

21. Summary of Effects and Mitigation

21.1 Introduction

21.1.1 This chapter provides a summary of the environmental commitments that have been described in each environmental topic chapter, which will need to be part of the Scheme implementation.

21.1.2 Table 21.1 below reports the specific mitigation commitments outlined in each environmental topic chapter.

Table 21.1: Schedule of Environmental Commitments (continued over)

Mitigation Item no.	Approximate chainage / location	Mitigation Objective and Commitment	Potential Mitigation Measure	Potential Timing of Mitigation Measure	Potential Monitoring Requirements	Potential Additional Consultation Required
Land Use (Chapter 8)						
LU1	Residential Properties on Shore Road	To minimise number of properties demolished or subjected to garden land take. Reduce disturbance to remaining neighbouring properties.	Route and Landscape design	During Construction	None	-
LU2	Agricultural land Greenisland	To minimise loss of agricultural land and maintain access to fields	Route and Landscape design. Creation of new field accesses. Provision of compensation.	During Construction	None	DoE/DARD
Geology and Soils (Chapter 9)						
GEO1	Throughout route	Reduce risks to construction workers health	Implementation of Best Practice procedures during construction	During Construction	None	EHS
GEO2	Throughout route	Reduce risks to fauna health	Implementation of Best Practice procedures during construction	During Construction	None	EHS
GEO3	Throughout route	Reduce risks to floral communities	Implementation of Best Practice procedures during construction	During Construction	None	EHS
GEO4	Throughout route	Reduce risk to groundwater	Implementation of Best Practice procedures during construction	During Construction	None	EHS
GEO5	Throughout route	Reduce risk to groundwater and surface waters	Implementation of Best Practice procedures during construction	During Construction	None	EHS
GEO6	Throughout route	Reduce risks to nearby receptors including residential properties.	Implementation of Best Practice procedures during construction	During Construction	None	EHS
GEO7	Throughout route	Reduce risks associated with soil gases	Implementation of Best Practice procedures during construction	During Construction	None	EHS
Water Quality and Drainage (Chapter 10)						
WQ1	Surrounding watercourses	To prevent pollution of watercourses from construction operations.	The Contractor shall produce an environmental management plan for the works detailing how best practice guidance, as detailed in PPG's published by the Joint Environment Agencies of the United	During Construction	Contractor's Site Management and Client's Representative	EHS and Rivers Agency may wish to see Contractor's

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			Kingdom and CIRIA Reports C532 & C648, will be implemented. In addition, a specific method statement covering the construction of watercourse crossings should be produced to demonstrate how the works would be completed with the minimum of disturbance.			method statements
WQ2	Infrastructure surrounding watercourse crossings	To maintain the existing flow capacity of watercourse channels during construction operations.	Temporary provisions for diverting flow from a watercourse during construction or extension of culverts should cater for a 1 in 10 year return period flow in that watercourse (as defined in current guidance). Current guidance also recommends contingency planning for flows greater than this. It is recommended that the contractor should undertake some form of flood risk assessment where residential property or other infrastructure could be affected, and design temporary measures to ensure flood risk is not increased during the works.	During Construction	Contractor's Site Management and Client's Representative	Rivers Agency may wish to see Contractor's proposals for temporary works
WQ3	Surrounding watercourses	To minimise changes to the channel and bank of a watercourse during construction operations.	No construction of temporary watercourse crossings. A full topographic and photographic survey should be completed along each watercourse covering the area to be disturbed during the works. This information should provide sufficient detail to allow the watercourse to be reinstated after the works. Reinstatement should include re-vegetation with local plant species to stabilise the banks. The Contractor should clearly mark out working zones around each watercourse, and these should be the minimum area required to safely complete the works. Surface water run off from the site should be attenuated to ensure	During Construction	Contractor's Site Management and Client's Representative	EHS and Rivers Agency may wish to see reinstatement proposals

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			discharges suit the capacity of each watercourse.			
WQ4	Groundwater under the Scheme	To minimise changes to the groundwater regime during construction	The Contractor should produce a method statement regarding the control of ground water in the overlying drift deposits. Groundwater collecting on the site should not be allowed to discharge in an uncontrolled fashion into watercourses.	During Construction	Contractor's Site Management and Client's Representative	EHS and Rivers Agency may wish to see method statement
WQ5	Groundwater under the Scheme	To prevent pollution of groundwater from construction operations	See WQ1 above. Specific measures would include, for example; lined bunds around all fuel, oil, and other chemical stores; centralise and minimise the number of these stores; complete all servicing, fuelling, and storage of vehicles at these major construction compounds; provide dedicated wash down areas for concrete and other delivery vehicles and capture and treat the effluent from these facilities. See WQ4 above. It is noted that some form of treatment (e.g. settlement) may be required before discharging groundwater to a watercourse.	During Construction	Contractor's Site Management and Client's Representative	EHS and Rivers Agency may wish to see method statement
WQ6	Surrounding watercourses	To prevent pollution of watercourses from surface water run off from the road once in operation	Inclusion of primary mitigation measures within the design to control the levels of pollution reaching watercourses with outfalls e.g. oil interceptors on each outfall on both the online and offline sections and an attenuation / treatment pond adjacent to watercourse no.13.	During Design	None at this stage	EHS should be consulted on the final surface water drainage proposals
WQ7	Surrounding watercourses	To prevent pollution of watercourses from the operation of the road	Works to culverts and other road infrastructure should be completed under an approved method statement and should	During Operation	None at this stage	Roads Service may wish to consult the

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			include best practice measures (including the Joint Environment Agencies Pollution Prevention Guidelines) to reduce the risk of significant physical disturbance of, or major spillages to, watercourses.			EHS on maintenance method statements
WQ8	Infrastructure surrounding watercourse crossings	To maintain or improve flow capacity of new / extended culverts passing under the finished road alignment.	New and extended culverts should be sized to accept a defined return period storm, which in turn should be set by the Scheme designers in accordance with current best practice and advice from the Rivers Agency. The storm flows should be calculated for each watercourse using FEH or similar accepted methods. The culverts should be no smaller than the existing watercourse crossings they will be replacing / or extending.	During Design	None at this stage	Rivers Agency with regard to watercourse / culvert data
WQ9	Surrounding watercourses	To minimise permanent changes to the channel and bank of a watercourse from the final design for watercourse crossings.	The design of the extended / new crossings shall be such as to avoid changing the alignment and concentration of flows upstream and downstream of each crossing point. Bank protection works upstream and downstream should be kept to the minimum length required. Analysis of the potential for scour at all bridge and culvert sites, and good design of scour protection works. The advice within CIRIA Report C551 Manual on Scour at Bridges and other Hydraulic Structures should be taken into account in the design. Design of all new river crossings and culvert works for the Scheme in accordance with the Scottish Executive's "River Crossings and Migratory Fish: Design Guidance".	During Design	None at this stage	None at this stage

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WQ10	Surrounding watercourses	To restrict the run off from the outfalls for the Scheme to acceptable levels in comparison to the watercourse channels.	Survey of the culvert and channel downstream of each proposed outfall location to determine the condition and capacity of each channel. Assessment of the flows within each watercourse and limiting the discharge rate from road drainage to an appropriate rate for each watercourse. One method would be to adopt a common Greenfield run off rate of 5 - 7l/s/ha (CIRIA C609), but this would need to be assessed against the capacity of each watercourse. Design of outfalls in accordance with current best practice to prevent scour and erosion of adjacent channel.	During Design	None at this stage	Rivers Agency with regard to discharges
WQ11	Surrounding watercourses	To minimise the impact of the completed road on the land drainage patterns.	Surface flows collected upslope of the new offline road alignment should be discharged to the nearest watercourse or drainage feature, thereby retaining the water within its natural drainage catchment and minimising hydrological changes to each watercourse. The drainage discharge points at each watercourse should be designed in accordance with best design practice to prevent erosion of the channel and banks.	During Design	None at this stage	Rivers Agency with regard to discharges
WQ12	Groundwater under the Scheme	To minimise changes to the groundwater regime from the presence of the Scheme.	None included at this stage.	N/A	N/A	N/A
WQ13	Groundwater under the Scheme	To prevent pollution of groundwater from the operation of the Scheme	None included at this stage.	N/A	N/A	EHS should be consulted on the final surface water drainage proposals

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Ecology and Nature Conservation (Chapter 11)						
ECOL1a	Works in vicinity of watercourses, outfalls to drains, in vicinity of Belfast Lough	Significantly reduce pollution risk to site during construction	An 'ecological clerk of works' will be retained throughout the construction period; Guidance published by the Joint Environment Agency will be applied; working areas will be clearly defined; Litter management, stockpiles of earth will not be kept near stream channels; earth stockpiles will be covered; on-site storage of chemical, fuel or construction materials shall be limited; fuel or chemical stores will be secure from vandalism and appropriately banded to at least 110% capacity.; all potentially polluting liquids and solids associated with vehicles, equipment and machinery need to be identified to site staff; pollution contingency plans will be developed ; contractor shall not wash tools and equipment in any watercourse; Washwater shall not be discharged into any watercourse or into road drains or disposed of in any way that could result in a discharge to controlled water; Mobile bunding or material for bund construction will be available should an emergency barrier need to be constructed to prevent material leakage from a works site into a watercourse; and Quantities of absorbent substrate will be available to soak up spillages or leaks;	During construction	None	-
ECOL1b	Watercourses, outfalls to drains which feed directly to Belfast Lough	Significantly reduce pollution risk to site during operation	Appropriate pollution prevention controls including SUDS, including a bypass type fuel/oil interceptor providing primary treatment for the flows in advance of discharge to a watercourse.	During operation	Monitoring change in water quality and success of SUDS systems/fuel interceptors in eliminating	EHS (requirement for Appropriate assessment and SUDS design)

Mitigation Item no.	Approximate chainage / location	Mitigation Objective and Commitment	Potential Mitigation Measure	Potential Timing of Mitigation Measure	Potential Monitoring Requirements	Potential Additional Consultation Required
					pollutants	
ECOL2	Jointure Bay Stream SLNCI site	Minimise loss of habitat	Ecological Clerk of Works to be retained throughout the construction period; minimise habitat loss; site staff made aware of location of sensitive habitats; and fencing and signage of sensitive habitats.	During construction	None	-
ECOL3	All habitat on off-line and on-line sections including watercourses	Off-set loss of habitat	Ecological Clerk of Works to be retained throughout the construction period; storage and construction compounds to be located in areas agreed with Ecological Clerk of Works; observance of Joint Environment Agency Regulations; and landscape planting using species of local provenance.	During construction	None	-
ECOL4	Invasive species	Eradicate Japanese knotweed from site	Ecological Clerk of Works to be retained throughout the construction period; Japanese knotweed Method Statement to be implemented; spraying and digging out Japanese knotweed rhizomes; and disposal of plant material in licensed landfill.	During construction	Regular checks (monthly) to ascertain any regrowth	-
ECOL5	Watercourses	Minimise loss/disturbance of otters and their habitat and minimise road mortality	Ecological Clerk of Works will be retained throughout the construction period; Pre-construction check for shelters and extent of otter usage of site prior to construction; culverts to remain passable to otter during construction and operational phase; and site compounds sited away from watercourses.	During construction	None	-
ECOL6	Buildings/mature trees to be felled/demolished	Minimise loss of bat habitat and minimise disturbance to roost sites	Ecological Clerk of Works will be retained throughout the construction period; inspection of all buildings and suitable tree roost sites prior to demolition or felling; workmen advised of possibility of finding bats on site; felling of mature trees using stepped approach for each limb. Continuous strips of woodland retained and any gaps replanted with native species of local provenance.	During construction	None	-
ECOL 7	Scrub/trees/ woodland	Minimise/off-set loss of breeding	Ecological Clerk of Works will be retained	During	None	-

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		habitat and disturbance to breeding birds	throughout the construction period; any necessary scrub or tree removal outside of the breeding season (March-August). If not possible, experienced ornithologist to supervise works to avoid disturbing breeding birds, planting of native species to off-set loss of breeding habitat.	construction		
Landscape and Visual Effects (Chapter 12)						
LV1	Throughout the Scheme	Repair landscape character by replacement of walls and replanting	Replacement of walls and replanting	During construction	None	EHS, The Planning Service
LV2	Unknown	Repair lost landscape elements by replacement of walls, replanting and use of high quality materials	Replacement of walls, replanting and use of high quality materials	During construction	None	EHS, The Planning Service
LV3	Throughout Scheme	Soften visual intrusion by replacement of walls and replanting	Replacement of walls and replanting	During construction	None	EHS, The Planning Service
LV4	Throughout Scheme	Soften visual intrusion by replacement of walls and replanting	Replacement of walls and replanting	During construction	None	EHS, The Planning Service
LV5	Throughout Scheme	Repair lost landscape elements by replacement of walls and replanting	Replacement of walls and replanting	During construction	None	EHS, The Planning Service
Cultural Heritage (Chapter 13)						
CH1	Ancillary works, e.g., site hut/stockpile locations	To minimise adverse impacts on archaeological heritage.	Engage qualified archaeologist to undertake desktop study of areas affected by ancillary works.	Prior to Construction	-	EHS – Built Heritage
CH2	Along entire length of route and any other areas of topsoil stripping	To document any unknown archaeological heritage.	Engage qualified archaeologist to observe topsoil stripping and record any features of archaeological interest.	During Construction	-	EHS – Built Heritage

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CH3	In the vicinity of the Scheme	To minimise the impact on the Cultural Heritage of the area.	Engage a qualified archaeologist to investigate affected archaeological sites as documented in Sections 13.4 & 13.5.	Prior to Construction	-	EHS – Built Heritage
Air Quality (Chapter 14)						
AQ1	On site and surrounding road network	To minimise dust blow from site, stockpiles and road network.	Dampening of haul roads and stockpiles. Keeping roads clean and using covers over construction lorry trailer units.	During Construction	-	-
AQ2	Public road network	To minimise dust/mud dispersal onto adjoining road network during wet weather.	Site traffic will only be able to access public roads at designated points to increase control over washing of mud from vehicles. Wheel washing facilities may be required.	During Construction	-	-
Traffic Noise and Vibration (Chapter 15)						
NV1	On site	To monitor and mitigate noise impact, as required.	Contractor should delegate a person responsible for noise monitoring and mitigation and acting upon inquiries from the local public.	During Construction	-	Environmental Health Officer
NV2	Entire length of carriageway	To reduce noise levels, generated from road traffic.	Use of low noise surfacing.	During Construction	-	-
NV3	1 and 1a Station Road	To reduce noise levels, generated from road traffic.	Use of acoustic laminate glazing.	During Construction	-	-
Pedestrians, Cyclists, Equestrians and Community Effects (Chapter 16)						
PECE1	University of Ulster	Control A2 vehicular flows during roundabout construction period – but with no temporary severance of vehicular (or pedestrian) access to/from the A2.	Use of temporary traffic lights	During construction	None	-
PECE2	Belfast High School	Control A2 vehicular flows during roundabout construction period – but with no temporary severance of vehicular (or pedestrian) access to/from the A2.	Use of temporary traffic lights	During construction	None	-
PECE3	Wavecrest Apartments	Control A2 vehicular flows during	Use of temporary traffic lights	During	None	-

A2 Shore Road Greenisland

Environmental Statement

Mitigation Item no.	Approximate chainage / location	Mitigation Objective and Commitment	Potential Mitigation Measure	Potential Timing of Mitigation Measure	Potential Monitoring Requirements	Potential Additional Consultation Required
		roundabout construction period – but with no temporary severance of vehicular (or pedestrian) access to/from the A2.		construction		
PECE4	St Colmans RC Church	Control A2 vehicular flows during roundabout construction period – but with no temporary severance of vehicular (or pedestrian) access to/from the A2.	Use of temporary traffic lights	During construction	None	-
PECE5	Church of the Nazarene	Control A2 vehicular flows during roundabout construction period – but with no temporary severance of vehicular (or pedestrian) access to/from the A2.	Use of temporary traffic lights	During construction	None	-
PECE6	Silverstream Primary School	Control A2 vehicular flows during roundabout construction period – but with no temporary severance of vehicular (or pedestrian) access to/from the A2.	Use of temporary traffic lights	During construction	None	-
PECE7	Greenisland community facilities and services - <i>(from St Colmans RC Church at the southern end of Station Road to Greenisland Train Station at the Northern end of Station Road)</i>	Control A2 vehicular flows during roundabout construction period – but with no temporary severance of vehicular (or pedestrian) access to/from the A2.	Use of temporary traffic lights	During construction	None	-
PECE8	Ulsterbus	Control A2 vehicular flows during roundabout construction period – but with no temporary severance of vehicular (or pedestrian) access to/from the A2.	Use of temporary traffic lights	During construction	None	
PECE9	Footpath & Cycleway	Control A2 vehicular flows during roundabout construction period – but with no temporary severance of vehicular (or pedestrian) access to/from the A2.	Use of pedestrian crossing.	During Construction	None	

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Disruption Due to Construction (Chapter 18)						
DDC1	Location TBC	To reduce the environmental impacts associated with temporary construction compounds	The contractor will follow various best practice guidance, as outlined in individual environmental topics.	During Construction	Site Supervisor	Planning and Highway Authorities.
DDC2	Throughout route	To reduce lorry movements	The contractor will ensure that material excavated on-site is re-used wherever possible	During Construction	Site Supervisor	Planning and Highway Authorities
DDC3	Location TBC	To maintain road safety for other highway users	The contractor will ensure that construction sites have wheel washing facilities	During Construction	Site Supervisor	Planning and Highway Authorities
DDC4	Throughout route	To ensure access for vehicle travellers is maintained	The contractor will as part of the Traffic Management Plan ensure that access, or alternative access if maintained at all times during construction along the A2	During Construction	Site Supervisor	Planning and Highway Authorities
DDC5	Throughout route	To ensure access for pedestrians, cyclists and equestrians is maintained	The contractor will as part of the Traffic Management Plan ensure that access, or alternative access if maintained at all times during construction along the A2	During Construction	Site Supervisor	Planning and Highway Authorities
DDC6	Throughout route – properties / buildings	To prevent structural damage to material assets	The contractor will ensure that pre-construction condition surveys are undertaken at those properties /buildings identified as being at risk from vibration impacts associated with construction activity	Pre-construction	Contractor	Planning Service. Roads Service, E&HS
Policies and Plans (Chapter 19)						
PP1	Throughout Route	To reduce the impact on local built heritage	Landscape design	During Construction	None	-