17 Summary of Key Impacts

17.1 Introduction

This chapter presents a summary of the key environmental impacts associated with this particular road improvement scheme.

17.2 Environmental Impact Table

An Environmental Impacts Table (Table 17.1) has been prepared for the scheme, the purpose of which is to present the main predicted residual impacts associated with the scheme in summarised form.

The table includes the following:

- Description of the potential impact;
- Sensitivity/value of the receptor;
- Significance of impact without mitigation;
- Mitigation objective and commitment to address specified impact;
- Significance of the impact with mitigation in place; and
- Duration of the impact.

A description of likely effects for the 'do nothing' should the scheme not be developed has also been included, and mainly comprises a no change situation for the existing site conditions.

The mitigation measures reference in Table 17.1 are described in more detail in Chapters 5 to 16 and summarised into a Schedule of Environmental Mitigation Measures (see Chapter 18).

Table 17.1. Environmental Impacts Table.

WITH PROPOSED SCHEME						DO MINIMUM
Description of Predicted Impact	**Sensitivity /Value of Receptor**	**Significance of Impact Without Mitigation**	**Mitigation Measure/s**	**Significance of Impact With Mitigation**	**Beneficial or Adverse Duration of Impact (long, medium, short term)**	**Description of Predicted Effects**
17.2.1.1.1 AIR QUALITY						
Deterioration in air quality at receptors within 200m of development (five properties).	Negligible	Not significant	No specific mitigation required, but best practice adhered to. **A1**	Not significant	Adverse, long-term	No change from existing situation.
Overall deterioration in NO_2 and PM_{10} for three properties.	Negligible	Not significant	No specific mitigation required, but best practice adhered to. **A1**	Not significant	Adverse, long-term	No change from existing situation.
No change in NO_2 and PM_{10} for one property.	Negligible	Not significant	No specific mitigation required, but best practice adhered to. **A1**	Not significant	Insignificant	No change from existing situation.
Improvement in NO_2 and PM_{10} for one property.	Negligible	Not significant	No specific mitigation required, but best practice adhered to. **A1**	Not significant	Beneficial, long-term	No change from existing situation.
17.2.1.1.2 CULTURAL HERITAGE						
Potential effect on Sites 24 and 26 due to creation of new widened road alignment.	Local - Negligible	Slight	Mitigation will not be required to address this impact. Avoidance through careful site working and fencing.	None	Adverse, long term	No change from existing situation.
Loss, damage or severance of previously unrecorded sites/remains.	Not known	Not known – no significant impact anticipated	Confirm with Historic Scotland whether or not any field evaluation is required within new areas of land take in advance of site clearance/ construction works. **C1**	Not known – no significant impact anticipated	Adverse	No change from existing situation.
Discovery of new features due to earthworks, adding to archaeological knowledge of area. (Recording of features and/or excavation if need to be removed).	Not known	N/A	Contractor to be vigilant during construction in case of disturbing unrecorded sites and made aware of potential for site discovery. **C2, C3**	N/A	Beneficial	No change from existing situation.

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LAND USE						
Changes in access arrangements for Marldene (private property).	Medium	Slight	Relocation of existing access arrangements. **L6**	Slight	Adverse	Existing access arrangement unchanged.
Loss of community land (at Magazine Wood lay-by).	Medium	Slight	Creation of new lay-by facility. **L1, L5**	Slight	Adverse	Lay-by and its use remains unchanged.
Loss of agricultural land: Whitburgh Farm. Longfaugh Farm. Saughland Farm.	 Medium Medium High	 Negligible Slight Moderate	Minimisation of land take; minimisation of public utility diversion; re-use of excavated agricultural soil; restoration of disturbed land as far as possible; and compensation for loss of land / installation of stock holding pens at Longfaugh Farm. **L1, L2, L3, L4, L5, L6**	 Negligible Slight Moderate	 Adverse Adverse Adverse	No land take.
Loss of existing field gates and other access points: Whitburgh Farm. Longfaugh Farm (Haugh field). Longfaugh Farm (field access A8). Saughland Farm (field accesses A18 & A19).	 Medium Medium Medium Medium	 Negligible Negligible Slight Negligible	Minimisation of disturbance; compensation for loss of access; and relocation of existing access arrangements / provision of new tracks. **L6, L7, L8**	 Negligible Negligible Negligible Negligible	 Adverse Adverse Adverse Adverse	No loss / alteration to current access points.

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Loss of woodland: On the edge of Magazine Wood/ due to new Longfaugh Farm field access. At Crichton Dean.	 Medium Low	 Slight Slight	 Minimisation of land take; restoration of disturbed area to original use as far as possible; and re-planting / landscaping. **L1, L5, L9**	 Slight Slight	 Adverse Adverse	 No change to woodland.
ECOLOGY AND NATURE CONSERVATION						
Temporary habitat loss due to location of working corridor site compound.	Low	Negligible	Minimise land take. Demarcation of the working corridor. Restoration and landscaping of disturbed areas. **E1, E2**	Negligible	Adverse, short term.	No change from existing conditions.
Temporary disturbance to otter holt on Cakemuir Burn due to construction activities (human activity, noise, dust and light).	National	Minor	Sensitive construction methods, e.g. noise reduction techniques, machinery turned off when not in use, directional lighting to be used. **E2**	None predicted	Adverse, short term.	No change from existing situation.
Temporary disturbance to badger foraging during construction (human activity, noise, dust and light).	Local	Minor	Minimise land take. Demarcation of the working corridor. Sensitive construction methods, e.g. noise reduction techniques, machinery turned off when not in use, directional lighting to be used. **E1, E2**	Negligible	Adverse, short term.	No change from existing situation.
Disturbance during tree felling activities to bats potentially roosting within the lime kiln at Magazine Wood.	Regional	Minor	Demarcation of the working corridor. Sensitive tree felling activities during Sep/Oct before hibernation roosting occurs (and outwith breeding bird season). **E2, E4, E7, E8**	Minor	Adverse, short-term.	No change from existing situation.

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Disturbance during tree felling activities to bats potentially roosting within trees, particularly at Magazine Wood.	Low	Minor to Moderate	Pre-construction checks for bat roosts within trees with potential and implement mitigation where required, e.g. fell during Sep/Oct before hibernation roosting occurs (and outwith breeding bird season), leave any tree with bat roost in situ, reasonable avoidance measures. **E3, E7**	Negligible	Adverse, short-term.	No change from existing situation.
Permanent habitat loss to the scheme footprint, comprising poor quality hedgerow and stone built wall and agricultural land.	Low	Negligible to Minor	Minimise land take. Demarcation of the working corridor. Landscaping and restoration of disturbed areas – planting of hedgerows. Pre-construction wildlife checks and implement mitigation if required. **E1, E2, E3, E5**	Negligible	Adverse, short-term. Neutral, long-term.	No change from existing situation.
Loss of scattered trees and areas of scrub habitat to the scheme footprint.	Local	Minor	Planting of trees/shrubs, inc. native species of local provenance as landscaping to maintain cover. Pre-construction checks for bats, birds and red squirrel and implement mitigation if required. **E3, E5**	Minor	Adverse, short-term. Neutral, long-term.	No change from existing situation.
Loss of an area of conifer plantation at Magazine Wood (possible within an area of long-established plantation) which provides potential bat roost habitat and breeding woodland bird habitat.	Regional/ Local	Moderate	Planting of trees inc. native broad-leaved species at Magazine Wood as landscaping to maintain tree cover. Pre-construction checks for bats, birds and red squirrel and implement mitigation if required. **E2, E3, E5, E7, E8**	Minor	Adverse, short-term. Neutral, long-term.	No change from existing situation. The commercial conifer plantation may affected by other woodland activities/strategies.

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Loss of small areas of riparian habitat associated with Salters Burn and the two unnamed burns due to realigning/extending existing culverts.	Local	Minor	Appropriate landscaping and restoration of disturbed areas. Culverts to include features to allow for natural channel to develop. **E1, E2, E5, E14**	Minor	Adverse, long-term	No change from existing situation.
Potential barrier effect for otter during realignment/extension of culverts.	National	Moderate	Watercourse to remain passable to otter at end of working day. **E6, E9**	Minor	Adverse, short-term. Beneficial, long-term.	No change from existing situation.
Loss of badger foraging habitat and fragmentation/barrier effect of new road alignment.	Local	Negligible to Minor	Minimise land take. Landscaping and restoration of disturbed areas – planting of trees/hedgerows. **E1, E2, E5**	Minor	Adverse, long-term	No change from existing situation.
Fragmentation and disturbance to ornithological habitats and increased risk of road casualty.	National to Low	Minor to Negligible	Minimise land take. Landscaping and restoration of disturbed areas – planting of trees/hedgerows. **E1, E2, E5**	Minor to Negligible	Adverse, long-term	No change from existing situation.
Potential increase in wildlife road casualties, specifically badger and otter, due to increased speeds on new alignment. Badger Otter Non-protected species	Local National Low to regional	Moderate Minor Negligible to minor	Realignment/extended culvert design includes mammal ledges, separate mammal tunnel beneath A68. **E10, E11, E15**	Negligible Minor Negligible to minor	Adverse, short-term. Beneficial, long-term.	No change from existing situation unless badgers/otters become more active within scheme extents.

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Potential for water quality effects on wildlife interest due to release of sediment or other pollutants or accidental spillage during construction.	High	Major	Mitigation as set out in Chapter 13 SUDS techniques utilised. Water Quality and Drainage. Water quality protection plan implemented together with Pollution Incident Response Plan. Attenuation and treatment of surface water run-off before discharge to receiving watercourse. **E13**	Negligible to minor	Adverse, short- to medium-term.	No change from existing situation.
Pollution of surface waters due to increased road-run off / potential for accidental spillage and impacts upon ecology (with new road drainage system in place).	High	Minor to moderate	SuDS to be incorporated including filter drains and detention basin. **E12, E13**	Negligible impact to minor beneficial with improved road drainage system	Beneficial, long term	No change from existing situation.
LANDSCAPE AND VISUAL						
Mainline widening - impact on landscape character due to land take - loss of agricultural land and poor quality hedgerows.	Medium	Moderate/ slight	Minimise permanent land take. High standard design to preserve the landscape character. Opportunities to enhance landscape character and biodiversity as a result of incorporating detention basin and appropriate landscaping, inc. tree/hedgerow planting, into design. **LE1, LE2, LE3, LE4, LE6, LE7, LE8, LE9**	Slight	Adverse, long term	No change from existing situation.
Side road alteration - impact on landscape character due to land take - loss of some distinct landscape features.	Medium	Moderate		Slight	Adverse, long term	No change from existing situation.
Visual impact of A68 widening/side road alterations on properties within proximity of the road improvement.	Medium - High	Negligible to moderate	Minimise permanent land take. High standard design to preserve the landscape character. Appropriate landscaping of road embankments and tree/hedgerow planting. **LE1, LE5, LE7, LE8**	Negligible	Adverse, long term to Beneficial, long term (for travellers on A68)	No change from existing situation.

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Visual intrusion due to temporary presence of construction site compounds, plant and lighting. Road users Properties	Medium High	Negligible Moderate/ slight	Limitation of working and storage areas. Ensure good housekeeping of the construction site and storage areas. Minimise use of lighting. Restoration of disturbed areas where possible. **LE10, LE11, LE12, LE13**	Negligible	Adverse, short-term	No change from existing conditions.
TRAFFIC NOISE AND VIBRATION						
Changes in noise levels at Receptors 1 (Marldene), 4 (Routhenhill) and 5 (Hope).	Moderate	Adverse but insignificant	N/A	N/A	Adverse, long-term	No change from current situation
Changes in noise levels at Receptors 2 (Old Crichton Dean) and 3 (Haugh Head House)	Moderate	Beneficial but insignificant	N/A	N/A	Beneficial, Long-term	No change from current situation
PEDESTRIANS, CYCLISTS, EQUESTRIANS AND COMMUNITY EFFECTS						
Pedestrians	Low	Slight Beneficial	No mitigation required as design incorporates a new combined footpath / cycleway facility to replace existing footpath of poorer quality. **P1**	Slight	Beneficial	Gradual further deterioration of footpath quality.
Cyclists	Low	Slight Beneficial	No mitigation required as design incorporates a narrow footpath included within closed off side roads at U77 and U78 to maintain access for cyclists and pedestrians. Safer provision as removal of traffic access. **P1**	Slight	Beneficial	No effect.
Equestrians	Low	None	N/A	None	N/A	No effect.
Community	Low	None	N/A	None	N/A	No effect.

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Description of Predicted Impact	**Sensitivity /Value of Receptor**	**Significance of Impact Without Mitigation**	**Mitigation Measure/s**	**Significance of Impact With Mitigation**	**Beneficial or Adverse Duration of Impact (long, medium, short term)**	**Description of Predicted Effects**
Vehicle Journeys Southbound Routenhill Others Northbound Marldene Old Crichton Dean Others Field Access for Saughland Farm	 Low Low Low Low Low Low	 Negligible Negligible Negligible Negligible Negligible Negligible	No mitigation required as design incorporates a new side road linking the U77/U78 to the A68 (in place of existing U77 and U78 junctions). Also new staggered junction at B6458 provides safer access for farm traffic. **P1**	 Negligible Negligible Negligible Negligible Negligible Negligible	Slight benefit to all in long-term due to safer junctions and improved road / junction layout.	No change to existing journeys or safety levels.
VEHICLE TRAVELLERS						
Driver Views	Medium	Slight Beneficial	N/A	Slight	Beneficial	No change to existing views.
Driver Stress	High	Major Beneficial	Advance warming signs erected. **V1**	Major	Beneficial	No change to existing situation.
Potential Accidents	Medium	Moderate Beneficial	N/A	Moderate	Beneficial	No change to existing situation.
ROAD DRAINAGE AND THE WATER ENVIRONMENT						
Road drainage: Increased volume of surface water road run-off and potential for pollutants to enter the watercourses and cause deterioration in water quality- Cakemuir Burn. Salters Burn and others.	 Very High High	 Very Large Adverse	The scheme design will provide SUDS treatment of the road runoff within detention basin prior to discharge to Salters Burn and within swale feature to Cakemuir/Fala Dam Burn. **W1, W2, W3, W7**	 Moderate Moderate	Beneficial due improved drainage (when compared to existing drainage system).	Continued input of untreated road runoff to catchment.
Surface Waters: Alteration to culverts- Cakemuir Burn Salters Burn and others	 High Very High	 Neutral Neutral	No mitigation but best practice in culvert design to be followed. **W4**	 Neutral		Possible deterioration over time with increase in age of structures e.g. erosion etc.

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Effect on existing groundwater regime and risk of groundwater pollution from routine runoff.	Medium	Slight Adverse	Careful and sensitive construction and detailed drainage design. Appropriate drainage system during construction. Adherence to SEPA's Pollution Prevention Guidance Notes and 'Special Requirements' regarding controlled water. Creation of Contingency Plans and Emergency Procedures. **W1, W2, W3, W5**	Slight	Adverse, long term.	No change from existing situation.
Flooding	Low	No Impact	No risk assessment required.	N/A	N/A	No change
Risk of serious accidental spillage and deterioration in water quality of surface water features.	Very High/High	Neutral	Despite a very low risk of serious accidental spillage, containment facilities and emergency response plan will be provided due to sensitivity of receiving environment. Adherence to SEPA's Pollution Prevention Guidance Notes and 'Special Requirements' regarding controlled water. Creation of Contingency Plans and Emergency Procedures. Appropriate storage for on-site materials. **W1, W3, W6**	Minor	Beneficial long-term provided containment facilities installed (compared to existing situation).	No change from existing situation apart from added benefit of installing emergency containment facilities.

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GEOLOGY AND SOILS						
Disturbance / damage to geological and soil resource & requirement to import substantial volumes of earthworks from of-site.	Low	Slight Adverse	Limitation of extent and location of working and storage areas. Implementation of erosion and sedimentation controls. Re-use of excavated material in landscaping. Appropriate handling and storage of soils. Implementation of appropriate construction methods. Additional soil procurement should be from local sources where possible. **G1, G2, G3, G4**	Slight	Adverse long-term	No change from existing situation.
Disturbance / damage to hydrogeology of the site.	Low	Negligible	Care with culvert extension and new culvert / drainage installation. Appropriate timing. **G5**	Negligible	Long-term	No change from existing situation.
DISRUPTION DUE TO CONSTRUCTION						
Impact of airborne dust levels on local properties.	Moderate	Minor Adverse	Use of dust suppression techniques such as regular water spraying to minimise airborne dust load. Ensure that any pollution emitting plants are not located in the vicinity of a receptor unnecessary. **A1**	Negligible	Adverse, short term.	No change from existing situation.
Impact of air pollutants/emissions on air quality at local receptor sites.	Moderate	No impact	None	No impact	No impact	No change from current situation.

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Damage to or disturbance of cultural heritage features.	Local	Negligible	Preventing access to cultural heritage feature by identifying sensitive features in contract documents and fencing off prior the onset of construction. Archaeological monitoring of any works that may cause subsurface damage and recording of any archaeological features discovered. Inclusion of 'special requirements' provided by Historic Scotland in contract documents and implementation of 'special requirements' during works. **C1**	Negligible	No impact	No change from current situation.
Disruption to access arrangements to land and property due to construction and temporary land take.	High	Major Adverse	Provide temporary access points where access is disrupted during construction. Adopt construction programming sensitive to the needs of farming activity and completing disruptive works within the shortest timescales possible. **L6**	Slight	Adverse, short term	No change from existing situation.
Temporary disturbance to birds due to construction activities (human activity, noise, dust and light).	Low	Negligible	Sensitive construction methods, e.g. noise reduction techniques, machinery turned off when not in use, directional lighting to be used. Dust suppression techniques to be applied where and when required. **E2**	Negligible	Adverse, short term.	No change from existing situation.

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Disturbance of otter holt on Cakemuir Burn.	National	Minor Adverse	EMS and use of lighting minimised and directed away from sensitive receptors such as watercourses etc. **E3, E6**	Negligible	Adverse, short term	No change from existing situation.
Disturbance to foraging badgers within the vicinity of the development.	National	Minor Adverse	Completion of pre-construction surveys, covering of culverts and excavations to avoid trapping of animals, ecological watching brief as required.	Negligible	Adverse, short term.	No change from existing situation.
Disturbance to potential bat roosts within lime kiln in Magazine Wood.	Regional	Minor Adverse	EMS and dust emissions reduced as in Air Quality chapter recommendations. **E3, E4**	Negligible	Adverse, short term	No change from existing situation.
Disturbance to potential bat roosts within trees in Magazine Wood and elsewhere within vicinity of development.	Local	Minor to moderate adverse	Completion of pre-construction surveys with timing of works altered as appropriate. **E3, E4**	Negligible	N/A	No change from existing situation.
Impact of local dust levels on surrounding vegetation/habitats as a result of construction activities.	Low	Negligible to minor	Use of dust suppression techniques such as regular water spraying to minimise airborne dust load. Ensure that any pollution emitting plants are not located in the vicinity of a receptor unnecessary. **A1**	Negligible	Adverse, short term	No change from existing situation.
Disturbance to nocturnal fauna within vicinity of development by lighting.	Local	Minor	EMS and use of lighting minimised and directed away from sensitive receptors. **E2**	Negligible	Adverse, short term	No change from existing situation.

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Visual impact on 4 local properties.	Local	Slight to moderate adverse	Retain existing vegetation where appropriate; limit size and extent of working and storage areas; ensure good housekeeping of the construction site and storage areas; use of temporary floodlighting only when necessary and orientated away from receptors where possible. **LE2**	Slight to moderate	Adverse, short term	No change from existing situation.
Noise and vibration disturbance to local receptors.	Moderate	Moderate adverse	Implement best practice to minimise noise. **T1**	Slight	Adverse, short tern	No change from existing situation.
Disturbance to pedestrians, cyclists, equestrians and community effects.	Low	Negligible	Maintenance of thoroughfare throughout construction corridor by means of alternative facility or arrangement. **P1**	Negligible	Adverse, short term	No change from existing situation.
Disturbance to vehicle journeys within vicinity of development.	Low	Slight adverse	Installation of temporary or permanent new side roads prior to closure of existing roads and routes and advanced notice of any expected major delays.	Negligible	Adverse, short term	No change from current situation.
Alteration in driver views along the construction corridor.	Medium	Slight adverse	None	Slight	Adverse, short term	No change from existing situation.
Alteration to driver stress levels within construction corridor.	High	Moderate adverse	Prior warning of changes in road layout; sensitive timing of key events such as traffic management; reduced speed limits within construction corridor.	Slight	Adverse, short term	No change from current situation.
Alteration in traffic accident risk within construction corridor.	Medium	Moderate adverse	Formal traffic management system with clear signage and reduced speed limits.	Moderate	Adverse, short term	No change from current situation.

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Physical disturbance to Salters Burn, Cakemuir Burn and two unnamed burns due to alteration of existing culverts (installation of realigned/extended culverts) along with pollution risks.	Very High	Neutral	Careful and sensitive construction and detailed drainage design. Assess need for licence under Controlled Activity Regulations. **W1, W4**	Neutral	Adverse, long term.	No change from existing situation.
Risk of construction phase impacts upon surface water resources.	Very High/High	Moderate adverse	Careful and sensitive construction and detailed drainage design. Assess need for licence under Controlled Activity Regulations. Implementation of good practice measures. **W7**	Slight	Adverse, short term.	No change from existing situation.
Importing soils to the site – increased traffic impacts.	Low	Moderate adverse	Utilising local materials, reducing the need for such high levels of material importing. **G1**	Slight	Adverse, short term	No change from existing situation.
Extent of earthwork and soil exposure .	Low	Moderate Adverse	Limitation of extent and location of working and storage areas. Implementation of erosion and sedimentation controls. Re-use of excavated material in landscaping. Appropriate handling and storage of soils. Implementation of appropriate construction methods. Additional soil procurement should be from local sources where possible. **G1, G2, G5**	Slight	Adverse long-term	No change from existing situation.