis*, red clover *Trifolium pratensis* and locally frequent common spotted-orchid *Dactylorhiza fuchsii*, and on the steeper ground around the pond there is in places a variety of other species

including common cat's-ear *Hypochaeris radicata*, lesser stitchwort *Stellaria graminea*, meadow buttercup *Ranunculus acris* and the grass crested dog's-tail *Cynosurus cristatus*.

- 9.5.23 The other more diverse area is the semi-improved neutral grassland just north-west of Sheriffhall roundabout, in which there are some drier patches of ground with shorter and more open grassland including early hair-grass *Aira praecox* and scattered common centaury *Centarium erythraea* and strawberry *Fragaria vesca*.
- 9.5.24 There are also a few abandoned fields classified as poor semi-improved grassland. These do not contain an abundance of agricultural species typical of improved grassland, but they are nevertheless very species-poor with a small range of common grasses and few herbs.
- 9.5.25 Heavily-mown amenity grassland occurs in a few patches within garden areas and at road junctions.

Water and Swamp

- 9.5.26 There is one water body close to the Proposed Scheme that will be partly impinged upon: this is Lugton Bogs Pond, a rectangular pond in the western area, just south of the A720 (see Figure 9.2 'Phase 1 Habitat Survey'). The pond appears to have been a duck-shooting pond judging from the presence of old shooting positions and a model 'decoy' duck. It is very steep-sided for the most part with little in the way of marginal vegetation and no swamp as such, although at the west end there is locally abundant yellow pimpernel, and there is hard rush *Juncus inflexus* scattered around the edge. Broad-leaved waterweed *Potamogeton natans* dominates most of the pond and submerged Canadian waterweed *Elodea canadensis* (a non-native plant species) is at least occasional. Algal patches were frequent in the summer, which along with the other aquatic species indicates eutrophic water status, although there was no obvious sign of pollution. A second pond at the north edge of the survey area (by the Sheriffhall Park & Ride) was found to be dry and was mapped as bare ground. It contains a strip of swamp habitat dominated by reed canary-grass *Phalaris arundinacea* at the south edge. No swamp-type habitat recorded was groundwater-dependent.
- 9.5.27 The only watercourse near the Scheme, and crossed by it, is the Dean Burn. This is a small stream which in many parts of its length has been historically over-deepened and straightened, although the watercourse shows signs of formation of natural meandering and side bar deposits within such artificial confines. The water quality in the burn appeared poor in places with some discoloration, but this watercourse is too small to have been assessed in the SEPA River Basin Management Plan interactive website. The bed is often silty with some areas of cobbles. Vegetation on the earth banks, where not within woodland, is highly ruderal upstream of the A7, with much comfrey *Symphytum* sp., giant hogweed and sometimes salmonberry amongst the coarse grasses and bramble. Downstream of the A7, the bank vegetation is semi-improved neutral grassland with (currently) only widely scattered giant hogweed, and there is occasional watercress *Nasturtium* sp. in the water. Further information on the Dean Burn is given in Chapter 11 – Road Drainage and the Water Environment.
- 9.5.28 The North Esk is a large river within a steep, wooded valley that passes within the southern edge of the survey area. The condition of the River North Esk is 'Poor' according to the SEPA River Basin Management Plan interactive website. This is likely attributable to poor access for fish migration as other criterion were either moderate (water quality) or good/high (water flow, physical condition and freedom from invasive species).

Other Habitats

- 9.5.29 A large proportion of the survey area is occupied by arable land, primarily of cereal crops.
- 9.5.30 Hedgerows occur in various places, and are particularly developed along either side of the A720 west of the roundabout, where the hedgerow strips are wide and are mapped as scrub. The dominant species is hawthorn *Crataegus monogyna* but a range of other species occur along the A720 including blackthorn *Prunus spinosus*, dog-

rose *Rosa canina* agg. and occasionally snowberry. Scattered scrub (primarily hawthorn and bramble) occurs along several road verges, along parts of the Dean Burn, and by Lugton Bogs Pond.

9.5.31 There are several mainly small patches of tall ruderal vegetation. These include rosebay willow herb *Chamerion angustifolium* and nettle *Urtica dioica*, and by the Dean Burn it also contains abundant giant hogweed and comfrey.

9.5.32 There are also a few small areas mapped as exotic shrub. The two such patches beside or near the Dean Burn include abundant salmonberry.

Groundwater Dependent Terrestrial Ecosystems

9.5.33 There are no habitats corresponding to Groundwater Dependent Terrestrial Ecosystems (GWDTEs) in the survey area.

Protected and Notable Species

9.5.34 The results of the ecological field surveys for protected and notable species are presented in the following sections. Appendices 9.1 – Bat Survey Methods and Results and 9.2 – Great Crested Newt Survey Details provide further details for the bat and great crested newt surveys respectively. Figures 9.3 to 9.7 show the locations of protected and notable species records and/or evidence:

- Figure 9.3 'Bat Roost Survey.'
- Figure 9.4 'Bat Activity and Static Detector Survey'
- Figure 9.5 'Protected Species Survey Results (Other than Bats/Badgers)'
- Figure 9.6 'Breeding Birds Survey Results'
- Figure 9.7 'Invasive Non-Native Species Survey'

Bats

9.5.35 Appendix 9.1 'Bat Survey Methods and Results' provides further information.

9.5.36 Eight structures and two trees were recorded with bat roost suitability during the field survey. A description of each structure/tree and potential roost features is provided in Table 9-9 'Assessment of Bat Roost Suitability' and illustrated on Figure 9.3 'Bat Roost Survey'.

Table 9-9 Assessment of Bat Roost Suitability

ID Reference	Structure Name /Tree Species	Description	Grid Reference	Bat Roost Suitability
SH1	Sheriffhall House	Large two-story stone farm house of approximately 100 years old. Occupied and in good condition. Roof is slate and lead flashing facing north-west and south-east. Older extension on east side has large gaps under some slates. Lifted flashing/slate on north-west side of main roof. Gaps between western extension and main house, gaps in wooden gable end of this extension and missing pantiles.	NT 32014 67988	High
SH2	Sheriffhall Barn	Stone steading/barn with pitched tile roof in poor condition. Many holes and crevices in walls and holes and missing tiles on roof. Windows are mostly broken or boarded up.	NT 32004 67925	Moderate
SH3	Sheriffhall Farmhouse	Two-story stone farm cottage with additional height in roof. Building is of approximately 100 years of age, occupied and in good condition. The roof faces north-west and south-east and is constructed of slate	NT 32035 67908	High

ID Reference	Structure Name /Tree Species	Description	Grid Reference	Bat Roost Suitability
		with lead flashing. Some gaps are present in the roof tiles and under flashing, particularly on the north facing aspect at the base of the chimney.		
SH4	Sheriffhall Dovecot	Stone dovecot tower of approximately 100 years of age (it is formed of the stairwell of the demolished 17th century 'House of Sheriffhall'). In good state of repair. The roof is made of slate with lead flashing. Openings for pigeons at top and half-way up are present, but the lower opening is blocked. Some gaps under roof slates.	NT 32050 67922	Moderate
SS1	Summerside White Cottage	Single story detached cottage. Rendered façade and slate roof in good condition. Potential gaps under slates at base of chimney.	NT 31622 68110	Low
SS2	Summerside Stone Cottages	Row of single-story stone cottages. Some gaps in flashing on south side around velux windows and at the side of old dormer windows. Otherwise tiles and slates appear well sealed.	NT 31622 68089	Moderate
SS3	Summerside House	Large two-story farmhouse with various extensions. Gaps around velux window on east side. An extension to the west is missing a slate and has small gaps under other slates and under flashing. Occasional larger gaps under roof slates on north side extension.	NT 31614 68064	High
SS4	Summerside Barn	Large barn of wooden construction with composite sheeting roof. Potential gaps under eaves and through open door.	NT 31594 68056	Low
T1	Sycamore	Small amount of deadwood.	NT 30868 67855	Low
T2	Beech	Long wound high up in tree where bough has detached. Gaps under strips of wood.	NT 31791 67643	Moderate

- 9.5.37 Further to the trees/structures recorded above, three hawthorn trees with bat roost suitability were noted during the ground investigation work for the Proposed Scheme in February 2018 within the mature hedge south-west of Summerside. All features were assessed to have low suitability and included tears in the bark and cavities in branch collars where limbs had been removed.
- 9.5.38 As noted above (Paragraph 9.2.12) a supplementary internal inspection of Sheriffhall Farmhouse and the adjacent Sheriffhall Barn was undertaken following a report of a bat within an upper bedroom in Sheriffhall Farmhouse. The roof space of Sheriffhall Farmhouse was split into two 'halves'. The east loft comprised a pitched hipped roof of traditional construction with no ridge beam. Insulation was relatively new, and the apex was heavily cobwebbed. The west loft contained a modern water tank covered with plastic and insulated, and an old open water tank. Crevices were present on this side within corners, spaces between rafters and sarking boards and at the top of the chimney wall; it was not possible to inspect all small gaps. No evidence of bats was found however the bat roost suitability assessment of the structure was maintained as high.
- 9.5.39 Roosting opportunities for bats were found to be limited in the Sheriffhall Barn, small gaps big enough to host one or two small, crevice dwelling bats were present in the wall head and window lintel. No evidence of bats was recorded and the bat roost suitability assessment of low was maintained.
- 9.5.40 Based on the suite of bat roost suitability surveys described above, eight structures were found to have bat roost suitability and were located within 50m of the Scheme. All trees were either assessed as having low suitability or were located beyond this distance and therefore outwith the likely zone of influence of the Scheme in relation to bats, and therefore did not require further investigation, in accordance with BCT guidelines. The eight structures were subject to bat emergence and re-entry surveys.

- 9.5.41 During the subsequent dusk emergence and/or dawn re-entry surveys one roost was recorded on one occasion in one building, Sheriffhall House. During the dawn re-entry survey on 04 August 2017 (at 04:56), a single common pipistrelle bat was recorded returning to a roost beneath the flashing along the southern aspect of the ridge of the roof.
- 9.5.42 The locations of the confirmed bat roost in Sheriffhall House, and also of Sheriffhall Farmhouse where a bat was reported within the dwelling (but no roost was subsequently found), are highlighted on Figure 9.3 'Bat roost survey'.
- 9.5.43 In general, bat activity was low during the emergence/re-entry surveys, with a maximum of three bats seen at any one time. The only bats species recorded during these surveys were soprano pipistrelle and common pipistrelle.
- 9.5.44 Transect surveys also recorded low levels of bat activity, with 14 recordings of common pipistrelle and 50 recordings of soprano pipistrelle made throughout the entire survey programme of May – September, inclusive. Soprano pipistrelles were the most commonly encountered species, with common pipistrelle also recorded frequently (mirroring the results of the other bat surveys). No other bat species were recorded during activity surveys. Activity was consistently recorded within the area of Lugton Bogs Pond and along a boundary of hawthorn hedging between the residences at Summerside and the arable field to the west. On two surveys pipistrelles were recorded feeding over the southern A7 road. This road was very well lit, and the bats appeared to be foraging very close to the surface of the road. All transect data (and transect routes) can be seen on Figure 9.4 'Bat Activity and Static Detector Survey'.
- 9.5.45 Static detectors were deployed in three locations over three distinct periods. Due to technological problems, data from a total of only ten (non-consecutive) days could be recovered. Although these data are not suitable for rigorous analysis, it confirmed that common and soprano pipistrelle bats are frequent within the survey area, and also highlighted the presence of two further species. A *Myotis* species of bat was identified in seven recordings (over one 24-hour period) from the Lugton Bogs Pond area. Given the habitat types present here and within the surrounding area, this is considered most likely to be Daubenton's bat *Myotis daubentonii*. Three recordings of noctule bat *Nyctalus noctula* were recovered from 02:11 on 8 July 2017 from the monitoring location near Sheriffhall House. The location of the static detectors is shown on Figure 9.4 'Bat Activity and Static Detector Survey'.

Badger

- 9.5.46 No evidence of badger was recorded during the 2017 field surveys carried out to inform this Stage 3 assessment. This species has been known to have previously utilised the wider area around the Scheme: evidence of badger was recorded during preliminary survey to inform previous assessments, including a sett, droppings and one dead individual on the A6106 South approximately 250m south of the current Proposed Scheme Extents.
- 9.5.47 Woodland within and directly adjacent to the Proposed Scheme Extents is sub-optimal for badger sett establishment and/or foraging, being represented by narrow isolated strips of woodland/scrub, immature plantation or mature plantation dominated by beech. This habitat provides limited shelter for setts and beech woodlands are known to support a low density of earthworms (SNH, undated b). Suitable foraging habitat within and directly adjacent to the Proposed Scheme is also limited, the majority of grassland being semi-improved with a sub-optimally tall sward (badgers favour grazed or mown grassland as it facilitates access to earthworms). Optimal improved grassland foraging habitat is present in very small patches which are largely isolated by infrastructure/arable fields.
- 9.5.48 Suitable habitat is considered to exist within the wider area beyond the Proposed Scheme Extents including substantial long-established broadleaved woodland providing habitat for sett construction and foraging, and improved grassland providing optimal foraging habitat.

Red Squirrel

9.5.49 No evidence of squirrel (red or grey) was recorded within the survey area. There is very limited suitable woodland habitat to support native red (or grey) squirrels within the Proposed Scheme Extents, although small areas of mature broadleaved woodland are present. Grey squirrels are known to occur in the wider area around the Proposed Scheme (confirmed by desk study records, the most recent dated 2017). For populations of red and grey squirrel to coexist, substantial areas of coniferous woodland are beneficial in assisting red squirrels to successfully compete against grey squirrel. Given the characteristics of the woodland habitat present within the Proposed Scheme and wider area, and the presence of grey squirrels which are frequently vectors of squirrelpox virus that is lethal to red squirrels, it is considered unlikely that a viable population of red squirrel could exist within the zone of influence of the Scheme. Moreover, Saving Scotland's Red Squirrels⁴ (a partnership of the Scottish Wildlife Trust, SNH, Forestry Commission Scotland, Scottish Land and Estates, Red Squirrel Survival Trust and RSPB Scotland), have no records of red squirrel in the Edinburgh area including the Proposed Scheme vicinity.

Otter

9.5.50 Evidence of otter was recorded within the immediate Proposed Scheme area, closely associated with the Dean Burn. Evidence included footprints and spraint sites as detailed in Table 9-10 'Otter Field Signs' and illustrated on Figure 9.5 'Protected Species Survey Results'. No otter refuges (holts, lie-ups or couches) were located, and habitat within the immediate Proposed Scheme area forming suitable cover for otter refuges are limited to the small patch of semi-natural woodland and other small areas of scattered scrub and introduced shrub along the Dean Burn.

Table 9-10 Otter Field Signs

Reference	Grid Reference	Feature	Description
O1	NT 30895 67823	Spraint	One old spraint.
O2	NT 31617 67855	Spraint	Footprint and one recent spraint on rocks/muddy bank under ivy where the burn crosses under a stone wall/arch.
O3	NT 31699 67845	Footprint	Prints on muddy bank.
O4	NT 31742 67843	Spraint	One very old spraint – only bones remaining, no smell.
O5	NT 31794 67842	Spraint	One very old spraint on corner of culvert foot.
O6	NT 31939 67770	Footprint	Several prints along 10 m of sandy bank.
O7	NT 31980 67759	Footprint	Single print.

9.5.51 Additionally, to the evidence in Table 9-10 'Otter Field Signs', otter footprints were recorded in two locations during ground investigation works for the Proposed Scheme undertaken in February 2018. These were on the east bank of Lugton Bogs Pond and on the banks of the Dean Burn nearby. This evidence is also shown on Figure 9.5 'Protected Species Survey Results'.

Water Vole

9.5.52 No evidence of water vole was found during field survey. The habitat within the Proposed Scheme area is considered to be sub-optimal for water vole because the section of the bankside vegetation of the Dean Burn is largely ruderal (i.e. 'weedy') and does not support the dense, lush vegetation preferred by water vole. The Lugton Bogs pond is also considered to be sub-optimal because of its large size, unsuitable marginal vegetation and limited connectivity to other waterbodies.

⁴ <https://scottishsquirrels.org.uk/squirrel-sightings/>

Great Crested Newt

- 9.5.53 Appendix 9.2 'Great Crested Newt Survey Details' provides further information on the great crested newt surveys.
- 9.5.54 Two waterbodies were identified within 250m of the Scheme. These are shown on Figure 9.5 'Protected Species Survey Results' and are referred to as Lugton Bogs Pond, located west of Sheriffhall Roundabout immediately south of the A720, and the Sheriffhall Park & Ride (P&R) Pond, located immediately east of Sheriffhall P&R. These waterbodies returned HSI scores of 0.27 (poor) and 0.54 (below average) respectively. This indicates the ponds are less likely to support populations of great crested newts but does not preclude their absence.
- 9.5.55 However, no great crested newts or evidence of their presence was recorded during subsequent field survey. At Lugton Bogs Pond adult palmate newts *Lissotriton helveticus* were recorded on two survey visits but no evidence of other amphibians was recorded, including an absence of frog or toad spawn. One common frog was incidentally recorded during non-amphibian survey in neutral grassland adjacent to Lugton Bogs Pond. Three-spined stickleback *Gasterosteus aculeatus* were found to be frequent in Lugton Bogs Pond during bottle trapping surveys, which much reduces favourability for amphibians since sticklebacks prey on the juvenile stages.
- 9.5.56 It was not possible to conduct further surveys at the Sheriffhall Park & Ride Pond because it was completely dry during the survey season. For this reason, it can be assumed that great crested newt were absent from this pond.

Breeding Birds

- 9.5.57 Territory analysis of the CBC surveys, taking a precautionary approach owing to the standard reduced number of survey visits, identified territories of seven BoCC Red list species and three BoCC Amber list species. The estimated territory centres of these species are shown on Figure 9.6 'Breeding bird Survey Results'. The Red list species were as follows:
- House sparrow – two territories, at buildings at Sheriffhall and Campend.
 - Linnet – five territories scattered across the fields all around the Proposed Scheme area.
 - Lesser redpoll – one territory in the north of the Proposed Scheme area.
 - Skylark – four territories in the open fields on the north side of the A720.
 - Song thrush – six territories located in the vicinity of wooded areas, the majority of which will remain.
 - Tree sparrow – three territories, all but one associated with buildings and gardens at Summerside and Campend.
 - Yellowhammer – five territories scattered widely around the Scheme, generally in the vicinity of hedgerows.
- 9.5.58 The Amber list species were as follows:
- Bullfinch – three territories in the Sheriffhall area and far east of the survey area.
 - Dunnock – nine territories, mostly in the vicinity of hedgerows, five of which are in the Proposed Scheme Extents.
 - Willow warbler – three territories, all but one of which are associated with large woodland blocks that will be almost entirely unaffected by the Scheme.
- 9.5.59 In addition to the above BoCC Red and Amber bird species, a single territory of lesser whitethroat was found beside the pond at the edge of the western part of the Scheme. Although Lesser whitethroat is not BoCC Red- or Amber-listed, it is a relatively uncommon species in Scotland and considered the most notable breeding species found.

Barn Owl

- 9.5.60 Barn owl was observed incidentally during a bat survey over an abandoned arable field (now neutral grassland) in the southern part of the survey area.
- 9.5.61 However, surveys for roosting or nesting sites within 100m of the Proposed Scheme Extents did not find any such sites. A disused barn at Sheriffhall has potential to be used (open doorways and windows, viable nesting/roosting locations on roof beams/platforms, and nearby suitable foraging habitat), but no evidence of barn owl (such as pellets or feathers) was found.

Other Incidental Bird Observations

- 9.5.62 Mute swan *Cygnus olor* and mallard *Anas platyrhynchos* were recorded on Lugton Bogs Pond (both BoCC Amber listed species) and breeding moorhen *Gallinula chloropus* was also confirmed on this pond.

Invasive Non-Native Species

- 9.5.63 Six plant species regarded as non-native and potentially invasive were recorded within the survey area as illustrated on Figure 9.7 'Invasive Non-Native Species Survey'. Of these, four (salmonberry, snowberry, cherry laurel *Prunus laurocerasus* and rhododendron) are considered likely to be escapes from residential gardens or estates, or deliberately planted for amenity function. Of these, rhododendron is regarded as an invasive plant species of UK concern (due to its inclusion on Schedule 9 of the WCA, although this Schedule no longer legally applies in Scotland). Rhododendron was only recorded in the plantation woodland of Melville Estate; this species was commonly planted in such areas in the late 18 and 19 centuries. As this species is contained within the plantation woodland in which it was planted, it is not considered to be high risk – i.e. posing an immediate threat to biodiversity in the area. This is also the case with snowberry which was recorded within the plantation woodland associated with the Melville Estate and within planted hedges. In both localities it is considered likely to have been deliberately planted and was not recorded 'escaping' from these situations. Cherry laurel was recorded in one location as part of amenity planting adjacent to Summerside. Again, it was not noted to be encroaching on any semi-natural habitats and so is not considered to be a high-risk species.
- 9.5.64 Salmonberry occurs within the plantation south of the Dean Burn but has also spread to the banks of the Dean Burn itself where it forms dense thickets in some places. This species is considered likely to extend this distribution with the burn providing an efficient dispersal pathway. This species can form dense stands which out-compete native species and may have a detrimental effect on biodiversity in this scenario. It is therefore considered to be a high-risk species.
- 9.5.65 Also recorded was giant hogweed which is an invasive plant of high conservation concern due to its inclusion on Schedule 9 of the WCA and the EU IAS Regulation. It occurred frequently along the Dean Burn (where it was also encroaching into the adjacent fields to the north), on roadside verges in two locations adjacent to the southern A7 and on one location south of the eastern A720, along the boundary of the arable field north-east of Sheriffhall Roundabout, in close proximity to Summerside and Sheriffhall residential areas, and in disused land adjacent to the A6106. These locations are shown on Figure 9.7 'Invasive Non-Native Species Survey'. Giant hogweed can form tall, dense stands which out-compete native plant species. It is therefore likely to have a detrimental effect on local biodiversity and is considered to be a high-risk species. It also presents a serious health and safety risk to humans as its sap can cause severe burns.
- 9.5.66 Canadian waterweed was recorded within Lugton Bogs Pond in the west of the Proposed Scheme area. This species is included on Schedule 9 of the WCA and as such is considered to be an invasive plant species of UK concern. It

spreads vegetatively and can quickly form thick mats to the detriment of local biodiversity (although this was not yet the case in the pond in which it was recorded) and is therefore considered to be a high-risk species.

Other Notable Species

- 9.5.67 Common toad is an SBL species and may potentially exist within the Proposed Scheme vicinity since this species is widespread and suitable habitat is present. Other non-notable amphibians (palmate newt and common frog) were confirmed to be present.
- 9.5.68 No reptiles were recorded incidentally during field surveys however suitable habitat such as tall neutral grassland and refugia features such as stone walls are present. It is likely that reptiles included on the SBL such as common lizard *Zootoca vivipara* and slow worm *Anguis fragilis* exist within the Proposed Scheme vicinity.
- 9.5.69 With regard to invertebrates, three species of damselfly were observed at Lugton Bogs Pond: common blue-tail *Ischnura elegans*, common blue *Enallagma cyathigera* and azure *Coenagrion puella*. Damselflies are noted within the CEC LBAP Species Action Plans. No incidental observations of butterflies were made although records of two species were returned during the desk study (orange-tip and small heath, LBAP and SBL species, respectively), but no optimal habitat for these species was recorded in the survey area.
- 9.5.70 No records of fish species were returned in the desk study and field observations of the Dean Burn (the only watercourse in the Proposed Scheme vicinity) indicate limited potential for fish with evidence of pollution and a largely silty substrate. The River North Esk, River South Esk and River Esk, into which the Dean Burn flows, have been assessed as having poor access for fish migration due to presence of barriers (legacy structures). Consequently, occurrence of notable fish species in the Dean Burn is likely to be limited by these downstream barriers.

9.6 Potential Impacts

Assessment of Ecological Importance

- 9.6.1 In view of the baseline data obtained through desk study and field survey, the following features have been excluded from further assessment because they have been found to be likely absent from the Proposed Scheme area or it is clear that no effect from the Proposed Scheme is possible:
- The Imperial Dock Lock SPA, Leith – this designated site is located 10.1km north of the Proposed Scheme and qualifies as a SPA for regularly supporting breeding populations of common tern *Sterna hirundo*. There is not considered to be any connectivity between the Proposed Scheme and this SPA and therefore no potential for effects;
 - Gilmerton Disused Railway LNCS – a locally designated site 886m north of the Scheme. Given the nature of the site and the intervening landscape, there is no direct connectivity between this site and the Scheme, and therefore there is no potential for effects;
 - Habitats which are not notable according to the criteria adopted by this assessment – these habitats are limited to artificial ‘habitats’ and common species-poor habitats including improved (agricultural) grassland, arable fields, amenity grassland and ruderal (weed) communities, which at their most biodiverse contain and support a limited assemblage of species. They are not important in the sense of CIEEM (2018) – in other words they are of less than Local importance – and are therefore excluded;
 - Red squirrel – no evidence of squirrel was recorded during field survey; additionally, grey squirrel occurs in the wider area and the woodland in the wider area is sub-optimal given presence of grey squirrel, and there are no red squirrel records in the Edinburgh area according to Saving Scotland’s Red Squirrels. Therefore, red squirrel is considered to be absent from the Proposed Scheme vicinity with no potential for effects;

- Great crested newt – Habitat Suitability Index assessment for this species found waterbodies present to have below average suitability or less. Newt surveys subsequently found no evidence of great crested newt, which is considered to be absent from the Proposed Scheme vicinity with no potential for effects;
- Water vole – no evidence of water vole was recorded during field survey and the habitat within the Proposed Scheme area is considered to be sub-optimal. Therefore, this species is considered absent from the Proposed Scheme and immediately surrounding area and there is no potential for effects;
- Amphibians – common species, including common toad, common frog and palmate newt may be present but are considered to be of less than Local importance and are excluded from further assessment;
- Notable plant species – although notable species of plant were returned in the desk study, no notable plants (except invasive plant species and pedunculated oak, which is addressed through consideration of impacts on long-established woodland of plantation origin) were located in the Proposed Scheme vicinity (despite survey being carried out by a highly experienced and knowledgeable botanist familiar with these species) and there is no potential for effects upon them; and,
- No notable lichens exist within the Proposed Scheme Extents, or indeed outwith notable nature conservation designations or habitats. No further consideration is therefore given to possible effects upon them.

9.6.2 Considering the above, the potential impacts of the Proposed Scheme on ecological features that require assessment are considered to comprise the following:

- Changes to air quality which could lead to loss of notified lichens within Dalkeith Oakwood SSSI;
- Changes to water quality which could lead to degradation of habitats and associated impacts on species assemblages which are notifying features/qualifying interests of the Firth of Forth SPA, Ramsar Site and SSSI and important to locally designated sites (LBS);
- Temporary loss of a very small area of habitat at the very edge of the Dalkeith Estate LBS northern boundary;
- Permanent loss of areas of ancient woodland within the extents of the Scheme;
- Permanent and/or temporary loss of areas of habitats considered to be of importance within the extents of the Scheme;
- Permanent and/or temporary loss of habitat used by protected and/or notable species;
- Disturbance of protected species resting sites and/or the disturbance of protected and/or notable species whilst foraging or commuting;
- Direct mortality of protected and/or notable species; and
- Potential spread of invasive non-native species.

9.6.3 The assessed importance of those ecological features identified in the baseline conditions, and which have not been screened out above, is set out in Table 9-11 'Importance of Ecological Features for the Nature Conservation Assessment', together with rationale. Ecological importance is shown using the DMRB terminology but has been assessed on a geographic scale as shown in Table 9-3 and as per IAN 130/10 (Highways Agency, 2010) and CIEEM (2018) guidance.

Table 9-11 Importance of Ecological Features for the Nature Conservation Assessment

Ecological Feature	Importance*	Rationale
Firth of Forth SPA/Ramsar site	International (Very High)	Designated at European level.
Firth of Forth SSSI	National (High)	Designated at national level.
Dalkeith Oakwood SSSI	National (High)	Designated at national level.

Ecological Feature	Importance*	Rationale
		The same level of importance is considered applicable to the scarce lichens and invertebrates occurring within the SSSI.
Dalkeith Oakwood LBS/Melville Castle LBS/River North Esk LNCS	County (Low)	Designation at county level.
Ancient woodland	National (High)	Ancient woodland is considered in Scottish Planning Policy to be of national importance with a presumption against effects on ancient woodland.
Non-ancient semi-natural woodland	Local (Negligible)	Semi-natural woodland is scarce at county scale. However the patch of semi-natural woodland within the Proposed Scheme area is extremely small, immature, has limited floristic diversity and high density of invasive non-native species. It has therefore been assigned local level importance.
Other woodland (plantation not in the Ancient Woodland inventory)	Local (Negligible)	The remaining woodland is plantation and therefore not (by definition) semi-natural, and is also not included in the AWI (as 'long-established woodland of plantation origin'), nor does it correspond to an LBAP priority habitat. As such, it is considered to provide local biodiversity benefit only.
Semi-improved neutral grassland, scrub and hedges	Local (Negligible)	These other semi-natural terrestrial habitats are not particularly notable ecologically, and are of very limited extent. However, they appreciably enrich the local ecological resource and scrub woodland and non-species rich hedgerows are priority habitats of the MLC LBAP.
Ponds	Local (Negligible)	Lugton Bogs Pond does not qualify as SBL pond habitat. However it is used by otter and provides significant local biodiversity benefits for amphibians, birds, invertebrates and plants. Freshwater habitats represent part of the Blue Networks described in the CEC LBAP.
Dean Burn	Local (Negligible)	Considered poor for notable fish species due to downstream barriers. Long lengths have been straightened and over-deepened, and it appears constrained by surrounding land-use. Evidence of pollution (water discoloration) was noted and there is significant presence of invasive plant species. Blue Networks are notable local habitats since they are in the CEC LBAP (although this burn is in the MLC area). Better quality watercourses are common in these Local Authority areas. Therefore the burn is not considered to exceed local importance.
River North Esk	Regional (Medium)	The River North Esk does not meet the criteria for SBL river habitat and has been classed by SEPA as of 'Poor' condition. It is therefore not significant at a National level, but is considered likely to support biodiversity beyond that of a local importance, and flows through both Midlothian and (following confluence with the River South Esk) East Lothian, therefore medium (i.e. regional) importance is considered appropriate.
Bats	Local (Negligible)	All species of bat receive legal protection under the Habitats Regulations. A large roost of bats was recorded during the desk study in the area local to the Scheme. Bat species recorded during field survey are of principal importance for conservation under the SBL and are LBAP species. However, bat activity was found to be low and only one roost site used by a single bat was identified in the survey area indicating the site is locally important only.
Badger	Local (Negligible)	No evidence of badger was found and habitat within the Proposed Scheme Extents was found to be sub-optimal. Optimal habitat is present nearby and historic evidence exists of badgers within the wider area. A negative change in badger distribution or numbers in the Proposed Scheme vicinity could be significant at the Local scale, but not higher given the widespread distribution of badger in lowland Scotland. This does not reduce obligations arising from the strict legal protection of badger.
Otter	County (Low)	Evidence shows that otters use Lugton Bogs Pond and the Dean Burn within the immediate Proposed Scheme area. A negative change in otter distribution or numbers in the Proposed Scheme vicinity could be significant to the county, given the small size of the counties in question, but not more given the widespread distribution of otter in

Ecological Feature	Importance*	Rationale
		lowland Scotland. This does not reduce obligations arising from the strict legal protection of otter.
Breeding birds	Local (Negligible)	Although there are BoCC Red list and Amber list species breeding in the Proposed Scheme vicinity, in these cases the species in question are sufficiently common in Scotland and the Lothians that assignment of higher importance is not justifiable. However, all such species significantly enhance the local resource, as does the single lesser whitethroat territory (which although not Red list or Amber listed is uncommon in Scotland).
Barn owl	County (Low)	Barn owl is a Schedule 1 species and has shown widespread reduction owing to loss of suitable nesting sites, and therefore has more than Local importance. However, the species is not rare and assignment of Regional importance would be unwarranted, thus County importance is considered appropriate.
Invasive non-native species	National (High)**	It is an offence under the WANE Act to cause the spread of non-native species outside of their native range. Invasives are potentially of national importance (in an adverse sense) considering risk to downstream Dalkeith Oakwood SSSI.
Reptiles	Local (Negligible)	No reptiles have been recorded in the desk study or incidentally during field survey, however habitat exists to support SBL species such as common lizard and slow worm, both of which will contribute to local biodiversity but do not warrant higher importance.
Fish	Local (Negligible)	Notable fish species are not likely to be present in the Dean Burn, because the watercourse is not of great quality and the River North Esk downstream is known to have barriers to fish migration. Therefore, fish populations within the Dean Burn, if present, are unlikely to be more than locally important.
Invertebrates (outside Dalkeith Oakwood SSSI – see SSSI above)	Local (Negligible)	Common species of damselflies are present in the Proposed Scheme vicinity and are of local importance by inclusion in the CEC LBAP.
Lichens (outside Dalkeith Oakwood SSSI – see SSSI above)	Regional (Medium)	Scarce lichens were noted in the desk study which, given the habitats present, are considered most likely (outside Dalkeith Oakwood SSSI, for which see above) to occur along the River North Esk and near Melville Castle. These lichens are considered to be of regional importance based on their national scarcity (but not rarity).

* Importance categories are as per CIEEM (2018) and IAN 130/10 guidelines. Corresponding sensitivity criteria, as defined in DMRB, Volume 11, Section 2, Part 4 LA 104 'Environmental Assessment and Monitoring' are provided in brackets to ensure consistency with other chapters of this EIA.

** Invasive non-native species are considered to be of High importance, not because they are of conservation value, but because their presence can have significant adverse effects on biodiversity.

Construction Impacts on Designated Sites

Firth of Forth SPA and Ramsar Site (International Importance)

- 9.6.4 As for Dalkeith Oakwood SSSI (see below), pollution events during construction could enter the Dean Burn and be transferred to the River Esk via the River North Esk, and then to the Firth of Forth designated sites. However, these designated sites are approximately 9km downstream, such that there would be a very large dilution effect from both the intervening watercourses and, far more substantially, the Firth of Forth itself. As such, there is not considered to be any risk to the integrity of these designated sites from pollution arising from construction activity. There is not considered to be any impact (no change) resulting in a **neutral effect**.
- 9.6.5 Whilst giant hogweed seeds could theoretically be carried to the Firth of Forth via the Dean Burn and intervening watercourses, giant hogweed does not grow in intertidal habitat and therefore cannot affect the majority of qualifying/notified features, which comprise or are dependent on intertidal and marine habitat. There is not considered to be any impact (no change) resulting in a **neutral effect**.

- 9.6.6 Consultation with SNH for Stage 2 specifically stated that “We anticipate no impacts on nearby nature conservation designated sites.” Connectivity to European sites is limited to hydrological connectivity via watercourses to the Firth of Forth SPA and Ramsar Site. The only identified impact pathways to these downstream sites are waterborne transfer of pollution and disrupted seeds of giant hogweed *Heracleum mantegazzianum* during construction. The dilution effect of the Firth of Forth and intervening watercourses is so large that there is not considered to be a risk to the integrity of these European sites from pollution, and giant hogweed does not grow in intertidal or marine habitat, therefore there is also no risk to integrity by this means. Consequently, and in view of the SNH consultation response, Habitats Regulations Appraisal is not considered necessary.

Firth of Forth SSSI (National Importance)

- 9.6.7 Pollution-related impacts are as described for the Firth of Forth SPA and Ramsar site, described above, resulting in a **neutral effect** on the Firth of Forth SSSI
- 9.6.8 Invasion of non-intertidal notified habitat in the SSSI would require giant hogweed seed to survive prolonged immersion in salt water and be carried inland beyond the intertidal zone, which is considered improbable. Invasion by non-native species is therefore not expected to occur also resulting in a **neutral effect**.

Dalkeith Oakwood SSSI (National Importance)

- 9.6.9 Dalkeith Oakwood SSSI is located approximately 1km from the nearest extent of the Proposed Scheme (at the tie-in to the A720 north-east of Sheriffhall). It is notified for wood pasture and parkland habitat, lichen assemblage and species-rich beetle fauna. Its boundaries are largely defined by the River North Esk and River South Esk. The Dean Burn, which flows in part within the Proposed Scheme Extents, discharges into the River North Esk 1.9km from the Scheme, at the immediate boundary of the SSSI.
- 9.6.10 Pollution events during construction could carry pollutants to the River North Esk which passes along the edge of the SSSI. However, the dilution effect of the River North Esk will be very large and also given the lack of aquatic notified features there is not considered to be any risk by this means to the integrity of the SSSI. Such events would therefore have a negligible magnitude impact and an overall **slight adverse** effect on the SSSI.
- 9.6.11 Giant hogweed seeds are known to spread via watercourses and can survive immersion in freshwater. Construction activities could exacerbate the current situation by, for example, spreading plants and seeds, churning up the ground containing seeds etc. In the worst case this could impact upon Dalkeith Oakwood SSSI downstream, since the Dean Burn could transfer water-borne seeds via the River North Esk to the edge of this SSSI. Although giant hogweed would be unlikely to establish in the SSSI except along the banks of the River North Esk, and the scale of impact on notified lichens and beetles would likely be minimal, this would constitute a moderate impact degradation of a nationally-designated site, which would result in a **large adverse** effect.

Dalkeith Estate LBS, Melville Castle LBS and River North Esk LNCS (County Importance)

- 9.6.12 The Proposed Scheme overlaps Dalkeith Estate LBS by approximately 5m along a length of approximately 100m at the eastern tie-in of the A720, at the far east of the Proposed Scheme. As a result, approximately 0.05ha of the LBS may be physically impacted upon during construction, this representing approximately 0.03% of the total LBS area. The habitat in this area, which is immediately adjacent to the A720 embankment, is mainly semi-mature mixed broadleaved woodland of lower quality and low species diversity. The AWI and field survey do not indicate it to be of semi-natural origin or to have any characteristics thereof. The loss of a small area of woodland would therefore represent a negligible magnitude impact to the LBS, resulting in a **slight adverse** effect. However, any loss of habitat

within the LBS will be temporary and will be effectively restored or enhanced in the medium-term by compensatory planting.

- 9.6.13 Dalkeith Estate LBS could also be impacted upon by pollution from construction of the Proposed Scheme via surface water run-off or via ground waters, although the likelihood of this occurring is low given expected adherence to pollution prevention guidance. These would be negligible impacts given the very small proportion of the LBS affected, resulting in a **slight adverse** effect.
- 9.6.14 Melville Castle LBS and River North Esk (Eskbank) LNCS encompass the River North Esk and its valley, at closest approximately 200m south and 650m south-east of the Proposed Scheme respectively. There is no possibility of construction pollution events reaching these sites via watercourses because they are 1.5km or more upstream of the confluence with the Dean Burn. The minimum over-land separation distances of 200m and 650m between the outermost southern parts of the Proposed Scheme and these sites indicates no risk of pollution via surface water run-off or ground waters. Given also expected adherence to standard pollution prevention guidance, there is considered to be no appreciable risk to the integrity of these local sites. Consequently, there is expected to be no impact on Melville Castle LBS and River North Esk (Eskbank) LNCS, resulting in a **neutral** effect.

Ancient Woodland (National Importance)

- 9.6.15 The Proposed Scheme overlaps woodland listed in the Ancient Woodland Inventory as long-established plantation by approximately 0.04ha, adjacent to the A7 to the south of Sheriffhall Roundabout. The maximum depth of this overlapping strip is approximately 15m at the south end, narrowing to approximately 1m at the north end. A small number of trees may therefore require removal or lopping of boughs. The impact on this plantation block, which is dominated by beech and ash with a sparse ground flora resulting from heavy beech leaf litter, will be Minor, the affected area being 0.02% of the block. Since the affected strip is narrow and is at the edge of the block there will be no appreciable impact on habitat connectivity.
- 9.6.16 Loss of a thinner strip of approximately 0.02 ha long established plantation, and maximum 10m depth narrowing to less than 1m, also occurs on the opposite side of the A7. This woodland is comprised of immature ash and sycamore, supplemented by birch and hawthorn, to the north, with some mature beech to the south. The ground flora is limited, sparse and unremarkable, with heavy leaf litter. Again, trees in this narrow strip may require removal or lopping. The impact would be similarly Minor owing to the small affected area (amounting to 0.76% of the plantation block on this side of the A7, which is dominated by beech) and low floristic quality of the woodland.
- 9.6.17 The western end of the realignment of the Dean Burn will take place within the edge of mature plantation. The affected section of woodland is categorised as long-established plantation in the AWI. It is assumed that in the worst case 0.1ha of long-established plantation (representing 0.08% of the wider plantation block considered to be long established according to the AWI) will be removed to accommodate the realignment works, and this would include mature broadleaved trees.
- 9.6.18 These small losses are considered to be a minor impact on the larger extents of adjacent long-established plantation in question – there is a total of approximately 51ha woodland in the Ancient Woodland Inventory within the survey area, compared to a maximum of 0.16ha being lost. Given the high importance assigned to ancient woodland, and the inability of new plantation to compensate fully for ancient woodland loss (even floristically-poorer long-established plantation), this results in a **moderate adverse** effect. However, this should be balanced against the ecological benefits that will result from the more natural geomorphological design of the realigned Dean Burn section, together with peripheral planting of native woodland.

9.6.19 Note that it is not considered feasible or proportionate to carry out any meaningful habitat improvement works to adjacent long-established woodland as a compensation measure for the above minimal loss. The adjacent long-established woodland is floristically poor plantation with a high proportion of non-native trees – whilst oak is present, beech (not native in Scotland) is dominant with occasional Scot's pine (not native outside the Highlands), hence heavy leaf litter and sparse flora. Part of the woodland is also affected by paint-balling activity. Although there is scattered non-native salmonberry in the adjacent long-established plantation, it is sparse and will likely remain so owing to the shade and leaf litter and could also recolonise from abundant sources along the nearby and upstream Dean Burn, thus removing salmonberry is not likely to significantly improve the floristics. Furthermore, floristic improvements would be best achieved by removing the mature beech, which is inadvisable given that it is the dominant species. Such attempts at woodland improvement are also considered disproportional considering that there are 51 ha woodland in the AWI in the survey area, compared to a total of 0.16 ha lost (0.3% of such woodland in the survey area), and an expected net increase of woodland cover in the survey area through planting of 5.3ha (see Figure 8.8 'Proposed Landscape Mitigation Measures') together with the ecological benefits of the Dean Burn realignment.

Construction Impacts on Habitats

Semi-natural Woodland (Local Importance)

9.6.20 Ancient woodland is addressed above. Semi-natural broadleaved plantation woodland (not included on the AWI) was recorded along the immediate banks of the Dean Burn. This was very small in area (0.2ha) and although semi-natural was considered no more than Locally important based on age and species assemblage (including prevalence of invasive non-native species, particularly giant hogweed, which has a significant negative effect on biodiversity). In order to facilitate construction of the Proposed Scheme the Dean Burn in this location requires re-alignment, and this will result in the major impact of permanent loss of this area of low-quality woodland. In combination with the level of importance, this results in a **slight adverse** effect.

Other Woodland (Local Importance)

9.6.21 Mature and semi-mature broadleaved plantation woodland (not included the AWI) is present in several locations within the Proposed Scheme Extent. This largely consists of smaller, fragmented areas which are likely to add to local biodiversity; however, woodland of this type is not noted as of priority in any Biodiversity Action Plans. Approximately 2.05ha of broadleaved plantation woodland (5.7% of such habitat in the survey area) will be permanently lost to the Scheme, although, as noted, woodland blocks are already highly fragmented, and construction of the Proposed Scheme will not result in further impairment of woodland habitat connectivity. The Proposed Scheme is anticipated to result in a minor impact on this woodland, which in combination with the assigned importance results in a **slight adverse** effect.

Other Terrestrial Habitat - Semi-improved Neutral grassland, Scrub and Hedges (Local Importance)

9.6.22 Other important habitats which occur within the Proposed Scheme area are semi-improved neutral grassland and scrub/hedges. Although not notable habitats (as per the SBL), or particularly diverse, both are priority habitats in the MLC LBAP. The semi-improved neutral grassland present is relatively species-rich compared to the other improved grassland habitat in the area. It is likely to support invertebrates, common reptiles and potentially foraging barn owl (see below for species-specific assessments). Scrub and hedgerows are also considered to enrich the local biodiversity, particularly for common breeding birds. Both neutral grassland and scrub/hedge is considered to be widespread throughout the Local Authority area. 7.1ha of semi-improved neutral grassland and 1.8ha of scrub/hedge habitat will be permanently lost during construction, corresponding to 23% and 37% of semi-improved neutral and

scrub/hedge habitat within the survey area, respectively. The loss of these extents of habitat is considered to constitute a moderate impact, which in combination with the assigned importance results in a **slight adverse** effect.

Ponds (Local Importance)

- 9.6.23 Only one pond will be affected by the Proposed Scheme: this is Lugton Bogs Pond, situated immediately south of the A720 west of Sheriffhall Roundabout (see Figure 9.2 'Phase 1 Habitat Survey'). The other pond within the survey area at Sheriffhall P&R (see Figure 9.2 'Phase 1 Habitat Survey'), which was dry during the amphibian surveys, will not be affected by the Proposed Scheme. 0.09ha (7.5%) of Lugton Bogs Pond will be permanently lost during construction. The pond does not qualify as notable (SBL) habitat, however it provides significant local biodiversity benefits for mammals (including otter and bats), amphibians, birds, invertebrates and plants. Freshwater habitats represent part of the Blue Networks described in the CEC LBAP. No other comparable freshwater ponds occur in the area around the Scheme, and ponds of this type are considered to be infrequent on a county scale. A reduction in size of this pond, likely to be preceded by drainage during the works, is considered to constitute a major impact on the feature, which in combination with the assigned importance results in a **slight adverse** effect.
- 9.6.24 Pollution of the Lugton Bogs Pond could occur during the construction phase as a result of accidental and uncontrolled spill of polluting materials. Given the relatively small size of the pond, a small quantity of polluting material, such as fuel or oil, could have a substantial effect on the plants and animals present within it. Such an event would, in a worst-case scenario, therefore represent a major impact, resulting in a **slight adverse** effect.

The Dean Burn (Local Importance)

- 9.6.25 This small and short watercourse is of value to local biodiversity. However, watercourses of better quality are common within the Local Authority area. The Dean Burn flows through the Proposed Scheme Extent and may therefore be directly impacted via pollution occurring as a result of construction. Pollution incidents could result in the death of plants and animals within the Dean Burn in the immediate vicinity of the construction area. However, with increasing distance from works, the dilution effect would reduce the likelihood of impacts upon aquatic life. The impacts would therefore be localised and of no more than moderate magnitude, resulting in a **slight adverse** effect.
- 9.6.26 The Dean Burn flows through the Proposed Scheme area (from the western end of the proposed Dean Burn realignment in the west, to the eastern-most extent of the Red Line Boundary along the Dean Burn) for approximately 780m. Two reaches of the burn (to the east and west of Sheriffhall Roundabout) will require to be permanently realigned to facilitate the Scheme. Realigned sections will be the same length as baseline, as per SEPA requirements, and no permanent loss of the Dean Burn is therefore anticipated. The realigned channel may be required to be wider and deeper than the existing channel for flood alleviation reasons, but certainly will not be reduced in size. As a result, there will therefore be no significant change to baseline conditions, resulting in a **neutral** effect.
- 9.6.27 There is also potential for further spread of giant hogweed if not appropriately mitigated. The spread of this invasive non-native species would likely result in a moderate magnitude impact and thus a **slight adverse** effect.

River North Esk (Regional Importance)

- 9.6.28 The River North Esk does not meet the criteria for 'Rivers and Streams' habitat of principal importance under the SBL and has been classed by SEPA as being of 'Poor' condition. However, the banks support riparian woodland which is an MLC LBAP priority habitat, and the river and riparian habitat is likely to support biodiversity of regional significance, including nationally scarce lichen flora. The River North Esk is located at closest approximately 400m south of the Scheme. There is direct connectivity to the downstream section of the River North Esk via the Dean Burn, therefore the lower parts of the River North Esk could be subject to pollution events if not controlled, although the dilution effect

of the river itself would be substantial, and the magnitude of impact would be negligible. Pollution during the construction phase would therefore result in a **slight adverse** effect on the River North Esk.

- 9.6.29 Additionally, the input of giant hogweed seeds to watercourses could be exacerbated by construction activities and these could be carried to the River North Esk without appropriate mitigation. These impacts would likely be moderate at worst, and there would be an overall **moderate adverse** effect.

Construction Impacts on Protected and Notable Species

Bats (Local Importance)

- 9.6.30 Four bat species were recorded within the Proposed Scheme vicinity. These were common pipistrelle, soprano pipistrelle, Daubenton's bat and noctule. All bat species receive legal protection under the Habitats Regulations and are considered to be of conservation concern. However, those which were found to be present are common and widespread in the Region and the wider UK. The *National Bat Monitoring Programme Annual Report 2017* (BCT, 2018) indicates the following population trends for the species recorded to be present on Site⁵:
- Common pipistrelle have shown statistically significant population increases in Great Britain since 1999. The Scottish trend also shows an increase, but this is not statistically significant;
 - The British population of soprano pipistrelle is considered to have been stable since 1999. In Scotland field survey counts have been stable and not differed significantly since the 1999 baseline;
 - The Daubenton's bat population in Great Britain and Scotland is considered to have been stable since 1999; and,
 - The population of noctule bat in Great Britain is considered to have been stable over the period since 1999, although there are insufficient data to calculate population trends for this species in Scotland.
- 9.6.31 No bats roosts will be permanently lost as a result of construction of the Scheme. One minor common pipistrelle roost (SH1) was recorded within Sheriffhall House which is located approximately 90m south from the A720 to the east of Sheriffhall Roundabout. The Proposed Scheme will result in the newly constructed slip road (accessing the new junction from the east) being located approximately 40m north of Sheriffhall House. The Proposed Scheme Extents are located immediately adjacent to the northern boundary of Sheriffhall House. Specifics of construction techniques are not yet known, however those required in this location of the Proposed Scheme are likely to generate high levels of noise and vibration which are above baseline conditions and require artificial lighting. The construction phase of the Proposed Scheme is expected to last for approximately 28 months and temporary disturbance to this minor bat roost during this period is therefore highly likely. Although disturbance is predicted, this is not considered likely to cause effective obstruction of the roost due to the location of the roost in relation to the works (on the opposite side of the house). The potential for the disturbance of one minor bat roost containing a very small number of bats would be a minor impact which is unlikely to significantly affect the conservation status of these common bats, either locally or at a larger scale. Disturbance of bats using this location for roosting would therefore result in a **slight adverse** effect at worst. Note that this assessment does not negate the requirement to comply with relevant legislation, and disturbance of any bat roost can only be permitted under licence issued by SNH.
- 9.6.32 General bat activity was recorded to be very low. The transect surveys highlighted the use of two particular features; bats were recorded as present at Lugton Bogs Pond on every transect visit and using the hawthorn hedge boundary between Summerfield the adjacent fields to the west on four out of five visits. There was no evidence of bats crossing

⁵ The National Bat Monitoring Programme utilises several survey methods. For both soprano and common pipistrelle, Roost Count Surveys indicate a significant decline in population since 1999. However, frequent roost switching behaviour exhibited by these species results in a negative bias and this trend is not therefore considered a reliable measure of population change for these species. Trends described are therefore based on Field Survey data.

the A720, although bats were recorded foraging over the quieter A7 and A6106 roads. No bats were recorded within the immediate vicinity of the Sheriffhall Roundabout. This is as expected as the area has little suitable foraging habitat and is very well lit. Based on favourability for invertebrate biodiversity, the majority of habitat present within the Proposed Scheme area is sub-optimal for foraging bats, with some small areas of semi-improved grassland, woodland edge, pond and stream habitats providing better foraging opportunity.

- 9.6.33 Lugton Bogs Pond will remain but will be reduced in size during construction to facilitate the Scheme. The hedgerow at Summerside will also largely remain, although the southern extent (40m) will be lost. The majority of other linear hedges and treelines located along the periphery of the current road layout will be lost to construction, although a significant length of other linear features will remain in the surrounding area. Prior to mitigation, approximately 7.1ha of semi-improved neutral grassland will be lost, together with loss of 1.8ha scrub/hedge and a 7.5% reduction in pond size, all representing suitable foraging habitat. The Dean Burn will require realignment however the realigned channel, with associated planting, will result in no effective loss of foraging habitat because the realigned section will be the same length as the section to be lost to construction. Given the above, habitat loss during construction, which will be permanent, will represent a moderate magnitude impact. The overall effect on bat foraging and commuting will therefore be **slight adverse**.
- 9.6.34 The Proposed Scheme area is currently well lit with street lights along all roads entering the Sheriffhall Roundabout. During construction it is likely that further artificial lighting will be required. This is likely to be over an extended period of time given the probable construction programme (approximately 28 months). It is likely that the bats using the Proposed Scheme area are already at least partially habituated to the lighting near the roundabout, as evidenced by the fact that during field surveys bats were recorded foraging over the well-lit A7 road. However, it is possible that bats will be dissuaded from habitats which may provide a foraging resource or commuting function due to the presence of increased lighting. Further large areas of suitable foraging/commuting habitat will remain unlit in the areas outwith the zone of influence of the Proposed Scheme. Artificial lighting during Proposed Scheme construction will therefore likely have a minor impact on bat activity. Lighting will therefore result in a **slight adverse** effect on bat foraging/commuting.

Badger (Local Importance)

- 9.6.35 No evidence of badger was recorded during the Stage 3 surveys. Evidence of badger (including a single hole sett, droppings, and one road casualty) was previously recorded during preliminary surveys carried out for earlier assessments, but the single hole sett could not be found again on further surveys and is considered absent, and no other evidence of badger was found.
- 9.6.36 Areas within and directly adjacent to the Proposed Scheme Extents are sub-optimal for badger. Woodland habitat is highly fragmented and either immature or dominated by beech, all of which are sub-optimal as habitat for sett location and/or foraging. Suitable foraging habitat is also limited, with the majority of grassland being semi-improved with a tall sward and therefore sub-optimal for foraging. 1.75ha of improved grassland habitat (12% of such habitat within the survey area) will be lost to the Proposed Scheme. Improved grassland habitat is generally considered optimal for badger foraging given the high density of earthworms; however, in the Proposed Scheme vicinity such habitat is again highly fragmented which reduces its suitability. Optimal habitat is known to exist in the wider area, including large areas of broadleaved woodland and improved grassland habitat – 97% of improved grassland, 85% of poor semi-improved grassland, 85% of semi-improved neutral grassland and almost all mature woodland in the survey area will be retained.
- 9.6.37 Based on the current survey results (but without prejudice to the findings of pre-construction surveys), no badger setts will be affected by the Scheme, and a small area of sub-optimal badger habitat will be permanently lost which

is negligible in consideration of suitable foraging habitat further afield. Therefore, no impacts are anticipated at any scale. This results in a **neutral** effect.

Otter (County Importance)

- 9.6.38 Otter evidence was recorded during field survey, including spraints and footprints, indicating they use the Dean Burn and Lugton Bogs Pond within the immediate Proposed Scheme Extents. The lack of evidence of any refuge locations (i.e. lie-ups, couches or holts) suggests that habitats within the site do not form core foraging/shelter habitat and are more likely to be used for commuting or foraging on a more sporadic, possibly seasonal basis. Lugton Bogs Pond is known to support amphibians, breeding water fowl and fish, all of which can provide a seasonal foraging resource for otter. The Dean Burn provides passage under the A720, A7, A6106 and Borders Railway and therefore may be important to otter movement in a local context.
- 9.6.39 The Lugton Bogs Pond will be permanently reduced in size by 0.09ha (7.5%) to facilitate construction of the Proposed Scheme. Theoretically this may result in a similar reduction in foraging resource in this pond, although such a reduction would likely have negligible overall impact on the local otter population. During construction disturbance in the area of Lugton Bogs Pond may temporarily dissuade otter from utilising this foraging resource. However, the pond represents a minor foraging resource for otter and sufficient alternative suitable foraging habitat is considered to exist in the wider area to sustain the local otter population, bearing in mind that otters typically range over 10-20km of watercourse. The temporary disturbance of otters at Lugton Bogs Ponds and the permanent reduction in its total area are therefore predicted to have at worst a **slight adverse** effect on foraging otter.
- 9.6.40 The Dean Burn will require permanent realignment in two separate locations to facilitate construction. Realigned sections will be the same length as baseline, and no permanent loss of the Dean Burn is therefore anticipated. There will thus be a **neutral** effect in relation to permanent habitat loss.
- 9.6.41 However, works on the Dean Burn, particularly at culverts, could result in the otters being encouraged to cross over road with potential for increased road mortality. This would be a major effect on otter, which in combination with the assigned level of importance results in a **moderate adverse** effect.

Breeding Birds (Local Importance)

- 9.6.42 The following points set out what construction impacts are considered likely upon the Red and Amber list breeding bird species:
- House sparrow – the two territories are not likely to be significantly affected by the Scheme, because they are located at buildings at Sheriffhall and Campend and there will be no major works in close proximity to the relevant buildings.
 - Linnet – the five territories are unlikely to be significantly affected because most trees and scrub/hedgerows in the survey area will be retained. There may be a temporary minor impact owing to loss of hedgerows/trees in the Proposed Scheme Extents.
 - Lesser redpoll – the one territory is unlikely to be significantly affected because of the very small width of the works in this area, which will leave the great majority of trees and shrubs in that vicinity intact.
 - Skylark – the four territories are unlikely to be significantly affected because the majority of agricultural field area will remain unaffected.
 - Song thrush – the six territories are expected to be largely unaffected because majority of woodland will remain.
 - Tree sparrow – two of the three territories are unlikely to be affected because they are associated with buildings and gardens at Summerside and Campend that will be largely unaffected; there may be a temporary impact to one territory near Sheriffhall through losses to the Proposed Scheme Extents.

- Yellowhammer – most of the five territories will be unaffected because they are based on hedgerows between fields that will not be affected; possible temporary adverse impacts on one territory from losses to the Proposed Scheme Extents.
- Bullfinch – two of the three territories may suffer temporary adverse impacts from loss of trees/shrubs to the Proposed Scheme Extents
- Dunnock – five of the nine territories are likely to suffer temporary adverse impact through loss of a large proportion of utilised hedgerows to the Proposed Scheme Extents.
- Willow warbler – one of three territories likely to suffer a temporary adverse impact through hedgerow loss

9.6.43 The single identified lesser whitethroat territory is also likely to suffer a temporary adverse impact through loss of the hedgerow in the relevant area.

9.6.44 In view of the above, and the Local importance assigned to breeding birds in the Proposed Scheme vicinity, there is expected to be at most minor impacts resulting in a temporary **slight adverse** effect on breeding birds.

Barn Owl (County Importance)

9.6.45 No breeding or roosting sites for barn owl were found within 100 m of the Scheme. Therefore, no construction impacts are likely for this species. This constitutes a **neutral** effect.

9.6.46 There will be a loss of approximately 7.1ha of semi-improved neutral grassland to the construction of the Proposed Development. This is potentially suitable foraging habitat for barn owls. However, this species occupies home ranges of up to 350ha during the breeding season and up to 5,000ha outside of the breeding season (Hardey *et al*, 2013). Therefore, the loss of habitat to the Proposed Scheme would be small in relation to home range size and would represent a minor magnitude impact. The reduction of foraging habitat for barn owl would therefore be a **slight adverse** effect.

Invasive Non-Native Species (High Importance)

9.6.47 The invasive non-native plant species known to exist within the direct Proposed Scheme Extents are: cherry laurel, snowberry, salmonberry, giant hogweed and Canadian waterweed. New Zealand flatworm was also returned in the desk study data and may be present in soil in the Proposed Scheme Extents. It will be necessary to implement standard control measures to prevent the spread of these species and comply with the legislative requirements of the WANE Act. Snowberry, salmonberry, Canadian waterweed and New Zealand flatworm are either considered to be low risk, present in relatively contained areas and/or require relatively simple management measures. Giant hogweed, however, covers a large extent of the Proposed Scheme Extents and extensive remediation/management will be required to comply with the WANE Act regarding direct spread (i.e. moving seed during the construction process) and indirect spread (i.e. inadvertently moving soil containing seed during e.g. redirection of watercourses) to facilitate construction of the Scheme. If this species was to spread within the local area, effective containment and remediation (i.e. restoration) may not be possible in the short- to medium-term. Given the potential for a moderate adverse magnitude impact, the geographical scale at which such an impact could manifest, and the likely complexity of measures necessary to manage invasive species effectively (particularly giant hogweed), a **large adverse** effect is possible, in the absence of appropriate mitigation.

Reptiles (Local Importance)

9.6.48 Habitat which could support notable reptiles such as common toad and slow worm exists within the Proposed Scheme vicinity. A small proportion of this (4.5ha semi-improved neutral grassland, amounting to 15% of the total semi-improved neutral grassland in the survey area, and very small areas of refugia such as stone walls) will be lost to

construction of the Scheme. The lost neutral grassland is spread out linearly along the Scheme, and the retained 85% of semi-improved neutral grassland that extends away from the lost area is similarly suitable for reptiles, therefore it is anticipated that reptiles could reasonably be expected to relocate to retained areas. The species known/likely to be present are common and widespread in the region and suitable habitat for these species is known to exist within the wider area. However, reptiles present in grassland/pond habitat may be directly impacted upon when clearing land to facilitate construction. This could lead to animals being displaced or directly killed. This is considered to be a moderate impact, which in combination with the assigned importance of these features results in a **slight adverse** effect.

Fish (Local Importance)

- 9.6.49 Presence of notable fish species within the Dean Burn is unlikely because of known downstream barriers reported by SEPA. Construction impacts upon any fish species present are possible during the realignment of the Dean Burn, which could result in trapping of fish. This would represent a minor magnitude impact, resulting in a **slight adverse** effect.
- 9.6.50 Additionally, the realignment works could, without mitigation, cause silt or other pollutants to travel downstream towards the River North Esk. Given the barriers to fish migration lower on the River North Esk, major impacts on locally-important fish populations is possible, without mitigation, resulting in a moderate magnitude impact and a **slight adverse** effect.

Invertebrates (Local Importance)

- 9.6.51 Notable beetles are addressed through the Dalkeith Oakwood SSSI designation for which they are a notified interest (see above).
- 9.6.52 All damselfly and dragonfly species are included in the CEC LBAP. Common blue-tail, common blue and azure damselflies were recorded at Lugton Bogs Pond and are considered to be of Local importance. A proportion of Lugton Bogs Pond (7.5%) will be permanently lost to construction of the Proposed Scheme and no other comparable habitat suitable for damselflies was recorded within the Proposed Scheme vicinity. Loss of pond habitat will result in a minor magnitude, which in combination with the assigned importance results in a **slight adverse** effect.

Operational Impacts on Designated Sites

Firth of Forth SPA and Ramsar Site (International Importance)

- 9.6.53 Pollution during operation could enter the Dean Burn and be transferred to the River Esk via the River North Esk, and then to the Firth of Forth designated sites. However, as for construction impacts, there would be a great degree of dilution as a result of the length of intervening watercourse (over 9km) and most importantly the enormous size of the Firth of Forth itself. In consequence and given also the scale and nature of the Scheme (and correspondence with SNH discussed in paragraph 9.4.4), there is considered to be no risk to the integrity of the Firth of Forth designated sites. This constitutes a **neutral** effect.

Firth of Forth SSSI (National Importance)

- 9.6.54 Impacts would be as described above, meaning a **neutral** effect on the Firth of Forth SSSI.

Dalkeith Oakwood SSSI (National Importance)

- 9.6.55 Dalkeith Oakwood SSSI is located approximately 1km from the nearest extent of the Proposed Scheme (at the tie-in to the A720 north-east of Sheriffhall). The Dean Burn which flows within the Proposed Scheme footprint discharges

into the River North Esk 1.9km from the Scheme, at the immediate boundary of the SSSI, and the River North Esk flows around the north edge of the SSSI. However, there are no aquatic notified features (including the invertebrate interest) in Dalkeith Oakwood SSSI, therefore as for construction impacts there is expected to be no impact during operation from potential pollution of the Dean Burn, and the integrity of the SSSI will be maintained, resulting in a **neutral** effect.

9.6.56 The SSSI includes a notified lichen assemblage. Lichens are highly sensitive to airborne pollution, of which the nearby A720 is a known source (as highlighted by SNH during the Stage 2 consultation). The primary pollutants which may increase as a result of operation of the Proposed Scheme and have a negative impact on lichen species at a significant distance are NO_x (oxides of nitrogen – nitric oxide and nitrogen dioxide). Table 9-12 'Results of NO_x Modelling' below shows the results of the NO_x modelling.

Table 9-12 Results of NO_x Modelling⁶

Receptor name	Receptor Location	X (m)	Y (m)	Base 2017 (µg m ⁻³)	DM 2020 (µg m ⁻³)	DS 2020 (µg m ⁻³)	Change (µg m ⁻³)
E1	Dalkeith Oakwood SSSI, northern corner nearest A68	333933.2	669138.6	20.8	16.2	16.4	0.2
E2	Dalkeith Estate LBS, closest woodland to A68	334091.8	669258.9	19.9	15.8	18.4	2.6
E3	Dalketh Oakwood SSSI, western corner nearest Proposed Scheme	333422.9	668873.2	18.6	15.0	15.7	0.7
E4	Dalkieth Estate LBS, woodland edge closest (adjacent to) Proposed Scheme	332391.6	668378.4	69.2	63.0	61.6	-1.4
E5	Dalkieth Estate LBS, woodland edge to the east of Sheriffhall farm	332143.3	667894.8	23.2	18.8	18.4	-0.4
E6	Dalkieth Estate LBS, woodland edge at junction of A6106 and railway	332165.7	667686.6	33.2	25.6	25.9	0.2
E7	Melville Castle LBS, closest point to the Proposed Scheme	331802.9	667381.8	28.0	22.5	22.1	-0.4

9.6.57 There is no specific critical level of atmospheric NO_x for lichens, but there is a critical level of 30 µg m⁻³ that applies to all vegetation (Ashmore and Wilson, 1994). Air pollution modelling typically requires that pollutant levels be predicted at a future point in the absence of the Proposed Scheme (the 'do-minimum' scenario), and with the Proposed Scheme (the 'do something' scenario), which are set out in the Table 9-12 Table 9-12 'Results of NO_x Modelling' as 'DM2020' and 'DS2020'. As can be seen, in 2020 without the Proposed Scheme, levels of NO_x are well under the critical level at the closest point of the SSSI to the Proposed Scheme (E3), and at the closest point of the SSSI to the A68 (E1). In 2020, with the Proposed Scheme, NO_x levels are predicted to rise slightly by 0.7 µg m⁻³ at E3, and 0.2 µg m⁻³ at E1, and that NO_x levels here will remain well below the critical level. It is therefore predicted that changes in NO_x levels at Dalkeith Oakwood SSSI will be negligible and of no consequence to the notified lichen assemblage. Indeed, given that there is only a slight change in NO_x levels at the closest edges of the Proposed Scheme, it is likely that NO_x levels in the SSSI as a whole will remain unchanged.

9.6.58 Consequently, it is expected that there will be no impact (either beneficial or adverse) caused by changes in airborne pollution on the notified lichen assemblage of Dalkeith Oakwood SSSI, and that the integrity of the SSSI will be maintained, constituting in a **neutral** effect.

Dalkeith Estate LBS, Melville Castle LBS and River North Esk LNCS (County Importance)

9.6.59 The Proposed Scheme overlaps Dalkeith Estate LBS by approximately 5m along a length of approximately 100m at the eastern tie-in of the A720, at the far east of the Proposed Scheme. A very small proportion of Dalkeith Estate LBS

⁶ 'DM' = 'do-minimum' i.e. conditions without Proposed Scheme; 'DS' = 'do something' i.e. conditions with the Proposed Scheme

could in theory be impacted by operational pollution entering via surface water run-off or via ground waters. However, the part of the Proposed Scheme potentially causing this impact is at the extreme east of the Proposed Scheme in the vicinity of a tie-in, where road drainage conditions are not expected to be worse than baseline and may be improved. Therefore, there is expected to be no appreciable risk to the integrity of Dalkeith Estate LBS from operational surface or groundwater pollution, resulting in a **neutral** effect.

- 9.6.60 Melville Castle LBS and River North Esk (Eskbank) LNCS encompass the River North Esk and its valley, at closest approximately 200m south and 650m south-east of the Proposed Scheme respectively. There is no possibility of construction pollution events reaching these sites via watercourses because they are 1.5km or more upstream of the confluence with the Dean Burn. The minimum over-land separation distances of 200m and 650m between the outermost southern parts of the Proposed Scheme and these sites indicates negligible risk of pollution via surface water run-off or ground waters. Consequently, there is expected to be no impact on Melville Castle LBS and River North Esk (Eskbank) LNCS, resulting in a **neutral** effect.

Operational Impacts on Habitats

- 9.6.61 Note that there are not considered to be any consequential operational impacts on terrestrial habitats not discussed under Operational Impacts on Designated Sites above. Therefore, this section concerns freshwater habitats.

Ponds (Local Importance)

- 9.6.62 Lugton Bogs Pond is situated immediately south of the A720 west of Sheriffhall Roundabout. The pond does not qualify as notable (SBL) habitat; however, it provides significant local biodiversity benefits for mammals (including otter and bats), amphibians, birds, invertebrates and plants. Freshwater habitats represent part of the Blue Networks described in the CEC LBAP. No other freshwater habitats occur within the Proposed Scheme vicinity, and they are infrequent on a county scale. Given the proximity of the Proposed Scheme to this pond (which will be impinged upon), there is potential for pollution released by the Proposed Scheme to enter the pond. This is considered to constitute a major magnitude impact which in combination with the assigned importance results in a **slight adverse** effect.

Dean Burn (Local Importance)

- 9.6.63 This small short watercourse is of value to local biodiversity; however, watercourses of better quality are common within the Local Authority area. The Dean Burn flows through the Proposed Scheme Extents and may (without mitigation) be directly impacted via pollution occurring during operation of the Scheme. This is considered to represent a major magnitude impact at a local scale, resulting in a **slight adverse** effect.

River North Esk (Regional Importance)

- 9.6.64 The River North Esk does not meet the criteria for 'Rivers and Streams' habitat of principal importance under the SBL and has been classed by SEPA as of 'poor' condition. However, it supports riparian woodland which is a MLC LBAP priority habitat which is likely to support a level of biodiversity of County significance. The River North Esk is located at closest approximately 400m south of the Scheme, and pollution by surface water run-off or ground water is considered unlikely at this distance, but pollution is possible via connectivity to the Dean Burn. Pollution of the River North Esk (and impacts upon associated biodiversity) would constitute an impact of major magnitude on a feature of county importance, resulting in a **moderate adverse** effect.

Operational Impacts on Protected and Notable Species

Bats (Local Importance)

- 9.6.65 The Proposed Scheme will result in the newly constructed slip road (accessing the junction from the east) being located approximately 40m north of Sherriffhall House, and therefore in closer proximity to the confirmed bat roost than the current road alignment. The bat roost is located on the south aspect of the roof, and during the suite of bat surveys bat activity was generally recorded around the south-west side of the building, i.e. the opposite side from the Scheme. Therefore, operational impacts on bats entering/exiting this roost are expected to be negligible. The effects of disturbance would therefore be **neutral**.
- 9.6.66 No bats were recorded crossing the A720 road during field surveys. The Proposed Scheme will result in a new bridge over the existing Sheriffhall Roundabout which will rise to 8.57m. Since no bat crossing points were recorded, and it is likely that raising of the carriageway will only further dissuade bats from crossing it, no impacts on bats are anticipated as a result of increased road collisions during operation of the Proposed Scheme, resulting in a **neutral** effect.

Otter (County Importance)

- 9.6.67 Otter evidence was recorded during field survey, including spraints and footprints, indicating they use the Dean Burn and Lugton Bogs Pond within the immediate Proposed Scheme Extents. The culvert containing the Dean Burn beneath the A7 is 35m in length with a diameter of 180cm. This culvert will be increased to approximately 40m in length to facilitate the Scheme. Otter are considered highly likely to use this feature to avoid having to cross the busy A7 road. Given the large diameter of the culvert (double that recommended in DMRB guidance, stipulating that a culvert over 20m in length should be a minimum of 90cm diameter to encourage otter use), an increased length of 5m is highly unlikely to dissuade otter from using this feature during operation of the Scheme.
- 9.6.68 The Dean Burn culvert under the A6106 South is 2.4m by 1.8m in section and 38m in length. Otter are highly likely to use this structure to avoid crossing the A6106 road. No alteration to this culvert is required by the Proposed Scheme and therefore baseline conditions will continue.
- 9.6.69 Hydrological modelling has shown that during Proposed Scheme operation, including resulting increased run-off etc., these culverts will not be surcharged in a 1 in 200 year flood event. Therefore, these features will remain available for commuting otter during all but the most extreme flood events.
- 9.6.70 Given the above, operation of the Proposed Scheme will not result in an impact on otter at any scale, resulting in a **neutral** effect.

Breeding Birds (Local Importance)

- 9.6.71 Operational impacts on general breeding birds are likely to be negligible. The new road layout will not be radically different to the existing layout, and although road traffic speed will be higher, passerines are unlikely to regularly cross the A720 at traffic height. Therefore, the operational effect on breeding birds is expected to be **neutral**.

Barn Owl (County Importance)

- 9.6.72 For barn owl, which regularly hunts at a low level and is vulnerable to traffic collision and is known to hunt in the Proposed Scheme vicinity, there will (without mitigation) be an increased risk of barn owl fatalities owing to the increased road speed. Given the County importance assigned to this species and the potential major impact on barn owl if increased fatalities occur (due to the small population within Midlothian and surrounding counties), the

unmitigated effect could potentially be of **moderate adverse** significance. However, mitigation can be implemented to reduce this risk.

Lichens outside Dalkeith Oakwood SSSI (Regional Importance)

9.6.73 Desk study information indicates that notable lichen species occur along the River North Esk and near Melville Castle, as well as within Dalkeith Oakwood SSSI. Lichens in Dalkeith Oakwood SSSI are treated under the SSSI above, and this section concerns notable lichens outside the SSSI. Lichens are highly sensitive to pollution, of which the nearby A720 is a known source (as highlighted by SNH during the Stage 2 consultation). It has been demonstrated (see assessment for Dalkeith Oakwood SSSI above) that no effects on the notified lichen assemblage within Dalkeith Oakwood SSSI are expected. Further reference to Table 9-12 'Results of NO_x Modelling' indicates that NO_x levels at E7 (the closest part of Meville Estate LBS, which contains part of the River North Esk) are predicted to increase by a minimal amount of 0.4 µg m⁻³ and to remain less than the critical level (30 µg m⁻³) at 22.1 µg m⁻³. Indeed, the 'do something' scenario is marginally better than the 'do minimum' scenario (22.5 µg m⁻³). Levels within Meville Estate LBS, and also at River North Esk LBS, would be expected to be negligibly different given that these areas are further from the Proposed Scheme. Consequently, it is expected that there will be no impact (beneficial or adverse) on lichen communities in the Proposed Scheme vicinity, constituting a **Neutral** effect.

Cumulative Impacts

- 9.6.74 Cumulative effects on ecological features arising from more than one construction impact of the Proposed Scheme or more than one operation impact of the Proposed Scheme have been addressed in the above impact assessments, in which multiple credible impact pathways (where they exist) have been considered holistically in the impact assessment for each ecological feature.
- 9.6.75 Possible cumulative effects on ecological features may also arise from the combination of construction effects of the Proposed Scheme with on-going operation effects of the Proposed Scheme. However, in all but one case residual effects are neutral with mitigation in place (and in many cases neutral before mitigation), such that the cumulative effect of combined residual construction effects and residual operation effects on ecological features remains neutral. Whilst there is a residual moderate adverse effect on ancient woodland, there is no operational effect on this feature and therefore no cumulative effect by this means.
- 9.6.76 Consequently, there are considered to be no cumulative effects on ecological features arising from the Proposed Scheme itself.
- 9.6.77 Chapter 19 - Cumulative Assessment assesses the potential for cumulative impacts resulting from the combination of impacts which have been identified as part of this ES which are likely to result in new or different likely significant effects, or an effect of greater significance than any one of the impacts on their own. It also considers impacts which in combination within impacts associated with other proposed development, are likely to result in an effect of greater significance, or a new or different likely significant effect, that the Proposed Scheme in isolation.

9.7 Mitigation

Embedded Mitigation

- 9.7.1 Wherever possible, the design of the Proposed Scheme has evolved to avoid impacts on important ecological features identified during the DMRB process.
- 9.7.2 Preliminary iterations of the Proposed Scheme design included culverting of a significant length of the Dean Burn in the area of the A6106 southbound. This would have resulted in a long (approximately 200m) culvert which was

identified as likely to pose a serious impediment to ecological features which utilise the burn such as otter and fish. Consequently, the design was amended to remove the need to culvert the Dean Burn in this location, thus avoiding impact on fish and otter.

- 9.7.3 A further embedded mitigation measure relevant to nature conservation is the incorporation of SuDS ponds into the design, which will incorporate sowing of native seed mixes and planting of native trees and shrubs.

Additional Mitigation and Enhancement

- 9.7.4 Where ecological mitigation is required additionally to the embedded mitigation, the implementation of such measures will be secured by the preparation of a Schedule of Environmental Commitments. This will be reviewed and approved by relevant statutory consultees including SNH. Environmental Commitments relevant to Nature Conservation are described below. Although only Very Large or Large effects are considered significant, mitigation has nevertheless been considered for all levels of effects, to reduce all residual effects.

Standard Mitigation

- 9.7.5 The following standard mitigation measures will be implemented:

- A Construction Environmental Management Plan (CEMP) will be prepared and approved by SEPA and SNH prior to commencement of construction. It will set out general environmental management measures, including pollution prevention, and the roles and responsibilities of Site personnel. The CEMP will include, as a minimum, a Pollution Prevention Plan (PPP), Water Management Plan (WMP) and Dust Management Plan (DMP);
- SEPA Pollution Prevention Guidelines (PPGs) and Guidance on Pollution Prevention (GPP) (which will ultimately replace PPGs) will be followed at all times during the construction and operation of the Scheme;
- Controls and contingency measures will be provided to manage run-off from construction areas and to manage sediment;
- In order to avoid potential pollution impacts to soils, vegetation and watercourses from machinery during construction, all refuelling and servicing of vehicles and plant will be carried out in a designated area which is bunded and has an impermeable base. This will be situated away from sensitive habitats and at least 50 m from any watercourse;
- Measures to avoid dust generation will be implemented as required during the construction phase;
- All site compounds, access tracks and other works areas will be of the minimum size required for the safe construction of the Scheme. Site compounds will be fenced to prevent encroachment of Site personnel, machinery and materials onto adjacent habitats. The temporary stockpiling of materials will be restricted to predetermined locations such as the construction compounds and will not be carried out on undisturbed adjacent habitats;
- Construction works will take place within a clearly demarcated works area. Demarcation will be achieved through suitable fencing;
- Where practicable, works near or at any retained trees or woodland will follow guidance detailed in British Standard 5837:2012 Trees in relation to design, demolition and construction – Recommendations (British Standards Institution, 2012);
- Sightings of protected or notable species within the Proposed Scheme area during the construction period will be recorded. If any evidence or sightings of protected or notable species occur within a minimum distance of 30m of works (or 250m in respect of great crested newts), then works in that area will stop immediately and a suitably qualified ecologist will be contacted for further advice;
- Any excavations will be left with a method of escape for any animal that may enter overnight, and will be checked at the start of each working day to ensure no animals are trapped within them;

- Any pipes will be capped or otherwise blocked at the end of each working day, or if left for extended periods of time, to ensure no animals become trapped;
 - As far as possible, works will be carried out in daylight to minimise the risk of disturbing protected species outside the construction area such as foraging/commuting bats; and,
 - Any artificial lighting, such as security lighting or lighting for construction works will be directional to avoid or minimise light spill.
- 9.7.6 The above pollution prevention measures including SEPA Pollution Prevention Guidelines (PPGs) and Guidance on Pollution Prevention (GPP) and other controls will be fully stipulated in the CEMP. Such measures are required to secure the relevant SEPA licences and are strictly controlled. Therefore, confidences in pollution avoidance measures are extremely high and anticipated to fully mitigate any water borne or surface run-off/groundwater pollution effects.
- 9.7.7 All personnel involved in the construction and operation of the Proposed Scheme will be made aware of the ecological features in the area and the mitigation measures and working procedures which must be adopted. This will be achieved through the delivery of an ecological toolbox talk as part of any induction processes. In addition, as required, briefings will be provided to all personnel in advance of works which are considered to present an increased risk of impacting upon ecological features (in particular, for example, when works are commencing under an SNH licence).
- 9.7.8 An Ecological Clerk of Works (ECoW) will be employed on a full-time basis for the duration of the construction of the Scheme. The ECoW will be responsible for monitoring and ensuring the implementation of all mitigation measures and compliance with legislative requirements in relation to ecological features. The ECoW will also carry out pre-works checks for protected and/or notable species and provide other ecological advice as appropriate.

Habitat Mitigation

- 9.7.9 Provisions have been included in the Proposed Scheme landscape design to mitigate the loss of notable habitats (woodland, scrub/hedges, semi-improved neutral grassland and ponds). Wide shelter belts of native trees/scrub (including species such as silver birch, hazel *Corylus avellana*, holly, oak, rowan *Sorbus aucuparia*, bird cherry *Prunus padus*, hawthorn, blackthorn and guelder rose *Viburnum opulus*) will border roads joining the new Sheriffhall Roundabout (see Figure 8.8 'Proposed Landscape Mitigation Measures'). Wet woodland patches planted adjacent to the realigned Dean Burn (and also adjacent to the north-east SuDS pond) will comprise appropriate native species (alder, bay willow *Salix pentandra*, purple willow *Salix purpurea* and goat willow *Salix caprea*). There will be a resulting net increase within the survey area of 5.3ha of native woodland cover. 1.8ha of scrub/hedge will be lost to the Scheme, but this is more than compensated by the increase in native woodland cover and planting of 0.37ha (2837m) of species-rich hedgerow whose composition will be entirely native (unlike existing hedges, which are mostly less diverse and in places contain non-native species). The planted hedges will comprise a range of species appropriate to this specific region of Scotland (blackthorn, hawthorn, bird cherry, holly, hazel and northern downy-rose), providing significant benefit to biodiversity in general. The 2837m of planted species-rich hedging represents an increase of 412m over existing less diverse hedging within the Scheme Extents. Whilst 7.1ha of locally important semi-improved neutral grassland will be lost (including habitat south of Lugton Bogs Pond which will be extended, see below), the sowing of species-rich neutral grassland along roads and on dry areas around SuDS ponds (as shown in Figure 8.8 'Proposed Landscape Mitigation Measures') will provide a net increase of 14.7ha. The species-rich grassland mix will simulate National Vegetation Classification (NVC) MG5 community, a much-declined habitat type. Additionally, pond mixes sown in and around the peripheries of the SuDS pond will create new wetland habitat (these are further described below).
- 9.7.10 0.09 ha (7.5%) of Lugton Bogs Pond will be lost to construction. To mitigate for this the pond will be extended to the west and will be replaced in area like for like.

- 9.7.11 If impacted upon by the construction footprint, the very small area of woodland within the Dalkeith Oakwood LBS will be re-planted in full with native broadleaved trees.
- 9.7.12 Scrub/hedge habitat in the landscape plan has also been designed to form an effective shelter belt to avoid species such as bats and barn owl inadvertently approaching the A720 and/or the feeder roads into the roundabout in order to minimise potential for road traffic collisions.
- 9.7.13 Four SuDS ponds will be created throughout the Proposed Scheme area with the primary function of providing surface water/drainage management. However, these ponds have been designed to maximise their value to biodiversity. The ponds have been designed to retain standing water to provide habitat for aquatic plants, amphibians and invertebrates. The pond design will retain standing water until at least the end of July to allow amphibian larvae to metamorphose into juveniles and leave the ponds for terrestrial habitats. Ponds will be planted with appropriate, native wetland plants of local provenance which will provide a variety of micro habitats. The provision of these ponds with retained water dramatically increases the wetland habitat interest of the local area, there currently being only one pond with limited wetland interest (Lugton Pond).
- 9.7.14 Boundaries around the SuDS ponds (required for health and safety reasons) will be designed as species-rich hedges rather than traditional fences to provide greater biodiversity benefits. These will consist of native species (as described above) of local provenance. Hedges will provide nesting habitat for breeding birds and refuge habitat for amphibians and reptiles. These 'soft' boundaries will also allow movement of species (such as reptiles and amphibians) between the SuDS pond and adjacent habitat. Slopes of the SuDS ponds will comprise neutral grassland which will be sown with a seed mix corresponding to NVC MG5 community.
- 9.7.15 The creation of pond edge habitat will include cuckooflower *Cardamine pratensis* benefitting orange-tip butterfly (a LBAP species), while MG5 grassland habitat, which will include a large proportion of fine grass species, will potentially benefit small heath butterfly, (an SBL species). Both butterflies were noted as potentially present within the desk study, but no suitable habitat to support them was present within the Proposed Scheme area.
- 9.7.16 Land along the Dean Burn adjacent to the SuDS ponds in the south of the Proposed Scheme between the A7 South and A6106 South will function as a flood storage area. This area will be allowed to flood naturally and will function as a wetland habitat and be planted with appropriate wetland plant species. The location and design of the SuDS ponds and flood storage area will facilitate their function as a habitat network, increasing connectivity and biodiversity value.
- 9.7.17 Decreases in Phase 1 habitats in the survey area as a result of the Proposed Scheme, aside from the very small area of (0.22ha) immature native woodland infested with non-native species (compensated by the net increase in native woodland cover of 5.3ha), involves habitats which have negligible ecological value (improved grassland, ruderal vegetation, arable, amenity grassland and ephemeral vegetation) and are more than compensated by the above-described increases in native habitats, which will provide a locally-significant net biodiversity gain once established.
- 9.7.18 Note that the provision of the above habitat measures constitute important contributions towards actions for Green Networks and Blue Networks under the CEC LBAP, and in particular to Actions 1, 4, 5 and 9 (concerning flower-rich habitat creation, pond and wetland creation, ecological improvement of watercourses, and wildlife corridors) under the MLC LBAP, and also (via habitat creation) to the Midlothian priority species common toad and hedgehog.

Species Mitigation

- 9.7.19 Construction of the Proposed Scheme is not expected to commence until 2021/2022 by which time the use of the Proposed Scheme area by protected species may have changed. A pre-construction survey for protected species within 100 m of the Proposed Scheme will therefore be carried out. This will be completed not more than six months

prior to commencement of construction. The results of the pre-construction survey will be the responsibility of, or reported and communicated to, the appointed construction contractor.

- 9.7.20 The replacement of notable habitats on a like-for-like or enhanced basis (created habitats in some cases will be more diverse than baseline and will potentially result in enhancement) will ensure that similar suitable areas of habitat will be available in the short-term post-construction for birds, amphibians, reptiles and invertebrates.
- 9.7.21 The Proposed Scheme Extent is located immediately adjacent to the northern boundary of Sheriffhall House. Specifics of construction techniques are not yet known, however those required in this location of the Proposed Scheme are likely to generate high levels of noise and vibration and require artificial lighting. Temporary disturbance to a minor bat roost located in Sheriffhall House is anticipated as a result of the above activity during construction of the Scheme. If necessary (subject to pre-construction surveys, (see Table 9-13 'Summary of Nature Conservation Mitigation Measures') such works will take place under the appropriate SNH derogation licence. Other standard mitigation measures such as controls on use of artificial lighting will also be employed to reduce impacts of construction upon bats (see Paragraph 9.7.5).
- 9.7.22 In order to minimise impacts on otter during extension of the A7 culvert and general disturbance in the vicinity of this and the A6106 culvert, specific mitigation will be implemented during the relevant construction phases. The construction program will be designed such that only one culvert is impacted on at one time to avoid the possibility of otter becoming effectively trapped in-between. During construction, the Dean Burn channel will always remain unobstructed by providing the realigned channel prior to works on the existing channel, ensuring otters (and fish) can pass through the culvert freely and will not be forced to leave the watercourse and cross the A7/A6106 road. As best practice, prior to construction works on the culverts, otter fencing will be installed along the adjacent road sides to permanently discourage otters from crossing the roads. Other standard mitigation measures such as controls on use of artificial lighting will also be employed to reduce impacts of construction upon otter (see Paragraph 9.7.5).
- 9.7.23 In order to encourage barn owl to cross the carriageway above traffic height, planting of trees and scrub will be carried out along both sides of the A720. In the short to medium term, this will force foraging barn owls to fly higher than they otherwise would, and this should mitigate the possible increase in barn owl/vehicle collisions that could otherwise occur.
- 9.7.24 For general breeding birds, compensatory planting of hedgerows to counteract losses to the Proposed Scheme Extents will mitigate in the medium term for reductions in breeding bird habitat and associated loss of breeding territories. The planting of hedgerows will exceed the total length that currently exists, and together with provision of tree sparrow boxes in suitable locations to further encourage the population of this local species, there is expected to be a net gain for general breeding birds.
- 9.7.25 Four invasive non-native plant species have been identified within the Proposed Scheme Extents which have the potential to be spread during construction of the Scheme. With regard to non-native plant species, if charged with committing an offence, it is a defence against prosecution to prove that all reasonable steps were taken, and all due diligence exercised in attempting to avoid committing the offence. Therefore, to demonstrate due diligence and avoid the accidental spread of the non-native species recorded, they should be encompassed within an Invasive Non-native Species Risk Assessment and Management Plan (INNS RAMP). This document will record the known locations of relevant species, assess the risk they pose and set out proportionate measures to be implemented to control these risks. Careful consideration of species-specific management is also required as the species in question have differing methods and timings of dispersal. The INNS RAMP should include all non-native species recorded in the Proposed Scheme area. Usually such a document would be produced once a detailed construction programme has been produced, however, high risk species have been identified which may result on significant adverse effects on

important ecological features. Therefore, reduce the risk of such effects, a management plan should be produced as soon as possible, and appropriate management should commence as soon as possible to be most effective.

- 9.7.26 All habitats present identified to support notable species of amphibians, reptiles and fish (semi-improved grassland, and vegetation along the Dean Burn and around Luton Bogs Pond) will be subject to specific management to avoid harm to these species. Where such vegetation will be cleared between March and October, inclusive, the vegetation will be trimmed down in stages prior to its destruction in accordance with published guidance (Edgar, *et al.*, 2010), to reduce its suitability for reptiles and amphibians and reduce the potential for presence of, and therefore harm to, these species. Works within the Dean Burn and Lugton Bogs Pond will be undertaken in conjunction with fish rescues to minimise risks of harm to fish. As noted above there will be no net loss of notable habitats and therefore similar (if not improved) habitats to support notable species will be present post-construction.
- 9.7.27 Note that the above species measures constitute important contributions towards actions in the CEC LBAP (concerning green networks, blue networks, otters and bats), and in particular to Actions 2 and 6 (concerning creations of nest boxes/other wildlife homes and tackling INNS) under the Midlothian LBAP.

Summary of Mitigation

- 9.7.28 The following table, Table 9-13 'Summary of Nature Conservation Mitigation Measures', provides a summary of the nature conservation mitigation measures proposed. This table is also included within Chapter 20 – Schedule of Environmental Commitments which will be used to inform the commitments in the contract document.

Table 9-13 Summary of Nature Conservation Mitigation Measures

Mitigation Item	Location/ Approximate Chainage	Timing of Measure	Description	Mitigation Purpose/Objective	Specific Consultation or Approval Required	Potential Monitoring Requirements
NC-1	Throughout Proposed Scheme	Pre-construction/ Construction	Appointment of Ecological Clerk of Works (ECoW)	To carry out any required pre-construction surveys, monitor site ecology and provide any required ecological toolbox talks. To monitor implementation of ecological mitigation and compliance with legislation. To liaise with statutory bodies as necessary, including for protected species licensing if pre-construction surveys and/or site monitoring dictate. Compliance with best practice.	None required	The monitoring of site ecology/ ecology mitigation is within the ECoW remit
NC-2	Throughout Proposed Scheme	Construction	Excavations to have means of escape overnight (battered sides or exit ramp); open pipes to be capped overnight; construction lighting to be minimised and directional to minimise light spill on adjacent habitats.	Prevention of harm to wildlife by standard measures. Compliance with best practice.	None required	ECoW to verify implementation
NC-3	All retained trees/shrubs/woodland near Proposed Scheme	Construction	Adhere to guidance in <i>British Standard 5837:2012 Trees in relation to design, demolition and construction</i>	Prevention of damage to retained trees/shrubs by standard measures. Compliance with best practice.	None required	ECoW to verify implementation
NC-4	Throughout Proposed Scheme	Construction/Operation	Planting of woodland, scattered trees, hedges and shrubs, the majority comprising a range of native species. Provided along verges, around SuDS ponds and along Dean Burn. Trees to be included along outer edges of A720 verges.	Compensation of woody habitat loss; provision of greater quantities of woody habitat; floristic and general biodiversity enhancement. Encouragement of bats/barn owl to fly above A720 traffic height. Compliance with policy regarding biodiversity enhancement and compensation of tree/woodland loss.	None required	ECoW to verify implementation
NC-5	Verges, vicinity of SuDS ponds, margins of Dean Burn	Construction/Operation	Sowing of MG5 meadow mix on verges and wider vicinity of SuDS ponds; sowing of marginal/wetland mixes around edges of SuDS ponds and Dean Burn	Floristic and general biodiversity enhancement, in addition to compensation of area of lost grassland. Compliance with policy regarding biodiversity enhancement.	None required	ECoW to verify implementation

Mitigation Item	Location/ Approximate Chainage	Timing of Measure	Description	Mitigation Purpose/Objective	Specific Consultation or Approval Required	Potential Monitoring Requirements
NC-6	East end of Proposed Scheme	Construction/Operation	Compensatory planting of native trees in vicinity of slight overlap with Dalkeith Estate LBS boundary	Compensation for any slight losses of immature trees within Dalkeith Estate LBS boundary. Compliance with policy regarding compensation of woodland loss.	Engagement with Dalkeith Estate advised if trees with the LBS are removed	ECoW to verify implementation
NC-7	SuDS ponds	Construction	SuDS ponds designed to retain water	Significant biodiversity gains including enhanced floristic, invertebrate, amphibian and bird diversity. Compliance with policy regarding biodiversity gains.	None required	ECoW to verify implementation
NC-8	Lugton Bogs Pond	Construction	Compensatory expansion of pond to maintain	Compensate for 7.5% loss of pond area to scheme footprint. Compliance with best practice.	None required	ECoW to verify implementation
NC-9	Throughout Proposed Scheme and adjacent areas as necessary	Pre-construction	Pre-construction protected and invasive species surveys.	Update Stage 3 survey data which will be over two years old. SNH considered that updated survey data was not required for the Stage 3 assessment, and that pre-construction surveys would identify any changes to baseline conditions.	Derogation license(s) from SNH would be required if the pre-construction surveys identify new protected species refuges that will be impacted by the works.	ECoW to carry out and verify surveys completed
NC-10	Throughout Proposed Scheme	Construction	Standard breeding bird protection measures: a) clearance of vegetation outside breeding season (taken to be March-August inclusive); or, if clearance necessary in breeding season, b) checks carried out by ECoW to locate active bird nests and protect accordingly until completion of breeding attempts.	Prevention of harm to active bird nests. Compliance with legislation regarding nests of wild birds.	None required	ECoW to check and monitor vegetation to be cleared in breeding bird season
NC-11	Throughout Proposed Scheme where invasive non-native species are present	Pre-construction/ Construction	Prepare Invasive Non-Native Species Risk Assessment and Management Plan (INNS RAMP), taking into account pre-construction survey for invasive species (see above), with particular requirement to address locally abundant giant hogweed in the scheme footprint (especially along the Dean Burn). Incorporate measures in the INNS RAMP in the CEMP and method statements.	Prevention of spread of invasive species. Prevention of potential contamination of downstream river habitats and SSSI. Compliance with legislation, policy and best practice regarding invasive non-native species.	None required	ECoW to monitor site for invasives and supervise removal of contaminated material

Mitigation Item	Location/ Approximate Chainage	Timing of Measure	Description	Mitigation Purpose/Objective	Specific Consultation or Approval Required	Potential Monitoring Requirements
NC-12	Throughout Proposed Scheme	Pre-construction/ Construction	Where habitat suitable for reptiles/amphibians will be cleared in period March-October inclusive, then guidance for minimising harm to reptile/amphibians to be followed, including strimming down in stages prior to clearance.	Minimising of potential injury to reptiles and amphibians. Compliance with legislation and/or best practice regarding reptiles and amphibians.	None required	ECoW to monitor such management if it is required
NC-13	Works in Dean Burn and Lugton Bogs Pond	Construction	Fish rescues during works within Dean Burn and Lugton Bogs Pond	Minimising of potential killing of any fish present in water features. Compliance with best practice.	None required	ECoW to verify implementation
NC-14	Dean Burn realignment	Construction	Realigned section of Dean Burn to be provided prior to removal of existing section, and to incorporate geomorphological enhancement to more natural condition.	Retention of continuous water corridor for otter and aquatic wildlife. Enhancement through provision of more natural channel section. Compliance with best practice and policy regarding wildlife protection and biodiversity gain.	None required	ECoW to verify implementation
NC-15	Dean Burn culverts	Construction	Otter fencing to be provided on either side of roads at Dean Burn crossings in accordance with DMRB guidance.	Deterrence of otters from crossing road rather than commuting through culverts. Compliance with best practice regarding wildlife protection.	None required	ECoW to verify implementation
NC-16	Summerside/ Sheriffhall	Construction/Operation	A minimum of five tree sparrow boxes to be provided at Summerside and/or Sheriffhall on suitable trees	Enhancement through encouragement of a localised small bird species. Compliance with policy regarding biodiversity gain.	Approval of landowner(s)	ECoW to verify implementation

9.8 Residual Effects

- 9.8.1 All effects on statutory and non-statutory sites for nature conservation will be fully mitigated through the implementation of robust pollution prevention measures (which are required to secure the necessary licenses and approvals from SEPA), and management of invasive species. Such mitigation is an inherent requirement for the Scheme, even if no significant effects on these sites were possible. Given also the predicted lack of effect on notable lichens in Dalkeith Oakwood SSSI, there are expected to be neutral residual effects on all statutory and non-statutory sites. This includes the downstream Firth of Forth SPA and Ramsar site.
- 9.8.2 Impacts resulting from the spread of invasive non-native plant species will be fully mitigated through production of a robust INNS RAMP, which is required to demonstrate due diligence and avoid offences under the WANE Act (2011).
- 9.8.3 A residual **moderate adverse** on ancient woodland remains, because tree planting cannot fully compensate for the predicted minor losses to woodland classified as long-established plantation in the AWI. However, this must be balanced against the ecological benefits that will be achieved by the more natural geomorphology of the realigned Dean Burn section (which affects the largest section of long-established plantation), and a net increase in native woodland cover of 5.3ha.
- 9.8.4 There are expected to be residual neutral effects on the River North Esk, otter and barn owl as a result of the proposed mitigation. This includes preparation and implementation of an INNS RAMP, use of tree planting to encourage higher barn owl flights over the carriageway, sowing of species-rich neutral grassland (constituting barn owl foraging habitat) and provision of a standard otter mitigation measures as well as a continuous watercourse commuting route during construction and installation of otter fencing at culverts to avoid possible road casualties.
- 9.8.5 Slight adverse effects on other bats, breeding birds, amphibians and reptiles, invertebrates and fish are expected to become residual neutral effects through implementation of proposed mitigation for habitats constituting breeding, foraging and refuge habitat for these species, including implementation of SEPA-approved pollution control measures embedded in a CEMP, compensatory tree/scrub planting and other habitat creation, installation of SEPA-approved SuDS including SuDS ponds, adherence to pollution prevention guidance, and compensatory expansion of Lugton Bogs Pond.
- 9.8.6 Pre-mitigation effects on notable lichens were neutral owing to a lack of predicted impacts, therefore there will be a residual neutral effect on lichens.
- 9.8.7 Preparation and implementation of an INNS RAMP will ensure that there will be a residual neutral effect from invasive non-native species.
- 9.8.8 For semi-natural broadleaved woodland, other woodland, ponds, and semi-improved neutral grassland and scrub/hedges, there are expected to be slight beneficial effects. These result from net increases (once planted/sown and established, as per the Landscape Mitigation Plan) of 5.3ha native woodland cover, 14.7ha species-rich neutral grassland, and 412m of species-rich hedging, and provision of the four SuDS ponds designed to retain water until at least July each year with associated biodiversity benefits.

Summary of Residual Effects

- 9.8.9 Table 9-14 'Potential Nature Conservation Construction and Operational Effects and Residual Effects' provides a summary of the pre-mitigation construction and operation impacts, mitigation measures and residual effects that have been described within this chapter.

Table 9-14 Potential Nature Conservation Construction and Operation Effects and Residual Effects

Predicted Impacts		Magnitude of Impact	Sensitivity of Feature	Scale of Effect	Mitigation Measures	Residual Effects
Firth of Forth SPA, Ramsar Site and SSSI						
Construction	None – not considered to be any risk to the integrity of these sites	No change	Very High	Neutral	None required	Neutral
Operation	None – not considered to be any risk to the integrity of these sites	No change	Very High	Neutral	None required	Neutral
Dalkeith Oakwood SSSI						
Construction	Possible contamination of SSSI with giant hogweed seeds transported via Dean Burn and River North Esk. No effect on notified invertebrates or lichens.	Major	High	Large Adverse	<ul style="list-style-type: none"> Preparation of Invasive Non-native Species Risk Assessment and Management Plan Incorporation of developed measures into CEMP and method statements. 	Neutral
Operation	No impacts anticipated – increase in NOx level at closest edges of SSSI predicted to be negligible, with critical NOx level remaining well below critical level.	No change	High	Neutral	None required	Neutral
Dalkeith Estate LBS						
Construction	Possible direct destruction of a very small proportion of the LBS, and/or pollution.	Moderate	Low	Slight Adverse	<ul style="list-style-type: none"> Standard pollution prevention measures incorporated in CEMP. 	Neutral
Operation	No impacts anticipated – no appreciable risk from surface/groundwater pollution	No change	Low	Neutral	None required	Neutral
Melville Castle LBS/River North Esk LNCS						
Construction	None – not considered to be any risk to the integrity of these sites	No change	Negligible	Neutral	None required	Neutral
Operation	None – not considered to be any risk to the integrity of these sites	No change	Negligible	Neutral	None required	Neutral
Ancient Woodland						
Construction	Direct destruction of small amounts (0.02ha, 0.04ha and 0.1ha) of three long-established plantation blocks, which are floristically-poor owing to non-native trees (mainly beech) and amounting to 0.3% of such woodland in the survey area.	Moderate	High	Moderate Adverse	<ul style="list-style-type: none"> Compensatory tree planting; residual remains Moderate Adverse because new planting cannot fully compensate loss of any type of ancient woodland, even plantation of lower quality. 	Moderate Adverse
Operation	No impacts anticipated	No change	Low	Neutral	None required	Neutral
Semi-Natural Broadleaved Woodland						

Predicted Impacts		Magnitude of Impact	Sensitivity of Feature	Scale of Effect	Mitigation Measures	Residual Effects
Construction	Permanent destruction of small (0.2 ha) low quality patch of immature woodland with substantial coverage of invasive species (mainly giant hogweed).	Major	Low	Slight Adverse	<ul style="list-style-type: none"> Compensatory tree planting around Proposed Scheme and SuDS ponds, providing a net increase in native woodland cover of 5.3 ha, and reduction in invasive species in the lost woodland. 	Slight Beneficial
Operation	No impacts anticipated	No change	Low	Neutral	None required	Neutral
Other Woodland						
Construction	Loss of 2.1 ha (out of 50.9ha in the survey area) of broadleaved plantation woodland.	Major	Negligible	Slight Adverse	<ul style="list-style-type: none"> Compensatory planting of woodland around Proposed Scheme and SuDS ponds, providing a net increase in native woodland cover of 5.3 ha. 	Slight Beneficial
Operation	No impacts anticipated	No change	Negligible	Neutral	None required	Neutral
Semi-Improved Neutral Grassland, Scrub and Hedges						
Construction	Loss of 7.1ha of low quality semi-improved neutral grassland and 1.8ha scrub/hedge	Major	Negligible	Slight Adverse	<ul style="list-style-type: none"> Compensatory tree and hedge planting around Proposed Scheme and SuDS ponds, where the hedges will be species-rich native hedges providing a net benefit in species composition and (including hedges around SuDS ponds) a gain in hedge length of 412m. Sowing of species-rich neutral grassland seed mixes around SuDS areas and along link roads, as per Landscape Mitigation Plan, resulting in a net increase in neutral grassland of 14.7ha. 	Slight Beneficial
Operation	No impacts anticipated	No change	Negligible	Neutral	None required	Neutral
Ponds						
Construction	Reduction in size of Lugton Bogs Pond by 7.5%, likely preceded by drainage of pond. Potential for pollution	Major	Negligible	Slight Adverse	<ul style="list-style-type: none"> Lugton Pond area to be maintained by pond expansion. Four SuDS ponds designed to retain water at least until July, providing net gain in pond/wetland habitat. Standard pollution prevention measures incorporated in CEMP. 	Slight Beneficial
Operation	Potential for pollution	Major	Negligible	Slight Adverse	<ul style="list-style-type: none"> Provision of SEPA-approved SuDS scheme including SuDS ponds. 	Neutral
Dean Burn						
Construction	Localised realignment of channel Potential for giant hogweed spread Potential for pollution	Major	Negligible	Neutral/Slight Adverse	<ul style="list-style-type: none"> Restoration of stream habitat to more natural geomorphology, with planting of adjacent native wet woodland trees. Preparation of Invasive Non-native Species Risk Assessment and Management Plan, and likely reduction in invasive species Standard pollution prevention measures incorporated in CEMP. 	Slight Beneficial
Operation	Potential for pollution	Major	Negligible	Slight Adverse	<ul style="list-style-type: none"> Provision of SEPA-approved SuDS scheme including SuDS ponds. 	Neutral

Predicted Impacts		Magnitude of Impact	Sensitivity of Feature	Scale of Effect	Mitigation Measures	Residual Effects
River North Esk						
Construction	Potential for giant hogweed spread Potential for pollution	Major	Low	Moderate Adverse	<ul style="list-style-type: none"> Preparation of Invasive Non-native Species Risk Assessment and Management Plan. Standard pollution prevention measures incorporated in CEMP. 	Neutral
Operation	Potential for pollution	Major	Low	Moderate Adverse	<ul style="list-style-type: none"> Provision of SEPA-approved SuDS scheme including SuDS ponds. 	Neutral
Bats						
Construction	Temporary disturbance of minor bat roost Moderate foraging habitat loss	Moderate	Local	Slight Adverse	<ul style="list-style-type: none"> Attainment of derogation licence for minor bat roost disturbance. Provision of SuDS ponds with semi-natural vegetation. Compensatory tree and hedge planting around Proposed Scheme and SuDS ponds Compensatory expansion of pond. 	Neutral
Operation	No impact expected.	No change	County	Neutral	None required.	Neutral
Badger						
Construction	Loss of negligible amount of foraging habitat, in comparison to surrounding area (97% improved grassland, 85% poor semi-improved grassland, 85% semi-improved neutral grassland and almost all mature woodland in the survey area will be retained), with no current evidence of badgers in Proposed Scheme vicinity	No change	Negligible	Neutral	<ul style="list-style-type: none"> Pre-construction survey No other mitigation required unless pre-construction survey dictates it. 	Neutral
Operation	No impact expected.	No change	Negligible	Neutral	None required.	Neutral
Otter						
Construction	Possible increased road mortality if encouraged to cross road during Dean Burn and culvert works. 7.5% reduction in Lugton Bogs Pond, representing negligible foraging resource reduction.	Major	Low	Moderate Adverse	<ul style="list-style-type: none"> Pre-construction survey Otter fencing to be installed to discourage crossing of road. Dean Burn realignment to supply new realigned section prior to diversion, so watercourse commuting route always available. Compensatory expansion of pond to be carried out. 	Neutral
Operation	No impact expected.	No change	Negligible	Neutral	None required.	Neutral
Breeding Birds						
Construction	Temporary loss or reduction in size of some Red and Amber list species. Red and Amber list species concerned are common in Scotland and Lothians. Temporary loss of one lesser whitethroat territory.	No change to Major depending on	Local	Slight Adverse	<ul style="list-style-type: none"> Compensatory planting of trees/scrub, including species providing passerine foraging resources. Provision of tree sparrow boxes. 	Slight Beneficial

Predicted Impacts		Magnitude of Impact	Sensitivity of Feature	Scale of Effect	Mitigation Measures	Residual Effects
	The latter would be a temporary Major impact because there is only one territory in the survey area. Temporary loss of territories of other species is set out in the impact assessment – many species will suffer no change because breeding habitat not impacted, whilst bullfinch and dunnock will suffer loss of up to two thirds of territories.	species (see left).				
Operation	Negligible impact expected on general breeding birds.	No change	Local	Neutral	None required.	Neutral
Barn Owl						
Construction	No direct impacts expected. Potential impacts relating to loss of potentially suitable foraging habitats, however, this is small in relation to the home range size.	No change	Low	Slight adverse	• Sowing of species-rich neutral grassland seed mixes around SuDS areas and along link roads, as per Landscape Mitigation Plan, resulting in a net increase in neutral grassland of 14.7ha.	Neutral
Operation	Increased barn owl fatalities resulting from increased road traffic speed and increased barn owl/vehicle collisions.	Major	Low	Moderate Adverse	• Replanting of trees/hedgerows along carriageway edges will (in short to medium term following establishment of planted trees/scrub) force barn owls to cross carriageway at greater height.	Neutral
Invasive Non-Native Plant Species						
Construction	Possible spread of giant hogweed seeds along Dean Burn and River North Esk.	Major	Low	Large Adverse	• Preparation of Invasive Non-Native Species Risk Assessment and Management Plan (INNS RAMP).	Neutral
Operation	No impact expected	No change	Low	Neutral	None required	Neutral
Reptiles						
Construction	Minor loss of suitable habitat (15% of semi-improved neutral grassland). Risk of killing/injury of common species.	Minor	Negligible	Slight Adverse	• Compensatory expansion of pond. • SUDS ponds to retain water until June for amphibians. • Standard vegetation strimming techniques to render unfavourable for reptiles prior to clearance.	Neutral
Operation	No impacts anticipated	No change	Negligible	Neutral	None required	Neutral
Invertebrates outside Dalkeith Oakwood SSSI (for notified invertebrate interests of Dalkeith Oakwood SSSI, see that designation)						
Construction	7.5% reduction in pond habitat supporting range of damselflies	Minor	Negligible	Slight Adverse	• Compensatory expansion of pond.	Neutral
Operation	No impacts anticipated	No change	Negligible	Neutral	None required	Neutral
Fish						
Construction	Pollution of watercourses affecting non-notable fish populations (given barriers to fish migration on River North Esk).	Major	Negligible	Slight Adverse	• Standard pollution prevention measures incorporated in CEMP.	Neutral

Predicted Impacts		Magnitude of Impact	Sensitivity of Feature	Scale of Effect	Mitigation Measures	Residual Effects
Operation	No impacts anticipated	No change	Negligible	Neutral	None required	Neutral
Lichens outside Dalkeith Oakwood SSSI (for notified lichens interests of Dalkeith Oakwood SSSI, see that designation above)						
Construction	No impacts anticipated	No change	Medium	Neutral	None required	Neutral
Operation	NOx level anticipated to rise by negligible amount at edge of nearest LBS containing notable lichens, and to remain well below critical level within LBSs containing them.	No change	Medium	Neutral	None required	Neutral

9.9 Compliance with Policies and Plans

- 9.9.1 In this section, CEC Local Development Plan and MLC Local Development Plan are abbreviated to 'CEC LDP' and 'MLC LCP'. Scottish Planning Policy is abbreviated to 'SPP'. The Edinburgh and South-East Scotland Strategic Development Plan is known as SESplan. In summary, the Proposed Scheme is expected to achieve full policy compliance.

Policies regarding Statutory Designated Nature Conservation Sites

- 9.9.2 There will be no contravention of such policies from direct impacts because the extents of the Proposed Scheme do not impinge upon designated nature conservation sites. As discussed in the impact assessments above, there is not expected to be any risk to designated sites from pollution via either air or water, and potential for adverse effect on Dalkeith Oakwood SSSI from downstream spread of giant hogweed will be mitigated by preparation of an Invasive Non-Native Species Risk Assessment and Management Plan. Therefore, policies regarding designated sites will be satisfied.

Policies regarding Protected Species

- 9.9.3 Compliance with protected species policies will be ensured through adherence to the stipulated protected species mitigation above. This includes pre-construction surveys and implementation of any further action that those surveys may dictate, and compensatory planting of hedges, scrub and trees.

Policies regarding Woodland

- 9.9.4 SPP, CEC LDP and MLC LDP all expect development to avoid losses of ancient or semi-natural woodland and veteran trees, or other woodland of landscape importance, and to provide compensation where loss cannot be avoided. Some of the woodland affected (including immature plantation beside the existing Sheriffhall Roundabout) does not qualify under these criteria. Other woodland does qualify, including the small amount potentially affected on the edge of Dalkeith Estate LBS, the small amount of low quality semi-natural woodland beside the Dean Burn, and the small amounts of long-established broadleaved plantation beside the A7 and the Dean Burn. However, these losses will be compensated in area by tree planting along the edges of the Proposed Scheme and around the SuDS ponds, therefore policies regarding compensatory woodland planting are expected to be satisfied.

Policies regarding General Biodiversity Protection/Enhancement

- 9.9.5 SPP, CEC LDP and MLC LDP all expect development to provide biodiversity enhancements where feasible, and to compensate for loss of significant ecological features whether designated or not. Compliance will be achieved by implementation of the proposed nature conservation mitigation measures.

Policies regarding Green Networks

- 9.9.6 The MLC LDP includes 'Sheriffhall Link' and 'Melville Link' green network components. However, these are located beyond the extents of the Proposed Scheme to the north-west/north/north-east and south-west respectively. There are no such green network components in the CEC LDP in the Proposed Scheme Extents or close by. Thus, compliance with these policies will be automatic. The requirement of SESplan for major developments to create, maintain or enhance green networks will be satisfied by the tree/scrub planting (which will be dominated by native species), use of native neutral grassland seed mixes, and expansion of Lugton Bogs Pond, all of which will at minimum maintain existing habitat connectivity.

Policies regarding Peatlands

- 9.9.7 No areas of peatland will be impacted therefore all options will automatically comply with all national and local policies concerned with protection of peat and associated carbon sequestration.

Policies regarding National and Local Biodiversity Action Plans

- 9.9.8 National and local policies expect priorities in the Scottish Biodiversity List (SBL) and Local Biodiversity Action Plans (LBAPs) to be acknowledged. This has been addressed in this chapter through desk study and fieldwork and development of proportionate mitigation measures. Compliance with these policies will therefore be achieved.

Policies regarding the Water Environment

- 9.9.9 SPP, CEC LDP and MLC LDP all contain presumptions against culverting. Culverting has been avoided as far as practical, including amendment of the design to avoid a former proposal to culvert 200m of the Dean Burn. The Dean Burn culvert beneath the A7 will be increased in length by 5m, which will not result in significant effects on the Dean Burn or associated ecological features (including otter, which is highly unlikely to be dissuaded by such a small extension).
- 9.9.10 SPP, CEC LDP and MLC LDP also all contain requirements for SuDS. Four SuDS ponds form part of the design. These will be planted to maximise their biodiversity value. Two SuDS ponds are located in close proximity to each other within the flood plain of the Dean Burn, and SuDS and other habitats created in this area will be functionally linked as to increase their biodiversity value.

9.10 Statement of Significance

- 9.10.1 As stated in Section 9.2, significant effects typically comprise residual effects that are within the moderate, large or very large categories. Therefore, the only significant residual effect remaining following mitigation is a **moderate adverse** residual effect on ancient woodland during construction.
- 9.10.2 This must be balanced against the ecological benefits of the more natural geomorphology of the realigned Dean Burn section (which has the main impact on ancient woodland), planting of native wet woodland along this section, and increased native woodland cover of 5.3ha. In combination with increases in species-rich grassland (gain of 14.7ha), hedging (more species-rich and 412m increase in length) and wetland habitat (with SuDS ponds designed to retain water most of the year), these measures are considered to result in a locally-significant net gain in biodiversity.

9.11 Monitoring

- 9.11.1 Responsibility for ensuring that the above mitigation is implemented, and that construction complies with nature conservation legislation, will lie with the Ecological Clerk of Works (ECoW) appointed by the principal contractor. This includes pre-construction surveys for protected and invasive species and acquisition (if found necessary) of protected species licences and compliance with them (**mitigation item NC-9**), and monitoring and appropriate management of invasive species (of which giant hogweed is a particular concern) in accordance with an Invasive Non-Native Species Risk Assessment and Management Plan (**mitigation item NC-11**).
- 9.11.2 An ecologist appointed by TS will monitor and maintain a record of both compliance and the effectiveness of mitigation during construction and carry out post-construction monitoring. The latter will include monitoring of:
- the effectiveness of the SuDS ponds and associated wetland habitat, which are intended to retain water most of the year;

- the effectiveness of otter fencing at the Dean Burn culvert;
- the planting and establishment of proposed woodland and hedges (including the wet woodland along the realigned section of the Dean Burn);
- the sowing and establishment of species-rich grassland;
- the provision and establishment of pond edge/wetland habitat in the SuDS ponds and Lugton Pond, and along the Dean Burn.

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