ANNEX C

COLLATED MITIGATION

GENERAL MITIGATION

GEN1. Where final scheme details could vary from those described in the ES, the terms of the contract would ensure that the resulting effects were no greater than those reported in the ES. If there were significant differences in the predicted effects of the scheme an addendum to the ES would have to be published for public consultation and comment and consideration by Transport Scotland and Scottish Ministers.

GEN2. Consultations and discussions with key stakeholders would continue through the contract.

GEN3. The contractor would be required to obtain all necessary permissions and consents for use of land outwith the land made available for the contract.

GEN4. The contractor would be required to securely fence off the area of the works in advance of construction in order to protect public safety and ensure that there is no unauthorised public access to the site.

GEN5. The contractor would be required to manage traffic on the A82 and A85 and on local roads safely and efficiently through the works to ensure the risk of delay and inconvenience was reduced to the minimum necessary for the works.

GEN6. Temporary signs would be employed during the life of the contract to warn drivers in advance about the presence of any queues and anticipated delays.

GEN7. Working hours would be agreed with Stirling Council and set out in the contract. At present they are assumed to be 08.00 to 19.00 Monday to Friday and 08.00 to 13.00 on Saturday. All night time and Sunday working would be agreed in advance with Stirling Council and Loch Lomond and the Trossachs National Park.

GEN8. Noise limits for construction would be agreed with Stirling Council and set out in the contract.

GEN9. Access to all properties would be maintained during construction and operation of the scheme.

GEN10. The contractor would be required to maintain effective liaison with local communities close to the construction area. This would include circulation of information about ongoing activities and a contact telephone number for use by the local community to contact the contractor for information. The telephone would be operated during operational hours and person(s) with appropriate authority to resolve any problems that occur would be available. A log of all complaints and actions taken would be kept and made available for inspection.

GEN11. The contractor would be required to produce and implement an Environmental Management System (EMS) for the construction and maintenance period.

GEN12. Compliance with the EMS would be audited at regular intervals by Transport Scotland's representative on site.

GEN13. The scheme drainage would include appropriate sustainable urban drainage system measures.

GEN14. The herringbone drainage system would be designed to sit underneath the topsoil layer of the cuttings to minimise visual intrusion.

GEN15. Ledges to allow animal passage would be included in the new culverts.

GEN16. Use of hexagonal reinforced earth and gabion baskets in the works would not be permitted.

GEN17. The new road and associated works would only be lit where essential to comply with current safety standards.

GEN18. The contractor would be required to remove the top turfs from the peat to use in restoration.
GEN19. The contractor would be required to re-use as much extracted peat as possible in the earthworks and landscaping for the scheme to avoid loss of peat to off-site disposal.
GEN20. The contractor would be encouraged to identify locations for peat taken off-site to be reused wherever possible.
GEN21. Timber felled from site and the adjacent area would be extracted using techniques sensitive to working on slopes on peat.
GEN22. All cascades water features would be designed to be as natural as possible in character.
GEN23. The contractor would be required to discuss and agree final deer fencing proposals with the Deer Commission for Scotland.

LAND USE

LU1. All redundant areas of road following construction of the new road would be grubbed up unless consultation with the landowner identifies these should be left for other purposes.
LU2. The West Highland Way spur would be realigned and access under the road provided by an underpass.
LU3. Access to the West Highland Way would be maintained during construction and any diversions well signed.
LU4. All residents and businesses in proximity to the works would be informed about the details of the final proposals and the construction timetable in advance of construction beginning.
LU5. The land take for the proposals would be kept to the minimum necessary for safe construction and mitigation of the works.
LU6. All utilities which would be affected by construction would be protected to ensure that the supplies of water, electricity, telephone etc to properties would be maintained. If any short interruptions were required to join in new connections to the site affected parties would be notified in advance.
LU7. Forestry would be felled to a wind-firm edge as agreed with the Forestry Commission.

GEOLOGY AND SOILS

G1. The contractor would be required to implement best practice measures to ensure disturbance to local geology and soils is reduced to the minimum necessary for the safe implementation of the works.
G2. The effect of erosion of new soil slopes would be mitigated by earthworks, detailed drainage design and re-use of removed turfs or new planting.
G3. Existing watercourses would be culverted under the bypass at their current location. The drainage pattern would not be significantly altered.
G4. Where peat deposits are to be excavated, pumping of inflowing groundwater to detention basins would be implemented if required.
G5. Opportunities to create rock cuts of geological interest would be exploited where appropriate.
G6. Only minor rock cuts would be expected. Newly exposed rock would be left bare where practical.

G7. Large glacial boulders uncovered by the works which were considered by the site's environmental representative to be suitable for inclusion in landscaping works would be safeguarded and used.

G8. Scheme drainage measures would be designed to avoid significant disturbance of local drainage patterns.

G9. All soils disturbed by the works would be handled, stored and re–spread following best practice[1] to minimise adverse effects upon soil quality.

G10. The contractor would be required to produce a method statement identifying how best practice would be implemented to ensure soils were safeguarded.

G11. All fuel and other chemicals would be stored in accordance with best management practice within the site compounds. All oil and fuel storage facilities and small static plant would be well managed to minimise the risks of leaks to soil and groundwater.

G12. Plant and vehicles used for the construction works would be maintained on impermeable surfaces to contain oil spills.

G13. All earth bunds and soil storage areas would be well managed to minimise run–off and erosion.

G14. Soils removed, as part of the earthworks to facilitate construction would be re–used wherever possible in the final landforming of the road unless found to be unsuitable.

G15. Any peat that could not be re-used in the works would be disposed off-site in accordance with best practice.

G16. Any contaminated ground that is encountered would be dealt with according to best practice and contained in the works or disposed of following best practice to a suitably licensed disposal facility.

G17. Turfs removed from the peat surface would be re-used in restoration of the earthworks to help promote stability.

G18. During construction, peat bodies along the route of the bypass would have their peat removed in order to avoid the potential for subsidence of the road surface and embankments to occur after construction as a result of buried peat decomposing and compressing.

G19. Construction vehicles would avoid crossing bodies of deep peat that are not to be removed or buried by the proposed development, wherever possible, to avoid damage to the integrity of the vegetation or underlying peat (which would make the body of peat more susceptible to failure during or after construction).

G20. During construction the effects of any deep cuttings on bedrock and/or glacial deposits that retain remaining peat bodies identified as at risk from construction would be considered and appropriate mitigation defined if required.

G21. Gently sloping batters would be used (of less than 15 degrees) where it has been identified that cuttings could put peat at risk of sliding on to the road during heavy rainfall events.

G22. The effects of the proposals on the hydrology of any peat body identified as potentially unstable would be further investigated prior to the commencement of construction activities in order to determine whether the proposed design could reduce the stability of the peat body and whether further mitigation measures would be required.

[1] For example see Ministry of Agriculture, Fisheries and Food, Good Practice Guide for Handling Soils http://webarchive.nationalarchives.gov.uk/20090306103114/http://www.defra.gov.uk/farm/environment/land-use/soilguid/index.htm

ROAD DRAINAGE AND THE WATER ENVIRONMENT

Dr1 The detailed drainage design would be carried out in accordance with the DMRB, SEPA[2], CIRIA[3] and other best practice guidance and to meet all requirements of the Water Environment (Controlled Activities) Regulations 2005 (CAR).

Dr2 All detailed drainage proposals would be discussed and agreed with SEPA. Method statements for works in proximity to or in watercourses would be discussed with SNH because of the importance of the River Fillan as part of a site designated for its European importance.

Dr3 The detailed drainage design would ensure that there is not an increased risk of flooding of areas in proximity to the works.

Dr4 All pipes, basins or filter drains would be isolated from existing surface and groundwaters using impermeable membranes in any locations where land is found to be contaminated.

Dr5 The detailed design would include appropriate Sustainable Urban Drainage System (SUDS[4]) measures including filter drains, detention basins and filter trench (the detention basins and filter trench would each have an underdrain) (see Section 8.8.1).

Dr6 All detailed drainage measures would be designed to benefit nature conservation where this is practical and feasible taking account of future maintenance requirements. The contractor would be required to follow best practice guidance.

Dr7 The filter trench would be infilled with suitable material and covered with geotextile and a layer of topsoil.

Dr8 All existing watercourses to be crossed would be culverted to maintain the existing flow path. The existing and proposed culverts would be designed to pass the peak flows of a 1 in 200 year return period (including climate change) as advised in SPP7[5] and the SEPA Technical Flood Risk Guidance[6].

Dr9 Any existing forestry drainage severed by the scheme would be picked up in the new drainage system.

Dr10 All surface water drainage from the scheme would pass through detention basins/filter trench before being discharged to the watercourses. This would provide flow attenuation and pollution benefits. The detention basins would have an underdrain which would provide additional treatment and capacity. The detention basins would be unlined and act as soakaways during periods when the basins levels exceed groundwater levels. This is most likely in the summer months.

Dr11 A herringbone system would be incorporated into the design of the cuttings to ensure that any run-off from the cuttings and any groundwater (throughflow) are intercepted and drained.

Dr12 The contractor would be required to identify and implement measures to prevent any sediment rich or polluted run-off or contaminated groundwater produced by the works entering and polluting the local drainage system and watercourses, and to adopt all specific measures identified in the contract requirements.

[2] Current list of relevant guidance available at: SEPA website www.sepa.org.uk
[3] CIRIA, Control of Water Pollution from Linear Construction Projects, Technical guidance (C648)
[4] Sustainable Urban Drainage Systems (SUDS) are drainage methods which are based on natural processes to achieve attenuation of run-off water quality and quantity. Guidance on SUDS systems is available from SEPA, CIRIA etc (see relevant web links)
[5] Scottish Planning Policy 7: Planning and Flooding
[6] SEPA Technical Flood Risk Guidance For Stakeholders Version 3
http://www.sepa.org.uk/flooding/flood_risk/planning__flooding.aspx

Dr13 The contractor would be required to develop contingency plans, emergency procedures and joint response plans which would be implemented in the case of accidental spillages during construction. These would be developed in compliance with all best practice guidance and would include a drainage catchment plan detailing the drainage system. This would be made available by the contractor to emergency services to aid in the event of a major spill.

Dr14 Sewage from construction compounds would either pass to a temporary septic tank which would be periodically emptied and removed for off-site disposal at a licensed sewage treatment facility, or would be temporarily connected to an existing sewer.

Dr15 During operation of the road the maintenance contractors would be required to comply with current SEPA guidance and specifications to avoid the risk of pollution.

Dr16 All SUDS measures would be maintained by Transport Scotland's trunk road maintenance appointee at the end of the contract maintenance period.

Sustainable Urban Drainage Systems

The proposed bypass would cross eight watercourses and it is intended to culvert these on their existing courses (see Section 3.2.2.3). Drainage measures would be required mainly on the upslope side of the road. In order to maintain the integrity of the cuttings in soil, ditches (approximately 0.5m deep) would be required at the top of the slope. Cascades would be used to link the cut-off drains and culverts (see Section 3.2.2.3). Given that the cuttings would intercept groundwater flows, it may be necessary to install herringbone drains to pick up individual seepages (see Section 3.2.2.8). Cuttings in rock would require similar drainage measures at rockhead but seepages from the rock are not expected to be problematic.

Areas of embankment would require upslope ditches to divert surface water into the watercourses.

SUDS measures for the bypass were developed as an integral part of the outline design (see Section 3.2.2.8). Such measures would provide settlement to deal with suspended solids, some breakdown of pollutants by natural processes and attenuation to ensure that run-off is limited to greenfield rates. The rate of recharge from a detention basin to the underlying strata is dependant upon the drift composition and the difference in water levels. The detention basins are designed to cope with run-off associated with a 1 in 200 year event.

The SUDS measures which would be implemented are:

- surface water run-off from the carriageway would be collected by filter drains in the verge. These would provide for attenuation and improve water quality by filtration and some biological degradation;
- at the roundabouts, kerbing would be provided at the carriageway edge with gullies and carrier drains as the primary form of drainage. The gullies would have a sump for the collection of sediment;
- chambers in the form of catchpits and manholes, would be located at no more than 90m intervals to facilitate the rodding of the system. The sumps in the catchpits would be able to collect sediment and provide another form of treatment;
- two unlined detention basins would be provided at the carriageway drainage outfall locations (see Table 8.8). The basins would have shut off valves to

minimise the risk of any spillages to the watercourses. Each basin would have sufficient volume to allow solids to settle;
- one filter trench at the north end of the bypass (see Table 8.8); and
- the two detention basins and the filter trench would each have an underdrain which would provide additional treatment and capacity below the basin base;

Short lengths of existing roads would continue to drain into the drainage systems. The SUDS measures including the drainage networks are shown on Figure 8.1.

Table 8.8: SUDS Measures.

SUDS Measure	Location	Land Take Area	Catchment	Outlet
Detention Basin (with underdrain) – Network A	Located around Chainage 300 adjacent to the existing A82.	Approximately 630 m^2	Approximately 1.0 hectare	Outfalls to an existing culvert and drains generally northward towards the valley of the River Fillan
Detention Basin (with underdrain) – Network B	Located to the East of the proposed north roundabout at Chainage 1050.	Approximately 715 m^2	Approximately 2.7 hectares	Outfalls to an existing culvert and drains generally northward towards the valley of the River Fillan
Filter Trench (with underdrain) – Network C	Located to the north of the proposed north roundabout. Chainage 1180-1230	Approximately 175 m^2	Approximately 1.0 hectare	Outfalls to an existing watercourse and drains generally northward towards the valley of the River Fillan

ECOLOGY AND NATURE CONSERVATION

EC1 Habitat loss would be restricted to that required for safe construction of the works.

EC2 New habitats created as part of the landscaping works for the scheme would be designed to enhance the biodiversity of the road corridor.

EC3 New tree planting (other than where specimen tree planting is identified in the outline landscape design) would be with native species typical of the local area, obtained from local sources wherever possible.

EC4 The new basins created as part of the site drainage would be designed as far as practicable to benefit nature conservation.

EC5 All new planting would be, where possible, of local provenance.

EC6 Culverts would be designed for wildlife in accordance with best practice.

EC7 The site would be checked for the presence of protected species prior to construction work beginning and appropriate mitigation measures would be discussed and agreed with SNH and implemented if any new activity was identified before or during construction.

EC8 The need for a licence[7] would be discussed with the Scottish Government before construction (because of the potential for otter to cross the site) and if considered necessary a licence would be applied for from the Government.

EC9 Specific measures to protect otters (fencing, culverts with ledges etc) have been identified and these would be included in the contract

[7] Where proposals have potential to affect European protected species a licence must be obtained from the Scottish Executive as described in European Protected Species, Development and the Planning System. Interim guidance for Local Authorities in licensing arrangements. October 2002, SEERAD

requirements. The detailed location would be finalised when the final scheme is defined with input from an appropriate expert.

EC10 All tunnels and culverts would be checked regularly when the scheme was operational by Transport Scotland's maintenance contractor to ensure fencing was in good condition and that no culverts or tunnels were blocked.

EC11 All trees and woodlands in proximity to the works but which do not require to be removed would be fenced off. Only essential tree loss would be permitted.

EC12 Any mature and dead trees would be checked by an appropriate expert for bats prior to removal and appropriate mitigation measures agreed with SNH and implemented if bats were found.

EC13 All woodland, scrub and other habitat would be checked for nesting birds before removal if this is programmed for the bird nesting season. If any are identified appropriate mitigation would be agreed with SNH and implemented. Wherever possible trees would be removed outwith of the breeding period.

EC14 Any land degraded by construction would be restored after construction was completed.

EC15 Turfs from the site would be recovered and re-used in the restoration of the site.

EC16 Any surface water features[8] affected by the proposals would be made good unless destroyed by construction of the scheme.

EC17 Best site management practices would be implemented on site to minimise the risk of intrusion into adjacent habitats and the risk of pollution incidents which could affect neighbouring habitats.

EC18 Method statements would be drawn up by the contractor and those for activities which could affect the freshwater/marine environment would be agreed with SEPA to ensure all necessary pollution prevention measures were included within them.

EC19 The contractors would follow best practice including the relevant SEPA pollution prevention guidelines (see www.sepa.org.uk).

EC20 Detailed contingency plans would be developed by the contractors for implementation in case of spillage during construction.

EC21 Wooden ramps (or similar) would be placed in any excavations during construction with potential to trap animals to allow easy escape. Open trenches would be checked each day for entrapments.

EC22 Surface road run-off from the A82 would pass through sustainable urban drainage systems (SUDS) prior to discharge to a local watercourse.

LANDSCAPE AND VISUAL

LV1. Soft cut and embankment slopes would be rounded off both top and bottom to the largest radius practical and generally shaped to create as naturalistic landform as possible within the constraints of the land made available.

LV2. Rock cuts would be cut to the natural grain of the rock (no pre-splitting) to create an aesthetically pleasing naturalistic landform – within the constraints of geotechnical safety requirements.

LV3. Peat or topsoil would be loose-tipped over the cutting to provide pockets into which plants could establish.

LV4. Bunds and false cuttings would be tapered out at a gradient of not more

[8] Further mitigation relating to water and drainage is contained in Section 9.8

than 15% along the road line in order to avoid sharp and un-natural transitions between landforms.

LV5. Bunds and false cuttings would be substantially widened on the side away from the road to allow the creation of a 'knolls and hollows' landform to mimic the existing and ensure the long-term landscape integration of the new road. (generally 1:2 slopes to the road side, 9m radius crest rounding, average 1:4 slope away from road, minimum 1:7 slopes parallel to the road).

LV6. The relationship between bund height, viewpoints at receptors, and road heights would be taken into account in any design development that amends road levels, so that the screening effect described in this assessment is not reduced to a significant degree.

LV7. All planting would be carried out using plant material of local provenance (the closest provenance that is available in commercial quantities) in order to ensure maximum benefit for local biodiversity.

LV8. Turfs from the areas stripped for the works would be safeguarded for use in restoration wherever practical.

LV9. All areas of land disturbed by the works would be lightly cultivated or graded to allow natural recolonisation by local species. Where there are questions of slope stability and anywhere where a good sward fails to develop within a few months would be sown with a low-vigour grass-seed mix (70% *Festuca* spp., 30*% Agrostis capillaris*). Bunds in proximity to houses would be seeded if natural recolonisation was slow.

LV10. New woodland would consist primarily of birch and willow planted in loose irregular clumps to mimic that found naturally. Small quantities of rowan, oak, elm and gean would be introduced locally where ground conditions are suitable in order to increase biodiversity or add local interest. The slopes facing the gardens at the rear of Tyndrum Terrace would be planted with a wider range of species to reflect the more domestic situation, including a percentage of evergreens and semi-evergreens to improve screening in winter. Species used would be selected from the following:

Table 10.3: Species used in New Woodland Mitigation Planting

Birch and willow scrub[9]	
Downy Birch	*Betula pubescens*
Goat Willow	*Salix caprea* agg.
Grey Willow	*Salix cinerea* agg.
Additional species that may be used to the rear of Tyndrum Terrace	
Blackthorn	*Prunus spinosa*
Dog-rose agg.	*Rosa canina* agg.
Guelder-rose	*Viburnum opulus*
Hawthorn	*Crataegus monogyna*
Hazel	*Corylus avellana*
Holly	*Ilex aquifolium*
Raspberry	*Rubus idaeus*
Scots Pine	*Pinus sylvestris*
Wild Privet	*Ligustrum vulgare*
Tree species that may be used selectively	
Pedunculate Oak	*Quercus robur*
Sessile oak	*Quercus petraea*
Rowan	*Sorbus aucuparia*
Wild Cherry	*Prunus avium*
Wych Elm	*Ulmus glabra*

[9] Additional species of willow found locally may be added to this list

LV11. In agreement with the Forestry Commission the area between the new road and the edge of the forest outwith the road corridor would be planted with scattered clumps of birch and rowan, covering some 25% of the area.

LV12. Deer fencing would be used to protect those areas of new planting considered most important for visual mitigation screening (to the rear of Tyndrum Terrace; between Willow Brae / Square and the new road; between Gleann Fiadh Lodge and the new road; east of the road between chainages 600 and 650 approximately and; between the south roundabout and the West Highland Way underpass on the side towards the houses). It may also be used to protect some other areas of planting and to control deer movement (see Section 3.4.2). Lines of deer fencing are shown on the outline landscape proposals drawings, although these would be subject to review once the final landform was complete.

LV13. Any engineering structures would be faced with materials or with patterns sympathetic to the rural environment. This would include avoiding the use of plain facing to wing-walls, unsympathetic geometric patterns such as hexagonal reinforced earth panels and gabions.

LV14. Culvert headwalls would be faced with local stone and designed to resemble dry-stone walls in random rubble brought to courses.

Mitigation during Construction

The mitigation commitments in this section apply generally to the entire scheme.

LV15. Construction compounds would be located away from residential areas as far as practical.

LV16. Lighting of compounds and construction areas would be restricted to the minimum necessary for safe working and site security.

LV17. Materials and machinery would be stored tidily during the works. Tall machinery including cranes would not be left in place for longer than required for construction purposes, in order to minimise its impact in views.

LV18. Roads providing access to site compounds and works areas would be maintained free of dust and mud.

LV19. On completion of construction, all remaining construction materials would be removed from the site.

Specific Mitigation

The sections following contain more specific local mitigation commitments, but the general commitments above (such as the wildflower seeding, or the rounding off of earthworks) are not repeated. These commitments are shown in plan form in Figures 10.9a-c and in cross section in Figures 10.10a-c.

Southern Roundabout

LV20. Road and junction alignments would be designed to retain the existing prominent conifers at the entrance to the village, providing that these are in good health immediately prior to construction.

LV21. Mounding would be formed northeast of the junction to screen the road and reduce the visibility of traffic on the roundabout from the houses on Glenfalloch Road north of the junction.

LV22. Clumps and groups of scrub woodland would be planted around the junction and on the new landforms to enhance the screening and to

help visually integrate the new road in the landscape.

Ch200 to 490

LV23. From Ch200 to 415, mounding would be formed on the east side of the road to reduce the visibility of the road and traffic from the houses on Glenfalloch Road.

LV24. A SUDS area would be formed at an existing low spot approximately opposite 'Northumbria' B&B. This would be designed to look like a large depression in the existing marshy ground, with natural slopes and an irregular form. The extent of marginal planting around this SUDS basin would be defined after construction. If it holds water, it would be planted with native marginal and aquatic species. If it remains as boggy ground it would be allowed to recolonise naturally.

LV25. From ch250 to 415 and from 420 to 440, the slopes on the west side of the road would be eased out substantially to help merge the new slopes into the existing form of the land.

LV26. The mounding and slope easing would taper out at about ch 415 and recommence at about ch420 in order to minimise the length of the West Highland Way spur underpass.

LV27. From ch420 to 450, the slopes on the east side of the road would be eased out substantially to help merge the new slopes into the existing form of the land.

LV28. The line of the West Highland Way spur would continue in the line of the underpass for a short distance either side of the underpass so that the route on was clearly visible through the underpass.

LV29. West of the road, the realigned West Highland Way spur climbs a steep and rugged slope to rejoin its existing alignment. The design of this section would be carefully developed at the detailed design stage by a mountain path specialist. It would be designed and constructed as a mountain path, with finishes and gradients that match the adjacent existing path or suit the existing terrain to ensure that it visually integrates into the landscape and that the mountain experience is maintained for users of the West Highland Way spur. Timber edgings and timber step risers would be avoided.

LV30. East of the road the realigned West Highland Way spur would take advantage of an old track bed to create a visually sympathetic and virtually level route to the car park and existing path start.

LV31. Throughout this section, clumps and groups of scrub woodland would be planted on the new embankments and mounding to enhance the screening and to help visually integrate the new road in the landscape. On average, planting would cover between 15% and 20% of the land available. Clumps and groups would be sized and distributed in a manner similar to the existing scattered scrub woodland in the area, and positioned where appropriate to maximise its screening benefit whilst retaining a naturalistic distribution.

LV32. The detailed design of this area might lead to changes in the road levels. In any design development, the relationship between the screen mounding, the road levels and the view from the houses on Glenfalloch Road would be maintained to ensure that the eventual screening effect is not substantially different from that shown in the mitigation design.

Ch490 to 700

LV33. From ch490 to 570 on the west side and from ch510 to 560 on the east side, embankments would be eased out substantially to help merge the new slopes into the existing form of the land.

LV34. Clumps and groups of scrub woodland would be planted on the new landforms to enhance the screening and to help visually integrate the new road in the landscape.

LV35. From ch530 to 700 on the west side and ch560 to 680 on the east side, the road would cut through existing plantation woodland. This would be felled back to the nearest wind-firm edge and the area between the road corridor and the new forest edge planted with clumps of birch and rowan in agreement with the Forestry Commission. The areas within the road corridor would be planted with birch and willow scrub as LV31, above.

LV36. Clumps and groups of scrub woodland would be planted on cutting slopes in soft material (as LV31) to help visually integrate the new road in the landscape.

Ch700 to 1050

LV37. From ch700 to 1040 mounding would be formed on the east side of the road to reduce the visibility of the road and traffic from the adjacent houses. This mounding would also serve as a noise barrier.

LV38. The detailed design of this area might lead to changes in the road levels. In any design development, the relationship between the screen mounding, the road levels, the view from the adjacent houses and the predicted noise attenuation would be maintained to ensure that the eventual screening is not substantially different, and the noise reduction effect is not significantly different, from that shown in the mitigation design.

LV39. Throughout this section, clumps and groups of scrub woodland would be planted on cutting slopes in soft material and on landscape and noise bunding (as LV31, but with the proportion of woodland cover increased between the road and houses to an average of 40% of the area affected) to help visually integrate the new road in the landscape and reinforce screening.

LV40. Throughout this section the plantation woodland would be at risk from windthrow so it would be felled back to the nearest wind-firm edge. The area between the road corridor and the new forest edge would be planted with clumps of birch and rowan in agreement with the Forestry Commission. The areas within the road corridor would be planted with birch and willow scrub as described above.

Northern Roundabout

LV41. Redundant parts of the existing road in front of The Shieling would be grubbed up and integrated into the adjacent landform, then planted with birch and willow scrub (subject to visibility requirements for road safety).

LV42. Wherever the top of the road cutting affects the edge of the existing plantation woodland it would be felled as necessary and replanted as a continuation of LV40.

LV43. Cutting slopes in soft material would be planted as a continuation of LV41.

LV44. A short avenue would be created along the spur to Crianlarich to provide an informal gateway to the village and reinforce the urban structure. These would be planted as advanced extra-heavy standard

trees to ensure that they had sufficient clear stem height to avoid the visibility envelope for the junction.

LV45. A SUDS area would be formed at approximately ch1050. This would be designed to look like a large depression with natural slopes and an irregular form. The extent of marginal planting around this SUDS basin would be defined after construction. If it holds water, it would be planted with native marginal and aquatic species. If it remains as boggy ground it would be allowed to recolonise naturally.

LV46. To reinforce local character, where fencing is required at the SUDS basin this would be, at least in part, a timber vertical board fence in the style used throughout the village as part of previous environmental improvement works.

CULTURAL HERITAGE

General Mitigation for the Bypass

After consultation with the relevant authorities a permanent archaeological watching brief has not been deemed to be necessary during groundbreaking works.

CH1 All known sites in proximity to the works would be fenced off or clearly pointed out to contractors to ensure they are not damaged.

Mitigation of Physical Impacts on Known Sites

Physical Impact on Bunker (site 44)

CH2 This site would be recorded to a suitable standard prior to demolition. This would likely involve a photographic and descriptive survey of the site, both internally and externally.

CH3 The demolition of the site would be monitored and recorded during a watching brief. Any items deemed to be of interest would be salvaged from the bunker prior to demolition.

Negligible Impact on West Highland Way (site 46)

CH4 The severance and re-routing of the WHW would have no effect on the cultural heritage value of the site and therefore no further mitigation is required.

Physical Impact on Old Field Bank (site 47)

CH5 This site would be recorded to a suitable standard prior to demolition. This would likely involve a photographic and descriptive survey of the site, and also a section through the site.

CH6 The demolition of the site would be monitored and recorded during a watching brief.

Physical Impact on Rectangular Building (site 48)

CH7 The site and immediate environs would be recorded to a suitable standard prior to demolition. This would likely involve survey of the immediately surrounding area and excavation of the site.

Physical Impact on Levelled Area (site 49)

CH8 The site and immediate environs would be recorded to a suitable standard prior to demolition. This would likely involve survey of the immediately surrounding area and excavation of the site.

Physical Impact on possible World War 2 Lookout Post (site 50)

CH9 This site would be recorded to a suitable standard prior to demolition. This would likely involve a photographic and descriptive survey of the site.

Negligible Impacts on Field Banks (sites 52 and 53)

CH10 Sites 52 and 53 are situated close to the west cutting of the bypass. While only a negligible impact is predicted (and therefore 'no significant effect') if the practicalities of cutting would result in the total destruction of these sites they would be recorded to a suitable standard.

DISRUPTION DUE TO CONSTRUCTION

DDC1. The contractor would be required to ensure that vehicles on the existing A82 (north and south of Crianlarich), Glenfalloch Road, the A85 (east of Crianlarich), the Callander Road, the Tyndrum Road, Willow Brae and Willow Square were safely routed through construction areas and to ensure that works were planned to limit the risk of disruption taking account of any other ongoing construction activities in the area.

DDC2. Information would be given during the life of the contract to warn drivers in advance about the presence of queues and the anticipated delay to journeys as a result. This would be via radio station traffic updates and bulletins. Queue lengths would be checked during construction activities requiring contraflows and the information used to inform traffic information outlets including the Traffic Scotland signs in the wider road network.

DDC3. Effective liaison by the contractor with the Crianlarich community would be maintained. This would include circulation of information about ongoing activities and a contact telephone number for use by the local community to contact the contractor for information. The telephone would be attended during all operational hours and the person(s) with the appropriate authority to resolve any problems that occur would be available. A log of all complaints and actions taken would be available for inspection.

DDC4. The contractor would be required to consider potential traffic and transport related effects as part of all relevant method statements and to include appropriate mitigation measures for all activities where the potential for significant effects was identified.

DDC5. Any complaints from the public would be followed up immediately and wherever feasible mitigation measures identified and implemented to ensure that complaints in the future were eliminated.

DDC6. The contractor would be required to comply with all contract requirements regarding access and to consult with Stirling Council Roads Department on all proposed traffic control measures on access routes and in advance of movement of any heavy loads.

DDC7. All construction traffic HGV drivers would be briefed on the importance of observing speed limits, in particular through residential areas.

DDC8. All HGV drivers would be briefed on the importance of allowing traffic to pass safely and not causing an obstruction to other road users.

DDC9. The contractor would be encouraged to establish a haul road, internal to the scheme, as early in the contract as possible to reduce the effects of construction traffic on the local road scheme.

DDC10. Access to all properties would be maintained.

TRAFFIC NOISE AND VIBRATION

NV1. All site staff would receive appropriate environmental training at the beginning of the contract and throughout the construction period as required. The contractor's compliance with environmental procedures would be audited on site at regular intervals during the construction works by Transport Scotland's environmental representative.

NV2. Silenced or sound reduced compressors would be used.

NV3. Silencers or mufflers would be fitted to pneumatic tools.

NV4. Deliveries would be programmed to arrive during daytime hours only and care would be taken to minimise noise when unloading vehicles.

NV5. Delivery vehicles would be prohibited from waiting within the site with their engines running.

NV6. Plant items would be properly maintained and operated according to manufacturers' recommendations, in such a manner as to avoid causing excessive noise. All plant would be sited so that the noise impact at nearby noise-sensitive properties is minimised.

NV7. Local hoarding, screens or barriers would be erected as necessary to shield activities causing particular disturbance.

NV8. Access to the site would primarily be via the existing A82, which would limit the potential for construction traffic noise impacts.

NV9. Appropriate noise limits and working hours would be specified in the contract documents, and in the construction Environmental Management System. Construction activities would be undertaken during daytime periods only, between the hours of 08:00 to 19:00 hours Monday to Friday and 09:00 to 13:00 hours on Saturday. Should occasional night-time and Sunday working be required, e.g. to minimise traffic disruption on the local road network, the contractor would be required to receive permission from Stirling Council Planning and Environmental Services Department, in advance.

NV10. The contractor would be required to establish and maintain effective liaison with the local community throughout the construction period. This would include provision of information on the on-going activities and provision of contact telephone numbers to contact the site for information during operational hours. A person would be identified with appropriate authority to resolve any problems. A log of complaints and actions taken to remedy these would be available for inspection.

Construction Vibration

As for construction noise, construction vibration is inherently temporary in nature, which acts to limit the duration of any impacts. In addition, the following mitigation measures would be implemented in appropriate locations:

NV11. During backfilling, sub-base compaction and black topping works, it is anticipated that the use of vibratory rollers may be required. Where this is the case, groundborne vibration predictions would be undertaken in accordance with the prediction methodology presented in the Transport Research Laboratory (TRL) 429 document entitled: *Groundborne vibration from mechanical construction works* and where the results of these predictions dictate that it is appropriate, vibration monitoring would be undertaken. Such survey work would be undertaken in accordance with the recommendations outlined in BS 5228 Part 2: 2009 and BS 7385 Part 1:1990: *Evaluation and measurement for vibration in buildings*, Part 1: *Guide for measurement of vibrations and evaluation of their effects on buildings*. The results of such monitoring would be

compared against the guidance criteria presented within BS5228: Part 2 and BS 7385 Part 2 (which considers the potential for building damage).

NV12. Where vibration levels exceed 10 mm/s at vibration sensitive dwellings, works within such areas would cease and alternative methods / working practices would be considered.

Operational Phase

The following measures are included in the route design and would reduce noise from the scheme:

NV13. The use of a lower noise road surface for the proposed new route alignment. Lower noise road surfaces assist in the control of noise from the road/tyre interface (rather than the other key component which is engine, exhaust and transmission noise).

NV14. Between Chainages 200 and 400, an earth bund ranging in height between 2 to 2.5m along its length has been located on the east side of the proposed route to provide noise attenuation to properties on the east side of Glenfalloch Road.

NV15. Between Chainages 600 and 760, the proposed route has been designed in a cutting with average depth of approximately 2.5m (east side). Between Chainages 680 and 760, the effective cutting depth (which dictates the noise reduction performance) has been increased to approximately 5m with use of surplus cut material installed at the top of the cutting embankment.

NV16. Between Chainages 760 and 850, increased cutting height has been continued in the form of a road side earth bund ranging from 3 to 4m in height.

NV17. Between Chainages 850 and 1030, the proposed route has been designed in cutting ranging in height from 1.5 to 4m along its length on the east side, depending on the lie of the local ground. The effective cutting depth has been increased to range from 3m to 7.5m with use of surplus cut material installed at the top of the cutting embankment.

NV18. A 1.8m high timber noise barrier located adjacent to, and to the west of, the western garden boundary of Number 11 Tyndrum Terrace.

NV19. For noise reduction purposes, the proposed noise barriers would have a superficial density of at least 12.5kgm^{-2} (based on the superficial density calculation procedure presented in CRTN), be continuous, imperforate and sealed at the base.

AIR QUALITY

Construction

The following are measures which would be employed to reduce the potential negative impacts during the construction phase:

AQ1 Vehicles carrying loose aggregate and workings would be sheeted.

AQ2 Completed earthworks would be covered or vegetated as soon as is practicable.

AQ3 Surface areas of stockpiles (subject to health and safety and visual constraints regarding slope gradients and visual intrusion) would be minimised to reduce the area of surfaces exposed to wind pick-up.

AQ4 All construction plant and equipment would be maintained in good working order and not left running when not in use.

AQ5 Dust suppressed tools would be used for all operations.

AQ6 There would be no unauthorised burning of any material anywhere on-site.
AQ7 Design controls for construction equipment and vehicles would be implemented and appropriately designed vehicles for materials handling would be used.
AQ8 Regular inspection would be undertaken to check for dust deposits and, if necessary, local roads would be cleaned and dust removed.
AQ9 Construction traffic would not pass along sensitive roads (residential roads, congested roads, unsuitable junctions, etc.) where possible.
AQ10 Vehicles used during construction would be kept clean and would be sheeted when on public highways.
AQ11 Large-scale vehicle movements would be timed to avoid peak hours on the local road network.

Operational
The proposed bypass leads to a reduction in NO_2 and PM_{10} concentrations at the majority of receptors assessed. Consequently no mitigation is required for the operational phase of the proposed bypass.

PEDESTRIANS, EQUESTRIANS, CYCLISTS AND COMMUNITY EFFECTS

PLE1. A pedestrian underpass would be constructed under the bypass to accommodate the West Highland Way spur. Signage to the West Highland Way would be reinstated.
PLE2. Alternative routes would be signed for any access route temporarily affected during construction.
PLE3. The visual barrier of the new road would be mitigated, in part, by careful design and new planting.
PLE4. The contract documents would specify construction traffic routes which use the existing road network as far as possible.
PLE5. Access to all properties would be maintained throughout construction.
PLE6. Signs would be erected for Crianlarich community facilities on the A82 before reaching the bypass.

VEHICLE TRAVELLERS

View from the Road
Mitigation in terms of capturing benefits for travellers using the road and the views they experience and reducing negative effects is built in to the scheme design (see below) and the additional landscape and visual mitigation described in Section 10.7. The degree to which travellers benefit is always a balance between seeking to achieve pleasant views for the road user with the need to achieve other effective mitigation, and priority has been given in this design to mitigation for the existing receptors (see also Annex C).

Road Design
The vertical alignment of the road (i.e. the extent to which cuttings and embankments are used) affects the extent to which travellers can see the landscape (and townscape) through which they are passing. This has been influenced by environmental considerations such as seeking to balance cut and fill, fitting the new road alignment into the surrounding topography, the need for noise barriers and planting and landscaping proposals to screen the road from nearby properties. The view from the A82(T) experienced by travellers would also be

affected by physical roadside obstructions such as safety barriers, signs, lighting and acoustic barriers (bunding and fencing).

Environmental barriers, particularly those needed to reduce traffic noise would be required in some locations along the scheme, and these would have potential to partially screen the view from the road anywhere with a barrier 1.5m high would restrict views from the road, 1.8m high would normally obstruct them). Further information on noise impacts and their mitigation is presented in Chapter 13 Noise and Vibration.

Landscape proposals have been developed to ensure that the road links with existing areas of landscape importance and vegetation, and to ensure that attractive vegetation typical of the local area is provided throughout the scheme. Further information on scheme landscape is provided in Chapter 10 and an outline landscape design for the scheme is shown on Figures 10.9a-c.

Driver Stress

Mitigation to reduce driver stress is embedded in the scheme design. The scheme design has taken account of traffic flows in the year of opening and 15 years after opening.