A10.6: Terrestrial and Freshwater Ecology – Impacts and Mitigation

1 Introduction

1.1.1 This appendix provides description of potential impacts and associated mitigation measures, supporting the summary presented in Chapter 10 (Sections 10.4 to 10.6). It also describes the remaining residual impacts on habitats and species as a result of construction and operation of the proposed scheme.

2 General Potential Impacts

2.1.1 The impacts described in this section are impacts that might occur during construction or operation in the absence of any mitigation.

2.2 Habitats and Species

Habitat Loss

Construction and Operation

2.2.1 There will be temporary habitat loss during construction of the proposed scheme due to the land-take required to accommodate the construction works including site compounds, borrow pits, storage of construction materials or similar. In addition, there are areas of permanent land-take required to accommodate the proposed scheme requiring vegetation clearance leading to permanent habitat loss and changes to habitat in areas such as the footprint of the new carriageway, land required for drainage elements and earthworks. The loss of habitats could also result in indirect mortality of species reliant on the habitat lost.

2.2.2 During construction, potential for pollution is likely to be predominantly associated with the run-off of construction materials including sediment and oils onto semi-natural habitats. This could result in adverse impacts to these habitats, such as habitat loss and degradation. In addition, particulate deposition of material arising from construction activities could result in habitat loss/degradation close to the construction site.

2.2.3 During operation of the proposed scheme, pollution resulting from road drainage, run-off which may contain oils and chemicals, and spray could adversely affect adjacent habitats, particularly wetland habitats reducing their suitability for species.

2.2.4 Visual and light pollution impacts on existing habitats are possible, during construction and operation with the magnitude dependent on the level of lighting erected in specific areas. Similarly, air pollution could arise during construction plant and during operation from traffic emissions. Emissions could have a negative impact on adjacent plant communities leading to habitat loss/degradation. Additional information on air quality impacts, the selection of ecologically sensitive receptors and information with regards to potential impacts on identified ecological receptors is presented in Chapter 14 (Air Quality).

2.2.5 The provision of new structures, such as bridges and culverts, has potential to cause shading, which could result in a change in species composition and loss of cover.

Species Mortality

Construction

2.2.6 During the construction phase, earth works and heavy machinery has the potential to cause mortality of slow moving species.

2.2.7 During construction, earthworks and culvert construction, works such as drilling, excavation and piling activities, carried out in the vicinity of the riverbank, will generate ground-borne vibrations that may propagate into the water column. Depending on the frequency, content and levels of noise reaching the water, this may have the potential to effect sensitive species and at various life stages (Richardson et al., 1995; Hawkins & Johnstone, 1978). Vibration could create an acoustic barrier/obstruction to which fish will not pass or, in the presence of high vibration, result in direct mortality of fish.

Operation

2.2.8 The operation of the proposed scheme could result in an increase in direct mortality of species as a result of increased road kills.

2.2.9 Some species are highly susceptible to being killed on roads. Sixty per cent of all recorded otter (*Lutra lutra*) deaths in the UK have been attributed to road accidents (Woodroffe, 2011), with the majority of road casualties (over 50%) occurring within 100m of a watercourse (Highways Agency et al., 2001) and frequently occurring during high water levels.

2.2.10 Mortality levels may also be greater at certain times of year. For instance during peak dispersal of young pine martens (*Martes martes*) which occurs around August; mortalities during this period may result in reduced recruitment into the breeding population. Similarly in early spring mortalities of amphibians could affect breeding migrations.

2.2.11 In the event that contaminated sediment builds up within the watercourse, chronic effects may develop overtime as a result of leaching of toxins from sediments. Species may be affected indirectly as a result of effects on prey species and/or bioaccumulation in predatory species.

Disturbance

Construction and Operation

2.2.12 Disturbance to species' activities and movements across the works corridor could occur as a result of noise and activity during construction. In addition, the operation of the proposed scheme can result in an increase in disturbance to species and can change the availability of usable habitat.

Habitat Fragmentation and Isolation

Construction and Operation

2.2.13 Temporary fragmentation of habitats could occur as a result of the presence of site compounds and associated infrastructure, such as haul roads. Noise from construction activities has the potential to act as a deterrent to fish species, preventing or delaying migrating species travelling through the watercourses of the proposed scheme. Permanent fragmentation could also occur where new infrastructure severs existing habitat resulting in physical obstructions to the natural movement of animal populations.

Hydrological Disruption

Construction and Operation

2.2.14 Wetland habitats including mires, fens and marshy grasslands are susceptible, in the short-term, to impacts from developments that affect the hydrological regimes of those habitats. Any change in hydrological regime caused by modification to the existing land drainage may lead to the successional drying out of such sites.

2.2.15 Wetland habitats close to infrastructure can be susceptible to hydrological changes during construction that subsist into operation of the proposed scheme. Earthworks can lead to the realignment of watercourses and changes in overland flow altering the amount of water reaching

wetlands. Cuttings can lead to the drawdown of groundwater levels in adjacent habitats resulting in dewatering of sites, whilst embankments may increase upwelling. These resulting hydrological changes could lead to the degradation or loss of wetland habitat types.

Invasive Non-native Species Transfer

2.2.16 In the absence of mitigation, it is possible that the transfer of Invasive Non-native Species (INNS) will occur during earthmoving, the creation and use of proposed temporary access roads and site compounds, and during works close to waterbodies. In addition, the transfer of INNS could result in a direct negative impact on native flora with an indirect impact on native fauna through a reduction of biodiversity.

3 Mitigation

3.1.1 The development of mitigation measures to address the potential impacts associated with the construction and operation of the proposed scheme were developed through discussions with Transport Scotland (TS) and consultation with SNH and SEPA. The mitigation presented follows Ecological Impact Assessment (IEEM, 2006) and Design Manual for Roads and Bridges (DMRB) (Highways Agency et al., 1993) guidance. A hierarchical approach to mitigation design has been adopted with the aim to avoid impacts in the first instance in line with the guidance in Planning Advice Note 1/2013: Environmental Impact Assessment (Scottish Government, 2013).

3.1.2 Mitigation measures listed in this ES will be specified as environmental commitments in the contract documents to ensure implementation by the appointed Contractor.

3.1.3 Table 1 describes the proposed mitigation measures.

3.1.4 Table 2 presents a summary of potential impacts considered by the ecological impact assessment which are expressed as significant, not significant or not applicable. Only those impacts assessed to be significant are considered in the subsequent specific impact assessment.

3.1.5 Where the significance of an effect is assessed as negligible, generic mitigation measures which are based on the application of best practice guidelines will ameliorate these potential effects and as such will not be discussed further. Where significance of effect has been identified as minor or above, specific mitigation measures such as habitat creation (planting, pond construction, provision of bat boxes etc.) will be implemented to reduce these impacts.

3.1.6 It should be noted that elements of the mitigation strategy such as habitat creation, fencing and underpasses have been strategically designed, where practicable, to provide mitigation for numerous receptors simultaneously. For example, bats will utilise underpasses, culverts and overbridges if designed and managed through careful control of lighting and planting, even though their principal purpose may be to mitigate impacts to other species such as otter.

3.1.7 The level of residual impact is then identified where a significant impact remains after the implementation of mitigation measures.

3.1.8 Tables 3–29 describe the specific impacts, proposed mitigation and residual impacts pertinent to each ecological receptor.

Table 1: Mitigation Measures

Mitigation Item	Approximate chainage/location	Timing of Measure	Description	Receptor
Generic Mitigation Measures				
E1	Throughout scheme	Pre-construction	Prior to construction, a Species Protection Plan will be drawn up for European Protected Species (including otter) and will be provided by the Contractor and agreed by SNH in advance of works commencing.	Bats Pine marten Red squirrel Wildcat Otter Freshwater fish (Atlantic salmon & lamprey sp.)
E2	Throughout scheme	Pre-construction/ Construction	A suitably qualified (or team of suitably qualified) Ecological Clerk of Works (ECoW) will be appointed to supervise the construction works, undertake pre-construction surveys for protected species of the areas affected by the proposed scheme plus a 250m buffer and ensure mitigation measures are implemented to avoid and reduce impacts on ecological receptors.	All receptors
E3	Throughout scheme	Pre-construction/ Construction	Pre-construction surveys will inform the need for any European Protected Species (EPS) licences required any additional measures to be undertaken by the contractor to obtain the necessary licences. During construction, destructive searches of terrestrial habitats will be undertaken by an ECoW prior to site clearance making the habitat unsuitable for amphibians. Searches will be carried out between March – October when amphibians are active and out of hibernation. Amphibians captured during this procedure should be relocated under the supervision of an ECoW to pre-identified areas that are sheltered and close to a suitable refuge or pond, in weather conditions conducive to activity. The location of pre-identified areas will be established through consultation with SNH.	All receptors
E4	Throughout scheme	Pre-construction/ Construction	An Environmental Management Plan including control of airborne pollution, surface water and sediment will be provided by the Contractor and agreed by SNH, SEPA and any other appropriate body in advance of works commencing. During construction, site management practices to avoid or reduce the risks of secondary impacts on habitat adjacent to the proposed scheme will be adopted.	All receptors
E5	Throughout scheme	Pre-construction/ Construction	During pre-construction and construction, site clearance of vegetation will be undertaken in woodland with red squirrel outside the red squirrel breeding season (February to September) where practicable. Where clearance must be undertaken during the red squirrel breeding season pre-works checks will be undertaken to identify active dreys no more than two days prior to tree felling works. If found, clearance must wait until kittens have left the drey Any clearance works undertaken during February or August will be supervised by an ECoW who will also undertake the pre-works check. Removal of active or inactive dreys will be carried out under a derogation licence from SNH.	Red squirrel

Mitigation Item	Approximate chainage/location	Timing of Measure	Description	Receptor
E6	Throughout scheme	Pre-construction/ Construction	During pre-construction and construction, site clearance of vegetation will be undertaken outside of the main bird breeding season (typically March - July inclusive) where practicable. Where site clearance works must be undertaken during the main bird breeding season pre-works checks by the ECoW will be undertaken no more than two days in advance and if no bird nests are found then the vegetation will be cleared. If found then clearance will wait until chicks have fledged. If necessary methods of exclusion and deterrent will be developed in consultation with SNH to prevent birds beginning to nest in suitable areas following clearance or ahead of the breeding bird season. All cleared material is to be rendered unsuitable for nesting birds or taken away from the works area.	Breeding birds
E7	Throughout scheme	Pre-construction/ Construction	During pre-construction and construction, as far as practicable, habitats will be removed when they have reduced value for species i.e. outside of the fruiting/seeding period; at a time when ponds are not used by amphibians. Minimise areas of vegetation clearance and demarcate clearly with fencing and signs areas of retained vegetation and retained dead wood habitat. During pre-construction and construction, where the removal of dead standing, fallen and felled timber is necessary, the material will be relocated into areas of existing and newly created woodland habitat, or adjacent habitats. Relocated deadwood will be placed in areas of partial shade. Where loss or degradation of valuable habitat is unavoidable and where watercourses are realigned, they will be returned, where practicable, to their former quality or improved once construction is complete. All areas of habitat and field boundary loss (including deer fence) due to temporary works, site compounds, easements, working areas or access roads will be reinstated following construction on a like-for-like basis.	All receptors
E8	Throughout scheme	Pre-construction/ Construction	During pre-construction and construction, any tree felling will be carried out by experienced contractors according to agreed felling methods and any licensing conditions to reduce direct mortality of protected species including bats through loss of resting places, roosts, etc.	Bats Red Squirrel
E9	Throughout scheme	Construction	All pits will be kept covered at night or provide a means of escape for mammals that may become entrapped.	Otter
E10	Throughout scheme	Pre-construction/ Construction	Temporary otter resistant fencing is to be provided around construction compounds following a specification agreed through consultation with SNH. Compound gates will be sensitively designed to prevent otter from gaining access to compounds and will be closed at night.	Otter
E11	Watercourses	Pre-construction/ Construction/ Operation	During pre-construction, construction and operation, drainage systems are to be designed so as to prevent otter entering and becoming trapped. During construction, the extent of areas affected by culverts, watercourse realignment and dewatering will be minimised as far as practical. During construction, best practice guidance to be adhered to when working within salmonid watercourses ((SEPA, 2010; Scottish Government, 2012). In-channel works and piling will avoid the salmonid and lamprey spawning and salmonid egg incubation periods and as such will be undertaken during months of least sensitivity (mid-October - June inclusive). Should works be required to be undertaken in June consultation will be undertaken with the Tay District	Otter River habitat Aquatic invertebrates Aquatic macrophytes Freshwater fish

Mitigation Item	Approximate chainage/location	Timing of Measure	Description	Receptor
			Salmon Fisheries Board (TDSFB) and SNH. Soft-start techniques are to be applied to piling work procedures to encourage sensitive species to evacuate the area. During construction, reasonable precautions are to be undertaken to avoid/reduce in-channel works and translocation of channel substrate. During construction, remove and relocate fish from channels to be dewatered for construction of culverts, realignments or bridges using methodology in line with established guidance or in consultation with SNH and SEPA.. During construction culverts on Ordie and Shochie burns will not be blocked and one side will be left open during extension works to allow otter to travel through. Dewatering during culvert extensions will be required and will be undertaken out with sensitive periods for fish as identified above. During operation blocked or poorly screened culverts may impede the natural migration of individuals or lead to greater fragmentation of habitats. Construction works to create new culverts, or to extend or upgrade culverts will abide by the relevant guidelines and will take into consideration the SAC's designation for Atlantic salmon (*Salmo salar*) and other migratory fish species: SEPA Good Practice Guidelines for Temporary Construction Methods (SEPA, 2009); SEPA Good Practice Guide for River Crossings (SEPA, 2010); SEPA Position Statement (SEPA, 2006); DMRB (Highways Agency, 2004), CIRIA Culvert Design and Operation Guide (C689) 2010 and The River Restoration Centre Manual of Techniques (River Restoration centre, 2002). During construction, where practicable, temporary diversion channels will be used instead of over pumping/siphons and gravity/flume pipes to maintain habitat connectivity during construction works in water features which require dewatering and to prevent death or injury to fauna. However, where over pumping is required, pumps will be screened to reduce this effect. During construction, temporary diversion channels will be created with suitable sized replacement substrate or transplanted substrate from the section being dewatered, making sure that the size and flow in the diversion channel is as near to the existing channel as possible. The temporary channel will be designed by a competent person with appropriate experience to ensure it functions fully. Watercourses will not be dammed during construction works. The watercourse substrate in the working area will be removed and stored for reuse. Where this is not possible imported materials for use as rip rap or stream bed will be appropriate for the location e.g. correct pH. The material will be free from invasive plants or animals.	
E12	Throughout scheme	Pre-construction/ Construction	Plant and personnel will be constrained to a prescribed working corridor through the use of temporary barriers, thereby minimising damage to habitats and potential direct mortality and disturbance to animals located within and adjacent to the proposed scheme working corridor.	All receptors
E13	Watercourses	Construction	Works compounds, storage sites, access roads and construction work will be located/carried out at least 10 m from water features as advised by SNH. The exception being where works are being carried out at watercourse crossings. Temporary fencing and signage will be installed to prevent encroachment by vehicles, machinery and personnel into sensitive areas such as banks of rivers and ponds. The boundary will be clearly marked and maintained at all times. The contractor will abide by SEPA PPGs for working near water (SEPA, 2003).	Otters All aquatic receptors
E14	Throughout scheme	Construction	During construction, habitat to be lost in areas where reptiles have been found to be present will be stripped of vegetation in stages under the direction and supervised of an ECoW.	Reptiles

Mitigation Item	Approximate chainage/location	Timing of Measure	Description	Receptor
E15	Throughout scheme	Operation	Habitat management of areas of woodland, scrub and/or grassland should be undertaken outside the main bird breeding season (March - July inclusive) to ensure that breeding birds, their eggs and/or nestlings are not subject to direct mortality. Vegetation management will be undertaken to avoid sensitive times of the year for species such as breeding birds. Any maintenance works required during the breeding bird season would be subject to the same restrictions outlined in measure E6.	Breeding birds
E16	Throughout scheme	Operation	Undertake maintenance works in and/or close to key habitats outside of sensitive periods for birds.	Breeding birds
E17	Throughout scheme	Operation	Crossing points for bats and otters will be monitored as part of the operational aftercare management contract.	Bats Otter
E18	Throughout scheme	Construction	Landscape planting and newly created habitat will be comprised of locally obtained native species of local provenance, and will comprise a mixture of species. Sowing/planting should be undertaken in the appropriate planting season but as soon as possible following completion of the works to reduce the likelihood of the areas being colonised by invasive, non-native species which are of lower value to wildlife.	Terrestrial habitats Invasive non-native species
E19	Throughout scheme	Construction	The loss of any bat roosts and roosting opportunities and habitat fragmentation will be offset by the provision of replacement roost habitat e. g. bat boxes, erected during construction. Bat surveys will determine the species, seasonal and dimensional requirements of replacement roost habitat.	Bats
E20	Throughout scheme	Pre-construction/ Construction	Earth movements from one site to another should minimised to avoid cross-contamination.	Invasive non-native species
E21	Throughout scheme	Construction	Offsetting the loss of ecologically important habitats will occur through habitat creation including roadside planting, where appropriate, and has been integrated with landscape planting as shown on Figure 11.2.	All receptors
E22	Watercourses	Operation	The design of new culverts, extended or upgraded culverts have taken into account the relevant guidelines in relation to otter, Atlantic salmon and other migratory fish species: SEPA Good Practice Guide for River Crossings (SEPA, 2010); SEPA Position Statement (SEPA, 2006); DMRB (Highways Agency, 2004), CIRIA Culvert Design and Operation Guide (C689) 2010 and The River Restoration Centre Manual of Techniques (River Restoration centre, 2002).	Otter Freshwater fish
E23	Throughout scheme	Operation	During the operation of the proposed scheme, management and maintenance of roadside verges will be undertaken to maintain and enhance floral diversity and to improve the linkages between similar habitats along the route corridor.	All terrestrial receptors
E24	Throughout scheme	Operation	Appropriate management of existing boundary habitats such as hedgerows or rough edges will be undertaken for the benefit of key farmland species of conservation concern such as yellowhammer (*Emberiza citronella*), skylark (*Alauda arvensis*), linnet (*Carduelis cannabina*) and meadow pipit (*Anthus pratensis*).	Breeding birds
E25	Throughout scheme	Operation	Replacement habitats will be monitored and managed during the aftercare and operation phase of the proposed scheme.	Terrestrial habitats

Mitigation Item	Approximate chainage/location	Timing of Measure	Description	Receptor
			Where practicable habitat creation should aim to fill in existing gaps in linear vegetation features, adjoin or connect existing blocks of woodland or act as stepping stones between habitat areas (Entwistle et al., 2001).	
E26	Throughout scheme	Operation	Habitat connectivity will be enhanced through the reinstatement of appropriate linear features such as drystone walls and hedgerows along the boundary of the proposed scheme.	All terrestrial receptors
E27	Throughout scheme	Operation	Severance and fragmentation of otter habitat will be prevented during operation by retention of commuting routes so movement between areas of habitat can be maintained.	Otter
E28	Throughout scheme	Construction	Works compounds, storage sites, access roads and construction work will be located/carried out at least 30m away from known and potential bat roosts and sensitive habitats for birds, and at agreed minimum distances from sensitive habitats for otter as advised by the ECoW. Any works to be undertaken within this distance must be subject to consultation with SNH, and undertaken under licence where applicable.	Bats Breeding birds Otter
E29	Shochie Burn culvert Ordie Burn culvert, Ardonachie Burn culvert ch9120	Operation	Provision of Dry Mammal Underpass (DMU) to mitigate fragmentation of otter habitat and to increase permeability of the road.	Otter
E30	Throughout scheme	Construction	A lighting plan will be developed for low light conditions and night-time working (that undertaken between sunset and sunrise). The use of construction lighting will be according to BS 5489 requirements and following guidance on lighting (e.g. Bat Conservation Trust and Institute of Lighting Engineers, 2007) including the use of directional lighting or preventative measures (e.g. installation of shields, hoods or limiting the height of lighting columns). Directional lighting is to be used to ensure that bat roosts, woodland edges, foraging areas and waterbodies (also to reduce disturbance to migratory fish and otters) are not disturbed, with any exceptions to be agreed with the ECoW. Sympathetic lighting will also mitigate for potential fragmentation of bat habitat. Night-time working to be avoided at the following sensitive locations: Shochie Burn culvert, Ordie Burn culvert, access road to Ordie Burn, Ordie Burn overbridge unless otherwise agreed with SNH.	All animal species
E31	Watercourses	Pre-construction/ Construction	During pre-construction and construction, surface and foul water will be appropriately drained and stored. These control measures must be in place before earthworks commence. During construction, chemicals, oils and fuels will be kept safely stored and away from water features and waste will be appropriately managed. During construction, plant and machinery must not be fuelled in the vicinity of watercourses and must observe SEPA guidelines (SEPA, 2003). Sites will be restored fully on completion of works and contractors will adhere to below, with respect to preventing pollution incidents near watercourses and water features. During construction, the contractor will abide by SEPA PPG 1, 3, 5, 6, 21 and 22 (SEPA, 2003). During construction, emergency procedures and spillage kits must be available and construction staff must be familiar with emergency procedures.	Terrestrial habitats (near water) Otter Aquatic receptors

Mitigation Item	Approximate chainage/location	Timing of Measure	Description	Receptor
			During construction, road run-off will be treated using Sustainable Urban Drainage Systems (SUDS) techniques including collection in treatment facilities including petrol interceptors and silt traps according to SEPA PPG guidelines as detailed above (SEPA, February 2003). During construction, vehicles must be prevented from fording watercourses by the provision of temporary culverts/bridges. During construction, silt traps must be placed beside all temporary watercourse crossings and maintained and cleaned regularly. During construction, silt fences will be used at the toe of slopes, made from geotextiles, to reduce silt transport. During construction, install cut off ditches to divert contaminated run-off and discharge away from water features. Also install cut off ditches to minimise the amount of water coming onto site to minimise the potential for silt and other pollutants. During construction, use cut-off trenches to prevent surface water run-off from entering excavations to reduce the quantity of silty water requiring treatment. Pump out and treat or take offsite any contaminated or silty water present in excavations (PPG 6). Suspended solids in silty water must be allowed to settle out before disposal. During construction, temporary SUDS will be used during construction to reduce and control velocities and volume for runoff to resemble pre-existing flow conditions within the water courses. During construction, works to drainage or watercourses will be undertaken so that upstream or downstream functioning of the water feature will be disturbed as little as possible. This may include maintaining downstream flow in dewatered sections and any use of pumps will reflect existing flow conditions.	
E32	Throughout scheme	Pre-construction/ Construction	During construction, vegetation buffer strips are to be maintained. During construction, levels of dust will be managed so that this does not build up significantly on trees and scrub vegetation. Measures to avoid or reduce air pollution impacts will be implemented and will include measures such as: dampening down construction areas and material stockpiles, especially when weather conditions are dry and windy; use of cutting equipment, e.g. abrasive disc cutters, that utilise water dust suppression; significant material stockpiles to be enclosed as far as practicable; concrete batching to be carried out only in enclosed or shielded areas; setting and enforcing appropriate speed limits on haul roads; implementing regular dampening down of unsurfaced site and access roads using water bowsers, particularly during dry, windy conditions; and provision of wheel washing facilities at site exits. During pre-construction and construction, the amount of exposed ground and soil stockpiles from which the water drains and the period of time such water drains will be minimised. Stockpiles will be covered or seeded.	Cairnleith Moss SSSI Aquatic receptors
E33	Watercourses and locations adjacent to the mainline	Operation	Road run-off will be treated using SUDS techniques including collection in treatment facilities including petrol interceptors and silt traps according to SEPA PPG guidelines as detailed above under Construction (SEPA, February 2003). To prevent pollution of water features during operation, SEPA PPG 1, 5, 21, and 22 (SEPA, 2003) will be abided by. Drainage systems must be suitably fenced to prevent otter entering and becoming trapped.	Aquatic receptors Terrestrial invertebrates Breeding birds

Mitigation Item	Approximate chainage/location	Timing of Measure	Description	Receptor
			Vegetation buffer strips are to be maintained. Maintenance works to drainage systems, culverts, bridges and channels will use a containment system as detailed in PPG5 (SEPA, 2003) where practical to prevent dust, debris and wastewater entering the water feature. SEPA PPG 5 (SEPA, 2003) will be abided by. Where there is a potential for oil leakage or spillage, SEPA PPG 3 (SEPA, 2003) will be abided by. New outfalls will be designed according to the SEPA Good Practice Guide for Intakes and Outfalls (SEPA, 2008).	Otter Pine marten Amphibians
E34	Throughout scheme	Pre-construction/ Construction/ Operation	Surveys will be undertaken pre- and post-construction to confirm the detailed location of any alien species. An invasive weed management strategy is to be developed prior to the start of construction. During construction and operation, an invasive none native species (INNS) management plan will be instigated which will include measures to prevent the spread of invasive species. During construction, an ECoW will be on site during the treatment and/or removal of any INNS.	Invasive non-native species
Specific Mitigation Measures (refer to Figure 11.2 for habitat mitigation and fencing, refer to relevant receptor figures for receptor locations)				
E35	Ordie Burn (ID -3)	Construction	To mitigate disturbance works will be undertaken under licence from SNH, consultation will first be undertaken to determine the requirement for a licence, which will detail a method statement to which work will comply.	Bats
E36	Shochie Burn (ID -2) Ordie Burn (ID – 3)	Construction/ Operation	To mitigate habitat fragmentation linear planting of hedgerows and standard trees to replace lost commuting habitat. Current permeability of the road to be maintained by retaining existing height of culverts.	Bats
E37	Newmill (ID – 4)	Construction/ Operation	Linear planting of hedgerows and standard trees to replace lost commuting habitat.	Bats
E38	Coltrannie/ Cairnleith overbridge (ID – 8),	Construction	Linear planting of hedgerows and standard trees to replace lost commuting habitat. Vegetation planted during construction to mitigate for operational impact.	Bats
E39	Quadrat 3 (ch7500 to ch8600)	Construction	Should works be required within an appropriate buffer zone as determined by consultation with SNH, they will not be allowed to take place during the osprey breeding season (March to July inclusive).	Breeding birds (Osprey)
E40	Muir of Thorn, Gelly Wood	Construction	Preconstruction surveys for dreys in trees to be felled. Any drey identified will need to be destroyed under SNH licence and replacement artificial dreys provided.	Red squirrel
E41	Muir of Thorn, Gelly Wood	Construction	A licence from SNH to legally allow disturbance to dreys to take place (within 50m during breeding season /zone of influence outside breeding season) will be required.	Red squirrel
E42	Along the route of the old A9 between ch3500 and ch5000 Between ch7800 and ch9200	Operation	Planting of new trees will be undertaken at a variety of locations (see landscape mitigation plans).	Red squirrel

Mitigation Item	Approximate chainage/location	Timing of Measure	Description	Receptor
E43	Land Parcel 1, Shochie Burn, Land Parcels 2 and 3, Lower Ordie Burn and Upper Ordie Burn, Land Parcel 5 Garry Burn, Land Parcels 7 and 10, Semi-natural broadleaved woodland by the A9 and Muir of Thorn (north), Land Parcels 6 and 9, Cairnleith Moss SSSI and Gelly Woods.	Operation	Planting of new woodland will be undertaken at a variety of locations (see landscape mitigation plans). Creation of a new pond will create new habitat. Planting of species-rich grassland and mixed woodland will be undertaken at a variety of locations across the scheme, including around a SUDS pond at ch8300 to ch8400 (see landscape mitigation plans).	Terrestrial invertebrates
E44	Shochie Burn (ID – 2) Newmill (ID – 4), Westwood (ID – 5), Coltrannie/ Cairnleith overbridge (ID – 8),	Operation	Provision of bat boxes as replacement roosting habitat for every tree with potential lost. Bat boxes to be monitored.	Bats
E45	Newmill (ID – 4).	Operation	Provision of a structure which will maintain commuting routes.	Bats
E46	Quadrat 1 (ch3000 to 3500), Quadrat 2 (ch6000 to ch7500), Quadrat 3 (ch7500 to 8600), Quadrat 4 (ch7500 to ch8600), Quadrat 5 (ch8600 to ch9400), Quadrat 6 (ch8600 to 9400).	Operation	Habitat creation (terrestrial habitats).	Terrestrial habitats (Breeding birds)
E47	Quadrat 2 (ch6000 to ch7500).	Operation	Provision of landscape planting to encourage barn owl to fly over road at greater height.	Breeding birds (Barn owl)
E48	Gelly Muir, Murthly Muir, Clearfell and Cairnleith Moss SSSI.	Operation	The proposed scheme design mainline design does not have roadside kerbs on the majority of the route (exceptions being locations such as laybys). This aspect of the design will facilitate exit of any reptiles (and amphibians also) from the carriageway.	Reptiles
E49	Gelly Muir, Murthly Muir, Clearfell and Cairnleith Moss SSSI.	Operation	Provision of habitat for reptiles reflecting that lost. Including, drystone walls as boundary features, situated in open, sunny, south facing positions.	Reptiles

Mitigation Item	Approximate chainage/location	Timing of Measure	Description	Receptor
E50	Gelly Wood	Operation	New overbridge with enhanced design crossing existing carriageway.	Pine marten Red Squirrel Otter
E51	Muir of Thorn, Gelly Wood	Operation	Compensatory habitat planting of mixed native woodland, use of more mature species would accelerate replacement of habitat lost.	Pine marten
E52	Shochie Burn, Ordie Burn, Coral Burn (un-named tributary) ch7020 to ch7320, Gelly Burn (north) un-named tributary ch7450 to ch7750, Tullybelton/Stanley Junction, Ardonachie Burn, Gelly Burn (north), Broomhill Burn and Gelly Burn (north) un-named watercourse at ch9120.	Operation	Otter proof fencing will be provided along the proposed scheme where the burns cross the road. Fencing will be positioned in such a way that otter will be directed to safe crossing points. Asymmetrical fencing will be used where there is no permeability of the road.	Otter
E53	Bankfoot SUDS pond (south), Bankfoot SUDS pond (east)	Construction/ Operation	Construction of a new pond at Bankfoot (east) with sensitive landscape and riparian planting will mitigate for the loss of ponds 8 and 9.	Amphibians Ponds
E54	Bankfoot SUDS pond (south), Bankfoot SUDS pond (east)	Construction	Drainage of ponds at appropriate time of year to minimise impacts to breeding animals and under supervision of ECoW. Amphibians to be captured and translocated to adjacent habitats to be retained.	Amphibians
E55	Gelly Wood	Construction	Planting of mixed woodland to compensate for habitat loss.	Bats

4 Specific Impacts, Mitigation and Residual Impacts

4.1.1 Potential impacts are not shown for receptors/locations, including the Mill Dam SSSI, where no impacts have been anticipated. ● = potential impact predicted, ○ = no impact predicted, ϴ = negligible impact predicted, n/a = potential impact not applicable for that receptor/location

Table 2: Impact Summary for Potential Impacts/Activities for all Receptors during Construction and Operation

Receptor	Feature	Impact/Activity								
		Direct Mortality	Habitat Loss	Habitat Fragmentation	Disturbance	Pollution/ sedimentation	Alien Species Transfer	Changes in Hydrology	Disease Transfer	Noise/ Vibration
Terrestrial habitats - construction	Cairnleith Moss SSSI	n/a	○	○	○	●	○	○	n/a	n/a
	Watercourses (riparian habitat)	n/a	○	○	●	○	○	○	n/a	n/a
	Throughout the proposed scheme	n/a	○	○	○	○	●	○	n/a	n/a
Terrestrial habitats - operation	Cairnleith Moss SSSI	n/a	○	○	○	○	○	○	n/a	n/a
	Agricultural land	n/a	ϴ	○	○	○	○	○	n/a	n/a
	Mature trees, broad-leaved semi-natural and coniferous plantation woodland	n/a	●	○	○	○	○	○	n/a	n/a
Terrestrial invertebrates - construction	Land parcels 1-3, 6 and 9	●	●	○	○	●	○	○	n/a	n/a
	Land Parcels 5, 7, 8 and 10.	●	●	○	○	○	○	○	n/a	n/a
	Cultivated land	●	●	○	○	●	○	○	n/a	n/a
	Land Parcel 4	○	○	○	○	○	○	○	n/a	n/a
Terrestrial invertebrates – operation	Land Parcels 1-3, 5-10	○	●	○	○	●	○	○	n/a	n/a
	Land Parcels 4, 11, 12	○	○	○	○	○	○	○	n/a	n/a
Bats – construction	1. Luncarty and 7. Bankfoot	○	○	○	●	○	n/a	n/a	n/a	n/a
	2. Shochie Burn and 3. Ordie Burn	○	○	●	●	●	n/a	n/a	n/a	n/a
	4. Newmill, 6. Garry Burn	●	○	●	●	●	n/a	n/a	n/a	n/a
	5. Westwood	●	○	●	○	○	n/a	n/a	n/a	n/a

Receptor	Feature	Impact/Activity								
		Direct Mortality	Habitat Loss	Habitat Fragmentation	Disturbance	Pollution/ sedimentation	Alien Species Transfer	Changes in Hydrology	Disease Transfer	Noise/ Vibration
	8. Coltrannie/ Cairnleith overbridge, 10. Gelly Wood, and 12. Byres of Murthly/Mill Dam SSSI	●	○	●	●	○	n/a	n/a	n/a	n/a
	9. Muir of Thorn woodland	○	○	●	●	○	n/a	n/a	n/a	n/a
	11. Murthly Estate (north)	○	○	○	○	○	n/a	n/a	n/a	n/a
Bats – operation	1. Luncarty and 7. Bankfoot	○	○	○	⊖	○	n/a	n/a	n/a	n/a
	2. Shochie and 3. Ordie	○	○	●	⊖	●	n/a	n/a	n/a	n/a
	9. Muir of Thorn woodland and 10. Gelly Wood	○	●	○	○	○	n/a	n/a	n/a	n/a
	6. Garry Burn	○	⊖	○	○	●	n/a	n/a	n/a	n/a
	8. Coltrannie/ Cairnleith overbridge	○	●	○	○	○	n/a	n/a	n/a	n/a
	4. Newmill 5. Westwood	○	●	●	○	○	n/a	n/a	n/a	n/a
	11. Murthly Estate (north)	○	○	○	○	○	n/a	n/a	n/a	n/a
	12. Byres of Murthly/Mill Dam SSSI	○	●	⊖	○	○	n/a	n/a	n/a	n/a
Breeding birds – construction	Quadrats 1-6	●	●	○	●	●	n/a	n/a	n/a	n/a
Breeding birds – operation	Quadrats 1-6	●	●	○	●	●	n/a	n/a	n/a	n/a
Reptiles – construction	Cairnleith Moss SSSI, Clearfell, Murthly Muir and Gelly Muir	●	○	○	●	⊖	n/a	n/a	n/a	n/a
	Woodland East, Woodland West	○	○	○	○	○	n/a	n/a	n/a	n/a
Reptiles – operation	Gelly Muir	●	●	○	○	⊖	n/a	n/a	n/a	n/a
	Cairnleith Moss SSSI, Clearfell and Murthly Muir	⊖	⊖	○	⊖	⊖	n/a	n/a	n/a	n/a
	Woodland East, Woodland West	○	○	○	○	○	n/a	n/a	n/a	n/a

Receptor	Feature	Impact/Activity								
		Direct Mortality	Habitat Loss	Habitat Fragmentation	Disturbance	Pollution/ sedimentation	Alien Species Transfer	Changes in Hydrology	Disease Transfer	Noise/ Vibration
Pine Marten – construction	Muir of Thorn and Gelly Wood	●	○	○	●	ϴ	n/a	n/a	n/a	n/a
Pine Marten – operation	Muir of Thorn and Gelly Wood	●	●	○	○	●	n/a	n/a	n/a	n/a
Red squirrel – construction	Muir of Thorn, Gelly Wood	●	○	○	●	○	n/a	n/a	n/a	n/a
	Five Mile Wood	ϴ	○	○	ϴ	○	n/a	n/a	n/a	n/a
Red squirrel – operation	Muir of Thorn, Gelly Wood	●	●	○	○	○	n/a	n/a	n/a	n/a
	Five Mile Wood	○	○	○	○	○	n/a	n/a	n/a	n/a
Otter – construction	Shochie Burn, Ordie Burn, Garry Burn, Ardonachie Burn, Gelly Burn (north), Broomhill Burn	●	○	●	●	●	n/a	n/a	n/a	n/a
	Shochie Burn Loch, Benchill Burn, Gelly Burn (south), Corral Burn, Birnam Burn	○	○	○	○	○	n/a	n/a	n/a	n/a
Otter – operation	Shochie Burn, Ordie Burn, Garry Burn	●	●	●	○	●	n/a	n/a	n/a	n/a
	Benchil Burn, Gelly Burn (south)	●	●	○	○	●	n/a	n/a	n/a	n/a
	Ardonachie Burn, Broomhill Burn, Gelly Burn (north), Corral Burn (unnamed tributary)	●	●	●	○	●	n/a	n/a	n/a	n/a
Amphibians – construction	P2 Shochie Burn	●	●	○	●	●	n/a	n/a	○	n/a
	P4 Waterfowling Pond, Marlehall	○	○	○	○	●	n/a	n/a	○	n/a
	P8 Bankfoot SUDS pond (south), P9 Bankfoot SUDS pond (east)	●	●	○	●	○	n/a	n/a	○	n/a
	P10, P13, P15-P18	○	○	○	○	○	n/a	n/a	○	n/a

Receptor	Feature	Impact/Activity								
		Direct Mortality	Habitat Loss	Habitat Fragmentation	Disturbance	Pollution/ sedimentation	Alien Species Transfer	Changes in Hydrology	Disease Transfer	Noise/ Vibration
Amphibians – operation	P2 Shochie Burn	○	○	○	○	●	n/a	n/a	○	n/a
	P4, P10, P13, P15-P18	○	○	○	○	○	n/a	n/a	○	n/a
	P8 Bankfoot SUDS pond (south)	○	●	○	○	○	n/a	n/a	○	n/a
	P9 Bankfoot SUDS pond (east)	○	●	○	○	○	n/a	n/a	○	n/a
River habitat – construction	Shochie Burn, Ordie Burn (lower), Ordie Burn (upper), Garry Burn, Named burns (non-designated)	n/a	●	n/a	n/a	⊖	n/a	⊖	n/a	n/a
	Unnamed watercourses (non-designated).	n/a	⊖	n/a	n/a	⊖	n/a	⊖	n/a	n/a
River habitat – operation	Shochie Burn, Ordie Burn (lower), Ordie Burn (upper). Named burns (non-designated), Unnamed watercourses (non-designated)	n/a	⊖	n/a	n/a	n/a	n/a	⊖	n/a	n/a
Freshwater invertebrates – construction	Shochie Burn, Ordie Burn, Garry Burn, Ardonachie Burn.	●	●	●	n/a	●	n/a	●	n/a	n/a
	Gelly Burn	⊖	⊖	○	n/a	⊖	n/a	⊖	n/a	n/a
Freshwater invertebrates – operation	Shochie Burn, Ordie Burn, Ardonachie Burn, Gelly Burn	n/a	n/a	●	n/a	●	n/a	●	n/a	n/a
	Garry Burn	n/a	n/a	n/a	n/a	●	n/a	n/a	n/a	n/a
Freshwater macrophytes – construction	Shochie Burn, Ordie Burn (lower), Ordie Burn (upper)	●	●	n/a	n/a	●	●	●	n/a	n/a
	Garry Burn	⊖	⊖	n/a	n/a	⊖	⊖	⊖	n/a	n/a
Freshwater macrophytes – operation	Shochie Burn, Ordie Burn (lower), Ordie Burn (upper)	○	●	n/a	n/a	●	○	●	n/a	n/a
	Garry Burn	○	⊖	n/a	n/a	⊖	○	⊖	n/a	n/a

Receptor	Feature	Impact/Activity								
		Direct Mortality	Habitat Loss	Habitat Fragmentation	Disturbance	Pollution/ sedimentation	Alien Species Transfer	Changes in Hydrology	Disease Transfer	Noise/ Vibration
Ponds – construction	Pond 4	○	○	n/a	n/a	●	n/a	⊖	n/a	n/a
	Pond 8	●	○	n/a	n/a	○	n/a	n/a	n/a	n/a
	Pond 9	●	○	n/a	n/a	○	n/a	n/a	n/a	n/a
	Pond 15	○	○	n/a	n/a	○	n/a	○	n/a	n/a
Ponds – operation	Pond 4	○	○	n/a	n/a	⊖	n/a	○	n/a	n/a
	Pond 8	n/a	●	n/a	n/a	○	n/a	n/a	n/a	n/a
	Pond 9	n/a	●	n/a	n/a	○	n/a	n/a	n/a	n/a
	Pond 15	○	○	n/a	n/a	○	n/a	○	n/a	n/a
Freshwater fish - construction	Shochie Burn and Ordie Burn (lower)	●	●	●	⊖	●	n/a	●	n/a	●
	Ordie Burn (upper), Garry Burn	●	●	○	⊖	●	n/a	○	n/a	●
Freshwater fish - operation	Shochie Burn and Ordie Burn (lower)	n/a	●	●	n/a	●	n/a	●	n/a	n/a
	Ordie Burn (upper), Garry Burn	n/a	○	n/a	n/a	●	n/a	○	n/a	n/a

Table 3: Terrestrial Habitats: Specific Impacts, Mitigation and Residual Impacts – Construction

Location and Key Attribute	Potential Impact	Characterisation of Impact (pre-mitigation)	Magnitude ad Significance	Proposed Mitigation	Significance of Residual Impact
Background Information: n/a **Legal Framework: n/a**					
Location: Cairnleith Moss SSSI *Key Attribute:* wetland habitats *Level of Importance:* National	Airborne pollution from construction activities	• Extent: Across the whole area • Effect: Direct negative • Reversibility: Reversible • Frequency: Recurring • Duration: Medium-term • Likelihood: Possible	Magnitude: Medium negative Significance: Major	Construction Pollution Mitigation (Table 1) E2, E3, E4, E32	Not significant
Location: Watercourses including the Shochie Burn and Ordie Burn *Key Attribute:* Mosaic of habitats and connectivity *Level of Importance:* Local	Disturbance	• Extent: Disturbance to riparian habitats and waterbodies likely to occur during construction activities in close proximity. • Frequency: Reccurring • Effect: Direct & indirect negative • Reversibility: Reversible • Duration: Medium-term • Likelihood: Unlikely	Magnitude: Medium negative Significance: Minor	Construction Disturbance Mitigation (Table 1) E2, E3, E7, E13	Not significant
Location: various locations, but especially watercourse crossings (ch700 and ch1600) and in or by woodland (ch8600 and Gelly Access Track) *Key Attribute:* Himalayan balsam and Rhododendron *Level of Importance:* National	INNS transfer	• Extent: At locations across the proposed scheme. • Effect: Direct negative • Reversibility: Reversible • Frequency: Recurring • Duration: Medium-term • Likelihood: Probable	Magnitude: Medium negative Significance: Major	Construction Alien Species Transfer Mitigation (Table 1) E2, E3, E4, E18, E20, E34	Not significant

Table 4: Terrestrial Invertebrates: Specific Impacts, Mitigation and Residual Impacts – Construction

Location and Key Attribute	Potential Impact	Characterisation of Impact (pre-mitigation)	Magnitude and Significance	Proposed Mitigation	Significance of Residual Impact
Background Information: Conservation Status, Scottish Biodiversity List (1 species), LBAP (3 species) **Legal Framework: None**					
Location: Land Parcel 1, Shochie Burn Key Attribute: Watercourse with scattered trees and shrubs, small pockets of woodland, a loch and small wetland areas. Level of Importance: Authority area	Direct mortality	• Extent: Potential loss of riparian, woodland, wetland and scrub habitats from culvert extension and embankment works. • Effect: Direct negative • Reversibility: Irreversible • Frequency: Single event • Duration: Permanent • Likelihood: Probable	Magnitude: Medium negative Significance: Moderate	Construction Direct Mortality Mitigation (Table10.6.1) E2, E3, E4, E7, E12	Not significant
	Habitat loss	• Extent: Potential loss of riparian, woodland, wetland and scrub habitats from culvert extension • Reversibility: Reversible • Frequency: Single event • Duration: Short to medium term	Magnitude: Low negative Significance:	Construction Habitat Loss Mitigation (Table10.6.1) E2, E3, E7, E12, E18, E21	Not significant

Location and Key Attribute	Potential Impact	Characterisation of Impact (pre-mitigation)		Magnitude and Significance	Proposed Mitigation	Significance of Residual Impact
		and embankment works. • Effect: Direct negative	• Likelihood: Probable	Minor		
	Pollution	• Extent: Potential for pollution of wetland and riparian areas, and for losses downstream not just in the local area. • Effect: Direct negative	• Reversibility: Reversible • Frequency: Recurring • Duration: Short to medium term • Likelihood: Probable	Magnitude: Low negative Significance: Minor	Construction Pollution Mitigation (Table10.6.1) E2, E3, E4, E31	Not significant
Location: Land Parcels 2 and 3, Lower Ordie Burn and Upper Ordie Burn Key Attribute: Watercourses with scattered trees and shrubs and small pockets of woodland, grassland and a small pond. Level of Importance: Local	Direct mortality	• Extent: Potential loss of riparian, woodland and scrub habitats from culvert extension and embankment works. • Effect: Direct negative	• Reversibility: Irreversible • Frequency: Single event • Duration: Permanent • Likelihood: Probable	Magnitude: Medium negative Significance: Minor	Construction Mortality Mitigation (Table10.6.1) E2, E3, E4, E7, E12	Not significant
	Habitat loss	• Extent: Potential for pollution of riparian areas, and for losses downstream not just in the local area. • Effect: Direct negative	• Reversibility: Reversible • Frequency: Single event • Duration: Short to medium term • Likelihood: Probable	Magnitude: Low negative Significance: Minor	Construction Habitat Loss Mitigation (Table10.6.1) E2, E3, E7, E12, E18, E21	Not significant
	Pollution	• Extent: Potential for pollution of riparian areas, and for losses downstream not just in the local area. • Effect: Direct negative	• Reversibility: Reversible • Frequency: Recurring • Duration: Short to medium term • Likelihood: Probable	Magnitude: Low negative Significance: Minor	Construction Pollution Mitigation (Table10.6.1) E2, E3, E4, E31	Not significant
Location: Land Parcel 5 Garry Burn Key Attribute: Watercourses with scattered trees and shrubs and grassland Level of Importance: Local	Direct mortality	• Extent: Potential loss of grassland habitats from access and accommodation works. • Effect: Direct negative	• Reversibility: Irreversible • Frequency: Single event • Duration: Permanent • Likelihood: Probable	Magnitude: Low negative Significance: Minor	Construction Direct Mortality Mitigation (Table10.6.1) E2, E3, E4, E7, E12	Not significant
	Habitat loss	• Extent: Potential loss of grassland habitats from access and accommodation works. • Effect: Direct negative	• Reversibility: Reversible • Frequency: Single event Duration: Short to medium term • Likelihood: Probable	Magnitude: Low negative Significance: Minor	Construction Habitat Loss Mitigation (Table10.6.1) E2, E3, E7, E18, E21	Not significant
Location: Land Parcels 7 and 10, Semi-natural broadleaved woodland by the A9 and Muir of Thorn (north) Key Attribute: Woodland, broadleaved	Direct mortality	• Extent: Potential loss of woodland habitats from access and construction works. • Effect: Direct negative	• Reversibility: Irreversible • Frequency: Single event • Duration: Permanent • Likelihood: Probable	Significance: Minor Magnitude: Low negative	Construction Direct Mortality Mitigation (Table10.6.1) E2, E3, E4, E7, E12	Not significant

Location and Key Attribute	Potential Impact	Characterisation of Impact (pre-mitigation)		Magnitude and Significance	Proposed Mitigation	Significance of Residual Impact
semi-natural and coniferous plantation Level of Importance: Local	Habitat loss	• Extent: Potential loss of woodland habitats from access and construction works. • Effect: Direct negative	• Reversibility: Reversible • Frequency: Single event • Duration: Short to medium term • Likelihood: Probable	Magnitude: Low negative Significance: Minor	Construction Habitat Loss Mitigation (Table10.6.1) E2, E3, E7, E18, E21	Not significant
Location: Land Parcels 6 and 9, Cairnleith Moss SSSI and Gelly Woods Key Attribute: Wetland SSSI with variety of habitats, and coniferous plantation woodland with wetland and heath areas. Level of Importance: National	Direct mortality	• Extent: Potential loss of woodland and marshy grassland habitats from access and construction works. Limited to the area immediately adjacent to the mainline and to access routes for the property at Gelly.	• Effect: Direct negative • Reversibility: Irreversible • Frequency: Single event • Duration: Permanent • Likelihood: Probable	Magnitude: Low negative Significance: Moderate	Construction Direct Mortality Mitigation (Table10.6.1) E2, E3, E4, E7, E12	Not significant
	Habitat loss	• Extent: Potential loss of woodland habitats from access and construction works. • Effect: Direct negative	• Reversibility: Reversible • Frequency: Single event • Duration: Short to medium term • Likelihood: Probable	Magnitude: Low negative Significance: Moderate	Construction Habitat Loss Mitigation (Table10.6.1) E2, E3, E7, E18, E21	Not significant
	Pollution	• Extent: Potential for pollution of riparian areas, and for losses downstream not just in the local area. • Effect: Direct negative	• Reversibility: Reversible • Frequency: Recurring • Duration: Short to medium term • Likelihood: Probable	Magnitude: Low negative Significance: Minor	Construction Pollution Mitigation (Table10.6.1) E2, E3, E4	Not significant
Location: Land Parcel 8, Muir of Thorn (North) Key Attribute: Coniferous plantation woodland with wetland and heath and semi-natural woodland areas. Level of Importance: Authority area	Direct mortality	• Extent: Potential loss of woodland habitat from access works. • Effect: Direct negative	• Reversibility: Irreversible • Frequency: Single event Duration: Permanent • Likelihood: Probable	Magnitude: Low negative Significance: Minor	Construction Direct Mortality Mitigation (Table10.6.1) E2, E3, E4, E7, E12	Not significant
	Habitat loss	• Extent: Potential loss of woodland habitat from access works. Effect: Direct negative	• Reversibility: Reversible • Frequency: Single event Duration: Short to medium term Likelihood: Probable	Magnitude: Low negative Significance: Minor	Construction Habitat Loss Mitigation (Table10.6.1) E2, E3, E7, E18, E21	Not significant

Table 5: Bats: Specific Impacts, Mitigation, Residual Impacts – Construction

Location and Key Attribute	Potential Impact	Characterisation of Impact (pre-mitigation)		Magnitude and Significance	Proposed Mitigation	Significance of Residual Impact
Background Information: Conservation Status – All bat species, except for common pipistrelle, are listed on Appendix II of the Council of Europe Convention on European Wildlife and Natural Habitats (the Bern Convention 1979). Perth and Kinross have consultative/ draft LSAPs for common (*Pipistrellus pipistrellus*), soprano (*P. pygmaeus*), Daubenton's (*Myotis daubentonii*), brown long eared (*Plecotus auritus*), Natterer's (*Myotis nattereri*) bats. **Legal Framework: Habitats Directive 1992 (Annex IV); and Conservation (Natural Habitats & c) Regulations 1994. See Annex 1 for more information.**						
Location: Luncarty (ID - 1) Key Attributes: Urban area with high roosting potential and moderate foraging and commuting potential. Level of Importance: Authority area	Disturbance	• Extent: Night works, lighting and construction activities will have a negative effect on foraging and commuting bats along Shochie Burn. Day works, such as piling and earthmoving, have potential to disturb building roosts and tree with potential to support roosting bats.	• Effect: Direct negative • Reversibility: Reversible • Frequency: Recurring • Duration: Short-term • Likelihood of Occurrence: Certain	Magnitude: Medium negative Significance: Moderate	Construction Disturbance Mitigation (Table 1) E1, E2, E3, E4, E28, E30	Not significant
Location: Shochie Burn (ID – 2) Key Attributes: Watercourse, riparian habitat and stone railway bridge with known roost and high foraging and commuting potential. Level of Importance: Authority area	Habitat fragmentation	• Extent: Severance of commuting route along Shochie Burn. • Effect: Direct negative • Reversibility: Reversible • Frequency: Single event	• Duration: Short term • Likelihood of Occurrence: Certain	Magnitude: Low negative Significance: Minor	Construction Habitat Fragmentation Mitigation (Table 1) E7, E19 Specific mitigation: Maintain existing height of culvert (E36).	Not significant
	Disturbance	• Extent: Construction activities will have a negative effect on foraging and commuting bats along Shochie Burn. Day works to have a direct effect on bats occupying bridge structure.	• Effect: Direct negative • Reversibility: Reversible • Frequency: Recurring • Duration: Long term • Likelihood of Occurrence: Certain	Magnitude: Medium negative Significance: Moderate	Construction Disturbance Mitigation (Table 1) E1, E2, E3, E4, E28	Not significant
	Pollution	• Extent: During construction, particulates including discharge from machinery, sediments and spillages have the potential to affect quality of foraging habitat. • Effect: Direct and indirect negative.	• Reversibility: Reversible. • Frequency: Recurring. • Duration: Short-term. • Likelihood: Probable.	Magnitude: Low negative. Significance: Minor	Construction Pollution Mitigation (Table 1) E1, E2, E3, E4, E31	Not significant

Location and Key Attribute	Potential Impact	Characterisation of Impact (pre-mitigation)		Magnitude and Significance	Proposed Mitigation	Significance of Residual Impact
Location: Ordie Burn (ID – 3) Key Attributes: Watercourse, riparian habitat and stone railway bridge with known roost and high foraging and commuting potential. Level of Importance: Authority area	Habitat fragmentation	• Extent: Severance of commuting route along Ordie Burn. • Effect: Direct negative • Reversibility: Reversible • Frequency: Single event	• Duration: Short term • Likelihood of Occurrence: Certain Legal Framework: As detailed above.	Magnitude: Low negative Significance: Minor	Construction Habitat Fragmentation Mitigation (Table 1) E7, E19 Specific mitigation: Maintain existing height of culvert (E36).	Not significant
	Pollution	• Extent: During construction, particulates including discharge from machinery, sediments and spillages have the potential to affect quality of foraging habitat. • Effect: Direct and indirect negative.	• Reversibility: Reversible. • Frequency: Recurring. • Duration: Short-term. • Likelihood: Probable.	Magnitude: Low negative. Significance: Minor	Construction Pollution Mitigation (Table 1) E1, E2, E3, E4, E31	Not significant
	Disturbance	• Extent: Construction activities will have a negative effect on foraging and commuting bats along Ordie Burn. Day works to have a direct effect on bats occupying bridge structure. • Effect: Direct negative	• Reversibility: Reversible • Frequency: Recurring • Duration: Long term • Likelihood of Occurrence: Certain	Magnitude: Medium negative Significance: Moderate	Construction Disturbance Mitigation (Table 1) E1, E2, E3, E4, E28 Specific mitigation: Undertake works under SNH licence which will detail a method statement (E35).	Not significant
Location: Newmill (ID – 4) Key Attributes: Mosaic of habitat types including arable land, mature tree lines, middle reaches of Ordie Burn, dismantled railway and farm buildings. Area offers high roosting, foraging and commuting potential. Level of Importance: Authority area	Direct mortality	• Extent: No known roosts to be affected. Felling and clearance of trees with roost potential for construction along Ordie Burn and tree lined access road. Potential for mortality or injury to bats roosting in trees to be felled. • Effect: Direct negative	• Reversibility: Irreversible • Frequency: Single event • Duration: Permanent • Likelihood of Occurrence: Probable	Magnitude: Medium negative Significance: Moderate	Construction Direct Mortality Mitigation (Table 1) E1, E2, E3, E4, E8	Not significant
	Habitat fragmentation	• Extent: Severance of commuting route along Ordie Burn and tributary close to Newmill Farm and mature tree line parallel to existing A9 • Effect: Direct negative • Reversibility: Reversible	• Frequency: Single event • Duration: Short-term • Likelihood of Occurrence: Certain	Magnitude: Low negative Significance: Minor	Construction Habitat Fragmentation Mitigation (Table 1) E7, E19	Not significant

Location and Key Attribute	Potential Impact	Characterisation of Impact (pre-mitigation)	Magnitude and Significance	Proposed Mitigation	Significance of Residual Impact
	Disturbance	• Extent: Construction activities will have a negative effect on foraging and commuting bats along Ordie Burn and mature tree line parallel to existing A9 • Effect: Direct negative • Reversibility: Reversible • Frequency: Recurring • Duration: Long term • Likelihood of Occurrence: Certain	Magnitude: Medium negative Significance: Moderate	Construction Disturbance Mitigation (Table 1) E1, E2, E3, E4, E28,	Not significant
	Pollution	• Extent: During construction, particulates including discharge from machinery, sediments and spillages have the potential to affect quality of foraging habitat. • Effect: Direct and indirect negative. • Reversibility: Reversible. • Frequency: Recurring. • Duration: Short-term. • Likelihood: Probable.	Magnitude: Low negative. Significance: Minor	Construction Pollution Mitigation (Table 1) E1, E2, E3, E4	Not significant
Location: Westwood (ID – 5) Key Attributes: Mosaic of habitat types including a stone quarry, mature tree lines, cultivated arable land and farm buildings. Area offers high roosting, foraging and commuting potential. Level of Importance: Authority area	Direct mortality	• Extent: No known roosts to be affected. Felling and clearance of ash trees with roost potential for construction along part of farm access track and field boundary tree line south of Westwood Farm. Potential for mortality or injury to bats roosting in trees to be felled. • Effect: Direct negative • Reversibility: Irreversible • Frequency: Single event • Duration: Permanent • Likelihood of Occurrence: Probable	Magnitude: Medium negative Significance: Moderate	Construction Direct Mortality Mitigation (Table 1) E1, E2, E3, E4, E8	Not significant
	Habitat fragmentation	• Extent: Shortening of commuting route along Westwood Farm access road tree line. • Effect: Direct negative • Reversibility: Reversible • Frequency: Single event • Duration: Short-term • Likelihood of Occurrence: Certain	Magnitude: Low negative Significance: Minor	Construction Habitat Fragmentation Mitigation (Table 1) E7, E19, E30	Not significant
Location: Garry Burn (ID – 6) Key Attributes: Watercourse and riparian habitat and with moderate roosting potential and high foraging and commuting potential. Mature trees with roosting potential in vicinity of proposed scheme. Level of Importance: Authority area	Direct mortality	• Extent. Felling and clearance of trees with roost potential for construction at south of Bankfoot. Potential for mortality or injury to bats roosting in trees to be felled. • Effect: Direct and indirect negative • Reversibility: Irreversible • Frequency: Single event • Duration: Permanent • Likelihood of Occurrence: Probable	Magnitude: Medium negative Significance: Moderate	Construction Direct Mortality Mitigation (Table 1) E1, E2, E3, E4, E8	Not significant
	Habitat fragmentation	• Extent: Severance of commuting route along Garry Burn and mature tree line • Frequency: Single event • Duration: Short-term	Magnitude: Low negative Significance:	Construction Habitat Fragmentation Mitigation (Table 1)	Not significant

Location and Key Attribute	Potential Impact	Characterisation of Impact (pre-mitigation)		Magnitude and Significance	Proposed Mitigation	Significance of Residual Impact
		parallel to existing A9. • Effect: Direct negative • Reversibility: Reversible	• Likelihood of Occurrence: Certain	Minor	E7, E19, E30	
	Disturbance	• Extent: Works such as piling and earthmoving have potential to disturb buildings containing a known bat roost and trees with potential to support roosting bats. Effect: Direct negative	• Reversibility: Reversible • Frequency: Recurring • Duration: Long term • Likelihood of Occurrence: Certain	Magnitude: Medium negative Significance: Moderate	Construction Disturbance Mitigation (Table 1) E1, E2, E3, E4, E28, E30	Not significant
	Pollution	• Extent: During construction, particulates including discharge from machinery, sediments and spillages have the potential to affect quality of foraging habitat. • Effect: Direct and indirect negative.	• Reversibility: Reversible. • Frequency: Recurring. • Duration: Short-term. • Likelihood: Probable.	Magnitude: Low negative. Significance: Minor	Construction Pollution Mitigation (Table 1) E1, E2, E3, E4, E31	Not significant
Location: Bankfoot (ID – 7) Key Attributes: Urban area with moderate roosting potential and low foraging and commuting potential. Level of Importance: Regional	Disturbance	• Extent: Night works, lighting and construction activities will have a negative effect on foraging and commuting bats around Bankfoot. • Effect: Direct negative	• Reversibility: Reversible • Frequency: Recurring • Duration: Long term • Likelihood of Occurrence: Certain	Magnitude: Medium negative Significance: Moderate	Construction Disturbance Mitigation (Table 1) E1, E2, E3, E4, E28, E30	Not significant
Location: Coltrannie/ Cairnleith overbridge (ID – 8) Key Attributes: Arable area with sections of deciduous mixed woodland offering moderate potential for roosting. Commuting and foraging potential is high. Level of Importance: Regional	Direct mortality	• Extent: No known roosts to be affected. Tree felling and clearance for construction of areas of mixed deciduous woodland with bat potential. Potential for mortality or injury to bats roosting in trees to be felled.	• Effect: Direct negative • Reversibility: Irreversible • Frequency: Single event • Duration: Permanent • Likelihood of Occurrence: Probable	Magnitude: Medium negative Significance: Moderate	Construction Direct Mortality Mitigation (Table 1) E1, E2, E3, E4, E8	Not significant
	Habitat fragmentation	• Extent: Loss of woodland east or west of the A9 at Cairnleith. • Effect: Direct negative • Reversibility: Reversible	• Frequency: Single event Duration: Short-term • Likelihood of Occurrence: Certain	Magnitude: Low negative Significance: Minor	Construction Habitat Fragmentation Mitigation (Table 1) E7, E19, E30	Not significant
	Disturbance	• Extent: Night works, lighting and construction activities will have a negative effect on foraging and commuting bats around the	• Reversibility: Reversible • Frequency: Recurring • Duration: Long term	Magnitude: Medium negative Significance:	Construction Disturbance Mitigation (Table 1) E1, E2, E3, E4, E28, E30	Not significant

Location and Key Attribute	Potential Impact	Characterisation of Impact (pre-mitigation)		Magnitude and Significance	Proposed Mitigation	Significance of Residual Impact
		Coltrannie/Cairnleith overbridge. • Effect: Direct negative	• Likelihood of Occurrence: Certain	Moderate		
Location: Muir of Thorn woodland (ID – 9) Key Attributes: Predominantly coniferous plantation woodland which offers low roosting potential. Foraging potential is also low but commuting potential high at woodland edge. Level of Importance: Authority area	Habitat fragmentation	• Extent: Disruption to commuting route along woodland edge at Muir of Thorn. • Effect: Direct negative • Reversibility: Reversible	• Frequency: Single event • Duration: Short-term • Likelihood of Occurrence: Certain	Magnitude: Low negative Significance: Minor	Construction Habitat Fragmentation Mitigation (Table 1) E7, E19, E30	Not significant
	Disturbance	• Extent: Night works, lighting and construction activities may have a negative effect on bats commuting along woodland edge. • Effect: Direct negative	• Reversibility: Reversible • Frequency: Recurring • Duration: Long term • Likelihood of Occurrence: Certain	Magnitude: Medium negative Significance: Moderate	Construction Disturbance Mitigation (Table 1) E1, E2, E3, E4, E28, E30	Not significant
Location: Gelly Wood (ID – 10) Key Attributes: Semi-natural coniferous woodland with areas of mixed deciduous woodland. Roosting, foraging and commuting potential is moderate. Level of Importance: Regional	Direct mortality	• Extent: No known roosts to be affected. Tree felling and clearance for construction of areas of Scots Pine with roost potential. Potential for mortality or injury to bats roosting in trees to be felled.	• Effect: Direct negative • Reversibility: Irreversible • Frequency: Single event • Duration: Permanent • Likelihood of Occurrence: Probable	Magnitude: Medium negative Significance: Moderate	Construction Direct Mortality Mitigation (Table 1) E1, E2, E3, E4, E8	Not significant
	Habitat fragmentation	• Extent: Disruption to commuting route along woodland edge. • Effect: Direct negative • Reversibility: Reversible	• Frequency: Single event Duration: Short-term • Likelihood of Occurrence: Certain	Magnitude: Low negative Significance: Minor	Construction Habitat Fragmentation Mitigation (Table 1) E7, E19, E30	Not significant
	Disturbance	• Extent: Night works, lighting and construction activities may have a negative effect on bats commuting along woodland edge • Effect: Direct negative	• Reversibility: Reversible • Frequency: Recurring • Duration: Long term • Likelihood of Occurrence: Certain	Magnitude: Medium negative Significance: Moderate	Construction Disturbance Mitigation (Table 1) E1, E2, E3, E4, E28, E30	Not significant
Location: Byres of Murthly/Mill Dam SSSI (ID – 12) Key Attributes: Line of trees through grassland connecting areas of woodland and wetland. Roosting and foraging potential is high with three	Direct mortality	• Extent: Three tree roosts potentially affected. Tree felling and clearance for construction. Potential for mortality or injury to bats roosting in trees to be felled. • Effect: Direct negative	• Reversibility: Irreversible • Frequency: Single event • Duration: Permanent • Likelihood of Occurrence: Probable	Magnitude: Medium negative Significance: Moderate	Construction Direct Mortality Mitigation (Table 1) E1, E2, E3, E4, E8	Not significant

Location and Key Attribute	Potential Impact	Characterisation of Impact (pre-mitigation)	Magnitude and Significance	Proposed Mitigation	Significance of Residual Impact
roosts confirmed. Commuting potential is good. Level of Importance: Authority area	Habitat fragmentation	• Extent: Disruption to commuting route along tree line. • Effect: Direct negative • Reversibility: Reversible • Frequency: Single event Duration: Short-term • Likelihood of Occurrence: Certain	Magnitude: Low negative Significance: Minor	Construction Habitat Fragmentation Mitigation (Table 1) E7, E19, E30	Not significant
	Disturbance	• Extent: Night works, lighting and construction activities may have a negative effect on bats commuting along tree line. • Effect: Direct negative • Reversibility: Reversible • Frequency: Recurring • Duration: Long term • Likelihood of Occurrence: Certain	Magnitude: Medium negative Significance: Moderate	Construction Disturbance Mitigation (Table 1) E1, E2, E3, E4, E28, E30	Not significant

Table 6: Breeding Birds: Specific Impacts, Mitigation and Residual Impacts – Construction

Location and Key Attribute	Potential Impact	Characterisation of impact (pre-mitigation)	Magnitude and Significance	Proposed Mitigation	Significance of Residual
Background Information: Breeding bird assemblage recorded for each survey quadrat: **Legal Framework: It is an offence under the Wildlife and Countryside Act 1981 and Nature Conservation (Scotland) Act 2004 to intentionally or recklessly kill, injure or take any wild bird; take, damage or destroy the nest of any wild bird while it is in use or being built obstruct or prevent any wild bird using its nest; and take or destroy the egg of any wild bird. It is also an offence to intentionally or recklessly disturb any wild bird included in Schedule 1 of the WCA while it is building a nest or is in, on or near a nest containing dependant young. Disturbing the dependant young of a Schedule 1 bird would also constitute an offence.**					
Location: Quadrat 1 (ch3000 to ch3500 Key Attribute: Breeding bird assemblage Level of Importance: Local	Direct mortality	• Extent: Direct mortality due to vegetation clearance or disturbance associated with construction of Tullybelton/Stanley junction on eastern side of the A9. Dualling of the A9 on the eastern side and the construction of the access track running adjacent to the A9 south towards Tullybelton/Stanley junction from ch3900 will also result in direct mortality. • Effect: Direct negative • Reversibility: Irreversible • Frequency: Recurring • Duration: Permanent • Likelihood: Certain	Magnitude: Low negative Significance: Minor	Construction Disturbance Mitigation (Table 1) E2, E3, E6, E12	Not significant
	Habitat loss	• Extent: Habitat loss associated with construction of the access track running adjacent to the A9 south towards Tullybelton/Stanley junction from ch3900. • Effect: Direct negative • Reversibility: Reversible • Frequency: Single event • Duration: Long-term • Likelihood: Certain	Magnitude: Low negative Significance: Minor	Construction Habitat Loss Mitigation (Table 1) E2, E3, E4, E7, E18, E21	Not significant

Location and Key Attribute	Potential Impact	Characterisation of impact (pre-mitigation)		Magnitude and Significance	Proposed Mitigation	Significance of Residual
	Disturbance	• Extent: Disturbance due to vegetation clearance, plant and personnel movement and lighting associated with construction of Tullybelton/Stanley junction on eastern side of the A9. The dualling of the A9 on the eastern side and construction of the access track running adjacent to A9 south towards Tullybelton/Stanley junction from ch3900 may cause disturbance.	• Effect: Direct negative • Reversibility: Reversible • Frequency: Recurring • Duration: Short-term • Likelihood: Certain	Magnitude: Low negative Significance: Minor	Construction Disturbance Mitigation (Table 1) E2, E3, E6, E12, E28	Not significant
	Pollution	• Extent: Pollution by contaminants associated with construction of the Tullybelton/Stanley junction on eastern side of the A9. Dualling of the A9 on the eastern side and construction of the access track running adjacent to A9 south towards Tullybelton/ Stanley junction from ch3900 could also release pollutants.	• Effect: Direct and indirect negative • Reversibility: Reversible • Frequency: Recurring • Duration: Short-term • Likelihood: Unlikely	Magnitude: Low negative Significance: Minor (ground nesting birds)	Construction Pollution Mitigation (Table 1) E2, E3, E4	Not significant
Location: Quadrat 2 (ch6000 to ch7500) Key Attribute: Breeding bird assemblage Level of Importance: Authority area	Direct mortality	• Extent: Direct mortality due to vegetation clearance or disturbance associated with dualling of the A9 on the eastern side from ch6000 to ch7500. Construction of accommodation over bridge over the A9 on the eastern side at ch6900, construction of access track from ch6200 to ch6900 and construction of the southbound Bankfoot Junction between ch6000 and ch6100 may cause direct mortality.	• Effect: Direct negative • Reversibility: Irreversible • Frequency: Recurring • Duration: Short-term • Likelihood: Certain	Magnitude: Medium negative (with respect to barn owl). Significance: Moderate	Construction Direct Mortality Mitigation (Table 1) E2, E3, E6, E12	Not significant
	Habitat loss	• Extent: habitat loss associated with construction of the access track from ch6200 to ch6900. • Effect: Direct negative	• Reversibility: Reversible Frequency: Single event • Duration: Long-term • Likelihood: Certain	Magnitude: Medium negative Significance: Moderate	Construction Disturbance Mitigation (Table 1) E2, E3, E4. E7, E18, E21	Not significant

Location and Key Attribute	Potential Impact	Characterisation of impact (pre-mitigation)		Magnitude and Significance	Proposed Mitigation	Significance of Residual
	Disturbance	• Extent: Disturbance due to vegetation clearance, plant and personnel movement and lighting associated with the duelling of A9 from ch6000 to ch7500 on eastern side. Construction of accommodation over bridge over the A9 on the eastern side at ch6900, construction of the access track from ch6200 to ch6900 and construction of the southbound Bankfoot Junction between ch6000 and ch6100 may disturbance.	• Effect: Direct negative • Reversibility: Reversible • Frequency: Recurring • Duration: Short-term • Likelihood: Certain	Magnitude: Low negative Significance: Minor	Construction Disturbance Mitigation (Table 1) E2, E3, E6, E12, E28	Not significant
	Pollution	• Extent: Pollution by contaminants associated with dualling of A9 on the eastern side from ch6000 to ch7500. Construction of the accommodation over bridge over the A9 on the eastern side at ch6900, construction of the access track from ch6200 to ch6900 and construction of the southbound Bankfoot Junction between ch6000 and ch6100 could also release pollutants.	• Effect: Direct and indirect negative • Reversibility: Reversible • Frequency: Recurring • Duration: Short-term • Likelihood: Unlikely	Magnitude: Low negative Significance: Minor (ground nesting birds).	Construction Pollution Mitigation (Table 1) E2, E3, E4	Not significant
Location: Quadrat 3 (ch7500 to ch8600) Key Attribute: Breeding bird assemblage (including osprey) Level of Importance: International	Direct mortality	• Extent: Direct mortality due to vegetation clearance or disturbance associated with dualling of the A9 from ch7600 to ch8600 on the eastern side. Construction of the accommodation overbridge over the A9 on eastern side at ch8600, construction of the access track from ch7600 to ch8600 and construction of a SUDS pond at approx ch8300 could cause direct mortality.	• Effect: Direct negative • Reversibility: Irreversible • Frequency: Recurring • Duration: Short-term • Likelihood: Certain	Magnitude: High negative (in relation to osprey) Significance: Major	Construction Direct Mortality Mitigation (Table 1) E2, E3, E6, E12	Not significant
	Habitat loss	• Extent: habitat loss associated with dualling of the A9 from	• Effect: Direct negative • Reversibility: Reversible	Magnitude: Medium negative	Construction Habitat Loss Mitigation (Table 1)	Not significant

Location and Key Attribute	Potential Impact	Characterisation of impact (pre-mitigation)		Magnitude and Significance	Proposed Mitigation	Significance of Residual
		ch7500 to 8850 on the eastern side. Construction of the accommodation overbridge over the A9 on the eastern side at ch8600, construction of the access track from ch7600 to ch8600 and construction of a SUDS pond at approx ch8300 will cause habitat loss.	• Frequency: Single event • Duration: Long-term • Likelihood: Certain	Significance: Major	E2, E3, E4, E7, E18, E21	
	Disturbance	• Extent: Disturbance due to vegetation clearance, plant and personnel movement and lighting associated with duelling of the A9 from ch7500 to ch8600 on the eastern side. Construction of accommodation overbridge over the A9 on the eastern side at ch8600, construction of the access track from ch7600 to ch8600 and construction of a SUDS pond at approx ch8300 may cause disturbance.	• Effect: Direct negative • Reversibility: Reversible • Frequency: Recurring • Duration: Short-term • Likelihood: Certain	Magnitude: High negative (in relation to osprey) Significance: Major	Construction Disturbance Mitigation (Table 1) E2, E3, E6, E12, E28 Specific Mitigation: Should works be required within an appropriate buffer zone as determined by consultation with SNH, they will not be allowed to take place during the osprey breeding season (March to July inclusive). (E39).	Not significant
	Pollution	• Extent: Pollution by contaminants associated with dualling of A9 on the eastern side from ch7500 to ch8850. Construction of the accommodation overbridge over the A9 on the eastern side at ch8600, construction of the access track from ch7600 to ch8600 and construction of SUDS pond at approx ch8300 could also release pollutants.	• Effect: Direct and indirect negative • Reversibility: Reversible • Frequency: Recurring • Duration: Short-term • Likelihood: Unlikely	Magnitude: Low negative Significance: Moderate (ground nesting birds)	Construction Pollution Mitigation (Table 1) E2, E3, E4	Not significant
Location: Quadrat 4 (ch7500 to ch8600) Key Attribute: Breeding bird assemblage Level of Importance:	Direct mortality	• Extent: Direct mortality due to vegetation clearance or disturbance associated with duelling of the A9 from ch7600 to ch8600 on the western side. Construction of the overbridge over the A9 on the western side at ch8600 may cause direct mortality.	• Effect: Direct negative • Reversibility: Irreversible • Frequency: Recurring • Duration: Short-term • Likelihood: Certain	Magnitude: Low negative Significance: Minor	Construction Direct Mortality Mitigation (Table 1) E2, E3, E6, E12	Not significant

Location and Key Attribute	Potential Impact	Characterisation of impact (pre-mitigation)		Magnitude and Significance	Proposed Mitigation	Significance of Residual
Local	Habitat loss	• Extent: habitat loss due to vegetation clearance associated with duelling of the A9 from ch7500 to ch8600 on the western side. Construction of the accommodation overbridge over the A9 on the western side at ch8600 will cause construction related habitat loss.	• Effect: Direct negative • Reversibility: Reversible • Frequency: Single event • Duration: Long-term • Likelihood: Certain	Magnitude: Medium negative Significance: Minor	Construction Habitat Loss Mitigation (Table 1) E2, E3, E4, E7, E18, E21	Not significant
	Disturbance	• Extent: Disturbance due to vegetation clearance, plant and personnel movement and lighting associated with duelling of A9 from ch7500 to ch8600 on western side. Vegetation clearance associated with the construction of accommodation overbridge over the A9 on the western side at ch8600 may cause disturbance.	• Effect: Direct negative • Reversibility: Reversible • Frequency: Recurring • Duration: Short-term • Likelihood: Certain	Magnitude: Low negative Significance: Minor	Construction Disturbance Mitigation (Table 1) E2, E3, E6, E12, E28	Not significant
	Pollution	• Extent: Pollution by contaminants associated with duelling of the A9 on the western side from ch7500 to ch8600. Construction of the overbridge over the A9 on the western side at ch8600 could also release pollutants.	• Effect: Direct and indirect negative • Reversibility: Reversible • Frequency: Recurring • Duration: Short-term • Likelihood: Unlikely	Magnitude: Low negative Significance: Minor (ground nesting birds)	Construction Pollution Mitigation (Table 1) E2, E3, E4	Not significant
Location: Quadrat 5 (ch8600 to 9400) Key Attribute: Breeding bird assemblage Level of Importance: Local	Direct mortality	• Extent: Direct mortality due to vegetation clearance or disturbance associated with dualling of A9 on western side from ch8600 to the tie-in with the existing A9 carriageway at ch9400. Construction of overbridge over the A9 on its western side around ch8600 and construction of access track (option 2) that extends from the western end of the quadrate to join with the A9 at ch8600 may also have direct mortality effects.	• Effect: Direct negative • Reversibility: Irreversible • Frequency: Recurring • Duration: Short-term • Likelihood: Certain	Magnitude: Low negative Significance: Minor	Construction Direct Mortality Mitigation (Table 1) E2, E3, E6, E12	Not significant

Location and Key Attribute	Potential Impact	Characterisation of impact (pre-mitigation)		Magnitude and Significance	Proposed Mitigation	Significance of Residual
	Habitat loss	• Extent: Habitat loss associated with construction of access track (option 2) that extends from the western end of the quadrat to join with the A9 at ch8600.	• Effect: Direct negative • Reversibility: Reversible • Frequency: Single event • Duration: Long-term • Likelihood: Certain	Magnitude: Low negative Significance: Minor	Construction Habitat Loss Mitigation (Table 1) E2, E3, E4, E7, E18, E21	Not significant
	Disturbance	• Extent: Disturbance due to vegetation clearance, plant and personnel movement and lighting associated with the dualling of A9 on the western side from ch8600 to the tie-in with the existing A9 carriageway at ch9400. Construction of the overbridged over the A9 on its western side around ch8600 and construction of access track (option 2) that extends from the western end of the quadrat to join with the A9 at ch8600 may cause disturbance.	• Effect: Direct negative • Reversibility: Reversible • Frequency: Recurring • Duration: Short-term • Likelihood: Certain	Magnitude: Low negative Significance: Minor	Construction Disturbance Mitigation (Table 1) E2, E3, E6, E12, E28	Not significant
	Pollution	• Extent: Pollution by contaminants associated with dualling of A9 on western side from ch8600 to the tie-in with the existing A9 carriageway at ch9400. Construction of the overbridge over the A9 on its western side around ch8600 and the construction of access track (option 2) that extends from the western end of the quadrat to join with the A9 at ch8600 could also release pollutants.	• Effect: Direct and indirect negative • Reversibility: Reversible • Frequency: Recurring • Duration: Short-term • Likelihood: Unlikely	Magnitude: Low negative Significance: Minor (ground nesting birds)	Construction Pollution Mitigation (Table 1) E2, E3, E4	Not significant
Location: Quadrat 6 (ch8600 to 9400) Key Attribute: Breeding bird assemblage	Direct mortality	• Extent: Direct mortality due to vegetation clearance or disturbance associated with dualling of A9 on the eastern side from ch8600 to the tie-in with the existing A9 carriageway at ch9400. Construction of accommodation overbridge and	• Effect: Direct negative • Reversibility: Irreversible • Frequency: Recurring • Duration: Short-term • Likelihood: Certain	Magnitude: Low negative Significance: Minor	Construction Direct Mortality Mitigation (Table 1) E2, E3, E6, E12	Not significant

Location and Key Attribute	Potential Impact	Characterisation of impact (pre-mitigation)		Magnitude and Significance	Proposed Mitigation	Significance of Residual
Level of Importance: Local		access track on eastern side of A9 around ch8600 will also result in direct mortality.				
	Habitat loss	• Habitat loss associated with construction of access track on eastern side of A9 around ch8600 and any associated works not directly under the proposed scheme footprint.	• Effect: Direct negative Reversibility: Reversible • Frequency: Single event • Duration: Long-term • Likelihood: Certain	Magnitude: Low negative Significance: Minor	Construction Habitat Loss Mitigation (Table 1) E2, E3, E4, E7, E18, E21	Not significant
	Disturbance	• Extent: Disturbance due to vegetation clearance, plant and personnel associated with the dualling of A9 on eastern side from ch8600 to the tie-in with the existing A9 carriageway at ch9400. Construction of the accommodation overbridge and access track on eastern side of A9 around ch8600 may cause disturbance to breeding birds.	• Effect: Direct negative • Reversibility: Reversible • Frequency: Recurring • Duration: Short-term • Likelihood: Certain	Magnitude: Low negative Significance: Minor	Construction Disturbance Mitigation (Table 1) E2, E3, E6, E12, E28	Not significant
	Pollution	• Extent: Pollution by contaminants associated with duelling of the A9 on eastern side from ch8600 to the tie-in with the existing A9 carriageway at ch9400. Construction of the accommodation overbridge and access track on eastern side of A9 around ch8600 could also release pollutants.	• Effect: Direct and indirect negative • Reversibility: Reversible • Frequency: Recurring • Duration: Short-term • Likelihood: Unlikely	Magnitude: Low negative Significance: Minor (ground nesting birds)	Construction Pollution Mitigation (Table 1) E2, E3, E4	Not significant

Table 7: Reptiles: Specific Impacts, Mitigation and Residual Impacts – Construction

Location and Key Attribute	Potential Impact	Characterisation of impact (pre-mitigation)		Potential Impact	Proposed Mitigation	Significance of Residual Impact
Background Information: Common lizards are listed as "avoid negative impacts" on the Scottish Biodiversity List (SBL). Legal Framework: Wildlife & Countryside Act 1981 (as amended) and Nature Conservation (Scotland) Act 2004.						
Location: Gelly Muir. Key Attribute: Habitats containing populations of common lizard. Level of Importance: Local	Direct mortality	• Extent: Mortality of common lizard due to construction related activities, including earthworks and vehicle movements. • Effect: Directs negative • Reversibility: Irreversible • Frequency: Recurring	• Duration: Short term • Likelihood: Certain Legal Framework: It is illegal to intentionally or recklessly kill, injure, trade or sell common lizards.	Magnitude: Medium negative Significance: Minor	Construction Direct Mortality Mitigation (Table 1). E2, E3, E7, E12, E14	Not significant
	Disturbance	• Extent: Vibration and increased human traffic associated with construction activities. Removal of debris used for shelter. • Effect: Direct negative	• Reversibility: Reversible. Frequency: Recurring. • Duration: Medium term • Likelihood: Probable	Magnitude: Low negative Significance: Minor	Construction Disturbance Mitigation (Table 1) E2, E3, E12	Not significant

Table 8: Pine Marten: Specific Impacts, Mitigation and Residual Impacts – Construction

Location and Key Attribute	Potential Impact	Characterisation of impact (pre-mitigation)		Magnitude and Significance	Proposed Mitigation	Significance of Residual Impact
Background Information: Listed on the Scottish Biodiversity List (SBL). Legal Framework: Wildlife & Countryside Act 1981 (as amended), Nature Conservation (Scotland) Act 2004 and Wildlife & Natural Environment (Scotland) Act 2011.						
Location: Muir of Thorn and Gelly Wood. Key Attribute: Suitable pine marten habitat for foraging and shelter. Level of Importance: Authority area.	Direct mortality	• Extent: Proposed construction activities in the area, including new access tracks, SUDS pond, new carriageway and fencing, tree felling, earthworks and site traffic may cause direct mortality of pine marten.	• Effect: Direct negative • Reversibility: Irreversible • Frequency: Recurring • Duration: Long term • Likelihood: Unlikely	Magnitude: Low negative Significance: Minor	Construction Direct Mortality Mitigation (Table 1) E1, E2, E3, E4, E7, E12	Not significant
	Disturbance	• Extent: Construction activities including additional carriageway, new access tracks, SUDS ponds and associated fencing are likely to increase disturbance levels from noise, vibration and increased human activity.	• Effect: Direct negative • Reversibility: Reversible • Frequency: Recurring • Duration: Short term • Likelihood: Probable	Magnitude: Medium negative Significance: Moderate	Construction Disturbance Mitigation (Table 1) E1, E2, E3, E4, E12	Not significant

Table 9: Red Squirrel: Specific Impacts, Mitigation and Residual Impacts – Construction

Location and Key Attribute	Potential Impact	Characterisation of impact (pre-mitigation)	Magnitude and Significance	Proposed Mitigation	Significance of Residual Impact
Background Information: Red squirrels are a priority species in the UKBAP and have a Local Species Action Plan (LSAP) in Tayside. **Legal Framework: Wildlife & Countryside Act 1981 (as amended), Nature Conservation (Scotland) Act 2004 and Wildlife & Natural Environment (Scotland) Act 2011.**					
Location: Muir of Thorn, Gelly Wood Key Attribute: Suitable red squirrel habitat for foraging and shelter Level of Importance: National	Direct mortality	• Extent: Proposed construction activities in the Muir of Thorn and Gelly Wood area, including new access tracks and a SUDS pond which will involve tree felling, and movement of site traffic are likely to cause significant changes to present activity levels therefore resulting in an increased risk of mortality. • Effect: Direct negative • Reversibility: Irreversible • Frequency: Single/recurring • Duration: Permanent • Likelihood: Unlikely	Magnitude: Medium negative Significance: Major	Construction Direct Mortality Mitigation (Table 1) E1, E2, E3, E4, E5, E8 Specific Mitigation: Preconstruction surveys for dreys in trees to be felled. Any drey identified will need to be destroyed under SNH licence and replacement artificial dreys provided (E40, E41).	Not significant
	Disturbance	• Extent: Construction activities including two new access tracks and a SUDS pond are likely to increase disturbance levels from noise, vibration and increased human activity. • Effect: Direct negative • Reversibility: Irreversible • Frequency: Recurring • Duration: Medium term • Likelihood: Certain	Magnitude: Medium negative Significance: Major	Construction Disturbance Mitigation (Table 1) E1, E2, E3, E4, E5, E12 Specific Mitigation: A licence from SNH to legally allow disturbance to dreys to take place (within 50m during breeding season /zone of influence outside breeding season) will be required (E40, E41).	Not significant

Table 10: Otter: Specific Impacts, Mitigation and Residual Impacts – Construction

Location and Key Attribute	Potential Impact	Characterisation of impact (pre-mitigation)		Magnitude and Significance	Proposed Mitigation	Significance of Residual Impact
Background Information: Otter are priority species in the UKBAP, are listed as an LBAP species in Tayside and are also qualifying features of the River Tay SAC. Legal Framework: Habitats Directive 1992 (Annex IV), Conservation (Natural Habitats & c) Regulations 1994 and Nature Conservation (Scotland) Act 2004.						
Location: Shochie Burn, Ordie Burn and Garry Burn Key Attribute: Core area of otter activity with holts and other resting sites and high value foraging and commuting habitat and part of the River Tay SAC Level of Importance: International	Direct mortality	• Extent: Proposed construction activities in adjacent areas to these burns including new access tracks, a SUDS pond, new/ improved junctions and culvert extensions are likely to cause significant changes to present activity levels therefore resulting in increased risk of mortality caused by RTA or falls into pits.	• Effect: Direct negative • Reversibility: Irreversible • Frequency: Single/recurring • Duration: Permanent • Likelihood: Unlikely	Magnitude: High negative Significance: Major	Construction Direct Mortality Mitigation (Table 1) E1, E2, E3, E4, E9, E10, E11, E12, E13	Not significant
	Habitat fragmentation	• Extent: Increase in width of burn crossing points and insertion of culverts may discourage otters from moving along water course. • Effect: Direct negative • Reversibility: Reversible	• Frequency: Single event • Duration: Long term • Likelihood: Probable	Magnitude: Medium negative Significance: Major	Construction Habitat Fragmentation Mitigation (Table 1) E1, E2, E3, E4	Not significant
	Disturbance	• Extent: Otters forage and have shelters along Ordie and Shochie burns. Likely to be disturbed from increased light, noise and vibration from construction activities and an increase in human activity particularly from construction of an access track and SUDS pond adjacent to Ordie Burn and improvement of existing access track at Ordie Burn. Culvert extensions may cause disturbance.	• Effect: Direct negative • Reversibility: Irreversible • Frequency: Recurring • Duration: Medium term • Likelihood: Certain	Magnitude: Medium negative Significance: Major	Construction Disturbance Mitigation (Table 1) E1, E2, E3, E4, E12, E28	Not significant
	Pollution	• Extent: Potential for pollution of watercourses due to accidental spills. Pollution of watercourses adjacent to road schemes may reduce availability of prey items. • Effect: Indirect and direct negative	• Reversibility: Reversible • Frequency: Single event • Duration: Short term • Likelihood: Unlikely	Magnitude: Low negative Significance: Moderate	Construction Pollution Mitigation (Table 1) E1, E2, E3, E4, E31	Not significant

Location and Key Attribute	Potential Impact	Characterisation of impact (pre-mitigation)		Magnitude and Significance	Proposed Mitigation	Significance of Residual Impact
Location: Ardonachie Burn, Gelly Burn (north), Broomhill Burn Key Attribute: Commuting potential for otter Level of Importance: Local	Direct mortality	• Extent: Proposed construction activities in adjacent areas to these burns including new access tracks, a SUDS pond and culvert extensions are likely to cause significant changes to present activity levels therefore resulting in an increased risk of mortality caused by RTA or falls into pits.	• Effect: Direct negative • Reversibility: Irreversible • Frequency: Single/recurring • Duration: Permanent • Likelihood: Unlikely	Magnitude: High negative Significance: Minor	Construction Direct Mortality Mitigation (Table 1) E1, E2, E3, E4, E9, E10, E11, E12, E13	Not significant
	Habitat fragmentation	• Extent: Increase in width of burn crossing points may discourage otters from moving along water course. Construction if a new accommodation works access track over Gelly Burn (north) may prevent otter from moving freely along the burn.	• Effect: Direct negative • Reversibility: Irreversible • Frequency: Single event • Duration: Permanent • Likelihood: Probable	Magnitude: High negative. Significance: Minor	Construction Habitat Fragmentation Mitigation (Table 1) E1, E2, E3, E4	Not significant
	Disturbance	• Extent: Otters are likely to be disturbed from increased light, noise and vibration from construction activities and an increase in human activity particularly where new road infrastructure is to be constructed over burns and culverts extended.. • Effect: Direct negative	• Reversibility: Irreversible • Frequency: Recurring • Duration: Medium term • Likelihood: Certain	Magnitude: Medium negative Significance: Minor	Construction Disturbance Mitigation (Table 1) E1, E2, E3, E4, E12, E28	Not significant
	Pollution	• Extent: Potential for pollution of watercourses due to accidental spills. Pollution of watercourses adjacent to road schemes may reduce availability of prey items available. • Effect: Indirect and direct negative	• Reversibility: Reversible • Frequency: Single event • Duration: Short term • Likelihood: Unlikely	Impact Magnitude: Low negative Impact Significance: Minor	Construction Pollution Mitigation (Table 1) E1, E2, E3, E4, E31	Not significant

Table 11: Amphibians: Specific Impacts, Mitigation and Residual Impacts – Construction

Location and Key Attribute	Potential Impact	Characterisation of impact (pre-mitigation)	Magnitude and Significance	Proposed Mitigation	Significance of Residual Impact
Background Information: Common toad (*Bufo bufo*) is listed on the Scottish Biodiversity List. All amphibian species within Perth and Kinross are covered by the Tayside Local Biodiversity Action Plan. **Legal Framework: Not applicable.**					
Location: P2, Shochie Burn Key Attribute: Common frog Level of Importance: Local	Direct mortality	• Extent: Limited to the area cleared for construction of the embankment and culvert, including access routes, on the western side of the highway between ch700 and ch780. • Effect: Direct negative • Reversibility: Irreversible • Frequency: Single event • Duration: Permanent • Likelihood: Certain	Magnitude: Medium negative Significance: Minor	Construction Direct Mortality Mitigation (Table 1) E2, E3, E7, E12	Not significant
	Habitat loss	• Extent: Limited to the area cleared for construction of the embankment and culvert, including access routes, on the western side of the highway between ch700 and ch780. • Effect: Direct negative • Reversibility: Reversible • Frequency: Single event • Duration: Short-term • Likelihood: Certain	Magnitude: Low negative Significance: Minor	Construction Habitat Loss Mitigation (Table 1) E2, E3, E7, E18, E21	Not significant
	Disturbance	• Extent: During the construction of the embankment, culvert and access routes, disturbance to terrestrial amphibian habitat may occur. • Effect: Direct negative • Reversibility: Reversible • Frequency: Recurring • Duration: Short-term • Likelihood: Probable	Magnitude: Low negative Significance: Minor	Construction Disturbance Mitigation (Table 1) E12	Not significant
	Pollution	• Extent: During the construction of the embankment, culvert and access routes, particulates including discharge from machinery, sediments and spillages have the potential to affect quality of breeding habitat (waterbodies) and terrestrial habitat. • Effect: Direct and indirect negative • Reversibility: Reversible • Frequency: Recurring • Duration: Short-term • Likelihood: Probable	Magnitude: Low negative Significance: Minor	Construction Pollution Mitigation (Table 1) E2, E3, E4, E31	Not significant
Location: P4, Waterfowling pond, Marlehall Key Attribute: Smooth or palmate newts, Common frog	Pollution	• Extent: During the construction of the highway and access routes, particulates including discharge from machinery, sediments and spillages have the potential to affect quality of breeding habitat (waterbodies) and terrestrial • Effect: Direct and indirect negative • Reversibility: Reversible • Frequency: Recurring • Duration: Short-term • Likelihood: Probable	Magnitude: Low negative Significance: Minor	Construction Pollution Mitigation (Table 1) E2, E3, E4	Not significant

Location and Key Attribute	Potential Impact	Characterisation of impact (pre-mitigation)	Magnitude and Significance	Proposed Mitigation	Significance of Residual Impact
Level of Importance: Local		habitat.			
Location: P8, Bankfoot SUDS pond (south) Key Attribute: n/a Level of Importance: Local	Direct mortality	• Extent: Limited to the area cleared for construction of the northbound on-slip, including access routes, on the western side of the highway between ch5000 and ch5020. • Effect: Direct negative • Reversibility: Irreversible • Frequency: Single event • Duration: Permanent • Likelihood: Certain	Magnitude: Medium negative Significance: Minor	Construction Direct Mortality Mitigation (Table 1) E2, E3, E7, E12 Specific Mitigation: Drainage of ponds at appropriate time of year to minimise impacts to breeding animals and under supervision of ECoW. Amphibians to be captured and translocated to adjacent habitats to be retained (E54)	Not significant
	Habitat loss	• Extent: Limited to the area cleared for construction of the northbound on-slip, including access routes, on the western side of the highway between ch5000 and ch5020, including loss of terrestrial habitat and also loss of breeding habitat. • Effect: Direct negative • Reversibility: Reversible • Frequency: Single event • Duration: Short-term • Likelihood: Certain	Magnitude: Low negative Significance: Minor	Construction Habitat Loss Mitigation (Table 1) E2, E3, E7, E18, E21 Specific Mitigation; Construction of a new pond at Bankfoot (east) with sensitive landscape and riparian planting. (E53)	Not significant
	Disturbance	• Extent: Limited to the area adjacent to that cleared for construction of the northbound on-slip, including access routes, on the western side of the highway between ch5000 and ch5020. • Effect: Direct negative • Reversibility: Reversible • Frequency: Recurring • Duration: Short-tern • Likelihood: Certain	Magnitude: Low negative. Significance: Minor	Construction Disturbance Mitigation (Table 1) E12	Not significant
Location: P9, Bankfoot SUDS pond (east) Key Attribute: Common frog	Direct mortality	• Extent: Limited to the area cleared for construction of the embankment, slip-roads and new SUDS ponds, including access routes, on the western side of the highway between ch5850 and • Effect: Direct negative • Reversibility: Irreversible • Frequency: Single event • Duration: Permanent • Likelihood: Certain	Magnitude: Medium negative. Significance: Minor	Construction Direct Mortality Mitigation (Table 1) E2, E3, E7, E12 Specific Mitigation: Drainage of ponds at	Not significant

Location and Key Attribute	Potential Impact	Characterisation of impact (pre-mitigation)	Magnitude and Significance	Proposed Mitigation	Significance of Residual Impact
Level of Importance: Local		ch6000.		appropriate time of year to minimise impacts to breeding animals and under supervision of ECoW. Amphibians to be captured and translocated to adjacent habitats to be retained (E54)	
	Habitat loss	• Extent: Limited to the area cleared for construction of the embankment, slip-roads and new SUDS ponds, including access routes, on the western side of the highway between ch5850 and ch6000, including breeding habitat (waterbodies) and terrestrial habitat. • Effect: Direct negative • Reversibility: Reversible • Frequency: Single event • Duration: Short-term • Likelihood: Certain	Magnitude: Low negative Significance: Minor	Construction Habitat Loss Mitigation (Table 1) E2, E3, E7, E18, E21 Specific Mitigation; Construction of a new pond at Bankfoot (east) with sensitive landscape and riparian planting. (E53)	Not significant
	Disturbance	• Extent: Limited to the area cleared for construction of the embankment, slip-roads and new SUDS ponds, including access routes, on the western side of the highway between ch5850 and ch6000. • Effect: Direct negative. • Reversibility: Reversible. • Frequency: Recurring. • Duration: Short-term • Likelihood: Certain.	Magnitude: Low negative. Significance: Minor	Construction Disturbance Mitigation (Table 1) E12	Not significant

Table 12: Aquatic Habitat / River Habitat: Specific Impacts, Mitigation and Residual Impacts – Construction

Location and Key Attribute	Potential Impact	Characterisation of impact (pre-mitigation)	Magnitude and Significance	Proposed Mitigation	Significance of Residual Impact
Legal Framework: Water Framework Directive (European Directive 2000/60/EC)					
Location: Shochie Burn Ordie Burn (lower and upper) Garry Burn Named burns (non-designated) Key Attribute: In-channel and riparian habitat Level of Importance:	Habitat loss	• Extent: Shochie Burn – culvert extension, new headwalls. Ordie Burn – culvert extension, new bridge, new headwalls Garry Burn - new headwalls. Named burns – culvert extensions & associated headwalls. • Effect: Direct negative • Reversibility: Reversible • Frequency: Single event • Duration: Temporary • Likelihood: Certain	Magnitude: Medium negative Significance: Moderate	Construction Habitat Loss Mitigation (Table 1) E2, E3, E11, E12, E13, E18, E21	Not significant

Location and Key Attribute	Potential Impact	Characterisation of impact (pre-mitigation)	Magnitude and Significance	Proposed Mitigation	Significance of Residual Impact
Regional - Shochie and Ordie (upper) burns Authority area - Garry and Ordie (lower) burns, Named burns (non-designated)					

Table 13: Freshwater Invertebrates: Specific Impacts, Mitigation and Residual Impacts – Construction

Location and Key Attribute	Potential Impact	Characterisation of impact (pre-mitigation)	Magnitude and Significance	Proposed Mitigation	Significance of Residual Impact
Background Information: There are 63 species of freshwater invertebrate listed as priority species on the UKBAP. **Legal Framework: Water Framework Directive (European Directive 2000/60/EC), Conservation (Natural Habitats, &c.) Regulations 1994 (as amended).**					
Location: Shochie Burn Ordie Burn Garry Burn Ardonachie Burn Key Attribute: Aquatic macro-invertebrate community and biological water quality Level of Importance: Authority area - Shochie Burn, Ordie Burn, Garry Burn and Ardonachie Burn	Direct mortality	• Extent: Shochie Burn, Ordie Burn and Ardonachie Burn (culvert extension/insertion) localised to areas of dewatering/bed removal. Dewatering and bed removal for culvert extension/insertion may result in direct mortality. Ordie Burn (upper) limited to new bridge installation if in stream works required. All – localised to areas of dewatering where headwalls being inserted. • Effect: Direct Negative • Reversibility: Reversible (through re-colonisation) • Frequency: Single event • Duration: Medium-term • Likelihood: Certain	Magnitude: Low negative Significance: Minor	Construction Direct Mortality Mitigation (Table 1) E2, E3, E4, E11, E12, E13, E31	Not significant
	Habitat loss	• Extent: Shochie Burn, Ordie Burn and Ardonachie Burn (culvert extension/insertion) localised to areas of dewatering/bed removal. Dewatering and bed removal for culvert extension/insertion may result in direct mortality. All – localised to areas of dewatering where headwalls being inserted. • Effect: Direct Negative • Reversibility: Reversible (through re-colonisation) • Frequency: Single event • Duration: Medium-term • Likelihood: Certain	Magnitude: Low negative Significance: Minor	Construction Habitat Loss Mitigation (Table 1) E7, E11, E12, E13	Not significant
	Habitat fragmentation	• Extent: Shochie Burn, Ordie Burn and Ardonachie Burn (culvert extension/insertion). Dewatering for culvert extension/insertion will result in loss of habitat continuity. • Effect: Indirect negative • Reversibility: Reversible • Frequency: Single event • Duration: Short-term	Magnitude: Low negative Significance: Minor	Construction Habitat Fragmentation Mitigation (Table 1) E11	Not significant

Location and Key Attribute	Potential Impact	Characterisation of impact (pre-mitigation)		Magnitude and Significance	Proposed Mitigation	Significance of Residual Impact
		• All – localised to areas of dewatering where headwalls being inserted.	• Likelihood: Certain			
	Pollution/ Construction site run-off	• Extent: All - Potential for local and downstream effects resulting in mortality and contaminated sediment. • Effect: Indirect/direct negative • Reversibility: Reversible	• Frequency: Short term • Duration: Short-term • Likelihood: Probable	Magnitude: Low negative Significance: Minor	Construction Pollution Mitigation (Table 1) E2, E3, E4, E31	Not significant
	Re-suspension of sediment	• Extent: All - Potential for local and downstream smothering of invertebrates and macrophyte food source. • Effect: Direct negative Reversibility: Reversible	• Frequency: Single event • Duration: Short term • Likelihood: Probable	Magnitude: Low negative Significance: Minor	Construction Pollution Mitigation (Table 1) E2, E3, E4, E11, E31	Not significant
	Changes to hydrology	• Extent: Shochie Burn, Ordie Burn and Ardonachie Burn (culvert extension/insertion). Limited to the area of dewatering/over-pumping for construction of culverts. All - reaches affected by potential increase to discharge for SUDS ponds and filter/pre earthworks drainage.	• Effect: Indirect negative • Reversibility: Reversible • Frequency: Single event • Duration: Short-term • Likelihood: Certain	Magnitude: Low negative Significance: Minor	Construction Hydrological Change Mitigation (Table 1) E11, E31	Not significant

Table 14: Freshwater Macrophytes: Specific Impacts, Mitigation and Residual Impacts – Construction

Location and Key Attribute	Potential Impact	Characterisation of impact (pre-mitigation)		Magnitude and Significance	Proposed Mitigation	Significance of Residual Impact
Background Information: Not applicable. **Legal Framework: Water Framework Directive (European Directive 2000/60/EC), Conservation (Habitats, &c.) Regulations 1994 (as amended), Wildlife and Countryside Act (1981) (and amendments).**						
Location: Shochie Burn Ordie Burn (lower and upper)	Direct mortality	• Extent: Extent: Shochie Burn and Ordie Burn (lower) limited to the area used for culvert extension. Ordie Burn (upper) limited to new	• Effect: Direct negative • Reversibility: Irreversible • Frequency: Single event	Magnitude: Low negative Significance: Minor	Construction Direct Mortality Mitigation (Table 1) E2, E3, E4, E11, E12,	Not significant

Location and Key Attribute	Potential Impact	Characterisation of impact (pre-mitigation)		Magnitude and Significance	Proposed Mitigation	Significance of Residual Impact
Key Attribute: Macrophyte community diversity and abundance. Attributes required for a diverse macrophyte community are wet habitat, varying degrees of flow/ water level, varying degrees of shade, varying degrees of water quality. Level of Importance: Shochie Burn – Regional Ordie Burn (lower)– Regional Ordie Burn (upper)– Authority area		bridge installation. Impact will also be limited to areas used to construct headwalls, which will occur on all watercourses. Extending/inserting culverts, inserting a new bridge and installing headwalls will result in direct loss of macrophytes.	• Duration: Long term • Likelihood: Near certain		E13, E31	
	Habitat loss	• Extent: Shochie Burn and Ordie Burn (lower) limited to the area used for culvert extension. Ordie Burn (upper) limited to new bridge installation. Impact also occurring in areas of headwall installations which will occur at all watercourses. Works involved in extending/inserting culverts, inserting a new bridge and installing headwalls will result in loss of macrophyte habitat beyond the direct footprint of the installations.	• Effect: Direct negative • Reversibility: Reversible. The small amount of habitat temporarily lost will become available once the system has settled following construction. • Frequency: Single event • Duration: Medium term • Likelihood: Near certain	Magnitude: Low negative. Significance: Minor	Construction Habitat Loss Mitigation (Table 1) E7, E11, E12, E13	Not significant
	Pollution	• Extent: All watercourses including areas downstream from pollution sources (likely to be from areas of in-channel works (culverts and headwall construction), earthworks adjacent to watercourses and from diffuse surface runoff and outfalls draining the works site. May cause loss of macrophytes or reduced viability of macrophyte assemblage. • Effect: Direct • Reversibility: Reversible. Large scale pollution incidences may have longer term effects on macrophytes communities, but they are likely to recover eventually through recolonisation. Some locally present species	• Frequency: Single event, recurring or constant. Pollution events may range from one off accidental spillages to constant contaminated discharges. • Duration: Short term, medium term or long term depending on scale of pollution incident. • Likelihood: Certain	Magnitude: Medium negative Significance: Moderate	Construction Pollution Mitigation (Table 1) E2, E3, E4, E11, E31	Not significant

Location and Key Attribute	Potential Impact	Characterisation of impact (pre-mitigation)		Magnitude and Significance	Proposed Mitigation	Significance of Residual Impact
		may be lost permanently, but overall ecological status and community assemblage is unlikely to change significantly.				
	Sediment loading	• Extent: All watercourses including areas downstream from pollution sources (likely to be from areas of in-channel works (culverts and headwall construction), earthworks adjacent to watercourses and from silt contaminated surface runoff and outfalls draining the works site. May cause loss of macrophytes through smothering or reduced photosynthesis due to high turbidity levels. • Effect: Direct (smothering) and indirect (loss of photosynthesis) • Reversibility: Reversible. Macrophytes communities may recover through recolonisation from upstream sources. Some locally present species may be lost permanently, but overall ecological status and community assemblage is unlikely to change significantly.	• Frequency: Single event, recurring or constant. Sediment loading may range from one off inputs, for example from in-channel excavations, to constant silt contaminated discharges. • Duration: Short term, medium term or long term depending on scale of sediment release into watercourses. Continuous silt contaminated runoff over the construction site may have a longer term impact than one off in-channel excavations. • Likelihood: Certain	Magnitude: Medium negative Significance: Moderate	Construction Pollution Mitigation (Table 1) E2, E3, E4, E11, E31	Not significant
	Hydrology changes	• Extent: Loss of habitat in areas of dewatering or overpumping for culvert installation and extension (Shochie Burn and Ordie Burn (lower). Scour of macrophytes or loss of flow sensitive species in all watercourses from increased discharge over bare ground of construction site.	• Effect: Direct • Reversibility: Reversible • Frequency: Single event (dewatering) or recurring • Duration: Short term • Likelihood: Probable	Magnitude: Low negative Significance: Minor	Construction Hydrological Change Mitigation (Table 1) E11, E31	Not significant
	Non-native species transfer	• Extent: All at risk if Himalayan balsam is spread from upstream. Risk of reduced plant diversity from increased competition from	• Frequency: Recurring Duration: Medium term • Likelihood: Unlikely (current designs show works outside	Magnitude: Low negative Significance: Minor	Construction Alien Species Transfer Mitigation (Table 1)	Not significant

Location and Key Attribute	Potential Impact	Characterisation of impact (pre-mitigation)		Magnitude and Significance	Proposed Mitigation	Significance of Residual Impact
		Himalayan balsam. • Effect: Indirect • Reversibility: Reversible	areas of Himalayan balsam, but disturbance to banks and beds may reveal and dislodge seeds, increasing spread).		E2, E3, E4, E11, E18, E34	

Table 15: Ponds: Specific Impacts, Mitigation and Residual Impacts – Construction

Location and Key Attribute	Potential Impact	Characterisation of impact (pre-mitigation)		Magnitude and Significance	Proposed Mitigation	Significance of Residual Impact
Background Information: The Tayside local BAP contains a habitat action plan for ponds and pools. The LBAP contains macrophyte and macro-invertebrate species found in ponds and pools. Priority species are listed on the UKBAP and Scottish Biodiversity list, many of which are aquatic plants and macro-invertebrates. Rare and endangered species are listed on the IUCN red list. **Legal Framework: None applicable**						
Location: Pond 4 Key Attribute: Macro-invertebrates Macrophytes Habitat Level of Importance: Authority area	Pollution	• Extent: Potential input via surface runoff from construction at pond 4 which is within 100m of construction area and at a lower elevation. • Effect: Direct • Reversibility: Usually reversible but large scale pollution incidents may take a long time to recover and some species may be completely lost	• Frequency: Single event, recurring or constant. Pollution events may range from one off accidental spillages to constant contaminated discharges. • Duration: Short term, medium term or long term depending on scale of pollution incident. • Likelihood: Unlikely	Magnitude: Low Significance: Minor	Construction Pollution Mitigation (Table 1) E2, E3, E4, E31	Not significant
Location: Pond 8 Pond 9 Key Attribute: Macro-invertebrates Macrophytes Habitat Level of Importance: Local	Direct mortality	• Extent: Ponds 8 and 9 (SUDS ponds) will be lost resulting in direct mortality of all macrophytes and macro-invertebrates. • Effect: Direct	• Duration: Permanent • Reversibility: Irreversible • Frequency: Single event • Likelihood: Certain	Magnitude: High Significance: Minor	Construction Direct Mortality Mitigation (Table 1) E12, E13 Specific mitigation: Construction of a new pond at Bankfoot (east) with sensitive landscape and riparian planting will mitigate for the loss of ponds 8 and 9 (E53).	Not significant

Table 16: Freshwater Fish: Specific Impacts, Mitigation and Residual Impacts – Construction

Location and Key Attribute	Potential Impact	Characterisation of impact (pre-mitigation)		Magnitude and Significance	Proposed Mitigation	Significance of Residual Impact
Background Information: Conservation Status – Atlantic salmon and all three species of lamprey are species of UK Conservation Concern and are also qualifying features of the River Tay SAC. **Legal Framework: All freshwater fish species are protected under the Salmon and Freshwater Fisheries Act (Consolidation) (Scotland) 2003. Other legislation includes the Conservation (Habitats, &c.) Regulations 1994 (as amended), European Eel (Council Regulation (EC) No. 1100/2007), Water Framework Directive (European Directive 2000/60/EC) and the Surface Waters (Fishlife) (Classification) (Scotland) Amendment Regulations 2007.**						
Location: Shochie Burn Ordie Burn Garry Burn Key Attributes: Fish Species (brown trout (*Salmo trutta*), sea trout, lamprey spp., European eel (*Anguilla Anguilla*), stone loach (*Barbatula barbatula*), three-spined stickleback (*Gasterosteus aculeatus*) and the heterogeneous habitat needed to support fish communities. Level of Importance: Shochie Burn – International Ordie Burn – International- Garry Burn - International	Direct mortality	• Extent: Shochie Burn and Ordie Burn (lower). Dewatering and bed removal for culvert construction could result in direct fish mortality. Ordie Burn (upper) limited to new bridge installation if in stream works required.	All – localised to areas of dewatering where headwalls being inserted. • Effect: Direct negative • Reversibility: Reversible (through re-colonisation) • Duration: Short-term • Likelihood: Certain	Magnitude: Low negative Significance: Moderate	Construction Direct Mortality Mitigation (Table 1) E1, E2, E3, E4, E11, E12, E13, E31	Not significant
	Habitat loss	• Extent: Shochie Burn and Ordie Burn (lower). Dewatering of sections to allow construction of culverts will result in habitat loss. All - dewatering of sections to allow construction of headwalls will result in habitat loss.	• Effect: Direct negative • Reversibility: Reversible • Duration: Short-term • Likelihood: Certain	Magnitude: Low negative Significance: Moderate	Construction Habitat Loss Mitigation (Table 1) E7, E11, E12, E13	Not significant
	Habitat fragmentation	• Extent: Shochie Burn and Ordie Burn (lower). Dewatering of sections during construction and lengthening of culverts will result in temporary habitat fragmentation.	• Effect: Direct negative • Reversibility: Reversible • Duration: Short-term • Likelihood: Certain	Magnitude: Low negative Significance: Moderate	Construction Habitat Fragmentation Mitigation (Table 1) E11	Not significant
	Noise and vibration	• Extent: All - Noise and vibration created close to the watercourses during construction may deter fish from the area, (acoustic barrier to migration or behavioural change to noise/vibration).	• Effect: Direct negative • Reversibility: Reversible • Duration: Short-term Likelihood: Probable	Magnitude: Low negative Significance: Moderate	Construction Disturbance Mitigation (Table 1) E1, E2, E3, E4, E11, E13,	Not significant
	Pollution/Construction site run-off	• Extent: All - Earthworks (ditch creation, embankments, insertion of headwalls, extension/insertion	• Effect: Direct negative • Reversibility: Reversible	Magnitude: Low negative	Construction Pollution Mitigation (Table 1)	Not significant

Location and Key Attribute	Potential Impact	Characterisation of impact (pre-mitigation)		Magnitude and Significance	Proposed Mitigation	Significance of Residual Impact
		of culverts, construction of bridge) may result in pollution from construction related pollutants.	• Duration: Short-term • Likelihood: Probable	Significance: Moderate	E1, E2, E3, E4, E11, E31	
	Re-suspension of sediment	• Extent: All - Increased sedimentation associated with bankside and in-channel earthworks, culvert extension and pre earthwork ditches. Smothering of gravels following sediment re-suspension may reduce availability of food (macro-invertebrates) and refuge (vegetation), displacing fish from the affected reach.	• Effect: Indirect negative • Reversibility: Reversible • Duration: Short-term • Likelihood: Certain	Magnitude: Low negative Significance: Moderate	Construction Pollution Mitigation (Table 1) E1, E2, E3, E4, E11, E31	Not significant
	Changes in hydrology	• Extent: Shochie Burn, Ordie Burn (lower). Dewatering associated with culvert placement/extension will alter hydrological conditions which may affect sediment patterns and water depth. Increased surface water input from pre earthworks ditches	• Effect: Indirect negative • Reversibility: Reversible • Duration: Short-term • Likelihood: Certain	Magnitude: Low negative Significance: Moderate	Construction Hydrological Change Mitigation (Table 1) E11, E29	Not significant

Table 17: Terrestrial Habitats: Specific Impacts, Mitigation and Residual Impacts – Operation

Location and Key Attribute	Potential Impact	Characterisation of impact (pre-mitigation)		Magnitude and Significance	Proposed Mitigation	Significance of Residual Impact
Background Information: n/a **Legal Framework: n/a**						
Location: Along the route of the old A9 between ch3500 and ch5000 Key Attribute: Mature trees including oaks and sycamores, has been identified as offering high bat roost potential. Level of Importance: Local	Habitat loss	• Extent: Between ch3500 and ch5000 • Effect: Direct negative • Reversibility: Irreversible	• Frequency: Single-event • Duration: Long-term • Likelihood: Certain	Magnitude: Medium negative Significance: Minor	Operation Habitat Loss Mitigation (Table 1) E18, E21, E25 Specific Mitigation: Planting of new trees will be undertaken at various locations (cross-reference with landscape) (E46).	Not significant

Location and Key Attribute	Potential Impact	Characterisation of impact (pre-mitigation)		Magnitude and Significance	Proposed Mitigation	Significance of Residual Impact
Location: Between ch7000 and ch8100 Key Attribute: Semi-natural broadleaved woodland (of plantation origin), has been identified as offering bat roost potential Level of Importance: Local	Habitat loss	• Extent: Between ch7000 and ch8100, likely to be a small corridor on either side of the road. • Effect: Direct negative • Reversibility: Irreversible	• Frequency: Single-event • Duration: Long-term • Likelihood: Certain	Magnitude: Medium negative Significance: Minor	Operation Habitat Loss Mitigation (Table 1) E18, E21, E25 Specific Mitigation: Planting of new woodland will be undertaken at various locations (cross-reference with landscape) (E46).	Not significant
Location: Between ch7800 and ch9200 Key Attribute: Coniferous plantation woodland. Has been identified as red squirrel habitat. Level of Importance: Local	Habitat loss	• Extent: Between ch7800 and ch9200, likely to be a small corridor on either side of the road. • Effect: Direct negative • Reversibility: Irreversible	• Frequency: Single-event • Duration: Long-term • Likelihood: Certain	Magnitude: Low negative Significance: Minor	Operation Habitat Loss Mitigation (Table 1) E18, E21, E25 Specific Mitigation: Planting of new woodland will be undertaken at various locations (cross-reference with landscape) (E46).	Not significant

Table 18: Terrestrial Invertebrates: Specific Impacts, Mitigation and Residual Impacts – Operation

Location and Key Attribute	Potential Impact	Characterisation of impact (pre-mitigation)		Magnitude and Significance	Proposed Mitigation	Significance of Residual Impact
Background Information: Conservation Status, Scottish Biodiversity List (1 species), LBAP (3 species) **Legal Framework: None**						
Location: Land Parcel 1, Shochie Burn Key Attribute: Watercourse with scattered trees and shrubs, small pockets of woodland, a loch and small wetland areas. Level of Importance: Authority area	Habitat loss	• Extent: Small loss of riparian and scrub woodland habitat under the footprint of the proposed scheme, including culvert extension. • Effect: Direct negative	• Reversibility: Irreversible • Frequency: Single event • Duration: Permanent • Likelihood: Certain	Magnitude: Low negative Significance: Minor	Operation Habitat Loss Mitigation (Table 1) E18, E21, E25 Specific mitigation: Planting of new woodland will be undertaken at various locations. Creation of a new pond will create new habitat (E43).	Not significant
	Pollution	• Extent: Potential for pollution of wetland and riparian areas from road runoff, and for	• Reversibility: Reversible • Frequency: Recurring	Magnitude: Low negative Significance:	Operation Pollution Mitigation (Table 1)	Not significant

Location and Key Attribute	Potential Impact	Characterisation of impact (pre-mitigation)		Magnitude and Significance	Proposed Mitigation	Significance of Residual Impact
		losses downstream not just in the local area. • Effect: Direct negative	• Duration: Short to medium term • Likelihood: Probable	Minor	E33	
Location: Land Parcels 2 and 3, Lower Ordie Burn and Upper Ordie Burn Key Attribute: Watercourses with scattered trees and shrubs and small pockets of woodland, grassland and a small pond. Level of Importance**: Local**	Habitat loss	• Extent: Small loss of riparian and scrub woodland habitat under the footprint of the proposed scheme, including culvert extension, and new road and bridge at Newmill. • Effect: Direct negative	• Reversibility: Irreversible • Frequency: Single event • Duration: Permanent • Likelihood: Certain	Magnitude: Low negative Significance: Minor	Operation Habitat Loss Mitigation (Table 1) E18, E21, E25 Specific mitigation: Planting of new woodland will be undertaken at various locations. Creation of a new pond will create new habitat (E43).	Not significant
	Pollution	• Extent: Potential for pollution of wetland and riparian areas from road runoff, and for losses downstream not just in the local area. • Effect: Direct negative	• Reversibility: Reversible • Frequency: Recurring • Duration: Short to medium term • Likelihood: Probable	Magnitude: Low negative Significance: Minor	Operation Pollution Mitigation (Table 1) E33	Not significant
Location: Land Parcel 5 Garry Burn Key Attribute: Watercourses with scattered trees and shrubs and grassland Level of Importance: Local	Habitat loss	• Extent: Small loss grassland habitat under the footprint of the proposed scheme, including access road and junction at Bankfoot (south) (ch4550 to ch5100). • Effect: Direct negative	• Reversibility: Irreversible • Frequency: Single event • Duration: Permanent • Likelihood: Certain	Magnitude: Low negative Significance: Minor	Operation Habitat Loss Mitigation (Table 1) E18, E21, E25 Specific mitigation: Planting of species rich grassland and mixed woodland will be undertaken at various locations including in the immediate vicinity of habitat loss. Creation of a new pond will create habitat (E43).	Not significant
	Pollution	• Extent: Potential for pollution of wetland and riparian areas of the Garry Burn from road runoff especially to the south of Bankfoot (ch4550 to ch5100). • Effect: Direct negative	• Reversibility: Reversible • Frequency: Recurring • Duration: Short to medium term • Likelihood: Probable	Magnitude: Low negative Significance: Minor	Operation Pollution Mitigation (Table 1) E33	Not significant

Location and Key Attribute	Potential Impact	Characterisation of impact (pre-mitigation)		Magnitude and Significance	Proposed Mitigation	Significance of Residual Impact
Location: Land Parcels 7 and 10, Semi-natural broadleaved woodland by the A9 and Muir of Thorn (north) Key Attribute: Woodland, broadleaved semi-natural and coniferous plantation Level of Importance: Local	Habitat loss	• Extent: Loss of woodland habitats from widening of the road between ch7000 and ch7550, and between ch8600 and the northern extremity of the proposed scheme. • Effect: Direct negative	• Reversibility: Irreversible • Frequency: Single event • Duration: Permanent • Likelihood: Certain	Magnitude: Low negative Significance: Minor	Operation Habitat Loss Mitigation (Table 1) E18, E21, E25 Specific mitigation: Planting of species rich grassland and mixed woodland will be undertaken at various locations across the scheme (cross-reference with landscape) (E43).	Not significant
	Pollution	• Extent: Potential for pollution of drains connecting with woodland habitats between ch7000 and ch7550, and between ch8600 and northern extent of proposed scheme. • Effect: Direct negative	• Reversibility: Reversible • Frequency: Recurring • Duration: Short to medium term • Likelihood: Probable	Magnitude: Low negative Significance: Minor	Operation Pollution Mitigation (Table 1) E33	Not significant
Location: Land Parcel 8, Muir of Thorn (south) Key Attribute: Coniferous plantation woodland with wetland area including wet woodland and small areas of semi-natural coniferous woodland. Level of Importance: Authority area	Habitat loss	• Extent: Small loss of plantation woodland as a result of widening of the road, between ch7825 and ch8300. • Effect: Direct negative	• Reversibility: Irreversible • Frequency: Single event • Duration: Permanent • Likelihood: Certain	Magnitude: Low negative significance: Minor	Operation Habitat Loss Mitigation (Table 1) E18, E21, E25 Specific mitigation: Planting of species rich grassland and mixed woodland will be undertaken at various locations across the scheme, including around a SUDS pond at ch8300 to ch8400 (cross-reference with landscape) (E43).	Not significant
	Pollution	• Extent: Potential for pollution of drains connecting with woodland habitats between ch7825 and ch8300.	• Effect: Direct negative • Reversibility: Reversible • Frequency: Recurring • Duration: Short to medium term • Likelihood: Probable	Magnitude: Low negative Significance: Minor	Operation Pollution Mitigation (Table 1) E33	Not significant

Location and Key Attribute	Potential Impact	Characterisation of impact (pre-mitigation)	Magnitude and Significance	Proposed Mitigation	Significance of Residual Impact
Location: Land Parcels 6 and 9, Cairnleith Moss SSSI and Gelly Woods Key Attribute: Wetland SSSI with variety of habitats, and coniferous plantation woodland with wetland and heath areas. Level of Importance: National	Habitat loss	• Extent: Small habitat loss as a result of widening of the road, of grass and scrub habitat from Land Parcel 6 between ch7550 and ch7825, and of grassland and woodland from Land Parcel 9 between ch7550 and the northern extremity of the proposed scheme. • Effect: Direct negative • Reversibility: Irreversible • Frequency: Single event • Duration: Permanent • Likelihood: Certain	Magnitude: Low negative Significance: Moderate	Operation Habitat Loss Mitigation (Table 1) E18, E21, E25 Specific mitigation: Planting of species rich grassland and mixed woodland will be undertaken at various locations across the scheme (cross-reference with landscape) (E43).	Not significant
	Pollution	• Extent: Potential for pollution of drains connecting with woodland habitats between ch7550 and ch7825 and between ch7550 and the northern extremity of the proposed scheme. • Effect: Direct negative • Reversibility: Irreversible • Frequency: Single event • Duration: Permanent • Likelihood: Certain	Magnitude: Low negative Significance: Moderate	Operation Pollution Mitigation (Table 1) E33	Not significant

Table 19: Bats: Specific Impacts, Mitigation, Residual Impacts – Operation

Location and Key Attribute	Potential Impact	Characterisation of Impact (pre-mitigation)	Magnitude and Significance	Proposed Mitigation	Significance of Residual Impact
Background Information: Conservation Status – All bat species, except for common pipistrelle, are listed on Appendix II of the Council of Europe Convention on European Wildlife and Natural Habitats (the Bern Convention 1979). Perth and Kinross has consultative/ draft LSAPs for common (*Pipistrellus pipistrellus*), soprano (*P. pygmaeus*), Daubenton's (*Myotis daubentonii*), brown long eared (*Plecotus auritus*), Natterer's (*Myotis nattereri*) bats. **Legal Framework: Habitats Directive 1992 (Annex IV); and Conservation (Natural Habitats & c) Regulations 1994. See Annex 1 for more information.**					
Location: Shochie Burn (ID – 2) Key Attributes: Watercourse, riparian habitat and stone railway bridge with moderate roosting potential and high foraging and commuting potential. Level of Importance: Authority area	Habitat fragmentation	• Extent: Severance of commuting route used by pipistrelle and *Myotis* spp. along Shochie Burn due to dualling of existing single A9 carriageway. • Effect: Direct negative • Reversibility: Irreversible • Frequency: Recurring • Duration: Permanent • Likelihood of Occurrence: Certain	Magnitude: Medium negative Significance: Moderate	Operation Fragmentation Mitigation (Table 1) E17, E19, E26 Specific mitigation: Maintain existing height of culvert (E36). Provision of bat boxes (E44).	Not significant
	Pollution	• Extent: Potential pollution events such as road run-off • Reversibility: Reversible • Frequency: Recurring	Magnitude: Low negative	Operation Pollution Mitigation	Not significant

Location and Key Attribute	Potential Impact	Characterisation of Impact (pre-mitigation)		Magnitude and Significance	Proposed Mitigation	Significance of Residual Impact
		would potentially affect the foraging habitat along Shochie Burn. • Effect: Direct negative	• Duration: Short-term • Likelihood: Probable	Significance: Minor	(Table 1) E33	
Location: Ordie Burn (ID – 3) Key Attributes: Watercourse, riparian habitat and stone railway bridge with moderate roosting potential and high foraging and commuting potential. Level of Importance: Authority area	Habitat fragmentation	• Extent: Severance of commuting route used by pipistrelle and *Myotis* spp. along Ordie Burn due to dualling of existing single A9 carriageway. • Effect: Direct negative	• Reversibility: Irreversible • Frequency: Recurring • Duration: Permanent • Likelihood of Occurrence: Certain	Magnitude: Medium negative Significance: Moderate	Operation Fragmentation Mitigation (Table 1) E17, E19 Specific mitigation: Maintain existing height of culvert (E36).	Not significant
	Pollution	• Extent: Potential pollution such as road run-off would potentially affect the foraging habitat along Ordie Burn. • Effect: Direct negative	• Reversibility: Reversible. • Frequency: Recurring. • Duration: Short-term. • Likelihood: Probable.	Magnitude: Low negative. Significance: Minor	Operation Pollution Mitigation (Table 1) E33	Not significant
Location: Newmill (ID – 4) Key Attributes: Mosaic of habitat types including arable land, mature tree lines, Ordie Burn, dismantled railway and farm buildings. Area offers high roosting, foraging and commuting potential. Level of Importance: Authority area	Habitat loss	• Extent: Loss of mature oak and sycamore trees with roost potential along Ordie Burn and tree lined access road. Loss of trees from Newmills junction. • Effect: Direct negative	• Reversibility: Irreversible • Frequency: Single event • Duration: Permanent • Likelihood of Occurrence: Certain	Magnitude: Medium negative Significance: Moderate	Operation Habitat Loss Mitigation (Table 1) E19, E21 Specific mitigation: Provision of bat boxes as replacement roosting habitat for every tree with potential lost (E44).	Not significant
	Habitat fragmentation	• Extent: Severance of commuting route used by pipistrelle and *Myotis* spp. along Ordie Burn due to dualling of existing single A9 carriageway. • Effect: Direct negative	• Reversibility: Irreversible • Frequency: Recurring • Duration: Permanent • Likelihood of Occurrence: Certain		Operation Fragmentation Mitigation (Table 1) E17, E19, E26 Specific mitigation: Linear hedgerow and standard tree planting along new carriageway, to enable bats to travel between safe crossing points (E37). Provision of a structure which will maintain commuting routes (E45).	Not significant

Location and Key Attribute	Potential Impact	Characterisation of Impact (pre-mitigation)	Magnitude and Significance	Proposed Mitigation	Significance of Residual Impact
Location: Westwood (ID – 5) Key Attributes: Mosaic of habitat types including a stone quarry, mature tree lines, cultivated arable land and farm buildings. Area offers high roosting, foraging and commuting potential. Level of Importance: Authority area	Habitat loss	• Extent: No known roosts to be affected. Felling and clearance of ash trees with roost potential for construction along part of farm access track and field boundary tree line south of Westwood Farm. Potential for mortality or injury to bats roosting in trees to be felled. • Effect: Direct negative • Reversibility: Irreversible • Frequency: Single event • Duration: Permanent • Likelihood of Occurrence: Probable	Magnitude: Medium negative Significance: Moderate	Operation Habitat Loss Mitigation (Table 1) E19, E21 Specific mitigation: Provision of bat boxes as replacement roosting habitat in nearby trees (roosts to be monitored) (E44).	Not significant
	Habitat fragmentation	• Extent: Shortening of commuting route along tree line on access track for Westwood Farm. • Effect: Direct negative • Reversibility: Irreversible • Frequency: Recurring • Duration: Permanent • Likelihood of Occurrence: Certain	Magnitude: Medium negative Significance: Moderate	Operation Fragmentation Mitigation (Table 1) E17, E19	Not significant
Location: Garry Burn (ID – 6) Key Attributes: Watercourse and riparian habitat and with moderate roosting potential and high foraging and commuting potential. Level of Importance: Authority area	Pollution	• Extent: Potential pollution events such as road run-off would potentially affect the foraging habitat along Garry Burn. • Effect: Direct negative • Reversibility: Reversible • Frequency: Recurring • Duration: Short-term • Likelihood: Probable	Magnitude: Low negative Significance: Minor	Operation Pollution Mitigation (Table 1) E33	Not significant
Location: Coltrannie/ Cairnleith overbridge (ID – 8) Key Attributes: Arable area with sections of deciduous mixed woodland offering moderate potential for roosting. Commuting and foraging potential is high. Level of Importance: Regional	Habitat loss	• Extent: Permanent loss of woodland areas east or west of the A9 will result in the loss of high value roosting, foraging and commuting habitat. • Effect: Direct negative • Reversibility: Irreversible • Frequency: Single event • Duration: Permanent • Likelihood of Occurrence: Near certain	Magnitude: Medium negative Significance: Moderate	Operation Habitat Loss Mitigation (Table 1) E19, E21 Specific mitigation: Provision of hedgerows and linear planting along access track (E38). Bat boxes to be provided to replace lost roosting features (E44).	Not significant

Location and Key Attribute	Potential Impact	Characterisation of Impact (pre-mitigation)		Magnitude and Significance	Proposed Mitigation	Significance of Residual Impact
Location: Muir of Thorn woodland (ID – 9) Key Attributes: Predominantly coniferous plantation woodland which offers low roosting potential. Foraging potential is also low but commuting potential high at woodland edge. Level of Importance: Regional	Habitat loss	• Extent: Permanent loss of plantation woodland area will result in the loss of low value rooting habitat and high value commuting habitat along woodland edge at Muir of Thorn. • Effect: Direct negative	• Reversibility: Irreversible • Frequency: Single event • Duration: Permanent • Likelihood of Occurrence: Certain	Magnitude: Medium negative Significance: Minor	Operation Habitat Loss Mitigation (Table 1) E17, E19 Specific mitigation: Mixed woodland planting (E55)	Not significant
Location: Gelly Wood (ID – 10) Key Attributes: Semi-natural coniferous woodland with areas of mixed deciduous woodland. Roosting, foraging and commuting potential is moderate. Level of Importance: Regional	Habitat loss	• Extent: Permanent loss of mature Scots pine woodland area will result in the loss of high value roosting, foraging and commuting habitat. • Effect: Direct negative	• Reversibility: Irreversible • Frequency: Single event • Duration: Permanent • Likelihood of Occurrence: Near certain	Magnitude: Medium negative Significance: Moderate	Operation Habitat Loss Mitigation (Table 1) E19, E21 Specific mitigation: Specific mitigation: Mixed woodland planting (E55)	Not significant
Location: Byres of Murthly/Mill Dam SSSI (ID – 12) Key Attributes: Line of trees through grassland connecting areas of woodland and wetland. Roosting and foraging potential is high with three roosts confirmed. Commuting potential is good. Level of Importance: Authority Area	Habitat loss	• Extent: Permanent loss of trees will result in the loss of three known roosts and other trees with good roosting potential. • Effect: Direct negative • Reversibility: Irreversible	• Frequency: Single event Duration: Permanent • Likelihood of Occurrence: Near certain	Magnitude: Medium negative Significance: Moderate	Operation Habitat Loss Mitigation (Table 1) E19, E21 Specific mitigation: Mixed woodland planting (E55)	Not significant

Table 20: Breeding Birds: Specific Impacts, Mitigation and Residual Impacts – Operation

Location and Key Attribute	Potential Impact	Characterisation of impact (pre-mitigation)		Magnitude and Significance	Proposed Mitigation	Significance of Residual Impact
Background Information: Breeding bird assemblage recorded for each survey quadrat: **Legal Framework: It is an offence under the Wildlife and Countryside Act 1981 and Nature Conservation (Scotland) Act 2004 to intentionally or recklessly kill, injure or take any wild bird; take, damage or destroy the nest of any wild bird while it is in use or being built obstruct or prevent any wild bird using its nest; and take or destroy the egg of any wild bird. It is also an offence to intentionally or recklessly disturb any wild bird included in Schedule 1 of the WCA while it is building a nest or is in, on or near a nest containing dependant young. Disturbing the dependant young of a Schedule 1 bird would also constitute an offence.**						
Location: Quadrat 1 (ch3000 to 3500) Key Attribute: Breeding bird assemblage Level of Importance: Local	Direct mortality	• Extent: Direct mortality due to road traffic collisions and habitat management associated with the operation of the proposed scheme within this quadrat. • Effect: Direct negative	• Reversibility: Irreversible • Frequency: Recurring • Duration: Permanent • Likelihood: Certain	Magnitude: Low negative Significance: Minor	Operation Direct Mortality Mitigation (Table 1) E15, E16	Not significant
	Habitat loss	• Extent: Habitat lost under the footprint of the Tullybelton/Stanley junction and the section of the dualled A9 in this quadrat. • Effect: Direct negative	• Reversibility: Irreversible • Frequency: Single event • Duration: Permanent • Likelihood: Certain	Magnitude: Medium negative Significance: Minor	Operation Habitat Loss Mitigation (Table 1) E21, E24 Specific Mitigation: Habitat creation (terrestrial habitats) (E46)	Not significant
	Disturbance	• Extent: Disturbance due to traffic noise, vibration and habitat management associated with the operation of proposed scheme within this quadrat. • Effect: Direct negative	• Reversibility: Irreversible • Frequency: Recurring • Duration: Permanent • Likelihood: Certain	Magnitude: Low negative Significance: Minor	Operation Disturbance Mitigation (Table 1) E15, E16	Not significant
	Pollution	• Extent: Release of contaminants by traffic and maintenance work during operation of proposed scheme within this quadrat. • Effect: Indirect negative	• Reversibility: Reversible • Frequency: Recurring • Duration: Permanent • Likelihood: Unlikely	Magnitude: Low negative Significance: Minor	Operation Pollution Mitigation (Table 1) E33	Not significant
Location: Quadrat 2 (ch6000 to ch7500) Key Attribute: Breeding bird assemblage Level of Importance: Authority area	Direct mortality	• Extent: Direct mortality due to road traffic collisions and habitat management associated with the operation of the proposed scheme within this quadrat. • Effect: Direct negative • Reversibility: Irreversible	• Frequency: Recurring • Duration: Permanent • Likelihood: Certain	Magnitude: High negative (in relation to barn owl). Significance: Moderate	Operation Direct Mortality Mitigation (Table 1) E15, E16 Specific Mitigation Provision of landscape planting to encourage barn owl to fly over road at greater height (E47).	Not significant

Location and Key Attribute	Potential Impact	Characterisation of impact (pre-mitigation)		Magnitude and Significance	Proposed Mitigation	Significance of Residual Impact
	Habitat loss	• Extent: Habitat lost under the footprint of the southbound Bankfoot junction and the dualled section of the A9 in this quadrat. • Effect: Direct negative	• Reversibility: Irreversible • Frequency: Single event • Duration: Permanent • Likelihood: Certain	Magnitude: Medium negative Significance: Moderate	Operation Habitat Loss Mitigation (Table 1) E21, E24 Specific Mitigation: Habitat creation (terrestrial habitats) (E46)	Not significant
	Disturbance	• Extent: Disturbance due to traffic noise, vibration and habitat management associated with the operation of the proposed scheme within this quadrat. • Effect: Direct negative	• Reversibility: Irreversible • Frequency: Recurring • Duration: Permanent • Likelihood: Certain	Impact Magnitude: Low negative Impact Significance: Minor	Operation Disturbance Mitigation (Table 1) E15, E16	Not significant
	Pollution	• Extent: Release of contaminants from traffic and maintenance work associated with the operation of the proposed scheme within this quadrat.	• Effect: Indirect negative • Reversibility: Reversible • Frequency: Recurring • Duration: Permanent • Likelihood: Certain	Impact Magnitude: Low negative Impact Significance: Minor	Operation Pollution Mitigation (Table 1) E33	Not significant
Location: Quadrat 3 (ch7500 to 8600) Key Attribute: Breeding bird assemblage Level of Importance: International	Direct mortality	• Extent: Direct mortality due to road traffic collisions and habitat management associated with the operation of the proposed scheme within this quadrat. • Effect: Direct negative	• Reversibility: Irreversible • Frequency: Recurring • Duration: Permanent • Likelihood: Certain	Magnitude: Low negative. Significance: Moderate	Operation Direct Mortality Mitigation (Table 1) E15, E16	Not significant
	Habitat loss	• Extent: Habitat lost under the footprint of the proposed scheme from ch7500 to ch8600. Habitat will also be lost under the footprint of the Footbridge at ch8600 and the SUDS pond at approx ch8300.	• Effect: Direct negative • Reversibility: Irreversible • Frequency: Single event • Duration: Permanent • Likelihood: Certain	Magnitude: Medium negative Significance: Major	Operation Habitat Loss Mitigation (Table 1) E21, E24 Specific Mitigation: Habitat creation (terrestrial habitats) (E46)	Not significant
	Disturbance	• Extent: Disturbance due to traffic noise, vibration and habitat management associated with the operation of the proposed scheme within this quadrat. • Effect: Direct negative	• Reversibility: Irreversible • Frequency: Recurring • Duration: Permanent • Likelihood: Certain	Magnitude: Low negative Significance: Moderate	Operation Disturbance Mitigation (Table 1) E15, E16	Not significant

Location and Key Attribute	Potential Impact	Characterisation of impact (pre-mitigation)		Magnitude and Significance	Proposed Mitigation	Significance of Residual Impact
	Pollution	• Extent: Release of contaminants from traffic and maintenance work associated with the operation of the proposed scheme within this quadrat. • Effect: Indirect negative	• Reversibility: Reversible • Frequency: Recurring • Duration: Permanent • Likelihood: Unlikely	Magnitude: Low negative Significance: Moderate	Operation Pollution Mitigation (Table 1) E33	Not significant
Location: Quadrat 4 (ch7500 to ch8600) Key Attribute: Breeding bird assemblage Level of Importance: Local	Direct mortality	• Extent: Direct mortality due to road traffic collisions and habitat management associated with the operation of the proposed scheme within this quadrat. • Effect: Direct negative	• Reversibility: Irreversible • Frequency: Recurring • Duration: Permanent • Likelihood: Certain	Magnitude: Low negative Significance: Minor	Operation Direct Mortality Mitigation (Table 1) E15, E16	Not significant
	Habitat loss	• Extent: Habitat lost under the footprint of the proposed scheme from ch7500 to ch8600. • Effect: Direct negative	• Reversibility: Irreversible • Frequency: Single event • Duration: Permanent • Likelihood: Certain	Magnitude: Medium negative Significance: Minor	Operation Habitat Loss Mitigation (Table 1) E21, E24 Specific Mitigation: Habitat creation (terrestrial habitats) (E46)	Not significant
	Disturbance	• Extent: Disturbance due to traffic noise, vibration and habitat management associated with the operation of the proposed scheme within this quadrat. • Effect: Direct negative	• Reversibility: Irreversible • Frequency: Recurring • Duration: Permanent • Likelihood: Certain	Magnitude: Low negative Significance: Minor	Operation Disturbance Mitigation (Table 1) E15, E16	Not significant
	Pollution	• Extent: Release of contaminants from traffic and maintenance work associated with the operation of the proposed scheme within this quadrat. • Effect: Indirect negative	• Reversibility: Reversible • Frequency: Recurring • Duration: Permanent • Likelihood: Unlikely	Magnitude: Low negative Significance: Minor	Operation Pollution Mitigation (Table 1) E33	Not significant
Location: Quadrat 5 (ch8600 to ch9400) Key Attribute: Breeding bird assemblage	Direct mortality	• Extent: Direct mortality due to road traffic collisions and habitat management associated with the operation of the proposed scheme within this quadrat. • Effect: Direct negative	• Reversibility: Irreversible. Frequency: Recurring • Duration: Permanent • Likelihood: Certain	Magnitude: Low negative Significance: Minor	Operation Direct Mortality Mitigation (Table 1) E15, E16	Not significant

Location and Key Attribute	Potential Impact	Characterisation of impact (pre-mitigation)		Magnitude and Significance	Proposed Mitigation	Significance of Residual Impact
Level of Importance: Local	Habitat loss	• Extent: Habitat lost under the footprint of the proposed scheme from ch8600 until the tie-in with the existing A9 duel carriageway to the north (refer to Terrestrial Habitats for estimates of habitat loss).	• Effect: Direct negative • Reversibility: Irreversible • Frequency: Single event • Duration: Permanent • Likelihood: Certain	Magnitude: Medium negative Significance: Minor	Operation Habitat Loss Mitigation (Table 1) E21, E24 Specific Mitigation: Habitat creation (terrestrial habitats) (E46)	Not significant
	Disturbance	• Extent: Disturbance due to traffic noise, vibration and habitat management associated with the operation of the proposed scheme within this quadrat.	• Effect: Direct negative • Reversibility: Irreversible • Frequency: Recurring • Duration: Permanent • Likelihood: Certain	Magnitude: Low negative Significance: Minor	Operation Disturbance Mitigation (Table 1) E15, E16	Not significant
	Pollution	• Extent: Release of contaminants from traffic and maintenance work associated with the operation of the proposed scheme within this quadrat.	• Effect: Indirect negative • Reversibility: Reversible • Frequency: Recurring • Duration: Permanent • Likelihood: Unlikely	Magnitude: Low negative Significance: Minor	Operation Pollution Mitigation (Table 1) E33	Not significant
Location: Quadrat 6 (ch8600 to 9400) Key Attribute: Breeding bird assemblage Level of Importance: Local	Direct mortality	• Extent: Direct mortality due to road traffic collisions and habitat management associated with the operation of the proposed scheme within this quadrat.	• Effect: Direct negative • Reversibility: Irreversible • Frequency: Recurring • Duration: Permanent • Likelihood: Certain	Magnitude: Low negative Significance: Minor	Operation Direct Mortality Mitigation (Table 1) E15, E16	Not significant
	Habitat loss	Extent: Habitat lost under the footprint of the proposed scheme from ch8600 until the tie-in with the existing A9 duel carriageway to the north (refer to Terrestrial Habitats for estimates of habitat loss).	• Effect: Direct negative • Reversibility: Irreversible • Frequency: Single event • Duration: Permanent • Likelihood: Certain	Magnitude: Medium Significance: Minor	Operation Habitat Loss Mitigation (Table 1) E21, E24 Specific Mitigation: Habitat creation (terrestrial habitats) (E46)	Not significant
	Disturbance	• Extent: Disturbance due to traffic noise, vibration and habitat management associated with the operation of the proposed scheme within this quadrat.	• Effect: Direct negative • Reversibility: Irreversible • Frequency: Recurring • Duration: Permanent • Likelihood: Certain	Magnitude: Low negative Significance: Minor	Operation Disturbance Mitigation (Table 1) E15, E16	Not significant

Location and Key Attribute	Potential Impact	Characterisation of impact (pre-mitigation)	Magnitude and Significance	Proposed Mitigation	Significance of Residual Impact
	Pollution	• Extent: Release of contaminants from traffic and maintenance work associated with the operation of the proposed scheme within this quadrat. • Effect: Indirect negative • Reversibility: Reversible • Frequency: Recurring • Duration: Permanent • Likelihood: Unlikely	Magnitude: Low negative Significance: Minor	Operation Pollution Mitigation (Table 1) E33	Not significant

Table 21: Reptiles: Specific Impacts, Mitigation and Residual Impacts – Operation

Location and Key Attribute	Potential Impact	Characterisation of impact (pre-mitigation)	Magnitude and Significance	Proposed Mitigation	Significance of Residual Impact
Background Information: Common lizards are listed as "avoid negative impacts" on the Scottish Biodiversity List (SBL). Legal Framework: Wildlife & Countryside Act 1981 (as amended) and Nature Conservation (Scotland) Act 2004.					
Location: Gelly Muir Key Attribute: Habitats suitable to sustain populations of common lizard. Level of Importance: Local	Direct mortality	• Extent: Mortality of common lizard due to road traffic related incidents and associated infrastructure. • Effect: Directs negative • Reversibility: Irreversible • Frequency: Recurring • Duration: Permanent • Likelihood: Probable	Magnitude: Medium negative Significance: Minor	Specific Mitigation: Absence of roadside kerbs on majority of route will facilitate exit of reptiles (and amphibians also) from the carriageway. (E48).	Not significant
	Habitat loss	• Extent: Direct loss of habitat at different stages of the lifecycle due to increased road size and associated infra-structure. • Effect: Direct negative • Reversibility: Reversible • Frequency: Single event • Duration: Long term • Likelihood: Near certain	Impact Magnitude: Medium negative Impact Significance: Minor	Operation Habitat Loss Mitigation (Table 1) E21, E26 Specific Mitigation: Provision of habitat for reptiles reflecting that lost. Including, drystone walls as boundary features, situated in open, sunny, south facing positions (E49).	Not significant

Table 22: Pine Marten: Specific Impacts, Mitigation and Residual Impacts – Operation

Location and Key Attribute	Potential Impact	Characterisation of impact (pre-mitigation)	Magnitude and Significance	Proposed Mitigation	Significance of Residual Impact
Background Information: Listed on the Scottish Biodiversity List (SBL). **Legal Framework: Wildlife & Countryside Act 1981 (as amended), Nature Conservation (Scotland) Act 2004 and Wildlife & Natural Environment (Scotland) Act 2011.**					
Location: Muir of Thorn and Gelly Wood. Key Attribute: Suitable pine marten habitat for foraging and shelter. Level of Importance: Authority area.	Direct mortality	• Extent: Road traffic incidents resulting in the direct mortality of pine marten. • Effect: Direct negative • Reversibility: Irreversible • Frequency: Recurring • Duration: Permanent • Likelihood: Probable	Magnitude: Medium negative Significance: Moderate	Specific Mitigation: New overbridge at Gelly Wood crossing existing carriageway (E50).	Not significant
	Habitat loss	• Extent: Loss of denning and foraging habitat to make way for the increased road area and associated works. • Effect: Direct negative • Reversibility: Reversible • Frequency: Single event • Duration: Long term • Likelihood: Near certain	Magnitude: Medium negative Significance: Moderate.	Operation Habitat Loss Mitigation (Table 1) E21 Specific Mitigation: Compensatory habitat planting of mixed native woodland, use of more mature species would accelerate replacement of habitat lost (E51).	Not significant
	Pollution	• Extent: Pine marten may be affected by indirect impacts such as pollution of drinking water or bioaccumulation in prey items due to runoff from the road • Effect: Indirect negative • Reversibility: Reversible • Frequency: Recurring • Duration: Short term • Likelihood: Unlikely	Magnitude: Medium negative Significance: Moderate	Operation Pollution Mitigation (Table 1) E33	Not significant

Table 23: Red Squirrel: Specific Impacts, Mitigation and Residual Impacts – Operation

Location and Key Attribute	Potential Impact	Characterisation of impact (pre-mitigation)	Magnitude and Significance	Proposed Mitigation	Significance of Residual Impact
Background Information: Red squirrels are a priority species in the UKBAP and have a Local Species Action Plan (LSAP) in Tayside. **Legal Framework: Wildlife & Countryside Act 1981 (as amended), Nature Conservation (Scotland) Act 2004 and Wildlife & Natural Environment (Scotland) Act 2011.**					
Location: Muir of Thorn, Gelly Wood Key Attribute: Suitable red squirrel habitat for foraging and shelter	Direct mortality	• Extent: Direct mortality may occur as red squirrel try to cross the new access tracks in the Muir of Thorn area and Gelly Wood. • Frequency: Single/recurring • Duration: Permanent • Likelihood: Unlikely	Impact Magnitude: Medium negative Impact Significance:	Operation Direct Mortality Mitigation (Table 1) Specific Mitigation: New overbridge at Gelly	Not significant.

Location and Key Attribute	Potential Impact	Characterisation of impact (pre-mitigation)	Magnitude and Significance	Proposed Mitigation	Significance of Residual Impact
Level of Importance: National		• Effect: Direct negative • Reversibility: Irreversible	Major	Wood crossing existing carriageway (E50).	
	Habitat loss	• Extent: Land take to extend the existing road and for new access tracks and a SUDS pond in Muir of Thorn and Gelly Wood areas will require tree felling and could damage/destroy dreys. • Effect: Direct negative • Reversibility: Irreversible • Frequency: Single event • Duration: Permanent • Likelihood: Certain	Magnitude: Medium negative Significance: Major	Operation Habitat Loss Mitigation (Table 1) E21 Specific Mitigation: If dreys are occupied by red squirrel a licence will need sought from SNH to legally allow tree felling and the subsequent destruction of dreys to take place (E41). Compensatory habitat planting of mixed native woodland, use of more mature species would accelerate replacement of habitat lost (E42).	Not significant.

Table 24: Otter: Specific Impacts, Mitigation and Residual Impacts – Operation

Location and Key Attribute	Potential Impact	Characterisation of impact (pre-mitigation)	Magnitude and Significance	Proposed Mitigation	Significance of Residual Impact
Background Information: Otter are priority species in the UKBAP, are listed as an LBAP species in Tayside and are also qualifying features of the River Tay SAC. Legal Framework: Habitats Directive 1992 (Annex IV), Conservation (Natural Habitats & c) Regulations 1994 and Nature Conservation (Scotland) Act 2004.					
Location: Shochie Burn, Ordie Burn, Garry Burn Key Attribute: Core area of otter activity with abundant resting sites and high value foraging and commuting habitat and part of the River Tay SAC. Level of Importance: International	Direct mortality	• Extent: Risks of RTAs involving otters on the widened road and new access tracks. Risk of otters drowning in culverts. • Effect: Direct negative • Reversibility: Irreversible • Frequency: Single/recurring • Duration: Permanent • Likelihood: Unlikely	Magnitude: High negative Significance: Major	Operation Direct Mortality Mitigation (Table 1) E11, E22 Specific Mitigation: Otter proof fencing will be provided along the proposed scheme where the burns (excluding Garry Burn) cross the road. Fencing will be positioned in such a way that otter will be directed to safe crossing points (E52).	Not significant

Location and Key Attribute	Potential Impact	Characterisation of impact (pre-mitigation)		Magnitude and Significance	Proposed Mitigation	Significance of Residual Impact
	Habitat loss	• Extent: Land take adjacent to watercourses as a result from the excavation of cuttings, construction of embankments and access roads and the extending of culverts where the roads cross watercourses would have adverse impacts. Land take for a SUDS pond at Ordie Burn and an access track will also have an impact.	• Effect: Direct negative • Reversibility: Irreversible • Frequency: Single • Duration: Permanent • Likelihood: Certain	Magnitude: High negative Significance: Major	Operation Habitat Loss Mitigation (Table 1) E21	Not significant
	Habitat fragmentation	• Extent: Culvert extensions for Shochie Burn and Ordie Burn may reduce their suitability for otter to move to areas along water courses.	• Effect: Direct negative • Reversibility: Irreversible • Frequency: Single even. • Duration: Permanent • Likelihood: Certain	Magnitude: High negative Significance: Major	Operation Habitat Fragmentation Mitigation (Table 1) E17, E22, E27, E29	Not significant
	Pollution	• Extent: Accidental spills and polluted run-off from road are unlikely to represent significant changes from current levels. • Effect: Indirect and direct negative	• Reversibility: Reversible • Frequency: Recurring • Duration: Short term • Likelihood: Probable	Magnitude: Low negative Significance: Moderate	Operation Pollution Mitigation (Table 1) E33	Not significant
Location: Benchil Burn, Gelly Burn (south) Key Attribute: High value foraging and commuting habitat and extends foraging and shelter habitat of Ordie Burn Level of Importance: Authority area	Direct mortality	• Extent: Risks of RTAs involving otters on new road sections. • Effect: Direct negative	• Reversibility: Irreversible • Frequency: Single/recurring • Duration: Permanent • Likelihood: Unlikely	Magnitude: High negative Significance: Moderate	Operation Direct Mortality Mitigation (Table 1) E11	Not significant
	Habitat loss	• Extent: Possible land-take for structure widening adjacent to Benchil Burn. • Effect: Direct negative	• Reversibility: Irreversible • Frequency: Single • Duration: Permanent • Likelihood: Probable	Magnitude: High negative Significance: Moderate	Operation Habitat Loss Mitigation (Table 1) E21	Not significant
	Pollution	• Extent: Accidental spills and polluted run-off from road are unlikely to represent significant changes from current levels. • Effect: Indirect and direct negative	• Reversibility: Reversible • Frequency: Recurring • Duration: Short term • Likelihood: Probable	Magnitude: Low negative Significance: Minor	Operation Pollution Mitigation (Table 1) E33	Not significant

Location and Key Attribute	Potential Impact	Characterisation of impact (pre-mitigation)		Magnitude and Significance	Proposed Mitigation	Significance of Residual Impact
Location: Ardonachie Burn, Corral Burn (un-named tributary) Gelly Burn (north), Broomhill Burn Key Attribute: Commuting potential for otter Level of Importance: Local	Direct mortality	• Extent: Risks of RTAs involving otters on the widened road and new access tracks, particularly at Gelly Burn (north). • Effect: Direct negative	• Reversibility: Irreversible • Frequency: Single/recurring • Duration: Permanent • Likelihood: Unlikely	Magnitude: High negative Significance: Minor	Operation Direct Mortality Mitigation (Table 1) E11 Specific Mitigation: Otter proof fencing will be provided along the proposed scheme where the burns cross the road. Fencing will be positioned in such a way that otter will be directed to safe crossing points. Asymmetrical fencing will be used where there is no permeability of the road. (E52).	Not significant
	Habitat loss	• Extent: Land take adjacent to watercourses as a result from the excavation of cuttings, construction of embankments and access roads and the extending of culverts where the roads cross watercourses would have adverse impacts. Land take for two SUDS ponds and respective access tracks will also have an impact.	• Effect: Direct negative • Reversibility: Irreversible • Frequency: Single • Duration: Permanent • Likelihood: Certain	Magnitude: High negative Significance: Minor	Operation Habitat Loss Mitigation (Table 1) E21	Not significant
	Habitat fragmentation	• Extent: Culvert extensions for Ardonachie Burn and Gelly Burn (north) may reduce their suitability for otter to move between habitat areas.	• Effect: Direct negative • Reversibility: Irreversible • Frequency: Single event • Duration: Permanent • Likelihood: Certain	Magnitude: High negative Significance: Minor	Operation Habitat Fragmentation Mitigation (Table 1) E17, E22, E27, E29, E50	Not significant
	Pollution	• Extent: Accidental spills and polluted run-off from road are unlikely to represent significant changes from current levels. • Effect: Indirect and direct negative	• Reversibility: Reversible • Frequency: Recurring • Duration: Short term • Likelihood: Probable	Magnitude: Low negative Significance: Minor	Operation Pollution Mitigation (Table 1) E33	Not significant

Table 25: Amphibians: Specific Impacts, Mitigation and Residual Impacts – Operation

Location and Key Attribute	Potential Impact	Characterisation of impact (pre-mitigation)	Magnitude and Significance	Proposed Mitigation	Significance of Residual Impact
Background Information: Common toad (*Bufo bufo*) is listed on the Scottish Biodiversity List. All amphibian species within Perth and Kinross are covered by the Tayside Local Biodiversity Action Plan. **Legal Framework: Amphibians are protected under Section 9(5) of the Wildlife Countryside Act 1981 (as amended).**					
Location: P2, Shochie Burn Key Attribute: Common frog Level of Importance: Local	Pollution	• Extent: Road spray, drainage and run-off may contain chemical contaminants such as petrol, diesel, oils, antifreeze and other substances derived from motor vehicles, which may have a potential negative effect on breeding and terrestrial habitat. • Effect: Direct and indirect negative • Reversibility: Reversible • Frequency: Recurring • Duration: Permanent • Likelihood: Probable	Magnitude: Low negative Significance: Minor	Operation Pollution Mitigation (Table 1) E33	Not significant
Location: P8, Bankfoot SUDS pond (south) Key Attribute: n/a Level of Importance: Local	Habitat loss	• Extent: The existing SUDS pond will be lost under the footprint of the proposed scheme, including the footprint of a new SUDS pond. Part of the terrestrial habitat will also be lost at ch5000 under the footprint of the proposed scheme including the new SUDS pond. • Effect: Direct negative • Reversibility: Reversible • Frequency: Single event • Duration: Short-term • Likelihood: Certain	Magnitude: Low negative Significance: Minor	Operation Habitat Loss Mitigation (Table 1) E21 Specific Mitigation: Creation of the new pond will create new breeding habitat. Suitable planting around the new pond, SUDS, main highway and slip-roads will create new terrestrial habitat (E53). Drainage of pond in appropriate time of year to minimise impacts to breeding animals. and under supervision of ECoW Amphibians to be captured and translocated to adjacent habitats to be retained (E54).	Not significant

Location and Key Attribute	Potential Impact	Characterisation of impact (pre-mitigation)	Magnitude and Significance	Proposed Mitigation	Significance of Residual Impact
Location: P9, Bankfoot SUDS pond (east) Key Attribute: Common frog Level of Importance: Local	Habitat loss	• Extent: The existing SUDS pond will be lost under the footprint of the proposed scheme. Part of the terrestrial habitat will be lost between ch5850 and ch6000 under the footprint of the proposed scheme including a new SUDS pond. • Effect: Direct negative • Reversibility: Reversible • Frequency: Single event • Duration: Short-term • Likelihood: Certain	Magnitude: Low negative Significance: Minor	Operation Habitat Loss Mitigation (Table 1) E21 Specific Mitigation: Creation of the new pond will create new breeding habitat. Suitable planting around the new pond and around new SUDS, main highway and slip-roads will create new terrestrial habitat (E53). Drainage of pond in appropriate time of year to minimise impacts to breeding animals. and under supervision of ECoW Amphibians to be captured and translocated to adjacent habitats to be retained (E54).	Not significant

Table 26: Freshwater Invertebrates: Specific Impacts, Mitigation and Residual Impacts – Operation

Location and Key Attribute	Potential Impact	Characterisation of impact (pre-mitigation)	Magnitude and Significance	Proposed Mitigation	Significance of Residual Impact
Background Information: There are 63 species of freshwater invertebrate listed as priority species on the UKBAP. Legal Framework: Water Framework Directive (European Directive 2000/60/EC), Conservation (Natural Habitats, &c.) Regulations 1994 (as amended).					
Location: Shochie Burn Ordie Burn Garry Burn Ardonachie Burn Gelly Burn Key Attribute:	Habitat fragmentation	• Extent: Shochie Burn, Ordie Burn (lower), Ardonachie Burn and Gelly Burn culvert extensions. • Effect: Indirect negative • Reversibility: Irreversible • Frequency: Constant • Duration: Permanent • Likelihood: Certain	Magnitude: Low negative Significance: Minor	Operation Habitat Fragmentation Mitigation (Table 1) E11	Not significant
	Pollution	• Extent: All watercourses. Additional run off from increased surface water • Frequency: Recurring • Duration: Short-term	Magnitude: Low negative	Operation Pollution Mitigation	Not significant

Location and Key Attribute	Potential Impact	Characterisation of impact (pre-mitigation)	Magnitude and Significance	Proposed Mitigation	Significance of Residual Impact
Aquatic macro-invertebrate community and biological water quality Level of Importance: Authority area - Shochie Burn, Ordie Burn, Garry Burn Ardonachie Burn Local - Gelly Burn		discharge. • Effect: Indirect/direct negative • Reversibility: Reversible • Likelihood: Certain	Significance: Minor (	(Table 1) E33	
	Hydrological change	• Extent: Shochie Burn, Ordie Burn (lower), Ardonachie Burn and Gelly Burn culvert extension affecting water velocities for high flow species. • Effect: Indirect negative • Reversibility: Irreversible • Frequency: Constant • Duration: Permanent • Likelihood: Certain	Magnitude: Low negative Significance: Minor	Operation Hydrological Change Mitigation (Table 1) E11, E33	Not significant

Table 27: Freshwater Macrophytes: Specific Impacts, Mitigation and Residual Impacts – Operation

Location and Key Attribute	Potential Impact	Characterisation of impact (pre-mitigation)	Magnitude and Significance	Proposed Mitigation	Significance of Residual Impact
Background Information: Not applicable. **Legal Framework: Water Framework Directive (European Directive 2000/60/EC), Conservation (Habitats, &c.) Regulations 1994 (as amended), Wildlife and Countryside Act (1981) (and amendments).**					
Location: Shochie Burn Ordie Burn (lower and upper) Key Attribute: Macrophyte community diversity and abundance. Attributes required for a diverse macrophyte community are wet habitat, varying degrees of flow/ water level, varying degrees of shade, varying degrees of water quality. Level of Importance: Shochie Burn – Regional	Habitat loss	• Extent: Shochie Burn and Ordie Burn (lower), limited to the area used for culvert extension. Ordie Burn (upper) limited to area used for bridge installation. New headwalls will be installed at the Shochie Burn and Ordie Burn (lower and upper). The extended culverts, new bridge and headwalls will result in permanent loss of macrophyte habitat. Within the culverts and under the bridge, shading will limit macrophyte growth. • Effect: Direct negative • Reversibility: Irreversible within footprint of new/extended culvert and headwalls. Effects of shading irreversible without removing structure. • Frequency: Single event • Duration: Permanent effect on immediate area. • Likelihood: Certain	Magnitude: Low negative Significance: Minor	Operation Habitat Loss Mitigation (Table 1) E11	Not significant
	Pollution	• Extent: All watercourses including areas downstream from pollution sources. Sources consist of outfalls that discharge runoff from the road, embankments/cuttings • Effect: Direct • Reversibility: Reversible. Large scale pollution incidences (e.g. road traffic collisions) may have longer term effects on	Magnitude: Low negative Significance: Minor	Operation Pollution Mitigation (Table 1) E33	Not significant

Location and Key Attribute	Potential Impact	Characterisation of impact (pre-mitigation)		Magnitude and Significance	Proposed Mitigation	Significance of Residual Impact
Background Information: Not applicable. **Legal Framework: Water Framework Directive (European Directive 2000/60/EC), Conservation (Habitats, &c.) Regulations 1994 (as amended), Wildlife and Countryside Act (1981) (and amendments).**						
Ordie Burn (lower) – Regional Ordie Burn (upper)– Authority area		and surrounding land. This runoff may be contaminated with oils, salts and nutrients. Shochie Burn and lower Ordie Burn will both receive drainage from four and three outfalls respectively. Upper Ordie Burn will have two new outfalls; one will discharge road runoff via filter drains. A small amount of runoff may also drain into the tributary of the Ordie Burn. The remaining outfalls will discharge runoff intercepted by the pre-earthwork ditches.	macrophytes communities, but they are likely to recover eventually through recolonisation. Some locally present species may be lost permanently, but overall ecological status and community assemblage is unlikely to change significantly. • Frequency: Single event (accidental spillages) or constant (contaminated runoff). Pollution events may range from one off accidental spillages to constant contaminated discharges. • Duration: Short term/medium term • Likelihood: Probable			
	Sediment loading	• Extent: All watercourses including areas downstream from outfalls. Source from silt contaminated runoff collected via drainage system. May cause loss of macrophytes through smothering or reduced photosynthesis due to high turbidity levels.	• Effect: Direct (smothering) and indirect (loss of photosynthesis)Reversibility: Reversible • Frequency: Intermittent • Duration: Short term/medium term • Likelihood: Probable	Magnitude: Low negative Significance: Minor	Operation Pollution Mitigation (Table 1) E33	Not significant
	Hydrology change	• Extent: All watercourses will receive a greater volume of runoff through the increased surface area of the road and embankments/cutting and improved drainage. Scour may be high around outfalls and deposition patterns may change. The distribution of macrophytes may be altered.	• Effect: Direct • Reversibility: Reversible • Frequency: Recurring • Duration: Short term/medium term • Likelihood: Probable	Magnitude: Low negative Significance: Minor	Operation Hydrological Change Mitigation (Table 1) E11, E33	Not significant

Table 28 Ponds: Specific Impacts, Mitigation and Residual Impacts – Operation

Location and Key Attribute	Potential Impact	Characterisation of impact (pre-mitigation)		Magnitude and Significance	Proposed Mitigation	Significance of Residual Impact
Background Information: The Tayside local BAP contains a habitat action plan for ponds and pools. The LBAP contains macrophyte and macro-invertebrate species found in ponds and pools. Priority species are listed on the UKBAP and Scottish Biodiversity list, many of which are aquatic plants and macro-invertebrates. Rare and endangered species are listed on the IUCN red list. **Legal Framework: None applicable**						
Location: Pond 8 & 9 Key Attribute: Macro-invertebrates Macrophytes Habitat Level of Importance: Pond 8 & 9 - Local	Habitat loss	• Extent: Both ponds will be lost under the footprint of the proposed scheme. • Effect: Indirect (Lost during construction)	• Reversibility: irreversible • Frequency: Single event • Duration: Permanent • Likelihood: Certain	Magnitude: High Significance: Minor	Operation Habitat Loss Mitigation (Table 1) E21 Specific Mitigation: Construction of a new pond at Bankfoot (east) with sensitive landscape and riparian planting will mitigation for the loss of ponds 8 and 9 (E53).	Not significant.

Table 29: Freshwater Fish: Specific Impacts, Mitigation and Residual Impacts – Operation

Location and Key Attribute	Potential Impact	Characterisation of impact (pre-mitigation)		Magnitude and Significance	Proposed Mitigation	Significance of Residual Impact
Background Information: Conservation Status – Atlantic salmon and all three species of lamprey are species of UK Conservation Concern and are also qualifying features of the River Tay SAC. **Legal Framework: All freshwater fish species are protected under the Salmon and Freshwater Fisheries Act (Consolidation) (Scotland) 2003. Other legislation includes the Conservation (Habitats, &c.) Regulations 1994 (as amended), European Eel (Council Regulation (EC) No. 1100/2007), Water Framework Directive (European Directive 2000/60/EC) and the Surface Waters (Fishlife) (Classification) (Scotland) Amendment Regulations 2007.**						
Location: Shochie Burn Ordie Burn Garry Burn Key Attributes: Fish Species (brown trout, sea trout, lamprey, European eel, stone loach, three-spined stickleback) and the heterogeneous habitat needed to support fish communities.	Habitat loss	• Extent: Shochie Burn and Ordie Burn (lower), limited to the area used for culvert extension. The extended culverts will result in permanent loss of fish habitat. • Effect: Direct negative	• Reversibility: Irreversible • Frequency: Single event • Duration: Permanent • Likelihood: Certain	Magnitude: Low negative Significance: Moderate	Operation Habitat Loss Mitigation (Table 1) E11	Not significant
	Habitat fragmentation	• Extent: Shochie Burn and Ordie Burn (lower). Increased culvert lengths potentially a barrier to migration. • Effect: Direct negative	• Reversibility: Irreversible • Duration: Constant • Likelihood: Uncertain	Magnitude: Low negative Significance: Moderate	Operation Habitat Fragmentation Mitigation (Table 1) E11, E22	Not significant

Location and Key Attribute	Potential Impact	Characterisation of impact (pre-mitigation)		Magnitude and Significance	Proposed Mitigation	Significance of Residual Impact
Level of Importance: Shochie Burn - International Ordie Burn - International Garry Burn - International	Pollution	• Extent: All - Additional run off from increased surface water discharge • Effect: Direct negative	• Reversibility: Reversible • Duration: Recurring • Likelihood: Probable	Magnitude: Low negative Significance: Moderate	Operation Pollution Mitigation (Table 1) E33	Not significant
	Hydrological change	• Extent: Shochie Burn, Ordie Burn (lower). Culvert extensions affecting water velocities. Increased surface water input from road discharges	• Effect: Indirect negative • Reversibility: Irreversible • Duration: Constant • Likelihood: Certain	Magnitude: Low negative Significance: Moderate	Operation Hydrological Change Mitigation (Table 1) E11, E22, E33	Not significant

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