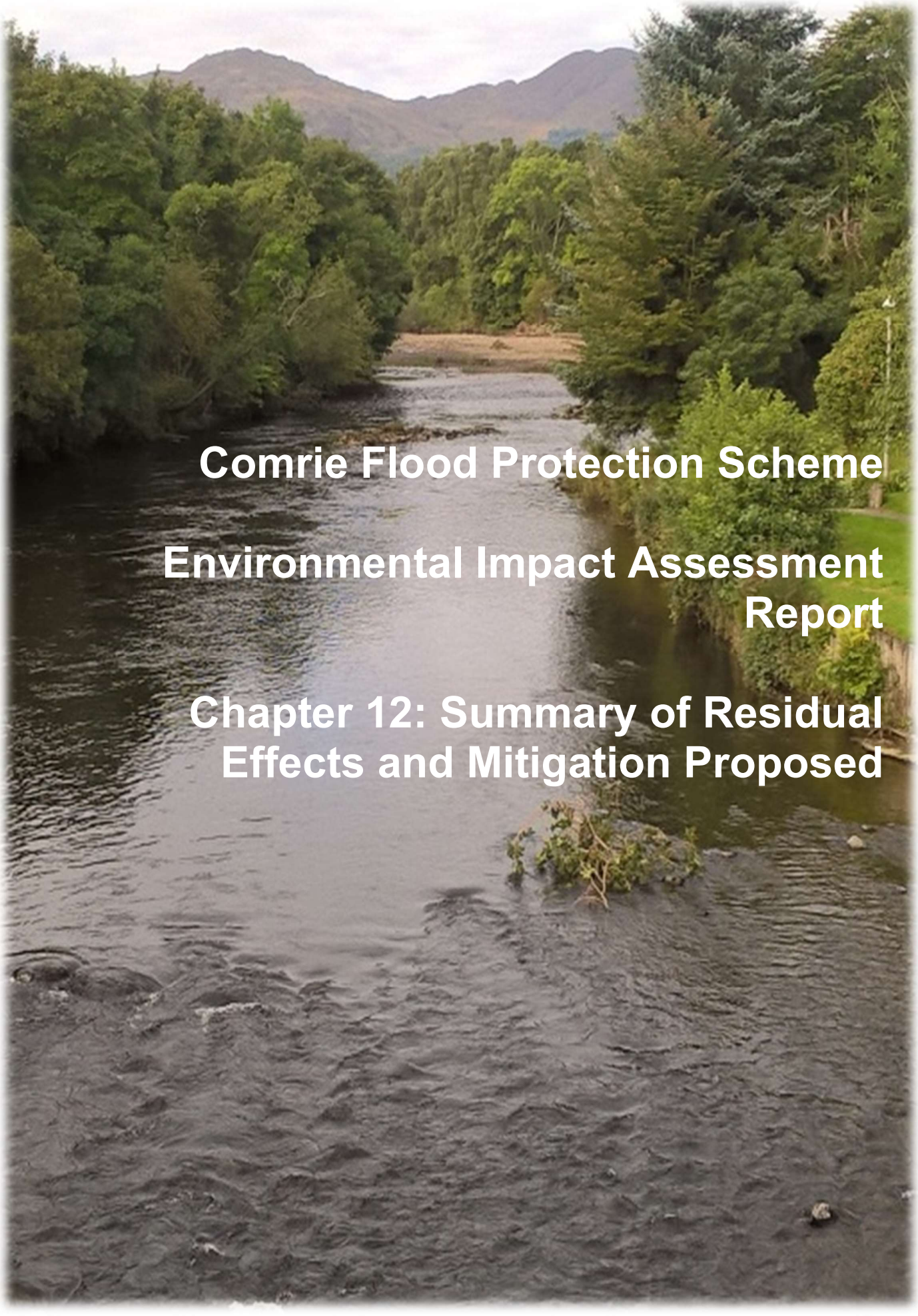

Comrie Flood Protection Scheme

Environmental Impact Assessment Report

Chapter 12: Summary of Residual Effects and Mitigation Proposed

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12 Summary of Residual Effects and Mitigation Proposed

12.1 Residual Effects

12.1.1 Summary tables (**Tables 12.1 – 12.5**) are provided below to present the potential likely significant effects of the Scheme and the mitigation proposed within each assessed topic within the EIAR (**Chapters 5 – 10**). The resultant residual effect is after that proposed mitigation is applied.

12.1.2 No significant residual effects were predicted for **Chapter 7: Hydrogeology & Contamination** as all of the identified potentially significant effects on identified receptors during the construction and operational stages are considered to be suitably mitigated to a non-significant level.

12.1.3 Those mitigation measures that have already been included and embedded in the outline design are shown highlighted green. For those measures not included (highlighted blue), it is recommended that these are taken forward and considered as part of the detailed design phase.

12.1.4 For completeness, all construction related mitigation proposed is highlighted orange, these are all detailed in the outline CEMP (**Appendix 3.1**) and should be incorporated into the final CEMP and CMS documents at the detailed design stage. These mitigation measures form the basis of the Schedule of Mitigation and Contractor requirements set out in **Table 12.6**.

Table 12.1: Summary of effects – Landscape and Visual

Discipline	Potential Effects (operational phase only)	Mitigation	Residual Effect (Year 20)
Landscape and visual	National Scenic Area Comrie to St Fillans	Replacement tree planting along river corridors.	No direct effects
	Upper Strathearn Special Landscape Area	Replacement tree planting along river corridors.	Negligible
	Scheme Area 1: Water of Ruchill	Replacement tree planting along river corridors; the use of natural stone cladding in the vernacular style for walling at Tomnagaske and No. 4 Aros Field; and the use of a green method of river bank protection.	**Minor** adverse
	Scheme Area 2: Central Comrie	Replacement planting including a number of extra heavy and semi-mature trees, the sensitive detailing of flood walling including the use of natural stone cladding in the vernacular style and the introduction of planted build outs on Strowan Road.	**Minor** adverse
	Scheme Area 3: River Lednock	Replacement planting including a number of semi-mature trees; and the sensitive detailing of flood walling including the use of natural stone cladding in the vernacular style and to match sandstone walling in the vicinity of St Serf's and St Margaret's churches.	**Minor** adverse
	Scheme Area 4: East Comrie	Replacement planting including a number of extra-heavy trees; and the sensitive selection of concrete finishes.	**Minor** adverse
	Representative viewpoint 1: Melville Monument	Replacement tree planting along the length of the Scheme.	**Negligible**
	Representative viewpoint 2: Core Path CMRI 1/5 South	The alignment of the embankment is positioned to minimise tree removal.	**Minor** adverse
	Representative viewpoint 3: Core Path CMRI 1/5 North	Replacement tree planting along the river.	**Minor** adverse
	Representative viewpoint 4: Dalginross Bridge	The alignment of the proposed wall to the south of the river has been positioned to minimise the removal of trees. The sensitive detailing of flood walling including the use of natural stone cladding in the vernacular style softens the appearance of walls. Replacement tree planting along the river banks and within the public open space. Tree planting within the open space includes a number of semi-mature trees. Street tree planting is proposed on Strowan Road. Ornamental planting is proposed within the public open space.	**Minor** adverse

Discipline	Potential Effects (operational phase only)	Mitigation	Residual Effect (Year 20)
Landscape and Visual	Representative viewpoint 5: Open Space North of the River Earn	The alignment of the proposed wall to the south of the river has been positioned to minimise the removal of trees. The sensitive detailing of flood walling including the use of natural stone cladding in the vernacular style softens the appearance of walls. Replacement tree planting along the river banks and within the public open space. Tree planting within the open space includes a number of semi-mature trees. Street tree planting is proposed on Strowan Road. Ornamental planting is proposed within the public open space.	**Minor** adverse
	Representative viewpoint 6: Strowan Road	The alignment of the proposed wall to the south of the river has been positioned to minimise the removal of trees. The sensitive detailing of flood walling including the use of natural stone cladding in the vernacular style softens the appearance of walls. Replacement tree planting along the river banks and within the public open space. Tree planting within the open space includes a number of semi-mature trees. Street tree planting is proposed on Strowan Road. Ornamental planting is proposed within the public open space.	**Minor** beneficial
	Representative viewpoint 7: The Bridge of Lednock	The alignment of the wall to the east of Glenbuckie minimises tree loss along the river bank. The sensitive detailing of flood walling including the use of natural stone cladding softens the appearance of walls. Replacement tree planting including semi-mature trees to be planted at St Margaret's Church.	**Minor** adverse
	Representative viewpoint 8: Dundas Bridge	The sensitive detailing of flood walling including the use of natural stone cladding softens the appearance of walls. Replacement tree planting along in the vicinity of St Serf's Church.	**Minor** adverse
	Representative viewpoint 9: Core Path CMRI 14/1	Replacement tree planting along the river banks.	**Minor** adverse
	Representative viewpoint 10	The embankment is offset slightly away from the edge of property boundaries resulting in the retention of boundary vegetation which assists in softening the profile of the embankment.	**Minor** adverse
	Representative viewpoint 11	The embankment has been aligned to follow the existing field pattern as far as possible. Woodland planting assists in grounding the embankment within the landscape.	**Minor** adverse
	Residential properties: Glenbuckie and Earnbank	Replacement tree planting along the river side and the use of natural stone coping on the vernacular style for walling. Further replacement planting within private gardens is to be agreed at detailed design and therefore not included in this assessment.	**Minor** adverse
	Caravans located on the	Replacement tree planting along the river.	**Minor** adverse

Discipline	Potential Effects (operational phase only)	Mitigation	Residual Effect (Year 20)
	southern boundary of Comrie Holiday Park		
Landscape and Visual	Residential Property: No. 5 Garry Place	Replacement planting within private gardens is to be agreed at detailed design and therefore not included in this assessment.	**Moderate** adverse
	Residential properties: Kintail and Dunearn	Replacement planting within private gardens is to be agreed at detailed design and therefore not included in this assessment.	**Major** adverse

Table 12.2: Summary of effects – Water Environment & Fluvial Geomorphology

Water Environment & Fluvial Geomorphology	Potential Effects	Mitigation	Residual Effect
CONSTRUCTION			
Hydrology and Flood Risk	Increased temporary flooding in Dalginross due to construction sequencing (if construction of flood defence walls started in north-east of Dalginross near Tay Avenue this would cut off the east-flowing flood recession route, creating a physical barrier resulting in pooling throughout a wide area of Dalginross).	Contractor will carefully consider construction sequencing in the Programme (risk minimised if flood defences are constructed in a clockwise direction starting in the south-west of Dalginross at Aros Field Road). Property-level protection for those identified to be at risk from secondary flooding will be constructed in advance of the Scheme defence works to ensure site-specific flooding impacts are avoided.	**Negligible**
	Increased temporary flooding in Comrie/Dalginross from River Earn if flood defences are completed on one bank first, deflecting flows to the opposite (incomplete) bank.	Contractor will carefully consider construction sequencing in the Programme. Construction on both banks in tandem will mitigate the risk of flows deflecting onto the opposite bank. If this is not possible, the northern defences should be constructed first (as properties on the southern bank of the River Earn are at a slightly higher elevation and therefore are at less risk of flooding).	**Negligible**
	Construction compounds situated in flood risk areas could be at risk of flooding. Unsecured materials and plant could exacerbate flood risk by causing flow restrictions if washed into the channel or if situated on the floodplain.	SEPA flood warnings in the local area will be reviewed regularly by the Environmental Manager or equivalent. Materials/plant will be securely stored in site compounds to prevent their movement. Plant and materials will be stored in safe areas out with the floodplain where practicable.	**Negligible**
Fluvial Geomorphology	Temporary disturbance/damage to existing river banks due to installation of flood defences and erosion protection measures. On Water of Ruchill beneficial effect of removing existing rip-rap and installation of the new root wad revetment on the outer meander bend (right bank) at the Field of Refuge over an approximately 250m stretch of the right bank.	Flood walls and embankments will be placed as far back from the bank edge as possible. Extent and duration of bare/exposed surfaces will be limited to minimise risk of silt-laden runoff entering watercourses. Restoration works will be undertaken as soon as possible following construction.	**Minor** adverse (River Earn and Water of Ruchill) **Negligible** (River Lednock)

Water Environment & Fluvial Geomorphology	Potential Effects	Mitigation	Residual Effect
Fluvial Geomorphology	Temporary disturbance/damage to river bed due to in-channel works (particularly the River Earn) required for installation of erosion protection measures.	Contractor will prepare Construction Method Statement(s) to plan and manage in-channel works and works on the bank, to be approved by SEPA prior to construction. Contractor will limit the extent of river bed disturbance in the River Earn (and other watercourses if required).	**Minor** adverse
	Temporary increase in sediment supply to watercourses due to construction activities close to river banks and removal of bankside vegetation	Contractor will implement sediment control measures to minimise risk of silt-laden runoff entering watercourses (such as silt/sediment traps and fences, temporary drainage provision and cut-off ditches around construction works, site compounds and soil/material stockpiles). Bankside vegetation will be retained wherever possible to help bind the soil.	**Negligible**
Water Quality	Increased risk of silt-laden and contaminated runoff to watercourses and sediment within the water column, particularly due to in-channel works and works on bank edge with associated effects on aquatic ecology.	Contractor will prepare a CEMP to be approved by SEPA prior to construction. Contractor may also need to apply to SEPA for a Construction Site Licence under CAR prior to construction. An ECoW will monitor construction works to ensure working methods and temporary mitigation measures are working effectively.	**Minor** adverse

Water Environment & Fluvial Geomorphology	Potential Effects	Mitigation	Residual Effect
Water Quality	Increased risk of pollutants and accidental spillages entering watercourses from construction activities, with associated effects on aquatic ecology and groundwaters.	Contractor's CEMP will include a Pollution Incident Plan or equivalent detailing measures to minimise risk of a serious pollution incident and actions to take in the event of a spillage during construction taking cognisance of GPP21 and GPP22. Emergency spill kits will be available on site to deal with accidental spillages and leaks. SEPA and CIRIA best practice guidance to manage and reduce the risk of water pollution and sediment release will be followed. Polluting activities will be undertaken within site compounds, or controlled areas a safe distance from watercourses, and will be appropriately bunded/contained to prevent any uncontrolled runoff to watercourses. Construction plant will be regularly checked for leakages and maintained. Storage of oils/fuels will follow good practice and sewage will be appropriately collected and disposed of. Pre-fabricated concrete units will be brought to site during construction rather than concrete being cast on site to reduce the risk of unset cement washing into watercourses, wherever possible. In-channel works will be avoided during November and May to avoid the sensitive spawning period for salmon.	**Minor** adverse
OPERATION			
Hydrology and Flood Risk	With the completed Scheme, an estimated 189 properties will be brought out of flood risk at the 0.5% AEP (1:200 year) event.	The overall scheme provides the mitigation to bring these properties out of flood risk.	**Moderate Beneficial**
	Increase in flood depth (up to 200mm) on land parcels out with the study area which do not contain any residential or non-residential receptors (i.e. low sensitivity).	Not applicable – these areas of land do not include any sensitive receptors and would therefore not yield an economic benefit from being protected by the Scheme. The completed Scheme does not increase existing flood risk in these areas.	**Negligible** (no change from baseline)

Water Environment & Fluvial Geomorphology	Potential Effects	Mitigation	Residual Effect
Fluvial Geomorphology and Water Quality	Disruption/change to natural flow patterns and velocities (particularly for River Earn and Lednock where flood defences located close to bank tops) resulting in increased flow velocities and erosion.	Periodic monitoring of the watercourses, particularly after flood events by a trained geomorphologist will ensure flood defences continue to be effective. Regular monitoring of bank protection measures by Perth & Kinross Council will ensure the measures are working and vegetation is establishing.	**Minor** adverse
	Increased scour risk of erosion protection measures and flood defences resulting in increased sediment supply to watercourses.	Regular monitoring of bank protection measures by the Council will ensure the measures are working and vegetation is establishing. Any periodic maintenance works will be subject to the same level of mitigation and good practice as during the construction phase to ensure risks of silt-laden and polluted runoff to watercourses is minimised.	**Negligible**

Table 12.3: Summary of effects – Ecology and Nature Conservation

Important Ecological Features (IEF)	Potential effect	Mitigation	Residual effect
Broadleaved woodland (District)	Construction – Habitat Loss Negative, irreversible	Generic mitigation Tree planting	**Minor** (not significant) Negative, short-term, irreversible
Rivers (District)	Construction – Pollution/habitat degradation Negative, reversible	Generic mitigation	**Minor** (not significant) Negative, short-term, reversible
Bats (District)	Construction – Direct mortality	Pre-construction surveys EPS licence and species protection plan	**Negligible**
	Construction – Loss of roosting habitat (trees)	Artificial bat roost habitat provision i.e. bat boxes on trees to be removed	**Minor** (not significant) Negative, short-term, reversible
	Construction – Loss of roosting habitat (trees)	Provision of artificial roost habitat in disused railway bridge[1]	**Minor** (not significant) Positive, medium-long term, reversible
	Construction – Disturbance (St Margaret's Church)	Avoidance of works during maternity roosting period	**Minor** (not significant) Negative, short-term, reversible
	Construction – loss of foraging/commuting habitat (vegetation removal and lighting)	Sensitive use of artificial lighting during bat activity period.	**Minor** (not significant)

Important Ecological Features (IEF)	Potential effect	Mitigation	Residual effect
		Tree and other landscape planting	Negative, short-term, reversible
Beaver (District)	No significant effects anticipated	Generic mitigation including landscape tree planting which will be a future foraging resource.	Negligible (not significant)
	Construction – fragmentation/barrier effects	Maintain dark corridors and through-routes on all three watercourses No obstacles in channel/on banks	**Minor** (not significant) Negative, short-term, reversible
Breeding birds (Local)	Construction – Direct mortality/injury/loss of nests	Timing of tree felling/vegetation clearance works outwith nesting period (April – July inclusive). Pre-construction surveys	**Negligible**
Red squirrel (Local)	No significant effects anticipated	Generic mitigation	**Negligible**
Otter (District)	Construction – Loss of resting sites	Provision of artificial holt[1] Pre-construction surveys EPS licence and species protection plan	**Minor** (not significant) Negative, long-term, irreversible
	Construction – fragmentation/barrier effects	Maintain dark corridors and through-routes on River Earn No obstacles in channel/on banks	**Minor** (not significant) Negative, short-term, reversible
Aquatic ecology (Regional)	Construction – habitat fragmentation during in-channel works	Avoid in-channel works during November – May period to protect salmonid spawning/brood areas	**Minor** (not significant) Negative, short-term, reversible

Important Ecological Features (IEF)	Potential effect	Mitigation	Residual effect
	Construction – Pollution and habitat degradation from siltation and contaminated runoff	Avoid in-channel works during November – May period to protect salmonid spawning/brood areas Generic mitigation	**Minor** (not significant) Negative, medium-term, reversible
Invasive, non-native species (INNS) (Local)	Construction – spread of INNS into the wild	Implementation of INNS management plan and control/appropriate disposal of INNS and biosecurity plan	**Minor** (not significant) Negative, medium-term, reversible
	Operation – spread of INNS into the wild	Implementation of long-term INNS management plan	**Minor** (not significant) Negative, medium-term, reversible

[1] Environmental enhancement measures have been agreed as part of the outline design but need to be further detailed at the next stage i.e. detailed design and upon obtaining landowner approval

Table 12.4: Summary of effects – Cultural Heritage

Discipline	Potential Effects	Mitigation	Residual Effect
Cultural Heritage	Construction effect: removal of Category C listed building garden wall, part of the curtilage of Earnside (LB5347) resulting in an impact of minor significance	Listed Building Consent followed by appropriate mitigation to be agreed with the Council.	**Minor** adverse Significance
	Construction effect: construction of a flood wall abutting the Category C Listed Building Dalginross Bridge (LB75), resulting in an impact of negligible significance	Listed Building Consent followed by appropriate mitigation to be agreed with the Council.	**Negligible** - adverse Significance
	Construction effect: impact on previously unrecorded cultural heritage assets from the construction of embankment and construction impact. Significance of impact unknown but unlikely to be greater than minor adverse significance	Programme of archaeological works to be agreed with Perth & Kinross Heritage Trust (advisors to the Council).	None
	Operational effect: Adverse effect of minor significance to the Comrie Conservation Area (CA585) from changes to its setting in particular from the removal of trees along the south of the River Earn on Strowan Road	N/A	**Minor** adverse

Table 12.5: Summary of effects – Socio-economics, Public Access and Amenity

Discipline	Potential Effects	Mitigation	Residual Effects
Socio-economic (Construction)	The Comrie Fortnight Festival and Comrie Flambeaux are two regionally important events that held within the Scheme construction extent.	None - It is predicted that the construction of the Scheme would not affect the staging of these regionally important events.	**Negligible**
	During construction, the impact of the Scheme in income and employment terms is predicted to result in a "very small" change to the economic opportunities of the group as a whole. However, a very small number of individuals may benefit more significantly.	The appointed Contractor will be required to maintain effective liaison with the local community throughout the construction period. A stakeholder communications plan will be developed and maintained by the appointed Contractor	**Negligible / Minor** Adverse
Socio-economic and Health, Safety and Wellbeing (Operation)	It is predicted that the Scheme would provide flood protection to 189 receptors which are currently at risk of flooding from a 1 in 200-year flood event. The reduction in flood risk will result in a positive effect upon health, safety and wellbeing.	N/A	**Moderate** Beneficial
Health, Safety and Wellbeing (construction)	The potential effects on the community, due to disturbance caused by the construction of the Scheme within close proximity to residential properties and community land / facilities etc. are summarised as follows: • Construction activities leading to increased traffic and associated driver frustration • Construction activities leading to increased noise and vibration levels • Local movement of large plant and machinery through rural areas and the town of Comrie • Increased flood risk during construction (in-river working areas reducing channel capacity) • Risk associated with people accessing construction areas • Risk to construction workers working in the river environment • Temporary diversions to the public road and footpath network	The detailed CEMP will be required to address noise, dust management, traffic management, programme, procedures for in river works and to comply with current legislative requirements.	**Minor** Adverse

Discipline	Potential Effects	Mitigation	Residual Effects
Agricultural land (Construction)	The construction of the Scheme is predicted to directly affect agricultural land with land-take required to locate and operate construction compounds and for the construction working corridor. Elements of the Scheme would also be constructed within agricultural areas (**Minor adverse**).	Land-take for the Scheme will be kept to the minimum necessary for safe construction and operation. Landowners will be notified in advance of construction works. Consultation with affected landowners and occupiers will be undertaken. Agricultural land temporarily used during construction will be re-instated to agricultural use immediately following completion of the works. Construction activities such as vehicle movements will be restricted to an allocated working corridor. Access to all fields which remain in agricultural use will be maintained and boundary features. Financial compensation for the temporary and permanent land-take required for the Scheme will be agreed separately between the affected land-holder and Perth & Kinross Council.	**Minor** Adverse
Agricultural land (Operation)	To the east of Dalginross, there is an approximate permanent land-take of **0.42 ha** as a result of the flood embankment (ER04) footprint including the 6m strip of land between the foot of the flood embankment and Dalginross which is required for maintenance access.		**Minor** adverse
	To the west of Dalginross, there is an approximate permanent land-take of **0.27 ha** as a result of the flood protection wall and embankment (WR02).		**Minor** adverse
Public Access (construction)	*It is predicted that the following routes would be temporarily diverted, and therefore amenity of the route would change during construction:*		
	CMRI/1 and PRoW 25/24: Camp Road will remain open to maintain access for residential receptors. There would potentially be a construction compound located within the agricultural field that will affect NMUs who are using the route past Camp Road **(moderate adverse).**	The detailed CEMP will be required to address noise, dust management, traffic management, programme, procedures for in river works and to comply with current legislative requirements. A phased construction programme will ensure access to rivers and the associated banks is maintained in certain areas	**Negligible / Minor**
	CMRI 14/PRoW 25/1, 25/14 and Ruchill Walk:<250m change in journey length **(minor-moderate adverse)**		**Minor-moderate** adverse
Public Access	CMRI/35, PRoW 25/35 and Bogton Braes Walk: >500m change in journey length **(moderate-major adverse)**		**Moderate** adverse

Discipline	Potential Effects	Mitigation	Residual Effects
(construction)		throughout the period of the works thereby enabling use by anglers, canoeists and NMU's. Where practicable, temporary diversion routes will be provided to maintain safe access for NMUs throughout the construction works. Any closure or re-routing of routes used by NMUs would take cognisance of relevant guidance such as the 'Roads for All: Good Practice Guides for Roads' (Transport Scotland, 2013). These will be agreed with the Council by the appointed Contractor and will be clearly indicated with signage as appropriate and with advance notification where possible.	
	The following routes would result in a change to the amenity during construction:		
	CMRI 43, PRoW 25/43, Glen Lednock Circular Path, Laggan Wood Walk, Maam Road Walk. **(Minor adverse)**	The detailed CEMP will be required to address noise, dust management, traffic management, programme, procedures for in river works and to comply with current legislative requirements. A phased construction programme will ensure access to rivers and the associated banks is maintained in certain areas throughout the period of the works thereby enabling use by anglers, canoeists and NMU's.	Negligible / Minor adverse
	CMRI/126 **(Minor adverse)**		Negligible / Minor adverse
	River Earn **(Minor-moderate adverse)**		Negligible / Minor adverse

Discipline	Potential Effects	Mitigation	Residual Effects
Public Access (construction)	Water of Ruchill **(Minor adverse)**	Where practicable, temporary diversion routes will be provided to maintain safe access for NMUs throughout the construction works. Any closure or re-routing of routes used by NMUs would take cognisance of relevant guidance such as the 'Roads for All: Good Practice Guides for Roads' (Transport Scotland, 2013). These will be agreed with the Council by the appointed Contractor and will be clearly indicated with signage as appropriate and with advance notification where possible.	Negligible / Minor adverse
	River Lednock (**Minor adverse)**		Negligible / Minor adverse
Public Access (Operation)	*It is predicted the amenity of the following designated routes (including Core Paths and Public Rights of Way) would be affected after the Scheme has been built out:*		
	CMRI/14, ProW 25/1, 25/14 and Ruchill Walk **(Negligible- Minor adverse)**	Once operational, landscape planting incorporated into the design of the Scheme may also serve to improve the amenity value experienced by users of NMU routes. There will be enhancement within the green space with improvements to the informal path network and a coherent ornamental planting scheme. Additional enhancement will occur along Strowan Road with additional planting within proposed traffic calming measures (trees with ornamental planting).	**Negligible / Minor** adverse
	CMRI/43, PRoW 25/43, Glen Lednock Circular Path, Laggan Wood Walk, Maam Road Walk **(Negligible- minor adverse)**		**Negligible** adverse
	River Earn **(Minor adverse)**		**Negligible / Minor** adverse
	River Lednock **(Minor adverse)**		**Negligible** adverse
Public Access (Operation)	CMRI 35, PRoW 25/35 and Bogton Route: To allow access to, stairs have been proposed at Garry Place and to the east of the Fire Station where		**Minor adverse** for

Discipline	Potential Effects	Mitigation	Residual Effects
	CMRI 35 enters Dalginross resulting in a negligible impact. For some vulnerable users, access from Garry Place will be restricted **(Minor adverse** for the majority of NMUs however, **minor- moderate adverse impacts** are predicted for some vulnerable users**)**		the majority of NMUs however, **minor - moderate adverse impacts** are predicted for some vulnerable users
Community Land and Facilities (Construction)	Land-take is required from community land and facilities listed below. It is also predicted that there will be a change to these amenities of the facility during construction resulting from the presence of loud machinery and an increase in construction traffic local to the site Comrie Fire Station <0.1ha land take St Margaret Church <0.1ha land take St Serf's Church <0.1ha land take **(all moderate adverse)**	Once operational, landscape planting incorporated into the design of the Scheme may also serve to improve the amenity value experienced by users of NMU routes. There will be enhancement within the green space with improvements to the informal path network and a coherent ornamental planting scheme. Additional enhancement will occur along Strowan Road with additional planting within proposed traffic calming measures (trees with ornamental planting).	**Moderate** Adverse
	The Greenspace along the riverbanks of the Earn (left and right) would also be directly affected. This facility could also be inaccessible during the period of construction works for the flood walls **(Moderate-major adverse)**		
Community Land and Facilities (Operation)	Effects on the community land and facilities listed below are predicted to occur as a result of changes to the surrounding landscape brought about through the expected required land-take and loss of trees as a result of the Scheme: Comrie Fire Station (**Minor)**	Once operational, landscape planting incorporated into the design of the Scheme may also serve to improve the amenity value experienced by users of NMU routes.	**Minor** Adverse / **Negligible**

Discipline	Potential Effects	Mitigation	Residual Effects
	St Margaret Church (**Minor-moderate**) St Serf Church (**Minor-moderate)** However, the sites would benefit from protection of 1 in 200-year flood events.	There will be enhancement within the green space with improvements to the informal path network and a coherent ornamental planting scheme. Additional enhancement will occur along Strowan Road with additional planting within proposed traffic calming measures (trees with ornamental planting).	
	Access to the Boulevard area and the right side of the River Earn (used by NMUs) has been maintained through the provision of stairs and ramps. The area will be directly affected resulting in a slight loss of land.		**Negligible**

12.2 Schedule of Mitigation Proposed

12.2.1 A summary of the specific measures identified in the EIAR to reduce the identified construction and operational effects are provided in **Table 12.6** below. All construction related mitigation proposed is highlighted orange, with mitigation measures already included and embedded in the outline design highlighted green.

12.2.2 Construction mitigation measures should be incorporated into the final CEMP and CMS documents at the detailed design stage.

12.2.3 All mitigation measures identified for the assessed landscape and visual topic have already been embedded into the outline design (**Chapter 5: Landscape & Visual Impact Assessment**).

Table 12.6 Schedule of Mitigation

Location	Responsibility and Timescales	Mitigation Measure	EIA Reference
Water Environment & Fluvial Geomorphology			
Scheme wide construction areas	The Council and appointed Contractor – advance works and throughout construction phase	Construction sequence plan to be implemented to reduce flood risk to town during the construction period.	EIAR **Chapter 6**: Water Environment & Fluvial Geomorphology
		SEPA flood warnings to be reviewed on a daily basis and appropriate action to be taken in the event of predicted heavy rainfall to protect unsecured materials/plant and items located in site compounds to prevent their movement or release. Plant and materials will be stored in safe areas out with the floodplain where practicable.	
		A Pollution Incident Plan (or equivalent) to be prepared to describe the measures to minimise the risk of a serious pollution incident and actions to take in the event of a spillage during construction, taking cognisance of SEPA's Guidance for Pollution Prevention (GPP) 21: Pollution incident response planning and GPP22: Dealing with spills. Emergency spill kits will be available on site to deal with accidental spillages and leaks.	
		The Contractor will implement sediment/pollution control measures to minimise the risk of silt-laden and polluted runoff entering watercourses. This may include silt/sediment traps and fences, temporary drainage provision and cut-off ditches around construction works, site compounds and soil/material stockpiles. The Contractor should also maintain robust surfacing of the site compounds to minimise the pooling of surface water.	
		Potentially polluting activities such as refuelling, vehicle washing and stockpiling of soils/materials will be undertaken within site compounds, or controlled areas a safe distance from watercourses, and will be appropriately bunded/contained to prevent any uncontrolled runoff to watercourses. Where possible, plant and machinery will be stationed on hardstanding surfaces with spillage/drip trays used where required. Construction plant will be regularly checked for leakages and will undergo regular maintenance.	
		Wherever possible, pre-fabricated concrete units will be brought to site during construction rather than concrete being cast on site to reduce the risk of unset cement washing into watercourses.	
		Best practice measures associated with storage of oils and fuels will be followed in compliance with CAR and SEPA's GPP2: Above ground oil storage tanks. Oils will be stored within a leak-proof container and be contained within a secondary containment system with a capacity of 110% or more of the containers storage capacity, in line with CAR General Binding Rule (GBR) 28.	

Location	Responsibility and Timescales	Mitigation Measure	EIA Reference
		Sewage from site welfare facilities will be disposed of appropriately either to the foul sewer with the permission of Scottish Water, or in accordance with GPP4: Treatment and disposal of wastewater where there is no connection to the public foul sewer.	
Three properties within the Scheme area	The Council and appointed Contractor – during the advance construction works	Targeted property level mitigation to address the detriment from minor changes in surface water-based flooding at a range of return periods.	EIAR **Chapter 3:** Scheme Description and Alternatives; and EIAR **Chapter 6**: Water Environment & Fluvial Geomorphology
Hydrogeology and Contamination			
Scheme wide construction areas	Appointed Contractor – during the construction phase	Emergency spill kits to be provided on site to protect against accidental release, leakage or spillage of potentially contaminative substances and materials.	EIAR **Chapter 7**: Hydrogeology and Contamination
		All fuel and other chemicals to be stored in accordance with best management practice within the site compounds. All oil and fuel storage facilities and small static plant to be well managed to minimise the risks of leaks to soil and groundwater.	
		Construction plant to be checked regularly and undergo regular maintenance to ensure the minimisation of leakages and spillages.	
		Suitable management measures to be implemented during construction to ensure the control and management of dust.	
		Construction activities to be halted should unexpected contamination be identified during construction (e.g. hydrocarbon impacted soils, asbestos) until a suitably qualified professional is consulted to assess the situation and provide advice.	
		Any contaminated ground (including invasive species) that is encountered to be dealt with according to best practice and contained in the works or disposed of following best practice to a suitably licensed disposal facility.	
		Concrete and cement mixing and washing areas to be located at appropriate distances from surface watercourses to limit potential pollution of the water environment.	

Location	Responsibility and Timescales	Mitigation Measure	EIA Reference
		Site drainage measures, including drainage ditches and silt traps to collect and treat increased surface run-off, to be implemented where required.	
		Construction traffic to be limited to allocated routes within the Scheme area.	
		The appropriate level of CAR authorisation to be required for all groundwater dewatering activities during the construction phase and groundwater to be collected and treated where necessary.	
		Control and management of dust to be implemented through the cleaning of construction plant (e.g. wheel washes and wash down areas) to minimise cross contamination across ownership boundaries.	
		An assessment of potential risks to construction workers from deep excavations or enclosed spaces to be undertaken prior to works being carried out and to include provision of suitable protective measures.	
Former gasworks area	The Council and specialist contractor – during construction	In the area of the former gasworks, excavation and removal of 1m depth of made ground and placement of a geotextile membrane to act as a demarcation layer to any residual contaminated soils at depth, with placement of clean cover soils above to a minimum depth of 0.4m.	Remediation Strategy and EIAR **Chapter 7**: Hydrogeology and Contamination
Ecology and Nature Conservation			
Riverside and identified areas with invasive weeds	The Council and appointed Contractor - pre-construction phase	Invasive Non-Native Species (INNS) management and eradication – treatment by spraying.	INNS Management Plan (**EIAR Appendix 8.8**)
Scheme wide construction areas	The Council and appointed Contractor Pre-construction and during construction phase	Site clearance including tree felling.	EIAR **Chapter 8**: Ecology and Nature Conservation
		Pre-construction surveys are required to ensure that construction activity avoids unlawful disturbance of protected species. This involves a Suitably Qualified Ecologist (SQE) undertaking surveys for European Protected Species (such as occupied otter holts) and nesting birds within the recommended minimum buffer areas for each species. Pre-construction surveys are aimed towards informing any additional mitigation measures that may be required and provide evidence for licence applications that may be required.	

Location	Responsibility and Timescales	Mitigation Measure	EIA Reference
Scheme wide construction areas	The Council and appointed Contractor Pre-construction and during construction phase	An Environmental/Ecological Clerk of Works (ECoW) will be appointed to ensure compliance with the CEMP and commitments made, to provide advice in the event of any unforeseen protected species issues that arise during construction, and to oversee the implementation of mitigation measures.	EIAR **Chapter 8**: Ecology and Nature Conservation
		Adherence to the Guidance for Prevention of Pollution (GPP) in respect of working in and around watercourses and protection of watercourses. Adherence to SEPA and CIRIA good practice engineering guidance, specifically WAT-SG-23 (bank protection), WAT-SG-25 (river crossings), WAT-SG-26 (sediment management) and WAT-SG-29 (construction methods) will also ensure minimisation of disturbance and risk of pollution. The Contractor will implement sediment/pollution control measures to minimise the risk of silt-laden and polluted runoff.	
		Avoidance of unnecessary disturbance to habitats (including river bed habitat) by minimising the extent of ground clearance and other construction practices and restoration works following construction wherever reasonably practicable.	
		All construction activity will be restricted to clearly defined working areas, keeping vegetation clearance to a minimum and limiting hardstanding to the minimum needed to reduce the need for additional drainage provision. Habitats which would be subject to temporary loss will be re-vegetated and reinstated as soon as possible after construction is complete.	
		Typical working hours will be between the hours of 07.00 – 19.00 to avoid the need to work in dark/low light levels when protected species such as otters and bats are likely to be most active. If night works are unavoidable the need for artificial lighting will be kept to a minimum and directed away from sensitive habitats and species such as bat roosts and river corridors.	
		The loss of broadleaved woodland habitat will be offset by proposed compensatory tree planting.	
		Direct mortality/injury of roosting bats using trees to be felled as roosts will be prevented by undertaking pre-construction surveys at all trees to be felled.	

Location	Responsibility and Timescales	Mitigation Measure	EIA Reference
Scheme wide construction areas	The Council and appointed Contractor Pre-construction and during construction phase	The loss of mature trees with potential bat roost habitat cannot be replaced like-for-like in the short to medium term, given that the trees to be felled are considered to be permanently lost, and it will take time for trees to grow and develop similar roost features (see tree planting proposals above). Instead bat roost habitat will be provided in the form of bat boxes on mature trees to be retained along the Water of Ruchill/Field of Refuge and on the Lednock. Replacement bat roost, such as Schwegler bat boxes and low-maintenance roost features, are designed to last a number of years and will provide roosting opportunities in close proximity to the existing resource to be lost to the Scheme. All replacement roost habitat will be located outwith areas of potential disturbance including artificial lighting/noise, and in accordance with bat box installation guidance in relation to height above ground and orientation.	EIAR **Chapter 8**: Ecology and Nature Conservation
		Tree felling, use of artificial lighting, piling and the use of heavy/vibrating machinery will be avoided within 50m up- and downstream of St Margaret's Church during the bat maternity roosting period of May to August inclusive in order not to disturb any roosting bats at a vulnerable period of their life cycle.	
		Direct mortality/injury/disturbance of nesting birds will be avoided by undertaking vegetation clearance/tree felling works outwith the sensitive nesting period of March – August inclusive. If site preparation works during this period are unavoidable the SQE or ECoW will undertake or commission to undertake pre-clearance checks and there is no alternative if nests (occupied nests or those in the process of being built) are found to works being delayed until any young have fledged.	
		Otter resting places will be identified by the Ecological Clerk of Works (ECoW) and a 30m buffer demarked. No access will be taken within this area without the permission and presence of the ECoW.	
		Prior to works, a European Protected Species derogation Licence would be acquired for disturbance of the identified resting sites.	
		Should any otter resting sites or beaver lodges, or burrows be identified within 30m of any working areas during the pre-construction surveys or during Site activities, all works will cease until the ECoW is contacted and a licence in obtained from SNH.	

Location	Responsibility and Timescales	Mitigation Measure	EIA Reference
Scheme wide construction areas	The Council and appointed Contractor Pre-construction and during construction phase	Construction will avoid periods of peak otter and beaver activity (where practicable) which are largely taken to include the hours between dusk and dawn. Where it is not possible to strictly comply with this requirement, construction activities will permit at least one night of undisturbed passage for every two day/nights of construction work subject at the discretion of the ECoW and additional pre-construction survey/monitoring as required to determine the level of use of the river banks.	EIAR **Chapter 8**: Ecology and Nature Conservation
		No obstacles/obstructions will be placed either in-channel or bankside that may impede the safe passage of otters, and potential resting places will not be obstructed. If crossing features are required, any structure over the feature will allow safe passage underneath.	
		In addition, it will be necessary to check exposed pipes and trenches each morning for any trapped animals (ECoW to be contacted in this event).	
		In-channel works will be avoided during the period November to May to avoid the sensitive spawning period for salmonids.	
Cultural Heritage			
Area of new flood wall which abuts the Dalginross Bridge and impacts listed buildings	The Council Pre-construction	Listed building consent will be required.	EIAR **Chapter 9**: Cultural Heritage
Scheme wide construction areas	The Council and appointed Contractor Pre-construction and during construction phase	Archaeological works to be agreed in advance with Perth & Kinross Heritage Trust.	
		Construction impacts upon previously unrecorded heritage assets will be mitigated through a programme of archaeological works which could include a watching brief on ground-breaking works if required.	

Location	Responsibility and Timescales	Mitigation Measure	EIA Reference
Socio-Economics, Access And Amenity			
Scheme area	Appointed Contractor – during the construction phase	All site compounds and construction areas will be appropriately fenced in order to prevent public access to the construction areas.	EIAR **Chapter 10**: Socio-economics, Public Access and Amenity
		The appointed Contractor will identify the measures to reduce the short-term health and safety risks due to the construction works. This will be completed by ensuring procurement documentation conditions are adhered to throughout the construction period as well as ensuring that best practice and (HSE) guidelines relating to construction site planning and management are implemented throughout the works period.	
		Methodologies including construction site and access, traffic management and phasing will be developed by the appointed Contractor to reduce the extent of any disruption to the local community including reducing conflicts with both local and strategic traffic and to ensure any H&S risks associated with construction movements are minimised.	
		Land-take for the Scheme will be kept to the minimum necessary for safe construction and operation.	
		Landowners will be notified in advance of construction works. Consultation with affected landowners and occupiers will be undertaken in advance of the works in order to plan the phased construction activities to minimise disturbance to agricultural practices including harvesting periods. All work will be carried out in accordance with the agreed programme.	
		Agricultural land temporarily used during construction will be re-instated to agricultural use immediately following completion of the works. Topsoil, where disturbed will be left in a loose friable condition and where agreed, appropriate cover will be replaced. Re-grading where appropriate will be undertaken.	
		Construction activities such as vehicle movements will be restricted to an allocated working corridor which will be determined by the appointed Contractor. Construction site and access will be agreed with affected landowners prior to works commencing.	
		Access to all fields which remain in agricultural use will be maintained and boundary features (fences, walls and hedges, water supplies, and drainage systems) will be re-instated following the completion of works.	
		The outline design embeds a series of steps and ramps to retain access to NMU routes, the rivers and the areas of open space following the construction of the Scheme.	

Location	Responsibility and Timescales	Mitigation Measure	EIA Reference
Scheme area	Appointed Contractor – during the construction phase	A phased construction programme will ensure access to rivers is maintained in certain areas throughout the period of the works thereby enabling use by anglers and canoeists and NMU's.	EIAR **Chapter 10**: Socio-economics, Public Access and Amenity
		Where practicable, temporary diversion routes will be provided to maintain safe access for NMUs throughout the construction works. Any closure or re-routing of routes used by NMUs would take cognisance of relevant guidance such as the 'Roads for All: Good Practice Guides for Roads' (Transport Scotland, 2013). These will be agreed with the Council by the appointed Contractor and will be clearly indicated with signage as appropriate and with advance notification where possible.	
		Construction would be undertaken in line with best practicable measures (as set out in the appointed Contractors CEMP) to ensure noise, air and dust impacts are reduced as far as reasonably practicable, whilst also reducing the visual impacts of works were feasible. Best practicable measures would include fencing off construction work areas, dust suppression techniques and completion of work during agreed working hours to minimise community disturbance.	
		The appointed Contractor will liaise with Perth & Kinross Council and construction activities will be planned carefully to ensure minimal disruption to local events hosted in Comrie and Dalginross.	