



# Stromeferry Appraisal

DMRB Stage 2 Report

Volume 2 – Environment  
Assessment (Final Draft)

September 2014

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DMRB STAGE 2 OPTIONS  
 ENVIRONMENTAL ASSESSMENT  
 REPORT (FINAL DRAFT)  
 September 2014

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## EXECUTIVE SUMMARY

### 1.1 Introduction

URS has been appointed by The Highland Council to complete a Stage 2 Design Manual for Roads and Bridges (DMRB) Environmental Options Assessment for the proposed A890 Strome ferry Bypass. Accordingly this report has been produced, where a number of options that have been developed are assessed with a view to enabling The Highland Council to make an informed decision when selecting a preferred option for the route.

This Executive Summary of the main environmental assessment report provides a summary of the DMRB Volume 2 Environmental Assessment report and its contents. The Stage 2 Assessment Report for the Strome ferry Bypass has been prepared in accordance with the Design Manual for Roads and Bridges (DMRB) Volume 5, Section 1, Part 2, TD 37/93 'Scheme Assessment Reporting' and DMRB Volume 11 'Environmental Assessment'.

The existing A890 considered in this report is an approximately 12km long section of public road alongside the southern shore of Loch Carron, located in Wester Ross, in the western Highlands of Scotland. The road forms part of the A890, between the Strathcarron Junction and the tie in with the A87, Invergarry to Kyle of Lochalsh Trunk Road, at Auchtertyre. The road also forms part of the wider road network between Dingwall, west to the Isle of Skye via Achnasheen, and provides a popular alternative route from Inverness to Kyle of Lochalsh and Skye.

The public road and a single track railway line share a tight corridor along the southern shores of Loch Carron, which is particularly restricted over an approximately 4.5 km long section from Ardnarff to Attadale. The A890 is mainly a single carriageway but reduces frequently to single track with passing places along this section of road.

Up until 1970, when the existing road was opened to the public, the transport link from Kyle of Lochalsh north towards Ullapool was provided by a ferry service crossing the Strome Narrows in between South and North Strome, with minor roads linking the crossing to the local road network at either end.

Since the existing road was opened, the approximately 4.5km long section of mainly single track road from Ardnarff to Cuddies' Point, which is located just west of Attadale, has been subject to landslides and rock fall events, causing the Highland Council to temporarily close the road on several occasions, in order to enable remedial works to the rock slopes to take place.

The study area for the assessment of route options contains a number of environmental constraints and features including:

- The Kyle of Lochalsh to Inverness railway line runs beside the current A890 from Strome ferry to Strathcarron. Stations along the existing route are present at Duncraig, Strome Ferry, Attadale and Strathcarron;
- There are seven Sites of Special Scientific Interest (SSSI) found within or in close proximity to the study area;
- One nearby National Nature Reserve, north of Ardarroch;
- Presence of Scheduled Monuments;
- Numerous Listed Buildings;

- Numerous residential houses along the existing route and in settlements which include Lochcarron, Achintee, Stromeferry, Achmore and Strathcarron.
- Scattered areas of woodland found on the Ancient Woodland Inventory (AWI); and
- Four nearby areas designated as Special Areas for Conservation (SAC);
- Presence of crofting land in some parts of the study area.

In addition to the above, land use in the study area tends to be crofting and agriculture along the coast and straths, with rough grazing on the higher slopes and hills and much of the interior. Land cover is predominantly rough moorland and grassland vegetation with some small areas of native woodland along lower slopes and sheltered glens and several larger areas of commercial forestry. A number of dwellings are located along the local road network along with some of small businesses and access tracks to forestry plantations.

## 1.2 Consultation

Public and stakeholder consultation during the Stage 2 process involved the following activities:

- Stakeholder Workshop;
- Consultation letters / emails to statutory consultees; and
- Public Exhibition.

A number of statutory consultees including, Scottish Natural Heritage, Scottish Environment Protection Agency, Historic Scotland, The Highland Council, and Marine Scotland have been consulted as part of the assessment at Stage 2. A range of non-statutory consultations were also undertaken.

## 1.3 Route Options Considered at Stage 2

Following options development and sifting as part of the Stage 1 DMRB/STAG assessment completed in 2013 a number of options were taken forward for consideration at Stage 2 of the DMRB assessment process. During the early part of Stage 2 a further sifting of options was conducted by the project team through research, team meetings and discussion with The Highland Council. The aim was to identify any key issues or constraints that would constrain delivering any of the options. As a result the following options and/or option features were discarded:

- Renewable energy solutions for a bridge crossing of Strome Narrows will not be considered as part of the Stage 2 DMRB options assessment (identified in the Stage 1 report as Option N6b). Renewable energy could be considered at a later stage of the project if considered feasible;
- A tunnel crossing of Strome Narrows will not proceed due to technical and cost constraints. From an engineering perspective the construction of a tunnel across Strome Narrows would have been difficult due to gradients whilst cost of construction would also have been restrictive;
- The crossing of Strome Narrows to the east was dismissed due to a combination of constraints including gradients, proximity to Strome Castle which is a Scheduled Monument, and landscape and visual impact due to proximity to residential and community receptors.

- The ‘local link’ routes were dropped as part of the Southern corridor route as there would have been no significant journey time savings. Additionally the link routes would have added additional cost to the option and were not considered essential to meet the chief objective of bypassing the rockfall area along the existing A890. Further considerations included a difficult terrain/topography with areas of peat potentially present, increased impact on species and habitats, landscape and materials generation/requirement.

1.3.1 **Route Options Assessed at Stage 2**

After the sifting of options described above, alignments were developed in more detail for each of the resulting 8 route options. The 8 route options assessed at Stage 2 are described in Table 1 below. A drawing of the routes is shown in Appendix 1.

**Table 1 – Route Options Assessed at Stage 2**

Option	Description
<b>Northern Corridor Options</b>	
N6 – North online through Lochcarron	Option N6 leaves the existing A890 south of Stromeferry, passing along the western contour of Creag Mhaol, and to the west of Stromeferry. It then crosses the Strome Narrows, via a bridge crossing with a total span length of approximately 830m. The bridge crossing would span both Loch Carron and the Dingwall to Kyle of Lochalsh railway line. From North Strome, N9 would then remain offline passing north of Stromemore. It would then return online for a short distance passing the Weavers, and then continue offline passing north of Slumbay and Lochcarron, crossing both the existing A896 and Alt Nan Carnan. N6 would then return online at Kirkton, along the existing A896 from Kirkton to Strathcarron Junction. Option N6 has an approximate length of 14.5km.
N9 – North Lochcarron Bypass	Option N9 follows the same alignment as N6 from Achmore to Leacanasigh. Option N9 leaves the existing A890 south of Stromeferry, passing along the western contour of Creag Mhaol, and to the west of Stromeferry. It then crosses the Strome Narrows, via a bridge crossing with a total span length of approximately 830m. The bridge crossing would span both Loch Carron and the Dingwall to Kyle of Lochalsh railway line. From North Strome, N6 would then return online and continue along the existing road through Stromemore, Strome Wood, Lochcarron and Kirkton until Strathcarron Junction. Option N9 has a total length of approximately 14.5km.
<b>Online Corridor Options</b>	
All online options follow the same alignment from Stromeferry to Strathcarron junction, but vary from Frenchman’s Burn to Cuddies Burn. Therefore from Stromeferry to Frenchmans Burn, online options follow the existing A890 with some widening into the existing rock face north of Ardnarff, and some lengths of small retaining wall provided between the existing railway and road. From Cuddies Burn to Attadale, the online options again follow the existing A890 alignment. A short length of retaining wall would be provided between the railway and road on the approach to Maman Hill. The online routes would continue offline to the west of the existing road alignment through Maman Hill therefore limiting the steep gradients on both the north and south approaches. Online options then return online until Achintee, and continue offline passing south east of Achintee, with new bridge crossings of River Taodail and its tributary, the existing A890 and the existing railway, with the existing level crossing at Strathcarron removed. Online options then return online north of Strathcarron until the Strathcarron junction. All online options have approximate lengths of between 13.1km and 13.5km.	
O2 – Online with Rail Viaduct	From Frenchmans Burn to Cuddies Burn, option O2 would realign the railway on to a new viaduct structure along the side of the loch. The structure would be approximately 1.6km in length. This would allow a

Option	Description
	wider corridor to accommodate the wider two lane road including a wide verge which incorporates a rock trap adjacent to rock face.
O3 – Online with Tunnel	From Frenchmans Burn to Cuddies Burn, option O3 would provide an inland tunnel. The tunnel would be approximately 1.5km in length. Some rock cut would be required on the south tunnel portal at Frenchmans Burn.
O4 – Do minimum (no drawing)	Existing road with no improvements proposed. This option is a baseline comparison to all Options considered.
O5 – Online Road with Rail Share	From Frenchmans Burn to Cuddies Burn, option O5 would provide a section of shared road / railway, with the A890 realigned to follow the railway alignment such that road traffic would be running on the same corridor as the railway. The road would share the railway line for a length of approximately 1.8km.
O7 – Online with Developed Avalanche Shelter	From Frenchmans Burn to Cuddies Burn, option O7 would provide a road viaduct which would carry the realigned A890 above the railway. The structure would be approximately 1.7km in length.
<b>Southern Corridor Option</b>	
S4 – South Glen Udalain	S4 would leave the existing A890 south of Braeintra, and follow the existing forest track through the Glen Udalain valley, remaining largely to the north of Allt Gleann Udalain. Option S4 would then cross the Allt Gleann Udalain, heading towards the Allt Loch Innis Nan Seangan valley. Option S4 would then continue northwards towards the River Attadale valley, remaining on the south west side of River Attadale valley, continuing in a north westerly direction before returning online to the existing A890 at the River Attadale bridge. Option S4 would then follow the same alignment as the online options, and continue online with a short length of retaining wall provided between the railway and road on the approach to Maman Hill. Option S4 would continue offline to the west of the existing road alignment through Maman Hill therefore limiting the steep gradients on both the north and south approaches. Option S4 then returns online until Achintee, and continues offline passing south east of Achintee, with new bridge crossings of River Taodail and its tributary, the existing A890 and the existing railway, with the existing level crossing at Strathcarron removed. Option S4 would then return online north of Strathcarron until the Strathcarron junction. Option S4 has an approximate length of 19.3km.

## 1.4 Environmental Assessment

### 1.4.1 *Landscape*

The Landscape and Visual Chapter provides an assessment of potential impacts on landscape character and visual amenity resulting from the identified route options for the Stromeferry Bypass. The assessments have been undertaken with reference to best practice guidance.

Desk and field based appraisals of the landscape and visual resource of the study area were carried out in order to establish the baseline conditions. These appraisals lead to the identification of a number of designated landscapes, the division of the study area into distinct Landscape Character Types (LCT) and five visual areas. An evaluation of potential change resulting from each of the route options was then undertaken and possible mitigation



measures identified. Conclusions were then drawn as to the level of potential landscape and visual impacts resulting from each option, as summarised below.

#### *Potential Landscape Character Impacts*

None of the route options are anticipated to result in significant impacts on the landscape designations identified within the study area.

The North Shore Route Options (N6 and N9) are anticipated to result in locally significant impacts on parts of four LCTs and the Strome Narrows area. Impacts on the remaining LCTs are not anticipated to be significant.

The Online Route Options are anticipated to result in localised significant impacts on one LCT, with Option O7 also anticipated to result in significant impacts on parts of a second LCT. No significant impacts are anticipated on the remaining LCTs and the landscape character of the study area as a whole.

The Southern Route Option (S4) is anticipated to result in locally significant impacts on five LCTs. There are likely to be no significant impacts on the character of the remaining LCTs.

It is therefore considered that, from a landscape character perspective, Online Route Option 4 is likely to have the least impact, followed by Online Route Options 3 and 5. The Southern Route Option is likely to result in the greatest impacts on landscape character and is therefore the least favoured option.

#### *Potential Visual Impacts*

The North Shore Route Options are anticipated to result in significant impacts on receptors at Stromemore, Strome ferry, Ardaneaskan, Portchullin, Achmore, the south side of Loch Carron (including the railway, A890 and residential properties between Ardnaff and Cam-allt), and users of the loch. Option N6 is also likely to result in significant impacts on receptors in Lochcarron. Visual receptors at other locations within the study area are not anticipated to receive significant impacts. There is potential for some positive impacts on receptors within Lochcarron from Option N9 due to a reduction of traffic.

All Online Route Options, with the exception of Option O4, are anticipated to result in significant impacts on select receptors in Strathcarron and Achintee. Online Route Options 2 and 7 are anticipated to result in significant impacts on receptors at Lochcarron and users of Loch Carron. Visual receptors at other locations within the study area are not anticipated to receive significant impacts. Online Route Options 3, 4 and 5 are not anticipated to result in significant impacts on visual receptors within the study area.

The Southern Route Option is anticipated to result in significant impacts on receptors in Attadale Glen and hill walkers on local footpaths. Visual receptors at other locations within the study area are not anticipated to receive significant impacts. There is also potential for positive impacts on receptors at a number of locations, such as those in Lochcarron and along the north side of the loch, at Achmore and Braeintra, railway passengers and loch users.

It is therefore considered that, from a visual amenity perspective, Online Route Option 4 is likely to have the least negative impact, followed by the Southern Route and Online Route Options 3 and 5. North Shore Option N6 represents the least favoured option, largely due to impacts associated with the crossing at Strome Narrows and on receptors in Lochcarron.

### 1.4.2 **Nature Conservation**

The nature conservation chapter identifies the ecological receptors (sites, species and habitats) of high (national or international – for definitions see chapter) value which are likely to be directly or indirectly affected by the proposed scheme options. These are:

Internationally designated sites (including their qualifying features):

- Rassal SSSI & SAC Biological features: Mixed woodland on base-rich soils associated with rocky slopes; Base-rich fens; Hard-water springs depositing lime; Plants in crevices on base-rich rocks; Limestone pavements; Alpine and subalpine calcareous grasslands; and Mountain willow scrub.
- Coille Mhor SSSI & SAC Biological features: Western acidic oak woodland.

Nationally designated sites (including their qualifying features):

- Rassal National Nature reserve Biological features: Upland mixed ash woodland.
- Slumbay Island SSSI Geological features: Structural and metamorphic geology: Moine.
- Attadale SSSI Geological features: Structural and metamorphic geology: Moine.
- Allt nan Carnan SSSI Biological features: Upland birch woodland.
- Carn a' Bhealaich Mhoir SSSI Geological features: Structural and metamorphic geology: Moine.
- Monar Forest SSSI Biological features: Upland habitat assemblage.
- Loch Carron Marine Consultation Area (MCA) Features: burrowed mud, horse mussel beds, kelp and seaweed communities on sublittoral sediments and tide-swept algal communities. Common skate and ocean quahog have also been recorded. It was also noted that there are aggregations of flameshell beds on the northern side of the narrows.

Habitats of national importance likely to be affected by the proposed scheme include:

- Semi-natural ancient broadleaf woodland; this habitat type occurs in discrete locations throughout the study area and is likely to contain plant and animal communities of significant conservation interest and
- Loch Carron marine water body, described above (Loch Carron MCA).

Species of national importance possibly affected by the proposed scheme include: Otter, bats, wild cat, breeding birds, golden eagle, hen harrier, and black-throated diver.

Other sites, habitats and species of importance at a regional or local scale are also likely to be affected by the proposed routes options, details of these can be found in the main chapter.

The design of the main carriageway is similar for each scheme option (and sub-options) with the exception of parts of the Online Routes. Online routes O2 and O5 incorporate a 1.8km long embankment / viaduct, Online route option 3 includes construction of a tunnel and Online route option O7 requires the extension of an existing avalanche shelter. These extra required structures result in construction impacts of varying degree but are not necessarily more

adverse than other routes. Predicted construction and operational impacts common to all options include:

- Water quality: Potential impacts include direct disturbance or destruction of freshwater and marine substrates and degradation through siltation and other pollution. This may directly or indirectly affect fresh water / marine species including bivalve molluscs.
- Sediment deposition: Potential impacts include modifications to current sediment deposition patterns. This may directly or indirectly affect a number of fresh water, marine and intertidal species.
- Effects on a range of terrestrial habitats will occur within the route corridors; though the extent and location will vary with each route option. Principal habitats affected will include the loss and fragmentation of damp Calluna heath, acid grassland, coniferous plantation woodland, with broadleaved plantation and semi-natural woodland also affected.
- Direct impacts upon intertidal habitats are only likely to occur with the Northern Route option (Strome Narrows Crossing) and the Online Route Option O2 (Viaduct) and possibly Online Route Options O5 & O7 (Shared Road / Rail & Developed Avalanche Shelter), all are likely to involve construction activities within the intertidal zone.
- Potential impacts upon breeding birds; these include destruction of nests, nesting/foraging habitats.
- Increased risk of wildlife road fatalities particularly within off-line sections, and because the road will be wider (upgraded to single carriageway) with a higher average traffic speed.

In respect of ecology and nature conservation, Online route 07 (Developed avalanche shelter) has the lowest overall impact and Southern route S4 the highest overall impact. Three critical conservation issues, potentially affected to varying degree by all options, have been identified: disturbance of protected sites, destruction of broadleaf semi-natural ancient woodland and negative impacts on Schedule 1/Annexe 1 birds. Protected sites most at risk include the Attadale SSSI, Allt nan Carnan SSSI and Loch Carron MCA. Ancient woodland comprises part of these sites but is also present out with these areas. Schedule/Annex 1 bird species potentially affected by the scheme include black-throated and red-throated divers and golden eagle.

Further investigations are required before the impacts of the current options can be fully analysed as part of a Stage 3 assessment. In particular further survey is required regarding the impact all options may have on protected sites (the MCA and SSSIs), habitats of high conservation interest (including semi-natural ancient woodland) and protected species. Work near watercourses and water bodies must be avoided or minimised and must adhere to all SEPA regulations and guidance, with all measures developed through consultation with SNH. SNH should also be consulted specifically concerning impacts to designated sites.

#### 1.4.3 ***Cultural Heritage***

The cultural heritage chapter has presented the potential impacts and residual effects from the scheme options for the Stromeferry Appraisal. Eight route options were considered, including a 'do nothing' option and two options require the construction of a bridge across the Strome Narrows. A total of two scheduled monument and fifteen listed buildings are located within the study area. There are over 100 non-designated assets within the study area of all options.

The scheduled monument of Strome Castle has the potential to have its setting impacted by the construction of a bridge across the Strome Narrows and recommendations have been made for the highest quality design principles for the structure to reduce the visual impact (applicable to Route options N6 and N9). The scheduled monument of Lochcarron Old Parish Church has the potential to be impacted by the Northern Route option N9 which ties back into the existing A890 adjacent to the site of the church and burial ground. The impacts from this are not limited to physical impacts, but also setting impacts from inappropriately sited street furniture and lighting columns.

There is the potential for beneficial impacts on a small number of listed buildings, especially the New Kelso category C(s) estate cottages which are currently located adjacent to the A890. The route options which take the road away from this particular area will reduce traffic flow and improve the setting of the assets.

The earliest archaeology located within the study area dates from the prehistoric period. A number of Bronze Age hut circles have been identified to the north of Lochcarron set into the hillside, all of which have the potential to be impacted by Route option N9. There is also evidence for raised beach sites along the loch edge which are sea-cut platforms formed when the sea-level dropped which then became raised beaches and were often used as lithic working sites in the prehistoric period. There is the potential for further lithic working sites to be recovered within all options which run adjacent to the shoreline.

There is evidence for early medieval, medieval and post-medieval activity in the site of the chapel of St. Maolrubha and a number of trackways running through the area, many of which were in use until the 19th century. There is extensive evidence of clearance activity of the 18th and 19th centuries in this area with a number of deserted crofting settlements and evidence for the sheep-farming which replaced the crofting agricultural system such as shieling huts. There will be potential impacts upon these assets from Route option N9.

#### 1.4.4 ***Effects on All Travellers***

The Effects on all Travellers chapter identifies the current baseline for pedestrians, cyclists, equestrians and vehicle travellers. The potential impacts identified include disruption to road and rail users during construction, driver stress, amenity/views from the road, loss of recreational area within surrounding woodland, the impacts upon core paths and Rights of Way and increased journey time for local residents. Options N6, N9 and S4 include increased journey times for more properties and all options involve closure of the A890/A896 and the railway. Route options N6 and N9 open up significant new views from the road, and Route option S4 reduces the views, with the Online Route options being the preferred option they not impact on the as many RoWs and core paths within study area.

#### 1.4.5 ***Community & Private Assets***

The Community and Private Assets assessment identifies the baseline situation with regards to population, community facilities, scheduled bus services, train services, residential properties, industrial/business properties and agricultural land. The potential impacts include access to agricultural land, private properties and recreational land and land take. All Options entail land take of both agricultural land and woodland. Although the agricultural land take is more extensive for Options N9 and S4 it is considered of moderate quality and crofting land. Options N6 and N9 will involve disruption to more residential accesses than Options O2/3/5/7 and S4. Therefore on the basis that Online Options involve the least amount of agricultural land take and less impact on accesses to residential properties these options are favoured. Options O2, O3 and O7 are preferred options as these do not impact the Railway during operation whereas Option O5 may.

#### 1.4.6 *Geology & Soils*

The Geology and Soils assessment identifies the study area baseline in terms of geology, including superficial geology, solid geology, soil quality, hydrogeology, man-made features, contaminated land, site history and geohazard potential including landslide / rockfall history. The impacts identified in the assessment primarily include impact to the Attadale and Allt nan Carnan SSSI's, impact to compressible soils (peat / alluvial soil), impact upon existing bedrock from cutting / tunnelling, impact from soil erosion and compaction.

The assessment identifies that the preferred route option would be Route Option S4 (South Glen Udalain) within the Southern route corridor. Although the proposed route primarily comprises the construction of a new road that will traverse areas of peat land (which will have an impact upon road design and the surrounding environment), it is considered that it could be designed and constructed to minimise impact to geology and soils if the mitigation measures are adopted. The route option would by-pass the existing rockfall problem area on the A890 whilst avoiding the construction of tunnels/bridges and the requirement for undertaking significant slope stability remedial works.

The second best route is considered to be any of the Online routes (with the exception of Route O3, which would include the excavation of an inland tunnel). These routes would primarily utilise the existing road network, which would have a reduced impact upon the underlying geology and soil. All route options would require slope stability remedial work, which would be costly but would have an overall long term beneficial impact. These options would also avoid potential issues in relation to peat, and would negate any potential environmental effects that this may have.

The least preferred options would be the Northern routes, N6 and N9. These options would require the construction of a crossing over the Strome Narrows (via bridge), which would be costly and would have a greater impact upon geology and soil. The proposed route options utilise the existing road network and include the construction of new stretches of road, part of which will cross the Allt nan Carnan SSSI. Peat may also be encountered along this corridor. However, the corridor would by-pass the area of slope instability along the existing A890 and would avoid the requirement for significant slope stability remedial works.

#### 1.4.7 *Air Quality*

The Air Quality chapter considered the impact of the proposed route options and their effects on local and regional air quality, and on Sites of Importance for Nature Conservation.

The chapter found that existing and future baseline air quality in the do-minimum scenario is of a good standard, with the pollutant concentrations of concern to this assessment being well below their respective national air quality objective values.

With the proposed North Shore Route options in operation, there would be a neutral to slight adverse impact on local air quality at some receptors, although due to the good standard of air quality within the study area, the overall effect on local air quality would be negligible. With the Online Route options and Southern Route options in operation, there would be a neutral impact on local air quality. The effect of any of these impacts is not considered to be significant.

Because baseline air quality in the study area is so good, none of the proposed route options would lead to an impact that would have a significant effect on regional air quality. However, the North Shore and Southern Route options would lead to an increase in the number of vehicle kilometres travelled, and therefore the amount of pollutants emitted on a regional scale, due to the construction of new highway.

The North Shore Route options would pass within 200 m of the Allt nana Carnan SSSI. Despite the additional vehicle flow associated with the rerouted A890, the effect on nitrogen deposition and annual mean NO<sub>x</sub> concentrations at the SSSI would not be significant.

#### 1.4.8 **Noise & Vibration**

An appraisal of the potential noise and vibration impacts associated with the set of route options has been undertaken by the counting of sensitive properties within 300 metres of the alignments. The number of sensitive properties has been compared with the baseline (Online Route O4) in order to determine the potential change in the number of properties affected by road traffic noise and vibration.

An assessment of the various options has shown that, with the exception of the North Shore Options, all of the assessed options give rise to a Neutral Impact. This is as a result of no significant change in the number of noise sensitive properties neighbouring the alignment in comparison with the baseline case.

The assessment of option N6 indicated that there would be a very large increase in the number of properties within 300 metres of the alignment, compared with the baseline case. This is considered to result in a Major Impact.

The assessment of option N9 indicated that there would be a large increase in the number of properties within 300 metres of the alignment, compared with the baseline case. This is considered to result in a Moderate Impact.

#### 1.4.9 **Road Drainage & the Water Environment**

The water features in the study area include Loch Carron, seven groups of major and minor watercourses divided by route options (major watercourses include the River Carron, River Taodail and the River Attadale), and the groundwater beneath the Scheme.

During construction, a number of standard control measures should be put in place to reduce the potential for significant quantities of sediment or other typical construction pollutants being discharged into the surrounding water bodies. These measures are considered to be current best practice within the construction industry. There may be a significant effect on the major watercourses and Loch Carron for some of the Online Route options and for the major watercourses for the Southern Route, related to changes in water quality, geomorphology and hydrology due to their high sensitivity.

Once the Scheme is constructed, road run off from the A890/A896 would be collected and passed to two levels of Sustainable Drainage Systems (SUDS) for treatment before being discharged, as is required for schemes of this nature. Again, there may be a significant effect on the major watercourses and Loch Carron for some of the Online Corridor Route options, and for the major watercourses for the Southern Corridor, related to changes in water quality, geomorphology and hydrology due to their high sensitivity.

Due to the shallow nature of the groundwater underlying the site, it is considered that there would be minor and negligible effects to the quality and overall movement of groundwater in the area due to the construction of the Bypass. With the implementation of the appropriate mitigation measures, it is predicted that there will be no significant impacts on the groundwater as a result of the Bypass.

The preferred option for the Scheme with regards to Road Drainage and the Water Environment would be the Online Route, with either the share road/rail or the avalanche shelter extension option. The least preferred option is the Southern Corridor or N9 Lochcarron

Bypass route due to the large number of new crossings required and earthworks related to building on undeveloped land.

#### 1.4.10 **Materials Assessment**

The Materials chapter identifies that there are a range of national, regional and local policy drivers that seek to minimise environmental impacts associated with material resource use and waste generation. There are a number of waste management facilities within the Highland Council area and a number of sites have also been identified that recycle and produce recycled materials within the Highland area. The construction of any of the Route options will require a wide range of materials and various forms of waste will be generated from each of the options. It is clear from the assessment that in terms of material resources Option S4 requires the most material use and also the most in terms of waste production. The Online and Northern Options require less material resources and have similar material use requirements and waste generation impacts with Option N9 performing the best. When material need and waste generation are considered together then Option O5 is the better of the all the Options. However Option N6 and the other Online Options have very similar requirements. As the project progresses and a preferred Route option is taken forward, there will be opportunities to reduce the materials impacts associated with the design.

### 1.5 **Environmental Assessment Summary**

The environmental report summarises the assessment findings for each topic with an Assessment Summary Table (AST) which presents the overall assessment for each option by environmental topic.

The results of the assessment indicate that all the route options under consideration will lead to adverse impacts to some extent across the environmental disciplines which reflect the diverse range of considerations associated with all Route options under consideration. Some benefits are also identified, particularly with regard to effects on all travellers due to the improvements made to the road with all route options. Generally the routes with the smallest physical footprint result in reduced environmental impacts.

It is considered highly likely that Environmental Impact Assessment will be required at DMRB Stage 3 for any of the Route options under consideration and that detailed survey work and consultation with statutory and non-statutory consultees will be essential.

## **1 INTRODUCTION**

### **1.1 Background**

URS has been appointed by The Highland Council to complete a Stage 2 Design Manual for Roads and Bridges (DMRB) Environmental Options Assessment for the proposed A890 Strome ferry Bypass. Accordingly this report has been produced, where a number of options that have been developed are assessed with a view to enabling The Highland Council to make an informed decision when selecting a preferred route option for the scheme.

### **1.2 Purpose of this Report**

This report is an environmental assessment of options that have been developed for the proposed Strome ferry Bypass. This Stage 2 Assessment Report for the Strome ferry Bypass has been prepared in accordance with the Design Manual for Roads and Bridges (DMRB) Volume 5, Section 1, Part 2, TD 37/93 'Scheme Assessment Reporting' and DMRB Volume 11 'Environmental Assessment'.

### **1.3 Need for the Scheme**

The existing A890 considered in this report is an approximately 12km long section of public road alongside the southern shore of Loch Carron, located in Wester Ross, in the western Highlands of Scotland. The road forms part of the A 890, between the Strathcarron Junction and the tie in with the A87, Invergarry to Kyle of Lochalsh Trunk Road, at Auchtertyre. The road also forms part of the wider road network between Dingwall, west to the Isle of Skye via Achnasheen, and provides a popular alternative route from Inverness to Kyle of Lochalsh and Skye.

The public road and a single track railway line share a tight corridor along the southern shores of Loch Carron, which is particularly restricted over an approximately 4.5 km long section from Ardnarff to Attadale. The A890 is mainly a single carriageway but reduces frequently to single track with passing places along this section of road.

Up until 1970, when the existing road was opened to the public, the transport link from Kyle of Lochalsh north towards Ullapool was provided by a ferry service crossing the Strome Narrows in between South and North Strome, with minor roads linking the crossing to the local road network at either end.

Since the existing road was opened, the approximately 4.5km long section of mainly single track road from Ardnarff to Cuddies' Point, which is located just west of Attadale, has been subject to landslides and rock fall events, causing the Highland Council to temporarily close the road on several occasions, in order to enable remedial works to the rock slopes to take place.

These events also affected the railway line and forced road and rail users to accept up to 130mile temporary road diversions during these closures. Other contingency measures, including dual running of road and rail and a ferry service from South to North Strome, were put in place by The Highland Council to alleviate some of the traffic problems through periods of road closures following more recent rock fall events.

Due to the ongoing problems with this section of public road, the Highland Council commissioned several feasibility studies in the 1990s, looking at various possible route options and schemes to bypass the problem areas. However, no final decision was reached on which option to take forward at that stage, and The Highland Council continued to maintain the route and carry out emergency works, as and when required.



## 1.4 Previous Work

Following a rock fall event in December 2011, when the existing A890 had to be closed over a period of several months, The Highland Council Committee for Transport, Environmental and Community Services, approved the proposal for a further options appraisal in connection with a new Stromeferry Bypass to be carried out in August 2012. This commission followed on from a number of feasibility studies completed for the Highland Council in the 1990s.

URS Infrastructure and Environment UK Ltd were appointed by The Highland Council in October 2012. The Client's brief included the following stipulations:

- The study is to review and consider relevant historical information from The Highland Council archives;
- The study is also to carry out proportionate appraisal work following current Scottish Government Appraisal Guidelines and the DMRB;
- In accordance with Scottish Transport Appraisal Guidance (STAG), during the Pre-Appraisal process the Consultant is to establish Stakeholder Groups, to carry out Stakeholder workshops and to develop the defined objectives for the scheme in consultation with the Stakeholders and the Client, considering identified problems and opportunities;
- The commission is also to undertake a Stage 1, Option Generation, Sifting and Development process in accordance with the STAG and the DMRB and to prepare material to allow presentations of the findings of the first appraisal stage to the public in March 2013;
- In addition, the brief also includes the second stage appraisal in accordance with STAG Part 2 and DMRB Stage 2. A report to complete the appraisal process is to be issued to summarize the findings of both Part 1 and Part 2 assessments of the options in spring 2014.

The Stage 1 DMRB assessment was completed in spring 2013 where a total of 31 routes were originally identified. 14 were discounted during the assessment process as they did not satisfy the scheme objectives. 17 remaining routes were examined in more detail and 9 routes were recommended to take forward for assessment at Stage 2. Therefore these 9 routes have been considered as part of the Stage 2 DMRB process. At an early stage of the Stage 2 assessment an option considering a bridge crossing featuring a tidal barrage at Strome Narrows was discounted, leaving 8 routes for full assessment in this Stage 2 report. Route descriptions and Option development is provided in Chapter 4 below.

## 1.5 Description of the Study Area

The scheme options are located along the A890 between Achmore and the A890/A896 Strathcarron junction. There are a broad range of environmental considerations and constraints with regard to each of the options under consideration and these are described within each assessment topic where relevant.

General environmental constraints are shown in Figure 1.1 which can be viewed in Appendix 1 of this report. Some of the main constraints in the study area include:

- The Kyle of Lochalsh to Inverness railway line runs beside the current A890 from Stromeferry to Strathcarron. Stations along the existing route are present at Duncraig, Strome Ferry, Attadale and Strathcarron;

- There are seven Sites of Special Scientific Interest (SSSI) found within or in close proximity to the study area;
- One nearby National Nature Reserve, north of Ardarroch;
- Presence of Scheduled Monuments;
- Numerous Listed Buildings;
- Numerous residential houses along the existing route and in settlements which include Lochcarron, Achintee, Stromeferry, Achmore and Strathcarron.
- Scattered areas of woodland found on the Ancient Woodland Inventory (AWI); and
- Four nearby areas designated as Special Areas for Conservation (SAC);
- Presence of crofting land in some parts of the study area.

### 1.5.1 **Topography**

The topography within the study area is typical for the west coast of Scotland. The area is bordered by Loch Alsh to the south, Loch Kishorn to the north-west and Loch Carron at the centre. All these lochs are sea-lochs, with direct connection into the 'Minch' and Atlantic Ocean.

The land mass in between the lochs varies from sea level along the coast lines, to levels of up to 490m above Ordnance Datum along the range of hills including Cnoc nam Mult at the south side of Loch Carron and 390m above Ordnance Datum at An Sgurr between Loch Carron and Kishorn.

Travelling the main route (A890) from Kyle of Lochalsh north towards Loch Carron, the road passes through undeveloped hills and areas of forestry, experiencing steep road gradients of up to 14%.

Landscape designations and character are further described in the Chapter 5 Landscape and Visual assessment.

### 1.5.2 **Climate**

The climate at Loch Carron can be described as a changeable, temperate climate, typical for the west coast of Scotland.

The average minimum temperature of the area is 6°C and the average maximum temperature recorded is 12°C. The total average annual rainfall recorded is 2037mm, with over 200 days of rainfall greater than 1mm. Monthly mean wind speed at 10m above ground is in average 8.2 knots. In addition, the area experiences approximately 36 days of air frost in a year.

The effect of the climate on the engineering design will be addressed in further detail during Stage 3, detailed design. At this stage allowance has been made to set route option alignments below the 300m AOD contour to reduce risk of freezing during winter months. In addition, outline drainage design has taken account of existing and future climate conditions.

Source: <http://www.metoffice.gov.uk/public/weather/climate/loch-carron-highland#?tab=climateTables>

### 1.5.3 *Land Use*

Land use in the study area tends to be crofting and agriculture along the coast and straths, with rough grazing on the higher slopes and hills and much of the interior. Land cover is predominantly rough moorland and grassland vegetation with some small areas of native woodland along lower slopes and sheltered glens and several larger areas of commercial forestry. A number of dwellings are located along the local road network along with some of small businesses and access tracks to forestry plantations.

### 1.5.4 *Man-made Features*

Man-made features that have been identified in the study area are as follows:

#### **Carriageways**

The main carriageways within the study area are the A890 between Auchtertyre and the Strathcarron junction, and the A896 between the Strathcarron Junction and Kishorn. Both routes are mainly single carriageways of varying road and verge width, including sections of single track, with associated road structures. These comprise bridges, culverts and retaining walls, as well as a reinforced concrete avalanche shelter.

There are also several local road networks, comprising single track and single carriageway sections, between Achmore and Plockton, and to Stromeferry on the south side of Loch Carron, as well as in and around Lochcarron village, and towards Slumbay and Stromemore on the north side of the loch.

The main road network is shown on Figure 1.1 General Environmental Constraints in Appendix 1.

#### **Railway Line**

A section of the railway line from Dingwall to Kyle of Lochalsh is located within the study area, as shown on Figure 1.1 in Appendix 1.

This comprises the trackbed, signals and associated infrastructure between Plockton, Stromeferry and Strathcarron, as well as station platforms at Duncraig, Stromeferry, Attadale and Strathcarron.

There are also uncontrolled level crossings at Ardnarff and north of Maman Hill, as well as a signal controlled level crossing at Strathcarron.

Various minor under-bridges and culverts are located along this section of railway line, with the most significant bridge structures located at Duncraig, Craig, Fernaig, Attadale and Achintee. The rail track also shares the existing avalanche shelter with the A890 just west of Cuddies' Point.

#### **Residential Properties**

A large number of residential properties are located within the study area. These are mainly concentrated along the existing road network, forming part of the main settlements in the area such as Lochcarron, Achmore, Strathcarron, Stromeferry and Achintee. However, single dwellings remote from the existing public roads are also present and have been identified as far as possible where affected by proposed route options.

Existing settlement areas identified are shown on Figure 9.1.1 in Appendix 1.

### **Commercial Properties**

Commercial properties and businesses were identified within the study area, and a business directory established, as part of the business survey conducted during Stage 2. The directory can be found in Volume 1 of the DMRB Report.

Some of the larger commercial properties within the study area have been identified as part of the Stage 2 assessment:

- Attadale Gardens;
- Lochcarron Pottery;
- Lochcarron Craft centre;
- Lochcarron Golf Club;
- Lochcarron Weavers;
- Various Cafes, Restaurants, Hotels & B&B;
- Forestry Commission.

In addition, landownership and boundaries have been identified as far as possible and can be viewed in Volume 1 of the DMRB Report.

### **Agricultural Properties/Activity**

Small scale agricultural activities occur within the study area in the form of small scale farms, crofting land and livestock farming. There are numerous agricultural buildings located within the study area. These comprise of:

- Two farms (Achbeg and Achmore Farm) within Achmore;
- One farm in Attadale (Home Farm);
- Sheep pens and cattle grids in close proximity to Achintee and Lochcarron;
- Sheep washes in close proximity to both Achintee and Strathcarron; and
- One sheep fold in Strathcarron.

### **Other Properties**

Other significant properties identified within the study area are as follows:

- Kirkton Church and graveyard;
- Strome Castle.

### **Marine Use**

A small harbour now mainly used for pleasure craft is located at Plockton (which is just outside the study area). There are existing slipways formerly used by a ferry service at Stromeferry and North Strome, and a further small quay and jetty east of the slipway at Stromeferry.

On the northern shore of Loch Carron, there are various small slipways used for pleasure craft near Lochcarron village and Slumbay. A fish farm and jetty are located further west, near Strome Wood.

**2 METHODOLOGY**

This Stage 2 Assessment Report for the A890 Stromeferry Bypass has been prepared in accordance with the DMRB Volume 5, Section 1, Part 2, TD 37/93 ‘Scheme Assessment Reporting’ and Volume 11 DMRB Environmental Assessment.

Route alignments have been prepared and illustrate the extent of the options that have been assessed in this Stage 2 report. The scheme options have been assessed to gauge their comparative impact and performance in the context of environmental impact.

This Stage 2 Environmental Assessment has been prepared in accordance with the requirements of guidance in DMRB Volume 5 Section 1 Part 2 TD 37/93 (Chapter 3, Preparation of the Stage 1 Report). It identifies the relevant baseline conditions of the area which could be significantly affected by any of the proposed Options, giving a broad indication of likely environmental effects. An overall assessment of the importance of impacts on the baseline environment is provided, highlighting any major problems or benefits.

DMRB provides guidance in Volume 11 (Environmental Assessment) for individual environmental topics to assess the impacts of road schemes.

*Significance of Impact*

Table 2.1 has been used to measure significance of environmental effects:

**Table 2.1–Significance of Environmental Effect Table**

(Note: Shaded areas considered significant effects)

		<i>Sensitivity of Receptor</i>				
		<i>Very High</i>	<i>High</i>	<i>Medium</i>	<i>Low</i>	<i>Negligible</i>
<i>Magnitude of Impact</i>	<i>Major</i>	Very Large	Large or Very Large	Moderate or Large	Slight or Moderate	Slight
	<i>Moderate</i>	Large or Very Large	Moderate or Large	Moderate	Slight	Neutral or Slight
	<i>Minor</i>	Moderate or Large	Slight or Moderate	Slight	Neutral or Slight	Neutral or Slight
	<i>Negligible</i>	Slight	Slight	Neutral or Slight	Neutral or Slight	Neutral
	<i>No Change</i>	Neutral	Neutral	Neutral	Neutral	Neutral

Chapter authors have noted any discipline specific guidance or deviations from the methodology set out in DMRB within relevant sections.

Note: definitions of ‘Magnitude’ and ‘Sensitivity’ are provided in DMRB, Volume 11, Section 2, Part 5 (HA 205/08).

## 2.1 Scope of Assessment

The Highways Agency (HA) is currently modernising DMRB Volume 11. The Aims and Objectives of Environmental Assessment (DMRB, Vol.11, Part1: HA 200/08) identifies in Table 1.1 the Environmental Impact Assessment Topics. At present only some of the topics have published updated guidance and some topics rely on previous historic guidance. For the purposes of this report the new DMRB topic structure shall be followed with old guidance being used where no new guidance is available. Table 2.2 shows the relationship between the old DMRB topics and the new topic structure.

**Table 2.2 – DMRB new topic structure**

Old DMRB Topics	New DMRB Topics (followed for this report)
Air Quality	Air Quality
Cultural Heritage	Cultural Heritage
Landscape Effects	Landscape
Ecology and Nature Conservation	Nature Conservation
Geology and Soils	Geology and Soils
Traffic Noise and Vibration	Noise and Vibration
Vehicle Travellers	Effects on all travellers
Pedestrians Equestrians	
& Community Effects	Community and Private Assets
Land Use	
Road Drainage and Water Environment	Road Drainage and Water Environment
	Materials Assessment
Impact of Road Schemes on Policies and Plans	Now absorbed into each new topic chapter
Disruption due to Construction	Now absorbed into each new topic chapter*

### *Materials Assessment*

As noted in Table 1.2 above Materials Assessment is a new DMRB topic, however no specific guidance is available as yet. An Interim Advice Note (IAN) 'Guidance on Environmental Impact Assessment of Materials' was published in October 2011. The IAN provides the latest and most up to date guidance available and notes that this is a developing area and that guidance will be developed in time to cover the full scope of assessment methodologies expected in DMRB Volume 11.

At this stage, detailed information regarding materials and waste is not available as route alignments have not been fully developed. The IAN provides assessment levels which should be followed; these include scoping, simple assessment and detailed assessment. At the scoping stage for those projects which have an estimated cost of greater than £300,000 it is assumed that the potential exists for impacts and effects to take place. Therefore, an assessment of materials should be undertaken. As all of the Options considered will have

project costs of greater than £300,000 a ‘simple’ level of assessment has been undertaken at this stage of the project (DMRB Stage 2) when Options are more refined at DMRB Stage 3 a detailed assessment will be carried out.

## 2.2 Report Structure

The following sections included in this DMRB Stage 2 environmental assessment report are shown in Table 2.3 below:

**Table 2.3 Report Structure**

Report Structure
Executive Summary
Chapter 1 – Introduction
Chapter 2 – Methodology
Chapter 3 – Consultation
Chapter 4 – Description of the Scheme Options
Chapter 5 – Landscape
Chapter 6 – Nature Conservation
Chapter 7 – Cultural Heritage
Chapter 8 – Effects on all Travellers
Chapter 9 – Community & Private Assets
Chapter 10 – Geology & Soils
Chapter 11 – Air Quality
Chapter 12 – Noise & Vibration
Chapter 13 – Road Drainage & the Water Environment
Chapter 14 – Material Assessment
Assessment Summary Tables
Report References
Appendix 1 – Drawings



Appendix 2 – Site Visit Report
Appendix 3 – Ecology Field Notes
Appendix 4 – Consultation Information

### 2.3 Drawings

A number of drawings have been prepared to illustrate environmental conditions for assessment topics. A list of drawings prepared is shown in Table 2.4 below. Figures can be viewed in Appendix 1 of this report.

**Table 2.4 Report Figures**

Drawing Number	Title
Figure 1.1	General Environmental constraints
Figure 4.1	Stage 2 Route options
Figure 5.1	Landscape Designations
Figure 5.2	Landscape Character types
Figure 5.3	Principal visual Receptors
Figure 5.4.1	Viewpoints 1 to 4
Figure 5.4.2	Viewpoints 5 to 8
Figure 5.4.3	Viewpoints 9 to 12
Figure 6.1	Nature Conservation Designations
Figure 6.2	Phase 1 Habitat Survey Summary Map
Figure 6.3	Protected Species
Figure 6.4	Phase 1 Habitat Survey Overview
Figure 7.1	Designated Heritage Assets
Figure 7.2	Historical Land Use Assessment
Figure 7.3.1	Non-designated Heritage Assets: Online Route Options
Figure 7.3.2	Non-designated Heritage Assets: North Shore Route Option
Figure 7.3.3	Non-designated Heritage Assets: North Shore Route Option
Figure 7.3.4	Non-designated Heritage Assets: Southern Route
Figure 8.1	Core Paths and Rights of Way
Figure 9.1.1	Residential, Community Assets and Woodland Areas

Figure 9.1.2	Residential, Community Assets and Woodland Areas
Figure 9.2	Farms & Agricultural Land Classifications
Figure 10.1	Peat Locations
Figure 10.2	Soil Types
Figure 11.1	Air Quality Study Area
Figure 13.1	Watercourses and Waterbodies
Figure 14.1	Waste Management Facilities Within the Highland Council Area

### 3 CONSULTATION

Public and stakeholder consultation during the Stage 2 process involved the following activities:

- Stakeholder Workshop;
- Consultation letters / emails to statutory consultees; and
- Public Exhibition.

A summary of each form of consultation is provided below.

#### 3.1 Stakeholder workshop

A stakeholder workshop was held at on the 11th November 2013 at the Strathcarron Hotel, Strathcarron. A number of Statutory Stakeholders and Economic Stakeholders who were consulted as part of the STAG Part 1/DMRB Stage 1 assessment were invited to this workshop for Stage 2. A list of invited Stakeholders and record of attendance is provided in Table 3.1:

**Table 3.1: Stage 2 Stakeholder Workshop**

Stakeholder List: Workshop 11 <sup>th</sup> November 2013	
STAKEHOLDER NAME	ATTENDANCE (Y/N)
<b>Statutory Stakeholders:</b>	
Marine Scotland	Y
Network Rail	N
First Scotrail	N
Transport Scotland	N
Highland & Islands Enterprise	Y
The Highland Council – Ward Manager	Y
The Highland Council – Planning	N
Scottish Environment Protection Agency (SEPA)	Y
Scottish Natural Heritage	Y
Historic Scotland	N
National Trust for Scotland	N

Stakeholder List: Workshop 11 <sup>th</sup> November 2013	
<b>Economic Stakeholders</b>	
The Highland Council – Ward Manager	Y
The Highland Council – Transport	N
The Highland Council – Planning (local)	N
The Highland Council – TEC Services	Y
Highland Councillors	Y
Highlands & Islands Enterprise	Y
Forestry Commission Scotland	N
Plockton Community Council	N
Stromeferry & Achmore Community Council	Y
Lochcarron Community Council	Y
Applecross Community Council	Y
Lochcarron and District Business Association	Y
Kirkton Woodland & Heritage Group	Y

The workshop was held in order to keep Stakeholders informed of the assessment work being carried out as well as ensuring that Stakeholders remained part of this process. The workshop outlined progress made since the previous Stage 1 workshop held in January 2013 and since the delivery of the 'Stromeferry Appraisal, STAG Part 1 / DMRB Stage 1' report to THC in May 2013. The workshop also highlighted the engineering and environmental challenges, scheme budgets and consultations being considered during the Stage 2 assessment process.

In general, all represented Stakeholders appeared satisfied with the process and progress presented during this workshop.

### 3.2 Consultation letters / emails to statutory consultees

A number of statutory bodies were consulted as part of the Stage 2 assessment and Table 3.2 provides details of the consultations undertaken. Copies of the responses received from consultees are included in Appendix 4 of this report. A summary of responses received is shown below in Table 3.2 Consultation Response Summaries.

**Table 3.2 – Consultation Response Summaries**

Consultee	Response
<p>Scottish Natural Heritage (SNH)</p>	<p>SNH raised a number of considerations for the Stage 2 assessment including:</p> <ul style="list-style-type: none"> <li>• The potential presence of European Protected Species (EPS) such as otter, bats and wild cats in the study area. It was recommended that surveys should be undertaken.</li> <li>• Potential presence of nationally protected species including water voles and golden eagles. It was recommended that surveys should be undertaken.</li> <li>• Presence of nationally designated sites including Allt na Carnan SSSI and Attadale SSSI.</li> <li>• Loch Carron Marine Consultation Area is located in the study area and contains extensive areas of flame shell beds and horse mussel beds at Strome Narrows.</li> <li>• Guidance on landscape character types in the Ross and Cromarty Landscape Character Assessment 1999.</li> <li>• The area below the road between Ardaneaskan and Slumbay is identified in the Wester Ross Local Plan 2006 as important in maintaining important views over open water and is afforded local/regional policy protection and is therefore relevant to any assessment.</li> <li>• Availability of environmental information associated with four hydro schemes at the Attadale estate.</li> </ul> <p>SNH also stated that should any renewable solutions be added to Options N6 or N9 at Stage 3 there may be potential for significant environmental effects.</p>
<p>Marine Scotland (MS)</p>	<p>MS provided comments on the proposed route options and highlighted the following topics for consideration as part of the Stage 2 assessment process:</p> <ul style="list-style-type: none"> <li>• Potential for impacts on marine mammals</li> <li>• Potential impacts on marine fish ecology and commercial fisheries</li> <li>• Benthic ecology</li> <li>• Diadromous fish</li> <li>• Aquaculture</li> <li>• Noise generation in sensitive areas</li> <li>• Presence of a fish farm within Loch Carron</li> </ul> <p>In addition to the above a number of information sheets on biological conservation and habitats were provided to inform the assessment.</p> <p>MS advised that a Marine Licence will be required for any construction works taking place below the limit of Mean High Water Springs and if there would be any associated dredging works taking place, that involved disposal at sea, a Marine Licence for Sea Disposal will also be required. The potential requirement for EIA under the Marine Works (EIA) Regulations 2007 (As Amended) was also noted.</p> <p>Further advice was provided with regard to the introduction of pre-application consultation requirements when applying for a Marine Licence.</p>
<p>National Trust for Scotland</p>	<p>No response received at Stage 2; however feedback at Stage 1 is still applicable to the Stage 2 assessment and has been considered.</p>
<p>Historic Scotland (HS)</p>	<p>Historic Scotland provided advice on cultural heritage assets in the</p>

Consultee	Response
	<p>study area and noted that Options N6 and N9 would likely have an impact on the setting of Strome Castle which is a scheduled monument, whilst the setting of Lochcarron Old Parish Church scheduled monument should also be considered with regard to these options. HS had not further specific comments to make on any of the other route options, other than to advise that potential impacts on the historic environment should be avoided and assessed.</p>
<p>The Highland Council (THC)</p>	<p>At Stage 1 THC advised of the requirement for planning consent and the likelihood of the need for an Environmental Impact Assessment (EIA) for a preferred route when selected. As client, THC provided further information throughout the Stage 2 assessment of options with regard to any potential development in the study area. Planning applications identified are included in Chapter 9 community &amp; Private Assets. Further consultation with various departments of THC will be required as part of the Stage 3 DMRB assessments.</p>
<p>Forestry Commission Scotland (FCS)</p>	<p>FCS replied to offer support where information can benefit the Stage 2 assessment of Options. Much of the information made available by FCS at Stage 1 was still relevant for this Stage 2 assessment.</p>
<p>Scottish Water</p>	<p>No response received at Stage 2.</p>
<p>Scottish Environment Protection Agency (SEPA)</p>	<p>SEPA raised a number of issues for consideration during the Stage 2 DMRB assessment process and provided information that helped to inform the environmental assessment. Areas of note where guidance was provided include:</p> <ul style="list-style-type: none"> <li>• Impacts on wetlands and groundwater</li> <li>• Marine ecological interests</li> <li>• Engineering activities in the water environment</li> <li>• Flood risk</li> <li>• Disturbance of peat and development on peatlands</li> <li>• Material requirements for the Scheme</li> <li>• Forest removal and waste.</li> </ul> <p>URS replied to SEPA to address a number of queries and to provide clarification. Further information provided to SEPA includes the following:</p> <ul style="list-style-type: none"> <li>• Site visit report</li> <li>• Technical Note on constructing roads over peat and peat management.</li> <li>• Preliminary list of proposed watercourse crossings for options</li> <li>• Examples of watercourse crossings</li> </ul> <p>The above information is available in Appendix 4 of this report.</p> <p>Finally, SEPA concluded their understanding is that the purpose of the Stage 2 assessment is to identify the factors to be taken into account in considering the options to allow a decision to be made on the preferred proposal and that the Stage 3 assessment concentrates on assessment of that preferred option.</p>

It should be noted that a number of other stakeholders including community councils were contacted during Stage 2 as part of the Options design process. Further details can be found in Volume 1 of the DMRB Report.

**3.3 Public Exhibitions**

Two public exhibitions were held in March 2014 to provide information on the Stage 2 assessment process and considerations in relation to the Stromeferry appraisal to the wider public. Comments and feedback was invited from the local community on proposed options, which assisted in shaping the final preferred solution as presented in the concluding part of this report.

Details of the public exhibitions is provided in Table 3.3 below and display boards from the events are provided in Appendix 4 of this report.

**Table 3.3 – Stage 2 Public Exhibition details**

NO	DATE	VENUE	ATTENDANCE (NUMBERS)
1	27 <sup>th</sup> March 2014	Lochcarron Village Hall	120
2	28 <sup>th</sup> March 2014	Achmore Village Hall	50

## 4 DESCRIPTION OF THE ROUTE OPTIONS

### 4.1 Options Development

The Stage 1 DMRB assessment was completed in spring 2013 where a total of 31 routes were originally identified. 14 were discounted during the assessment process as they did not satisfy the scheme objectives. 17 remaining routes were examined in more detail and 9 'emerging' routes were recommended to take forward for assessment at Stage 2. The 9 'emerging routes' from the Stage 1 assessment are described in Table 4.1 below:

**Table 4.1 – Stage 1 Emerging Routes**

Route	Description
<b>Northern Corridor</b>	
The northern corridor options included for a bridge or tunnel crossing at two locations.	
N6 – North Lochcarron Bypass	An additional route option proposed to provide a full bypass of Lochcarron Village. This route is an off-line route option considering a western bridge crossing of the Strome Narrows, and follows the route of the existing minor road along the northern shore of Loch Carron, upgraded to agreed design standards.
N9 – North online through Lochcarron	An off-line route option originating at Achmore, considering (an eastern) Strome Narrows crossing and following the route of the existing minor road along the northern shore of Loch Carron, upgraded to agreed design standards. This route remains on-line through Lochcarron Village.
N6b – Renewable energy	This route alignment followed that of N6 or alternatively N9 and considered using the Strome Narrows crossing to incorporate devices to generate renewable energy.
<b>Online Corridor Options</b>	
O2 – Viaduct	On-line improvement of the existing carriageway and a local 1.8km bypass of the rock fall area west of Cuddies' Point by means of a cantilevered structure along the shoreline.
O3 – Tunnel	On-line improvement of the existing carriageway and a local 1.6km bypass of the rock fall area west of Cuddies' Point by means of an inland tunnel structure
O4 – Do minimum	'Do-Minimum' scenario, with no proposed improvements to the existing route. This option also includes considerations for suitable contingency measures during (future) road closures.
O5 – Shared-use	On-line improvement of the existing carriageway and a local 1.8km shared road / rail corridor west of Cuddies' Point.
O7 – Avalanche shelter	On-line improvement of the existing carriageway and a local 2.0km extended rock shelter west of Cuddies' Point.
<b>Southern Corridor Options</b>	
S4 – Glean Udalain	A principal southern off-line bypass route from the A890 through Glen Udalain and Attadale valley, and on-line improvements of the existing A890 carriageway from Attadale north. In addition, local link routes to the Stromeferry / Achmore area (S1/3) were also to be considered.

The above routes are available in the Stage 1 STAG/DMRB report completed in 2013.

During the early part of Stage 2 a further sifting of options was conducted by the project team through research, team meetings and discussion with The Highland Council. The aim was to



identify any key issues or constraints that would constrain delivering any of the options. As a result the following options were discarded:

- Option N6b which included renewable energy solutions for a bridge crossing of Strome Narrows will not be considered as part of the Stage 2 DMRB options assessment. Renewable energy could be considered at a later stage of the project if considered feasible.
- A tunnel crossing of Strome Narrows will not proceed due to technical and cost constraints. From an engineering perspective the construction of a tunnel across Strome Narrows would have been difficult due to gradients whilst cost of construction would also have been restrictive;
- The crossing of Strome Narrows to the east was dismissed due to a combination of constraints including gradients, proximity to Strome Castle which is a Scheduled Monument, and landscape and visual impact due to proximity to residential and community receptors.
- The 'local link' routes were dropped as part of the Southern corridor route. The link routes would have added additional cost to the option and were not considered essential to meet the chief objective of bypassing the rockfall area along the existing A890. Additional considerations included a difficult terrain/topography with areas of peat potentially present, increased impact on species and habitats, landscape and materials generation/requirement.

#### 4.2 Route Options Assessed at Stage 2

After the sifting of options described above, alignments were developed in more detail for each of the resulting 8 route options. The 8 route options assessed at Stage 2 are described in Table 4.2 below. Drawings of each route are shown in Appendix 1.

**Table 4.2 – Route Options Assessed at Stage 2**

Option	Description
<b>Northern Corridor Options</b>	
N6 – North online through Lochcarron	Option N6 leaves the existing A890 south of Stromeferry, passing along the western contour of Creag Mhaol, and to the west of Stromeferry. It then crosses the Strome Narrows, via a bridge crossing with a total span length of approximately 830m. The bridge crossing would span both Loch Carron and the Dingwall to Kyle of Lochalsh railway line. From North Strome, N9 would then remain offline passing north of Stromemore. It would then return online for a short distance passing the Weavers, and then continue offline passing north of Slumbay and Lochcarron, crossing both the existing A896 and Alt Nan Carnan. N6 would then return online at Kirkton, along the existing A896 from Kirkton to Strathcarron Junction. Option N6 has an approximate length of 14.5km.
N9 – North Lochcarron Bypass	Option N9 follows the same alignment as N6 from Achmore to Leacanasigh. Option N9 leaves the existing A890 south of Stromeferry, passing along the western contour of Creag Mhaol, and to the west of Stromeferry. It then crosses the Strome Narrows, via a bridge crossing with a total span length of approximately 830m. The bridge crossing would span both Loch Carron and the Dingwall to Kyle of Lochalsh railway line. From North Strome, N6 would then return online and continue along the existing road through Stromemore,

Option	Description
	Strome Wood, Lochcarron and Kirkton until Strathcarron Junction. Option N9 has a total length of approximately 14.5km.
<b>Online Corridor Options</b>	
<p>All online options follow the same alignment from Strome ferry to Strathcarron junction, but vary from Frenchman's Burn to Cuddies Burn. Therefore from Strome ferry to Frenchmans Burn, online options follow the existing A890 with some widening into the existing rock face north of Ardnarff, and some lengths of small retaining wall provided between the existing railway and road. From Cuddies Burn to Attadale, the online options again follow the existing A890 alignment. A short length of retaining wall would be provided between the railway and road on the approach to Maman Hill. The online routes would continue offline to the west of the existing road alignment through Maman Hill therefore limiting the steep gradients on both the north and south approaches. Online options then return online until Achintee, and continue offline passing south east of Achintee, with new bridge crossings of River Taodail and its tributary, the existing A890 and the existing railway, with the existing level crossing at Strathcarron removed. Online options then return online north of Strathcarron until the Strathcarron junction. All online options have approximate lengths of between 13.1km and 13.5km.</p>	
O2 – Online with Rail Viaduct	From Frenchmans Burn to Cuddies Burn, option O2 would realign the railway on to a new viaduct structure along the side of the loch. The structure would be approximately 1.6km in length. This would allow a wider corridor to accommodate the wider two lane road including a wide verge which incorporates a rock trap adjacent to rock face.
O3 – Online with Tunnel	From Frenchmans Burn to Cuddies Burn, option O3 would provide an inland tunnel. The tunnel would be approximately 1.5km in length. Some rock cut would be required on the south tunnel portal at Frenchmans Burn.
O4 – Do minimum (no drawing)	Existing road with no improvements proposed. This option is a baseline comparison to all Options considered.
O5 – Online Road with Rail Share	From Frenchmans Burn to Cuddies Burn, option O5 would provide a section of shared road / railway, with the A890 realigned to follow the railway alignment such that road traffic would be running on the same corridor as the railway. The road would share the railway line for a length of approximately 1.8km.
O7 – Online with Developed Avalanche Shelter	From Frenchmans Burn to Cuddies Burn, option O7 would provide a road viaduct which would carry the realigned A890 above the railway. The structure would be approximately 1.7km in length.
<b>Southern Corridor Option</b>	
S4 – South Glen Udalain	<p>S4 would leave the existing A890 south of Braeintra, and follow the existing forest track through the Glen Udalain valley, remaining largely to the north of Allt Gleann Udalain. Option S4 would then cross the Allt Gleann Udalain, heading towards the Allt Loch Innis Nan Seangan valley. Option S4 would then continue northwards towards the River Attadale valley, remaining on the south west side of River Attadale valley, continuing in a north westerly direction before returning online to the existing A890 at the River Attadale bridge. Option S4 would then follow the same alignment as the online options, and continue online with a short length of retaining wall provided between the railway and road on the approach to Maman Hill. Option S4 would continue offline to the west of the existing road alignment through Maman Hill therefore limiting the steep gradients on both the north and south approaches. Option S4 then returns online until Achintee, and continues offline passing south east of Achintee, with new bridge crossings of River Taodail and its tributary, the existing A890 and the existing railway, with the existing level crossing at Strathcarron removed. Option S4 would then return online north of Strathcarron until the Strathcarron junction. Option S4 has an approximate length</p>

Option	Description
	of 19.3km.

## 5 LANDSCAPE

### 5.1 Introduction

This Chapter reports on the findings of a DMRB Stage 2 landscape and visual assessments of the identified route options for the Stromeferry Bypass.

The assessment provide a description of the landscape resource and visual amenity of the study area, an overview of potential change and make informed predictions of potential impacts. The assessment process also involves consideration of potential opportunities to help mitigate negative landscape and visual impacts.

### 5.2 Planning Policy Context

The landscape and visual assessments of the route options have been undertaken with reference to the following national policy and guidance.

- National Planning Framework 2 (NPF2);
- Scottish Planning Policy (SPP);
- Planning Advice Note 60: Planning for Natural Heritage; and
- Fitting Landscapes – Securing more sustainable landscapes.

In addition to the above national policy and advice, a review of the Highland wide Local Development Plan has been undertaken. Section 5.2.1 below provides an overview of the key objectives and policies set out in the plan of relevance to the proposed route options and specifically in relation to landscape character and visual amenity aspects.

#### 5.2.1 *Highland wide Local Development Plan, 2012*

The vision of the development plan sets out a number of goals and ways that these will be met. The following outlines those of particular relevance to landscape and visual and the proposed route options:

- Safeguarding the environment by '*ensuring that the special quality of the natural, built and cultural environment in Highland is protected and enhanced*'; and
- Supporting a competitive, sustainable and adaptable economy by '*helping to deliver, in partnership with Transport Scotland and other transport bodies, transport infrastructure improvements across the area*'.

The following provides an overview of policies relevant to landscape character and visual amenity considerations set out in the development plan:

**Policy 28 – Sustainable Design** states that '*the Council will support developments which promote and enhance the social, economic and environmental wellbeing of the people of Highland.*' The policy also sets out a list of points against which development will be assessed for compliance, including the level of impact on certain resources such as landscape and scenery and the need to '*demonstrate sensitive siting and high quality design in keeping with local character and historic and natural environment and in making use of appropriate materials*'.

**Policy 29 – Design Quality and Place Making** states that *‘new development should be designed to make a positive contribution to the architectural and visual quality of the place in which it is located’* and that *‘Applicants should demonstrate sensitivity and respect towards the local distinctiveness of the landscape, architecture, design and layouts in their proposals’*.

**Policy 36 – Development in the Wider Countryside** outlines a set of criteria against which development outwith the main settlements will be assessed. This includes the need to ensure that development is compatible with the landscape character and capacity.

**Policy 57 – Natural, Built and Cultural Heritage** outlines protection for important natural, built and cultural heritage assets designated at the local/ regional, national and international level. For local and regional level designations it states that *‘we will allow developments if it can be satisfactorily demonstrated that they will not have an unacceptable impact on the natural environment, amenity and heritage resource’*. For sites of a national importance, the policy states that the council *‘will allow developments that can be shown not to compromise the natural environment, amenity and heritage resource. Where there may be any significant adverse effects, these must be clearly outweighed by social or economic benefits of national importance. It must also be shown that the development will support communities in fragile areas who are having difficulties in keeping their population and services’*.

**Policy 61 – Landscape** states that *‘new developments should be designed to reflect the landscape characteristics and special qualities identified in the Landscape Character Assessment of the area in which they are proposed. This will include consideration of the appropriate scale, form, pattern and construction materials, as well as the potential cumulative effect of developments where this may be an issue. The Council would wish to encourage those undertaking development to include measures to enhance the landscape characteristics of the area. This will apply particularly where the condition of the landscape characteristics has deteriorated to such an extent that there has been a loss of landscape quality or distinctive sense of place. In the assessment of new developments, the Council will take account of Landscape Character Assessments, Landscape Capacity Studies and its supplementary guidance on Siting and Design and Sustainable Design, together with any other relevant design guidance’*.

### 5.3

#### Approach & Methodology

The landscape and visual options assessments have been undertaken in accordance with the Guidelines for Landscape and Visual Impact Assessment (GLVIA), Third Edition, 2013, published by the Landscape Institute and the Institute of Environmental Management and Assessment. Reference has also been made to the Design Manual for Roads and Bridges Volume 11 Section 3 Part 5 and other best practice guidance.

As recommended in the GLVIA, landscape and visual impacts are assessed separately.

**Landscape impacts** relate to changes to the physical landscape and its perceived character, which is considered to be an important environmental resource.

**Visual impacts** relate to modifications to views experienced by people within the study area. Viewers are referred to in this Chapter as receptors.

The assessments are undertaken in the following broad stages:

- Establishment of the Baseline;
- Appreciation of the Proposed Scheme Options;
- Identification of Potential Impacts;

- Identification of Potential Mitigation measures.

### 5.3.1 ***Establishment of the baseline***

A baseline study has been undertaken through a combination of desk based research and on site appraisal in order to establish the existing conditions of the landscape and visual resources of the study area. The landscape baseline study identifies landscape designations and distinct landscape types within the study area and helps define their key characteristics. The visual baseline aids in the identification of potential visual receptor locations and provides a description of the nature of the existing views.

### 5.3.2 ***Appreciation of the Proposed Scheme Options***

In order to be able to assess the potential impacts of the proposed route options on landscape character and visual amenity it is important to develop a thorough understanding of each option. This includes a review of the location and potential alignment of each route and the requirement for earthworks, structures or other elements and is achieved through a review of drawings and information and on site appraisal. This helps to establish the potential extent of visibility and influence of each option and supports the identification of areas for further targeted survey and analysis. A detailed description of the proposed route options is provided in Chapter 4.

### 5.3.3 ***Identification of Potential Impacts***

The landscape and visual assessments seek to identify receptors that would potentially be significantly affected by the proposed route options. Determination of the landscape and visual impacts has been undertaken by employing professional judgment and includes consideration of the baseline conditions, susceptibility and sensitivity to change and the nature of potential change. The assessments involve an evaluation of the level and significance of potential impacts based on the following scale and criteria.

**Major impact (negative or positive):** where the route option would cause a very noticeable change in the landscape character or visual amenity e.g. notable change in landscape characteristics or views over an extensive area or very intensive change over a more limited area.

**Moderate impact (negative or positive):** where the route option would cause a noticeable change in the landscape character or visual amenity e.g. small changes in landscape characteristics or views over a wide area or notable changes in a more limited area.

**Minor impact (negative or positive):** where the route option would cause a small change in the landscape character or visual amenity e.g. small changes to an area, landscape components or views.

**No impact (Neutral):** where the route option would cause a barely or not discernible change in the existing landscape character or visual amenity e.g. small or virtually imperceptible change to an area, landscape components or views.

For the purpose of this assessment, impacts of moderate or above are considered to be significant.

### 5.3.4 ***Identification of potential mitigation measures***

Potential mitigation measures will be identified for each route option in order to help reduce any potential negative impacts. These will also be used to help inform the options appraisal and subsequent detailed design process.

## 5.4 Consultations

Initial consultation with various statutory bodies, including Scottish Natural Heritage (SNH) and The Highland Council, local groups and the wider community has been carried out through a series of stakeholder events and exhibitions. In terms of landscape and visual aspects, the need to protect areas of national importance for natural heritage has been identified as one of the key objectives by the stakeholders. In addition, the potential for negative impacts on the natural heritage of the Strome Narrows area, which is undesignated, has also been identified as a potential concern.

SNH to date have provided comments on a number of landscape considerations, which include, the Landscape Character Assessment publications; Kyle – Plockton Special Landscape Area and Views over Open Water. The Views over Open Water designation is located to the area below the road between Ardaneaskan and Slumbay and is identified in the Wester Ross Local Plan 2006 as important for maintaining key views over open water and is afforded local/regional policy protection and is therefore relevant to any assessment. Further information on consultation undertaken is included in Chapter 3 above.

## 5.5 Study Area

A study area of 5km for the proposed route options has been identified for the landscape and visual assessments. This extent, as shown on Figure 5.1, has been defined through a review of maps and aerial photographs, in conjunction with several site visits and appraisal. These indicated that due to the nature of the surrounding landscape and the identified route options any potentially significant impacts are likely to be restricted to a localised area. The 5km extent allows for a good overview of the landscape and visual context to be achieved and covers all receptors considered to have the potential to be significantly affected by the proposed route options.

## 5.6 Establishment of the Baseline

The following section provides a description of the existing landscape character and visual resource of the study area. The baseline has been established through a combination of desk based study and on site appraisal. Visits to the site and receptor locations were carried out between the 12th and 15th of August and the 29th and 30th of October 2013.

### 5.6.1 *Landscape Designations*

Landscapes can be given international, national, regional or local designations in recognition of their importance, outstanding scenic interest or attractiveness. The study area contains a number of landscape designations which are shown on Figure 5.1. There are two National Scenic Areas (NSA), two Special Landscape Areas (SLA) and two Search Areas for Wild Land (SAWL).

#### ***National Scenic Areas***

Parts of two NSAs have been identified within the study area; the Wester Ross NSA and the Kintail NSA.

Only a very small part of the Kintail NSA is within the southern edge of the study area. Initial site appraisal has identified that due to the distance and nature of the intervening landform between the route options and the Kintail NSA it is unlikely to be affected and as such has not been considered further in this assessment.

The Wester Ross NSA is located to the north of the route options and covers a large area of Wester Ross from Loch Kishorn, northwards to Greenstone Point and Gruinard Bay. This area

is characterised by a large expanse of mountainous and moorland landscapes, with dramatic and varied scenery. The distinctive and recognisable forms of the mountains and extensive views along the coast and lochs and towards the Isle of Skye combine to result in some of the most renowned scenery in Scotland. The majority of settlement is found in small groups along the coast, with little in the interior which therefore has a strong sense of remoteness, exposure and naturalness.

### **Special Landscape Areas**

The Kyle – Plockton SLA is located in the west of the study area and covers a small section of the coast around Kyle of Lochalsh and Plockton. This area covers a range of differing landscape characteristics, from small scale islands, bays and inlets along the shore to the wooded and forested slopes and undulating moorland above. There are a number of small harbour settlements along the coastline including, Kyle, Badicaul, Erbusaig, Drumbuie and Plockton, often with picturesque views along the coast and to the mountains of Skye and Torridon. Weather conditions and the relationship with the sea provide a constantly changing impression of this landscape. The SLA description identifies *Intricate Coastline and Picturesque Vistas* as the key special qualities of this area and also identifies the Skye Bridge as a notable engineering structure in a national context.

The Strathconnon, Monar and Mullardoch SLA is located to the east of the study area and covers a large area of the southwest highlands between Loch Carron and Strathglass. The character of this area is defined by a large extent of moorland and mountain massif, dissected by deep, long glens. The area is largely uninhabited and often difficult to access, resulting in the impression of remoteness. Land cover and vegetation consists predominantly of grasses and montane heath with occasional areas of woodland along lower slopes of glens, giving a strong impression of naturalness. The remoteness, difficulty of access and naturalness combine to result in a strong sense of wildness, particularly in the interior of this area. The SLA description identifies the following special qualities of this landscape: *Grand Mountain Ridges, Long Glens and Wide Strath*; and *Wildness and Remoteness*.

### **Wild Land**

In 2002 SNH published a policy statement entitled *Wildness in Scotland's Countryside*. This document describes the main pressures which can lead to the loss of wildness and considers how to identify areas of wild land. A map identifying the main areas where wild land is likely to be found was included as part of the policy statement. Parts of two SAWLs are located within the study area.

The first SAWL is located in the north of the study area covering a large mountainous area to the north of Strathcarron, stretching eastwards from Glen Shieldaig towards Achnasheen and Kinlochewe. The second SAWL is located to the east of the study area and covers a very large area, stretching from Glen Shiel in the south towards Glen Carron and Strathconnon in the north. Both of these areas are characterised by expanses of mountain and moorland with a strong sense of remoteness and naturalness, particularly in the interior.

#### 5.6.2

### **Landscape Character**

This is a relatively diverse landscape, ranging from rocky moorland to wide farmed strath and enclosed inlets. The predominant character is one of rugged moorland and hills, divided by steep sided glens and inlets such as Loch Carron, Attadale and Strath Ascaig.

Land use tends to be crofting and agriculture along the coast and straths, with rough grazing on the higher slopes and hills and much of the interior. Land cover is predominantly rough



moorland and grassland vegetation with some small areas of native woodland along lower slopes and sheltered glens and several larger areas of commercial forestry.

Settlement is relatively sparse throughout the overall area and is predominantly concentrated along the coast. The village of Lochcarron, which stretches along the north coast of Loch Carron, is the largest settlement in the area. In addition there are also numerous other small coastal settlements such as Stromeferry, Stromemore, Achmore, Ardaneaskan, Achintraid, Stromeferry and Strathcarron / Achintee.

A detailed review and classification of the landscape areas and types of Scotland has been undertaken by SNH and partner Councils. The study area for the proposed route options is covered by the Ross and Cromarty Landscape Character Assessment and the Skye and Lochalsh Landscape Assessment. These documents provide a detailed classification of the landscape character of the two areas, dividing them into a total of 38 Landscape Character Types (LCTs), 12 of which have been identified within the study area. Initial site appraisal identified that two of the 12 LCTs (Linear Crofting and Rural Estate Settlement) would not gain visibility of any of the proposed options due to intervening landform and as such they have not been considered further in this assessment. Site appraisal also identified an additional area of Coastal Strath LCT at Attadale and therefore the boundaries of the identified SNH LCTs have been redefined slightly in this location. Similarly the extents of the Lochcarron area of the Harbour Settlement LCT have also been altered slightly to include the associated crofting land which better relates to the settlement than the adjacent Rocky Moorland. Figure 5.2 shows the extents of each of the LCTs within the study area.

The following ten LCTs have been identified for inclusion in the assessment:

- Coastal Strath;
- Coniferous Woodland Plantation;
- Harbour Settlement;
- Rocky Moorland;
- Rocky Undulating Plateau;
- Rounded Hills;
- Rugged Massif;
- Rugged Mountain Massif;
- Smooth Moorland; and
- Wide Farmed Strath.

Three of the identified LCTs within the Ross and Cromarty document have similar and corresponding, although differently named, LCTs within the Skye and Lochalsh document. Where this occurs they have been grouped for the purposes of this assessment to avoid unnecessary repetition.

The following provides a brief description of the character of each of the above LCTs.

#### ***Coastal Strath/ Wide Farmed Strath***

The Coastal Strath LCT is found in four locations within the study area, at Achmore, Attadale, Achtertyre and Glen Elchaig, and the Wide Farmed Strath in one area, along Strath Carron. These areas are characterised by a wide, flat bottomed strath bounded by steeply sloping moorland hills. The lateral enclosure provided by the steep sides result in a strong linearity to the landscape. A number of roads and tracks, including the main routes of the A890 and A896, are located along the base of these straths, further emphasising the impression of linearity. Forestry blocks and shelterbelt planting provides some local containment of views within the otherwise, open landscape. The predominant land cover is a mix of semi-improved grassland used for cattle and sheep grazing, with areas of rougher grassland and moorland.

The two areas of Coastal Strath LCT, at Achmore and Attadale, are of a slightly smaller scale, with a greater sense of enclosure than that of the larger scale Strath Carron.

#### ***Coniferous Woodland Plantation***

This LCT is found in several areas in the south of the study area, the largest of which being located on the slopes and hills to the south of Stromeferry, and is defined by large blocks of coniferous forestry. The forestry tends to blanket the underlying landform, disguising any landmarks and bringing uniformity to the landscape. The associated fences, tracks, plough lines and recent felling activity increase the impression of human influence in this landscape, which contrasts with many of the adjacent LCTs. The hard edges and geometric shapes of the forestry blocks are often unrelated to the underlying topography and contrast with the pattern of native woodland found elsewhere.

#### ***Harbour Settlement***

This LCT is found in a number of locations within the study area and includes many of the main settlements, including Lochcarron and Plockton. These areas consist of small coastal settlements centred around the harbour and often include adjacent crofting lands. Lochcarron, the largest of these settlements, stretches along the north shore of Loch Carron and is stepped up the hillside a short way. Narrow linear fields stretch further up the slopes above the settlement providing a clear pattern to the landscape. A similar field pattern is found along the shoreline in areas where the settlement is slightly set back from the coast. The improved grassland of these fields provides a context to the settlement and contrasts with the rougher vegetation of the rocky moorland landscape beyond.

#### ***Rocky Moorland/ Rocky Undulating Plateau***

These LCTs are the predominant type within the study area and are characterised by sloping and undulating moorland with numerous rock outcrops and boulders. This is a large scale landscape with a varying degree of openness and containment defined by the nature of the topography and occasional blocks of forestry. There are few focal points or elements to help give an indication of the scale of this landscape or aid with orientation. The undulating topography provides a range of experiences and degrees of enclosure as one travels through the area, locally influencing the impression of the landscape. Settlement in this area is very limited, leading to an impression of remoteness and isolation, particularly in the interior away from forestry blocks and hill tracks.

#### ***Rounded Hills***

This LCT is found in two locations within the study area, on either side of Strath Carron. These areas are characterised by large scale rounded hills consisting of a combination of wide concave and convex slopes. A uniformity of vegetation cover, consisting of moorland and grassland, adds to the smooth texture and simple composition. The scale of the hills, with their wide bases, gives a sense of bulk to this landscape. There is a general lack of settlement and

intensive land use within these areas resulting in a sense of remoteness, exposure and naturalness, although this is somewhat influenced by elements in adjacent character types.

### ***Rugged Massif/ Rugged Mountain Massif***

A small part of the Rugged Mountain Massif is found at the northern edge of the study area, whereas the Rugged Massif LCT covers a large part of the south of the study area. These areas are characterised by extensive areas of mountainous landscape, ranging from low hills to high Munro summits, often divided by broad steep sided glens. The impression of these areas tends to be of extensive ranges rather than individual hills or mountains, whose scale is difficult to perceive. There is a general lack of habitation and human influence on this landscape, particularly in the interior which exhibits a strong sense of remoteness, isolation and naturalness. Settlement and more intensive land use, such as sheep grazing, around the fringes of this LCT locally reduce the sense of remoteness.

### ***Smooth Moorland***

This LCT is found in two locations within the study area, the largest of which covers an area north of Glen Ling, with the smaller area at the head of the glen. The character of this area is defined by a smooth textured, undulating landform which results in a simple visual composition. Land cover is predominantly moorland and grassland reinforcing the large scale uniformity. This simplicity and uniformity combine with a general lack of focal elements to make it difficult to distinguish the scale of this landscape. However, elements in adjacent landscapes, such as forestry blocks or occasional fences and hill tracks can give a greater sense of scale locally. There is a strong sense of exposure and remoteness in many parts of this LCT, away from forestry and tracks.

### ***Strome Narrows Landscape***

In addition to the above identified LCTs, the Strome Narrows area is recognised as of distinct character. The steeply sloping sides and prevalence of forestry combine with a narrow loch to provide a strong sense of lateral enclosure to this landscape. This is further emphasised by a bend in the loch at this point which further restricts views. However, there are some distant views inland along Loch Carron and outwards across the outer loch towards Plockton and Skye beyond. This is the location of the former ferry crossing and as such there are small settlements on either side of the Narrows.

#### **5.6.3 *Visual Amenity***

The following identifies potential visual receptor locations within the study area and provides a brief description of the existing view. The identification of receptors focuses on those areas most likely to be significantly affected, as informed by initial site appraisal. For ease of assessment, potential receptors have been divided into five main visual areas. The locations of key principal receptors within the study area are shown on Figure 5.3. A series of viewpoints have been identified in each area to provide a reference of the existing views from a cross section of potential receptors. Viewpoint locations are shown on Figure 5.3 and photographs from each location shown on Figures 5.4.1 to 5.4.3.

### ***Inner Loch Carron Valley***

The majority of visual receptor locations within the valley are found along the shore edge. Views from these locations tend to be orientated across the loch, towards the opposing hillside.

The north shore has the largest concentration of potential visual receptors in the study area, and includes the village of Lochcarron. Views from Lochcarron are generally focused

southwest across the loch to the opposite shore and hills beyond (viewpoint 1). The existing A890 and railway follow the coastline opposite and the associated traffic and rock cut face are visible. Vehicles on the A896, which passes through Lochcarron, are prominent in the foreground of views from some properties. Outwith Lochcarron, the north shore area also includes the A896, the minor road towards Stromemore and a number of recreational routes. From more elevated locations, such as from the A896 above Lochcarron (viewpoint 2), there are expansive and attractive views over Loch Carron and the surrounding hills. The area between the Stromemore road and the shoreline, westwards from Slumbay, has been identified as an area of Views Over Open Water and as such is given a degree of protection through the local development plan.

On the southern shore of Loch Carron potential visual receptor locations include a number of residential properties; the existing A890 (viewpoint 3) and the railway. Potential receptors in this area also include recreational walkers, cyclists and tourists. Views from the southern shore are low level and focused north and west across the loch towards Lochcarron and the hills beyond. The layby and viewpoint on the A890 above Stromeferry (viewpoint 4) is an important and popular stopping point with elevated, expansive views along Loch Carron to the northeast.

Properties at the head of the loch, in Strathcarron (viewpoint 5) and Achintee, experience views across and along the length of the valley. Views from these locations tend to be fragmented by trees or vegetation and often include the existing A890 and associated vehicular movement in the foreground.

In addition to the above, a key set of potential visual receptors to be considered are loch users. These receptors gain 360 degree views along and across the loch and to the surrounding hills. The main focus of views is along the loch and towards the settlement of Lochcarron, on the north shore.

### ***Strome Narrows***

There are a number of potential receptors within this area, located largely within Stromeferry, Stromemore and Leacanasigh. Views from these locations tend to be slightly elevated and focused across the narrows to the opposite shore. There are some more distant, framed views up the loch from Stromeferry and down the loch towards Plockton, from Stromemore. In addition to residential properties, Strome Castle (viewpoint 6) and its visitors are important visual receptors. Views from the castle ruins are orientated south across the narrows and west into the more open water around Plockton and Ardaneaskan. The prominent landform of Creag Mhaol on the opposite shore is a distinctive element within the view. The northern shoreline, below the road, is part of the Views Over Open Water designated area, signalling the heightened value of these views.

### ***Outer Loch Carron***

To the west of the Strome Narrows there are several small settlements along the coast, including Plockton, Craig, Portchullin and Ardaneaskan. Views from Ardaneaskan are focused to the south and west across the loch towards the steep wooded slopes of the opposite shore, from Creag Mhaol to Plockton. Views from Portchullin (viewpoint 7) are generally focused to the north and west across the loch towards Ardaneaskan and the adjacent forested slopes. From Craig, views tend to be orientated northwards across the open outer loch towards the opposite shore and the distinctive hills above Loch Kishorn. Views from Plockton (viewpoint 8) are focused east across the open outer loch towards the Strome Narrows and Creag Mhaol. Views towards the narrows from Plockton are partially broken by a number of small islands which sit in the open water to the south of Ardaneaskan. The northern shoreline, below the

road, is part of the Views Over Open Water designated area, signalling the value of these views.

In addition to potential receptors described above, users of the minor roads to Ardaneaskan and Plockton, and passengers on the railway are also important to consider. Both roads pass through the heavily wooded and forested slopes above the shore on either side of the loch and therefore views tend to be restricted and limited to occasional glimpses. The railway follows the shoreline and as such provides more open, low level views across and along the outer loch. There are a number of walking routes within this area, experiencing a variety of views, from low level loch side views to elevated filtered and open views from upper slopes and hillsides, such as from Creag Mhaol.

### ***Strath Ascaig and Attadale Glen***

Outwith the main area of the Loch Carron valley, there are a number of small settlements or groups of properties found along Strath Ascaig and Strath Attadale.

Within Strath Ascaig, there are a number of residential properties, largely located in Achmore (viewpoint 9) and Braeintra. Views from these locations tend to be along or across the strath to the surrounding wooded and forested slopes. There are framed, restricted and glimpsed views down the strath to the outer areas of Loch Carron and Loch Kishorn and the distinctive hills beyond. Other receptors in this area include walkers along the footpath at Creag Mhaol and users of the minor roads and the A890. Views from the A890, south from Strome ferry to Gleann Udalain, are generally enclosed and restricted by adjacent trees and forestry. However there are two short sections between Achmore and Braeintra with more open views over Strath Ascaig.

The Attadale glen has several potential visual receptor groups, including residential properties and holiday cottages, hill walkers, and visitors to the gardens and annual highland games. The majority of these visual receptors are located on the northern side of the glen and are orientated south or southwest across its base to the opposite slopes. Views within the Glen are generally enclosed by the steeply sloping sides and the prevalence of mature trees around the main house and along the river (viewpoint 10). There are some framed views along the glen towards Loch Carron to the west, and the hills and mountains to the east. At the eastern end of the glen the walking routes follow an estate track that climbs up out of the glen, gaining elevated views west over the glen to Loch Carron and the settlement and hills on the opposite shore (viewpoint 11).

### ***Wider Area***

Within the wider study area there are very few potential visual receptors. Potential receptors within these areas tend to consist of hill walkers following the Scottish Hill Tracks, core paths, historic stalking paths and those to popular hill summits and Munros. Views from these routes vary along their length with elevated open panoramas from hilltops and ridges, and framed and more contained views along glens (viewpoint 12). Away from the settlements along the coast there tend to be fewer structures and man-made elements visible from these walking routes, with the exception of occasional tall fences, hill tracks and forestry blocks, such as those found along Gleann Udalain and Glen Ling.

### ***Other Areas***

In addition to the above areas, there are a number of other settlements within the study area, including at the head of Loch Kishorn, along the northern side of Loch Alsh, either side of Loch Long and at Killilan in Glen Elchaig. Initial site appraisal has identified that no visibility of the

scheme options would be possible from these locations due to screening from landform, as such they have not been considered further in this assessment.

## 5.7 Identification of Potential Impacts

### 5.7.1 *Overview*

The following provides a brief overview of the elements of the route options with the potential to result in landscape and visual impacts.

#### ***Construction Impacts***

The route options are likely to result in temporary landscape and visual impacts during the construction phase. These impacts would result from movement of construction vehicles and machinery; vegetation clearance of the works area; operations at the contractor's main offices and works compound areas; fencing, carriageway construction, signage etc. temporary access roads; traffic diversions; transfer and storage of material and security lighting at night.

Construction impacts are those that relate to temporary works and structures which would not result in permanent impacts on the landscape character or visual amenity. The stage 2 assessment presented in this report focuses on permanent, long term impacts of the different route options and therefore does not refer to potential construction impacts.

#### ***Operational Impacts***

The route options would potentially result in impacts on the landscape character and visual amenity of the study area. These impacts would result from permanent removal of vegetation along the route option; introduction of a road, associated earthworks and structures; introduction of signage, safety barriers and other road furniture; and traffic along the new route.

The following section provides an assessment of the potential operational impacts on landscape character and visual amenity of each route option.

### 5.7.2 ***North Shore Route Options (N6 and N9)***

#### ***Landscape Designations***

Options N6 and N9 would not result in any direct impacts on the identified landscape designations. Small areas of the northern SAWL and Wester Ross NSA may gain visibility of both north shore options. However, they are unlikely to result in any perceptible negative impacts on these areas. The southern section of Options N6 and N9, and particularly the Strome Narrows crossing, would potentially result in indirect impacts on the Kyle-Plockton SLA. However, the extent of the area affected would be limited, resulting in minor or no negative impacts on the character of this designated area. None of the other identified landscape designations would be impacted by Options N6 or N9.

#### ***Landscape Character***

Options N6 and N9 pass through the following LCTs: Wide Farmed Strath; Harbour Settlement; Rocky Moorland; Coniferous Woodland Plantation; Coastal Strath; and Rugged Massif, therefore potentially resulting in direct and indirect impacts. The landscape character of the remaining LCTs found within the study area is unlikely to be affected by either option.

*Wide Farmed Strath LCT*

The northern section of Options N6 and N9 is located within the Wide Farmed Strath LCT. The options generally follow the existing alignment of the A896 in this area and as such potential impacts on the character would largely be a result of upgrading works to the existing road. This would result in localised direct impacts where the road would be physically located, with localised indirect impacts on the immediate surroundings. Due to the limited and localised nature of change and the presence of the existing road, Options N6 and N9 are likely to result in locally minor negative impacts on the character of the Wide Farmed Strath LCT.

*Harbour Settlement LCT*

Option N6 would pass through Lochcarron, generally following the alignment of the existing A896 and minor road towards Stromemore. This option would result in direct change on this LCT and would also bring increased traffic levels, resulting in negative impacts. Option N9 would pass through and immediately adjacent to two areas of this LCT (Lochcarron and Stromemore) resulting in potential direct and indirect change. The nature of the Harbour Settlement LCT, which is orientated towards the loch, would reduce the level of potential impacts. This option would also lead to a reduction of traffic through the Lochcarron area of this LCT, potentially resulting in positive impacts. The crossing of Strome Narrows of both options is likely to result in indirect impacts on the Stromemore area, and to a lesser extent the Plockton area of this LCT.

Option N6 is likely to result in locally moderate negative impacts on the Stromemore and Lochcarron areas of this LCT and minor or no impact on the remaining areas. Option N9 is likely to result in locally moderate negative impacts on the Stromemore area, and minor or no negative impacts on the remaining areas of this LCT.

*Rocky Moorland LCT*

The majority of Option N9 and part of N6 would be located within the Rocky Moorland LCT, resulting in localised direct impacts where new sections of road and upgrading of existing roads would physically occur. Indirect impacts would generally be limited to the local area, particularly to the north, but would also extend to parts of the area of Rocky Moorland to the south of Loch Carron. The existing A896 and associated traffic passes through this LCT, reducing the effective sensitivity to change. There are likely to be localised moderate negative impacts as a result of both options. However, when considering the Rocky Moorland LCT as a whole, impacts are likely to be minor negative.

*Coniferous Woodland Plantation LCT*

A very short section of both options would pass through the edge of the Coniferous Woodland Plantation LCT, resulting in direct impacts due to the loss of some trees. There may also be indirect change on part of this area as a result of visibility of the Strome Narrows crossing and route along the north side of the loch. However, this is unlikely to alter the impression of the character of this area and as such impacts are anticipated to be locally minor. No negative impacts are anticipated on the wider area of this LCT.

*Rugged Massif and Coastal Strath LCTs*

The southern section of both options would pass along edges of the Rugged Massif and Coastal Strath LCTs, therefore resulting in localised direct impacts. Indirect change, in the form of visibility of the road and associated traffic is likely to be fairly widespread within the Strath Ascaig area of the Coastal Strath LCT. However, the existing A890 passes through this area, effectively reducing the sensitivity to change. In addition to impacts on the Strath Ascaig area of this LCT, there may also be potential for more distant indirect impacts on the Attadale

glen area as a result of visibility of the section to the north of Lochcarron. Indirect impacts on the Rugged Massif LCT would generally be limited to the slopes above Strath Ascaig, with the majority of the area unaffected. There are likely to be locally moderate negative impacts where the route would be physically located and its immediate surroundings. However, impacts on the wider character of both the Rugged Massif and Coastal Strath are likely to be minor negative.

#### *Strome Narrows Landscape*

The approaches to and crossing of Strome Narrows has the potential for impacts on the LCTs on both shores and also the distinct character of the narrows itself. Both options would involve introduction of a large structural element across the narrows and are therefore anticipated to result in major negative impacts on the character of the Strome Narrows.

#### **Visual Amenity**

Options N6 and N9 have the potential to result in visual impacts on receptors in each of the 5 identified visual areas shown on Figure 5.3.

#### *Inner Loch Carron Valley*

The north shore of Loch Carron includes the highest concentration of potential visual receptors within the study area. The northern section of both routes, between Strathcarron Junction and Kirkton, would largely follow the alignment of the existing A896 and as such is likely to result in minor localised change. The two options follow different routes between Kirkton and Stromewood. Option N9 passes to the north of Lochcarron, opposite to the main view experienced from residential properties. It would also reduce traffic in the foreground of views from many receptors and is therefore anticipated to result in minor positive impacts. Option N6 would follow the existing alignments of the A896 and minor road towards Stromemore and would be in the foreground of views from a large number of receptors. Therefore impacts on receptors in Lochcarron are anticipated to be moderate negative.

From the southern shore, between Achintee and Ardnaff, including the existing A890 and railway, views tend to be focused northwards across the loch. Option N9 would introduce new embankments and cuttings, a linear element and associated traffic in these views. Therefore it is anticipated that impacts on these receptors would be moderate and negative. Option N6 is likely to be less visible and generally perceived as an increase in traffic levels along the north shore and through Lochcarron. It is therefore anticipated that impacts would be minor negligible. Impacts on visual receptors using the loch would be similar to those from the southern shore.

From Strathcarron, views would be more fragmented and at a greater distance and as such Options N6 and N9 are anticipated to result in minor or no negative impacts.

#### *Strome Narrows*

Options N6 and N9 would involve upgrading and realigning the existing minor road to pass north of Stromemore, introduction of a bridge across Strome Narrows and a new section of road around the west side of Creag Mhaol.

All potential visual receptor locations within this area, including Stromeferry, Stromemore, the railway, existing minor roads and the elevated Stromeferry viewpoint would be in close proximity to and gain visibility of the proposed crossing, road tie-ins and associated traffic. Both options are therefore anticipated to result in moderate or major negative impacts.



### *Outer Loch Carron*

Views of Options N6 and N9 from receptors at Portchullin and Ardaneaskan would be similar to those within the Strome Narrows area, described above. It is therefore anticipated that impacts on receptors at Portchullin and Ardaneaskan would be moderate to major and negative.

Views from Craig and Plockton would be more distant and partially screened and filtered by adjacent trees and the Strome Islands. It is anticipated that the bridge crossing associated with both options would result in moderate or minor negative impacts and the tunnel option minor or no negative impacts.

### *Strath Ascaig & Attadale Glen*

Within the Strath Ascaig visual area, both route options pass around the western shoulder of Creag Mhaol at an elevated position, tying into the existing A890 to the north of Achmore. The receptors within this area include residential properties, road users and hill walkers. Views from these receptors are generally focused across and along the strath. Receptors in Achmore would have close proximity views of the tie-in and change would include removal of vegetation and introduction of road embankments and traffic. It is anticipated that this would result in moderate negative impacts.

From Attadale, views of Options N6 and N9 would be more distant and often restricted by foreground trees. However, where open views are possible over Loch Carron to the hillside beyond, it is anticipated that Option N9 would result in minor negative impacts and Option N6 negligible impacts.

### *Wider Area*

As outlined in the baseline, there are relatively few visual receptors within the wider area. Where views of Options N6 and N9 are possible these would tend to be relatively distant and as such the level of change would be more limited. It is therefore anticipated that receptors within the wider area would generally experience minor or no impacts.

### ***Overall Landscape and Visual Impacts of North Shore Route Options***

In consideration of the above assessment, it is anticipated that the overall impacts of the North Shore Route Options on the landscape character and visual amenity of the area would be moderate negative.

#### **5.7.3 *Online Routes***

##### ***Landscape Designations***

The online route options are unlikely to result in impacts on the character of any of the identified landscape designations within the study area.

##### ***Landscape Character***

The Online Route Options pass through the following four LCTs: Wide Farmed Strath; Rocky Moorland; Coastal Strath; and Coniferous Woodland Plantation, therefore potentially resulting in direct and indirect impacts. There is also the possibility of indirect impacts on the Harbour Settlement LCT. The landscape character of the remaining LCTs found within the study area is unlikely to be affected by the Online Route Options.

### *Wide Farmed Strath*

The northern sections of all of the online route options are located within the Wide Farmed Strath LCT. They initially follow the existing alignment of the A890 and as such potential impacts on the character would largely be a result of widening single track sections and minor realignment of the existing road. All options would involve a new bridge over the railway and River Taodail at Strathcarron and a new section of road around the south of Achintee. These are likely to result in localised moderate negative impacts on this LCT.

### *Rocky Moorland LCT*

The online route options largely follow the existing alignment of the A890 road and as such impacts would result from minor widening and upgrades. However, there are several different options along the central section, southwest of Cuddies Point, leading to different levels of impact.

Online Route Option O4 is a do minimum option and therefore would result in no impacts.

Online Route Option O2 would involve construction of a 1.6km railway viaduct along Loch Carron. This option would therefore lead to an increase in the width of the existing road and rail corridor along the edge of the Rocky Moorland LCT, resulting in minor negative impacts.

Online Route Option O3 would involve construction of a 1.5km inland tunnel. This would result in the removal of traffic from a short section of the existing road, potentially resulting in localised minor positive impacts. However, depending on the specific design requirements and locations of the tunnel entrances, these elements may result in a locally minor negative impact.

Online Route Option O5 would involve utilising a shared road and rail surface for 1.8km. The majority of change relating to this option would be an extension of the road surface to incorporate the railway and is likely to have minor negative impact on the character of the Rocky Moorland LCT.

Online Route Option O7 would involve a 1.7km long road viaduct above the railway. This would result in an increased prominence of built structures and traffic along the existing road corridor on the fringe of the LCT. There are relatively few built structures within this LCT, with the exception of a few scattered houses, and the existing avalanche shelter, along the coastal fringe. This option is likely to lead to minor or moderate negative impacts as a result of a potential increase in the prominence of built structures within this LCT. The detailed design and materials used to construct the road viaduct would have a strong influence on the potential level of impact.

In addition to the above options for the central section, all of the online options would involve realignment of the route at Maman Hill. This would move the route down the slope, slightly closer to the coast, potentially resulting in a very small positive impact.

### *Coastal Strath and Coniferous Woodland Plantations LCTs*

The online route options all follow the same alignment as the existing road through these LCTs and as such potential change would be a result of minor upgrading and local realignment. The online route options are therefore likely to result in no negative impacts on both the Coastal Strath and Coniferous Woodland Plantation LCTs.

### *Harbour Settlement LCT*

In addition to those LCTs that the route options pass through, there is potential for indirect change in the form of visibility from the Lochcarron area of the Harbour Settlement LCT. Due to the distance and limited nature of potential change of the majority of the Online Route Options this is likely to result in no negative impacts. However, Option O7 is likely to result in increased prominence of structures and traffic and therefore impacts are anticipated to be minor to moderate negative.

### **Visual Amenity**

The Online Route Options have the potential to result in visual impacts to receptors in 1 of the 5 identified visual areas: Inner Loch Carron Valley. Due to the limited visibility and extent of potential change, it is not anticipated that the Online Route Options would result in negative impacts on receptors within the Strome Narrows, Outer Loch Carron, Strath Ascaig and Attadale Glen or the wider area.

### *Inner Loch Carron Valley*

All properties along the northern shore of Loch Carron, within this area, would have direct views towards the online route options on the opposite shore of the loch. The route options propose a range of engineering solutions which largely follow the existing road corridor. The direct views across Loch Carron are of a medium distance, between two and three kilometres, and therefore the changes to the view resulting from many of the options would be difficult to discern from the existing rock face and stabilisation measures. Online Options O2 (rail viaduct) and O7 (developed avalanche shelter) would introduce large infrastructure elements into the view and as such are anticipated to result in moderate negative impacts. Online Option O3 (tunnel) would involve removal of traffic from views along a 1.5km section of the route and as such would potentially result in minor positive impacts. Online Options O4 (do minimum) and O5 (road/ rail share) are anticipated to result in minimal or no change and therefore no negative impacts.

The majority of the Online Route Options are anticipated to result in no or minor negative impacts on receptors on the south side of Loch Carron.

All of the Online Route Options would involve a new bridge over the railway and River Taodail and a new section of road around the south of Achintee. These elements would locally increase the visual prominence of the road and associated traffic, resulting major or moderate impacts at some receptors in Strathcarron and Achintee.

### **Overall Landscape and Visual Impacts of Online Route Options**

In consideration of the above assessment it is anticipated that the overall impacts of the Online Route Options on the study area would be as follows:

- Option O2 (rail viaduct): minor negative landscape impacts and moderate negative visual impacts;
- Option O3 (tunnel): no perceptible negative or positive landscape impacts and minor negative visual impacts;
- Option O4 (do minimum): no landscape or visual impacts;
- Option O5 (road/ rail share): minor negative landscape and visual impacts; and

- Option O7 (developed avalanche shelter): minor or moderate negative landscape impacts and moderate negative visual impact.

The level of impacts identified above would be highly dependent on the detailed design of each option.

#### 5.7.4 ***Southern Route Option (S4)***

##### ***Landscape Designations***

Option S4 would not pass through any landscape designations and therefore would not result in any direct impacts. The northern section of this route option (from Strathcarron Junction to Attadale) is largely online and as such is unlikely to result in any impacts on the Wester Ross NSA or the northern SAWL. In addition, no impacts on the Kyle-Plockton SLA are anticipated. There is potential for localised indirect change to parts of the Strathconon, Monar and Mullardoch SLA and the southern SAWL as a result of introduction of a road into the adjacent landscape. This is likely to affect a small area on the fringe of both designations, at a distance of approximately 1.5km and 3km, at their closest points. Therefore Option S4 is likely to result in localised minor negative impacts, with the overall landscape character of these designations unaffected.

##### ***Landscape Character***

Option S4 passes through the following LCTs: Wide Farmed Strath; Rocky Moorland; Coastal Strath; Smooth Moorland; Coniferous Woodland Plantation; and Rocky Undulating Plateau, therefore potentially resulting in direct and indirect impacts on their character. The landscape character of the remaining LCTs found within the study area is unlikely to be affected by Option S4.

##### ***Wide Farmed Strath LCT***

Much of the northern section of Option S4, from the Strathcarron Junction to Attadale, would follow the same alignment as the existing A890. However, a new bridge structure over the railway and River Taodail at Strathcarron and realignment around the south of Achintee would directly affect this LCT, resulting in locally moderate negative impacts. Due to the relatively limited and localised nature of change and the presence of the existing road, Option S4 is likely to result in minor negative impacts on the Wide Farmed Strath LCT.

##### ***Rocky Moorland/ Rocky Undulating Plateau LCT***

Two sections of Option S4, to the north and south of Attadale, pass through parts of the Rocky Moorland LCT and a further section passes through an area of Rocky Undulating Plateau. The northern section is predominantly along the existing alignment of the A890, with slight realignments at Maman Hill and west of Achintee, and as such is unlikely to result in impacts to the character of the Rocky Moorland LCT. The central section south of Attadale would be entirely offline and as such would involve the construction of a new road through this landscape, resulting in direct impacts through the loss of moorland and forestry along the footprint of the road and associated earthworks. Indirect impacts, as a result of visibility of and noise from the road and associated traffic, are likely within the immediate surroundings of the potential route, extending to more distant elevated locations. Visibility and noise have the potential to influence the impression of the character of the Rocky Moorland LCT. The area potentially affected is currently influenced by existing commercial forestry which effectively reduces the sense of remoteness and therefore sensitivity. It is anticipated that Option S4 would result in locally moderate negative impacts on the character of the Rocky Moorland LCT.

A short section of this option passes along the edge of the Gleann Udalain area of the Rocky Undulating Moorland LCT, resulting in direct impacts through the loss of moorland. Indirect impacts on the Rocky Undulating Plateau LCT would largely be limited to the Gleann Udalain area and be a result of visibility and noise of the road and associated traffic. Existing adjacent forestry and associated tracks locally influence this part of the LCT, reducing the sense of remoteness and naturalness.

Nevertheless it is anticipated that there would be locally moderate negative impacts on parts of the Undulating Moorland and the Rocky Undulating Plateau LCTs.

#### *Coastal Strath LCT*

Option S4 diverges from the existing A890 at the crossing over River Attadale, before running along the south side of the glen, initially along the base then climbing the side slopes towards the head of the glen. This route option is therefore likely to result in both direct and indirect impacts on the Attadale area of the Coastal Strath LCT. Direct impacts would be a result of loss of small areas of improved and rough grassland and moorland, trees and forestry and would occur where the road would be physically located. Indirect change would be more widespread within the glen and result from the visibility of the road and traffic and the associated noise which could influence the impression of this landscape. Indirect change would be somewhat limited by existing trees alongside the River Attadale, particularly from the north side of the glen floor. However, it is anticipated that Option S4 would result in locally major and moderate negative impacts on the Attadale area of the Coastal Strath LCT

There is potential for Option S4 to result in minor positive impacts on the Strath Ascaig area of the Coastal Strath LCT due to a reduction of traffic along the existing A890 through this area.

#### *Smooth Moorland LCT*

The central part of Option S4 would pass through the edge of the Smooth Moorland LCT, therefore resulting in potential direct and indirect impacts. Direct impacts would affect a small area and would be a result of loss of moorland along the footprint of the road and associated earthworks. Indirect impacts would be more widespread and would be a result of visibility of the road and traffic and its associated noise. Visibility and noise have the potential to influence the impression of the remote and isolated character of the Smooth Moorland LCT. It is therefore anticipated that Option S4 would result in locally major and moderate negative impacts on the character of the Smooth Moorland LCT.

#### *Coniferous Woodland Plantation LCT*

Much of the southern half of Option S4 would pass through or along the fringe of the Coniferous Woodland Plantation LCT. This would therefore result in direct impacts, through the loss of forestry. However, the extent of this would be somewhat reduced by recent felling activities which have removed much of the forestry along this part of Glenn Udalain. Due to the forested nature of this LCT, indirect impacts would be very limited. It is therefore anticipated that there would be locally minor negative impacts where the route would be physically located and no negative impacts on the character of the wider LCT.

#### *Rugged Massif LCT*

There would be no direct impacts on the Rugged Massif LCT. However, there is potential for Option S4 to result in some localised impacts on parts of the fringe of this LCT. Indirect change would be limited to a few areas to the south of Gleann Udalain and would be a result of visibility of and noise from the road and associated traffic. The existing A890 has some local influence on the area of this LCT potentially affected, reducing the sensitivity to change. It is anticipated that Option S4 would result in locally minor negative impacts on the Rugged Massif

LCT. However, due to the limited extent and indirect nature of the change, the overall impression of the character of this LCT is unlikely to be affected.

### **Visual Amenity**

The Southern Route Option and Alternative Link have the potential to result in visual impacts to receptors in 3 of the 5 identified visual areas; Inner Loch Carron Valley, Strath Ascaig and Attadale Glen, and the Wider Area. Due to topographical screening, it is considered that there are unlikely to be any visual impacts on receptors within the Strome Narrows and Outer Loch Carron areas.

#### *Inner Loch Carron Valley*

Receptors on the north shore of Loch Carron are likely to gain visibility of short sections of this route at Achintee, Maman Hill and along the southern edge of Attadale Glen. These views would be relatively distant and change would largely be limited to vegetation removal, short sections of new road and associated traffic. Traffic on the existing A890, south from Attadale, would be removed from the existing views. Therefore, on balance, it is anticipated that Option S4 would result in no negative impacts on receptors on the north shore of Loch Carron. Impacts on users of the loch would be similar.

The introduction of a new bridge over the railway and River Taodail at Strathcarron and the realignment around the south of Achintee are likely to result in major or moderate negative impacts on some receptors in these settlements.

Change to the majority of receptors along the southern shore of Loch Carron would be opposite to the main view across the loch. Receptors at Craigton would potentially gain views of the tie-in of the route to the existing A890 at Attadale. However, the change would be outwith the main view and traffic on the proposed route would be at a greater distance to that on the existing A890. It is therefore anticipated that receptors on the south side of the loch would receive no or minor positive impacts.

#### *Strath Ascaig & Attadale Glen*

Option S4 would result in a reduction of the levels of traffic on the existing A890 as it passes across and along the edge of Strath Ascaig. It is therefore considered that receptors in this area would receive minor positive impacts as a result of this option.

Views from Attadale House and gardens are generally limited by mature woodland. However, there are framed views across the glen from the front of the house. Visitors to the annual highland games experience more open views along the glen, although views south are restricted by trees along the river. It is anticipated that receptors at these locations would receive minor negative impacts.

In other locations within the glen, receptors include walkers, residents and visitors to the holiday cottages. Views from these locations vary but are generally more open and focused along or across the glen. Option S4 passes along the south side of the glen, and would be partially visible, particularly where it climbs the side slope towards the head of the glen. It is therefore anticipated that receptors at these locations would receive moderate or major negative impacts.

#### *Wider Landscape*

In general there are relatively few potential receptors within the wider area that would experience change resulting from Option S4. However, the central section of the route, between Attadale and Gleann Udalain, would be visible from, and in close proximity to, a small

number of walking routes. Receptors on these walking routes are likely to experience change due to the introduction of the road and associated traffic. It is therefore anticipated that impacts on these receptors would be moderate and negative.

### ***Overall Landscape and Visual Impacts of the Southern Route Option***

In consideration of the above assessment it is anticipated that the overall impacts of Option S4 would be moderate negative on the landscape character and minor negative on the visual amenity of the area.

## **5.8 Potential Mitigation Measures**

### **5.8.1 *General***

Careful consideration of the detailed route alignment and design will be an important part of the options appraisal and design development process. The following outlines a number of key principles that could help minimise negative landscape and visual impacts:

- Make use of existing topographical features, landform and woodland to help restrict the visual envelope;
- Sympathetic topography design (avoiding engineered steep slopes/cuttings where there is potential and local precedence), with preference for slopes which blend seamlessly (at best) or naturally with the surrounding topography.
- Identify and avoid key landscape features, such as rock outcrops, local high points and ridges;
- Where cuttings and embankments are unavoidable grading out of the slopes can help to tie the option into the surrounding landscape;
- Keep the need for barriers, signage etc. to a minimum, especially in more open, simple landscapes, as these can cause visual clutter and a poor landscape fit;
- Where appropriate, planting to maintain and/or restore the existing landscape character. A landscape treatment, which responds to and fits with the existing landscape character, should be adopted and should extend right to the paved edges of the road.
- Minimisation of visible “engineering” works, and concrete kerbing – the character of the road design should match that visible on stretches of the A890 outside the project boundary.
- Minimising additional signage and rationalising/omitting existing signage that becomes redundant as a result of the proposed works
- Exploring opportunities for additional on and off-site screening to reduce the impact of existing sections of improved road.

In addition to these broad principles the following highlights potential mitigation measures that may help reduce negative landscape and visual impacts of each of the identified route options.

### **5.8.2 *North Shore Route Options***

When developing the micro-siting of any of these route options it will be important to make use of existing topography and woodland to minimise visibility from settlements, such as Loch

Carron and Stromeferry, and aid integration into the landscape. Where these route options pass through rocky moorland landscape areas it will be important to ensure that they respect the undulating landform and exhibit a simplicity of design to achieve the best possible landscape fit and minimise their visual prominence.

Several sections of both options, and particularly Option N6, follow the alignments of existing roads. These sections of existing road would involve upgrading works, such as widening or minor realignment. Where widening would be required the grading out of cutting slopes and embankments and incorporation of planting would help tie the option into the surrounding landscape and therefore reduce potential negative impacts.

The location and detailed design of the Strome Narrows crossing and its approaches will also be important considerations as these have the potential to result in significant negative landscape and visual impacts. A simple bridge structure is likely to have less impact on the landscape character and views than a more complex design, although the height of the structure is also an important consideration. Minimising the need for cuttings and embankments and the incorporation of woodland planting along the approaches may help reduce the visual prominence and complexity of the route, further improving the landscape fit.

Woodland planting along localised sections of the route, such as at Achmore may also help to reduce the visual prominence and impact and help tie the route into the surrounding landscape.

#### 5.8.3 ***Online Route Options***

These route options follow the same broad alignment as that of the existing A890 along the south side of Loch Carron. The introduction of a new bridge over the railway and River Taodail at Strathcarron and realignment around Achintee would need careful consideration to help minimise potential landscape and visual impacts. Due to steep slopes and space constraints along the shoreline the potential for mitigation measures is somewhat reduced. Depending on the specific option the sensitive design of structures and choice of materials would be important considerations in order to minimise visual prominence and achieve a good landscape fit. Careful consideration of the design and alignment of the forested section of this route, southwest of Ardnarff, will be required to help reduce the engineered appearance of slopes and the need for barriers and other structures. This in conjunction with woodland planting will help to ensure a good landscape fit and minimise visual prominence.

Special note should be given to the potential rock cuts and retaining structures, where heavy engineered solutions should be softened by the “greening” of walls through hydro-seeding, seeded matting and natural regeneration.

#### 5.8.4 ***Southern Route Option***

The key mitigation considerations for this route option will be to make use of existing forestry and topography, minimise the need for cuttings and embankments and reduce potential negative impacts on the rocky moorland and smooth moorland landscape and Strath Attadale. The rocky moorland and smooth moorland landscapes are relatively open with only a few manmade features such as the deer fencing, access paths and hill tracks. It is therefore important that the alignment and design of a route through these areas utilises the existing topography and avoids key features such as rocky outcrops and local high points in order to minimise its visual prominence. Simplicity of design, achieved through avoiding the need for cuttings and embankments and other features such as barriers and signs will help minimise potential negative landscape and visual impacts.



Further south, Option S4 would pass through a large area of forestry which has recently been partially felled; the route alignment in this area should make use of existing topography, way leaves, tracks and corridors alongside the forestry in order to minimise potential negative impacts. Additional woodland planting may also help to further reduce negative impacts.

As with the Online Route Options, the introduction of a new bridge over the railway and River Taodail at Strathcarron and realignment around Achintee would need careful consideration to help minimise potential landscape and visual impacts.

Due to the importance of the landscape and visual impacts, detailed designs should incorporate and effectively integrate landscape mitigation from the outset.

## 5.9 Summary and Conclusions

### 5.9.1 *Landscape*

None of the route options are anticipated to result in significant impacts on the landscape designations identified within the study area

The North Shore Route Options are anticipated to result in locally moderate, and therefore significant, negative impacts on parts of the Harbour Settlement, Rocky Moorland, Rugged Massif and Coastal Strath LCTs and the Strome Narrows area. Impacts on the remaining LCTs are not anticipated to be significant. The overall impacts on the landscape character of the study area are anticipated to be moderate negative for both options.

The Online Route Options are anticipated to result in localised moderate, and therefore significant, negative impacts on the Wide Farmed Strath LCT. Option O7 may also result in moderate negative impacts on parts of the Rocky Moorland LCT. No or minor negative impacts are anticipated on the remaining identified LCTs and the landscape character of the study area as a whole. The level of impacts of these options would be heavily dependent on their detailed designs.

The Southern Route Option is anticipated to result in locally major or locally moderate negative impacts on the Wide Farmed Strath, Rocky Moorland, Rocky Undulating Plateau, Coastal Strath and Smooth Moorland LCTs. There are likely to be locally minor or no negative impacts on the character of the remaining LCTs. The overall impacts on the landscape character of the study area are anticipated to be moderate negative.

It is therefore considered that, from a landscape character perspective, Online Route Option 4 is likely to have the least impact, followed by Online Route Options O3 and O5. The Southern Route Option is likely to result in the greatest impacts on landscape character and is therefore the least favoured option.

### 5.9.2 *Visual*

The North Shore Route Options are anticipated to result in major or moderate, and therefore significant, negative impacts on receptors at Stromemore, Strome ferry, Ardaneaskan, Portchullin, Achmore, the south side of Loch Carron (including the railway, A890 and residential properties between Ardnaff and Cam-allt), and users of the loch. Option N6 is also likely to result in major or moderate impacts on receptors in Lochcarron. Visual receptors at other locations within the study area are anticipated to receive minor or no impacts. There is potential for some positive impacts on receptors within Lochcarron from Option N9 due to a reduction of traffic. The overall impacts on the visual amenity of the study area are anticipated to be moderate negative for both options.

All Online Route Options, with the exception of Option O4, are anticipated to result in moderate or major impacts on select receptors in Strathcarron and Achintee. Online Route Options O2 and O7 are anticipated to result in moderate, and therefore significant, negative impacts on receptors at Lochcarron and users of Loch Carron. Visual receptors at other locations within the study area are anticipated to receive minor or no impacts. Online Route Options O3, O4 and O5 are anticipated to result in minor or no impacts on visual receptors within the study area. The overall impacts on the visual amenity of the study area are anticipated to be moderate negative for Options O2 and O7, and no or minor negative for Options O3, O4 and O5. As with landscape character, the detailed design of these options would be critical to the level of potential impacts.

The Southern Route Option is anticipated to result in major or moderate, and therefore significant, negative impacts on receptors in Attadale Glen and hill walkers on local footpaths. Visual receptors at other locations within the study area are anticipated to receive minor or no impacts. There is also potential for positive impacts on receptors at a number of locations, such as those in Lochcarron and along the north side of the loch, at Achmore and Braeintra, railway passengers and loch users. On balance the overall impacts on the visual amenity of the study area are anticipated to be minor negative.

It is therefore considered that, from a visual amenity perspective, Online Route Option O4 is likely to have the least negative impact, followed by the Southern Route and Online Route Options O3 and O5. North Shore Option N6 represents the least favoured option, largely due to impacts associated with the crossing at Strome Narrows and on a large number of receptors in Lochcarron.

## 6 NATURE CONSERVATION

### 6.1 Introduction

DMRB Volume 10 (Section 4) and Volume 11 (Section 3, Part 4) addresses nature conservation and environmental assessment with the aim of maintaining viable populations of characteristic fauna and flora and the communities they comprise via:

- The maintenance of the diversity and character of the countryside, including its wildlife communities and important geological and physical features;
- The maintenance of viable populations of wildlife species, throughout their traditional ranges, and the improvement of the status of rare and vulnerable species.

The objective for DMRB Stage 2 assessment is to undertake sufficient assessment to identify the nature conservation factors, and the significance of effects upon them, to be taken into account by the The Highland Council in developing and refining route options.

#### 6.1.1 *Policy & Legislative Background*

This section provides a summary of relevant nature conservation legislation.

Two key pieces of nature conservation legislation are the *European Birds Directive* (79/409/EEC) and *Habitats Directive* (92/43/EEC). The former concerns the general protection of birds and designation of Special Protection Areas (SPAs) for Annex 1 species. The Habitats Directive concerns the protection of certain animals and plants (European Protected Species) and habitats, for which Special Areas of Conservation (SACs) must be designated. At the international level, the *Bern Convention*, *Biodiversity Convention* and *Ramsar Convention* are most relevant to nature conservation.

National legislation implements both Conventions and Directives. The most important are:

- Conservation (Natural Habitats, &c.) Regulations 1994 (as amended in Scotland). The 'Habitats Regulations' implement the Habitats Directive, protecting European Protected Species (EPS) and SACs/SPAs. For EPS (e.g. otter, bats, great crested newt) it is an offence to:
  - Deliberately or recklessly kill, injure or take an EPS (or its eggs where applicable);
  - Deliberately or recklessly disturb an EPS at a place of shelter, or elsewhere if this could impair its ability to breed or affect its local distribution;
  - Damage, destroy or obstruct access to an EPS place of shelter (whether occupied or not).

Actions which would be offences can be licensed, but only under strict conditions: the reason must be one of the specified purposes in Regulation 44(2); there must be no satisfactory alternative; and the 'favourable conservation status' of the species must be maintained. Similarly, developments affecting SACs/SPAs are only permitted if: there are imperative overriding reasons of public interest; there are no alternatives; and site integrity will not be adversely affected.

- Wildlife & Countryside Act 1981 (as amended in Scotland). Protects birds, animals and plants which are not EPS (e.g. water vole, red squirrel, pine marten and wildcat), regulates non-native invasive species, and designates and protects Sites of Special

Scientific Interest (SSSIs). For Schedule 5 animals (e.g. red squirrel and pine marten) it is an offence to intentionally or recklessly:

- Kill, injure or take the animal;
- Disturb the animal whilst at a place of shelter;
- Damage, destroy or obstruct the animal's places of shelter.

For birds it is an offence to:

- Kill, injure or take any wild bird or its eggs;
- Take, damage or destroy the nest of any wild bird whilst it is in use or being built;
- Disturb Schedule 1 birds at or near the nest or lek, or their dependent young.

The water vole is not directly protected in Scotland but its places of shelter are. Common reptiles are protected from killing and injuring. Common amphibians are protected only from sale and trade. Actions which would be offences can be licensed under certain conditions. Developments affecting SSSIs (and other national designations) are generally only permitted where there are overriding reasons of national importance and site integrity will not be adversely affected.

- Nature Conservation (Scotland) Act 2004. Places a duty on public bodies to further the conservation of biodiversity, and provides 'reckless' as well as 'intentional' wildlife offences.
- Protection of Badgers Act 1992 (as amended in Scotland). Provides offences for deliberately, recklessly or knowingly causing/permitting badger killing, injury, taking etc.; setts are protected from damage, destruction, obstruction (whether occupied or not) or disturbance when occupied. Actions which would be offences can be licensed under certain conditions.

Also relevant to nature conservation are the *Water Environment & Water Services (Scotland) Act 2003* ('WEWS') and the *Water Environment (Controlled Activities) (Scotland) Regulations 2005* ('CAR'), which implement the European Water Framework Directive (WFD). This requires that all aquatic ecosystems, and (with regard to their water needs) terrestrial ecosystems and wetlands, do not deteriorate and meet 'good status' by specified dates. River Basin Districts and River Basin Management Plans must be established.

### 6.1.2 **Relevant Planning Policy**

Planning policy exists at national, regional and local levels. Current planning policy and guidance relevant to nature conservation and to the route options is listed below.

- National Planning Framework for Scotland 2 (NPF2) 2009 aims to co-ordinate policies of a spatial nature with investment priorities. Biodiversity is stated as one of the factors contributing to the core objective of sustainable economic development. The National Actions include delivery of a Scottish Forest Strategy and development of a National Ecological Network. Linked with such actions is the possible identified need to plan for species migration as a result of climate change, and the possibility of ecological opportunities in responses to rising sea levels.
- Scottish Planning Policy (SPP) 2010 includes a policy entitled 'Landscape & Natural Heritage'. This highlights the importance of biodiversity for natural services, sustainability and the Scottish economy. As well as emphasising the biodiversity duty

of planning authorities, and covering the protection of designated sites and species, it also makes the following critical points:

- Planning authorities should take a broader approach to landscape and natural heritage than just conserving designated or protected sites and species, taking into account ecosystems and natural processes in development plans and planning decisions;
  - Planning authorities should apply the precautionary principle where the impacts of a proposed development are uncertain but there is sound evidence for believing that significant irreversible damage could occur;
  - Benefits should be sought for species and habitats from new development including the restoration of degraded habitats;
  - Connectivity between habitats should be encouraged, through green networks;
  - Woodland and trees of high nature conservation value should be protected and enhanced.
- Planning Advice Note (PAN) 60, entitled 'Planning for Natural Heritage', supports the above policy with further detailed guidance and case studies on good practice.

A number of Policies within the Highland Wide Local Development Plan (2012), the Wester Ross Local Plan (2006) and the West Highland & Islands Local Plan (2010) have also been considered as part of the assessment.

## 6.2 Approach & Methodology

This assessment is based on data gathered during an extended Phase 1 habitat survey, desk study information and consultation responses. The assessment is based on current best practice outlined in legislation and Scottish Planning Policy and employs methodological guidance for Ecological Impact Assessment (EclA) in DMRB Volumes 10 & 11, and that developed by the Institute of Ecology and Environmental Management (IEEM) (IEEM, 2006).

### 6.2.1 Consultations

A full list of organisations consulted for Stage 2 assessment is provided in Chapter 3 of this report. Consultations to date have been with Scottish Natural Heritage (SNH), Scottish Environmental Protection Agency (SEPA) and Marine Scotland. Consultation has also taken the form of workshops, involving statutory, non-statutory conservation organisations and members of the local community etc.

### 6.2.2 Desk Study

Baseline information has been collated through desktop research of a number of sources. Details on statutory site designations and ancient woodland were obtained via the SNH SiteLink and Natural Spaces webpages (<http://www.snh.gov.uk/publications-data-and-research/snhi-information-service/>) and are provided in, Figure 5.1. Sites deemed of relevance were those within 10km of the route options for statutory designated sites, and within 500m for non-statutory sites and features.

Information regarding relevant protected and notable species was gained via the NBN Gateway (<http://data.nbn.org.uk/>), The Skye & Lochalsh Biodiversity Action, The Wester Ross Biodiversity Action Plan, UK Biodiversity Action Plan (<http://ukbars.defra.gov.uk/plans/national.asp>), and the JNCC Taxon Designation spread sheet (<http://jncc.defra.gov.uk>).

### 6.2.3 *Field Survey*

An extended Phase 1 Habitat survey was undertaken by URS between the 5<sup>th</sup> and 18<sup>th</sup> August 2013. There were no significant access restrictions. The standard Phase 1 Habitat survey methodology (JNCC, 2003) was used, but with close attention to the species composition of all habitats, assessment of habitats for protected species, recording of protected species evidence, and mapping of non-native invasive plant species, aided by extensive use of target notes. The Phase 1 habitat maps are provided in Figures 6.2 & 6.4. The target notes are provided in – Appendix 3.

### 6.3 **Assessment of options**

For this Stage 2 nature conservation assessment of the options the potential severity of each impact is based on guidelines in the DMRB<sup>1</sup>. The reasons that this system is used, which is somewhat crude compared to the full EIA assessment method recommended by the Institute of Ecology & Environmental Management (IEEM), are: i) for consistency with other chapters; ii) because the full IEEM assessment method is designed for Stage 3 EIA with full determination of impact significance and probability within a geographic scale, as opposed to the simpler comparison of design options required here; iii) specific protected species surveys have not yet been undertaken so impact predictions are not fully informed.

Under the DMRB system impacts are described as ‘Major’, ‘Moderate’, ‘Minor’, ‘Negligible’ or ‘No change’, and as either ‘Adverse’ or ‘Beneficial’, as shown in the following table.

**Table 6.1 - Assessing magnitude of impact.**

Magnitude of impact	Typical criteria descriptors
Major	Loss of resource and/or quality and integrity of resource; severe damage to key characteristics, features or elements ( <i>Adverse</i> ).
	Large scale or major improvement of resource quality; extensive restoration or enhancement; major improvement of attribute quality ( <i>Beneficial</i> ).
Moderate	Loss of resource, but not adversely affecting the integrity; partial loss of/damage to key characteristics, features or elements ( <i>Adverse</i> ).
	Benefit to, or addition of, key characteristics, features or elements; improvement of attribute quality ( <i>Beneficial</i> ).
Minor	Some measurable change in attributes, quality or vulnerability; minor loss of, or alteration to, one (maybe more) key characteristics, features or elements ( <i>Adverse</i> ).
	Minor benefit to, or addition of, one (maybe more) key characteristics, features or elements; some beneficial impact on attribute or a reduced risk of negative impact occurring ( <i>Beneficial</i> ).
Negligible	Very minor loss or detrimental alteration to one or more characteristics, features or elements ( <i>Adverse</i> ).
	Very minor benefit to or positive addition of one or more characteristics, features or elements ( <i>Beneficial</i> ).
No change	No loss or alteration of characteristics, features or elements; no observable impact in either direction.

<sup>1</sup> Design Manual for Roads and Bridges: Volume 11 Environmental Assessment, Section 2 Environmental Impact Assessment, Part 5 Ha 205/8 Assessment and Management of Environmental Effects.

Unless stated otherwise, all assessed impacts are adverse. Where unmitigated impact is likely to differ from mitigated impact, this is mentioned in the options assessment.

#### 6.4 Constraints to the assessment

Access was restricted in places to the due to the presence of steep terrain especially within the area known as the Narrows, and along the foreshore area on the south side of Loch Carron due to the presence of the railway. The extended Phase 1 Habitat survey did not include access to small private residences and associated curtilages.

The lack of design information relating to proposed structures associated with specific route options i.e. bridges and viaducts, at Stage 2 did not allow for a concise assessment of the likely impacts associated with their construction upon either protected sites or species to be made. It is anticipated that detailed information will be available at Stage 3.

Observations of protected species and evidence of them are incidental only and do not represent full protected species surveys, which will be required for Stage 3 assessment. Additionally, the absence of desk study information on protected species in a given area does not necessarily equate with their absence. Consequently, the potential impacts on protected species cannot be fully evaluated until the Stage 3 assessment.

#### 6.5 Consultation Responses

Details of responses relevant to nature conservation are as follows.

The SNH response made the following points:

- Nationally Designated Sites – Two nationally designated sites could be affected by the proposed scheme, with both the Allt Nan Carnan and Attadale SSSIs occurring within the study corridors. The assessment should therefore identify any impacts to the sites as well as alternative options and mitigation;
- Locally Designated Sites – The Lower River Kishorn and Kishorn Saltmarsh are recognised as sites of local conservation interest, as defined within the Wester Ross Local Plan 2006 and thus afforded subsequent local / regional protection;
- Inventory of Ancient and Semi Natural Woodlands – SNH stipulate that fragments of ancient woodland occur on both the north and south sides of Loch Carron, the locations of which are contained within the Wester Ross Local Plan 2006. In-addition to the ancient woodland the 2006 plan contains information relating to the locations of amenity trees which is also afforded local / regional policy protection;
- Loch Carron Marine Consultation Area – the Strome Narrows which forms part of the consultation area, and is known for the extensive beds of both Flame shell (*Limaria hians*) and Horse mussel (*Modiolus modiolus*). Additionally both species are listed on the UKBAP and as such the Strome Narrows area is considered to be of local importance due to the presence of such species;
- Several European protected species may be present within the route option areas; namely, otter, bats and wild cat and that appropriate surveys should be undertaken in-order to identify and assess any impacts, as well as to inform suitable mitigation measures;
- Nationally protected species are known to occur within the wider area with water voles having been recorded on watercourses within the Attadale Estate. Additionally, golden

eagles are known to breed within Gleann Udulain, where a significant population of badgers is also known to be present.

The SEPA response highlighted a number of issues which they asked to be considered within the Stage 2 assessment:

- Impacts on Wetlands; namely, ground water terrestrial ecosystems which are protected by the Water Framework Directive; guidance contained within the Functional Wetland Typology for Scotland should be used with the Phase 1 results as a means of identifying and mapping all wetland areas. After which both direct and indirect impacts on wetland habits can be quantified.
- SEPA would normally request that an appropriate National Vegetation Classification (NVC) survey be undertaken upon all identified areas of wetland; whilst SEPA would prefer the NVC surveys to be undertaken at Stage 2, they appreciate that such a detailed level of survey is normally reserved for the Stage 3 element of the process.
- Marine ecological interest, SEPA requests that the Stage 2 assessment includes a baseline assessment of the intertidal and subtidal habitats and species present at the Strome Narrows, and other areas if works to the online route option is also likely to impact upon intertidal and subtidal habitats.

## 6.6 Baseline Conditions – Desk Study

### 6.6.1 Designated species

The Highland Biological Recording Group (HBRG) was consulted in relation to previously recorded accounts of designated species pertaining to the Strome ferry study area i.e. ten kilometre squares NG83 and NG93. The HBRG database holds the main data for taxa within the Highlands other than higher plants and birds, and most are accessible via the NBN Gateway web site; subsequently, the data pertaining to the designated species shown in Table 6.2 have been obtained from NBN Gateway. All records are post-1995.

In-addition to the NBN Gateway records, information relating to the presence of designated species was obtained from unpublished reports relating to the Attadale Strathan proposed Hydro scheme, and shown in Table 6.2 below

**Table 6.2 – NBN Gateway & Attadale Strathan proposed Hydro scheme: designated species records within 10km NG83 & NG93**

Category	Common Name	Scientific Name	Designation(s) <sup>2</sup>
Mammal	Daubenton's Bat	<i>Myotis daubentonii</i>	EPS UKBAP SBL LBAP
	Eurasian Badger	<i>Meles meles</i>	Badger Act SBL
	Water Vole	<i>Arvicola amphibiensis</i>	Sch5 UKBAP SBL LBAP
	European Otter	<i>Lutra lutra</i>	EPS UKBAP SBL LBAP
	Pine Marten	<i>Martes martes</i>	Sch5 UKBAP SBL LBAP

<sup>2</sup> EPS = European Protected Species; Sch 1 = Schedule 1 of Wildlife & Countryside Act; Sch 5 = Schedule 5 of Wildlife & Countryside Act; Annex1 = Annex 1 of the Birds Directive; UKBAP = UK Biodiversity Action Plan; SBL = Scottish Biodiversity List; 'Red List' & 'Amber List' = bird species of high and medium conservation concern respectively; 'Red List(E)' and 'Red List(V)' = red-listed plants which are endangered or vulnerable respectively; LBAP = Local Biodiversity Action Plan.



Category	Common Name	Scientific Name	Designation(s) <sup>2</sup>
	Hedgehog	<i>Erinaceus Europeans</i>	Sch6 UKBAP SBL
	Common Seal	<i>Phoca vitulina</i>	UKBAP
	Common Porpoise	<i>Phocoena phocoena</i>	Sch6 UKBAP SBL LBAP
	Common Dolphin	<i>Delphinus delphis</i>	Sch5 UKBAP SBL LBAP
Reptile	Common Lizard	<i>Zootoca vivipara</i>	Sch5 UKBAP LBAP
	Slow Worm	<i>Anguis fragilis</i>	Sch5 UKBAP SBL LBAP
Bird	Tree Pipit	<i>Anthus trivialis</i>	Red List UKBAP SBL LBAP
	Lesser Redpoll	<i>Carduelis cabaret</i>	Red List UKBAP SBL LBAP
	Willow Warbler	<i>Phylloscopus trochillus</i>	Amber List LBAP
	Blue Tit	<i>Cyanistes caeruleus</i>	
	Great Tit	<i>Parus major</i>	
	Coal Tit	<i>Parus ater</i>	
	Robin	<i>Erithacus rubecula</i>	
	Wren	<i>Troglodytes troglodytes</i>	
	Raven	<i>Corvus corax</i>	
	Gold Crest	<i>Regulus regulus</i>	
	Wheatear	<i>Oenanthe oenanthe</i>	Amber List
	Chaffinch	<i>Fringilla coelebs</i>	
	Grey Wagtail	<i>Motacilla cinerea</i>	Amber List LBAP
	Goldfinch	<i>Carduelis carduelis</i>	
	Common Crossbill	<i>Loxia curvirostra</i>	Sch1
	Common Grasshopper Warbler	<i>Locustella naevia</i>	Red List UKBAP SBL
	Grey Heron	<i>Ardea cinerea</i>	LBAP
	Buzzard	<i>Buteo buteo</i>	
	Common Sandpiper	<i>Acitis hypoleucos</i>	Amber List
	Black-headed Gull	<i>Larus ridibundus</i>	Amber List SBL
	Common Bullfinch	<i>Pyrrhula pyrrhula</i>	Amber List UKBAP SBL LBAP
	Common Cuckoo	<i>Cuculus canorus</i>	Red List UKBAP LBAP
	Common Kestrel	<i>Falco tinnunculus</i>	Amber List SBL LBAP
	Common Linnet	<i>Carduelis cannabina</i>	Red List UKBAP SBL
	Common Pochard	<i>Aythya ferina</i>	Amber List SBL
	Common Starling	<i>Sturnus vulgaris</i>	Red List UKBAP LBAP

Category	Common Name	Scientific Name	Designation(s) <sup>2</sup>
	Common Swift	<i>Apus apus</i>	Amber List SBL
	Wood Warbler	<i>Phylloscopus sibilatrix</i>	Red List UKBAP SBL
	Eurasian Curlew	<i>Numenius arquata</i>	Red List UKBAP SBL LBAP
	Eurasian Siskin	<i>Carduelis spinus</i>	SBL
	Ring Ouzel	<i>Turdus torquatus</i>	Red List UKBAP SBL LBAP
	Black-throated Diver	<i>Gavia arctica</i>	Sch1 Amber List UKBAP SBL LBAP
	Hedge Sparrow	<i>Prunella modularis</i>	Amber List UKBAP LBAP
	Herring Gull	<i>Larus argentatus</i>	Red List UKBAP SBL
	Hooded Crow	<i>Corvus cornix</i>	SBL
	House Sparrow	<i>Passer domesticus</i>	Red List UKBAP LBAP
	Merlin	<i>Falco columbarius</i>	Sch1 Amber List SBL LBAP
	Northern Lapwing	<i>Vanellus vanellus</i>	Red List UKBAP SBL
	Osprey	<i>Pandion haliaetus</i>	Sch1 Amber List SBL
	Peregrine Falcon	<i>Falco peregrinus</i>	Sch1 SBL LBAP
	Redwing	<i>Turdus iliacus</i>	Sch1 Red List SBL LBAP
	Reed Bunting	<i>Emberiza schoeniclus</i>	Amber List UKBAP SBL LBAP
	Short-eared Owl	<i>Asio flammeus</i>	Annex1 Amber List SBL
	Skylark	<i>Alauda arvensis</i>	Red List UKBAP SBL LBAP
	Song Thrush	<i>Turdus philomelos</i>	Red List UKBAP SBL LBAP
	Spotted Flycatcher	<i>Muscicapa striata</i>	Red List UKBAP SBL LBAP
	Whooper Swan	<i>Cygnus cygnus</i>	Sch1 Amber List SBL
	Yellowhammer	<i>Emberiza citrinella</i>	Red List UKBAP LBAP
Amphibian	Common Frog	<i>Rana temporaria</i>	Sch5 LBAP
Invertebrate	Violet Oil-beetle	<i>Meloe violaceus</i>	UKBAP SBL
	Small Pearl-bordered Fritillary	<i>Boloria selene</i>	UKBAP
	Small Heath	<i>Coenonympha pamphilus</i>	UKBAP SBL
	Large Heath	<i>Coenonympha tullia</i> <i>Coenonympha</i>	Sch5 UKBAP SBL
	Broom-tip	<i>Chesias rufata</i>	UKBAP SBL
	Dusky Brocade	<i>Apamea remissa</i>	UKBAP SBL
	Garden Tiger	<i>Arctia caja</i>	UKBAP SBL
	Ghost Moth	<i>Hepialus humuli</i>	UKBAP SBL

Category	Common Name	Scientific Name	Designation(s) <sup>2</sup>
	Grey Dagger	<i>Acronicta psi</i>	UKBAP SBL
	Rosy Rustic	<i>Hydraecia micacea</i>	UKBAP SBL
	Shaded Broad-bar	<i>Scotopteryx chenopodiata</i>	UKBAP SBL
	Shoulder-striped Wainscot	<i>Mythimna comma</i>	UKBAP SBL
	White Ermine	<i>Spilosoma lubricipeda</i>	UKBAP SBL
	Buff Ermine	<i>Spilosoma luteum</i>	UKBAP SBL
	Cinnabar	<i>Tyria jacobaeae</i>	UKBAP SBL
	Small Square-spot	<i>Diarsia rubi</i>	UKBAP SBL
	Green-brindled Crescent	<i>Allophyes oxyacanthae</i>	UKBAP SBL
	Brown-spot Pinion	<i>Agrochola litura</i>	UKBAP SBL
	Centre-barred Sallow	<i>Atethmia centrigo</i>	UKBAP SBL
	Knot Grass	<i>Acronicta rumicis</i>	UKBAP SBL
	Dark Brocade	<i>Blepharita adusta</i>	UKBAP SBL
	Latticed Heath	<i>Chiasmia clathrata</i>	UKBAP SBL
	Broom Moth	<i>Melanchra pisi</i>	UKBAP SBL
	Small Phoenix	<i>Ecliptopera silaceata</i>	UKBAP SBL
	Autumnal Rustic	<i>Eugnorisma glareosa</i>	UKBAP SBL
	Powdered Quaker	<i>Orthosia gracilis</i>	UKBAP SBL
	Neglected rustic	<i>Xestia castanea</i>	UKBAP SBL
	Crescent	<i>Celaena leucostigma</i>	UKBAP SBL
	Red Carpet	<i>Xanthorhoe decoloraria</i>	UKBAP SBL
Vascular plant	Lesser Butterfly-orchid	<i>Platanthera bifolia</i>	UKBAP SBL
	Small-white Orchid	<i>Pseudorchis albida</i>	UKBAP SBL LBAP
Non-vascular plant	Wilson's pouchwort	<i>Acrobolbus wilsonii</i>	UKBAP SBL LBAP
Bony fish	European Eel	<i>Anguilla anguilla</i>	UKBAP SBL
	Atlantic Salmon	<i>Salmo salar</i>	UKBAP SBL LBAP
	Brown/Sea Trout	<i>Salmo trutta</i>	UKBAP SBL LBAP
	Atlantic Cod	<i>Gadus morhua</i>	RedList LBAP
	Plaice	<i>Pleuronectes platessa</i>	LBAP
	Common skate	<i>Raja batis</i>	LBAP

### 6.6.2 **Statutory Designated Sites**

The following statutory designated sites occur within the study area or within a 10km radius:

#### *Coille Mhor SSSI*

Coille Mhor Site of Special Scientific Interest (SSSI) is located in Lochalsh, less than one kilometre north-east of Balmacara Square. The site is characterised by areas of oak and birch-dominated ancient and semi-natural broadleaved woodland separated by open ground. The SSSI also encompasses a notable oligotrophic loch, Loch Achaidh na h-Inich, which provides the habitat for a significant assemblage of dragonfly species.

Mature oak and birch woodland with rowan, grey willow, alder and hazel dominates much of the site and forms one of the largest and most representative examples of upland oak woodland within Skye and Lochalsh. The oak is found primarily on the lower, south facing slopes where it occurs alongside mature birch. The growth structure of many of the older oaks suggests that they matured in an open wood-pasture habitat. Below Sgurr Beag, on the freely draining, flushed slopes ash is also a component of the woodland. On the higher, more exposed ground such as the steep scree slopes and crags along the face of Carn Greannach and within Gleannan Dorch birch predominates. Willow and alder are also present; particularly where there are flushes or boggy ground, and rowan is common on the cliffs.

The woodland habitat is enriched by the lichen flora, which includes some species at their northernmost limit, and, in the west of the site, by the presence of several incised burns and their steep banks. These support a rich flora that includes woodruff, enchanter's nightshade, dog's mercury and remote sedge amongst banks of ferns. Towards the east and north of the site the soils are more acidic and give rise to a predominantly grassy ground cover with heather and blaeberry in open areas.

Loch Achaidh na h-Inich represents a nationally scarce loch type supporting at least 37 species of emergent, submerged and floating plants, including the nationally scarce species long-stalked pondweed *Potamogeton praelongus* and six-stamened waterwort *Elatine hexandra*. Adding further to the loch's significance is an adjacent area of tall fen vegetation.

The loch and fen support an outstanding assemblage of dragonflies which is nationally important. Ten species of dragonfly have been recorded within the SSSI including the nationally rare northern emerald *Somatochlora arctica*.

Notification history, first notified under the 1981 Act: 20 October 1988, re-notified under the 1981 Act: 18 September 2000 with a 98.84 ha increase in area. Notification reviewed under the 2004 Act: 29 July 2009.

#### *Coille Mhor Special Area of Conservation*

Coille Mhor Special Area of Conservation (SAC), qualifying habitat:

- Western acidic oak woodland.

Conservation objectives, to avoid deterioration of the qualifying habitat (listed below) thus ensuring that the integrity of the site is maintained and the site makes an appropriate contribution to achieving favourable conservation status for each of the qualifying features; and

To ensure for the qualifying habitat that the following are maintained in the long term:

- Extent of the habitat on site;

- Distribution of the habitat within site;
- Structure and function of the habitat;
- Processes supporting the habitat;
- Distribution of typical species of the habitat;
- Viability of typical species as components of the habitat; and
- No significant disturbance of typical species of the habitat.

#### *Rassal SSSI*

Rassal SSSI is located on the east side of the A896 between Shildaig and Lochcarron, just north of Tornapress. The site contains the largest exposure of Durness limestone in Wester Ross and is the only site in the area where limestone pavement has developed. Rassal Ashwood is the largest ashwood on limestone in the Highlands, while the Allt Mor Gorge is the best example in the area of rich western valley woodland on calcareous soils.

The north and west facing slopes of Sgurr a' Gharaidh provide an excellent section through one of the major rock structures associated with a great dislocation in the Earth's Crust known as the Moine Thrust. This extends from the north Sutherland coast to Skye and developed during the earth movements known as the Caledonian Orogeny, which gave rise to the Highlands of Scotland. A thick wedge of base rock, known as Lewisian Gneiss, was forced over a sequence of little altered Torridonian Sandstones and Cambrian strata, causing these to be faulted into a number of displaced wedges. This structure contrasts with the Lochalsh area, near the southern end of the mainland outcrop of the Thrust Zone, where the Lewisian Gneiss rests on the top of 'foreland' strata which are relatively undisturbed. Study of such contrasting structures is essential in fully understanding the mechanisms involved in mountain building processes and has resulted in the inclusion of this feature within the SSSI.

Rassal Ashwood is an extensive area of old ash trees and associated rich woodland flora. Past management means that over much of the site it has developed as wood pasture with a distinctive pattern of open terraces with woodland largely restricted to rocky ridges and clearance cairns. The adjacent Allt Mor Gorge contains a range of woodland from calcareous ash-wych elm at the lower end through wych elm-hazel to more acid birch-rowan at its upper margin. Birch-rowan woodland also occurs at Coille Dhubh. The lichen flora of these woodland habitats is of particular interest supporting 46 nationally scarce species and 15 nationally rare species including the largest population in the British Isles of *Leptogium saturninum* and *Wadeana minuta* and the most northerly record for *Pannaria ignobilis*. The ground flora contains a wide range of typical woodland species as well as a number of plants of very restricted distribution like dark-red helleborine *Epipactis atrorubens*.

The lower slopes of the site are characterised by limestone grassland which is rich in herbs. The grassland also supports an important population of waxcap fungi. Numerous springs, flushes and base-rich fen areas occur. Of particular interest are tufa forming springs dominated by the moss *Cratoneuron* and areas dominated by sedges, black bog-rush *Schoenus nigricans* and broadleaved cotton grass *Eriophorum latifolium*.

The upper parts of the site consist of a complex of numerous exposures of limestone which form crags and pavements amid a matrix of more acid grassland and moorland. Where rock crevices protect plants from grazing, stunted trees and shrubs, mainly birch, rowan, ash holly and willow are found. Plants associated with the limestone pavement include the holly fern

*Polystichum lonchitis*, mountain avens *Dryas octopetala*. And the nationally rare rock sedge *Carex rupestris*.

The upland assemblage reflects the presence of a mosaic of other habitat types associated with the limestone. These include alkaline fens, calcareous grassland, rocky slopes, spring heads and subalpine flushes.

The site supports a rich, and internationally important, flora of mosses and liverworts, with 220 species being recorded. Of these, one species of moss *Hymenostylium insigne* is nationally rare whilst fifteen species are nationally scarce. Areas of particular importance for mosses and liverworts are the woodland at Coille Dhubh, the heaths on the north face of Sgurr a' Gharaidh, and gorges of the Allt a' Ghiubhais and Allt Mor.

The variety of microhabitats associated with this site means it supports a diverse assemblage of invertebrates. Of particular note are the *saproxylic flies* including *Xylophagus ater* associated with dead wood and the rare crane fly *Orimarga virgo* and the nationally scarce crane fly *Gonomyia conoviensis* associated with the calcareous seepages.

Notification history, first notified under the 1949 Act: 1974 as Glas Cnoc SSSI, re-notified under the 1981 Act: 22 August 1985 with an increase in area. Notification reviewed under the 2004 Act: 30 March 2011.

#### *Rassal Special Area of Conservation*

##### Qualifying Habitats:

- Alpine and subalpine calcareous grasslands;
- Base-rich fens;
- Hard-water springs depositing lime;\*
- Limestone pavements;\*
- Mixed woodland on base-rich soils associated with rocky slopes;\*
- Mountain willow scrub; and
- Plants in crevices on base-rich rocks.

\* Indicates priority habitat

##### Conservation Objectives

To avoid deterioration of the qualifying habitats (listed below) thus ensuring that the integrity of the site is maintained and the site makes an appropriate contribution to achieving favourable conservation status for each of the qualifying features; and

To ensure for the qualifying habitats that the following are maintained in the long term:

- Extent of the habitat on site;
- Distribution of the habitat within site;
- Structure and function of the habitat;

- Processes supporting the habitat;
- Distribution of typical species of the habitat;
- Viability of typical species as components of the habitat; and
- No significant disturbance of typical species of the habitat.

#### *Slumbay Island SSSI*

Slumbay Island Site of SSSI is located on the north shore of Loch Carron about 1 km to the south of the settlement of Lochcarron. The site provides exposure for one of the best examples of a distinctive type of laminated rock known as mylonite. The formation of this rock type is associated with the Moine Thrust Zone, which was active over 400 million years ago during the period of mountain building known as the Caledonian Orogeny. The site plays a vital role in the understanding of events which took place during the formation of the Thrust Zone.

Notification history, first notified under the 1981 Act: 5 February 1988 with a notification reviewed under the 2004 Act: 12 December 2008.

#### *Attadale SSSI*

Attadale SSSI is situated alongside the A890 on the east shore of Loch Carron, opposite Lochcarron village. The site is a consummate example of the development of the basal conglomerate within the Moine Series – a phenomenon known from only a very few sites in Scotland. The abundance and variety of deformed pebbles in the conglomerate and the clearly defined relationships between the Moine and underlying Lewisian gneiss render this site irreplaceable for teaching and research.

The Lewisian gneiss was incorporated into the Moine sequence during the period of crustal instability and mountain building known as the Caledonian Orogeny. Historically, the proven existence of this basal Moine conglomerate was fundamental to the controversy concerning the interpretation of such occurrences of Lewisian gneiss within the Moine.

Notification history, first notified under the 1981 Act: 18 January 1989 with a notification reviewed under the 2004 Act: 28 March 2008.

#### *Allt Nan Carnan SSSI*

Allt Nan Carnan SSSI is a deeply incised gorge approximately 3.5 kms in length which is located to the north west of the village of Lochcarron on the north shore of Loch Carron. The site is one of Wester Ross's more acidic examples of gorge woodland and is the one most influenced by the proximity of the sea.

The site contains a range of native tree species characteristic of nutrient poor soils, here developed from Lewisian gneiss. Birch and hazel are dominant with rowan, aspen, holly and willows. Oak and ash occur only occasionally.

The ground flora is characteristic of damp shady conditions with little or no grazing pressure. Dwarf, shrubby heather is abundant along with grasses and fern ledges.

Only where seepages occur are tall herb ledge communities present. Very locally, more nutrient rich bands of rock provide conditions for more varied flora.

Notification history, first notified under the 1981 Act: 2 July 1986 with a notification reviewed under the 2004 Act: 30 July 2008.

#### *Carn A' Bhealaich Mhoir SSSI*

Carn a' Bhealaich Mhoir SSSI lies southeast of Plockton, in the hills overlooking Loch Carron. The site displays nationally important features of the Moine Thrust Zone. The Moine Thrust is a major fracture in the Earth's crust, which runs along Scotland's north-western seaboard from Loch Eriboll on the north coast to the Sleat peninsula. The Thrust is one of the most important features of Highland geology and was formed around 430 million years ago during a mountain-building event known as the 'Caledonian Orogeny'. The Moine Thrust Belt extends westwards from the Moine Thrust and encompasses a number of other thrusts and associated nappes ('slabs' of rock bounded by thrusts).

The Carn a' Bhealaich Mhoir SSSI contains the most informative part of an unusually extensive section of traceable contact (uninterrupted by faults) between Lewisian and Torridonian rocks within the Moine Thrust Belt. The rocks are part of the 'Kishorn Nappe', the lowest unit of the Moine Thrust Belt in the Lochalsh district. The contact between the two rock types is an unconformity – the younger Torridonian rocks having been deposited as sediment on a land surface carved from the older Lewisian rocks. However, the rock sequence has been overturned by folding, so that the older Lewisian rocks now lie above the younger Torridonian rocks on the 'inverted limb' of a fold structure known as the 'Lochalsh Syncline'. Shearing and 'mylonitization' (crushing) of rock near the contact between the Lewisian and Torridonian indicates that, during the Caledonian Orogeny, a zone of high strain was concentrated along the unconformity. The shearing has erased any evidence of the shape of the original Lewisian landscape; however, blocks of Lewisian rock incorporated into the Torridonian, provide evidence for the original nature (unconformity) and orientation (Torridonian above Lewisian) of the contact.

The site is a remarkable example of an overturned unconformity and is of national importance as the best locality to study the Lewisian -Torridonian contact and the effects of deformation in the Kishorn Nappe.

Notification history, first notified under the 1981 Act: 4 July 1985, notification reviewed under the 2004 Act: 15 June 2010.

#### *Monar Forest SSSI*

Monar Forest is a large SSSI occurring within the central mountains of Ross and Cromarty, between Loch Monar in the south and upper Strathconon in the north. It supports an extensive assemblage of upland habitats and provides a link between those in the Affric-Cannich group to the south and the Fannichs and other hills to the north.

The assemblage of upland habitats extends over two major mountain ranges (Maoile Lunndaidh and Bidean an Eoin Deirg/Sgurr a' Chaorachain) and includes alpine moss heath, snowbeds, alpine heath, subalpine dry heath and tall-herb ledges. The species rich summit heath is the most outstanding and extensive feature and is dominated by woolly hair-moss *Racomitrium lanuginosum* with abundant cushion forming alpine plants such as thrift *Armeria maritima*, least willow *Salix herbacea*, sibbaldia *Sibbaldia procumbens* and moss campion *Silene acaulis*.

A range of montane heaths are present including those with abundant alpine bearberry *Arctous alpinus* and crowberry *Empetrum nigrum* and the more restricted hepatic rich types. Virtually the full range of snowbed plant communities is present at the head of north facing corries. The cliffs are locally base-rich and good tall-herb ledge communities are present with



species such as alpine saw wort *Saussurea alpina*, purple saxifrage *Saxifraga oppositifolia* and, on more acid ledges, *Alchemilla glomerulans*. Beneath these base-rich cliffs, flushed grassland has developed with chestnut rush *Juncus castaneus* and russet sedge *Carex saxatilis*.

Notification history, first notified under the 1949 Act: 1974, re-notified under the 1981 Act: 5 March 1985 with a 116.3 ha decrease in area. Notification reviewed under the 2004 Act: 10 February 2010.

A number of statutory designated sites occur within the route corridors under consideration.

#### *Non-Statutory Designated Sites*

Loch Carron designated a Marine Consultation Area, although this is not a statutory designation, the term does recognise the importance and diversity of the benthic habitats and species found within this area.

Search features recorded in Loch Carron include burrowed mud, horse mussel beds, kelp and seaweed communities on sublittoral sediments and tide-swept algal communities. Common skate and ocean quahog have also been recorded.

It was also noted that there are aggregations of flameshell beds on the northern side of the narrows.

#### *Ancient Woodland<sup>3</sup>*

Scottish ancient woodland is defined as land that is currently wooded and has been continually wooded since 1750 or the mid-1800s, depending on the earliest mapping available. The Ancient Woodland Inventory (AWI) is a provisional guide to the location of ancient woodland in Scotland, which has important biodiversity and cultural value by virtue of its antiquity. The AWI uses three classes of woodland, derived from 1750 'Roy' maps and c1860 1st Edition OS maps:

- Ancient Woodland. Semi-natural woodland on 1750/c1860 maps and continuously wooded since (if later planted with non-native trees they are called 'Plantations on Ancient Woodland Sites').
- Long-established Woodland of Plantation Origin. Plantation on 1750/c1860 maps and continuously wooded since. Many have semi-natural characteristics.
- Other 'Roy' woodland. Un-wooded on c1860 maps but wooded on 1750 maps. Such sites have, at most, had only a short break in continuity of woodland cover and may still retain features of Ancient Woodland.

The AWI is not definitive and should be used with care. In particular any woodland shown on OS 1<sup>st</sup> Edition maps or Roy maps (available at [www.nls.uk](http://www.nls.uk)) which is not in the AWI is still likely to be one of the above woodland classes, and should be treated as such unless evidence is available to the contrary. Note also that during capture of the AWI data there was a minimum capture size of two hectares.

Although there is no legislation specifically protecting ancient woodland, Scottish Planning Policy identifies it as an important and irreplaceable national resource that should be protected

<sup>3</sup> The notes on ancient woodland stated here are a summary of guidance given by SNH (<http://www.snh.gov.uk/planning-and-development/advice-for-planners-and-developers/woodlands/>) and information obtained directly from SNH staff by email on 28/10/2011.

and enhanced, as should other native and long-established woodlands with high nature conservation value.

All woodland in the AWI in the survey area under consideration is shown within Figure 6.1 (Nature Conservation Designations) of this document and consists largely of fragments of ancient semi-natural broadleaf woodland occurring along both the north and south shores of Loch Carron.

*Evaluation of Nature Conservation Features*

**Table 6.3 Ecological Feature Evaluation**

Ecological Importance	Criteria
<b>International or European Value</b>	<p>Natura 2000 sites including: Sites of Community Importance (SCIs); Special Protection Areas (SPAs); potential SPAs (pSPAs); Special Areas of Conservation (SACs); candidate or possible SACs (cSACs or pSACs271); and Wetlands of International Importance (Ramsar sites).</p> <p>Biogenetic Reserves, World Heritage Sites and Biosphere Reserves.</p> <p>Areas which meet the published selection criteria for those sites listed above but which are not themselves designated as such.</p> <p>Resident, or regularly occurring, populations of species which may be considered at an International or European level where: the loss of these populations would adversely affect the conservation status or distribution of the species at this geographic scale; or the population forms a critical part of a wider population at this scale; or the species is at a critical phase<sup>5</sup> of its life cycle at this scale.</p>
<b>UK or National Value</b>	<p>Designated sites including: Sites of Special Scientific Interest (SSSIs) and National Nature Reserves (NNRs).</p> <p>Areas which meet the published selection criteria e.g. JNCC (1998) for those sites listed above but which are not themselves designated as such.</p> <p>Areas of key/priority habitats identified in the UK Biodiversity Action Plan (BAP), including those published in accordance with Section 41 of the Natural Environment and Rural Communities Act (2006) and those considered to be of principal importance for the conservation of biodiversity.</p> <p>Areas of Ancient Woodland e.g. woodland listed within the Ancient Woodland Inventory (AWI).</p> <p>Resident, or regularly occurring, populations of species which may be considered at an International, European, UK or National level where: the loss of these populations would adversely affect the conservation status or distribution of the species at this scale; or the population forms a critical part of a wider population at this scale; or the species is at a critical phase of its life cycle at this scale.</p>
<b>Regional Value</b>	<p>Areas of key/priority habitats identified in the Regional BAP (where available); areas of key/priority habitat identified as being of Regional value in the appropriate Natural Area Profile (or equivalent); areas that have been identified by regional plans or strategies as areas for restoration or re-creation of priority habitats (for example, South West Nature Map); and areas of key/priority habitat listed within the Highways Agency's BAP.</p> <p>Resident, or regularly occurring, populations of species which may be considered at an International, European, UK or National level and key/priority species listed within the HABAP where: the loss of these populations would adversely affect the conservation status or distribution of the species at this scale; or the population forms a critical part of a wider population; or the</p>

	species is at a critical phase of its life cycle.
<b>County or Unitary Authority Area Value</b>	Designated sites including: Sites of Nature Conservation Importance (SNCIs); County Wildlife Sites (CWSs); and Local Nature Reserves (LNRs) designated in the county or unitary authority area context. Areas which meet the published selection criteria for those sites listed above but which are not themselves designated as such. Areas of key/priority habitats identified in the Local BAP; and areas of habitat identified in the appropriate Natural Area Profile (or equivalent). Resident, or regularly occurring, populations of species which may be considered at an International, European, UK or National level where: the loss of these populations would adversely affect the conservation status or distribution of the species across the County or Unitary Authority Area; or the population forms a critical part of a wider population; or the species is at a critical phase of its life cycle.
<b>Local Value</b>	Designated sites including: Local Nature Reserves (LNRs) designated in the local context. Trees that are protected by Tree Preservation Orders (TPOs). Areas of habitat; or populations/communities of species considered to appreciably enrich the habitat resource within the local context (such as veteran trees), including features of value for migration, dispersal or genetic exchange.

An evaluation of features comprising designated sites, habitats and species in respect to their nature conservation value is presented in Table 6.4 (sites and habitats) and Table 6.5 (species). Value was assessed using methods detailed in Table (6.3) above. Where the desk study provided no specific evidence for the current presence of features these were excluded from the evaluation.

Information for justification of the ecological value is taken from JNCC accounts for UK BAP list of priority habitats and from the UK BAP priority species list (see references section).

**Table 6.4 Ecological Importance of Nature Conservation Features (Sites and Habitats) Identified within the Study Area**

Nature Conservation Feature	Ecological Importance	Justification
<b>Designated Sites</b>		
<b>Rassal SSSI &amp; SAC</b>	<b>International or European Value</b>	International designated site for its biological features which is afforded protection under national legislation. Biological features: Mixed woodland on base-rich soils associated with rocky slopes; Base-rich fens; Hard-water springs depositing lime; Plants in crevices on base-rich rocks; Limestone pavements; Alpine and subalpine calcareous grasslands; and Mountain willow scrub.

<b>Coille Mhor SSSI &amp; SAC</b>	<b>International or European Value</b>	International designated site for its biological features which is afforded protection under national legislation. Biological features: Western acidic oak woodland.
<b>Rassal National Nature reserve</b>	<b>National</b>	National designated site for its biological features which is afforded protection under national legislation. Biological features: Upland mixed ash woodland.
<b>Slumbay Island SSSI</b>	<b>National</b>	National designated site for its geological features which is afforded protection under national legislation. Geological features: Structural and metamorphic geology: Moine.
<b>Attadale SSSI</b>	<b>National</b>	National designated site for its geological features which is afforded protection under national legislation. Geological features: Structural and metamorphic geology: Moine.
<b>Allt nan Carnan SSSI</b>	<b>National</b>	National designated site for its biological features which is afforded protection under national legislation. Biological features: Upland birch woodland.
<b>Carn a' Bhealaich Mhoir SSSI</b>	<b>National</b>	National designated site for its geological features which is afforded protection under national legislation. Geological features: Structural and metamorphic geology: Moine.
<b>Monar Forest SSSI</b>	<b>National</b>	National designated site for its biological features which is afforded protection under national legislation. Biological features: Upland habitat assemblage.
<b>Loch Carron Marine Consultation Area</b>	<b>National</b>	Designated a Marine Consultation Area, although this is not a statutory designation, the designation does recognise the importance and diversity of the benthic habitats and species found within this area.  Marine Protected Area (MPA) search features recorded in Loch Carron include burrowed mud, horse mussel beds, kelp and seaweed communities on sublittoral sediments and tide-swept algal communities. Common skate and ocean quahog have also been recorded.

		It was also noted that there are aggregations of flameshell beds on the northern side of the narrows.
<b>Terrestrial Habitats</b>		
<b>Woodland, Broadleaf Semi- natural Ancient</b>	<b>National</b>	National priority habitat in the UK BAP and LABAP habitat. This habitat type occurs in discrete locations throughout the study area and is likely to contain plant and animal communities of significant conservation interest.
<b>Woodland, Broadleaf Long Established Plantation Origin</b>	<b>Authority</b>	Key habitat type with a restrictive distribution within the study area, may possess characteristics in terms of plant and animal communities similar to semi-natural woodlands according to proximity.
<b>Woodland, Coniferous Plantation</b>	<b>Local</b>	Large areas occur within the study area, such habitat type may be utilised for foraging and refuge sites by animals such as badger, pine marten, red squirrel and raptors etc.
<b>Grasslands, Agriculturally Improved</b>	<b>Local</b>	This habitat type occurs within the study area particularly along the edge of Loch Carron and within adjacent glens. This habitat may be utilised by foraging animals such as badgers and raptors.
<b>Upland Habitats</b>	<b>Authority / Local</b>	Habitats such as upland heathland, blanket bog, and flushes are National priority habitats in the UK BAP and are LABAP short-listed habitats. However, the extent, composition and quality of these habitats within the study area are currently unknown.
<b>Aquatic Habitats</b>		
<b>Fresh Water bodies, Lochs, Rivers and Burns</b>	<b>Authority / Local</b>	Fresh water features are national priority habitats in the UK BAP and are LABAP priority habitats. Such features are important for fish, aquatic plant and invertebrate communities, as well as providing foraging and refuges for otters and water vole etc.
<b>Marine Waterbodies, Loch Carron</b>	<b>National</b>	Marine Protected Area (MPA) search features recorded in Loch Carron include burrowed mud, horse mussel beds, kelp and seaweed communities on sublittoral sediments and tide-swept algal communities. Common skate and ocean quahog have also been recorded. It was also noted that there are aggregations of flameshell beds on the

		northern side of the narrows.
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**Table 6.5 Ecological Importance of Nature Conservation Features (Species) Identified within the Study Area**

Nature Conservation Feature	Ecological Importance	Justification
<b>Mammals</b>		
<b>Otter</b>	<b>National</b>	National priority species and LABAP priority species. Historic persecution has led to numbers or range having declined over 50%. Otters are protected under the Habitat Regulations and the NCSA.
<b>Bats</b>	<b>National</b>	National priority species and LABAP priority species. Threat to species from roost and foraging habitat loss / fragmentation. Bats are protected under the Habitat Regulations and the NCSA.
<b>Badger</b>	<b>Authority</b>	Badgers are protected under the PBA, the NCSA and the WANE.
<b>Pine marten</b>	<b>Authority</b>	National priority species. Threat to species from persecution and habitat loss / fragmentation. Pine martens are protected under the Habitat Regulations and the WCA.
<b>Red squirrel</b>	<b>Regional</b>	National priority species and LABAP priority species. This species is currently under threat from grey squirrel expansion and squirrel pox virus epidemics. Red squirrels are protected under the WCA and NCSA.
<b>Water vole</b>	<b>Regional</b>	National priority species and LABAP priority species. This species is currently under threat from mink expansion and habitat loss / fragmentation. Water voles are protected under the WCA and NCSA.
<b>Wild cat</b>	<b>National</b>	National priority species and LABAP priority species. Historic persecution has led to numbers or range having significantly declined; also breeding with domestic cats is considered to be a significant threat to the viability of the species. Wild cats are protected under the Habitat Regulations and the NCSA.
<b>Birds</b>		
<b>Golden eagle</b>	<b>National</b>	LABAP priority species. The golden eagle is afforded the highest degree of legal protection under the Schedule 1 of the WCA. The NCSA provides additional

		protection for the golden eagle in Scotland.
<b>Hen harrier</b>	<b>National</b>	National priority species and LABAP priority species. The hen harrier is afforded the highest degree of legal protection under the Schedule 1 of the WCA for breeding birds and Birds Directive for migratory birds. The NCSA provides additional protection for the species in Scotland.
<b>Merlin</b>	<b>Regional</b>	LABAP priority species. The merlin is afforded the highest degree of legal protection under the Schedule 1 of the WCA for breeding birds and Birds Directive for migratory birds. The NCSA provides additional protection for the species in Scotland.
<b>Red-throated diver</b>	<b>Regional</b>	LABAP priority species. The red-throated diver is afforded the highest degree of legal protection under the Schedule 1 of the WCA for breeding birds and Birds Directive for migratory birds. The NCSA provides additional protection for the species in Scotland.
<b>Black-throated diver</b>	<b>National</b>	National priority species and LABAP priority species. The black-throated diver is afforded the highest degree of legal protection under the Schedule 1 of the WCA for breeding birds and Birds Directive for migratory birds. The NCSA provides additional protection for the species in Scotland.
<b>Short-eared owl</b>	<b>Regional</b>	LABAP priority species. The short-eared owl is afforded legal protection under the Annex 1 of the Birds Directive and WCA for breeding birds. The NCSA provides additional protection for the species in Scotland.
<b>Greenshank</b>	<b>Regional</b>	LABAP priority species. The greenshank is afforded the highest degree of legal protection under the Schedule 1 of the WCA for breeding birds and Birds Directive for migratory birds. The NCSA provides additional protection for the species in Scotland.
<b>Golden plover</b>	<b>Regional</b>	LABAP priority species. The golden owl is afforded legal protection under the Annex 1 of the Birds Directive and WCA for breeding birds. The NCSA provides additional protection for the species in Scotland.
<b>Wood sandpiper</b>	<b>Regional</b>	LABAP priority species. The wood sandpiper is afforded the highest degree of legal protection under the Schedule 1 of the WCA for breeding birds and Birds Directive for migratory birds. The NCSA provides additional protection for the species in

		Scotland.
<b>Fish</b>		
<b>Atlantic salmon</b>	<b>Regional</b>	National priority species and LABAP priority species. Salmon is listed in Annex II of the EC Habitats Directive and are protected under the Habitats Regulations and the Salmon and Freshwater Fisheries Act.
<b>European eel</b>	<b>Regional</b>	National priority species. Currently there is evidence of decline relating to this species although little evidence exists of a reduction in geographical range.
<b>Brown / Sea trout</b>	<b>Regional</b>	National priority species and LABAP priority species. A number of populations are known to be under threat from habitat deterioration and the stocking of fish for recreational purposes.
<b>Skate</b>	<b>Regional</b>	National priority species, the skate is believed to be in severe decline, largely due to targeted and non-targeted fishing. Locations where common skate gather to reproduce and feed should be protected to aid in population recovery.



## 6.7 Baseline Conditions – Habitat Survey

### 6.7.1 *Introduction*

The Phase 1 Habitat maps are provided in Figures 6.2 and 6.4, a list of target notes from the Phase 1 Habitat survey is also provided in Appendix 3.

Within the upland areas Damp calluna heath was found to be the most extensive dwarf shrub habitat within the Stromeferry options study corridors, this type of heathland is regarded as a sub-category of Dry dwarf shrub heath, with the damp calluna heath largely occurring on more gently sloping less well drained ground. The second most extensive habitat type was found to be commercial coniferous plantation woodland, with large areas occurring within the south west and east of the study site. Large areas of recently felled conifer trees and newly planted trees frequently occur within the commercial forestry boundaries. Within such areas, mosaics of acid grassland, marsh / marshy grassland and dry dwarf heath were observed but on a scale too small to be recorded individually.

Grassland habitats predominate within areas subjected to higher grazing pressure by livestock; namely the field systems within the valley bottoms and at lower elevations on surrounding hills, with acid semi-improved grassland being the most prevalent, improved and species poor semi-proved grassland occur in the areas most intensively grazed.

On the steeper slopes and flat areas with a more porous substrate extensive area of Dry dwarf shrub heath occurs, dominated by heather *Calluna vulgaris*.

Semi-natural broadleaf woodland often occurs within discrete pockets largely associated with steep ground such as sheer sided ravines and hillsides, the main concentration occurs within the western region of the study area.

A more in-depth description of the most extensive habitats within the study area have been compiled based upon their collective abundance, beginning with the most extensive habitats, also refer to Table 6.6 below.

**Table 6.6** Area of habitat within 500m buffer of each route (km<sup>2</sup>) & %

Phase 1 Habitat Type	Northern route		Northern alternative route		Online 02 route		Online 0405047 route		Online 03 route		Southern route		Total
	(km <sup>2</sup> )	%	(km <sup>2</sup> )	%	(km <sup>2</sup> )	%	(km <sup>2</sup> )	%	(km <sup>2</sup> )	%	(km <sup>2</sup> )	%	
A1.1.1 Broadleaf Woodland – semi-natural	1.02	19.12	1.07	19.98	0.75	14.08	0.75	14.11	0.75	14.11	0.99	18.60	5.33
A1.1.2 Broadleaf Woodland – plantation	0	0	0	0	0.01	24.55	0.01	24.55	0.01	24.54	0.01	26.37	0.04
A1.2.2 Coniferous Woodland – plantation	1.22	7.81	1.22	7.79	2.26	14.41	2.26	14.41	2.26	14.41	6.45	41.18	15.67
A1.3.2 Mixed Woodland - plantation	0	0.40	0	0.40	0.11	24.80	0.11	24.80	0.11	24.80	0.11	24.80	0.43
A2.1 Scrub – dense / continuous	0.09	20.70	0.09	19.72	0.02	4.35	0.02	4.35	0.02	4.35	0.20	46.55	0.43
A2.2 Scrub - scattered	0.03	8.56	0.04	10.67	0.08	22.58	0.08	22.58	0.08	22.58	0.04	13.01	0.34
A4.2 Coniferous woodland – recently felled	0.015	6.90	0.15	6.90	0.26	12.01	0.26	12.01	0.26	12.02	1.09	50.16	2.18
B1.2 Acid grassland – semi-improved	1.62	23.34	1.55	22.22	0.86	12.41	0.86	12.41	0.86	12.41	1.20	17.21	6.96
B2.2 Neutral grassland: semi-improved	0.20	50.00	0.20	50.00	0	0	0	0	0	0	0	0	0.41
B4 improved grassland	0.40	9.96	0.40	10.09	0.73	18.19	0.73	18.19	0.73	18.19	1.01	25.39	3.99
B5 Marsh/marshy grassland	0.09	38.53	0.09	38.53	0	0	0	0	0	0	0.06	22.95	0.25
B6 Poor semi-improved grassland	1.06	27.44	1.29	33.24	0.33	8.43	0.33	8.43	0.33	8.43	0.54	14.04	3.88
C1.1 Bracken - continuous	0	2.41	0	2.41	0.05	29.36	0.05	29.36	0.05	29.36	0.01	7.10	0.18

C1.2 Bracken - scattered	0	0	0	0	0	0.02	30.13	0.02	30.13	0.02	30.13	0.01	9.61	0.06
D1.1 Dry dwarf shrub heath - acid	1.56	16.29	1.56	16.29	1.04	1.10	11.47	1.12	11.69	3.21	33.46	9.59		
D2 Wet dwarf shrub heath	0.28	16.74	0.28	16.74	0.17	0.17	10.09	0.17	10.09	0.60	36.24	1.66		
D5 Dry heath / acid grassland	0.07	50.00	0.07	50.00	0	0	0	0	0	0	0	0.15		
Damp calluna heath	3.27	18.38	2.76	15.54	1.44	1.55	8.73	1.83	10.30	6.93	38.98	17.78		
G1 Standing water	0	3.75	0	3.75	0	0	0	0	0	0.05	92.50	0.05		
G1.6 Standing water: brackish	0	0	0	0	0.01	0.01	25.00	0.01	25.00	0.01	25.00	0.03		
G2 Running water	0.02	4.38	0.03	4.98	0.09	0.09	17.40	0.09	17.40	0.21	38.45	0.53		
Intertidal – shingles / cobbles	0	0	0	0	0.07	0.07	25.00	0.07	25.00	0.07	25.00	0.27		
H2.6 Saltmarsh: dense/continuous	0.29	16.69	0.30	17.14	0.29	0.29	16.54	0.29	16.54	0.29	16.54	1.73		
I1.1.1 Natural rock exposure: inland cliff, acid/neutral	0.02	14.04	0.02	14.04	0.03	0.03	19.46	0.03	20.84	0.02	10.78	0.16		
J1.2 Amenity grassland	0.07	45.89	0.09	54.11	0	0	0	0	0	0	0	0.16		
Total														72.26

#### *Damp Calluna Heath (D1)*

Based upon the JNCC Phase 1 Survey categories Damp calluna heath is regarded as a sub-category of D1 Dry dwarf shrub heath, occurring on shallow substrates consisting largely of peat (< 0.5m depth) with greater than 25% coverage of ericoids; namely heather *Calluna vulgaris* though distinct in terms of its lower growth composition than areas of dry dwarf heath.

Within the Stromeferry study area damp calluna heath occurred largely on moderately sloping ground, which was better drained than the flatter areas where Wet dwarf shrub heath occurs, but less so than the steeper well drained slopes where Dry dwarf shrub heath is found.

Common plant assemblages included heather, cross-leaved heath *Erica tetralix*, deer grass *Trichophorum cespitosum*, purple-moor grass *Molinia coerulea*, *Sphagnum capillifolium*, bog myrtle *Myrica gale*, bog asphodel *Narthecium ossifragum* and tormentil *Potentilla erecta*.

#### *Woodland- Coniferous Plantation (A1.2.2)*

Extensive areas of densely planted commercial coniferous plantation woodland occur within the study area; especially, within the south west and south east. Principal tree species include sitka spruce *Picea sitchensis*, scots pine *Pinus sylvestris*, and larch *Larix sp.*, self-seeded trees from nearby plantations were recorded with adjacent habitats including semi- natural broadleaf woodland and both Dry dwarf shrub heath and Damp calluna heath.

#### *Dry dwarf Shrub Heath (D1)*

Dry dwarf shrub heath is widely distributed within the study area, often frequenting areas with steep slopes and flat areas with shallow drier substrates. Plant communities present within such areas is often frequented by mature / senescent growth of heather in combination with heath bedstraw *Galium mollugo*, tormentil *Potentilla erecta*, bilberry *Vaccinium myrtillus*, bell heather *Erica cinerea*, creeping bent *Agrostis stolonifera* and red fescue *Festuca rubra*.

#### *Semi-Natural Broadleaf Woodland (A1.1.1)*

Occurring largely within the west of the study corridor within discrete areas often associated with steep ground such as sheer sided ravines and hillsides. Small pockets of this habitat type where also recorded within areas of commercial coniferous forestry plantation. A number of the Semi-natural broadleaf woodland sites are listed on the ancient woodland inventory, refer to Figure 6.1.

Principal high canopy species are sessile oak *Quercus petraea*, silver birch *Betula pendula*, downy birch *Betula pubescens*, ash *Fraxinus excelsior* and rowan *Sorbus aucuparia*. Alder *Alnus glutinosa* and goat willow *Salix caprea* often frequent areas with less well drained soils.

Principle understory species include immature high canopy species as well as hazel *Corylus avellana*, holly *Ilex aquifolium* and hawthorn *Crataegus monogyna*.

#### *Semi-improved Acid Grassland (B1.2)*

This habitat type was found to be largely restricted to the lower elevations on surrounding hills, where grazing by livestock has not been so intensive but excessive enough not to sustain the dominant presence of ericoid species such as heather.

Principal recorded species include common bent *Agrostis capillaris*, yorkshire fog *Holcus lanatus*, purple-moor grass, tormentil, heath rush *Juncus squarrosus*, devil's-bit scabious

*Succisa pratensis*, and where damper soil conditions prevail tufted hair grass *Deschampsia cespitosa* and soft rush *Juncus effusus* occur.

#### *Improved and Semi-improved Neutral Grassland (B4 & B2.2)*

Improved and species poor semi-improved grassland occur in areas most intensively grazed by livestock, with many areas having been reseeded as part of grassland management regimes. Such areas largely occur as field systems associated with specific farmsteads.

Plant assemblages within such habitats are less diverse than the semi-improved acid grassland, with species ranging from perennial rye-grass *Lolium perenne*, and white clover *Trifolium repens* to sweet vernal-grass *Anthoxanthum odoratum*, common bent, yorkshire fog, purple-moor grass, and tormentil, though occurring less frequent than in the semi-improved acid grassland.

#### *Marsh / Marshy Grassland (B5)*

This habitat type was predominantly recorded within low lying areas, often adjacent to abandoned grazed grassland. Common plant species included soft rush, meadowsweet *Filipendula ulmaria*, purple moor-grass, and sharp-flowered rush *Juncus acutiflorus*.

#### *Saltmarsh (H2.6)*

An extensive area of Saltmarsh habitat occurs at the north eastern periphery of Loch Carron, several other smaller sites can also be found on both the north and south shores of the Loch, most notably at Attadale and near the settlement of Lochcarron, evidence of grazing by both sheep and wildfowl most notably Greylag geese *Anser anser* was also observed.

Notable species amongst the plant assemblages include thrift *Armeria maritima ssp. maritima*, sea plantain *Plantago maritima*, sea aster *Aster tripolium*, saltmarsh rush *Juncus gerardii* and red fescue, sea arrowgrass *Triglochin palustre* was also recorded.

#### *Shingle Banks (H1.2)*

Extensive shingle banks are exposed at low tide adjacent to the saltmarsh area near Strathcarron, it is considered likely that such habitat in combination with the saltmarsh is used extensively by migrating and over wintering waders and wildfowl.

#### *Brackish Standing Water (G1.6)*

Brackish standing water which occurs within the study corridors range from small pools occurring within the saltmarsh habitat and more extensive bodies; particularly those present near the confluence with the River Attadale.

#### *Standing Water (G1)*

Numerous small montane lochans frequent the study corridors, particularly on the south side of Loch Carron, together with larger water bodies such as Loch na Sroine etc. In-addition to fish and macrophyte interests, such water bodies are also likely to be used as breeding sites by several bird species of conservation interest namely, Black-throated and Red-throated divers.

#### *Running Water (G2)*

Several notable watercourses are present within the study area including the River Attadale and the River Carron, the latter being the subject of a restoration project, which principally

involves the restocking of the river with Atlantic salmon *Salmo salar*. Together with the numerous minor watercourses which frequent the region, they combine to provide a valuable resource in terms of both migratory and non-migratory fish.

#### *Scrub (A2.1 & A2.2)*

Dense scrub occurs in several discrete areas throughout the study corridors; Gorse *Ulex europaeus* is prevalent within saltmarsh habitat and within certain riparian areas particularly on parts of the River Carron. Goat willow *Salix caprea* often forms dense stands particularly on the woodland edges adjacent to wet heath or damp calluna heath habitats.

#### *Other habitats: Rock exposure and Amenity Grassland (I1.1.1 & J1.2)*

Rock exposure occurs throughout the study area, the most notable exposures relate to the Attadale SSSI, for which the site is designated. Amenity grasslands can be found near the settlement of Lochcarron and relate to the golf course and sport fields.

#### *Stage 3 Recommendations for further habitat surveys*

The Phase 1 Habitat survey has identified a number of areas where additional and more in-depth surveys are required, the surveys should take the form of a National Vegetation Classification (NVC) survey, which will enable a better understanding of the potential impacts (direct & indirect) certain elements of the proposed routes, would have upon habitats of a high conservation interest, such as Semi-natural Ancient Woodland and Wetland habitats etc.

In-addition to the NVC surveys, a biotope survey of the Strome Ferry Narrows and southern foreshore of Loch Carron will be required for the Stage 3 part of the assessment.

### 6.7.2 ***Baseline Conditions – Protected Species***

No specific protected species surveys were undertaken during the Stage 2 part of the assessment, such surveys will be required for Stage 3. Subsequently the comments in this section of the chapter are based upon evidence collated during the desk-study, incidental observations made during the Phase 1 Habitat walk over survey, as well as an assessment of the potential of habitats to support protected species based upon previous experience of the surveyor. Protected mammal data is shown in Figure 6.3.

#### *Otter*

The otter is a European Protected Species and as such is protected in Scotland solely under the Conservation (Natural Habitats &c.) Regulations 1994 (as amended).

Based upon incidental observations and collated data, otters are considered to be widespread within the study area and environs. During the Phase 1 Habitat survey field evidence relating to the presence of otters in the form of one refuge (Holt) and spraint sites were recorded within several locations around Loch Carron, refer to Figure 6.3.

In combination the habitats present around Loch Carron and environs incorporating fresh water and riparian habitats will provided a number of suitable resources to resident otters both in the form of foraging habitats and locations for refuges.

As no specific otter surveys were undertaken during the Stage 2 assessment, though adhoc data was recoded during the Phase 1 Habitat survey; subsequently, a comprehensive survey will be required to inform the Stage 3 assessment. It is recommended, that owing to the steep nature of the topography in many places along the Loch Carron shoreline i.e. the Narrows and the presence of the railway line which limits access on foot, that a boat based survey is

undertaken where required, otherwise the recording of important field evidence may be impeded. Depending on the findings, licensing of the works, employment of mammal fencing and underpasses, and appropriate timing of the works might be required.

#### *Badger*

No past records relating to presence badgers within the study area were obtained during the desk study, other than SNH indicating that significant badger populations' are known to occur within Gleann Udalain.

No badger setts were recorded during the walk over Phase 1 Habitat survey, though a badger latrine was recorded within the southern route, refer to Figure 6.3.

Soil acidity is known to affect the numbers of earthworms, a principal component of a badger's diet, thus the number of available food patches (productive feeding areas) to a given badger social group is likely to influence their spatial distribution. Subsequently, in locations such as the study area where acid soils prevail, the spatial distribution of individual badger social groups is likely to be significant in terms of area.

Given the presence of specific habitat types such as broadleaf woodland and scrub, which tend to correlate with higher productivity in terms of earthworms and hence a more productive foraging habitat for badgers, it is likely that badger spatial distribution will show a degree of correlation with such habitat types.

A comprehensive survey will be required to inform the Stage 3 assessment, depending on the findings, licensing of the works, employment of mammal fencing and underpasses, and appropriate timing of the works might be required.

#### *Bats*

All bat species have been designated a European Protected Species and as such are protected in Scotland solely under the Conservation (Natural Habitats &c.) Regulations 1994 (as amended).

No records relating to the presence of bats were obtained during the desk study, though a number of bat species including Common pipistrelle *Pipistrellus pipistrellus*, Soprano pipistrelle *Pipistrellus pygmaeus*, Brown long-eared bat *Plecotus auritus* and Daubenton's bat *Myotis daubentonii* are regarded as being widespread within the Highland region.

An Anabat SD1 remote ultrasound detector was deployed at the time of the Phase 1 Habitat survey; though only one species was recorded (Common pipistrelle) during a later analysis of the data obtained from the recorder, it showed a not insignificant level of bat activity within an area of open broadleaf woodland located on the north side of Loch Carron, refer to Figure 6.3.

Comprehensive bat activity surveys will be required to inform the Stage 3 assessment, depending on the findings, licensing of the works and the employment of appropriate mitigation may be required.

#### *Red squirrel*

The NBN database contains no records relating to the presence of red squirrels within the study area, and no evidence of them were observed during the Phase 1 Habitat walkover survey.

However given the prevalence of suitable habitat in the form coniferous plantation within sections of the proposed route corridors, it is considered likely that red squirrels are present

within the local environs. Subsequently, it will be considered prudent to undertake appropriate surveys as a means of informing the Stage 3 assessment.

#### *Pine marten*

There are a number of previous records relating to the presence of pine marten within the route options vicinity; given the wide spread occurrence of suitable habitat combined with field evidence in the form of scats observed during the Phase 1 Habitat walkover survey; it is considered likely that pine martens are widespread within the neighbourhood. Further checks for field evidence relating to this species e.g. dens and scats in the route options vicinity can be conducted whilst undertaking other protected species surveys.

#### *Water vole*

There are a number of previous records relating to the presence of water vole within the vicinity of the routes under consideration, and given the prevalence of suitable habitat within the proposed corridors it is considered likely that water vole may be wide spread.

A comprehensive survey of likely water vole habitat will be required to inform the Stage 3 assessment, depending on the findings, licensing of the works and the employment of appropriate mitigation may be required.

#### *Breeding Birds*

Given the varied habitat types present within the study corridors, there is likely to be a wide range of breeding bird species within the area during the nesting season, considered from March to August inclusive, though a number of species may breed earlier or later.

A review of the bird species records obtained from the NBN website (HBRG do not collate records relating to birds), clearly demonstrates the short comings of such information obtained from biological data bases and record centres. Clearly the list of recorded bird species for the area is deficient given the diversity of the habitats present.

During the walkover Phase 1 Habitat survey three schedule one bird species (Wildlife and Countryside Act 1981 (WCA) were observed within the corridor boundaries (refer to Figure 6.3); namely, golden eagle *Aquila chrysaetos*, black-throated diver *Gavia arctica* and red-throated diver *Gavia stellata*. All three species favour open moorland habitats, the red-throated diver nests on the margins (or islands) of small lochans and flies to forage on neighbouring large freshwater bodies or sea lochs. The black-throated diver tends to nest on the margins of larger freshwater lochs from which they also forage, whilst golden eagle foraging territories can range in excess of 40 square kilometres, encompassing largely open countryside.

Given the combined presence of open moorland / montane habitats and numerous small lochans particularly to the south of Loch Carron, it is considered likely that a fourth schedule one bird species, the common scoter *Melanitta nigra* will also be present during the breeding season.

Several other UKBAP and Red Listed species will also breed upon the open moorland including skylark *Alauda arvensis*, golden plover *Pluvialis apricaria*, greenshank *Tringa nebularia* and snipe *Gallinago gallinago* etc.

Woodland habitats including broadleaf and coniferous plantations are also likely to support a diverse range of breeding bird species including pied flycatcher *Ficedula hypoleuca*, redstart *Phoenicurus phoenicurus*, siskin *Carduelis spinus* and crossbill *Loxia curvirostra*. Breeding dipper *Cinclus cinclus*, common sandpiper *Actitis hypoleucos* and goosander *Mergus*



*merganser* are known to utilise habitats which occur on the sides of lochs as well as the riparian areas of the rivers and burns present within the study area.

As a means of informing the Stage 3 assessment, breeding and over wintering (including migration periods) bird surveys are required, focusing upon the habitats most at risk from direct impacts as well as disturbance.

#### *Amphibians*

Amphibian records for the study area are somewhat bereft and relate to the known presence of the common frog *Rana temporaria*, which likely to be widespread within the study corridors. One record from the NBN database refers to the presence of a crested newt; however, the data does not differentiate between the smooth newt *Triturus vulgaris* and the great crested newt *Triturus cristatus*, the males of both species support crests during the breeding season.

The palmate newt *Lissotriton helveticus* is also likely to be present within suitable habitat, as this species is known to be widespread within the Highland region.

Future surveys would only be required if potential breeding ponds and associated terrestrial habitat were at risk from any of the proposed route options.

#### *Reptiles*

Two species of reptile have previously been recorded within the study area based upon records received from the NBN database; namely, the Common lizard *Zootoca vivipara* and the Slow worm *Anguis fragilis*; though it is considered likely that a third species the adder *Vipera berus* will also be present given the types of habitats present and the known distribution of the species.

As a means of establishing the presence and distribution of the three species of reptile within the study corridors and as a means of informing the Stage 3 assessment, target sample survey should be undertaken.

#### *Marine Ecology*

Loch Carron is designated a Marine Consultation Area (MCA) and search features recorded in Loch Carron include burrowed mud, horse mussel *Modiolus modiolus* beds, kelp and seaweed communities on sublittoral sediments and tide-swept algal communities. Common skate and ocean quahog *Arctica islandica* have also been recorded.

It was also noted that there are aggregations of flameshell *Limaria hians* beds on the northern side of the narrows.

In-addition to the above features, records relating the presence of the following marine mammals within Loch Carron exist, harbour seal *Phoca vitulina*, common porpoise *Phocoena phocoena* and common dolphin *Delphinus delphis*. No adhoc observations of marine mammals were made during the walkover investigation around Loch Carron.

In-order to fully inform the Stage 3 assessment the following surveys will be required:

- Biotope surveys of the potential crossing locations at Stromeferry Narrows and areas of the south shore of Loch Carron if a viaduct option is still under consideration, as a means of recording the animal and algae communities present within both the Littoral and Eulittoral zones of the shoreline;

- Bethnic surveys of the Narrows and any viaduct areas, in-order to record sublittoral animal and algae communities; and.
- Seal and cetaceans surveys, as a means of identifying both the presence and distribution of marine mammals with Loch Carron.

#### *Freshwater Fish*

The Rivers Carron and Attadale are known to support breeding Atlantic salmon *Salmo salar* and brown / sea trout *Salmo trutta*; together with their minor tributaries. Although such species are not afforded any exacting protection, they are UK BAP priority species, and salmon is also a Scottish Biodiversity List species. The Rives Carron and Taodail are classified as 'Good' status by SEPA, whilst the River Attadale is classified as high (<http://gis.sepa.org.uk/rbmp/>), and all parameters contributing to this overall status are also described as 'Good', including fish ecology. This status must be maintained, and negative impacts on the river avoided (see Options Assessment below).

#### *Invertebrates*

A number of UKBAP species have been recorded within the study areas associated with the proposed route options; however, as stated previously most animal and plant groups are woefully under-recorded. Wetlands, semi-natural broadleaf wood, and dwarf dry heath habitats are considered to be those of most interest for invertebrates in general terms. Although the actual amount of semi-natural vegetation which may be impacted is regarded as small compared to the total available.

Further targeted investigations are considered necessary, in-order to inform a Stage 3 assessment with regards to the presence and distribution of all UKBAP species.

#### *Vascular Plants*

The only higher plant records relating to the area pertain to two species of orchid, both UKBAP species as detailed within Table 6.2 above.

The desk study and the Phase 1 Habitat survey has identified areas such as saltmarsh, wetlands, semi-natural broadleaf woodland and dwarf heath habitats were other UK and local BAP species are most likely to occur; refer to the target notes in Appendix 3.

It is recommended as part of the Stage 3 assessment that detailed targeted NVC surveys are undertaken as a means of identifying both habitats and individual plant species, which would be at significant risk via one or multiple route options.

#### *Non-vascular Plants*

Information obtained from non-published accounts relating to potential impacts upon Bryophyte communities as a consequence of the proposed Attadale Estate Hydro - scheme 3, identified the Eas Ban Burn as being a nationally / internationally important watercourse for bryophytes.

Given the propensity of similar habitat types to occur elsewhere within the study corridors, further targeted investigations are considered necessary, in-order to inform the Stage 3 assessment.

### 6.7.3 ***Baseline Conditions – Invasive Species***

Within the area subject to the Stage 2 investigation, no invasive plant species were recorded; however, given the widespread presence of species such as Japanese knotweed *Fallopia japonica* along the road and rail systems in Scotland, it is considered likely that it will be present with the study area, particularly along areas of the Loch Carron shoreline.

Although specific surveys are not considered necessary, as a means of compliance with current legislation, all invasive species should be recorded during other Stage 3 walk over surveys.

## 6.8 **Options Assessment**

### 6.8.1 ***Introduction***

There are three principal route corridors currently under consideration at Stage 2 consisting of 8 options in total; the routes are described in Chapter 4.

This nature conservation assessment assumes that the protected species previously highlighted will be impacted to some extent, though the magnitude of impact cannot be accurately assessed at this stage, further investigations are required at Stage 3.

General impacts on protected fauna that could be caused by the development may include one or more of the following:

- Killing or injuring (during construction and operation);
- Disturbance;
- Habitat loss;
- Habitat fragmentation;
- Barriers to dispersal;
- Facilitated predation<sup>4</sup>;
- Pollution;
- Sediment deposition.

### 6.8.2 ***Predicted construction impacts common to all options***

This section includes consideration of impacts common to all three principal route options.

#### Water quality

Water quality may be affected during construction and operation. Potential impacts include direct disturbance or destruction of freshwater and marine substrates and degradation through siltation and other pollution. This may directly or indirectly affect fresh water / marine species including bivalve molluscs.

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<sup>4</sup> For example, this could occur if habitat clearance was undertaken during the bird breeding season and small stands of cover were left in place around active nests in order to protect them, because in practice this often makes it easier for predators to detect a nest and predate its contents.

### Sediment Movements

Sediment deposition may be affected during construction and operation. Potential impacts include modifications to current sediment deposition patterns. This may directly or indirectly affect a number of fresh water, marine and intertidal species.

### Terrestrial Habitat loss

Effects on a range of terrestrial habitats will occur within the route corridors; though the extent and location will vary with each route option. Principal habitats affected will include the loss and fragmentation of damp calluna heath, acid grassland, coniferous plantation woodland, with some broadleaved plantation and semi-natural woodland also affected.

### Intertidal Habitat

Direct impacts upon intertidal habitats are only likely to occur with the Northern Route options (Strome Narrows Crossing) and the Online Route Option O2 (Viaduct) and possibly Online Route Options O5 & O7 (Shared Road / Rail & Enhanced Av. Shelter), all are likely to involve construction activities within the intertidal zone.

### Invasive species

No issues were identified relating to the presence of invasive species.

### Breeding birds

Depending on the timing of the proposed site clearance and enabling works, there may be potential impacts upon breeding birds due to the widespread presence of this group. Impacts may especially affect species nesting within woodland, heathland, grassland areas and near watercourses within the route corridors. Potential impacts include destruction of nests, nesting/foraging habitats, and temporary disturbance associated with construction (including noise, vibrations and pollution).

### Potential for greater risk of wildlife road fatalities

Without adequate mitigation, the road improvement options are likely to increase the risk of wildlife road fatalities particularly within off-line sections, and because the road will be wider (upgraded to single carriageway) with a higher average traffic speed.

## 6.8.3 ***Northern Route Option N9 - North Lochcarron Bypass***

### **Predicted Impacts**

#### *Protected Sites*

Major effects relating to the Northern Route option corridor on protected sites includes the likely destruction, fragmentation and disturbance of designated habitats within the Allt nan Carnan SSSI, as a consequence of the off-line road section from the existing A896 to Kirkton.

#### *Habitats*

The off-line section described above will also cause destruction, fragmentation and disturbance to larger areas of damp calluna heath, semi-improved acid grassland and conifer plantation. Whilst the proposed link road to the Strome Narrows crossing, which extends in a westerly direction from the existing A890 just north of the settlement of Achmore would result

in destruction, fragmentation and disturbance of both dry dwarf shrub heath and broadleaf semi-natural ancient woodland.

Within on line sections of the route, impacts will be associated with the on line improvements to the existing road i.e. upgrading to a single carriageway, which is likely to involve the destruction, fragmentation and disturbance of all types of woodland including areas of broadleaf semi-natural ancient woodland, which borders the existing road, particularly within the areas around Stromemore. Areas of damp calluna heath, dry dwarf shrub heath and semi-improved acid grassland will also be affected.

Due to the requirement to span the area known as the narrows of Loch Carron and depending upon the design of the structure there is potential to cause destruction, fragmentation and disturbance to benthic and intertidal habitats within the Loch Carron MCA.

Degradation of aquatic habitats affecting fish is also considered likely.

*Non-native invasive species*

There are no obvious constraints due to the presence of invasive species within this route option but further surveys are required to confirm this.

*Protected species likely to be affected*

There will be disturbance during construction; habitat loss and fragmentation; and higher risk of road casualties due to a wider and faster road.

**Table 6.7 Northern Route Option N9, predicted impacts upon protected species**

Receptor & Sensitivity	Predicted Impacts	Significance of impact
Otter - High / National Value	Direct mortality; Habitat fragmentation; Disturbance; Sedimentation and run-off.	Minor
Bats - High / National Value	Direct mortality; Loss of roost sites; Foraging / commuting habitat fragmentation; Disturbance.	Moderate
Badger – Medium / Authority Value	Direct mortality; Loss of refuge sites; Foraging / commuting habitat fragmentation; Disturbance.	Moderate
Pine marten – Medium / Authority Value	Direct mortality; Loss of refuge sites; Foraging / commuting habitat fragmentation; Disturbance.	Moderate
Red squirrel -Medium / Authority Value	Direct mortality; Loss of refuge sites; Foraging / commuting habitat fragmentation; Disturbance.	Moderate
Water vole -Medium / Authority Value	Direct mortality; Loss of refuge sites;	Minor

	Foraging / commuting habitat fragmentation; Disturbance.	
Wild cat - High / National Value	Direct mortality; Loss of refuge sites; Foraging / commuting habitat fragmentation; Disturbance.	Minor
Birds - High to Medium / National & Regional Value	Direct mortality; Loss of refuge sites; Foraging habitat fragmentation; Disturbance.	Moderate
Fish – Medium / Regional Value	Degradation of habitat; Disturbance; Sedimentation and run-off.	Moderate

6.8.4 **Northern Route Option N6 - Online through Lochcarron**

**Predicted Impacts**

*Protected Sites*

As this route option does not feature the off-line road section from the existing A896 to Kirkton, there will be no impacts upon designated habitats within the Allt nan Carnan SSSI or neighbouring areas.

*Habitats*

The proposed link road to the Stromeferry Narrows crossing, which extends in a westerly direction from the existing A890 just north of the settlement of Achmore, would result in destruction, fragmentation and disturbance of both dry dwarf shrub heath and broadleaf semi-natural ancient woodland.

Within on line sections of the route, impacts will be associated with the on line improvements to the existing road i.e. upgrading to a single carriageway, which is likely to involve the destruction, fragmentation and disturbance of all types of woodland including areas of broadleaf semi-natural ancient woodland, which borders the existing road, particularly within the areas around Stromemore. Areas of damp calluna heath, dry dwarf shrub heath and semi-improved acid grassland will also be affected.

Within the settlement of Lochcarron there is likely to be localised loss of scattered trees and species poor semi-improved grassland as a consequence of improvements to the existing carriageway.

Due to the requirement to span the area known as the narrows of Loch Carron and depending upon the design of the structure there is potential to cause destruction, fragmentation and disturbance to benthic and intertidal habitats within the Loch Carron MCA.

Degradation of aquatic habits affecting fish is also considered likely.

*Non-native invasive species*

There are no obvious constraints due to the presence of invasive species within this route option but further surveys are required to confirm this.

*Protected species likely to be affected*

There will be disturbance during construction; habitat loss and fragmentation; and higher risk of road casualties due to a wider and faster road – see Table 6.8. .

**Table 6.8 Northern Route Option N6, predicted impacts upon protected species**

Receptor & Sensitivity	Predicted Impacts	Significance of impact
Otter - High / National Value	Direct mortality; Habitat fragmentation; Disturbance; Sedimentation and run-off.	Minor
Bats - High / National Value	Direct mortality; Loss of roost sites; Foraging / commuting habitat fragmentation; Disturbance.	Moderate
Badger – Medium / Authority Value	Direct mortality; Loss of refuge sites; Foraging / commuting habitat fragmentation; Disturbance.	Moderate
Pine marten – Medium / Authority Value	Direct mortality; Loss of refuge sites; Foraging / commuting habitat fragmentation; Disturbance.	Moderate
Red squirrel -Medium / Authority Value	Direct mortality; Loss of refuge sites; Foraging / commuting habitat fragmentation; Disturbance.	Moderate
Water vole -Medium / Authority Value	Direct mortality; Loss of refuge sites; Foraging / commuting habitat fragmentation; Disturbance.	Minor
Wild cat - High / National Value	Direct mortality; Loss of refuge sites; Foraging / commuting habitat fragmentation; Disturbance.	Minor
Birds - High to Medium / National & Regional Value	Direct mortality; Loss of refuge sites; Foraging habitat fragmentation; Disturbance.	Moderate
Fish – Medium / Regional Value	Degradation of habitat; Disturbance; Sedimentation and run-off.	Moderate

6.8.5 **Online Route Option O2 - Railway Viaduct**

**Predicted Impacts**

*Protected Sites*

Major effects relating to the Online Route 2 option which incorporates a 1.8km long embankment / viaduct includes direct impacts to intertidal areas along part of the southern shoreline of Loch Carron (MCA). Likely impacts include destruction, fragmentation and disturbance to benthic and intertidal habitats; also the localised loss of saltmarsh habitat is likely to occur.

Likely impacts to the Attadale SSSI would also occur if this corridor option was selected; the extent would depend upon the design and the exact location of the viaduct.

*Habitats*

Within on line sections of the route, impacts will be associated with improvements to the existing road i.e. upgrading to a single carriageway, which is likely to involve the destruction, fragmentation and disturbance of all types of woodland including areas of broadleaf semi-natural ancient woodland, which borders the existing road. Areas of dry dwarf shrub heath, semi-improved acid grassland and species poor semi-improved grassland will also be affected.

*Non-native invasive species*

There are no obvious constraints due to the presence of invasive species within this route option but further surveys are required to confirm this.

*Protected species likely to be affected*

There will be disturbance during construction; habitat loss and fragmentation; and higher risk of road casualties due to a wider and faster road – see Table 6.9.

**Table 6.9 Online Route Option O2, predicted impacts upon protected species**

Receptor & Sensitivity	Predicted Impacts	Significance of impact
Otter - High / National Value	Direct mortality; Loss of refuge sites; Habitat fragmentation; Disturbance; Sedimentation and run-off.	Moderate
Bats - High / National Value	Direct mortality; Loss of roost sites; Foraging / commuting habitat fragmentation; Disturbance.	Moderate
Badger – Medium / Authority Value	Direct mortality; Loss of refuge sites; Foraging / commuting habitat fragmentation; Disturbance.	Minor
Pine marten – Medium / Authority Value	Direct mortality; Loss of refuge sites; Foraging / commuting habitat	Minor



	fragmentation; Disturbance.	
Red squirrel -Medium / Authority Value	Direct mortality; Loss of refuge sites; Foraging / commuting habitat fragmentation; Disturbance.	Minor
Water vole -Medium / Authority Value	Direct mortality; Loss of refuge sites; Foraging / commuting habitat fragmentation; Disturbance.	Minor
Wild cat - High / National Value	Direct mortality; Loss of refuge sites; Foraging / commuting habitat fragmentation; Disturbance.	Minor
Birds - High to Medium / National & Regional Value	Direct mortality; Loss of refuge sites; Foraging habitat fragmentation; Disturbance.	Moderate
Fish – Medium / Regional Value	Degradation of habitat; Disturbance; Sedimentation and run-off.	Moderate

6.8.6 **Online Route Option O3 - Tunnel**

**Predicted Impacts**

*Protected Sites*

Likely impacts to the Attadale SSSI would occur if this corridor option was selected; the extent would depend upon the design and the exact location of the tunnel and connecting roads.

*Habitats*

Within on-line sections of the route, impacts will be associated with improvements to the existing road i.e. upgrading to a single carriageway, which is likely to involve the destruction, fragmentation and disturbance of all types of woodland including areas of broadleaf semi-natural ancient woodland, which borders the existing road. Areas of dry dwarf shrub heath, semi-improved acid grassland and species poor semi-improved grassland will also be affected.

The off-line section incorporating the tunnel and link road will cause destruction, fragmentation and disturbance to areas of semi-natural ancient broadleaf woodland, damp calluna heath and dwarf dry heath. Degradation of aquatic habits affecting fish is also considered likely.

*Non-native invasive species*

There are no obvious constraints due to the presence of invasive species within this route option but further surveys are required to confirm this.

*Protected species likely to be affected*

There will be disturbance during construction; habitat loss and fragmentation; and higher risk of road casualties due to a wider and faster road – see Table 6.10.

**Table 6.10 Online Route Option O3, predicted impacts upon protected species**

Receptor & Sensitivity	Predicted Impacts	Significance of impact
Otter - High / National Value	Direct mortality; Loss of refuge sites; Habitat fragmentation; Disturbance; Sedimentation and run-off.	Minor
Bats - High / National Value	Direct mortality; Loss of roost sites; Foraging / commuting habitat fragmentation; Disturbance.	Moderate
Badger – Medium / Authority Value	Direct mortality; Loss of refuge sites; Foraging / commuting habitat fragmentation; Disturbance.	Moderate
Pine marten – Medium / Authority Value	Direct mortality; Loss of refuge sites; Foraging / commuting habitat fragmentation; Disturbance.	Moderate
Red squirrel -Medium / Authority Value	Direct mortality; Loss of refuge sites; Foraging / commuting habitat fragmentation; Disturbance.	Minor
Water vole -Medium / Authority Value	Direct mortality; Loss of refuge sites; Foraging / commuting habitat fragmentation; Disturbance.	Minor
Wild cat - High / National Value	Direct mortality; Loss of refuge sites; Foraging / commuting habitat fragmentation; Disturbance.	Moderate
Birds - High to Medium / National & Regional Value	Direct mortality; Loss of refuge sites; Foraging habitat fragmentation; Disturbance.	Moderate
Fish – Medium / Regional Value	Degradation of habitat; Disturbance; Sedimentation and run-off.	Moderate

**6.8.7 Online Route Option O4 – Do Minimum**

This option provides a baseline comparison for all the other options within the Online Route; the do minimum proposal does not incorporate any improvements to the existing road along the south shore of Loch Carron. As such there will be no additional impacts upon protected sites, habitats or protected species associated with this option.

6.8.8 **Online Route Option O5 - Shared Road / Rail**

**Predicted Impacts**

*Protected Sites*

Major effects relating to the Online Route Option O5 which incorporates a 1.8km shared railway line / road embankment are likely to be associated with modifications to the railway line as a means of incorporating the road carriageway; subsequently, direct impacts are considered likely to occur to intertidal areas along part of the southern shoreline of the Loch Carron (MCA). Likely impacts include destruction, fragmentation and disturbance to benthic and intertidal habitats, localised loss of saltmarsh habitat is also likely to occur.

Presently it is not clear if this option would have any impacts upon the Attadale SSSI, if this corridor option was selected.

*Habitats*

Within on line sections of the route, impacts will be associated with improvements to the existing road i.e. upgrading to a single carriageway, which is likely to involve the destruction, fragmentation and disturbance of all types of woodland including areas of broadleaf semi-natural ancient woodland, which borders the existing road. Areas of dry dwarf shrub heath, semi-improved acid grassland and species poor semi-improved grassland will also be affected.

*Non-native invasive species*

There are no obvious constraints due to the presence of invasive species within this route option but further surveys are required to confirm this.

*Protected species likely to be affected*

There will be disturbance during construction; habitat loss and fragmentation; and higher risk of road casualties due to a wider and faster road – see Table 6.11.

**Table 6.11 Online Route Option O5, predicted impacts upon protected species**

Receptor & Sensitivity	Predicted Impacts	Significance of impact
Otter - High / National Value	Direct mortality; Loss of refuge sites; Habitat fragmentation; Disturbance; Sedimentation and run-off.	Moderate
Bats - High / National Value	Direct mortality; Loss of roost sites; Foraging / commuting habitat fragmentation; Disturbance.	Moderate
Badger – Medium / Authority Value	Direct mortality; Loss of refuge sites; Foraging / commuting habitat fragmentation; Disturbance.	Minor
Pine marten – Medium / Authority Value	Direct mortality; Loss of refuge sites; Foraging / commuting habitat	Minor

	fragmentation; Disturbance.	
Red squirrel -Medium / Authority Value	Direct mortality; Loss of refuge sites; Foraging / commuting habitat fragmentation; Disturbance.	Minor
Water vole -Medium / Authority Value	Direct mortality; Loss of refuge sites; Foraging / commuting habitat fragmentation; Disturbance.	Minor
Wild cat - High / National Value	Direct mortality; Loss of refuge sites; Foraging / commuting habitat fragmentation; Disturbance.	Minor
Birds - High to Medium / National & Regional Value	Direct mortality; Loss of refuge sites; Foraging habitat fragmentation; Disturbance.	Moderate
Fish – Medium / Regional Value	Degradation of habitat; Disturbance; Sedimentation and run-off.	Moderate

6.8.9 **Online Route Option O7 - Developed Avalanche Shelter**

**Predicted Impacts**

*Protected Sites*

This option incorporates a 2km extension to the existing avalanche shelter; presently it is not clear if this option would have any impacts to Attadale SSSI, if this corridor option was selected.

*Habitats*

Within on line sections of the route, impacts will be associated with improvements to the existing road i.e. upgrading to a single carriageway, which is likely to involve the destruction, fragmentation and disturbance of all types of woodland including areas of broadleaf semi-natural ancient woodland, which borders the existing road. Areas of dry dwarf shrub heath, semi-improved acid grassland and species poor semi-improved grassland will also be affected.

*Non-native invasive species*

There are no obvious constraints due to the presence of invasive species within this route option but further surveys are required to confirm this.

*Protected species likely to be affected*

There will be disturbance during construction; habitat loss and fragmentation; and higher risk of road casualties due to a wider and faster road – see Table 6.12.

**Table 6.12 Online Route Option O7, predicted impacts upon protected species**

Receptor & Sensitivity	Predicted Impacts	Significance of impact
Otter - High / National Value	Direct mortality; Loss of refuge sites; Habitat fragmentation; Disturbance; Sedimentation and run-off.	Minor
Bats - High / National Value	Direct mortality; Loss of roost sites; Foraging / commuting habitat fragmentation; Disturbance.	Minor
Badger – Medium / Authority Value	Direct mortality; Loss of refuge sites; Foraging / commuting habitat fragmentation; Disturbance.	Minor
Pine marten – Medium / Authority Value	Direct mortality; Loss of refuge sites; Foraging / commuting habitat fragmentation; Disturbance.	Minor
Red squirrel -Medium / Authority Value	Direct mortality; Loss of refuge sites; Foraging / commuting habitat fragmentation; Disturbance.	Minor
Water vole -Medium / Authority Value	Direct mortality; Loss of refuge sites; Foraging / commuting habitat fragmentation; Disturbance.	Minor
Wild cat - High / National Value	Direct mortality; Loss of refuge sites; Foraging / commuting habitat fragmentation; Disturbance.	Minor
Birds - High to Medium / National & Regional Value	Direct mortality; Loss of refuge sites; Foraging habitat fragmentation; Disturbance.	Moderate
Fish – Medium / Regional Value	Degradation of habitat; Disturbance; Sedimentation and run-off.	Minor

6.8.10 ***Southern Route Option S4 – Glen Udalain***

**Predicted Impacts**

*Protected Sites*

This route is primarily an off-line option leaving the existing A890 trunk road south of the settlement of Braeintra heading east along Glen Udalain valley towards Glen Ling, after which the route heads north towards the River Attadale and ties in with the existing road at Attadale. The route continues on line to Strathcarron Junction with proposed improvements to the

existing carriageway which are likely to include sections of road widening and surface improvements.

The southern route option will not impact upon any statutory protected sites.

*Habitats*

Due to the off line nature of the majority of this route option, direct impacts upon habitats will be greater than any other route under consideration. Impacts associated with the construction of the off line section are likely to involve the destruction, fragmentation and disturbance of all types of woodland, particularly commercial conifer plantation but also including areas of broadleaf semi-natural ancient woodland, which occurs along the route. Areas of dry dwarf shrub heath, damp calluna heath, semi-improved acid grassland and species poor semi-improved grassland will also be affected.

Degradation of aquatic habits affecting fish is also considered likely.

*Non-native invasive species*

There are no obvious constraints due to the presence of invasive species within this route option but further surveys are required to confirm this.

*Protected species likely to be affected*

There will be disturbance during construction; habitat loss and fragmentation; and higher risk of road casualties due the presence of vehicular traffic in previously undisturbed and unaffected areas – see Table 6.13.

**Table 6.13 Southern Route Option, predicted impacts upon protected species**

Receptor & Sensitivity	Predicted Impacts	Significance of impact
Otter - High / National Value	Direct mortality; Loss of refuge sites; Habitat fragmentation; Disturbance; Sedimentation and run-off.	Moderate
Bats - High / National Value	Direct mortality; Loss of roost sites; Foraging / commuting habitat fragmentation; Disturbance.	Major
Badger – Medium / Authority Value	Direct mortality; Loss of refuge sites; Foraging / commuting habitat fragmentation; Disturbance.	Major
Pine marten – Medium / Authority Value	Direct mortality; Loss of refuge sites; Foraging / commuting habitat fragmentation; Disturbance.	Major
Red squirrel -Medium / Authority Value	Direct mortality; Loss of refuge sites; Foraging / commuting habitat fragmentation; Disturbance.	Major

Water vole -Medium / Authority Value	Direct mortality; Loss of refuge sites; Foraging / commuting habitat fragmentation; Disturbance.	Moderate
Wild cat - High / National Value	Direct mortality; Loss of refuge sites; Foraging / commuting habitat fragmentation; Disturbance.	Major
Birds - High to Medium / National & Regional Value	Direct mortality; Loss of refuge sites; Foraging habitat fragmentation; Disturbance.	Major
Fish – Medium / Regional Value	Degradation of habitat; Disturbance; Sedimentation and run-off.	Moderate

## 6.9 Summary of Predicted Impacts

The ecological receptors (sites, habitats and species) of high value which are likely to be directly or indirectly affected by the proposed development are:

- Statutory Designated Sites
- Marine Habitat including Intertidal Areas
- Semi-natural Ancient Woodland
- Peatland Habitats
- Otter, bats, badgers, pine marten and birds etc. (and their respective refuges/dwelling places).

Impacts on these receptors must be avoided or reduced wherever possible through the adoption of minimum impact options and the application of good practice mitigation techniques to avoid killing and injuring, and to minimise disturbance. Compensation must be applied for the loss or damage to habitats and the consequential destruction of dwelling/resting places of protected species, for example the loss of bat roost sites.

The major differences relating to the three principal route options are:

### 6.9.1 Northern Route Option N9 Lochcarron Bypass

#### Habitats

- Destruction, fragmentation and disturbance of designated habitats within Allt nan Carnan SSSI – **Major adverse**.
- Destruction, fragmentation and disturbance of broadleaf semi-natural ancient woodland particularly along the route of the link road north of Achmore – **Major adverse**.
- Destruction, fragmentation and disturbance of dry dwarf heath, damp calluna heath and semi-improved acid grassland - **Moderate adverse**.

*Protected Species*

- Direct mortality, loss of refuge sites, habitat fragmentation and disturbance to bats, badger, pine marten, red squirrel and birds – **Moderate adverse**.
- Narrows Crossing, direct mortality, habitat fragmentation and disturbance to benthic and intertidal communities – **Major / Moderate adverse** depending upon the design and footprint of the structure.

6.9.2 ***Northern Route Option N6 – Through Lochcarron***

- Destruction, fragmentation and disturbance of broadleaf semi-natural ancient woodland particularly along the route of the link road north of Achmore – **Major adverse**.
- Destruction, fragmentation and disturbance of dry dwarf heath, damp calluna heath and semi-improved acid grassland - **Moderate adverse**.

*Protected Species*

- Direct mortality, loss of refuge sites, habitat fragmentation and disturbance to bats, badger, pine marten, red squirrel and birds – **Moderate adverse**.
- Narrows Crossing, direct mortality, habitat fragmentation and disturbance to benthic and intertidal communities - **Major / Moderate adverse** depending upon the design and footprint of the structure.

6.9.3 ***Online Route Option O2 (Online with Railway Viaduct)***

*Habitats*

- Destruction, fragmentation and disturbance of benthic and intertidal habitats; also the localised loss of saltmarsh habitat is likely to occur along the length of the 1.8km viaduct – **Major adverse**.
- Likely impacts to the geological features of the Attadale SSSI would also occur if this corridor option was selected, though the extent is presently unclear – **Major / Moderate adverse**.
- Destruction, fragmentation and disturbance of all woodland types including small areas broadleaf semi-natural ancient woodland associated with the upgrade of the existing road – **Minor adverse**.
- Destruction, fragmentation and disturbance of dry dwarf heath, damp calluna heath and semi-improved acid grassland - **Minor adverse**.

*Protected Species*

- Direct mortality, loss of refuge sites, habitat fragmentation and disturbance to otter, bats, badger, pine marten, red squirrel and birds – **Minor adverse**, possible **Moderate adverse** for otters.
- Viaduct, direct mortality, habitat fragmentation and disturbance to benthic and intertidal communities - **Major / Moderate adverse** depending upon the design and footprint of the structure.



#### 6.9.4 **Online Route Option O3 (Online with Tunnel)**

##### *Habitats*

- Likely impacts to the geological features of the Attadale SSSI would occur if this corridor option was selected, though the extent is presently unclear – **Major / Moderate adverse**.
- The off line link road to the tunnel will cause destruction, fragmentation and disturbance to areas of broadleaf semi-natural ancient woodland – **Major adverse**.
- Destruction, fragmentation and disturbance of conifer plantation woodland, dry dwarf heath, damp calluna heath and semi-improved acid grassland - **Minor adverse**.

##### *Protected Species*

- Direct mortality, loss of refuge sites, habitat fragmentation and disturbance to bats, badger, pine marten, red squirrel and birds – **Moderate adverse**.

#### 6.9.5 **Online Route Option O4 (Do Minimum)**

- No additional impacts upon protected sites, habitats or protected species associated with this option – No change.

#### 6.9.6 **Online Route Option O5 (Online with Shared Road / Rail)**

##### *Habitats*

- Modifications to the existing railway embankment to incorporate the road carriageway are likely to result in direct impacts occurring to intertidal areas along part of the southern shoreline of the Loch Carron (MCA). Likely impacts include destruction, fragmentation and disturbance to benthic and intertidal habitats, localised loss of saltmarsh habitat is also likely to occur – **Moderate adverse**.
- Presently it is not clear if this option would have any impacts to the Attadale SSSI, if this corridor option was selected - **Likely no change**.
- Destruction, fragmentation and disturbance of conifer plantation woodland, dry dwarf heath, damp calluna heath and semi-improved acid grassland - **Minor adverse**.

##### *Protected Species*

- Direct mortality, loss of refuge sites, habitat fragmentation and disturbance to otter, and birds – **Moderate adverse**.
- Direct mortality, loss of refuge sites, habitat fragmentation and disturbance to, bats, badger, pine marten and red squirrel – **Minor adverse**.

#### 6.9.7 **Online Route Option O7 (Online with Developed Avalanche Shelter)**

##### *Habitats*

- Presently it is not clear if this option would have any impacts to the Attadale SSSI, if this corridor option was selected - **Likely minor adverse**.

- Destruction, fragmentation and disturbance of conifer plantation woodland, dry dwarf heath, damp calluna heath and semi-improved acid grassland - **Minor adverse**.

*Protected Species*

- Direct mortality, loss of refuge sites, habitat fragmentation and disturbance to otters, bats, badger, pine marten, red squirrel and birds – **Minor adverse**.

6.9.8 **Southern Route Option S4 (Glen Udalain)**

*Habitats*

- Impacts associated with the construction of the off line section are likely to involve the destruction, fragmentation and disturbance of all types of woodland, particularly commercial conifer plantation but also including areas of broadleaf semi-natural ancient woodland, which occurs along the route - **Major adverse**.
- Destruction, fragmentation and disturbance of large areas of dry dwarf shrub heath and damp calluna heath - **Major adverse**.

*Protected Species*

- Direct mortality, loss of refuge sites, habitat fragmentation and disturbance to bats, badger, wild cat, pine marten, red squirrel and birds – **Major adverse**.
- Direct mortality, loss of refuge sites, habitat fragmentation and disturbance to otters – **Moderate adverse**.

**Table 6.14 Summary of Route Corridor Options – Northern Route N6 (Lochcarron Bypass including crossing) with estimated significance**

Route Options	Receptor & Sensitivity	Predicted Impacts	Significance of impact	Significance Index (lowest score = least ecological impact)
Northern Route N6 (including crossing)			Rank (Based upon Highest Score): 2 of 7	58
Designated Sites	Rassal SSSI & SAC – Very High / International Value	None	N/A	0
	Coille Mhor SSSI & SAC – Very High / International Value	None	N/A	0
	Rassal National Nature reserve – High / UK Value	None	N/A	0
	Slumbay Island SSSI - High / UK Value	None	N/A	0
	Attadale SSSI - High / UK Value	None	N/A	0
	Allt nan Carnan SSSI - High / UK Value	Destruction; Fragmentation; Habitat fragmentation / modification	Major	5

	Carn a' Bhealaich Mhoir SSSI - High / UK Value	None	N/A	0
	Monar Forest SSSI - High / UK Value	None	N/A	0
	Loch Carron Marine Consultation Area - High / UK Value	<b>Narrows Crossing</b> Disturbance; Destruction; Habitat fragmentation / modification.	Major (could be lower depending upon the design of the structure)	5
Terrestrial Habitats	Woodland, Broadleaf Semi- natural Ancient - High / UK Value	Disturbance; Destruction; Habitat fragmentation / modification	Major	5
	Woodland, Broadleaf Long Established Plantation Origin – Medium / Authority Value	Disturbance; Destruction; Habitat fragmentation / modification.	Minor	1
	Woodland, Coniferous Plantation – Medium or Low / Local Value	Disturbance; Destruction; Habitat fragmentation / modification.	Moderate	3
	Grasslands, semi-improved Medium to Low / Local Value	Disturbance; Destruction; Habitat fragmentation / modification.	Moderate	4
	Upland Habitats – Medium to Low / Authority & Local Value	Disturbance; Destruction; Habitat fragmentation / modification.	Moderate	4
Aquatic Habitats				
	Fresh Water bodies, Lochs, Rivers and Burns – High to Medium / Authority & Local Value	Disturbance; Sedimentation and run-off.	Minor	2
	Marine Water bodies, Loch Carron including Salt Marsh – High / National Value	<b>Narrows Crossing</b> Disturbance; Destruction / modification of benthic habitats; Sedimentation and run-off.	Major (could be lower depending upon the design of the structure)	5
Protected Species	Otter - High / National Value	Direct mortality; Habitat fragmentation; Disturbance; Sedimentation and	Minor	2

		run-off.		
	Bats - High / National Value	Direct mortality; Loss of roost sites; Foraging / commuting habitat fragmentation; Disturbance.	Moderate	3
	Badger – Medium / Authority Value	Direct mortality; Loss of refuge sites; Foraging / commuting habitat fragmentation; Disturbance.	Moderate	3
	Pine marten – Medium / Authority Value	Direct mortality; Loss of refuge sites; Foraging / commuting habitat fragmentation; Disturbance.	Moderate	3
	Red squirrel -Medium / Authority Value	Direct mortality; Loss of refuge sites; Foraging / commuting habitat fragmentation; Disturbance.	Moderate	3
	Water vole -Medium / Authority Value	Direct mortality; Loss of refuge sites; Foraging / commuting habitat fragmentation; Disturbance.	Minor	1
	Wild cat - High / National Value	Direct mortality; Loss of refuge sites; Foraging / commuting habitat fragmentation; Disturbance.	Minor	2
	Birds - High to Medium / National & Regional Value	Direct mortality; Loss of refuge sites; Foraging habitat fragmentation; Disturbance.	Moderate	4
	Fish – Medium / Regional Value	Degradation of habitat; Disturbance; Sedimentation and run-off.	Moderate	3

**Table 6.15 Summary of Route Corridor Options –Northern Route N9 (Through Lochcarron including crossing) with estimated significance**

Route Options	Receptor & Sensitivity	Predicted Impacts	Significance of impact	Significance Index (lowest score = least ecological impact)
<b>Northern Route N9 (including crossing)</b>			<b>Rank (Based upon Highest Score): 3 of 7</b>	<b>49</b>
Designated Sites	Rassal SSSI & SAC – Very High / International Value	None	N/A	0
	Coille Mhor SSSI & SAC – Very High / International Value	None	N/A	0
	Rassal National Nature reserve – High / UK Value	None	N/A	0
	Slumbay Island SSSI - High / UK Value	None	N/A	0
	Attadale SSSI - High / UK Value	None	N/A	0
	Allt nan Carnan SSSI - High / UK Value	None	N/A	0
	Carn a' Bhealaich Mhoir SSSI - High / UK Value	None	N/A	0
	Monar Forest SSSI - High / UK Value	None	N/A	0
	Loch Carron Marine Consultation Area - High / UK Value	<b>Narrows Crossing</b> Disturbance; Destruction; Habitat fragmentation / modification.	Major (could be lower depending upon the design of the structure)	5
Terrestrial Habitats	Woodland, Broadleaf Semi- natural Ancient - High / UK Value	Disturbance; Destruction; Habitat fragmentation / modification	Moderate	4
	Woodland, Broadleaf Long Established Plantation Origin – Medium / Authority Value	Disturbance; Destruction; Habitat fragmentation / modification.	Minor	1
	Woodland, Coniferous Plantation – Medium or Low / Local Value	Disturbance; Destruction; Habitat fragmentation / modification.	Minor	2
	Grasslands, semi-	Disturbance;	Moderate	3

	improved Medium to Low / Local Value	Destruction; Habitat fragmentation / modification.		
	Upland Habitats – Medium to Low / Authority & Local Value	Disturbance; Destruction; Habitat fragmentation / modification.	Moderate	3
Aquatic Habitats				
	Fresh Water bodies, Lochs, Rivers and Burns – High to Medium / Authority & Local Value	Disturbance; Sedimentation and run-off.	Minor	2
	Marine Water bodies, Loch Carron including Salt Marsh – High / National Value	<b>Narrows Crossing</b> Disturbance; Destruction / modification of benthic habitats; Sedimentation and run-off.	Major (could be lower depending upon the design of the structure)	5
Protected Species	Otter - High / National Value	Direct mortality; Habitat fragmentation; Disturbance; Sedimentation and run-off.	Minor	2
	Bats - High / National Value	Direct mortality; Loss of roost sites; Foraging / commuting habitat fragmentation; Disturbance.	Moderate	3
	Badger – Medium / Authority Value	Direct mortality; Loss of refuge sites; Foraging / commuting habitat fragmentation; Disturbance.	Moderate	3
	Pine marten – Medium / Authority Value	Direct mortality; Loss of refuge sites; Foraging / commuting habitat fragmentation; Disturbance.	Moderate	3
	Red squirrel -Medium / Authority Value	Direct mortality; Loss of refuge sites; Foraging / commuting habitat fragmentation; Disturbance.	Moderate	3
	Water vole -Medium / Authority Value	Direct mortality; Loss of refuge sites; Foraging / commuting habitat fragmentation; Disturbance.	Minor	1

	Wild cat - High / National Value	Direct mortality; Loss of refuge sites; Foraging / commuting habitat fragmentation; Disturbance.	Minor	2
	Birds - High to Medium / National & Regional Value	Direct mortality; Loss of refuge sites; Foraging habitat fragmentation; Disturbance.	Moderate	4
	Fish – Medium / Regional Value	Degradation of habitat; Disturbance; Sedimentation and run-off.	Moderate	3

**Table 6.16 Summary of Route Corridor Options – Online Route O2 (with Railway Viaduct) with estimated significance**

Route Options	Receptor & Sensitivity	Predicted Impacts	Significance of impact	Significance Index (lowest score = least ecological impact)
<b>Online Route O2 (with Railway Viaduct)</b>			<b>Rank (Based upon Highest Score): 4 of 7</b>	<b>47</b>
Designated Sites	Rassal SSSI & SAC – Very High / International Value	None	N/A	0
	Coille Mhor SSSI & SAC – Very High / International Value	None	N/A	0
	Rassal National Nature reserve – High / UK Value	None	N/A	0
	Slumbay Island SSSI - High / UK Value	None	N/A	0
	Attadale SSSI - High / UK Value	Disturbance; Destruction.	Moderate (could be lower depending upon the design of the structure)	4
	Allt nan Carnan SSSI - High / UK Value	None	N/A	0
	Carn a’ Bhealach Mhoir SSSI - High / UK Value	None	N/A	0
	Monar Forest SSSI - High / UK Value	None	N/A	0
	Loch Carron Marine Consultation Area - High / UK Value	Disturbance; Destruction; Habitat fragmentation / modification.	Major (could be lower depending upon the design of the structure)	5

Terrestrial Habitats	Woodland, Broadleaf Semi- natural Ancient - High / UK Value	Disturbance; Destruction; Habitat fragmentation / modification	Minor	2
	Woodland, Broadleaf Long Established Plantation Origin – Medium / Authority Value	Disturbance; Destruction; Habitat fragmentation / modification.	Minor	1
	Woodland, Coniferous Plantation – Medium or Low / Local Value	Disturbance; Destruction; Habitat fragmentation / modification.	Minor	2
	Grasslands, semi-improved Medium to Low / Local Value	Disturbance; Destruction; Habitat fragmentation / modification.	Minor	2
	Upland Habitats – Medium to Low / Authority & Local Value	Disturbance; Destruction; Habitat fragmentation / modification.	Minor	2
Aquatic Habitats				
	Fresh Water bodies, Lochs, Rivers and Burns – High to Medium / Authority & Local Value	Disturbance; Sedimentation and run-off.	Minor	2
	Marine Water bodies, Loch Carron including Salt Marsh – High / National Value	Disturbance; Destruction / modification of benthic habitats; Sedimentation and run-off.	Major (could be lower depending upon the design of the structure)	5
Protected Species	Otter - High / National Value	Direct mortality; Habitat fragmentation; Disturbance; Sedimentation and run-off.	Moderate	4
	Bats - High / National Value	Direct mortality; Loss of roost sites; Foraging / commuting habitat fragmentation; Disturbance.	Moderate	3
	Badger – Medium / Authority Value	Direct mortality; Loss of refuge sites; Foraging / commuting habitat fragmentation; Disturbance.	Minor	2



Pine marten – Medium / Authority Value	Direct mortality; Loss of refuge sites; Foraging / commuting habitat fragmentation; Disturbance.	Minor	2
Red squirrel -Medium / Authority Value	Direct mortality; Loss of refuge sites; Foraging / commuting habitat fragmentation; Disturbance.	Minor	2
Water vole -Medium / Authority Value	Direct mortality; Loss of refuge sites; Foraging / commuting habitat fragmentation; Disturbance.	Minor	1
Wild cat - High / National Value	Direct mortality; Loss of refuge sites; Foraging / commuting habitat fragmentation; Disturbance.	Minor	2
Birds - High to Medium / National & Regional Value	Direct mortality; Loss of refuge sites; Foraging habitat fragmentation; Disturbance.	Moderate	3
Fish – Medium / Regional Value	Degradation of habitat; Disturbance; Sedimentation and run-off.	Moderate	3

**Table 6.17 Summary of Route Corridor Options – Online Route O3 (with Tunnel) with estimated significance**

Route Options	Receptor & Sensitivity	Predicted Impacts	Significance of impact	Significance Index (lowest score = least ecological impact)
<b>Online Route O3 (with Tunnel)</b>			<b>Rank (Based upon Highest Score): 5 of 7</b>	<b>42</b>
Designated Sites	Rassal SSSI & SAC – Very High / International Value	None	N/A	0
	Coille Mhor SSSI & SAC – Very High / International Value	None	N/A	0
	Rassal National Nature reserve – High / UK Value	None	N/A	0
	Slumbay Island SSSI - High / UK Value	None	N/A	0
	Attadale SSSI - High / UK Value	Disturbance; Destruction.	Moderate (could be lower depending	3

			upon the design of the Tunnel)	
	Allt nan Carnan SSSI - High / UK Value	None	N/A	0
	Carn a' Bhealaich Mhoir SSSI - High / UK Value	None	N/A	0
	Monar Forest SSSI - High / UK Value	None	N/A	0
	Loch Carron Marine Consultation Area - High / UK Value	None	N/A	0
Terrestrial Habitats	Woodland, Broadleaf Semi- natural Ancient - High / UK Value	Disturbance; Destruction; Habitat fragmentation / modification	Major (could be lower depending upon the design of the Tunnel and connecting roads)	5
	Woodland, Broadleaf Long Established Plantation Origin – Medium / Authority Value	Disturbance; Destruction; Habitat fragmentation / modification.	Minor	1
	Woodland, Coniferous Plantation – Medium or Low / Local Value	Disturbance; Destruction; Habitat fragmentation / modification.	Minor	2
	Grasslands, semi-improved Medium to Low / Local Value	Disturbance; Destruction; Habitat fragmentation / modification.	Minor	2
	Upland Habitats – Medium to Low / Authority & Local Value	Disturbance; Destruction; Habitat fragmentation / modification.	Moderate	3
Aquatic Habitats				
	Fresh Water bodies, Lochs, Rivers and Burns – High to Medium / Authority & Local Value	Disturbance; Sedimentation and run-off.	Minor	2
	Marine Water bodies, Loch Carron including Salt Marsh – High / National Value	None	N/A	0
Protected Species	Otter - High / National Value	Direct mortality; Habitat fragmentation; Disturbance;	Minor	2

		Sedimentation and run-off.		
	Bats - High / National Value	Direct mortality; Loss of roost sites; Foraging / commuting habitat fragmentation; Disturbance.	Moderate	4
	Badger – Medium / Authority Value	Direct mortality; Loss of refuge sites; Foraging / commuting habitat fragmentation; Disturbance.	Moderate	3
	Pine marten – Medium / Authority Value	Direct mortality; Loss of refuge sites; Foraging / commuting habitat fragmentation; Disturbance.	Moderate	3
	Red squirrel -Medium / Authority Value	Direct mortality; Loss of refuge sites; Foraging / commuting habitat fragmentation; Disturbance.	Minor	2
	Water vole -Medium / Authority Value	Direct mortality; Loss of refuge sites; Foraging / commuting habitat fragmentation; Disturbance.	Minor	1
	Wild cat - High / National Value	Direct mortality; Loss of refuge sites; Foraging / commuting habitat fragmentation; Disturbance.	Moderate	3
	Birds - High to Medium / National & Regional Value	Direct mortality; Loss of refuge sites; Foraging habitat fragmentation; Disturbance.	Moderate	4
	Fish – Medium / Regional Value	Degradation of habitat; Disturbance; Sedimentation and run-off.	Moderate	3

**Table 6.18 Summary of Route Corridor Options – Online Route O5 (with Shared Road / Rail) with estimated significance**

Route Options	Receptor & Sensitivity	Predicted Impacts	Significance of impact	Significance Index (lowest score = least ecological impact)
<b>Online Route O5 (with Shared Road / Rail)</b>			<b>Rank (Based upon Highest Score): 6 of 7</b>	<b>42</b>
Designated Sites	Rassal SSSI & SAC – Very High / International Value	None	N/A	0
	Coille Mhor SSSI & SAC – Very High / International Value	None	N/A	0
	Rassal National Nature reserve – High / UK Value	None	N/A	0
	Slumbay Island SSSI - High / UK Value	None	N/A	0
	Attadale SSSI - High / UK Value	Disturbance; Destruction.	Minor (could be higher depending upon the design of the shared embankment)	2
	Allt nan Carnan SSSI - High / UK Value	None	N/A	0
	Carn a' Bhealaich Mhoir SSSI - High / UK Value	None	N/A	0
	Monar Forest SSSI - High / UK Value	None	N/A	0
	Loch Carron Marine Consultation Area - High / UK Value	Disturbance; Destruction; Habitat fragmentation / modification.	Moderate (could be lower depending upon the design of the shared embankment)	4
Terrestrial Habitats	Woodland, Broadleaf Semi- natural Ancient - High / UK Value	Disturbance; Destruction; Habitat fragmentation / modification	Minor	2
	Woodland, Broadleaf Long Established Plantation Origin – Medium / Authority Value	Disturbance; Destruction; Habitat fragmentation / modification.	Minor	1
	Woodland, Coniferous Plantation – Medium or Low / Local Value	Disturbance; Destruction; Habitat fragmentation / modification.	Minor	2

	Grasslands, semi-improved Medium to Low / Local Value	Disturbance; Destruction; Habitat fragmentation / modification.	Minor	2
	Upland Habitats – Medium to Low / Authority & Local Value	Disturbance; Destruction; Habitat fragmentation / modification.	Minor	2
Aquatic Habitats				
	Fresh Water bodies, Lochs, Rivers and Burns – High to Medium / Authority & Local Value	Disturbance; Sedimentation and run-off.	Minor	2
	Marine Water bodies, Loch Carron including Salt Marsh – High / National Value	Disturbance; Destruction / modification of benthic habitats; Sedimentation and run-off.	Moderate (could be lower depending upon the design of the shared embankment)	4
Protected Species	Otter - High / National Value	Direct mortality; Habitat fragmentation; Disturbance; Sedimentation and run-off.	Moderate	3
	Bats - High / National Value	Direct mortality; Loss of roost sites; Foraging / commuting habitat fragmentation; Disturbance.	Moderate	3
	Badger – Medium / Authority Value	Direct mortality; Loss of refuge sites; Foraging / commuting habitat fragmentation; Disturbance.	Minor	2
	Pine marten – Medium / Authority Value	Direct mortality; Loss of refuge sites; Foraging / commuting habitat fragmentation; Disturbance.	Minor	2
	Red squirrel -Medium / Authority Value	Direct mortality; Loss of refuge sites; Foraging / commuting habitat fragmentation; Disturbance.	Minor	2
	Water vole -Medium / Authority Value	Direct mortality; Loss of refuge sites; Foraging / commuting habitat fragmentation;	Minor	1

		Disturbance.		
	Wild cat - High / National Value	Direct mortality; Loss of refuge sites; Foraging / commuting habitat fragmentation; Disturbance.	Minor	2
	Birds - High to Medium / National & Regional Value	Direct mortality; Loss of refuge sites; Foraging habitat fragmentation; Disturbance.	Moderate	3
	Fish – Medium / Regional Value	Degradation of habitat; Disturbance; Sedimentation and run-off.	Moderate	3

**Table 6.19 Summary of Route Corridor Options – Online Route O7 (with Developed Avalanche Shelter) with estimated significance**

Route Options	Receptor & Sensitivity	Predicted Impacts	Significance of impact	Significance Index (lowest score = least ecological impact)
<b>Online Route O7 (with Developed Avalanche Shelter)</b>			<b>Rank (Based upon Highest Score): 7 of 7</b>	<b>29</b>
Designated Sites	Rassal SSSI & SAC – Very High / International Value	None	N/A	0
	Coille Mhor SSSI & SAC – Very High / International Value	None	N/A	0
	Rassal National Nature reserve – High / UK Value	None	N/A	0
	Slumbay Island SSSI - High / UK Value	None	N/A	0
	Attadale SSSI - High / UK Value	Disturbance; Destruction.	Minor (could be higher depending upon the design of the shelter)	2
	Allt nan Carnan SSSI - High / UK Value	None	N/A	0
	Carn a' Bhealach Mhoir SSSI - High / UK Value	None	N/A	0
	Monar Forest SSSI - High / UK Value	None	N/A	0
	Loch Carron Marine Consultation Area - High / UK Value	None	N/A	0

Terrestrial Habitats	Woodland, Broadleaf Semi- natural Ancient - High / UK Value	Disturbance; Destruction; Habitat fragmentation / modification	Minor	2
	Woodland, Broadleaf Long Established Plantation Origin – Medium / Authority Value	Disturbance; Destruction; Habitat fragmentation / modification.	Minor	1
	Woodland, Coniferous Plantation – Medium or Low / Local Value	Disturbance; Destruction; Habitat fragmentation / modification.	Minor	2
	Grasslands, semi-improved Medium to Low / Local Value	Disturbance; Destruction; Habitat fragmentation / modification.	Minor	2
	Upland Habitats – Medium to Low / Authority & Local Value	Disturbance; Destruction; Habitat fragmentation / modification.	Minor	2
Aquatic Habitats				
	Fresh Water bodies, Lochs, Rivers and Burns – High to Medium / Authority & Local Value	Disturbance; Sedimentation and run-off.	Minor	2
	Marine Water bodies, Loch Carron including Salt Marsh – High / National Value	None	N/A	0
Protected Species	Otter - High / National Value	Direct mortality; Habitat fragmentation; Disturbance; Sedimentation and run-off.	Minor	1
	Bats - High / National Value	Direct mortality; Loss of roost sites; Foraging / commuting habitat fragmentation; Disturbance.	Minor	2
	Badger – Medium / Authority Value	Direct mortality; Loss of refuge sites; Foraging / commuting habitat fragmentation; Disturbance.	Minor	2
	Pine marten –	Direct mortality;	Minor	2

	Medium / Authority Value	Loss of refuge sites; Foraging / commuting habitat fragmentation; Disturbance.		
	Red squirrel -Medium / Authority Value	Direct mortality; Loss of refuge sites; Foraging / commuting habitat fragmentation; Disturbance.	Minor	2
	Water vole -Medium / Authority Value	Direct mortality; Loss of refuge sites; Foraging / commuting habitat fragmentation; Disturbance.	Minor	1
	Wild cat - High / National Value	Direct mortality; Loss of refuge sites; Foraging / commuting habitat fragmentation; Disturbance.	Minor	2
	Birds - High to Medium / National & Regional Value	Direct mortality; Loss of refuge sites; Foraging habitat fragmentation; Disturbance.	Moderate	3
	Fish – Medium / Regional Value	Degradation of habitat; Disturbance; Sedimentation and run-off.	Minor	1

**Table 6.20 Summary of Route Corridor Options – Southern Route S4 with estimated significance**

Route Options	Receptor & Sensitivity	Predicted Impacts	Significance of impact	Significance Index (lowest score = least ecological impact)
<b>Southern Route S4</b>			<b>Rank (Based upon Highest Score): 1 of 7</b>	<b>62</b>
Designated Sites	Rassal SSSI & SAC – Very High / International Value	None	N/A	0
	Coille Mhor SSSI & SAC – Very High / International Value	None	N/A	0
	Rassal National Nature reserve – High / UK Value	None	N/A	0
	Slumbay Island SSSI - High / UK Value	None	N/A	0
	Attadale SSSI - High / UK Value	None	N/A	0
	Allt nan Carman SSSI	None	N/A	0



	- High / UK Value			
	Carn a' Bhealaich Mhoir SSSI - High / UK Value	None	N/A	0
	Monar Forest SSSI - High / UK Value	None	N/A	0
	Loch Carron Marine Consultation Area - High / UK Value	None	N/A	0
Terrestrial Habitats	Woodland, Broadleaf Semi- natural Ancient - High / UK Value	Disturbance; Destruction; Habitat fragmentation / modification	Major	5
	Woodland, Broadleaf Long Established Plantation Origin – Medium / Authority Value	Disturbance; Destruction; Habitat fragmentation / modification.	Minor	1
	Woodland, Coniferous Plantation – Medium or Low / Local Value	Disturbance; Destruction; Habitat fragmentation / modification.	Major	5
	Grasslands, semi-improved Medium to Low / Local Value	Disturbance; Destruction; Habitat fragmentation / modification.	Minor	2
	Upland Habitats – Medium to Low / Authority & Local Value	Disturbance; Destruction; Habitat fragmentation / modification.	Major	5
Aquatic Habitats				
	Fresh Water bodies, Lochs, Rivers and Burns – High to Medium / Authority & Local Value	Disturbance; Sedimentation and run-off.	Moderate	4
	Marine Water bodies, Loch Carron including Salt Marsh – High / National Value	None	N/A	0
Protected Species	Otter - High / National Value	Direct mortality; Habitat fragmentation; Disturbance; Sedimentation and run-off.	Moderate	3
	Bats - High / National	Direct mortality;	Major	5

	Value	Loss of roost sites; Foraging / commuting habitat fragmentation; Disturbance.		
	Badger – Medium / Authority Value	Direct mortality; Loss of refuge sites; Foraging / commuting habitat fragmentation; Disturbance.	Major	5
	Pine marten – Medium / Authority Value	Direct mortality; Loss of refuge sites; Foraging / commuting habitat fragmentation; Disturbance.	Major	5
	Red squirrel -Medium / Authority Value	Direct mortality; Loss of refuge sites; Foraging / commuting habitat fragmentation; Disturbance.	Major	5
	Water vole -Medium / Authority Value	Direct mortality; Loss of refuge sites; Foraging / commuting habitat fragmentation; Disturbance.	Moderate	3
	Wild cat - High / National Value	Direct mortality; Loss of refuge sites; Foraging / commuting habitat fragmentation; Disturbance.	Major	5
	Birds - High to Medium / National & Regional Value	Direct mortality; Loss of refuge sites; Foraging habitat fragmentation; Disturbance.	Major	6
	Fish – Medium / Regional Value	Degradation of habitat; Disturbance; Sedimentation and run-off.	Moderate	3

*NOTE: ‘Significance Index’ is a qualitative and indicative comparison of the level of overall impact of each option, from the simple allocation of 1, 2 or 3 etc. to each option (Minor equates to 1-2, Moderate equates to 3-4 and Major equates to 5-6), which allows the option scores to be summed for each route. ‘Lowest impact’ overall may still entail major impacts, e.g. on some protected species which require further assessment. There is not a linear relationship between the scores (e.g. an option, which scores 12, is not necessarily ‘twice as bad’ as an option, which scores 6).*

### 6.10 Predicted Operational impacts common to all options

Operational effects are considered likely to apply to all route corridors, though the magnitude of the impact upon receptors is likely to be greater within off-line corridors and those which span or run in close proximity to water bodies.

Likely effects associated with the operation of the road scheme are considered to be:

- Water quality impacts due to contaminated surface water run-off, especially in sections of the route occurring within close proximity to watercourses / water bodies;
- Increased risk of road mortality to protected species including otter, bats and birds etc. where habitats have become fragmented and possibly due to increased road speeds; and
- Disturbance to protected species not habituated to vehicle traffic, enhanced noise levels and increased human presence; particularly within areas where off-line sections are constructed.

## 6.11 Potential Mitigation Measures

### *Principles of Mitigation*

The principles of mitigation in order of priority are as follows:

- Avoid any negative impact upon target habitat or species;
- Minimise impacts by input into the scheme design.

If this is not possible, then:

- Minimise the scale and magnitude of the impact; and then
- Compensate for the impact through provision of alternatives.

Subsequently, the objective of potential mitigating measures is to identify anticipated 'standard' or 'generic' measures taking into account best practice, legislation and guidance, which are deemed appropriate to the scheme.

Site-specific measures would be developed as the design for the proposed road scheme advanced and incorporated into the Project Environmental Management Plan, details of which are likely to incorporate the following measures.

### *Habitat Creation and Restoration*

Likely mitigation for habitats lost to the scheme may include habitat recreation i.e. grassland or woodland creation using appropriately sourced local native species. Alternatively, if such measures were constrained due to land availability, compensation areas could be established off-site as means of facilitating habitat creation and management.

Habitat creation / restoration should aim to replicate over an appropriate period of time the key habitats lost or affected by the scheme. However, the extended time for compensatory tree planting to mature has to also be taken into consideration when dealing with the loss of woodland habitat; additionally, it is recognised that the loss of broadleaf semi-natural ancient woodland cannot be mitigated against within the time frame associated with ecological impact assessments, given the high conservation interest associated with the maturity of such habitats. Subsequently, the avoidance of direct impacts to ancient woodland sites should be of primary consideration during assessment stage.

### *Protected Species*

Effects on species during construction can be mitigated through the provision of appropriate protection systems and/or exclusion zones. Mammal-proof fencing can be provided to mitigate for direct mortality of badger and otter. Exclusion zones around habitats and features such as resting places would minimise the impact on protected species and their habitats, and reduce disturbance. Limits on night-time working or the provision of directional lighting would also reduce disturbance to protected species such as badgers, bats and otter.

Artificial refuges can be provided as a means of partially mitigating against the loss of natural sites such as otter holts, badger setts and bat roosts etc. Screening via appropriate planting can also be used to further facilitate the prospect for additional refuges and foraging habitat for other species such as birds.

Appropriate planting can also help reduce the impacts upon species associated with the fragmentation of commuting routes and foraging habitat, this type of mitigation can be particularly effective with bats. Strategically sited mammal underpasses are an additional form of mitigation used to combat habitat fragmentation caused by roads, combined with mammal fencing they can be effective with species such as badgers, otters and other mammal species.

The restrictive use of artificial lighting in sensitive areas, combined with constraints on night time working are considered to be effective means of reducing disturbance to protected species. Also the programming of potentially damaging site activities to avoid sensitive periods is also considered to be not only an effective means of reducing disturbance but also avoiding direct mortality i.e. undertaking tree / scrub clearance out with the breeding bird season.

Erecting exclusion zones around protected habitats and other conservation interests clearly demarcates such features, whilst preventing accidental damage and disturbance occurring.

### *Control of Pollution*

Pollution incidents affecting all receptors during construction can be mitigated through the development of a project specific pollution prevention plan, part of an overall project environmental management plan. Such a plan will research and develop prescriptions which will as a minimum demonstrate compliance with best practice measures and guidance, such as the SEPA Pollution Prevention Guidelines (PPGs), including appropriate fuel, chemical and bulk material storage. Pollution impacts during operation (i.e. hydro-carbon road run-off) can be mitigated through the provision of suds ponds as part of a sustainable drainage system (SUDS).

## **6.12 Stage 2 Summary Assessment**

Analysis of the Stage 2 assessment study indicates that the Online Route 7 (Developed Avalanche Shelter) option would have the lowest impact upon the identified nature conservation features described within this chapter, although the exact impact upon the geological designated features of the Attadale SSSI is still unclear.

Overall the Online Route appears to have one of the lowest affects upon terrestrial habitats; although Route Option O3 the tunnel is likely to directly impact upon a significant area of Broadleaf Semi-natural Ancient Woodland. Other major affects relate to the likely impacts to Loch Carron MCA, if the railway viaduct Route Option O2 was selected; likely impacts include destruction, fragmentation and disturbance to benthic and intertidal habitats.

In addition to crossing Loch Carron at the narrows, the North Shore Route N6 will result in the loss and fragmentation of broadleaf semi-natural ancient woodland and peatland habitats, including part of the Allt nan Carnan SSSI. The loss of the woodland habitat is also likely to

have a negative effect on a number of protected species. Although the alternative North Shore Route N9 would not impact upon the SSSI, the other impacts associated with the main route would remain.

The Southern Route S4 would have the greatest impacts upon terrestrial habitats including peatland, conifer plantation, scrub and broadleaf semi-natural ancient woodland (Attadale) etc. given the largely offline nature of the route option. The loss, fragmentation and disturbance of such habitats is also likely to have a negative effect on a number of protected species, including schedule 1 / annex 1 bird species, i.e. black / red-throated divers and golden eagle.

Table 6.21 below shows a summary of the preferred options.

**Table 6.21 Environmental Impacts Table – Ecology and Nature Conservation**

Corridor Option	Preferred Option	Intermediate Options	Least Preferred Options
North Shore Route N6 (Lochcarron Bypass)			✓
North Shore Route N9 (Through Lochcarron)			✓
Online Route O2 (Railway Viaduct)			✓
Online Route O3 (Tunnel)		✓	
Online Route O5 (Shared Road / Rail)		✓	
Online Route O7 (Developed Avalanche Shelter)	✓		
Southern Route S4			✓

6.12.1 **Further Consultations and Investigations**

In the event that a DMRB Stage 3 assessment is progressed following this Stage 2 study, the following recommendations should be implemented.

The Phase 1 Habitat survey has identified a number of areas where additional and more in-depth surveys are required, the surveys should take the form of a National Vegetation Classification (NVC) survey, which will enable a better understanding of the potential impacts (direct & indirect) certain elements of the proposed routes, would have upon habitats of a high conservation interest, such as Semi-natural Ancient Woodland and Wetland habitats etc.

In-addition to the NVC surveys, a biotope survey of the Stromeferry Narrows and southern foreshore of Loch Carron will be required for Stage 3 part of the assessment.

No specific protected species surveys were undertaken during the Stage 2 part of the assessment, such surveys will be required to inform the Stage 3 assessment, based upon evidence collated during the consultation process and the Phase 1 Habitat walkover survey.

Additionally should the route options which impact upon designated sites be progressed to Stage 3, it is recommended that consultations with SNH are undertaken as a means of determining the likely extent of such impacts.

## 7 CULTURAL HERITAGE

### 7.1 Introduction

This section of the Stage 2 report identifies and assesses the impacts upon the heritage resource from the remaining options considered for the Stromeferry Bypass. The heritage resource consists of archaeology, historic buildings and historic landscape and covers both designated and non-designated heritage assets.

#### 7.1.1 *Purpose and scope of the assessment*

This assessment continues the work begun in the Stage 1 report where 16 route options were initially considered. Following an analysis of Stage 1 reports, the number of route options was reduced to three main corridors, the northern, online and southern. Within the northern corridor, the route options were reduced to two options, one running mainly online through Lochcarron and another running offline to the north of Lochcarron. The online corridor contains five options, including a “do nothing” option with minimal variation between each option. There are local improvements on each option between Frenchman’s Burn to Cuddies Burn. The southern corridor contains one main option, running through the Glen Udalain valley, then heading towards the Allt Loch Innis Nan Seangan valley before returning online to the existing A890 at the River Attadale bridge, with various minor offline sections before returning online north of Strathcarron.

The purpose of the Stage 2 Options Appraisal simple assessment (DMRB Volume 11.3.2 Cultural Heritage, 2007) is to:

- Address critical unknown aspects in order to reach an appropriate understanding of the effects of the proposed routes;
- To establish the value of the affected asset;
- To establish the impact of the routes, and
- To establish the need for mitigation.

The assessment will identify and discuss the heritage assets within these route corridors. Following this, the importance of the heritage asset will be established and the magnitude of the impact resulting from the proposed route corridors will be assessed. This will firstly be reported without mitigation.

Following this, mitigation measures will be proposed and the resulting significance of effect determined.

#### 7.1.2 *Study Area*

For designated assets such as Scheduled Monuments, Listed Buildings, gardens and battlefields recorded on the Historic Scotland Inventory and conservation areas, a 1km buffer zone was placed around the centre line of all the proposed routes. This is to identify not only those assets which may experience a physical impact from the proposals, but also to identify those assets which may experience an impact upon their setting. This data was obtained from the Highland Historic Environment Record and the Historic Scotland GIS database. All designated heritage assets are mapped on Figure 7.1 and referenced in the text in bold.

For non-designated assets including archaeological sites and findspots, locally significant buildings and locally significant historic landscapes, a search buffer of 250m from the route

centre line was used. This allows the assessment of a wider corridor and allows for any minor shift in route alignment. The data was obtained from the Highland Historic Environment Record (HHER) and referenced in the text in bold. The data is displayed on Figures 7.3.1 – 7.3.4.

### 7.1.3 **Legislation & Policy**

The following legislation and policy has been referred to as part of this assessment:

- The Historic Environment (Amendment) (Scotland) Act 2011;
- The Planning (Listed Buildings and Conservation Areas) (Scotland) Act 1997;
- National Planning Framework 2 (NPF2);
- Scottish Planning Policy (SPP) (2010);
- Planning Advice Note 2/2011 – Planning and Archaeology (2011);
- The Scottish Historic Environment Policy (Historic Scotland, 2010).

In addition to the above a number of Policies within the Highland Wide Local Development Plan (2012), the Wester Ross Local Plan (2006) and the West Highland & Islands Local Plan (2010) have also been considered as part of the assessment.

## 7.2 **Methodology**

Each of the route options is assessed against criteria set out in the Design Manual for Roads and Bridges, Volume 5 Section 1 Part 2 TD 37/93 (DMRB, Highways Agency et al) and Volume 11 Section 3 Part 2 HA 208/07 Annexes 5, 6, 7 (Highways Agency et al 2007) and the Scottish Transport Appraisal Guidance 2013 (STAG). Both of these guidance documents outline the requirements of a Stage 2 appraisal with regards to assessing the impacts upon the heritage resource. The importance of the heritage assets, the magnitude of the impact and the resultant effect will be stated within the report using the terminology set out in the guidance stated above.

All works have been undertaken in accordance with the Institute for Archaeologists Code of Conduct (IfA 2013/4) and the Managing Change in the Historic Environment: Setting document issued by Historic Scotland (Historic Scotland 2010).

The assessment methodology follows guidance set out in DMRB, Volume 11, Section 3, Part 2, Cultural Heritage (Highways Agency 2007). Application of appropriate mitigation measures follows guidance set out in DMRB Volume 10, Section 6, (Highways Agency 2001). Assessment of residual effects is undertaken in two stages. The magnitude of impact is first assessed without reference to the value of the feature. The findings of this assessment are then cross-referenced with the value rating of the feature (see Section 7.2.1 below) to establish the significance of residual effect that is likely to result from the option firstly prior to mitigation measures being imposed, then again taking into account the mitigation proposals. Both stages are calculated by the use of a matrix (Table 7.1) that balances the importance of a feature against the magnitude of impact.

**Table 7.1: Significance of Impact**

		<i>Sensitivity of Receptor</i>				
		<i>Very High</i>	<i>High</i>	<i>Medium</i>	<i>Low</i>	<i>Negligible</i>
<i>Magnitude of Impact</i>	<i>Major</i>	Very Large	Large or Very Large	Moderate or Large	Slight or Moderate	Slight
	<i>Moderate</i>	Large or Very Large	Moderate or Large	Moderate	Slight	Neutral or Slight
	<i>Minor</i>	Moderate or Large	Slight or Moderate	Slight	Neutral or Slight	Neutral or Slight
	<i>Negligible</i>	Slight	Slight	Neutral or Slight	Neutral or Slight	Neutral
	<i>No Change</i>	Neutral	Neutral	Neutral	Neutral	Neutral

**7.2.1 Assessing Value**

The value of a structure, area, site or landscape reflects its significance as a historic asset and, therefore, its sensitivity to change. For the purposes of this report, value has been assessed in accordance with DMRB Volume 11, Section 3, Part 2, Cultural Heritage (Highways Agency 2007). Designations and other criteria currently vary depending on the nature of the asset and therefore the evaluation of archaeological remains, historic buildings and the historic landscape is undertaken by reference to different sets of criteria as outlined in Tables 7.1 to 7.3. The purpose of the evaluation is to allow an objective assessment of the significance of an effect on that heritage asset in accordance with Table 7.1.

Historic Scotland has outlined a number of values which contribute to an asset’s value, including evidential, historical, aesthetic and communal value. Non-designated assets may exhibit equivalent values to those which have been granted statutory protection and have been assessed accordingly.

**Table 7.2: Guide for Assessing the Value of Heritage Assets**

<b>Importance</b>	<b>Description</b>
Very High	World Heritage Sites Assets of acknowledged international importance Assets that can contribute significantly to acknowledged international research objectives Buildings of recognised international importance Historic landscapes of international value, whether designated or not Extremely well preserved historic landscapes with exceptional coherence, time-depth or other critical factor(s)
High	Scheduled Monuments Non designated assets of schedulable quality and importance Assets that can contribute significantly to acknowledged national research objectives Grade A Listed Buildings Other Listed Buildings that can be shown to have exceptional qualities in their fabric or historical association not adequately reflected in their listing grade Conservation Areas containing very important buildings



	<p>Non designated structures of clear national importance          Designated historic landscapes if outstanding interest          Well preserved historic landscapes, exhibiting considerable coherence, time-depth or other critical factor(s)</p>
Medium	<p>Designated or non-designated assets that contribute to regional research objectives          Grade B Listed Buildings          Historic (unlisted) buildings that can be shown to have exceptional qualities in their fabric or historic association          Conservation Areas containing important buildings          Historic Townscape or built-up areas with historic integrity in their buildings, or built settings (e.g. including street furniture and other structures)          Designated special historic landscapes          Non-designated that would justify special historic landscape designation, landscapes of regional value          Averagely well-preserved historic landscapes with reasonable coherence, time-depth or other critical factor(s).</p>
Low	<p>Non designated assets of local importance          Assets compromised by poor preservation and/or poor survival of contextual associations          Assets of limited value, but with potential to contribute to local research objectives          Grade C(s) Listed buildings          Historic (unlisted) buildings of modest quality in their fabric or historical association          Historic Townscape or built-up areas of limited historic integrity in their buildings, or built settings (e.g. including street furniture and other structures)          Robust non-designated historic landscapes          Historic landscapes with importance to local interest groups          Historic landscapes whose value is limited by poor preservation and/or poor survival of contextual associations</p>
Negligible	<p>Assets with very little or no surviving archaeological interest          Buildings of no architectural or historical note; buildings of an intrusive character          Landscapes with little or no significant historical interest</p>
Unknown	<p>The importance of this resource cannot be ascertained          Buildings with some hidden (i.e. inaccessible) potential for historic significance</p>

7.2.2 **Levels of Impacts**

Impacts of the route option upon cultural heritage assets can be positive or negative; direct or indirect; long term or temporary and/or cumulative. They may arise from the construction and/or the operation of the works.

Positive impacts may arise from the cessation of erosion, intrusion or damage that would continue if the route were not built. Negative impacts can arise from new effects, or an increase in the rate of existing deterioration over what would otherwise be the case.

Direct impacts are those that arise as straightforward consequences of the route option. For archaeological remains and historic structures, this can mean physical damage to, or physical improvement of, the fabric of the asset, but it can also mean impacts on the setting of cultural heritage assets. For instance an increase in noise and pollution as a result of the route option would constitute a direct impact.

An indirect impact is an impact arising from the option via a complex route, where the connection between the option and the impact is complicated, unpredictable or remote.

Long-term impacts can be related to either the construction or the operation of the Route. Long-term construction impacts include topsoil stripping, geotechnical investigations, hedgerow removal, excavations for borrow pits, drainage and communications, the movement and installation of heavy machinery and plant, and mitigation works in connection with other environmental topics. Long-term operational impacts are those that would arise from the use of the road once built, for example new lighting, noise, dust, vibration, and visual intrusion by traffic or planting.

Temporary impacts are mainly related to the construction of the Route. These include noise, dust, visual intrusion and disruption of access during construction, all of which may cease with the completion of the road. Temporary impacts arising from the operation of the Route may be the result of noise caused by traffic diverted during predictable maintenance or other traffic management operations.

Setting is a material consideration in Scottish planning and guidance relating to archaeological remains, historic buildings and designed landscapes and should be assessed as part of the EIA process. Historic Scotland has published specific guidance relating to the setting of heritage assets (Historic Scotland 2010). The guidance note does give a broad description of how Historic Scotland views setting. It states *'setting should be thought of as the way in which the surroundings of a historic assets or place contribute to how it is experienced, understood and appreciated.'* In managing change within the historic environment, the Scottish Historic Environment Policy (SHEP) emphasises the need to maintain an appropriate setting for a heritage asset.

Cumulative impacts can arise from the multiple effects of the same route on a single asset, different multiple effects of the route and other sources on the same asset, or incremental effects arising from a number of small actions over time. Interactions may arise from activities related to other topics, such as drainage schemes, endangered species relocation, sound attenuation measures or access arrangements, taken together with any cultural heritage impacts.

**Table 7.3: Guidance factors in assessing the magnitude of impacts on heritage assets**

Impact	
Change to most or all key heritage (archaeology, buildings) elements, such that the resource is totally altered Comprehensive changes to setting Change to most or all key historic landscape elements, parcels or components; extreme visual effects; gross change of noise or change to sound quality; fundamental changes to use or access; resulting in total change to historic landscape character unit.	Major
Changes to many key heritage elements, such that the resource is clearly modified Considerable changes to setting that affect the character of the asset Changes to many key historic landscape elements, parcels or components, visual change to many key aspects of the historic landscape, noticeable differences in noise or sound quality, considerable changes to use or access; resulting in moderate changes to historic landscape character.	Moderate
Changes to key heritage elements, such that the asset is slightly altered Slight changes to setting Changes to few key historic landscape elements, parcels or components, slight visual changes to few aspects of historic landscape, limited changes to noise levels or sound quality; slight changes to use or access: resulting in limited changes to historic landscape character.	Minor

Very minor changes to elements or setting. Very minor changes to key historic landscape elements, parcels or components, virtually unchanged visual effects, very slight changes in noise levels or sound quality; very slight changes to use or access; resulting in a very small change to historic landscape character.	Negligible
No change No change to elements, parcels or components, no visual or audible changes; no changes arising from in amenity or community factors	No change

### 7.3 Consultations

Consultation has been undertaken with various statutory consultees during the preparation of this report. The consultees and their responses are as follows:

- Historic Scotland – Responded on 6th November 2013. Only had comments to make upon the North Shore routes options. In particular they noted the potential bridge crossing for the Strome Narrows as likely to impact upon the setting of the Scheduled Monument of Strome Castle. They also noted that particular care should be taken with regard to any proposals to widen the carriageway of the A896. The scheduled area of the Lochcarron Old Parish Church needs to be avoided within the North Shore proposals.
- National Trust for Scotland – Responded at Stage 1 and noted that it owns the Strome Castle Scheduled Monument. Also highlighted that the presence of residential properties and difficult terrain may prove challenging.

### 7.4 Baseline

#### 7.4.1 Designated Assets

There are two Scheduled Monuments located within the 1km search area of all of the routes.

The Scheduled Monument of Strome Castle (**8481**) is located on a promontory overlooking Loch Carron and guarding the narrowest point of the loch, and the sea entrance. The castle currently consists of a tower and remnants of a large hall and still has commanding views westwards towards the Isle of Skye.

The castle was first recorded in 1472 as a stronghold of the Lords of the Isle, the Earls of Ross. Celestine, Earl of Ross gifted the castle to Allen Cameron of Lochiel, confirmed by a charter of 1495 from King James V. This charter did not stand for long as in the reign of James VI, the charter was revoked as part of James' assertion of authority over the Highland chiefs and instead granted Strome Castle to the MacDonalDs of Glengarry. The dominant position of this stronghold meant that it became the source of dispute between the MacDonalDs in Lochcarron and Lochalsh and their neighbours, the MacKenzieS in Kintail. As a result of this dispute, the castle was attacked many times throughout the 16<sup>th</sup> century and the castle appears to have changed ownership a number of times. Eventually, the rivalry between the two clans came to a head in 1602 when Kenneth MacKenzie, Lord of Kintail laid siege to the castle. The exact course of events is not clear but it was reported by contemporary chroniclers that the stash of gunpowder held in the castle was accidentally ruined by a servant who spilled water on it. News of this reached Kenneth MacKenzie who had been due to abandon the siege. On hearing this, he redoubled the siege, compelling the MacDonalDs within to surrender. Following this, the MacKenzieS blew up the castle and it was never rebuilt. The explosion caused several large parts of the main tower to collapse and there are large chunks of masonry some distance from the castle giving an impression of the

force of the explosion. The hall was also destroyed and the damage caused was so extensive that the castle was never occupied again.

Archaeological excavations have taken place within and around the castle ruins in 1994. These have found evidence of several phases of development within the hall section and the structural remains of a tower have been uncovered at the eastern end. In addition to phasing evidence for the construction of the castle, a flint flake and fragments of vitrified rock were received from a trench located in the main hall. No further evidence has been recovered for older, possibly prehistoric structures on this promontory, though its defensive position would have made this an attractive location. The wealth of evidence recovered from this excavation indicates the potential for the recovery of further archaeological material.

The key characteristics of this monument are defined by its position as the ruins of a late medieval castle. It has historical value in the social history of the area and as the focus of tensions between the MacDonald and Mackenzie clans and excavation has shown it has the potential to contribute to the understanding of late medieval life, castle construction and how defensive structures of this period were designed. The setting of the castle is the loch and the Strome Narrows the castle overlooks as well as the southern shore. Positioned as it is, overlooking the narrowest available crossing point of the loch, the castle occupies a strongly defensive position, with views towards the sea to identify approaching raiders and views across to the south identifying approaching attackers coming from the hills and forest. There are also views available up the loch to the north, which would allow early warning of any attack from this direction. The setting of the castle contributes to the understanding of the monument. Views from the southern shore towards the castle are also important. As a defensive site, the views afforded from and towards the castle are of particular significance and contribute towards the setting and understanding of the monument forming part of the key characteristics.

Lochcarron Old Parish Church (**8867**) is located 160m to the south of Lochcarron Parish Church adjacent to the current A896. The monument consists of the remains of Lochcarron Old Church and burial ground. The church was built in 1751 and abandoned in 1845 after the current parish church was constructed in 1834-6 in a location to the northeast of the old building. The church was known as the 'Great Church of Lochcarron' and was said to occupy the site of the medieval church of St. Maolrubha. St. Maolrubha was born in Ireland in 642 and was descended from the King of Ireland. He travelled to Scotland in the 670s with a retinue of monks to preach and travelled mainly in Argyll, founding around half a dozen churches finally settling at Abercrossan building a church and monastery. He was martyred by Danish vikings in 722 on a missionary voyage to Farr. The church of St. Maolrubha was granted to the Canons of Ross in the 13<sup>th</sup> century along with a number of other churches in the Argyll area and the chapel was still extant in the 16<sup>th</sup> century when Timothy Pont recorded the site as "*Clachean Mulray, with kirk and toun*". It is assumed that the toun that Pont refers to here is Kirkton. The parish was erected by the Court of Teinds in 1726 with the name changed to Lochcarron in 1775, by which time, the later or replacement church for Lochcarron had been constructed.

The church constructed in 1751 is now in ruins. All that remains is the southeast wall and gables. From this, it can be ascertained that the structure was rubble built with large, rectangular windows. The setting of this monument is closely linked to the current church which replaced it in 1834-36 which lies to the northeast. The setting also encompasses the village of Kirkton and Loch Carron itself. Most medieval churches were orientated east-west. This church is aligned southwest-northeast. With the position of the church at the head of the loch, this alignment would allow a much greater view down the loch, towards the Strome Narrows and therefore the church was deliberately placed here on an orientation that would enhance views. Therefore unimpeded views of the loch contribute to the significance of this asset. The key characteristics of this asset are the ability to provide information on the

archaeology of early modern church buildings with medieval origins and the information it can provide on the evolution of church architecture. It can also provide historical information on the spread of the mission of St. Maolrubha during the early medieval period. It also has the ability to contribute to the understanding of medieval and early modern ecclesiastical practises and the material culture. It should be noted that any physical work which is required within the boundary of the Scheduled Monument as mapped by Historic Scotland will require Scheduled Monument Consent prior to any work commencing.

#### 7.4.2 *Non-designated Assets*

There are approximately 100 non-designated assets located within the search buffers of the various route options. These assets were identified from the Highland Historic Environment Record (HHER).

##### **Prehistoric & Iron Age (10,000BC – AD500)**

A number of assets have been located within the search area which provides evidence for prehistoric settlement activity. Extensive research undertaken by the Scotland's First Settlers Project undertaken in 2007 principally by Caroline Wickham-Jones and Karen Hardy has revealed Mesolithic and later activity all along the west coast and on the coast of the Isles in this region. The survey was also undertaken along the shore of three inland sea lochs including Loch Carron. The project found that these shorelines were not so intensively occupied during the prehistoric period when compared with the coastline, but prehistoric activity did occur here.

The evidence from the search areas includes a findspot of a copper alloy axe head (**MHG29497**), a cairn located to the north of Slumbay Harbour (**MHG32724**) and a cist grave located above Smuggler's Bay (**MHG14046**) to the west of Stromemore. A scatter of lithic material (**MHG39296**) containing quartz flakes was found to the south of Achintee on the eastern shore of the loch in an area of raised beach. A raised beach is an indicator of the former level of the coastline and evidence of sea level changes, tsunami incidents and evidence of changes resulting from the Ice Age. As the sea level drops, old wave cut platforms are exposed when the sea retreats and the area left exposed becomes a raised beach. These areas have archaeological potential as they were often used as lithic working sites.

A number of hut circles dating from the Bronze Age have been identified located to the north of Lochcarron set into the slopes of the hills to the north (**MHG14042**, **MHG7656**, **MHG7646/MHG41305**). These hut circles include an entry for a grouping of six hut circles around Black Mare's Rock which may have been mis-interpreted and could possibly be early modern shieling huts. The hut circles are around 7.7m in diameter and are evidence of settlement occupation. The area above Lochcarron would be ideal for settlement, with the shelter from the mountains to the north and the easy access to the sea and the natural resources within. Further evidence of later occupation comes in the form of a possible dun dating from the Iron Age (**MHG7944**) located to the north of Lochcarron. A dun is a circular building or enclosure with a thick outer wall. This asset has also been described as a broch, which is similar in plan, but was a defended house with hollow walls which contained guard cells. Brochs are found in north and west Scotland with the nearest example being at Applecross to the northwest. Without detailed excavation, it is impossible to provide a secure definition, however it should be noted that analysis of aerial photographs did not reveal any trace of this feature.

The potential for prehistoric archaeology within the search area is medium. Particular care should be taken around the loch shoreline as there is the potential for more areas of raised beach to be uncovered.

### Early Medieval (AD500-1100)

Two non-designated heritage assets have been identified from within the search area from the early medieval period. A possible boat burial (**MHG7667**) has been identified on the northern shore of the loch, to the southwest of Lochcarron. A setting of stones orientated east to west and laid roughly parallel, each line being 6m long and set 1.5m apart was observed with a traverse stone blocking each end. This layout of stones is similar to alleged Viking graves found on the Isle of Canna. Given the ease of access to the northern shore of the loch provided by the harbour at Slumbay, it is highly likely that this area was continually used by travellers when accessing the western coast. No evidence of settlement has been recovered from this period however.

The other early medieval asset is the possible location of the chapel of St. Maolrubha (**MHG52555**) linked with the Scheduled Monument discussed above. It is not been conclusively proven that an early chapel or cell dedicated to St. Maolrubha was even established within the Lochcarron area, but local tradition states that an early medieval cell was established here. Various locations have been suggested, including below the site of the later church which is now in ruins, but scheduled. Other locations include near to Eas An Temapuill (waterfall of the church) or a nearby burn called Allt an-t-Sagairt (burn of the priest).

The existence of a possible chapel in the area in the early medieval period indicates that there was settlement activity nearby. As mentioned above, the shoreline location and ease of access to the sea, particularly near the natural harbours indicates that these places would have been attractive for settlement. The potential for early medieval archaeology is therefore low to medium.

### Medieval (1100 – 1540)

The medieval period is characterised in the archaeological record of this area by a number of smallcrofting settlements located along the loch edge, along with a number of trackways. The trackways have only been identified on the northern shoreline of the loch. There are settlements located on the southern shore, but given the topography of this area, it is possible these roads were very ephemeral, being removed by rockslides and loch inundations.

A trackway has been identified running from the settlement at Ribhuachan to the Coulags township (**MHG51300**). This track keeps to the higher ground formed by a raised beach and runs to the northwest of the A890. This trackway would have been in regular use until the clearances of the 1790s which removed the settlement at Ribhuachan, thus removing the need for the track.

A trackway from Glen Carron to New Kelso (**MHG51299**) was the main route between these two areas until the construction of the main Parliamentary road in 1819 which became the A890.

Another trackway between Kishorn to Kirkton (**MHG45874**) was probably used as a corpse road or drove road as it goes to the graveyard at Kirkton and was extended at some point (**MHG51355**) to lead from the burial ground to the cattle market. The road ran from the settlements around Kishorn (including north to Shildaig and west to Applecross peninsula) to the old parish churchyard of Lochcarron at Kirkton. It ran up Glen Mor, struck out across Kishorn brae somewhere near the current sub-power station, following roughly the line of the telegraph poles, crossed the Allt nan Carnan at its most fordable point, then followed the line of the current footpath through Kirkton Wood down to the old graveyard and later, onto the market area where the industrial units now stand. It would have gone out of serious use once the Parliamentary roads were built in 1817 and 1819, although local knowledge recalls sheep being driven along it during the 1940s. The cattle market which was the destination of the

drove road was established as a market and fair ground (**MHG45875**) in close proximity to the later settlement of Lochcarron. The cattle market itself was reported to be a major event which survived the Highland Clearances with farmers bringing first their cattle, then the crofters with their sheep from Shieldaig, Kishorn and the Applecross peninsula to sell to drovers who took them east and south. The fair survived until the arrival of the railway in 1870 when the market was moved nearer to Strathcarron station.

The earliest map of the area is the Timothy Pont map of Wester Ross surveyed from 1583-1614. Although undertaken in the post-medieval period, the map is useful as the settlements that are shown here would have been established during the medieval period or earlier. The map shows Loch Carron and Strome Castle as well as a number of other farmsteads, many of which are no longer extant. On the northern shore, Slumbay is shown as *Slumba*, and Lochcarron is shown as *Heglith Loch Carron*. Farmsteads along the northern shore of the loch which are noted here but no longer extant include *Doun*, *Rango*, and *Kyleriiss*. On the southern and eastern shore, there is a settlement or farmstead labelled *Achnanty* which may be the modern Achintee and Attadale is shown on the 1583-1614 map as *Attadiel*. There are two settlements shown on the south shore which do not seem to be extant today. These are labelled as *Ardinerrurr* and *Strahais*.

Another crofting settlement shown on the Pont map is labelled as *Ry Vouachan*, later known as Ribhuachan (**MHG45873**). The evidence for this settlement comes from a dry-stone walled enclosure which was constructed from stones from the houses which were once within Ribhuachan. The name appears in charters of 1546-8 as *Ruboachane* and would have been a small crofting settlement, holding around five families. The settlement was cleared between 1793 and 1806.

Achintee (**MHG32889**) is another settlement marked on the Pont map. This is recorded as marked on the 1<sup>st</sup> edition OS map, but the settlement is clearly shown here and is therefore medieval in origin. Unlike Ribhuachan, this settlement has survived, though much reduced, to the present day.

At Kirkton (**MHG54237**) there are the remains of six ruined buildings located in the woodland. Given that one of the driving roads led to the graveyard at Kirkton, it is highly likely that the crofting settlement in this location was established during the medieval period and cleared during the late 18<sup>th</sup> early 19<sup>th</sup> century with the site of the ruined parish church being the only indicator of this settlements presence.

The potential for medieval archaeology is medium to high, particularly in those areas where the proposed route corridors pass through cleared settlements.

#### **Post-medieval (1540 – 1750)**

There are no assets identified from the post-medieval period within the search area. Clearly the settlements that were established during the medieval period carried on, but activity was localised.

The Blaeu map of 1654 shows the main settlements on the northern shore as *Stron Carroun*, *Doun* and *Ribowachan*. To the east, the settlements along the loch edge are labelled as *Edira*, *Achnanty*, *Clachan Mulrui* and *Attadill*. Moving along the southern shore, the only settlement labelled is *Ardynerrur*. A number of those are still extant but there are a number which no longer exist and are therefore form areas of archaeological potential.

#### **Early Modern & Modern (1750 – present)**

The majority of evidence from the study area dates from the early modern period, that is, from the 18<sup>th</sup> century onwards. It was during this period that the Highland clearances took place.

These resulted from the desire of the land owning gentry and clan chiefs to generate more income from their land. The system up until this point had been one of renting the land to an intermediary who would then sub-let parcels of land to individual clansmen or crofters and their families who would farm their croft to provide subsistence for themselves and a small surplus. This system of sub-letting had been in place for many years but did not provide the desired income for the clan chiefs and land owning gentry. In the late 18<sup>th</sup> century, it was decided that letting the land for sheep farming was a much more profitable venture. Therefore, the land-owners re-let the land to the factors or land agents who then sub-let the land to sheep farmers, or even used the land themselves to farm sheep for wool and meat. This shift in agricultural focus meant that the land once let to the crofters was no longer available to them and was needed for pasture. Whole communities of crofting families were removed from their homes. Often the houses were burnt or destroyed but the crofters were allowed to take the timber from the roof structure in order to build a new house elsewhere. This practise led to the decimation of the Highland population, the majority of whom were left desolate with no other choice but to move either to the cities or to emigrate to America, Canada or Australia where there are significant populations descended from these immigrants.

There is evidence for the Highland Clearances in the archaeological record of the study area with a number of lost farmsteads and villages located within the search area and with the surrounding landscape. Evidence of the former crofting landscape survive in the form of boundary stones (**MHG54236**), former settlements that were depopulated such as that at Strome Meanach (**MHG7647**) and landscape features associated with crofting such as head dykes (**MHG22272**, **MHG43713**).

There is also evidence of the aftermath of the clearances with a large number of shieling huts and head dykes associated with the old crofting rigs, scattered across the study area. These are the buildings used by shepherds to take shelter in when driving sheep across the landscape and when looking after the herd at night. The large number of these within a relatively small study area indicates the proliferation of sheep farming which resulted from the clearances. The majority of the shieling huts and farmsteads within the study area are located to the north of Lochcarron.

Lochcarron is described as a crofting township (**MHG22513**). It is not labelled on maps until the Thomson maps of 1820. It is possible that this was a very small crofting settlement, perhaps consisting only of a few croft houses and may have been known as Janetown. After the clearances, it may have become a central point of settlement for the people displaced when their settlements were erased from the landscape. The evidence from the post-medieval and early modern mapping highlights the number of settlements and farmsteads which were located along the loch prior to the clearances which now no longer exist. For example, Braeintra located in the forest to the southeast of Achmore, Ribhuachan located on the northern shore of the loch and Strome Meanach also located on the northern loch shore are all shown on mapping from the 16<sup>th</sup> century to the early 19<sup>th</sup> century but are no longer extant. Despite the loss of a number of settlements during the early modern period, the character and layout of these crofting villages can still be discerned, with settlements located on the lower ground near the loch edge with the rigs extending to the rear of the properties. This pattern can still be seen in aerial photographs of Lochcarron to the rear of the properties on Rathad nan Croitean where strips of land stretch back from the properties to the rough moorland of the rising ground to the north.

As described above, the settlement of Lochcarron was a crofting settlement with the remnants of the crofts, head dykes and shieling huts all extant here. There are a large number of farmsteads, buildings, head dykes, shieling huts and clearance cairns throughout the study area on the lower slopes of the surrounding hills. In the landscape to the north of the settlement, there is archaeological evidence for the transformation from crofting to large scale



sheep farming. Set into a head dyke are the remains of six shieling huts (**MHG51312 – MHG51346-50**). The shielings huts mark the transition of this area to sheep farming, as was the aim of the clearances, so despite the crofting way of life continuing to some degree at Lochcarron, it is clear that the majority of the available land was given over to sheep farming, thus generating a much higher income for the factor and the land owner. The shieling huts are now roofless, but they are equally spaced with a hut in the middle of each crofting strip. According to local tradition, these buildings were used to watch over the livestock overnight when the sheep were corralled into the head dyke end of the crofting strips. This would trap the sheep between the head dyke and river gorge forming a retaining triangle. The shieling huts were constructed at the same time as Lochcarron itself, in around 1800.

A map of 1826 by John Thomson of the Northern part of Ross and Cromarty Shires is the first map to show any road network within the study area and is also the first to show the Strome Ferry crossing the entrance to Loch Carron. On the southern shore, a road is shown leading from Kirkton northwards running to the east of Achmore to the shore of Loch Carron and the ferry. The road then picks up on the northern shore near Strome Castle which then leads northeast-wards set back from the shore past Strom Mianach (sic), Strome Caranach and Slumbay. The road then moves closer to the shoreline to move past Loch Carron and Kirk, with the church here clearly illustrated. The road then moves northwards, forking at the apex of the loch to go towards New Kelso with the other spur running to the north.

Towards the latter half of the 19<sup>th</sup> century, the landscape remained rural with the economy based on agriculture. The crofting settlements such as that at Stromeferry remained small and nucleated. However, in the 1870s, the Dingwall and Skye Line of the Highland Railway was constructed. The terminus of this line was at Stromeferry and the station became the centre of trade between the Isles and West Highlands and the rest of the Scotland. The village rapidly expanded accordingly to serve tourists who made the journey including the construction of a hotel and a pier was constructed to handle the ferry traffic bring in fish from the west coast for transport on the railway to Inverness, Edinburgh and further. The Dingwall Railway also had stations at Stromemore and Attadale (**MHG7750**), both of which are still in use.

The extension of the line in 1897 to Kyle of Lochalsh resulted in a decline in the fortunes of Stromeferry. The village continued to survive due to the existence of the Strome Ferry crossing and the station was still extant and used mainly for tourists. Two of the final ships are now wrecks within the loch; the Pride of Strome (**MHG14810**) and Strome Castle (**MHG51353**). The ferry crossing closed in 1970.

Lochcarron became a thriving settlement in the latter half of the 19<sup>th</sup> century. A number of new buildings were constructed including a parish manse (**MHG22226**), a school (**MHG24919**), a corn mill (**MHG31251**), a poor house (**MHG31252**), a battery and rifle range (**MHG31253**), a smithy (**MHG32883**) and a fish trap at the north end of Lochcarron (**MHG51311**). There are a more buildings within the town which are listed. A well within the settlement known as The Everlasting Well was sunk by the minister Lachlan Mackenzie (**MHG51412**). He was renowned for his sermons and prophecies and sunk the well claiming that it would run as long as the world lasted. The well is now capped over but the spring which supplies it continues to flow.

The creation of Lochcarron also stimulated further development for example the creation of a causeway (**MHG51310**) across Kirkton Moor to collect peat. The causeway was created around 1800 and was formed by building up the roadway and lowering the ground on either side through peat extraction ((**MHG39295**). The causeway survives as a linear feature 3.5m wide and 1.2m high and survives over 100m in length.

The settlement at Stromemore (**MHG22280/MHG39258**) also appears to have been created after the clearances, possibly as a result of the instigation of the Strome Ferry. This

settlement consisted of an Inn, a head dyke, numerous buildings and sheep pens. Most of the sheep pens and buildings survive well today though some are now in ruins (**MHG32877**, **MHG32879**).

The settlement at Strathcarron (**MHG22575**) also appears on the 1<sup>st</sup> edition Ordnance Survey mapping of the 1880s and was established to take advantage of the railway line and station which was established here. The station (**MHG40331**) and associated infrastructure including two signal boxes (**MHG35917**, **MHG35918**) and footbridge (**MHG35919**) were constructed to serve the Dingwall and Skye Line which brought a much need tourist and commercial transport lifeline to the area. A hotel (**MHG24918**) was built here to serve the tourist traffic which is still extant.

There is mapping evidence for a number of farmsteads and other isolated houses within the search area which appear on the 1<sup>st</sup> edition Ordnance Survey mapping. There is a farmstead at Imair (**MHG22476**), two houses at Fernbank (**MHG52507**, **MHG52508**), and a house at Strathcarron called Camalt Cottage (**MHG53550**). All of these buildings are now demolished. This period also sees the creation of ornamental features such as the walled garden at Attadale House (**MHG43981**).

The modern period saw a consolidation of the expansion of Lochcarron and Stromeferry. No significant changes took place during this period.

#### **Undated**

There are a large number of non-designated assets within the study area which cannot be dated to any specific period. There are a number of enclosures, head dykes and buildings shown on early mapping but no longer extant, thus making dating difficult. There are also a number of clearance cairns scattered throughout the study area which cannot be dated with any certainty. These assets are indicative of continued activity throughout the centuries but cannot be used to identify a particular period.

There are also records of sea caves or rock shelters which do not contain any dateable evidence and therefore their antiquity cannot be established with certainty.

#### 7.4.3

#### ***Historic Buildings***

There are 15 Listed Buildings within the study area. A description is provided below, with the description and setting set out below:

##### **7262 – New Kelso House Category A. High Importance.**

Description – 1755 with 19<sup>th</sup> century alterations. 2 storey and attic, 17 bay range of varying dates. One of 3 linen factories established by the board of trustees of forfeited estate in the Highlands. Converted to domestic use in 1810. Listed category A for historical importance.

Setting – Located at the northern end of Loch Carron, set back off the main road on the valley floor. Façade faces eastwards with a covering of trees to southern views. The building is set within its own plot and distinguished from the surrounding buildings with good access to the River Carron.

##### **6995 – Achmore Fernaig farm barn Category B. Medium Importance.**

Description – Late 18<sup>th</sup> century early 19<sup>th</sup> century cruck barn, long elevations east to west. Off centre paired winnowing doorways, corrugated iron roof. Internally, 6 pairs of large and heavy cruck blades

Setting – The farm barn is located within a working farmyard, set back from a farm track. Setting of this is clearly defined by the agricultural land to the northwest of the barn.

**6997 – Achmore farm barn – Category B. Medium Importance.**

Description – Early 19<sup>th</sup> century hay/threshing barn of Lochalsh/Kintail type. Long elevations east-west. Coursed rubble, square corners with later wooden shingle roof. Winnowing doors at centre.

Setting – The setting of the barn is within a farmyard with other agricultural buildings. Boundary is well defined and it sits within low lying agricultural ground.

**7258 – Lochcarron old parish church – Category B. Medium Importance.**

Description – Built c.1840, tall rectangular church with 4 long Gothic Y-traced mullions with multi-pane glazing dominating the south elevation. Entrance in centre of west gable, 2 small headed windows in east gable. The present church replaced an older building of 1751, the ruins of which are located 160m to the south and are scheduled.

Setting – The setting of this church is linked to the older ruins to the south and therefore views towards this will be of significance. The church does not have a tower or spire and therefore there is not a dominant feature within this landscape, however due to the flat landscape at the loch head, the building is visible from a wide surrounding area.

**7259 – Lochcarron Free Church – Category B. Medium Importance.**

Description – Constructed in 1846 with alterations in 1859. T-plan church, harled. Projecting gabled wing in centre north with wide centre doorway. Single round headed windows light north elevation, 4 similar symmetrically placed in south elevation. Still in use as a church.

Setting – The church is located on the loch shore and has open, panoramic views across the water. The church has no spire or tower and thus does not form a dominating feature in the landscape and although it shares the ecclesiastical setting with the other churches of the area, there is no visual link between them due to the lack of tall identifying elements which can be seen from a distance.

**7263 – New Kelso Farm Square – Category B. Medium Importance.**

Description – Late 18<sup>th</sup> century walled courtyard. East and west side of square filled by cruck framed ranges including Kintail barn, north side by cartshed, stables and byres and to the south, an implement shed. Unusual courtyard steading.

Setting – The setting is clearly delineated by the courtyard layout of the buildings but also encompasses the surrounding agricultural land.

**7267 – Tullich Farm Square – Category B. Medium Importance.**

Description – Early 19<sup>th</sup> century U-plan farmstead. Open courtyard facing south. Western arm comprises Kintail type threshing barn. Cruck framed. Mid-19<sup>th</sup> century range fills eastern arm linked by a low centre byre with central segmented headed arch spanning path to farmhouse to the north. Unusually large barn but the farmhouse is not individually listed.

Setting – The setting of this farmstead is defined by the courtyard walls, forming an enclosed space. The farmhouse has a southerly outlook and has association with the surrounding agricultural land.

**49299 – Lochcarron main street, Bank House inc. former stables, boundary walls, gatepiers and railings – Category B. Medium Importance.**

Description – 1870 banking house, 2-storeys, 3 bays. Principal elevation faces south. There is a later 20<sup>th</sup> century conservatory to centre of west elevation. The original interior layout is mostly intact. The stables are single storey 4-bay rubble walls. Now used as a garage built into the eastern boundary wall. The boundary wall and gatepiers are of coped square rubble with cast iron railings and floriated finials. The building is still in its original use, with half of the building used as a bank and half as a private residence.

Setting – The setting of this building is the main road which it overlooks and the village of Lochcarron itself. The bank faces out across a parkland towards the loch and these views do contribute to the setting of the asset as well as being in commercial use, it is partially residential and constructed in this location to take advantage of the street frontage, and the picturesque views.

**6933 – Stromferry, former Church of Scotland Mission Church – Category C(s). Low Importance.**

Description – Late 19<sup>th</sup> century rectangular plan church, small with spirelet bellcote. Rubble with red sandstone ashlar dressing. Slate roof. No longer in use as an ecclesiastical building.

Setting – Located overlooking the loch with extensive, panoramic views. Small spirelet gives this building a vertical presence within the landscape and there is a link with the former mission church which is located on higher ground to the south which is of a very similar architectural style and contemporary, with a spirelet bellcote. . The setting is the settlement of Stromeferry and the loch and the other contemporary churches.

**6996 – Achmore farm, farmhouse and steading – Category C(s). Low Importance.**

Description – 1868, farmhouse built by Alexander Ross. Centre door masked by later gabled porch. 2-storey with piended slate roof. Single storey wing to the rear. Steading is single storey, U-plan steading range.

Setting – The farmhouse is located adjacent to the road, but with the gable end fronting onto it. The setting of this house is the associated steading and the agricultural land surrounding the property. There are also setting associations with the settlement of Achmore itself.

**7254 – Attadale House – Category C(s). Low Importance.**

Description – Built 1755 with later additions. 2-storeys with attic, with wide irregular south front. Entrance turret as well as a later 19<sup>th</sup> century drum tower rising 3 storeys with a conical roof. Slate roofs.

Setting – The setting of this house is well defined by the associated designed gardens. The property is well screened with a band of woodland planting and although the tower gives the building a vertical presence, it is not easily visible within the landscape.

**7260 – Lochcarron Hotel – Category C(s). Low Importance.**

Description – Building of c.1800 with alter additions and alterations by James Ross in 1847. Core of 2 storeys an attic. Extension of 2 storeys with west gable. Slate roofs.

Setting – The setting of this building is the A896 along which was constructed to take advantage of passing trade. In addition, the hotel has expansive, panoramic views across the

loch. This loch side location was the reason for choosing this place for construction and therefore the loch and views form part of the setting.

**7261 – Lochcarron Old Police Station – Category C(s). Low Importance**

Description – Constructed in 1865, the station is a 3-bay house with central door and sash windows. Slate roof and renewed end stacks.

Setting – The A896 forms part of the setting of this building along with village of Lochcarron itself. The loch side location offers good views, but does not form the part of the setting of this building.

**48207 – Stromeferry former free church – Category C(s). Low Importance.**

Description – Built in the late 19<sup>th</sup> century, small, rectangular plan church with spirelet bellcote. Square and snecked rubble with red sandstone ashlar dressings. No longer in use for ecclesiastical purposes.

Setting – Located on the loch edge with extensive, panoramic views. Small spirelet gives this building a vertical presence within the landscape and there is a link with the former mission church which is located on higher ground to the south which is of a very similar architectural style and contemporary, with a spirelet bellcote. . The setting is the settlement of Stromeferry and the loch.

**7264 – New Kelso driveway pair of estate cottages – Category C(s). Low Importance.**

Description – A pair of mid-19<sup>th</sup> century estate cottages, 3 bay both south facing. Both have corniced end stacks with slate roofs. Listed for their group value.

Setting – The setting of these assets is one another and the buildings around New Kelso farm square with which they are associated. They are also associated with the surrounding agricultural landscape.

***Conservation Areas***

The Conservation Area of Plockton is located approximately 3km to the west of the outer north corridor route option. Although located outside of the study area, it contains a number of Listed Buildings including Category A structures. It is also a National Trust for Scotland Conservation Village. One of the key characteristics of the conservation area are the views towards Loch Carron and therefore the proposed route corridors have the potential to impact upon the setting of this heritage asset.

**7.4.4 *Historic Landscape***

The Historic Land use Assessment (HLA) produced by Historic Scotland shows that the landscape is dominated by areas of woodland and areas of rough grazing. Nine different landscape types were identified within the search, and the number of different units within these types is given in Table 7.4

**Table 7.4 – Historic Landscape Types**

Historic Landscape Type	No. of units of this type	Importance
Built up area	9	Low
Crofts and smallholdings	5	Low
Designed landscape	2	Low
Fields and farming	31	Low
Mineral, waste and peat industries – Quarrying	1	Negligible
Moorland and Rough grazing	55	Low
Recreation Area – golf course	1	Low
Water body	12	Negligible
Woodland and forestry	77	Low

Within these nine broad historic landscape types there are sub-divisions. For example the woodland and plantation type is split into:

- Coniferous Plantation – 18 units;
- Managed Woodland – 37 units;
- Woodland Plantation – 22 units.

All of these woodland units, the woodland plantation and coniferous plantation are modern in origin dating from the 20<sup>th</sup> century. The areas of managed woodland have more antiquity, potentially dating from the 18<sup>th</sup> century onwards.

The fields and farming historic unit is split into:

- Rectilinear Fields – 27 units;
- Amalgamated Field – 1 unit;
- New Field – 3 units.

The rectilinear fields are remnants of the agricultural history of this area, dating from the 18<sup>th</sup> and 19<sup>th</sup> century. The fact that fields and farming forms such a large part of the study area indicates the consequences of the clearances and the reduction in settlements.

The woodland landscape type and rough grazing landscape type which dominate the search area is found in the highland areas to the north and south of the loch. These areas are punctuated with small pockets of rectilinear fields and natural water bodies but as the land slopes downwards towards the loch shore and around the lower ground at the north of the loch within the valley of the River Carron, there is an increase in the variety of landscape types.

The topography of the study area has dictated much of the former and current use of the land, with much of the study area unviable for settlement due to the steep gradients of the

surrounding hills, mountains and river valleys. These areas have been left for grazing and woodland. The other areas which are more heavily used are broadly located on the lower slopes towards the loch and in the valley floor of the River Carron where construction and alteration of the landscape would be easier to achieve.

## 7.5 Options Appraisal

### 7.5.1 *N6, North Online through Lochcarron*

This route is a largely online option. On the southern shore of the loch, the route leaves the A890 south of Strome ferry to the west of the summit of Creag Mhaol. The route crosses the Strome Narrows via a bridge spanning 830m and landing on the northern shore to the south of Leacanasigh. At North Strome, the route returns online continuing through Strome Wood, Lochcarron and Kirkton until reaching Strathcarron Junction.

There are 15 Listed Buildings, two Scheduled Monuments and approximately 55 non-designated assets within the search area.

#### *Construction Impacts*

This route travels online for the vast majority of its length. However there are small areas of deviation, in particular near to the proposed bridge construction.

The construction of a bridge to cross the Strome Narrows will also involve the construction of significant earthworks to overcome the difficult topography of the approach and exit from the bridge or tunnel. The construction of the bridge will have potential impacts upon the setting of Strome Castle. It has been established that one of the key characteristics of this asset is its defensive position and the views across the mouth of the loch towards the sea. The introduction of a structure within this view will diminish the ability to understand the function of the castle, however, the relationship between the castle and the southern shore, and the castle and the loch itself will still be appreciated. The impact is therefore judged to be **minor**.

The construction of any bridge will also impact upon the views from the conservation area at Plockton and from the category C(s) listed Strome ferry former Church of Scotland Mission Church (**6933**) and the category C(s) listed Strome ferry former Free Church (**48207**). It has been identified that an important view from the conservation area is focused upon Loch Carron. A bridge structure will restrict these views and remove the "open" feeling of views up the loch. From the church, there are extensive, open views across the loch which was clearly the reason for the placement of the buildings. A large bridge structure would reduce the openness of this view and introduce a large, modern engineered element into this wild and natural landscape. The impact is therefore judged to be **minor**.

The northern shore landing of the proposed bridge and route onshore has the potential to permanently and physically impact upon the site of a rock shelter (**MHG46066**). There is also the record of a cist burial here (**MHG14046**), however this is essentially the record of a find, rather than a marker for any physical remains. There is the potential for archaeology associated with the cist, or further cist burials to survive nearby. Impacting upon these asset, or deposits associated with them would remove their ability to provide archaeological information on prehistoric activity in the area, including material culture and social hierarchy. From the plans provided thus far, it is difficult to assess if these assets would be impacted by the route, therefore the impact on these assets of low value is judged to be **moderate**.

Where the route follows the extant online section between Leacanasigh and Strome Wood, any potential road improvements, including the widening of the carriageway have the potential to impact upon heritage assets of low value. Two ruined croft buildings (**MHG32879**, **MHG32877**) have the potential to be cleared away entirely by the option to facilitate

carriageway upgrades. The removal of these assets would eradicate their key characteristics and therefore the impact is judged to be **major**.

#### *Operational Impacts*

The route corridor will take traffic from the current A890 and move it to the northern shore. This will remove the visual and noise impacts and help to restore the tranquillity of the original setting of the category C(s) listed pair of estate cottages at New Kelso (**7264**), assets of low value located just off the current carriageway. This impact is judged to be **minor**.

The Scheduled Monument of Lochcarron Old Parish Church has the potential to be impacted by the introduction of ancillary road structures such as barriers and signage. It has been identified that the setting of this asset encompasses the views towards and across Loch Carron and that this setting contributes to the significance of the asset. There is the potential for signage to interrupt or impede upon this view. There is also the potential for any lighting proposed for the new carriageway to impact upon the setting of the church by reducing the total darkness experienced by this asset during the night time and introducing an artificial light into the setting which will impact upon the Scheduled Monument of Lochcarron Old Parish Church (**8867**). This impact is judged to be **minor**.

The scheduled Strome Castle (**8481**) will experience impacts from the operational phase of this route following the opening of the bridge. The movement of traffic on the bridge will not impact upon the asset to any significant degree, but the presence of the bridge itself within views to the west has the potential to reduce the ability to appreciate the key characteristics of this asset. As a defensive site, the views from this asset contribute to the significance and understanding of the asset. At present, there are no major modern elements intruding into the view. A new bridge would be an imposing modern element within views towards the sea, an important historical view as it would be an approach for any sea-borne attackers. The relationship between the southern shore and views along the loch itself will not be impacted by the bridge and the understanding of this site as a defensive feature will be retained. Therefore, the visual impact from the operational bridge is judged to be **minor**.

#### *Cumulative Impacts*

There will be no cumulative impact from development upon the archaeological resource.

#### *Mitigation*

The bridge should be of the highest quality, iconic design as it will be seen in important views from Strome Castle.

It is recommended that any signage or street furniture be located away from the scheduled area of Lochcarron Old Parish Church.

#### *Residual Effects*

The following assets will experience a moderate adverse effect:

- Lochcarron Old Parish Church, 160m SSW of Lochcarron Parish Church – Scheduled Monument (8867);
- Strome Castle – Scheduled Monument (8481).

The following assets will experience a slight adverse effect:

- Plockton Conservation Area;



- Strome ferry former Church of Scotland Mission Church category C(s) - (69330);
- Strome ferry former Free Church category C(s) listed - (48207);
- Two ruined croft buildings (MHG32879, MHG32877);
- Rock shelter (MHG46066);
- Cist (MHG14046).

The following assets will experience a slight beneficial effect:

- Pair of estate cottages, New Kelso driveway category C(s) (7264).

### 7.5.2 ***N9, North Lochcarron Bypass Route Option***

The route follows the N6 route up to Leacanasigh. From this point, N9 goes offline, passing north of Stromemore returning online for a short distance until veering north offline through Strome Wood, passing north of Slumbay and Lochcarron, crossing the existing A896 and Allt nan Cannan. The route joins the A896 at Kirkton continuing online until Strathcarron Junction.

There are eleven Listed Buildings, two Scheduled Monuments and 62 non-designated assets within the search area.

#### *Construction Impacts*

The proposed route re-joins the online A896 in close proximity to the Scheduled Monument of the Lochcarron Old Parish Church (**8667**). There is the potential therefore for the construction to physically impact upon the scheduled area or to disturb bodies which may have been interred outside the boundaries of the burial ground. This construction activity will also impact upon the setting of the church by interrupting its tranquillity and interrupting the views between the Scheduled Monument and the loch, however this impact will be temporary, for the duration of the construction. The key characteristics of this monument are its isolated setting, with uninterrupted views of Loch Carron. The impact of a road upgrading, in addition to the potential setting impacts is therefore judged to be **moderate**.

The construction of a bridge to cross the Strome Narrows will also involve the construction of significant earthworks to overcome the difficult topography of the approach and exit from the bridge or tunnel. The construction of the bridge will have potential impacts upon the setting of Strome Castle. It has been established that one of the key characteristics of this asset its defensive position and the views across the mouth of the loch towards the sea. The introduction of a structure within this view will diminish the ability to understand the function of the castle; however the relationship between the castle and the southern shore, and the castle and the loch itself will still be appreciated. The impact is therefore judged to be **minor**.

The construction of any bridge will also impact upon the views from the conservation area at Plockton and from the category C(s) listed Strome ferry former Church of Scotland Mission Church (**6933**) and the category C(s) listed Strome ferry former Free Church (**48207**). It has been identified that an important view from the conservation area is focused upon Loch Carron. A bridge structure will restrict these views and remove the "open" feeling of views up the loch. From the church, there are extensive, open views across the loch which was clearly the reason for the placement of the buildings. A large bridge structure would reduce the openness of this view and introduce a large, modern engineered element into this wild and natural landscape. The impact is therefore judged to be **minor**.

The northern shore landing of the proposed bridge and route onshore has the potential to permanently and physically impact upon the site of a rock shelter (**MHG46066**). There is also the record of a cist burial here (**MHG14046**), however this is essentially the record of a find, rather than a marker for any physical remains. There is the potential for archaeology associated with the cist, or further cist burials to survive nearby. Impacting upon these asset, or deposits associated with them would remove their ability to provide archaeological information on prehistoric activity in the area, including material culture and social hierarchy. From the plans provided thus far, it is difficult to assess if these assets would be impacted by the route, therefore the impact on these assets of low value is judged to be **moderate**.

The route of N9 deviates from the online road between Leacanasigh and Mid Strome. The construction of the route, including the small area of cutting has the potential to impact upon archaeological deposits associated with Stromemore (**MHG32958**), an asset low value. As the route will only pass through a small area of the township, there will remain in situ substantial portions of the asset for future archaeological study. The archaeological value of the asset will be reduced but not removed entirely. The impact is therefore judged to be **minor**.

The construction of the offline section from Mid Strome onwards has the potential to permanently remove and impact upon a number of non-designated heritage assets. Excavations required to construct the road and the movement of construction traffic has the potential to impact upon hut circles (**MHG14042, MHG7646**), clearance cairns (**MHG41305, MHG33087**), a cairn (**MHG32724**), a possible boat burial (**MHG7667**) and enclosures (**MHG22480, MHG22481**), all assets of low value. Impacting upon these would remove their ability to provide information for possible prehistoric settlement in the area and the transformation from the crofting way of life to wholesale sheep farming after the clearances. The impact is therefore judged to be **major**.

The route offline to the northeast of Lochcarron has the potential to impact on a number of non-designated assets. At present, the route does not directly impact upon the assets location; however there is the potential for the recorded location of the heritage assets to not be 100% accurate and therefore the route could remove these assets. The assets consist of a head dyke (**MHG22772**) within which are set a number of shieling huts (**MHG22542, MHG43713, MHG51312, MHG51354, MHG51346, MHG51347, MHG51348, MHG51349, MHG51350**). In addition to this is the location of a causeway (**MHG51310**) constructed over peat bog and marshy ground. These are all assets of low value. At present, the route does not physically impact upon the assets; however there is the potential if the route option is re-aligned to remove the archaeological value of these assets and the ability to provide information on the change from crofting to sheep farming following the clearances. The impact is judged to be **minor**.

The route to the northeast of Lochcarron also has the potential to impact on the site of a possible broch or dun (**MHG7944**), an asset of medium value. It should be noted that the presence of this asset has not been confirmed through aerial photographic survey. There is the potential for the route to impact upon assets associated with this asset and would therefore reduce the archaeological value of the asset and the information it provides on the construction techniques of these structures and the social hierarchy of the Iron Age society who constructed it. The route as it stands does not directly impact upon the asset and therefore is judged to be a **minor** impact.

There is the potential for the route to physically impact and remove previously unrecorded archaeology. The slopes of An Sgurr and the area around Black Mares Rock have a high potential for the recovery of archaeological deposits, in particular as this is an area of raised beach, which will run all the way to the loch shore. Excavation and construction of

embankments required for the option have the potential to remove these assets of low value. The impact is therefore judged to be **major**.

#### *Operational Impacts*

The Scheduled Monument of Lochcarron Old Parish Church has the potential to be impacted by the introduction of ancillary road structures such as barriers and signage. It has been identified that the setting of this asset encompasses the views towards and across Loch Carron and that this setting contributes to the significance of the asset. There is the potential for signage to interrupt or impede upon this view. There is also the potential for any lighting proposed for the new carriageway to impact upon the setting of the church by reducing the total darkness experienced by this asset during the night time and introducing an artificial light into the setting which will impact upon the Scheduled Monument of Lochcarron Old Parish Church (8867). This impact is judged to be **minor**.

The scheduled Strome Castle will experience impacts from the operational phase of this route following the opening of the bridge. The movement of traffic on the bridge will not impact upon the asset to any significant degree, but the presence of the bridge itself within views to the west has the potential to reduce the ability to appreciate the key characteristics of this asset. As a defensive site, the views from this asset contribute to the significance and understanding of the asset. At present, there are no major modern elements intruding into the view. A new bridge would be an imposing modern element within views towards the sea, an important historical view as it would be an approach for any sea-borne attackers. The relationship between the southern shore and views along the loch itself will not be impacted by the bridge and the understanding of this site as a defensive feature will be retained. Therefore, the visual impact from the operational bridge is judged to be **minor**.

The operation of this route corridor will take traffic from the current A890 and move it to the northern shore. This will remove the visual and noise impacts and help to restore the tranquillity of the original setting of the category C(s) listed pair of estate cottages at New Kelso (**7264**), assets of low value located just off the current carriageway. This impact is judged to be **minor**.

The operation of this route will remove large amounts of traffic from running through Lochcarron centre. This will have a beneficial effect on the Listed Buildings within the town, by reducing pollution, vibration and noise, however this is balanced with the issue that the buildings within Lochcarron were intended to service traffic along the road. They were deliberately sited alongside the road to capture passing trade. This will be reduced by the proposed route. The impact is therefore negligible.

#### *Cumulative Impacts*

There will be no cumulative impact from development upon the archaeological resource.

#### *Mitigation*

There is the potential for work associated with the creation of a carriageway to impact upon the scheduled area of the Lochcarron Old Parish Church (**8867**). If intrusive works do occur within the formally scheduled area, Scheduled Monument Consent will be required prior to undertaking any groundworks. Following this, archaeological fieldwork will be required prior to or during groundworks to ensure that any archaeological deposits unearthed are recorded appropriately.

If a bridge is to be proposed, it is possible that high quality, iconic design might reduce the visual impact of the bridge.

It is recommended that a detailed walkover followed by a programme of archaeological fieldwork is undertaken in advance of development along the offline section of the route. In particular, this would be undertaken to record the hut circles which would be removed by the development.

It is proposed that any ruins that are required to be cleared prior to construction first be assessed for heritage significance. If they are found to have heritage value, these will be recorded prior to demolition. In particular if any ruined croft buildings already identified on the HER (Historic Environment Record) are to be demolished, these are to be recorded prior to demolition.

It is recommended that any signage or street furniture be located away from the scheduled area of Lochcarron Old Parish Church.

#### *Residual Effects*

The following assets will experience a moderate adverse effect:

- Lochcarron Old Parish Church, 160m SSW of Lochcarron Parish Church – Scheduled Monument (8867);
- Strome Castle - Scheduled Monument (8481);
- Hut circles (MHG14042, MHG7646);
- Cairn (MHG32724);
- Possible boat burial (MHG7667).

The following assets will experience a slight adverse effect:

- Plockton Conservation Area;
- Stromeferry former Church of Scotland Mission Church category C(s) - (69330);
- Stromeferry former Free Church category C(s) listed - (48207);
- Previously unidentified assets along the offline section;
- Clearance cairns (MHG41305, MHG33087);
- Enclosures (MHG22480, MHG22481);
- Causeway (MHG51310);
- Head dyke (MHG22772);
- Shielling huts on head dyke (MHG2242, 43713, 51312, 51354, 51346, 51347, 51348, 51349, 51350);
- Rock shelter (MHG46066);
- Cist (MHG14046);
- Township of Stromemore (MHG32598).

The following assets will experience a slight beneficial effect:

- Pair of estate cottages, New Kelso driveway category C(s) (7264).

### 7.5.3

#### ***Online Route Option O2 – Online with Rail Viaduct***

There are 6 Listed Buildings within 1km of the route centre line. 24 non-designated assets have been identified within this route.

This route is based on the current road alignment. From Frenchmans Burn to Cuddies Burn the route would realign the railway onto a viaduct structure along the side of the loch for 1.6km. This would allow more space to construct the two-lane road, verge and rock trap. The online route option would move offline to the west of the existing road alignment through Maman Hill to limit the steeper gradients, returning online until Achintee when the route moves offline to the southeast of Achintee with a new bridge crossing the River Taodail. The option then continues online north of Strathcarron until the Strathcarron Junction.

#### *Construction Impacts*

There is the potential for the construction of the viaduct carrying the rail line coming off the embankment at Cuddies Point and the road widening here to impact upon the site of a building at Cuddies Point (**MHG22515**) and the site of a farmstead (**MHG22514**). These are assets of low value. These assets exhibit archaeological value and can provide evidence of post-clearance farmstead architecture. It is likely however that the construction of the original road and the railway running parallel to the west will have already impacted upon these archaeological assets. If they have not already been removed, it is likely that a large portion of their key characteristic which is their archaeological value will have been compromised by previous construction. Their value is therefore negligible and the potential impact is judged to be **moderate**.

The construction of a railway viaduct alongside the loch edge to carry the carriageway has the potential to impact upon possible raised beach features and lithic scatters associated with this. The identification of a raised beach to the north indicated that the immediate shoreline and the area above have the potential to contain similar deposits. If these deposits do exist, their key characteristics include archaeological value and the knowledge they could contribute to the understanding of prehistoric settlers in these coastal areas. The value of these potential archaeological deposits is low and the impact from construction is judged to be **moderate**.

The construction of the offline section southeast of Achintee has the potential to impact upon the non-designated low value asset of a lithic scatter (**MHG46083**). The proposed route does not directly impact upon the asset, but due to its scattered nature and the possibility of raised beaches along the loch edge, there is the potential for further lithic scatters to be uncovered. Removal of the asset through development will remove the archaeological information the artefacts could provide for prehistoric seasonal settlement activity and the development of lithic implements in this area. The impact is judged to be **minor**.

The potential widening of single track sections of the carriageway has the potential to impact upon the non-designated asset of the trackway (**MHG51299**) through Glen Carron to New Kelso, an asset of low value. The current carriageway currently cuts across the route of the trackway and any widening of this section will impact further by removing more of the asset. As the route of this trackway is discernible for considerable distance both to the north and south of the current carriageway, the construction will not remove such a significant portion of the road so as to remove all understanding of its route and destination. Therefore the impact is judged to be **minor**.

The construction of the local improvement section at Maman Hill will involve new land take, excavation for the road, the movement of construction traffic and associated construction activities including the tie-in to the extant carriageway. This has the potential to impact upon the extant Camallt Cottage (**MHG53550**) an asset of low value. The option at present appears to go through the building, and may require the demolition of the structure. A planning application was submitted and approved in 2010 to demolish the building, but it is uncertain if this has yet been carried out. Therefore, if this building has been removed, the impact will be upon the site of the cottage. A detailed historic record was taken of the building in 2010 as part of the planning condition and therefore the historic value of the site and the information it can provide for 19<sup>th</sup> century architecture has been preserved already. Therefore, the impact is judged to be **negligible**.

The potential widening may also impact upon the pair of two category C(s) listed estate cottages (**7264**) at New Kelso, assets of low value. The construction works will create additional noise and activity and there is the potential for the carriageway itself to move closer to the buildings. This will impact upon the setting of these cottages which at present is defined by their relationship to the former trackway through Glen Carron and their isolated and tranquil position at the loch head. The setting impact will be temporary during the course of the construction period and therefore the impact is judge to be **minor**.

The construction of the new bridge and embankment over the River Taodail has the potential to impact upon the setting of the Strathcarron Hotel (**MHG24918**) and asset of low value and non-designated building. Although the asset will not be physically impacted, the construction of the embankment and bridge will involve the movement and noise from construction traffic and earth moving equipment. The proximity of the embankment has the potential therefore to reduce the aesthetic value of the asset. The impact is judge to be **minor**.

#### *Operational Impacts*

Any archaeological assets impacted by the construction of the proposed option will have already been removed by the operational phase, therefore there will be no further impact.

The operation of the route over the new bridge over the River Taodail and embankment has the potential to permanently impact upon the setting of the Strathcarron Hotel (**MHG24918**). The proximity of the embankment has the potential to block views from this asset of low value along the loch and reduce the aesthetic value of the asset. The impact is judged to be **minor**.

The operation of the route and presence of associated road structures such as barriers and signage will potentially impact upon the setting of the two listed estate cottages (**7264**), assets of low value. Any additional street furniture, including lighting will introduce modern elements into the immediate landscape and detract from the rural and isolated setting of these cottages and reduce their aesthetic value. In addition, any road widening could potentially bring the carriageway in closer proximity to the cottages and therefore reduce the sense of tranquillity that currently exists in this location. The impact is therefore judged to be **minor**.

#### *Cumulative Impacts*

There will be no cumulative impact from development upon the archaeological resource.

#### *Mitigation*

It is recommended that a detailed walkover be carried out by an archaeological contractor along the route of the proposed embankment. This will help to identify any areas of lithic scatters. It is also recommended that analysis of geotechnical borehole data is undertaken by an archaeologist to establish the potential for buried raised beach deposits to be encountered prior to development.

It is suggested that in the first instance, road widening is not undertaken in the area in close proximity to the listed New Kelso cottages. This would also remove the impact on the former trackway from Glen Carron to New Kelso. If this is not possible, it is recommended that road furniture and lighting be kept to a minimum in this area.

If the road widening does occur in the area of the trackway, due to the low value of the asset and the low potential for the recovery of any significant archaeological deposits, no archaeological fieldwork is recommended here.

It is recommended that the new bridge and embankment at Strathcarron be sensitively designed and low profile to avoid blocking views from Strathcarron Hotel across the loch.

#### *Residual Effects*

The following assets will experience a residual effect of **slight adverse** following mitigation:

- the potential for the raised beach;
- the farmstead (MHG22514);
- the building (MHG22515);
- Lithic scatter (MHG46083);
- Strathcarron Hotel (MHG24918); and
- trackway from Glen Carron to New Kelso (MHG51299).

The following asset will experience a residual effect of **neutral** following mitigation:

- Camallt Cottage (MHG53550);
- Two category C(s) listed estate cottages at New Kelso.

#### 7.5.4 ***Online Route Option O3 – Online with tunnel***

There are 6 Listed Buildings within 1km of the route centre line. 24 non-designated assets have been identified within this route.

Option O3 runs online until Frenchmans Burn where a 1.5km inland tunnel would be constructed. The route returns online at Cuddies Burn. The route continues with small deviations offline at Maman Hill where the route deviates west from its original alignment and at Achintee where the route deviates to the southeast of the village.

#### *Construction Impacts*

The potential widening of single track sections of the carriageway has the potential to impact upon the non-designated asset of the trackway (MHG51299) through Glen Carron to New Kelso, an asset of low value. The current carriageway currently cuts across the route of the trackway and any widening of this section will impact further by removing more of the asset. As the route of this trackway is discernible for considerable distance both to the north and south of the current carriageway, the construction will not remove such a significant portion of the road so as to remove all understanding of its route and destination. Therefore the impact is judged to be **minor**.

The construction of the offline section southeast of Achintee has the potential to impact upon the non-designated low value asset of a lithic scatter (**MHG46083**). The proposed route does not directly impact upon the asset, but due to its scattered nature and the possibility of raised beaches along the loch edge, there is the potential for further lithic scatters to be uncovered. Removal of the asset through development will remove the archaeological information the artefacts could provide for prehistoric seasonal settlement activity and the development of lithic implements in this area. The impact is judged to be **minor**.

The construction of the offline section at Maman Hill will involve new land take, excavation for the road, the movement of construction traffic and associated construction activities including the tie-in to the extant carriageway. This has the potential to impact upon the extant Camallt Cottage (**MHG53550**) an asset of low value. The option at present appears to go through the building, and may require the demolition of the structure. A planning application was submitted and approved in 2010 to demolish the building, but it is uncertain if this has yet been carried out. Therefore, if this building has been removed, the impact will be upon the site of the cottage. A detailed historic record was taken of the building in 2010 as part of the planning condition and therefore the historic value of the site and the information it can provide for 19<sup>th</sup> century architecture has been preserved already. Therefore, the impact is judged to be **negligible**.

The construction of the new bridge and embankment over the River Taodail has the potential to impact upon the setting of the Strathcarron Hotel (**MHG24918**) and asset of low value and non-designated building. Although the asset will not be physically impacted, the construction of the embankment and bridge will involve the movement and noise from construction traffic and earth moving equipment. The proximity of the embankment has the potential therefore to reduce the aesthetic value of the asset. The impact is judged to be **minor**.

The potential widening may also impact upon the pair of two category C(s) listed estate cottages (**7264**) at New Kelso. The construction works will create additional noise and activity and there is the potential for the carriageway itself to move closer to the buildings. This will impact upon the setting of these cottages which at present is defined by their relationship to the former trackway through Glen Carron and their isolated and tranquil position at the loch head. The setting impact will be temporary during the course of the construction period and therefore the impact is judged to be **minor**.

The construction of the tunnel will be through rock and therefore will not impact upon the archaeological resource. The tunnel portals are located in areas with no heritage resource and therefore will have no impact.

#### *Operational Impacts*

The route and presence of associated road structures such as barriers and signage will potentially impact upon the setting of the two listed estate cottages (**7264**), assets of low value. Any additional street furniture, including lighting would introduce modern elements into the immediate landscape and detract from the rural and isolated setting of these cottages and reduce their aesthetic value. In addition, any road widening could potentially bring the carriageway in closer proximity to the cottages and therefore reduce the sense of tranquillity that currently exists in this location. The impact is therefore judged to be **minor**.

The operation of the route over the new bridge over the River Taodail and embankment has the potential to permanently impact upon the setting of the Strathcarron Hotel (**MHG24918**). The proximity of the embankment has the potential to block views from this asset of low value along the loch and reduce the aesthetic value of the asset. The impact is judged to be **minor**.

#### *Cumulative Impacts*



There will be no cumulative impact from development upon the archaeological resource.

#### *Mitigation*

It is suggested that in the first instance, road widening is not undertaken in the area in close proximity to the listed New Kelso cottages if possible. This would also remove the impact on the former trackway from Glen Carron to New Kelso. If this is not possible, it is recommended that road furniture and lighting be kept to a minimum in this area.

If the road widening does occur in the area of the trackway, due to the low value of the asset and the low potential for the recovery of any significant archaeological deposits, no archaeological fieldwork is recommended here.

It is recommended that the new bridge and embankment at Strathcarron be sensitively designed and low profile to avoid blocking views from Strathcarron Hotel across the loch.

#### *Residual Effects*

The following assets will experience a residual effect of **slight adverse** following mitigation:

- trackway from Glen Carron to New Kelso (MHG51299);
- Lithic scatter (MHG46083); and
- Strathcarron Hotel (MHG24918).

The following asset will experience a residual effect of **neutral** following mitigation:

- Two category C(s) listed estate cottages at New Kelso;
- Camallt Cottage (MHG53550).

#### **Online Route Option 04 – Do minimum**

There are 6 Listed Buildings within 1km of the route centre line. 24 non-designated assets have been identified within this route.

#### *Construction Impacts*

As this route represents a “do-minimum” scenario, there will be no construction impacts on the heritage assets, as they have already been impacted by the construction of the extant road.

#### *Operational Impacts*

There will be no operational impacts on the heritage assets resulting from this option.

#### *Cumulative Impacts*

There will be no cumulative impact from development upon the archaeological resource.

#### *Mitigation*

As no impacts have been identified, no mitigation is proposed.

#### *Residual Effects*

There will be no residual effect upon the heritage resource from this option.

### Online Route Option 05 – Online with Road and Rail Share

There are 6 Listed Buildings within 1km of the route centre line. 24 non-designated assets have been identified within this route.

This route travels online until Frenchmans Burn where there would be a shared road/railway with the road traffic and the rail traffic sharing the same carriageway. This would run for 1.8km until Cuddies Burn. The route continues with small deviations offline at Maman Hill where the route deviates west from its original alignment and at Achintee where the route deviates to the southeast of the village before returning online at Strathcarron and being carried over the River Taodail on a new bridge and embankment.

#### *Construction Impacts*

Although improvements will be required for the railway section of the route in order to make it road-worthy, this option will involve existing roads and areas of land which have already been impacted by previous development.

The potential widening of single track sections of the carriageway has the potential to impact upon the non-designated asset of the trackway (**MHG51299**) through Glen Carron to New Kelso, an asset of low value. The current carriageway currently cuts across the route of the trackway and any widening of this section will impact further by removing more of the asset. As the route of this trackway is discernible for considerable distance both to the north and south of the current carriageway, the construction will not remove such a significant portion of the road so as to remove all understanding of its route and destination. Therefore the impact is judged to be **minor**.

The construction of the offline section southeast of Achintee has the potential to impact upon the non-designated low value asset of a lithic scatter (**MHG46083**). The proposed route does not directly impact upon the asset, but due to its scattered nature and the possibility of raised beaches along the loch edge, there is the potential for further lithic scatters to be uncovered. Removal of the asset through development will remove the archaeological information the artefacts could provide for prehistoric seasonal settlement activity and the development of lithic implements in this area. The impact is judged to be **minor**.

The construction of the local improvement section at Maman Hill will involve new land take, excavation for the road, the movement of construction traffic and associated construction activities including the tie-in to the extant carriageway. This has the potential to impact upon the extant Camallt Cottage (**MHG53550**) an asset of low value. The option at present appears to go through the building, and may require the demolition of the structure. A planning application was submitted and approved in 2010 to demolish the building, but it is uncertain if this has yet been carried out. Therefore, if this building has been removed, the impact will be upon the site of the cottage. A detailed historic record was taken of the building in 2010 as part of the planning condition and therefore the historic value of the site and the information it can provide for 19<sup>th</sup> century architecture has been preserved already. Therefore, the impact is judged to be **negligible**.

The construction of the new bridge and embankment over the River Taodail has the potential to impact upon the setting of the Strathcarron Hotel (**MHG24918**) and asset of low value and non-designated building. Although the asset will not be physically impacted, the construction of the embankment and bridge will involve the movement and noise from construction traffic and earth moving equipment. The proximity of the embankment has the potential therefore to reduce the aesthetic value of the asset. The impact is judged to be **minor**.

The potential widening may also impact upon the pair of two category C(s) listed estate cottages (**7264**) at New Kelso. The construction works will create additional noise and activity and there is the potential for the carriageway itself to move closer to the buildings. This will impact upon the setting of these cottages which at present is defined by their relationship to the former trackway through Glen Carron and their isolated and tranquil position at the loch head. The setting impact will be temporary during the course of the construction period and therefore the impact is judged to be **minor**.

#### *Operational Impacts*

The route and presence of associated road structures such as barriers and signage will potentially impact upon the setting of the two listed estate cottages (**7264**), assets of low value. Any additional street furniture, including lighting will introduce modern elements into the immediate landscape and detract from the rural and isolated setting of these cottages and reduce their aesthetic value. In addition, any road widening could potentially bring the carriageway in closer proximity to the cottages and therefore reduce the sense of tranquillity that currently exists in this location. The impact is therefore judged to be **minor**.

The operation of the route over the new bridge over the River Taodail and embankment has the potential to permanently impact upon the setting of the Strathcarron Hotel (**MHG24918**). The proximity of the embankment has the potential to block views from this asset of low value along the loch and reduce the aesthetic value of the asset. The impact is judged to be **minor**.

#### *Cumulative Impacts*

There will be no cumulative impact from development upon the archaeological resource.

#### *Mitigation*

It is suggested that in the first instance, road widening is not undertaken in the area in close proximity to the listed New Kelso cottages. This would also remove the impact on the former trackway from Glen Carron to New Kelso. If this is not possible, it is recommended that road furniture and lighting be kept to a minimum in this area.

If the road widening does occur in the area of the trackway, due to the low value of the asset and the low potential for the recovery of any significant archaeological deposits, no archaeological fieldwork is recommended here.

It is recommended that the new bridge and embankment at Strathcarron be sensitively designed and low profile to avoid blocking views from Strathcarron Hotel across the loch.

#### *Residual Effects*

The following assets will experience a residual effect of **slight adverse** following mitigation:

- trackway from Glen Carron to New Kelso (MHG51299);
- Lithic scatter (MHG46083); and
- Strathcarron Hotel (MHG24918).

The following asset will experience a residual effect of **neutral** following mitigation:

- Two category C(s) listed estate cottages at New Kelso;
- Camallt Cottage (MHG53550).

### 7.5.5 *Online Route Option O7 – Online with Developed Avalanche Shelter*

There are 6 Listed Buildings within 1km of the route centre line. 24 non-designated assets have been identified within this route.

From Frenchmans Burn to Cuddies Burn there would be a road viaduct carrying the road above the railway for 1.7km. The route continues with small deviations offline at Maman Hill where the route deviates west from its original alignment and at Achintee where the route deviates to the southeast of the village before returning online at Strathcarron and being carried over the River Taodail on a new bridge and embankment.

#### *Construction Impacts*

The potential widening of single track sections of the carriageway has the potential to impact upon the non-designated asset of the trackway (**MHG51299**) through Glen Carron to New Kelso, an asset of low value. The current carriageway currently cuts across the route of the trackway and any widening of this section will impact further by removing more of the asset. As the route of this trackway is discernible for considerable distance both to the north and south of the current carriageway, the construction will not remove such a significant portion of the road so as to remove all understanding of its route and destination. Therefore the impact is judged to be **minor**.

The construction of the offline section southeast of Achintee has the potential to impact upon the non-designated low value asset of a lithic scatter (**MHG46083**). The proposed route does not directly impact upon the asset, but due to its scattered nature and the possibility of raised beaches along the loch edge, there is the potential for further lithic scatters to be uncovered. Removal of the asset through development will remove the archaeological information the artefacts could provide for prehistoric seasonal settlement activity and the development of lithic implements in this area. The impact is judged to be **minor**.

The construction of the offline section at Maman Hill will involve new land take, excavation for the road, the movement of construction traffic and associated construction activities including the tie-in to the extant carriageway. This has the potential to impact upon the extant Camallt Cottage (**MHG53550**) an asset of low value. The option at present appears to go through the building, and may require the demolition of the structure. A planning application was submitted and approved in 2010 to demolish the building, but it is uncertain if this has yet been carried out. Therefore, if this building has been removed, the impact will be upon the site of the cottage. A detailed historic record was taken of the building in 2010 as part of the planning condition and therefore the historic value of the site and the information it can provide for 19<sup>th</sup> century architecture has been preserved already. Therefore, the impact is judged to be **negligible**.

The construction of the new bridge and embankment over the River Taodail has the potential to impact upon the setting of the Strathcarron Hotel (**MHG24918**) and asset of low value and non-designated building. Although the asset will not be physically impacted, the construction of the embankment and bridge will involve the movement and noise from construction traffic and earth moving equipment. The proximity of the embankment has the potential therefore to reduce the aesthetic value of the asset. The impact is judged to be **minor**.

The potential widening may also impact upon the pair of two category C(s) listed estate cottages (**7264**) at New Kelso. The construction works will create additional noise and activity and there is the potential for the carriageway itself to move closer to the buildings. This will impact upon the setting of these cottages which at present is defined by their relationship to the former trackway through Glen Carron and their isolated and tranquil position at the loch

head. The setting impact will be temporary during the course of the construction period and therefore the impact is judged to be **minor**.

#### *Operational Impacts*

The route and presence of associated road structures such as barriers and signage will potentially impact upon the setting of the two listed estate cottages (**7264**), assets of low value. Any additional street furniture, including lighting will introduce modern elements into the immediate landscape and detract from the rural and isolated setting of these cottages and reduce their aesthetic value. In addition, any road widening could potentially bring the carriageway in closer proximity to the cottages and therefore reduce the sense of tranquillity that currently exists in this location. The impact is therefore judged to be **minor**.

The operation of the route over the new bridge over the River Taodail and embankment has the potential to permanently impact upon the setting of the Strathcarron Hotel (**MHG24918**). The proximity of the embankment has the potential to block views from this asset of low value along the loch and reduce the aesthetic value of the asset. The impact is judged to be **minor**.

#### *Cumulative Impacts*

There will be no cumulative impact from development upon the archaeological resource.

#### *Mitigation*

It is suggested that in the first instance, road widening is not undertaken in the area in close proximity to the listed New Kelso cottages. This would also remove the impact on the former trackway from Glen Carron to New Kelso. If this is not possible, it is recommended that road furniture and lighting be kept to a minimum in this area.

If the road widening does occur in the area of the trackway, due to the low value of the asset and the low potential for the recovery of any significant archaeological deposits, no archaeological fieldwork is recommended here.

It is recommended that the new bridge and embankment at Strathcarron be sensitively designed and low profile to avoid blocking views from Strathcarron Hotel across the loch.

#### *Residual Effects*

The following assets will experience a residual effect of **slight adverse** following mitigation:

- trackway from Glen Carron to New Kelso (MHG51299);
- Lithic scatter (MHG46083); and
- Strathcarron Hotel (MHG24918).

The following asset will experience a residual effect of **neutral** following mitigation:

- Two category C(s) listed estate cottages at New Kelso;
- Camallt Cottage (MHG53550).

### 7.5.6 ***Southern Route – S4, South Glen Udalain***

There are six Listed Buildings and 25 non-designated heritage assets within this route corridor and search area.

The route diverts from the A890 to the south of Braeintra and moves east along the Glen Udalain Valley. The option continues north towards the River Attadale valley remaining on the southwest side of the valley, continuing northwest before returning online at the River Attadale bridge. The route continues with small deviations offline at Maman Hill where the route deviates west from its original alignment and at Achintee where the route deviates to the southeast of the village before returning online at Strathcarron and being carried over the River Taodail on a new bridge and embankment.

#### *Construction Impacts*

The construction of the option has the potential to physically impact upon the shieling hut (**MHG22546**) associated with the former township of Allt Loch Innis Nan Seangan (**MHG22544**) an asset of low value. Any forest clearance or excavations required for the new road or embankments may permanently remove deposits associated with this asset such as further buildings, shieling huts and enclosures which are currently masked by the plantation. The removal of this will remove its potential to provide evidence ofcrofting settlements and townships and the change in the landscape and architecture following the clearances. The settlement of Allt Loch Innis Nan Seangan will remain in situ allowing research to be undertaken in the future, however this will not reduce the impact on the shieling hut itself which is judged to be **major**.

The potential widening of single track sections of the carriageway has the potential to impact upon the non-designated asset of the trackway (**MHG51299**) through Glen Carron to New Kelso, an asset of low value. The current carriageway currently cuts across the route of the trackway and any widening of this section will impact further by removing more of the asset. As the route of this trackway is discernible for considerable distance both to the north and south of the current carriageway, the construction will not remove such a significant portion of the road so as to remove all understanding of its route and destination. Therefore the impact is judged to be **minor**.

The construction of the offline section southeast of Achintee has the potential to impact upon the non-designated low value asset of a lithic scatter (**MHG46083**). The proposed route does not directly impact upon the asset, but due to its scattered nature and the possibility of raised beaches along the loch edge, there is the potential for further lithic scatters to be uncovered. Removal of the asset through development will remove the archaeological information the artefacts could provide for prehistoric seasonal settlement activity and the development of lithic implements in this area. The impact is judged to be **minor**.

The construction of the local improvement section at Maman Hill will involve new land take, excavation for the road, the movement of construction traffic and associated construction activities including the tie-in to the extant carriageway. This has the potential to impact upon the extant Camallt Cottage (**MHG53550**) an asset of low value. The route at present appears to go through the building, and may require the demolition of the structure. A planning application was submitted and approved in 2010 to demolish the building, but it is uncertain if this has yet been carried out. Therefore, if this building has been removed, the impact will be upon the site of the cottage. A detailed historic record was taken of the building in 2010 as part of the planning condition and therefore the historic value of the site and the information it can provide for 19<sup>th</sup> century architecture has been preserved already. Therefore, the impact is judged to be **negligible**.

The potential widening may also impact upon the pair of two category C(s) listed estate cottages (**7264**) at New Kelso. The construction works will create additional noise and activity and there is the potential for the carriageway itself to move closer to the buildings. This will impact upon the setting of these cottages which at present is defined by their relationship to the former trackway through Glen Carron and their isolated and tranquil position at the loch

head. The setting impact will be temporary during the course of the construction period and therefore the impact is judged to be **minor**.

#### *Operational Impacts*

The route and presence of associated road structures such as barriers and signage will potentially impact upon the setting of the two listed estate cottages (**7264**), assets of low value. Any additional street furniture, including lighting will introduce modern elements into the immediate landscape and detract from the rural and isolated setting of these cottages and reduce their aesthetic value. In addition, any road widening could potentially bring the carriageway in closer proximity to the cottages and therefore reduce the sense of tranquillity that currently exists in this location. The impact is therefore judged to be **minor**.

The route over the new bridge over the River Taodail and embankment has the potential to permanently impact upon the setting of the Strathcarron Hotel (**MHG24918**). The proximity of the embankment has the potential to block views from this asset of low value along the loch and reduce the aesthetic value of the asset. The impact is judged to be **minor**.

#### *Cumulative Impacts*

There will be no cumulative impact from development upon the archaeological resource.

#### *Mitigation*

It is recommended that a detailed walkover and/or woodland survey be undertaken along the sections of the route within the forest to establish the likelihood of survival for the township sites and to identify any other structures which may be impacted by the option. Following this, a more detailed survey may be required before construction commences.

It is suggested that in the first instance, road widening is not undertaken in the area in close proximity to the listed New Kelso cottages. This would also remove the impact on the former trackway from Glen Carron to New Kelso. If this is not possible, it is recommended that road furniture and lighting be kept to a minimum in this area.

If the road widening does occur in the area of the trackway, due to the low value of the asset and the low potential for the recovery of any significant archaeological deposits, no archaeological fieldwork is recommended here.

It is recommended that the new bridge and embankment at Strathcarron be sensitively designed and low profile to avoid blocking views from Strathcarron Hotel across the loch.

#### *Residual Effects*

The following assets will experience a residual effect of **moderate adverse** following mitigation:

- Possible shieling hut (MHG22546).

The following assets will experience a residual effect of **slight adverse** following mitigation:

- trackway from Glen Carron to New Kelso (MHG51299);
- Lithic scatter (MHG46083); and
- Strathcarron Hotel (MHG24918).

The following asset will experience a residual effect of **neutral** following mitigation:

- Two category C(s) listed estate cottages at New Kelso;
- Camallt Cottage (MHG53550).

## 7.6 Option Summary Tables

In accordance with DMRB (HA208/07 6.13) there is a requirement to report on the significance of effect both before and after mitigation measures are proposed. The significance of effect on the heritage asset prior to mitigation is reported in the final Residual Significance of Effects column shown in brackets.

**Table 7.5 Option N6 – North Online through Lochcarron**

Receptor	Sensitivity	Potential impacts	Magnitude of Impact	Mitigation measures	Residual Significant Effects
Lochcarron Old Parish Church	High	<p>During construction - direct, permanent and temporary, negative from movement of construction traffic, possible impact upon scheduled area and burials.</p> <p>During operation – permanent setting impacts from road furniture, lighting and signage</p>	Moderate	No placement of signage, lighting or road furniture in the vicinity of the scheduled area	<p>Construction - (Moderate Adverse) Moderate Adverse</p> <p>Operation – (Moderate Adverse) Slight Adverse</p>
Strome Castle	High	<p>During construction – temporary impacts upon the setting of the asset through movement of construction vehicles and interruption of views</p> <p>During operation – permanent impact on the important view from the asset put towards the sea</p>	Minor	Potential for iconic, high quality design	<p>(Moderate Adverse)</p> <p>Moderate Adverse</p>
Stromeferry, former Free Church of Scotland listed category C(s)	Low	<p>During construction – temporary setting impacts from construction of bridge and embankment</p> <p>During operation –</p>	Minor	High quality, iconic design of the bridge structure could reduce the visual impact	<p>(Slight Adverse)</p> <p>Slight Adverse</p>



		permanent setting impacts on views across the loch from this asset			
Stromeferry, former Church of Scotland Mission Church	Low	During construction – temporary setting impacts from construction of bridge and embankment  During operation – permanent setting impacts on views across the loch from this asset	Minor	High quality, iconic design of the bridge structure could reduce the visual impact	(Slight Adverse)  Slight Adverse
Plockton Conservation Area	High	During construction – temporary setting impacts from construction of bridge and embankment  During operation – permanent setting impacts on views towards Loch Carron	Minor	High quality, iconic design of the bridge structure could reduce the visual impact	(Slight Adverse)  Slight Adverse
Pair of estate cottages New Kelso Drive	Low	During operation – permanent impact from reduction in traffic	Minor	No mitigation required	(Slight Beneficial)  Slight Beneficial
Rock shelter MHG46066	Low	Direct, permanent impacts from construction of bridge	Moderate	Walkover survey followed by a programme of archaeological fieldwork	(Slight Adverse)  Slight Adverse
Cist MHG14046	Low	Direct, permanent impacts from construction of bridge	Moderate	Walkover survey followed by a programme of archaeological fieldwork	(Slight Adverse)  Slight Adverse

**Table 7.6 Option N9 – North Lochcarron Bypass Route**

Receptor	Sensitivity	Potential impacts	Magnitude of Impact	Mitigation measures	Residual Significant Effects (prior to mitigation)
Lochcarron Old Parish Church	High	<p>During construction, direct, permanent and temporary, negative from movement of construction traffic, possible impact upon scheduled area and burials.</p> <p>During operation – permanent setting impacts from road furniture, lighting and signage</p>	Moderate	No placement of signage, lighting or road furniture in the vicinity of the scheduled area	<p>Construction - (Moderate Adverse) Moderate Adverse</p> <p>Operation – (Moderate Adverse) Slight Adverse</p>
Strome Castle	High	<p>During construction – temporary impacts upon the setting of the asset through movement of construction vehicles and interruption of views</p> <p>During operation – permanent impact on the important view from the asset out towards the sea</p>	Minor	Potential for iconic, high quality design	<p>(Moderate Adverse)</p> <p>Moderate Adverse</p>
Stromeferry, former Free Church of Scotland listed category C(s)	Low	<p>During construction – temporary setting impacts from construction of bridge and embankment</p> <p>During operation – permanent setting impacts on views across the loch from this asset</p>	Minor	High quality, iconic design of the bridge structure could reduce the visual impact	<p>(Slight Adverse)</p> <p>Slight Adverse</p>
Stromeferry, former Church of Scotland Mission Church	Low	<p>During construction – temporary setting impacts from construction of bridge and embankment</p> <p>During operation – permanent setting impacts on views across the loch from this asset</p>	Minor	High quality, iconic design of the bridge structure could reduce the visual impact	<p>(Slight Adverse)</p> <p>Slight Adverse</p>
Plockton Conservation Area	High	<p>During construction – temporary setting impacts from construction of bridge and embankment</p> <p>During operation – permanent setting impacts on views towards Loch Carron</p>	Minor	High quality, iconic design of the bridge structure could reduce the visual impact	<p>(Slight Adverse)</p> <p>Slight Adverse</p>

Pair of estate cottages New Kelso Drive	Low	During operation – permanent impact from reduction in traffic	Minor	No mitigation required	(Slight Beneficial) Slight Beneficial
Hut circle MHG14042	Low	Direct, permanent impacts from construction of offline section of route	Major	Walkover survey followed by a programme of archaeological fieldwork	(Moderate Adverse) Moderate Adverse
Hut circle MHG7646	Low	Direct, permanent impacts from construction of offline section of route	Major	Walkover survey followed by a programme of archaeological fieldwork	(Moderate Adverse) Moderate Adverse
Clearance cairn MHG41305	Low	Direct, permanent impacts from construction of offline section of route	Major	Walkover survey followed by a programme of archaeological fieldwork	(Slight Adverse) Slight Adverse
Clearance cairn MHG33087	Low	Direct, permanent impacts from construction of offline section of route	Major	Walkover survey followed by a programme of archaeological fieldwork	(Slight Adverse) Slight Adverse
Cairn MHG32724	Low	Direct, permanent impacts from construction of offline section of route	Major	Walkover survey followed by a programme of archaeological fieldwork	(Moderate Adverse) Moderate Adverse
Possible boat burial MHG7667	Low	Direct, permanent impacts from construction of offline section of route	Major	Walkover survey followed by a programme of archaeological fieldwork	(Moderate Adverse) Moderate Adverse
Enclosure MHG22480	Low	Direct, permanent impacts from construction of offline section of route	Major	Walkover survey followed by a programme of archaeological fieldwork	(Slight Adverse) Slight Adverse
Enclosure MHG22481	Low	Direct, permanent impacts from construction of offline section of route	Major	Walkover survey followed by a programme of archaeological fieldwork	(Slight Adverse) Slight Adverse
Stromemore township MHG32598	Low	Direct, permanent impacts from construction of offline section of route	Minor	Walkover survey followed by a programme of archaeological fieldwork	(Slight Adverse) Slight Adverse

Rock shelter MHG46066	Low	Direct, permanent impacts from construction of bridge	Moderate	Walkover survey followed by a programme of archaeological fieldwork	(Slight Adverse) Slight Adverse
Cist MHG14046	Low	Direct, permanent impacts from construction of bridge	Moderate	Walkover survey followed by a programme of archaeological fieldwork	(Slight Adverse) Slight Adverse
Causeway MHG51310	Low	Direct, permanent impacts from construction of offline section of route	Minor	Walkover survey followed by a programme of archaeological fieldwork	(Slight Adverse) Slight Adverse
Head dyke MHG22772	Low	Direct, permanent impacts from construction of offline section of route	Minor	Walkover survey followed by a programme of archaeological fieldwork	(Slight Adverse) Slight Adverse
Structures on head dyke (x9)	Low	Direct, permanent impacts from construction of offline section of route	Minor	Walkover survey followed by a programme of archaeological fieldwork	(Slight Adverse) Slight Adverse
Broch/dun MHG7944	Medium	Direct, permanent impacts from construction of offline section of route	Minor	Walkover survey followed by a programme of archaeological fieldwork	(Slight Adverse) Slight Adverse
Potential archaeological assets	Low	Permanent, direct from construction of offline section of route	Major	Walkover survey followed by programme of archaeological fieldwork	(Slight Adverse) Slight Adverse

**Table 7.7 Option O2 – Online with Rail Viaduct**

Receptor	Sensitivity	Potential impacts	Magnitude of Impact	Mitigation measures	Residual Significant Effects
Building at Cuddies Point MHG22515	Negligible	Permanent, direct - construction impacts of road returning online	Moderate	Walkover survey	(Slight Adverse) Slight Adverse
Farmhouse at Cuddies Point MHG22514	Negligible	Permanent, direct - construction impacts of road returning online	Moderate	Walkover survey	(Slight Adverse) Slight Adverse
Potential for raised beach deposits along embankment section	Low	Permanent, direct - construction impacts of road returning online	Moderate	Walkover survey Analysis of geotechnical data	(Slight Adverse) Slight Adverse
MHG51299 – trackway from Glen Carron to New Kelso	Low	Permanent, direct from widening of single track carriageway	Minor	Removal of requirement to widen the carriageway at this point – otherwise, no mitigation recommended	(Slight Adverse) Slight Adverse
Strathcarron Hotel (MHG24918)	Low	During construction – temporary setting impacts from construction of bridge and embankment  During operation – permanent setting impacts on views across the loch from this asset	Minor	Considerate design of embankment	(Slight Adverse) Slight Adverse
Lithic scatter MHG46083	Low	Permanent, direct impact on associated assets from route alignment	Minor	Walkover survey followed by a programme of archaeological fieldwork	(Slight Adverse) Slight Adverse

Camallt Cottages MHG53550	Low	Permanent direct impact on site of cottages	Minor	No mitigation proposed	Neutral
New Kelso driveway pair of estate cottages	Low	During construction – temporary setting impacts  During operation – permanent setting impacts from road furniture and lighting	Minor	Removal of requirement to widen the carriageway at this point and minimise new road signage and lighting	(Slight Adverse)  Neutral

**Table 7.8 Option O3 – Online with Tunnel**

Receptor	Sensitivity	Potential impacts	Magnitude of Impact	Mitigation measures	Residual Significant Effects
MHG51299 – trackway from Glen Carron to New Kelso	Low	Permanent, direct from widening of single track carriageway	Minor	Removal of requirement to widen the carriageway at this point – otherwise, no mitigation recommended	(Slight Adverse)  Slight Adverse
New Kelso driveway pair of estate cottages	Low	During construction – temporary setting impacts  During operation – permanent setting impacts from road furniture and lighting	Minor	Removal of requirement to widen the carriageway at this point and minimise new road signage and lighting	(Slight Adverse)  Neutral

**Option – Online O4 – Do minimum – No Residual Effect**

**Table 7.9 Option O5 – Online with Road and Rail Share**

Receptor	Sensitivity	Potential impacts	Magnitude of Impact	Mitigation measures	Residual Significant Effects
Strathcarron Hotel (MHG24918)	Low	<p>During construction – temporary setting impacts from construction of bridge and embankment</p> <p>During operation – permanent setting impacts on views across the loch from this asset</p>	Minor	Considerate design of embankment	<p>(Slight Adverse)</p> <p>Slight Adverse</p>
Lithic scatter MHG46083	Low	Permanent, direct impact on associated assets from route alignment	Minor	Walkover survey followed by a programme of archaeological fieldwork	<p>(Slight Adverse)</p> <p>Slight Adverse</p>
Camallt Cottages MHG53550	Low	Permanent direct impact on site of cottages	Minor	No mitigation proposed	Neutral
MHG51299 – trackway from Glen Carron to New Kelso	Low	Permanent, direct from widening of single track carriageway	Minor	Removal of requirement to widen the carriageway at this point – otherwise, no mitigation recommended	<p>(Slight Adverse)</p> <p>Slight Adverse</p>
New Kelso driveway pair of estate cottages	Low	<p>During construction – temporary setting impacts</p> <p>During operation – permanent setting impacts from road furniture and lighting</p>	Minor	Removal of requirement to widen the carriageway at this point and minimise new road signage and lighting	<p>(Slight Adverse)</p> <p>Neutral</p>

**Table 7.10 Option O7 – Online with Developed Avalanche Shelter**

Receptor	Sensitivity	Potential impacts	Magnitude of Impact	Mitigation measures	Residual Significant Effects
Strathcarron Hotel (MHG24918)	Low	<p>During construction – temporary setting impacts from construction of bridge and embankment</p> <p>During operation – permanent setting impacts on views across the loch from this asset</p>	Minor	Considerate design of embankment	<p>(Slight Adverse)</p> <p>Slight Adverse</p>
Lithic scatter MHG46083	Low	Permanent, direct impact on associated assets from route alignment	Minor	Walkover survey followed by a programme of archaeological fieldwork	<p>(Slight Adverse)</p> <p>Slight Adverse</p>
Camallt Cottages MHG53550	Low	Permanent direct impact on site of cottages	Minor	No mitigation proposed	Neutral
MHG51299 – trackway from Glen Carron to New Kelso	Low	Permanent, direct from widening of single track carriageway	Minor	Removal of requirement to widen the carriageway at this point – otherwise, no mitigation recommended	<p>(Slight Adverse)</p> <p>Slight Adverse</p>
New Kelso driveway pair of estate cottages	Low	<p>During construction – temporary setting impacts</p> <p>During operation – permanent setting impacts from road furniture and lighting</p>	Minor	Removal of requirement to widen the carriageway at this point and minimise new road signage and lighting	<p>(Slight Adverse)</p> <p>Neutral</p>



**Table 7.11 Option S4 – South Glen Udalain**

Receptor	Sensitivity	Potential impacts	Magnitude of Impact	Mitigation measures	Residual Significant Effects
Strathcarron Hotel (MHG24918)	Low	<p>During construction – temporary setting impacts from construction of bridge and embankment</p> <p>During operation – permanent setting impacts on views across the loch from this asset</p>	Minor	Considerate design of embankment	<p>(Slight Adverse)</p> <p>Slight Adverse</p>
Lithic scatter MHG46083	Low	Permanent, direct impact on associated assets from route alignment	Minor	Walkover survey followed by a programme of archaeological fieldwork	<p>(Slight Adverse)</p> <p>Slight Adverse</p>
Camallt Cottages MHG53550	Low	Permanent direct impact on site of cottages	Minor	No mitigation proposed	Neutral
MHG22546 – possible shieling hut	Low	Permanent, direct from construction of route through the forest section	Major	Woodland survey	<p>(Moderate adverse)</p> <p>Moderate adverse</p>
MHG51299 – trackway from Glen Carron to New Kelso	Low	Permanent, direct from widening of single track carriageway	Minor	Removal of requirement to widen the carriageway at this point – otherwise, no mitigation recommended	<p>(Slight Adverse)</p> <p>Slight Adverse</p>
New Kelso driveway pair of estate cottages	Low	<p>During construction – temporary setting impacts</p> <p>During operation – permanent</p>	Minor	Removal of requirement to widen the carriageway at this point and minimise new road signage and	<p>(Slight Adverse)</p> <p>Neutral</p>

		setting impacts from road furniture and lighting		lighting	
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**7.7 Preferred Route Option**

In terms of the heritage resource, N9, the North Lochcarron Bypass represents the highest level of residual effect to the heritage resource and is the worst option from a heritage point of view.

Following the options assessment, it is recommended that the online options present the lowest level of residual effect to the heritage resource of the area. N6 is also a viable option; however, the bridge across the loch entrance remains a possible setting issue with the scheduled Strome Castle. If this option were to be pursued, it is recommended that consultation be undertaken with Historic Scotland at the earliest opportunity.

**7.8 Difficulties Encountered/Limits to Assessment**

No particular limitations or difficulties were encountered during the preparation of this chapter.

**7.9 Summary & Conclusions**

This chapter has presented the potential impacts and residual effects upon the heritage resource for the Stromeferry Bypass. The baseline has identified a number of Listed Buildings within the search area, including the category C(s) New Kelso Cottages located west of Strathcarron Junction which have the potential to have their setting impacted by a number of the route options. Two Scheduled Monuments were identified within the search area. Strome Castle has the potential to have its setting impacted by the construction of the bridge across the entrance to Loch Carron which could impede views from the asset. The Lochcarron old Parish Church has the potential to be impacted physically by option N9 and have its setting impacted by both north shore options.

The baseline assessment identified a number of prehistoric heritage assets and remains of shielding huts and crofting settlements associated with the Highland Clearances. A number of the route options have the potential to impact upon these, with the offline option N9 crossing an area of dense archaeological potential southwest and northeast of Lochcarron.

## 8 EFFECTS ON ALL TRAVELLERS

### 8.1.1 *Introduction*

In accordance with DMRB guidance this section assesses the potential impacts on both motorised users and non-motorised users (NMUs), which include pedestrians, cyclists and equestrians.

The objective of these respective Stage 2 assessments are to:-

- “Undertake sufficient assessment to identify the routes used by pedestrians and others, the community facilities and the effects upon these two categories to be taken into account by the Design organisation in developing and refining the options, in agreement with the Overseeing Department’s Project Manager” (Source DMRB Vol. 11 : Section 3, Part 8 – section 9).
- “Undertake sufficient assessment to identify the factors and effects concerning vehicle travellers to be taken into account by the Design Organisation in developing and refining route options in agreement with the Overseeing Department’s Project Manager” (Source: DMRB Vol. 11: Section 3, Part 9 – section 5).

This DMRB Stage 2 appraisal of the Effects on All Travellers assesses, in broad terms, the likely effects of each route option on these baseline receptors and aims to inform future decision making regarding a preferred route option to be taken forward for more detailed assessment at DMRB Stage 3.

### 8.1.2 *Methodology*

The assessment has been carried out using guidance provided in DMRB as described below.

This assessment has been undertaken following guidance in both DMRB Volume 11, Section 3, Part 8 (*Pedestrians, Cyclists, Equestrians and Community Effects*), and DMRB Volume 11, Section 3, Part 9 (*Vehicle Travellers*) and with reference to guidance contained in the Scottish Natural Heritage (SNH) (*EIA Handbook Appendix 5: Outdoor Access Impact Assessment - 2009*) in respect of issues likely to arise in the EIA process with regards to outdoor access.

It should be noted that for ease of reference, and the avoidance of duplication, the changes in landscape quality/visual intrusion impacts (*which form part of the DMRB “Changes in Amenity” assessment requirements*) is detailed in the Landscape & Visual chapter of this report.

The Stage 2 assessments are undertaken in the following stages:

- Establishment of the baseline;
- Assessment of potential impacts; and
- Identification of potential mitigation measures.

#### ***Establishment of the baseline***

The development of the baseline allows the establishment of a clear understanding of the existing conditions to allow a sufficient assessment of the likely consequences of the route options and the baseline position to be made.

Baseline conditions were identified through a review of the following:-

- Site visit;
- Ordnance Survey (OS) Explorer Maps 428 and 429;

- The Highland Council Core Path Network Plans for the Map 35:Lochcarron ( Ross & Cromarty area) 2011;
- The Highland Council Core Path Network Plans for the Map 21:Dornie, Plockton, Achmore & Kyle (Skye & Lochalsh area) 2011;
- Scottish Paths Record (SNH);
- URS' GIS Database;
- Forestry Commissions GLADE Land Information Search (available at time of assessment);
- Desk-top documentation review and web-based information sources (*relevant references/links provided*);
- Other various online information sources.

**Assessment of potential impacts**

The Effects on All Travellers methodology embraces a number of key considerations for existing receptors contained within, and in proximity to, the route location and these are highlighted below. The scope of effects considered in this assessment (*during both the Route construction and Route operation phases*) includes:

- Permanent or temporary restriction of vehicular traveller access or severance of access to residential, community, and other civic facilities;
- Permanent or temporary restriction of vehicular traveller access or severance of access to local business operations;
- Permanent or temporary severance of public recreational amenities and routes e.g. existing public Rights of Way (RoW), The Highland Council core path networks, cycleways, bridleways etc;
- Route effects on existing pedestrians, cyclists, equestrians and local vehicular journey routes e.g. changes in journey lengths and times;
- Changes in amenity which DMRB Vol. 11 defines as “*the relative pleasantness of a journey*”, although this has excluded the changes in landscape quality/visual intrusion impact elements which, as previously stated, are covered in the landscape chapter;
- Any adverse mental and physiological effects experienced by a driver traversing the Route section of the A890 (“*driver stress*”).

The assessment of the potential effects of the Route options has been undertaken as follows:

- Identification of a particular travellers effect;
- Consideration of the magnitude of the effect (the actual change taking place to the environment).The scales adopted for the magnitude of the effects are shown in Table 8.1 below:

**Table 8.1 - Magnitude Scales**

Level of Magnitude	Definition
Major	A fundamental change to the traveller’s baseline conditions
Moderate	A material but non-fundamental change to the traveller’s baseline conditions
Minor	A detectable but non-material change to the traveller’s baseline conditions
None	No detectable change to the traveller’s baseline conditions

Consideration of the sensitivity of the receptor – a judgement as to the importance or value of the receptor, and its resilience to cope with changes resulting from the traveller’s effect. A scale of sensitivity of the receptor has been defined as None, Low, Medium, High and Very High.

Determination of the level of impact by considering both the magnitude and sensitivity of the traveller’s receptor as summarised in Table 8.2 below:-

**Table 8.2 – Determination of Impact Significance (Effects falling within shaded boxes are considered to be Significant)**

		Sensitivity of Receptor				
		Very High	High	Medium	Low	Negligible
Magnitude of Impact	Major	Very Large	Large or Very Large	Moderate or Large	Slight or Moderate	Slight
	Moderate	Large or Very Large	Moderate or Large	Moderate	Slight	Neutral or Slight
	Minor	Moderate or Large	Slight or Moderate	Slight	Neutral or Slight	Neutral or Slight
	Negligible	Slight	Slight	Neutral or Slight	Neutral or Slight	Neutral
	No Change	Neutral	Neutral	Neutral	Neutral	Neutral

Note: A qualitative judgment for the determination of significance has been adopted and only those effects that fall within the “moderate” and “major” categories are considered to be significant.

**Identification of potential mitigation measures**

Mitigation measures have been identified to minimise the traveller’s effects of the proposed Route as far as possible within the technical constraints of the project. The mitigation is designed to prevent, reduce, and where possible offset the potential effects upon the community baseline conditions. Mitigation will also be used to help inform the options appraisal and more detailed design stages.

**8.1.3 Consultations**

The Stage 2 consultation requirements as contained within DMRB Vol. 11 Section 3, Part 8 (Chapter 9) are not particularly prescriptive but do require that consideration of the route options at this stage should not lead to unnecessary anxiety amongst local people and *“members of the public should not therefore be asked for information on usage of community facilities, nor should origin/destination surveys be undertaken”*.

The DMRB Stage 2 consultation guidance only calls for consultation with the local highways officer responsible for cycling provision *“where cyclists will be significantly affected”*. Consultation responses with relevance to access issues for this A890 Stromeferry Bypass project were received from Sustrans Scotland, The Highland Council (THC) and the Forestry Commission Scotland. In addition consultation was carried out with THC’s Access Officer to assist the collection of information on relevant core paths, rights of way and undesignated paths.

Consultation responses with relevance to access issues for this A890 Stromferry Bypass project were received from various statutory bodies and local groups through a series of stakeholder events. The key objectives identified by the stakeholders in terms of the Effects on All Travellers were (See Chapter 3 for more details):

- Increasing accessibility and social inclusion by facilitating new opportunities for public transport and non-motorised users;
- Providing new opportunities for enjoyment of the natural landscape
- Removing the risk of disruption to users during operation and minimise disruptive closures during construction; and
- Providing a deliverable, safe and reliable solution that reduces journey times.

#### 8.1.4 **Policy**

The following legislation and policy has been referred to as part of this assessment:

- National Planning Framework 2 (NPF2);
- Scottish Planning Policy (SPP) (2010);
- Strategic Transport Projects Review (2009).

In addition to the above a number of Policies within the Highland Wide Local Development Plan (2012), the Wester Ross Local Plan (2006) and the West Highland & Islands Local Plan (2010) have also been considered as part of the assessment.

#### 8.1.5 **Baseline**

For this chapter the receptors contained within, or in relevant proximity to a road corridor zone (250 metres off-set radius) either side of each of the proposed route options have been considered and this forms the study area. These baseline conditions are detailed below and are illustrated in Figure 8.1.

##### **Pedestrian**

A significant part of the land (and inland water) in the vicinity of the Stromeferry Bypass Route is covered by the Land Reform (Scotland) Act 2003 legislation. Under Part 1 of the Land Reform (Scotland) Act 2003 everyone now has statutory access rights for recreational purposes on most land and inland water in Scotland, provided these rights are exercised responsibly and regardless of whether an identified path or track exists or not. Section 13 of the 2003 Act reinforces the duty of all Scottish local authorities (and the two National Park authorities) to assert, protect, and keep open and free from obstruction or encroachment on any route – which includes Rights of Way (RoW) – by which access may reasonably be exercised.

Under the Land Reform (Scotland) Act 2003, The Highland Council, as the access authority also has a statutory requirement to produce a Core Paths Plan to cover its administrative area.

The Highland Council Core Path Network Plan was adopted on 21<sup>st</sup> September 2011. A review of the Core Path Networks Plan map and dataset relevant to the study area (Maps 21 and 35) indicates several core path sections within, or crossing, the study area.

The Stromeferry Bypass Study area is surrounded by mountainous landscape including Creag Dhubh Mhor and Sgurr a' Gharaidh. It is popular with outdoor enthusiasts and there are

therefore a number of designated and undesignated paths, as described and illustrated with various examples in Images 8.1 – 8.4 below.



**Image 8.1 – Footpath west of Achmore towards Portchullin**

There are nine designated core paths located within the Stromferry Bypass Study area, shown on Figure 8.1 (in Appendix 1) and listed below in Table 8.3. These core paths are of various lengths, types and are spread throughout the study area.

**Table 8.3 – Core Paths**

Path Reference	Description
Core path Plan map21 (THC): Path Number SL01.01	Portchullin to Fernaig Road is a track/grass, 1.3km in length
Core path Plan map21 (THC): Path Number SL01.02,	Stromewood is a track, 1.6km in length
Core path Plan map35 (THC): Path Number RC29.01,	Croft Road to Shore Road vennels a,b c are constructed stone paths, 0.5km in length
Core path Plan map35 (THC): Path Number RC29.02,	Achintraid to Leacanashie is a forest track/constructed path, 4.9km length
Core path Plan map35 (THC): Path Number RC29.03,	Attadale Circular is a estate track, 8.3km in length
Core path Plan map35 (THC): Path Number RC29.04,	Smithy to New Kelso path is a farm track, 1.3km in length
Core path Plan map35 (THC): Path Number RC29.05,	New Kelso Paths is a forest track/grass, 3.7km in length
Core path Plan map35 (THC): Path Number RC29.06,	Ardeneaskan to Reraig Burn is a forest track, 2.2km in length
Core path Plan map35 (THC): Path Number RC29.07,	Cnoc na Straing is a constructed stone path, 0.7km in length



**Image 8.2 – Footpath near Lochcarron towards Cnoc Na Staing core path**

In addition the Forestry Commissions GLADE Land Information Search and information from The Highland Council shows approximately 18 separate Rights of Way within the Stromeferry Bypass Area which are not included in the core paths network. These are shown in Figure 8.1 (in Appendix 1).



**Image 8.3 – Footpath close to Kirkton Wood**





**Image 8.4 – Footpath west of Strathcarron**

### ***Cyclists***

A review of the cycle route maps on the Sustrans website (Ref: 8-1) reveals that there are no cycle routes within, or crossing, the study area for the Strome Ferry Bypass Scheme. (*Note:* This was also confirmed in the Sustrans consultation response). Indeed, the nearest Sustrans route is the Great Glen Way running from Fort William to Inverness. The Visit Scotland Highland Cycle route 'The Plockton Circuit' is also situated c. 5km south-west of the southern end of the Route boundary.

The statements made in the preceding "Pedestrians" section regarding the Land Reform (Scotland) Act 2003 and the Highland Council Core Path Network Plans area also applicable for public recreational access rights to cycling in, and around, the Route area.

Strome Ferry Bypass as well as its surrounding network of undesignated paths and RoWs are used by cyclists. During a site visit it was noted that the A890 (Strome Ferry Bypass) and its surrounding paths/tracks are used by cyclists.

### ***Equestrians***

There are no riding centres within or immediately adjacent to the proposed Strome Ferry Bypass Route study area. The nearest British Horse Society (BHS) approved riding centre establishments (Ref 8-2) are the Highland Riding Centre, Borlum Farm, Drumnadrochit and Chapelton Farm Equestrian Centre, Muir Of Ord both of which are c. 50km north-east of the southern end of the Route boundary.

However, the statements made in the "Pedestrians" section above regarding the Land Reform (Scotland) Act 2003 and the Highland Council Core Path Network Plans area also applicable for public recreational access rights to horse riding in, and around, the study area.

Strome Ferry Bypass (A890) and its surrounding woodland paths/tracks can also be utilised as routes for equestrian users.

**Vehicle Travellers**

**Road layout**

(Note: images 8.5 – 8.11 illustrate sections of the existing road)

The section of the A890 between Stromeferry and the A890/A896 at Strathcarron Junction is a single carriageway trunk road that travels in a mainly north-easterly direction and varies in level along the route. The trunk road runs parallel with the Kyle of Lochalsh – Dingwall railway line along the majority of the length of the defined Route study area. The route geometry is relatively straight along the whole length with the only significant curved alignment being between Attadale and Strathcarron. The majority of the road provides open views along or across Loch Carron but forestry blocks, shelterbelt planting, very steep rocky moorland slopes and native woodland provide some containment of views towards the east when travelling northbound.

Commencing at the north-west end of the study area is Strathcarron Junction where the A890 meets the A896, this is a 'T' priority junction. The road is wooded and enclosed on both sides. As vehicle travellers continue heading southeast, the A890 heads out of the wooded area and narrows to a lane road which runs south of New Kelso and a bridge over the River Carron, after which it widens back to a single carriageway trunk road. As the road nears Strathcarron it meets the A890/Railway Terrace minor road a 'T' priority junction, crosses the railway line via a level crossing where right hand bend takes the route southward.

The road, now parallel with the railway line, heads south and narrows into a single lane road for approximately 50m. After this, there is a gentle right hand bend making the road head in a southwest direction, again parallel to the railway. The road then crosses a bridge over the River Taodail and continues in a relatively straight geometry southwest with long gentle right and left hand bends for c. 2km. It then crosses Allt Cul an Lin and continues heading southwest.



**Image 8.5 River Taodail with road near Strathcarron**

The road then ascends whilst bending to the left, it also crosses An Cam-allt as it continues to bend left into a wooded area (enclosed on both sides) and the gradient increases (c. 14%). As

the road reaches the top of the hill it emerges from the wooded area, there is a gentle 'S' bend over c. 150m, and it descends. The road continues downhill at a steep gradient (14%) and there is a shallow U-bend as it reaches the bottom of the hill.

The road then heads in a relatively straight geometry past Attadale Station (to the west), and Attadale Gardens (to the east). The road meets the Attadale Estate/A890 'T' junction on the left hand side just prior to crossing the River Attadale and the elevation starts to increase with a gentle gradient and gentle bends right then left, offering a view over the Loch to the east.

The road then continues to bend to the right then left as it descends at a shallow gradient, with a steep rock cut bordering to the east. Near the base of the hill the road narrows to a single lane road for c. 700m which bends gently to the right and runs under the avalanche shelter after which it increases in elevation with a mild gradient and has two passing places before the road then widens to a single carriageway trunk road.

The road continues in a southwest direction running parallel to the railway line narrowing twice into a single lane road : one section with two and another with four passing places for c.600m. The road ascends whilst crossing Allt na Beiste and then descends where it narrows to a single lane road (for c. 750m), during which it crosses Allt an Ard achaidh and has 5 passing places.



**Image 8.6 Attadale lay-by/passing point near station**



**Image 8.7 Near Attadale Gardens looking south**

As the road passes Ardnaff (to the west) it ascends and becomes a single carriageway trunk road. The road continues to ascend and descend with gentle gradients and a series of gentle left and right hand bends. The road narrows to a single lane road for c. 1.2km, runs on a 'U' bend over c.200m and then widens to a single carriageway trunk road where it meets the A890/High Street 'T' junction.



**Image 8.8 North between Stromeferry and Attadale**

The road continues southwest until it meets a A890/unnamed road wide 'T' junction on the west of the road, after which it 'U' bends to the left for c. 1km. In the 'U' bend the road meets an A890/unnamed road 'T' junction on the south of the road. The road now heads east and enters another 'U' bend to the right for c. 1.4 km. In this second 'U' bend the road crosses Allt Cadha an Eas and heads south.

The road meets an unnamed road/A890 'T' junction on the right hand side and continues heading southwards till the end of the study area and heads towards Auchtertyre.

**Junctions and Accesses**

As mentioned above, there are several 'T' junctions along the route of the Strome ferry Bypass (between Achmore and the A890/A896 Strathcarron junction) within the study area. These are detailed below:

- The A890 and A896 ('Strathcarron') junction between Kirkton and New Kelso – requires northbound traffic from the A890 to make a left-turn across the southbound A896.



**Image 8.9 Strathcarron Junction**

- Railway terrace and A890 junction in Strathcarron - requires northbound traffic from railway terrace main road to make a right-turn across the southbound A890 carriageway.
- Attadale gardens road and A890 junction in Attadale – requires northbound traffic from Attadale gardens road to make a right-turn across the southbound A890 carriageway.
- Strome ferry main road/High street and A890 junction South of South Strome - requires southbound traffic from Strome ferry main road/High street to make a right-turn across the northbound A890 carriageway.
- Unnamed road and A890 junction north of Achmore – requires southbound traffic from the unnamed road to make a right-turn across the northbound A890 carriageway.
- Unnamed road and A890 junction east of Achmore – requires southbound traffic from the unnamed road to make a right-turn across the northbound A890 carriageway.
- Unnamed road and A890 junction south of Braeintra – requires southbound traffic from the unnamed road to make a right-turn across the northbound A890 carriageway.

There are numerous direct vehicular accesses along the length of this section of the Stromeferry Bypass (A890) which comprises the defined study area corridor: -

- There are c. 9 x residential accesses
- A further c. 31 vehicular accesses from the A890 are for non-residential use comprising:-
  - c. 13 x Field accesses;
  - c. 18 x Land owner vehicular accesses; and
  - c. 10 x Forest tracks.



**Image 8.10 – Forestry track access at Scheme's most Southerly point**

**Lay-Bys and Bus Stops**

Along the whole length of the section of the A890 Stromeferry Bypass contained within the study area: -

- There are up to 12 vehicle lay-bys, the majority of which are situated between Attadale Station and Stromeferry;
- There are 2 road-side picnic areas, one of which is located just south of Ardnaff offering views North and West across Loch Carron, and the other is located north of Stromeferry, this located at the Loch Carron viewpoint offering unrestricted views of Loch Carron.
- Bus route maps highlight to two bus stops located adjacent to Strathcarron Hotel, however, there were no formal bus stops/shelters seen during the site visit. In addition, it is assumed that buses will stop at trains stations located within the Study area.



**Image 8.11 Passing Point prior to Avalanche Shelter along A890 heading north**

### **Driver Stress**

Driver stress is defined for the purposes of environmental assessment as the adverse mental and physiological effects experienced by a driver traversing a road network. Driver stress has three main components: frustration, fear of potential accidents and uncertainty relating to the route being followed.

The existing single carriageway lay-out of the A890 between Stromeferry and the A890/A896 Strathcarron Junction, together with the two formal road junctions, several gated access connections and the vehicle lay-by provision along this approximate 15km stretch of trunk road, creates a number of vehicle traveller considerations including:-

- Change of A890 road layout from a single carriageway section to a one lane road section, along several sections of the scheme, e.g. before the Attadale section of the Route e.g. changes in vehicle speeds, braking etc;
- Potential driver frustration of travelling behind slow moving vehicles and general traffic congestion during busy periods along the Route corridor e.g. peak weekday times, weekends, the main tourism periods (April to October) and during periods of road maintenance works;
- Potential uncertainty/fear of overtaking on any of the single lane stretches of the A890 and use of any of the one lane sections e.g. near Attadale;
- Potential uncertainty/fear of turning manoeuvres across the northbound and southbound A890 carriageways respectively;
- Change in vehicle speeds as drivers enter/exit the formal road junctions, vehicle lay-bys, residential accesses and other vehicular accesses.

### **View from the Road**

This is a relatively diverse landscape, ranging from rocky moorland to wide farmed strath and enclosed inlets. The road traverses the southern and eastern side of the loch and offers views of the rugged moorland and hills, divided by steep sided glens and inlets such as Loch Carron, Attadale and Strath Ascaig.

The landscape character and visual amenity of the Study area is covered in detail within the Landscape and Visual Amenity chapter of this report.

#### 8.1.6 ***Route Options Assessment***

The following provides an assessment of the elements of the route with the potential to result in impacts upon all travellers within the study area. A description of the 8 options assessed is provided in Chapter 4 Description of the Route Options. Impacts relating to access of individual properties and community assets are described within the Community and Private Assets chapter (Chapter 9) of this report.

For each of the 8 route options, potential positive and adverse effects are anticipated as a result of construction activities such as construction compounds and the storage of materials in informal lay-bys (which will be temporary in nature) and permanent re-alignment of the road. Mitigation measures have been prescribed where possible.

Table 8.4 below identifies both the construction and operational impact for all the route options.

##### ***Construction Impacts***

All 8 route options will result in temporary impacts during the construction phase. These impacts would result from movement of construction vehicles and machinery, vegetation clearance of the works area, operations of the contractor's main offices and works compound areas, fencing, carriageway construction, signing etc. temporary access roads, traffic diversions, transfer and storage of material and security lighting at night.

##### ***Operational Impacts***

All 8 route options will result in impacts on accessibility, non-motorised users and vehicle travellers within the study area. These impacts may result in permanent removal of vegetation along the route options, introduction of a road, associated earthworks and structures, introduction of signage, safety barriers and other road furniture and traffic along the new route.

Tables 8.4, 8.5 and 8.6 below provide an assessment of the potential operational impacts upon land-use and accessibility of each route option.



**Table 8.4: North Offline Lochcarron Bypass (N9) and North Online through Lochcarron (N6) Route Options**

Receptor	Potential impacts/Predicted Effects	Sensitivity	Magnitude of Impact	Mitigation measures	Significance
Disruption to all road users during construction	Both routes will cause temporary disruption to travellers who traverse the A896, Church Street and those at the Strathcarron Junction during construction.  Option N9 will cause less disruption to road users as the majority of the route will require offline construction. The introduction of traffic management conditions potentially with temporary speed restrictions and shuttle working may be required; this will be further explored in Stage 3.	Medium	N6: Moderate	Phasing of construction works to minimise disruption to vehicle travellers and maintenance of vehicle traveller access along the A890/A896 to avoid any temporary route or access severance.  Ensuring that any diversions are well signposted and drivers are fully aware of any likely delays.	Moderate adverse
			N9: Minor		Slight adverse
Driver Stress during construction	During construction it is likely that driver stress and frustration along the A890 and surrounding roads will increase due to a change in baseline conditions through, for example, temporary vehicle movements, lane narrowing, traffic management measures, congestion and delays.  Vehicle travellers wishing to access minor roads or access junctions which may be closed as a result of the route will experience enhanced driver stress and frustration. Uncertainty of the route being followed is unlikely to be a factor during construction of Option N9 as most construction work is offline and diversions on existing routes shall not be significant. However, it may be a factor during construction of Option N6 as it predominantly travels along existing roads. Fear of potential accidents is unlikely to be affected if appropriate traffic management measures are implemented during construction.  The introduction of specific traffic management conditions with temporary speed restrictions and shuttle working may be	Medium	N6: Moderate	Provision of advance signage information warning receptors of potential journey delays along the A890 and A896 due to the major construction works. Also the provision of radio station traffic bulletin updates and information displays on Traffic Scotland signs in the wider trunk road network. Ensuring that advanced signage, appropriate traffic management, diversion routes and by incorporating it into route design. Providing adequate room for road users and for all vehicle types to help reduce driver stress. Phasing of construction works can also be helpful in minimising disruption to vehicle travellers as can the establishment of agreed	Moderate adverse
			N9: Moderate / Minor		Moderate / Slight adverse

	required; this will be further explored in Stage 3.			working methods in advance of construction works.	
Disruption to core paths during construction	<p>Both Options N6 and N9 will potentially have a construction impacts on core paths may result in increased journey lengths. These paths impacted are listed below:</p> <ul style="list-style-type: none"> <li>The Smithy to New Kelso path will likely experience temporary disruption where it meets the A896;</li> <li>The Cnoc na Straig path is likely to experience temporary disruption where it meets the A896 for Option N6, and northern end for option N9 where it may also experience temporary severance;</li> <li>The Croft road to Shore road vennels core paths are likely to experience temporary disruption where it meets the A896 for option N6;</li> <li>The Achintraid to Leancanshie path is located c.250m from both options and therefore the potential effects are likely to be minimal, and;</li> <li>The Portchullin to Fernaig path will experience disruption and temporary severance at two locations along the path.</li> </ul>	High	Minor	<p>Ensure access is maintained to main path network.</p> <p>Ensure that diversion requirements agreed with The Highland Council, and that temporary diversions have advanced signage to minimise uncertainty of the route.</p>	Moderate / Slight adverse
Disruption to Rights of Way (RoW) during construction	<p>Both Options would likely impact upon the:</p> <ul style="list-style-type: none"> <li>The A896 north-west of Kirkton heading inland past Tullich RoW will likely experience disruption at its southern end;</li> </ul>	Medium	Minor	<p>Ensure access is maintained to main path network.</p> <p>Ensure that diversion requirements agreed with The</p>	Slight adverse

	<ul style="list-style-type: none"> <li>The RoW North of Strome Wood (North) towards Achintraid will likely experience disruption and severance at its southern end. However the disruption impact is likely to be greater for Option N9;</li> <li>The coastal RoW between Stromeferry and Fernaig, will likely experience disruption and temporary severance in the middle of this path adjacent to Portchullin, and</li> <li>The RoW from Achmore heading inland and crossing existing A890, will likely experience disruption where it meets the A890.</li> </ul>		<p>Highland Council and that temporary diversions have advanced signage to minimise uncertainty of the route.</p>	
<p>Kyle of Lochalsh to Dingwall Railway</p>	<p>Both routes will cause temporary disruption to the Kyle of Lochalsh to Dingwall scheduled railway services during construction as they must cross the railway line west of Achmore.</p> <p>The construction of the over-bridge could be a major cause of disruption to the railway line. Although as much work as possible will be undertaken with no disruption to the railway when the route is not operational, i.e. at weekends or night-time. This will be further explored at Stage 3.</p>	<p>High</p>	<p>Major</p> <p>Phasing of construction works to minimise disruption the railway line. Ensuring that travellers are fully aware of any likely delays and cancellations due to required construction works.</p>	<p>Large or Very Large adverse</p>
<p>Amenity value *</p>	<p>Options N6 and N9 would be visible from the existing A890 during construction and would potentially adversely affect the quality of the view, the traveller's ability to see the surrounding landscape is unlikely to be altered.</p> <p>NIMUs using all of the core paths and RoWs identified above may become closer to traffic using Options N6 and N9, and may therefore experience adverse amenity effects in terms of visual, noise and air quality (e.g. dust) which are covered in more detail within Chapter 5 – Landscape, Chapter 12 – Noise and Vibration and Chapter 11 – Air Quality. Further information at</p>	<p>Medium</p>	<p>Minor</p> <p>To reduce effects on amenity value and view from the road, mitigation would include those specified in Chapter 5 – Landscape, Chapter 12 – Noise and Vibration and Chapter 11 – Air Quality.</p>	<p>Slight adverse / Neutral</p>

	the detailed design stage will influence amenity value.					
Vehicle journey length – through journeys	During operation Options N6 and N9 would result in providing uninterrupted vehicle traveller movements along the new A890/A896 route alignment which will result in the likely reduction of journey times, due to the resolution of route disruptions.	Medium	Moderate	None required	Moderate Beneficial	
Vehicle journey length – local access	During operation, Options N6 and N9 new road alignments and alterations of access may cause an overall slight increase in total journey times for residents travelling from south of the Avalanche Shelter to Lochcarron, Kirkton and Strathcarron (and vice versa) as the A890 would be closed at the avalanche shelter. All other local journeys would remain the same.	Medium	Negligible	None required	Neutral / Slight Beneficial	
Driver Stress during operation	The resolution of route disruption through the new alignments will result in uninterrupted vehicle traveller movement and decreased journey times including avoiding the existing area of rock fall on the A890. As a result Option N6 & N9 create enhanced mental and physiological effects through the removal of driver frustration, potentially increase amenity value and improve vehicle safety. The Strorne Narrow bridge may cause a low level of fear of potential accidents, as incidents on bridges can have a greater severity. However, there will be less fear crossing a new tunnel compared to a road with a history of landslips. Uncertainty of the route being followed will not be a factor during operation as the A890 would be closed at the avalanche shelter. The introduction of the road improvement may enable more	Medium	Moderate	None required	Moderate Beneficial	

	<p>people to view and experience the landscape than was possible before. Views from the road also provide interest which may help alleviate driver stress. However, the physical impact on the surrounding landscape may have a negative impact on the local landscape character.</p> <p>The views to the east across the Loch would remain open along the North Shore Corridors, whilst the extent of views to the north and west would remain restricted by the rising hillside /contained by the rising topography.]</p> <p>The bridge crossing at Strome Narrows would potentially lead to travellers gaining views to the east across the Loch Carron, with views likely to be partially contained by any retained woodland, and west along the Strome Narrows.</p>	High	Minor	<p>Ensure the incorporation of access mitigation measure and/or enhancement opportunities into the route design and ensuring that finalised construction design avoids permanent severance of the existing paths.</p>	Moderate / Slight adverse
Severance of Core paths during Operation	<p>Options N6 &amp; N9 will likely cause permanent severance of along the Portchullin to Fernaig core path, and as a result may increase journey lengths for NIMUs using the path.</p>	High	N6: Minor N9: Minor	<p>Ensure the incorporation of access mitigation measure and/or enhancement opportunities into the route design and ensuring that finalised construction design avoids permanent severance of the existing paths.</p>	Moderate / Slight adverse
Severance of Rights of Way (RoW) during operation	<p>Options N6 &amp; N9 may cause permanent severance along the coastal RoW between Stromeferry and Fernaig, at the western end of the RoW from Achmore heading east inland and crossing existing A890.</p> <p>Option N9 may also cause permanent severance at the southern end of the North of Strome Wood (North) towards Achintraid RoW.</p> <p>The severance of these paths may result in increased journey lengths for NIMUs using these paths.</p>	High			Moderate / Slight adverse

\*Excluding changes in landscape quality/visual intrusion impact elements which are covered in Chapter 5 Landscape.

**Table 8.5: Online (O2 Rail Viaduct, O3 Inland Tunnel, O5 Shared Road & Rail and O7 Developed Avalanche Shelter) Options**

Receptor	Potential impacts/Predicted Effects	Sensitivity	Magnitude of Impact	Mitigation measures	Significance
Disruption to all road users during construction	The Online options will cause temporary disruption to travellers who traverse the A890, Railway Terrace and those at the Strathcarron Junction during construction.		O2 and O3: Minor	Phasing of construction works to minimise disruption to vehicle travellers and maintenance of vehicle traveller access along the A890/A896 to avoid any temporary route severance. Ensure diversions are well signposted and drivers are fully aware of any likely delays.	Moderate / Slight adverse
	The construction of Options O2 and O3 are likely to cause less disruption as the majority of the construction is offline. The introduction of traffic management conditions such as temporary speed restrictions and shuttle working may be required; this will be further explored in Stage 3.  There is a risk that unexpected rock falls during construction may lead to lengthy diversions.	High	O5 and O7: Moderate		Large / Moderate adverse

<p>Driver Stress during construction</p>	<p>Road works are likely to increase driver stress and frustration along the A890 and surrounding roads due to a change in baseline conditions through, for example, temporary vehicle movements, lane narrowing, traffic management measures, congestion and delays.</p> <p>Vehicle travellers wishing to access minor roads junctions that may be closed as a result of the route will experience enhanced driver stress and driver frustration.</p> <p>Uncertainty of the route being followed is likely to be a factor during construction as most construction work is online and diversions on existing routes may be necessary.</p> <p>Fear of potential accidents is unlikely to be affected if appropriate traffic management measures are implemented during construction.</p> <p>The introduction of specific Traffic management conditions potentially with temporary speed restrictions and shuttle working may be required; this will be further explored in Stage 3.</p>	<p>Medium</p>	<p>Moderate</p>	<p>Provision of advance signage information warning receptors of potential journey delays along the A890 and A896 due to the major construction works. Also the provision of radio station traffic bulletin updates and information displays on Traffic Scotland signs in the wider trunk road network.</p> <p>Ensuring that advanced signage, appropriate traffic management, diversion routes and by incorporating it into route design.</p> <p>Providing adequate room for road users and for all vehicle types will help reduce driver stress.</p> <p>Phasing of construction works can also be helpful in minimising disruption to vehicle travellers as can the establishment of agreed working methods in advance of construction works.</p>	<p>Moderate adverse</p>
<p>Disruption to core paths during construction</p>	<p>The Online Options will potentially cause temporary disruption to the Smithy to New Kelso, New Kelso and Attadale Circular paths where they meet the existing A890, and as a result may increase journey lengths.</p>	<p>High</p>	<p>Minor</p>	<p>Ensure access is maintained to main path network.</p> <p>Ensure that diversion requirements agreed with The Highland Council.</p>	<p>Slight / Moderate adverse</p>



<p>Disruption to Rights of Way (RoW) during construction</p>	<p>The Online Options would likely impact upon RoWs may result in increased journey lengths. These paths impacted are listed below:</p> <ul style="list-style-type: none"> <li>• North of existing A890 at Strathcarron heading north adjacent to the railway line, and the North of Attadale connecting with the Attadale circular core path, this RoW are likely to experience temporary disruption where they meet the existing A890;</li> <li>• Strathcarron to Achintee adjacent to existing A890, this RoW is likely to experience temporary disruption and severance where the path is adjacent to the existing A890, and;</li> <li>• South of Attadale crossing the A890 heading south east, this RoW is likely to experience temporary disruption and severance to the end of the path which meets the exiting A890.</li> </ul>	<p>Medium</p>	<p>Minor</p>	<p>Temporary diversions should have advanced signage to minimise uncertainty of the route, but they may increase overall journey lengths.</p>	<p>Slight adverse</p>
<p>Kyle of Loch Aish to Dingwall Railway</p>	<p>All the online options will impact upon the railway during construction period; however, their impact upon the railway will be to varying degrees. O2 would realign the railway to traverse along the viaduct along Loch Carron for c.1km. O5 would impact the railway by sharing the track for</p>	<p>High</p>	<p>O3 : Moderate</p>	<p>Phasing of construction works to minimise disruption the railway line. Ensuring that travellers are fully aware of any likely delays and cancellations due to required construction works. Carry out work to the railway at</p>	<p>Moderate / Large adverse</p>

	<p>c. 1.8km.</p> <p>O7 may impact the railway due to a road viaduct being introduced above the existing railway line for c.1.7km.</p> <p>All options will require some impact of the railway line at Strathcarron with the introduction of a bridge crossing.</p>		O2, O5 and O7: Major	weekends or night-time to avoid disruption.	Large or Very Large adverse
Amenity value*	<p>After the construction stage, all online options have potential to maintain or enhance amenity value and allow road users to experience the landscape.</p> <p>NIMUs using the road, core paths and RoW's identified above may be more exposed to traffic using the Online Options and may therefore experience adverse amenity effects in terms of slightly higher vehicle speeds, visual, noise and air quality (e.g. dust) which are covered in more detail Chapter 5 – Landscape and Visual, Chapter 12 – Noise and Vibration and Chapter 11 – Air Quality. However detailed design measures at Stage 3 can ensure adverse impacts are avoided.</p> <p>However, the RoW North of existing A890 at Strathcarron heading north adjacent to the railway line, this RoW may experience increased amenity effects as the traffic moves further away.</p>	Low	Minor	To reduce effects on amenity, mitigation would include those specified in Chapter 5 – Landscape and Visual, Chapter 12 – Noise and Vibration and Chapter 11 – Air Quality.	Slight beneficial / Neutral
Vehicle journey length – through journeys	<p>During operation, all Online Options will result in providing uninterrupted vehicle traveller movements along the new A890 which will result in the likely reduction of journey times due to the resolution of</p>	Medium	Moderate	None required	Moderate Beneficial

Vehicle journey length – local access	route disruptions.				Moderate Beneficial
Driver Stress during operational period	<p>The resolution of route disruption through the new scheme alignments will result in uninterrupted vehicle traveller movement and decreased journey times. As a result the Online Options create enhanced mental and physiological effects through the removal of driver frustration, potentially increase amenity value.</p> <p>All Options will improve safety along the A890; however Options O5 has potential to cause an increase in driver fear when travelling along the road/rail share section.</p> <p>Uncertainty of the route being followed will not be a factor during operation.</p> <p>Views from the road for the Online options would be unchanged for the majority of the route and new alignments may enhance the road experience.</p>	Medium	Minor	None required	Slight Beneficial
Severance of Core paths during operation	<p>None of the Online Options are likely to have an operational impact which may cause severance to the core paths within the study area.</p>	High	None	None required	Neutral
Severance of Rights of Way (RoW) during operation	<p>All Options: The RoWs from Strathcarron to Achintee adjacent to existing A890 and the South of Attadale crossing the A890 may require permanent severance due to potential road widening.</p>	Medium	Negligible	Finalised Route construction design to avoid permanent severance of the existing RoW, if possible.	Neutral / Slight

\*Excluding changes in landscape quality/visual intrusion impact elements which are covered in Chapter 5 Landscape.

**Table 8.6: Southern Route (S4)**

Receptor	Potential impacts/Predicted Effects	Sensitivity	Magnitude of Impact	Mitigation measures	Significance
Disruption to all road users during construction	<p>Option S4 will cause temporary disruption to travellers who traverse the A890, Railway Terrace and those at the Strathcarron Junction during construction of the selected Route option.</p> <p>The introduction of traffic management conditions with temporary speed restrictions and shuttle working may be required; this will be further explored in Stage 3.</p>	Medium	Minor	<p>Phasing of construction works to minimise disruption to vehicle travellers and maintenance of vehicle traveller access along the A890/A896 to avoid any temporary route severance.</p> <p>Ensure diversions are well signposted and drivers are fully aware of any likely delays.</p>	Slight adverse
Driver Stress during construction	<p>Road works along the A890 and at tie-ins are likely to increase driver frustration and stress for travellers along the A890 and surrounding roads due to a change in baseline conditions through, for example, temporary vehicle movements, lane narrowing, traffic management measures, congestion and delays.</p> <p>Vehicle travellers wishing to access minor roads junctions that may be closed as a result of the route will experience enhanced driver stress and frustration.</p> <p>Uncertainty of the route being followed is unlikely to be a factor during construction as most construction work is offline and diversions on existing routes may not be necessary.</p> <p>Fear of potential accidents is unlikely to be affected if appropriate traffic management measures are implemented during construction.</p> <p>The introduction of Traffic management conditions with temporary speed restrictions and shuttle working may be required; this will be further explored in Stage 3.</p>	Medium	Minor	<p>Driver stress is a manageable problem which be mitigated against using advanced signage, appropriate traffic management, diversion routes and by incorporating it into route design.</p> <p>For any diversions, frequent advanced signage can be used to minimise uncertainty of the route and reduce driver stress. In addition, providing adequate room for road users and for all vehicle types can help reduce driver stress.</p> <p>Phasing of construction works can also be helpful in minimising disruption to vehicle travellers as can the establishment of agreed working methods in advance of construction works.</p>	Slight adverse

Disruption to Core paths during construction	Option S4 will potentially cause temporary disruption to the Smithy to New Kelso, New Kelso and Attadale Circular paths where they meet the existing A890, and therefore likely cause increased journey times.	High	Minor	Slight / Moderate adverse
Disruption to Rights of Way (RoW) during construction	<p>Option S4 would likely impact upon the rights of way identified below:</p> <ul style="list-style-type: none"> <li>The RoW North of existing A890 at Strathcarron heading north and the RoW north of Attadale (connecting with the Attadale circular core path) are likely to experience temporary disruption where it meets the existing A890;</li> <li>The RoW from Strathcarron past Achintee heading inland is likely to experience temporary disruption and severance along the A890 and to the north-east of Achintee;</li> <li>The RoW South of Attadale crossing the A890 heading inland towards Glen Ling is likely to experience temporary disruption and severance where it meets the existing A890 and as it nears Glen Ling;</li> <li>The RoW from the A890 along Glen Udalain Valley towards Glen Ling is likely to experience temporary disruption along the entire length of this path;</li> <li>The RoW from South of Braeintra towards Glen Udalain is likely to experience temporary disruption and severance where it meets Glen Udalain, and;</li> <li>The RoW West of Sallachy towards Glen Udalain is likely to experience temporary disruption and severance where it meets Glen Udalain.</li> </ul>	High	Moderate	<p>Moderate / Large adverse</p> <p>Ensure access is maintained to main path network and diversion requirements are agreed with THC. Temporary diversions should have advanced signage to minimise uncertainty of the route, but they may increase overall journey lengths.</p>

<p>Kyle of Loch Alish to Dingwall Railway</p>	<p>Temporary disruption to the Kyle of Loch Alish to Inverness scheduled railway services during the widening of roads between Attadale and Strathcarron junction and replacing the existing level crossing with a bridge crossing, however, this can be done when the route is not operation, i.e. at weekends or night-time.</p>	<p>High</p>	<p>Moderate</p>	<p>Phasing of construction works to minimise disruption the railway line. Ensuring that travellers are fully aware of any likely delays and cancellations due to required construction works.</p>	<p>Moderate / Large adverse</p>
<p>Amenity value*</p>	<p>Part of Option S4 would be visible from the existing A890 during construction and would potentially adversely affect the quality of the view, but the traveller's ability to see the surrounding landscape is unlikely to be altered. The physical impact on the surrounding landscape may have a negative impact on the local landscape character. During construction, NMUs using all of the core paths and RoWs identified may be more exposed to traffic on the new road and therefore experience adverse amenity effects in terms of visual, noise and air quality (e.g. dust) which are covered in more detail within Chapter 5 – Landscape and Visual, Chapter 12 – Noise and Vibration and Chapter 11 – Air Quality.</p>	<p>Medium</p>	<p>Minor</p>	<p>To reduce effects on amenity and view from road, mitigation would include those specified in Chapter 5 – Landscape and Visual, Chapter 12 – Noise and Vibration and Chapter 11 – Air Quality.</p>	<p>Slight adverse</p>
<p>Vehicle Journeys – through journeys</p>	<p>During operation, the new road alignments will result in providing uninterrupted vehicle traveller movements along the new A890 route alignment. However, due to the deviation in the new route alignment, total journey times may increase even though journey disruptions will have been minimised.</p>	<p>Medium</p>	<p>Moderate</p>	<p>None required</p>	<p>Moderate Beneficial</p>

	Medium	Moderate			Moderate Adverse
<p>Vehicle Journeys – local access</p>	<p>During operation, the new road alignment for Option S4 may cause an overall slight increase in total journey times for residents travelling from south of the Avalanche Shelter to Lochcarron, Kirkton and Strathcarron (and vice versa) as the A890 would be closed at the avalanche shelter. All other local journeys would remain the same.</p>				
<p>Driver Stress</p>	<p>The resolution of route disruption through the new alignment will result in uninterrupted vehicle traveller movement but may lead to increased journey times for some road users as described above. Option S4 can create enhanced beneficial mental and psychological effects through the removal of driver frustration, potentially increase amenity value and improve vehicle safety along the A890 by bypassing the rockfall area. Driver uncertainty of the route being followed will not be a factor during operation. Views from the road will provide interest which may help alleviate driver stress. However, the physical impact on the surrounding landscape may have a negative impact on the local landscape character whilst the remote nature of the route may be unsettling for some road users. The extent of views would remain restricted by the rising topography either side of the route, with the extent of available views likely to be limited by retained forestry. Views from the southern end of the route would be likely to be largely contained by rising topography and retained woodland, with potential glimpses across the Loch Carron.</p>	<p>Medium</p>	<p>Minor</p>	<p>None required</p>	<p>Slight Beneficial</p>



Core paths	The Southern Options will potentially not have an operational impact upon the core paths within the study area.	High	None	None Required	Neutral
Rights of Way	<p>The Southern Options, local improvements and road widening would likely impact upon the rights of way identified below:</p> <ul style="list-style-type: none"> <li>• North of existing A890 at Strathcarron heading north adjacent to the railway line, this RoW may experience increased amenity effects as the local improvements move the traffic further away;</li> <li>• Strathcarron to Achintee adjacent to existing A890, this RoW may experience permanent severance along the length of the path due to road widening, and</li> <li>• South of Attadale crossing the A890 heading south east towards Glen Ling, this RoW may experience permanent severance at the southern end of the path;</li> <li>• A890 along Glen Udalain Valley towards Glen Ling, this RoW is likely to experience permanent severance along the entire the length of this path for the SR, and from the head of the Glen Udalain Valley heading east for the SRL, and;</li> <li>• Achmore heading east towards Glen Udalain Valley, this RoW is likely to experience permanent severance at several intervals along the length of this path, SRL only.</li> </ul>	Medium	Major	Route construction Design to avoid permanent severance of the existing RoW, if possible.	Moderate / Large Adverse

\*Excluding changes in landscape quality/visual intrusion impact elements which are covered in Chapter 5 Landscape.

### 8.1.7 **Residual Impacts**

All options have the potential to cause residual impact through:

- The permanent severance or diversion of one or more RoW's;
- The resolution of long term route disruptions, through uninterrupted vehicle traveller movements;
- Potential to create enhanced mental and psychological effects through the removal of driver frustration, potentially increase amenity value and the improvement of safety for vehicles joining/exiting the A890/A896.

### 8.1.8 **Difficulties Encountered/Limits to Assessment**

Limited availability of data at Stage 2 to undertake a quantitative assessment of driver stress, this will be developed in more detail as part of the DMRB Stage 3 assessment.

Detailed design information will help determine journey times and impacts on local receptors at Stage 3.

### 8.1.9 **Conclusions**

Journey times for the majority of options are likely to decrease in the future for through travel, which will reduce driver frustration with the exception of Option S4 which would cause increased journey times for local traffic in particular once the route is completed due to the closure of the A890 at the avalanche shelter.

Options N9 and S4 are likely to cause fewer disruptions and less driver stress for the A890 and A896 during construction as they are predominantly offline options, therefore the majority of disruptions will only occur at tie-ins to current roads. Construction of the online options may lead to significant diversions depending on construction methods employed.

Disruption to the Kyle of Loch Alsh to Dingwall Railway will arise with all Options during the construction phase; however the Online options would lead to greater adverse effects than Options N6, N9 or S4. Removal of the level crossing as part of Option S4 and the Online Options would be beneficial.

All of the options will have a construction impact upon RoWs and the core paths identified within the study area. Option S4 has the greatest impact upon the RoWs within the study area as the route encounters several paths.

Options N6 and N9 will likely involve either severance or diversion of core paths within the study area.

During construction the North and Southern Route options may impact upon the view from the road/amenity. Routes N6 and N9 would allow for new views across the Loch as it crosses the Strome Narrows, but the Southern Routes would deprive vehicle travellers of the views across the Loch as this is inland and relatively remote.

Table 8.7 provides an overall assessment for Effects on all Travellers.

**Table 8.7 – Effects on all Travellers Assessment Summary**

Route Option	Preferred Option	Intermediate Option	Least Preferred Options
O2 (Sidelong Viaduct)	✓		
O3 (Inland Tunnel)	✓		
O5 (Share road/rail)		✓	
O7 (Avalanche Shelter extension)	✓		
N6 (Through Lochcarron)		✓	
N9 (Lochcarron Bypass)		✓	
S4 (Glen Udalain)			✓

8.1.10 ***Recommendations for further work***

Should the bypass progress to DMRB Stage 3 a more detailed assessment should be undertaken and the magnitude and significance of effects assessed. In addition the vehicle travellers assessment should be updated where necessary to take account of any further landscape assessment or selected route options, possible changes to journey times and changes in safety as a result of route disruption.

## 9 COMMUNITY AND PRIVATE ASSETS

### 9.1.1 *Introduction*

Based on the guidance provided in DMRB, this section provides a Stage 2 Assessment of the potential effects on community and private assets. Assets which have been considered are residential, commercial (agricultural and forestry), community and development land.

The consideration of the effects on community and private assets directly associated with the proposed A890 Stromeferry Bypass has been undertaken with reference to DMRB Volume 11 Section 3 Part 6 (*Land Use*) and DMRB Volume 11 Section 3 Part 8 (*Pedestrians, Cyclists, Equestrians and Community Effects*).

The objectives of these respective Stage 2 assessments are as follows:-

#### **Demolition of Private Property and Associated Land-Take**

*“Undertake sufficient assessment to identify the type and number of properties which might need to be demolished and which should be taken into account by the Design Organisation in developing and refining route options in agreement with the Overseeing Department’s Project Manager”.*

#### **Loss of Land Used by the Community**

*“Undertake sufficient assessment to identify the location, status and importance of land used by the public which could be lost and which needs to be taken into account by the Design Organisation in developing and refining route options in agreement with the Overseeing Department’s Project Manager”.*

#### **Effects upon Development Land**

*“Undertake sufficient assessment to identify areas of land which fall within local planning authority development designations and which need to be taken into account by the Design Organisation in developing and refining route options in agreement with the Overseeing Department’s Project Manager”.*

#### **Effects upon Agricultural Land**

*“Undertake sufficient assessment to identify the value of agricultural land and the effects upon it should be taken into account by the Design Organisation in developing and refining route options in agreement with the Overseeing Department’s Project Manager; and to assess their likely impacts on individual farm units in broad terms”.*

The Stage 2 appraisal of the effects on Community and Private Assets assesses, in broad terms, the likely Scheme options effects on these baseline receptors and aims to inform future decision making regarding a preferred Scheme option to be taken forward for more detailed assessment at DMRB Stage 3.

### 9.1.2 *Methodology*

The assessment has been carried out using the guidance provided in DMRB, see Chapter 2 of this report for further details.

DMRB Volume 11, Section 3, Part 6 (Land Use) provides guidance on assessing a scheme’s impact on community and private property and DMRB Volume 11 Section 3 Part 8

(Pedestrians, Cyclists, Equestrians and Community Effects) provides guidance on assessing the impact on the community.

The Stage 2 assessments are undertaken in the following stages:

- Establishment of the baseline;
- Assessment of potential impacts; and
- Identification of potential mitigation measures.

#### ***Establishment of the baseline***

Establishment of the baseline in order to establish a clear understanding of the existing conditions to allow a sufficient assessment of the likely consequences of the scheme options on the baseline position to be made. Baseline conditions were determined through a review of the following:

- Site visits;
- The Highland-Wide Local Development Plan (2012);
- Wester Ross Local Plan (2006);
- West Highlands and Islands Local Plan (2010);
- The National Records of Scotland (NRS): Wester Ross, Strathpeffer and Lochalsh Ward of the Highland Council administrative area: Population;
- Scotland's Census 2011 Shaping Our Future: Data Explorer (<http://www.scotlandscensus.gov.uk/ods-web/home.html>);
- National Public Transport Data Repository (NPTDR), published by Transport Direct ([data.gov.uk](http://data.gov.uk));
- Lochcarron and District Business Association (<http://www.lochcarron.org.uk/>);
- URS' internal GIS Database;
- Desk-top documentation review and web-based information sources (relevant references/links provided);
- Land Capability for Agriculture Map Sheet 4 (The Macaulay Institute for Soil Research (MLURI)); and
- Ordnance Survey (OS) Explorer Maps 428 and 429.

#### ***Assessment of potential impacts***

The effects on community and private assets methodology embraces a number of key considerations for existing receptors contained within, and in proximity to, the bypass location and these are highlighted below. The scope of effects considered in this assessment (*during both the Scheme construction and Scheme operation phases*) includes:

- Loss of private property (e.g. demolition) and associated land-take to accommodate the construction of the route options;
- Loss of community land - "common ground such as village greens and open space e.g. any land laid out as public parks or used for the purpose of public recreation, or land which is a disused burial ground";

- Loss of land which The Highland Council (THC) has already designated for future development required as land-take to accommodate the construction of the Scheme options;
- Any impacts of the route options on the Council’s development designations;
- A broad assessment of any loss of agricultural land required as land-take to accommodate the construction of the route options and any likely effects on individual farm units, and;
- Assessment of any relevant planning applications or known proposed developments.

The assessment of the potential effects of the Scheme options (*prior to mitigation*) has been undertaken as follows:

- Identification of a particular community or private asset effect;
- Consideration of the magnitude of the effect (the actual change taking place to the environment). The scales adopted for the magnitude of the effects are shown in Table 9.1 below:

**Table 9.1 - Magnitude Scales**

Level of Magnitude	Definition
<b>Major</b>	A fundamental change to the Community or Private Assets baseline conditions.
<b>Moderate</b>	A material but non-fundamental change to the Community or Private Assets baseline conditions.
<b>Minor</b>	A detectable but non-material change to the Community or Private Assets baseline conditions.
<b>Negligible</b>	Very little or no impact to Community or Private Assets baseline conditions.
<b>None</b>	No detectable change to the Community or Private Assets baseline conditions.

- Consideration of the sensitivity of the receptor; a judgement as to the importance or value of the receptor, and its resilience to cope with changes resulting from the community or private asset effect. A scale of sensitivity of the receptor has been defined as None, Low, Medium, High and Very High;
- Determination of the level of impact by considering both the magnitude and sensitivity of the community or private asset receptor as summarised in Table 9.2 below:-

**Table 9.2** - Determination of Impact Significance (Effects falling within shaded boxes are considered to be Significant)

		<i>Sensitivity of Receptor</i>				
		<i>Very High</i>	<i>High</i>	<i>Medium</i>	<i>Low</i>	<i>Negligible</i>
<i>Magnitude of Impact</i>	<i>Major</i>	Very Large	Large or Very Large	Moderate or Large	Slight or Moderate	Slight
	<i>Moderate</i>	Large or Very Large	Moderate or Large	Moderate	Slight	Neutral or Slight
	<i>Minor</i>	Moderate or Large	Slight or Moderate	Slight	Neutral or Slight	Neutral or Slight
	<i>Negligible</i>	Slight	Slight	Neutral or Slight	Neutral or Slight	Neutral
	<i>No Change</i>	Neutral	Neutral	Neutral	Neutral	Neutral

Note: A qualitative judgment for the determination of significance has been adopted and only those effects that fall within the “moderate” and “major” categories are considered to be significant.

**Identification of potential mitigation measures**

Mitigation measures have been identified to minimise effects on community or private assets as far as possible within the technical constraints of the project. The mitigation is designed to prevent, reduce, and where possible offset the potential effects upon the community baseline conditions. These will also be used to help inform the options appraisal and more detailed design stages.

At this stage impacts resulting from each of the options have been based on road option alignments developed at Stage 2. It should be noted that these options may be refined at Stage 3, where associated effects would be recorded in an Environmental Impact Assessment.

9.1.3 **Consultations**

DMRB Volume 11 Section 3 Paragraph 6 (10.3) requires consultation with the planning authority (THC, at Stage 1) for information on statutory and non-statutory areas designated for their agricultural importance. However, for this Stage 2 assessment there was no need to consult on this as information was obtained from the Macaulay Institute for Soil Research (MLURI) Land Capability for Agriculture Maps. THC will also be consulted regarding land of agricultural importance and crofting land further at Stage 3.

Initial consultation with various statutory and non-statutory bodies has been carried out through a series of stakeholder events in order to help inform the identification of the eight route options. See Chapter 3 ‘Consultation’ for a summary of consultation carried out at Stage 2 and Appendix 4 for copies of consultation responses received.

Some of the considerations identified during the consultation process included the need to:

- Remove the risk of disruption to users during operation and minimise disruptive closures during construction;

- Facilitate sustainable economic development by minimising the impact on existing economic operators and providing a local and strategic link.

In considering the potential effects on land allocated for development in the development plan, it is recommended that the views of the local authority Planning department on the implications for the local authority’s development policies be sought. A written consultation approach was made to The Highland Council and the Council indicated that there are no major planning applications being considered within the study area at the present time. This status should be reviewed at Stage 3.

9.1.4 **Policy**

The following legislation and policy has been referred to as part of this assessment:

- National Planning Framework 2 (NPF2);
- Scottish Planning Policy (SPP) (2010).

In addition to the above a number of Policies within the Highland Wide Local Development Plan (2012), the Wester Ross Local Plan (2006) and the West Highland & Islands Local Plan (2010) have also been considered as part of the assessment.

9.1.5 **Baseline**

For this assessment the receptors located within a 1 kilometre radius of a route option have been considered and this forms the defined study area. The baseline community facilities and the land uses are detailed below.

**Population**

The National Records of Scotland (NRS) publishes population data for the Wester Ross, Strathpeffer and Lochalsh Ward of the Highland Council administrative area. The total population from the NRS 2012 mid-year estimates was 11,834, but this covers a significantly larger area than that around the A890 Stromferry Bypass location. However, analysis of the published postcode population profiles produced as part of Scotland’s Census 2011 ‘Shaping Our Future Data Explorer’ which covers the study area and its immediate environs (e.g. Achintraid, Ardarroch and Braeintra) is shown in the Table 9.3 (below):

**Table 9.3: Populations**

Postcode	Population
Total Scotland’s Census 2011: Data Explorer population (includes study area and some surrounding areas)	910
Total Ward (Wester Ross, Strathpeffer & Lochalsh) population (NRS 2012 mid-year estimates)	11,834
Total Highland area population (NRS 2012 mid-year estimates)	232,910
Total Scotland population (NRS 2012 mid-year estimates)	5,313,600

**Residential:**

The study area for the Stromeferry Bypass Stage 2 assessment is predominantly rural with numerous dispersed residential areas.



- Scotland number of households – 2,372,777 in Census 2011;
- Highland number of households – 102,091 in Census 2011;
- Wester Ross, Strathpeffer and Lochalsh Ward number of households – 5,418 Census 2011.

There are approximately 350 residential properties in total located within the Stromeferry Bypass study area. Lochcarron is the largest of settlement in the area and is the local centre with a population of approximately 550 and approximately 200 residential properties.

In the geographic area directly adjacent to the defined study area boundary there are a number of other residential areas e.g. Achintraid, Dornie, Ardaneaskan and Ardarroch. These are relevant as residents travelling to/from these properties may require to use parts of the A890 and A896 which are included in the study area.

***Industrial/Business:***

There are a wide range of industrial/businesses located within the study area. These range from commercial forestry to hotels, restaurants and fish farming. The study area also includes the Lochcarron Industrial Estate. The majority of the industrial/businesses located within the study area are related to travel, tourism and leisure. The majority of the businesses are located within the main residential areas of Lochcarron, Strathcarron, Stromeferry, Achmore, Attadale and Kirkton, with Lochcarron having the greatest number (shown below in Image 1).



**Image 1 – Along A896 within Lochcarron**

***Community Facilities:***

There are numerous community groups and facilities located within the study area (shown in Figure 9.1 – Community Assets). These include those shown below in Table 9.4:

**Table 9.4: Community Facilities within the Stromeferry A890 Bypass study area.**

Facility	Description
Howard Doris Centre (which contains Lochcarron Library)	The Howard Doris Centre, located in Mill Brae Lochcarron, holds the small public library and provides supported accommodation, medical, nursing, social facilities and day care. (Shown in Image 2).
Lochcarron Primary School	Lochcarron Primary School is located at the northern end of Lochcarron between Lochcarron and Kirkton.
Post office facilities	Lochcarron Sub post office is located at the Lochcarron Food Centre and an o/s post box is located outside on the A896.
Free Presbyterian Church of Scotland	The Free Presbyterian Church of Scotland is located within Lochcarron on Church Street just off the A896.
Church of Scotland	The Lochcarron Church of Scotland is located within Lochcarron along the A986.
Lochcarron Burial Ground	The Lochcarron burial ground is located next to the Lochcarron Golf Club along the A896 between Kirkton and Lochcarron.
Police Station	Lochcarron Police Station is located within Lochcarron at the junction of the A896 and Cearnag Mhoireach.
Lochcarron Village Hall	Lochcarron Village Hall, located along Church Street in Lochcarron, holds community events, such as the Lochcarron's own farmers' markets, within its building, associated car park and recreation ground.
Lochcarron Fire and Rescue Service	Lochcarron Retained Fire & Rescue Service, located at Lochcarron Industrial estate, is part of the Highlands & Islands Fire and Rescue Service. As well as emergency call-outs, they provide advice for fire safety.
Smithy Heritage Centre	The Smithy Heritage Centre is located in in 'Ribhuachan' approximately 2 miles out of Lochcarron within a restored smithy and forge.
Attadale Estate	A 30,000 acre estate which has 4 holiday cottages to let and its beautiful gardens are open to the public from the beginning of April until the end of October.
Strathcarron Centre	Located in part of the Strathcarron Station building it incorporates a community Learning Centre, a Visitor Centre and a Post office/store.
Strome Castle	Strome Castle is first recorded in 1472 as a stronghold of the Lord of the Isles. It was blown up by Kenneth Mackenzie, 1st Lord Kintail, about 1602, after a siege, and only its ruins remain. (See Image 3).

Ardaneaskan Museum	The museum is located within Ardaneaskan and contains items that that would be part of a crofter's everyday life.
Stromeferry and Achmore Hall	The Stromeferry and Achmore Hall is located on Plockton Road within Achmore.
Inverness College the Highland School of Aquaculture (Seafield Centre)	The Seafield Centre is part of the Inverness College the Highland School of Aquaculture and is located north of Kishorn.
Strome Woods	There are currently 2 Strome Woods as identified by OS Mapping. One is located on the north side of Loch Carron north of Mid Strome, the other is located west of Achmore and is a managed by the Forestry Commission. (See Image 4).
Scotland Episcopal Church	The Scotland Episcopal Church is located North of Kishorn along the A896. This is identified as a place of worship on OS Streetview maps.
Place of Worship	OS Streetview identified Places of Worship in Kirkton, thought to be associated with the Lochcarron Burial ground. Located along the A896.



**Image 2 – The Howard Doris Centre located within Lochcarron**

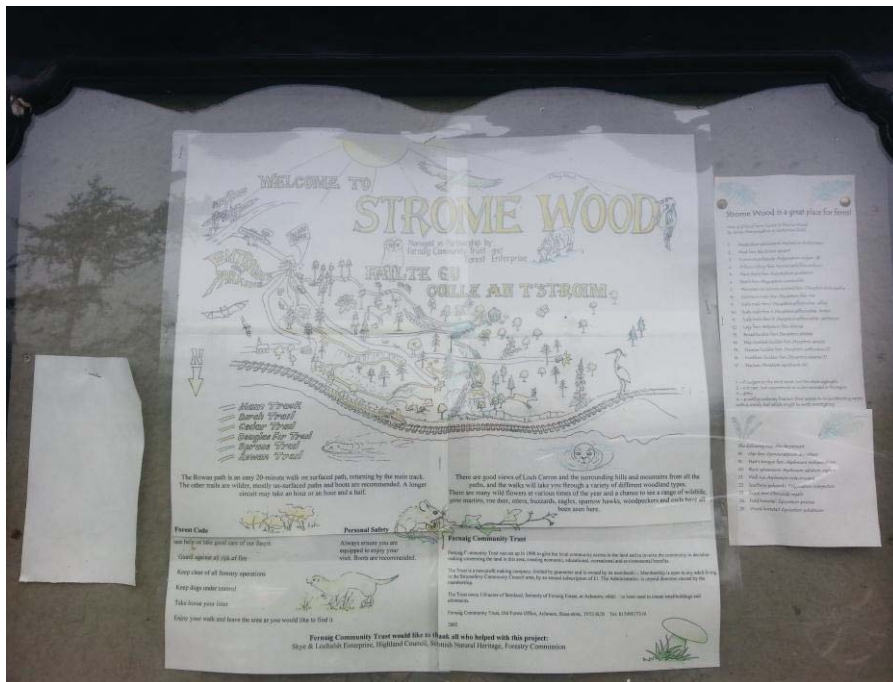


Image 3 – Strome Wood (South) map located within Achmore



Image 4 – Strome Castle Tourist Board and map located close to Strome Castle

Within the immediate area surrounding the defined study area, there are a limited number of additional community and visitor facilities which the Stromeferry Bypass may affect. This would need to be further considered in Stage 3.

### Scheduled Bus Services

There are 7 bus stops located within the Strome ferry Bypass Scheme Study area. These are, taken from the National Public Transport Data Repository (NPTDR) and are located at:

- Public Hall, Plockton Road, Achmore;
- Railway Station Entrance, Station Road, Strome ferry;
- Railway Station, A890, Strathcarron;
- Strathcarron Hotel, A890, Strathcarron;
- Lochcarron Parish Church, A896, Kirkton;
- Opposite Lochcarron Parish Church A896, Kirkton;
- Post office, A896, Lochcarron.

A summary of the scheduled bus services which use the bus stops and the routes within the Strome ferry Bypass Scheme study area is provided in Table 9.5 below.

**Table 9.5: Strome ferry Bypass Scheme Study Area Bus Services**

Service	Operator	Operation Description
704	Lochcarron Garage	Toscaig to Inverness via Lochcarron: Wednesdays and Saturdays – 1 return trip to Inverness each specified day
702	DMK Motors	Strathcarron, at Station on A890 via Lochcarron to Torridon, o/s Post office on Daibaig Road: Mondays to Saturdays, 6 return journeys (aka route done 12 times a day). However some journeys only available either on school days or Saturdays and School Holidays only.
66X	Stagecoach in Skye	Only operated during the summer period. Daily. Portree to Inverness via Strome ferry and Strathcarron
164	Stagecoach Highlands	Ardaneaskan to Kyle of Lochalsh via Lochcarron and Strathcarron. Mondays to Fridays during school days only. 1 return journey a day.
700-0	Westerbus	Gairloch or Laide to Inverness via Strathcarron. Monday to Saturday, 1 return journey per day.
T21	Clan Taxis	From Strome ferry to Kyle of Lochalsh and to Lochcarron on Wednesdays and Saturdays to include connection to 704. Tuesdays, Wednesdays and Saturdays only, 1 return journey per day.
'Flexi' Community Bus	Ronnie Maclean's	Tuesday to and from Kyle/Strome ferry

**Scheduled Train Services**

A scheduled rail service operated by First ScotRail (239 and 239R) runs between Kyle of Lochalsh and Dingwall. The railway stations located along the current Stromeferry Bypass include Stromeferry Station located in South Strome, Attadale Station and Strathcarron Station. The rail service runs beside the existing road and crosses the Stromferry Bypass A890 at Strathcarron, immediately prior to Strathcarron Station. The frequency of this service (May to December 2013 timetable) is summarised in Table 9.6 below:

Table 9.6: Scheduled Rail Services

Service	Monday – Saturday (per day)	Sunday (per day)
Dingwall – Kyle of Lochalsh	5	2
Kyle of Lochalsh – Dingwall	5	2

(Source: <http://www.networkrail.co.uk/browse%20documents/eNRT/Dec13/timetables/Table%20239.pdf>)

**Agricultural:**

Due to the land elevations/terrain the area is predominantly used for commercial forestry rather than agriculture which is dispersed and in the form of livestock grazing, and crofting activities.

*East of Lochcarron and North of (including) Attadale*

This section of the study area follows the existing A896 along the flat bottom of Strath Carron. The adjacent land cover and land use is largely wet grassland and rough grazing as shown in Image 5. There is also a small area of crofting land located in close proximity to Achintee.



**Image 5 - A896 near Tullich Roads Depot, looking south-west**

As shown in Image 6, Strath Carron is a wide flat valley with semi-improved grassland used primarily for grazing, interspersed with patches of low woodland (alder, ash and birch) and occasional groups of larger trees around properties (including pine, beech and lime).



**Image 6 - Looking north-east across Attadale strath**

*North to South of Lochcarron towards Stromemore*

To the north of Lochcarron village, as shown in Image 7, are primarily open fields, areas of commercial forestry plantation and rocky moorland. There are also small areas of crofting land north of Lochcarron Village and west of Kirkton.



**Image 7 - A896 above Lochcarron, looking east across rocky moorland**

Small areas of crofting land and Strome Wood are also in the study area here, followed by a section of more open broadleaved woodland and rough grassland further south towards Strome Narrows.

*South of Attadale to Braeintra and Creag Mhaol*

On the south side of the loch, west of Stromeferry, the study area features steep slopes above Loch Carron, an area of commercial forestry and a section of open moorland.

The existing road follows the side of Loch Carron and is contained by rock face, steep slopes and cliffs. This section is largely characterised by a narrow flat corridor along the base of the cliffs and has very little agricultural value with the exception of an agricultural holding in the Attadale valley and some scattered fields along the route.

Inland at the top of the woodland which consists largely of Pine, Spruce and Larch, the existing A890 emerges into an area of rocky moorland (Image 8), which is not suitable for agricultural activity.

Land between Achmore and Creag Mhaol is currently used for grazing and is of limited use for agriculture.



**Image 8 - Looking south-east over rocky moorland near source of Allt a’Ghiubhais**

*Land Use capability for agriculture*

Volume 11 of DMRB (Section 3, Part 6) recommends that the assessment of roads and bridge schemes should give an appreciation of the likely consequences of land take on agricultural land. The Macaulay Land Capability for Agriculture (LCA) classification is the official agricultural classification system widely used in Scotland as a basis for land evaluation. The Macaulay Institute classifies agricultural land into seven use capability classes with four of the classes further subdivided into divisions:

- 1) Very Wide Range of Crops
- 2) Wide Range of Crops
- 3) Moderate Range of Crops
- 4) Narrow Range of Crops
- 5) Used as Improved Grassland
- 6) Used Only as Rough Grazing
- 7) Very Limited Agricultural Value

The “best and most versatile (BMV) land” is classified as Class 1, 2 and 3<sub>1</sub>. This is the land which is most flexible, productive and most likely to deliver future crops.

A desktop review of the Macaulay Institute’s ‘Land Capability for Agriculture – Western Scotland (Sheet 4, 1:250,000)’ map, shown in Figure 9.2 – Farms and Agricultural Land Classifications, shows the agricultural land classification around the Scheme study area is as follows:



*North/East of Lochcarron and North of (including) Attadale*(i) Lochcarron to Strathcarron Junction

A combination of Class 5<sub>1</sub> (predominantly along the loch/coast) and Class 5<sub>3</sub> (predominantly inland) has been identified in this area (both categories are capable of use as improved grasslands).

(ii) Attadale to Strathcarron Junction

A combination of Class 5<sub>1</sub> (land capable of use as improved grasslands) and Classes 6<sub>2</sub> and 6<sub>3</sub> (both classified as land capable of use only as rough grasslands), with the majority of the land in this area classified as the later.

*West/South of Lochcarron*

Predominantly Class 5<sub>2</sub> (land capable of use as improved grasslands) along the loch/coast and a combination of Classes 6<sub>2</sub> and 6<sub>3</sub> inland (land capable of use only as rough grasslands) with the later becoming more prominent the further inland travelled.

*South of Attadale to Achmore*

Predominantly class 5<sub>3</sub> (land capable of use as improved grasslands) along the loch/coast, although there is a section of class 5<sub>1</sub> in proximity to Achmore. Inland there is a combination of classes 5<sub>1</sub> (land capable of use as improved grasslands) and 6<sub>3</sub> (land capable of use only as rough grasslands) with the later the predominant land classification.

*Agricultural buildings*

There are numerous agricultural buildings located within the study area. These comprise of:

- Two farms (Achbeg and Achmore Farm) within Achmore;
- One farm in Attadale (Home Farm);
- Sheep pens and cattle grids in close proximity to Achintee and Lochcarron;
- Sheep washes in close proximity to both Achintee and Strathcarron; and
- A sheep fold in Strathcarron.

*Aquaculture*

- One fish farm located north-west of the Smith Heritage Centre (along the A896).

*Crofting Land*

A croft is a small, enclosed agricultural unit of land traditionally situated in the former crofting counties in the Highlands and Islands of Scotland.

Crofting refers to the principle of living on and working the croft holding, and is commonly mistaken for small-scale farming. However, crofters usually have other occupations, or are retired, from which they obtain the bulk of their income.

Crofting is a system of landholding unique to Scotland; it 'plays an important part in shaping the landscape, enhancing the natural environment, the cultural heritage and social economy of the Highlands and Islands of Scotland. It sustains marginal and fragile rural populations and encourages the unique bond between people and the land'. (Ref 9-1)'.

A croft is held subject to the provisions of the Crofting Acts. There have been 'a series of Acts passed since 1886 providing security to crofters, protecting them from being unfairly removed from their land, guaranteeing fair rents and allowing them to claim compensation for improvements should their tenancy come to an end. The law of crofting was codified as the Crofters (Scotland) Act of 1993, but there have been substantial reforms, notably in 2007 and 2010 as part of the Scottish Government's Land Reform Programme. The latest version of the Act was published in 2013. Crofts are regulated by the Crofting Commission, which has its head offices in Inverness' (Ref 9-1).

There are approximately 100 plus areas of crofting land within the study area, most are located around the settlements identified above, of which the majority surround Lochcarron.

### **Woodland**

The Forestry Commissions GLADE Land Information Search (available at time of assessment) shows the location of various types of forestry within the Strome ferry bypass study area. It highlights several areas of dedicated woodlands, commercial forestry plantations, woodland grant schemes, potential native woodland network and forestry commission woodland areas.

The main areas of woodland highlighted within the Strome ferry Bypass study area are:

- Forestry Commission Scotland Woodland located inland between Achmore and Ardnaff, which is visible from the existing A890 route;
- Forestry Commission and Dedicated Woodlands along the coast between Portchulin and the Strome ferry bypass Avalanche Shelter. This section includes Strome Wood (South) which is located on Creag Mhaol and used as a community/recreational resource and owned by the Forestry Commission;
- Dedicated Woodlands along the coast between Ardaneaskan and Mid Strome;
- Forestry Commission Scotland Woodlands inland and along the coast between Ardaneaskan and Achintraid;
- Commercial Forestry Plantation and Strome Wood located inland north of Mid Strome;
- Dedicated Woodlands at Gleann Udalain and Attadale Estate Woodlands surrounding Attadale; and
- Forestry Commission Scotland Woodland inland west of Kirkton.

The study area contains a large amount of woodland along with other smaller areas from those identified above, all of which can be used for recreational, leisure and commercial purposes. The woodland located within the study area is shown in Figures 9.1.1 and 9.2.2 – Residential, Community Assets and Woodland Areas (sourced from OS Streetview vector data). Ancient Woodland areas found within the study area are identified in Chapter 6 'Nature Conservation'.

### **Land Allocated for Development:**

The study area includes some areas of land allocated for development, established through the Highland Wide Local Development Plan, Wester Ross Local Plan and West Highlands and Islands Local Plan.

Development areas identified in the Local Plan and Local Development Plan Maps are listed below, and shown in Figures 9.1.1 and 9.2.2 – Residential, Community Assets and Woodland Areas:

- Achmore has one area designated for housing (south of Forestry Houses), one designated for affordable housing (west of Former Council Housing), one area designated for business (south of Achbeg Farm) and two designated for community (west of Achmore Hall and North of Achmore Hall);
- South Strome has one area designated as mixed use (Old Marconi Yard), and
- Lochcarron has two areas designated for affordable housing (Sage Terrace and Kirkton Gardens south end), one area designated for housing (Upper Kirkton Gardens), one area designated for redevelopment (North Kirkton) and one designated for business/industrial (Tullich Industrial Estate).

### ***Planning applications***

Overall, a search of the wider area shows a large number of applications for alterations to dwelling houses and development of single or small clusters of dwellings. These applications are minor in nature; therefore it is not thought that they are likely to have any impact on the development of options.

There is one granted planning application (application reference: 13/04798/FUL) which is for the formation of permanent vehicular road access onto the A896 from Land North of the School house, Lochcarron ('Bellmouth Junction'). This will allow short term access for timber extraction from Kirkton woodland and longer term accessibility for mixed development purposes.

A review of forthcoming development should be carried out at Stage 3 during the EIA and planning application processes.

#### 9.1.6

### ***Options Assessment***

The following provides a brief overview of the elements of the bypass with the potential to result in impacts upon community and private assets.

It should be noted that impacts relating to increased journey times for all travellers are addressed in Chapter 8 – Effects On All Travellers.

A determination of the potential impact on individual properties, where possible, has been based on Options and alignments prepared for the Stage 2 assessment, as shown in Appendix 1.

For each of the route options, the potential beneficial and adverse effects to any community assets and land uses in the study area are anticipated as a result of temporary land take during the construction, for example construction compounds and the storage of materials in informal lay-bys, and permanent land-take. All of the route options will affect access in the local area and impacts have been considered where they can be identified at this stage. Mitigation measures have also been prescribed where possible. It should be noted that there may be additional land take during the construction phase for construction compounds etc. that will not be required once the scheme is operational and this will be further investigated at Stage 3.

The route options are likely to result in temporary land take impacts upon community and private assets during the construction phase. These impacts would result from vegetation clearance of the works area, operations of the contractor's main offices and works compound

areas, fencing, carriageway construction, signage etc. temporary access roads and transfer and storage of material.

These construction land take impacts are those that relate to temporary works and structures which would not result in permanent impacts upon the community or private assets. The stage 2 assessment regarding land take presented in this report focuses on permanent, long term impacts of the different route options and therefore does not refer to potential construction impacts.

Option 4 is do minimum and involves no improvements to the proposed A890 route. This option therefore provides a baseline comparison to all options considered and is not assessed below.

**Table 12.7: Option N6 (North Online through Lochcarron) and Option N9 (North Lochcarron Bypass) Assessment Table**

Receptor	Potential Impacts/Predicted Effects	Sensitivity	Magnitude of Impact	Potential Mitigation measures	Significance
Access to Private Assets (non-agricultural) during construction	<p>Disruption to accesses during construction is likely to occur in the residential areas of:</p> <ul style="list-style-type: none"> <li>• Kirkton;</li> <li>• Stromemore;</li> <li>• Achmore;</li> <li>• North Strome;</li> <li>• Leacanasain; and</li> <li>• Lochcarron (N6 will have a greater potential impact as it travels through Lochcarron).</li> </ul> <p>However, temporary impacts and solutions upon individual properties have not yet been determined and will be further investigated as Stage 3.</p> <p>There may be impacts upon journey times; however this is covered in Chapter 8 Effects on All Travellers.</p>	High	N6: Moderate/ Major	<p>Ensure access is maintained at all times where access is required and consultation is undertaken with landowners.</p> <p>Construction programme and timing to ensure any new accesses are in place to avoid temporary severance.</p>	Moderate adverse
			N9: Moderate/ Minor		Slight adverse
Access to agricultural land during construction	<p>Disruption of field access and crofting land access is likely to occur during construction, to fields in close proximity to Achbeg and Achmore farms, crofting land (in areas identified above) and the sheep pens/cattle grids around Lochcarron.</p> <p>However, temporary impacts and solutions upon individual farms, fields and crofting land areas have not yet been determined and will be further investigated as Stage 3.</p>	Medium	N6: Minor/ Negligible	<p>Ensure access is maintained at all times where access is required and consultation is undertaken with landowners.</p> <p>Construction programme and timing to ensure that any new field accesses are in place to avoid temporary severance of field access for farming operations.</p> <p>Ensure detailed design avoids severance and maintains access where possible.</p>	Slight adverse / Neutral
			N9: Moderate		Slight adverse

<p>Access to Community assets (non-agricultural) during construction</p>	<p>Both routes are both likely to cause access disruption to community assets and rest stops along the A890 and A896 through storage of materials and realignment work during construction; although these will not be required once the scheme is operational.</p> <p>The community assets within Lochcarron e.g. Lochcarron Hall, Lochcarron Police Station and Lochcarron Primary School, are likely to have the greatest access disruption. Option N9 will cause less disruption as it bypasses the village.</p> <p>Disruption of access to Forestry Commission and Dedicated Woodlands along the coast between Portchulin and the Stromeferry (including) Strome Wood South, dedicated Woodlands along the coast between Leacanaisigh and Mid Strome, Strome Wood North and Forestry Commission Woodland inland west of Kirkton.</p> <p>The scheduled bus and railway services are likely to be affected, however this is identified and discussed Chapter 8 Effects on All Travellers. However, temporary impacts and solutions upon community assets have not yet been determined and will be further investigated as Stage 3.</p>	<p>Medium</p>	<p>N6: Moderate/ Minor</p> <p>N9: Minor</p>	<p>Ensure access is maintained at all times to areas where access is required.</p> <p>Consult with landowners and Forestry Commission Scotland over scale and duration of impact</p> <p>Construction programme and timing to ensure that any new accesses are in place to avoid temporary severance of accesses</p> <p>Contractors to provide temporary signposting and barriers to separate woodland and forestry recreational users from construction activity (in compliance with appropriate Health &amp; Safety legislation requirements) and avoid temporary severance of public access to the remainder of the woodland area.</p>	<p>Slight adverse</p> <p>Slight adverse / Neutral</p>
<p>Land-take of Development land</p>	<p>The only potential for displacing future development land is by Option N9 at the Kirkton redevelopment designated area (North Kirkton).</p> <p>Option N9 may also have an impact upon the granted planning application (application reference: 13/04798/FUL) for the formation of permanent vehicular road access for allow short term access for timber extraction from Kirkton woodland and longer term accessibility for mixed development purposes located North of the School house,</p>	<p>Medium</p>	<p>N6: Negligible/ Minor</p> <p>N9: Moderate / Minor</p>	<p>Ensure consultation is undertaken with landowners.</p> <p>Ensure detailed design minimises land take where possible.</p> <p>Ensure appropriate compensation to land owners for permanent loss of development land areas required to accommodate the bypass design.</p>	<p>Slight adverse / Neutral</p> <p>Slight adverse</p>

	Lochcarron.				
Land-take of Private Assets (non-agricultural)	<p>The North Shore routes (N6 &amp; N9) are likely to require land take at:</p> <ul style="list-style-type: none"> <li>• Kinloch House, Kirkton (N9 only);</li> <li>• Properties to the North-West of Colonels Road west of A896 (N9 only);</li> <li>• Properties either side of Church Street/A896 to Church Street/Slumbay (N6 only);</li> <li>• East of Leacanasigh to North Strome which includes an area of commercial forestry plantation; and</li> <li>• Properties north of Achmore.</li> </ul> <p>Land-take required for these private assets is likely to also relate to crofting land-take for the options.</p> <p>Option N9 will potentially impact upon approximately 20 areas of crofting land, and Option N6 will potentially impact upon approximately 10 areas of crofting land, within the study area.</p> <p>The construction of these routes, especially N6, may potentially cause permanent alteration of access to private properties and business premises. However, permanent access impacts and solutions upon individual properties have not yet been determined and will be further investigated as Stage 3.</p>	High	<p>N6: Moderate / Major</p> <p>N9: Moderate/ Major</p>	<p>Ensure consultation is undertaken with landowners and the Crofting Commission.</p> <p>Ensure detailed design minimises land take where possible.</p> <p>Ensure appropriate compensation to land owners for permanent loss of private land areas required to accommodate the bypass design.</p>	<p>Large / Moderate adverse</p> <p>Large / Moderate adverse</p>

<p>Loss of agricultural land</p>	<p>Options N6 and N9 do not pass through any areas of prime agricultural land and will likely impact upon land designated between 5<sub>1</sub>. (Used as Improved Grassland) and 6<sub>3</sub> (Used Only as Rough Grazing). Two farms (Achbeg and Achmore Farm) within Achmore are likely to be impacted by land-take by both the routes. Sheep pens and cattle grids in close proximity and Lochcarron are likely to be impacted by the N9 route only. Option N9 will have a greater impact than N6 as it is predominantly constructed offline. Crofting land-take may occur, especially relating to route N9, in those areas identified in 'land-take of private assets' (above). Permanent access disruption and field alteration is a possibility but should be minimised through mitigation measures and will be further identified for individual receptors at Stage 3.</p>	<p>Medium</p>	<p>N6: Moderate/ Minor  N9: Moderate/ Major</p>	<p>Ensure consultation is undertaken with landowners. Ensure detailed design minimises land take where possible. Ensure appropriate compensation to land owners for permanent loss of agricultural and crofting land areas required to accommodate the bypass design.</p>	<p>Slight adverse  Moderate adverse</p>
<p>Loss of Community assets, Land-take (non-agricultural)</p>	<p>Option N9 is also likely to cause permanent land-take at Strome Wood North. Both routes are likely to require permanent land-take of Forestry Commission and Dedicated Woodlands along the coast between Portchulin and the Stromeferry (including) Strome Wood South, dedicated Woodlands along the coast between Leacanaisigh and Mid Strome, Strome Wood North and Forestry Commission Woodland inland west of Kirkton. Permanent access disruption is a possibility but should be minimised through mitigation measures and will be further identified for individual receptors at Stage 3.</p>	<p>High</p>	<p>N6: Moderate / Minor  N9: Moderate</p>	<p>Ensure consultation is undertaken with landowners. Ensure detailed design minimises land take where possible. Ensure appropriate compensation to land owners for permanent loss of community woodland areas required to accommodate Scheme design. Ensure detailed design minimises land take where possible and appropriate compensation to FCS for permanent loss of woodland areas required for accommodating the bypass design.</p>	<p>Slight adverse  Moderate / Slight adverse</p>



**Table 12.8: Online Routes (O2 Rail Viaduct, O3 Tunnel, O5 Road/Rail Share, O7 Developed Avalanche Shelter) Assessment Table**

Receptor	Potential impacts/Predicted Effects	Sensitivity	Magnitude of Impact	Mitigation measures	Significance
Disruption of access to private assets (non-agricultural) during construction	<p>Construction disruption to accesses is likely to occur in the residential areas of:</p> <ul style="list-style-type: none"> <li>• Strathcarron,</li> <li>• Achintee,</li> <li>• Attadale,</li> <li>• Ardnaff.</li> </ul> <p>However, temporary access impacts and solutions upon individual properties have not yet been determined and will be further investigated as Stage 3.</p>	High	Moderate / Minor	<p>Ensure access is maintained at all times and consultation is undertaken with landowners.</p> <p>Construction programme and timing to ensure any new accesses are in place to avoid temporary severance.</p>	Slight adverse
Access disruption to agricultural land during construction	<p>Disruption of field access and crofting land access is likely to occur during construction.</p> <p>This is likely to occur to fields in close proximity to Strathcarron, Achintee and Attadale, crofting land and the sheep pens/cattle grids around Strathcarron and Achintee.</p> <p>These routes will potentially cause disruption of access to agricultural fields. However, temporary access impacts and solutions upon individual farms, fields and crofting land have not yet been determined and will be further investigated as Stage 3.</p>	Medium	Minor	<p>Ensure access is maintained at all times and consultation is undertaken with landowners.</p> <p>Construction programme and timing to ensure that any new field accesses are in place to avoid temporary severance of field access for farming operations.</p>	Slight adverse / Neutral
Access disruption to Community assets	<p>The Online Routes will likely cause access disruption to community assets and rest stops along the A890 and A896 through storage of materials and realignment work during construction; although these will not be required once the bypass is operational.</p>	Medium	Minor	<p>Ensure access is maintained at all times to areas where access is required.</p> <p>Consult with landowners including the Forestry Commission Scotland over</p>	Slight adverse / Neutral

	<p>The community assets within Strathcarron, Attadale and Stromeferry, e.g. the Howard Doris Centre located in Strathcarron and the Attadale Gardens, are likely to have the greatest access disruption.</p> <p>The Online Route Options are likely to cause access disruption to Forestry Commission Woodland located inland between Achmore and Ardnaff.</p> <p>The scheduled bus and railway services are likely to be affected, however this is identified and discussed within Chapter 8 Effects on All Travellers..</p> <p>These routes will potentially cause disruption of access to community assets. However, temporary access impacts and solutions upon community assets have not yet been determined and will be further investigated as Stage 3.</p>			<p>scale and duration of impact.</p> <p>Construction programme and timing to ensure that any new accesses are in place to avoid temporary severance of accesses.</p> <p>Contractors to provide temporary signposting and barriers to separate Wood recreationalists from construction activity (in compliance with appropriate Health &amp; Safety legislation requirements) and avoid temporary severance of public access to the remainder of the woodland area.</p>	
<p>Land take of future development land</p>	<p>The Online route options are likely to have no impact upon planning applications or development areas identified within the study area.</p>	<p>Medium</p>	<p>None</p>	<p>None required.</p>	<p>Neutral</p>
<p>Land take of Private assets (non-agricultural)</p>	<p>The Online routes will require land take at:</p> <ul style="list-style-type: none"> <li>• Across the road from Strathcarron Hotel;</li> <li>• Properties to the North-East of Achintee including Park Cottage and Rosedyke;</li> <li>• Carron View residential property adjacent to Achintee/A890;</li> <li>• Carron Restaurant pottery and art gallery, and;</li> <li>• Properties at Ardnaff.</li> </ul> <p>The land-take required for these private assets is</p>	<p>High</p>	<p>Moderate/ Minor</p>	<p>Ensure consultation is undertaken with landowners.</p> <p>Minimise severance through design.</p> <p>Ensure appropriate compensation to land owners for permanent loss of private land areas required to accommodate the bypass design.</p>	<p>Slight adverse</p>

<p>Loss of agricultural land</p>	<p>likely to also relate to crofting land-take for the options. All Online Options will potentially require land-take of 8 crofting areas. The construction of these routes may potentially cause permanent alteration of access to private properties and business premises. However, permanent access impacts and solutions upon individual properties have not yet been determined and will be further investigated as Stage 3.</p>	<p>Medium</p>	<p>Minor / Negligible</p>	<p>Ensure consultation is undertaken with landowners. Minimise severance through design. Ensure appropriate compensation to land owners for permanent loss of agricultural land areas required to accommodate Scheme design.</p>	<p>Slight adverse / Neutral</p>
<p>Loss of Community assets, land-take (non-agricultural)</p>	<p>None of the route options have any effects on prime agricultural land. However, the Online routes pass through land classified between 4<sub>2</sub>, (Narrow Range of crops) within Strathcarron (the most valuable within the study area) and 6<sub>3</sub> (Used Only as Rough Grazing). In addition, crofting land-take may occur, in those areas identified in 'land-take of private assets' (above). None of the Online Options are likely to cause permanent land-take of community assets within the study area. The Online Route Options are likely to require permanent land-take at Forestry Commission and Dedicated Woodlands along the coast between Stromeferry and the A890 Avalanche Shelter, and at the Attadale Estate Woodlands surrounding Attadale. Permanent access disruption is a possibility but should be minimised through mitigation measures and will be further identified for individual receptors at Stage 3.</p>	<p>High</p>	<p>Negligible/ Minor</p>	<p>Ensure detailed design minimises land take where possible and appropriate compensation to FCS for permanent loss of woodland areas required for accommodating the bypass design.</p>	<p>Slight adverse / Neutral</p>

**Table 12.9: Southern Route Option S4 (South Glen Udalain) Assessment Table**

Receptor	Potential impacts/Predicted Effects	Sensitivity	Magnitude of Impact	Mitigation measures	Significance
Access disruption to private assets (non-agricultural) during construction	Residential areas potentially impacted are identified below: <ul style="list-style-type: none"> <li>• Strathcarron;</li> <li>• Achintee, and;</li> <li>• Attadale.</li> </ul> However, temporary access impacts and solutions upon individual properties have not yet been determined and will be further investigated as Stage 3.	High	Minor	Ensure access is maintained at all times and consultation is undertaken with landowners. Construction programme and timing to ensure any new accesses are in place to avoid temporary severance.	Slight adverse
Access disruption to agricultural land during construction	Disruption of field access and crofting land access is likely to occur during construction to fields in close proximity to Strathcarron, Achintee and Attadale, crofting land and the sheep pens/cattle grids around Strathcarron, Achintee, Attadale and Braeintra. This Route will potentially cause temporary disruption of access to agricultural fields. However, temporary access impacts and solutions upon individual farms, fields and crofting areas have not yet been determined and will be further investigated as Stage 3.	Medium	Minor / Moderate	Ensure access is maintained at all times and consultation is undertaken with landowners . Construction programme and timing to ensure that any new field accesses are in place to avoid temporary severance of field access for farming operations.	Slight adverse
Access disruption to Community assets	This Route will likely impact upon the Attadale Estate and Visitor Gardens as it passes in close proximity. Option S4 will likely cause access disruption to community assets and to rest stops along A890	Medium	Minor / Negligible	Ensure access is maintained at all times to areas where it is required. Consult with landowners and Forestry Commission over scale and duration of impact.	Slight adverse / Neutral

	<p>and A896 through storage of materials and realignment work during construction, although these will be temporary impacts during the construction phase.</p> <p>The scheduled bus and railway services are likely to be affected, however this is identified and discussed within Chapter 8 Effects on All Travellers.</p> <p>This Route will potentially cause temporary disruption of access to community assets. However, temporary access impacts and solutions upon individual community assets have not yet been determined and will be further investigated as Stage 3.</p>			<p>Construction programme and timing to ensure that any new accesses are in place to avoid temporary severance of accesses.</p> <p>Contractors should provide temporary signposting and barriers where required to ensure access is available during the construction phase to separate recreationalists from construction activity (<i>in compliance with appropriate Health &amp; Safety legislation requirements</i>) and avoid temporary severance of public access to the remainder of the woodland area.</p>	
<p>Loss of future development land</p>	<p>The S4 option is likely to have no impact upon any of the development areas identified within the study area.</p>	<p>Medium</p>	<p>None</p>	<p>None required</p>	<p>Neutral</p>
<p>Land take of Private assets (non-agricultural)</p>	<p>The S4 route will require land take at:</p> <ul style="list-style-type: none"> <li>• Achintee/Strathcarron;</li> <li>• Properties to the North-East of Achintee including Park Cottage and Rosedyke;</li> <li>• Carron View residential property adjacent to Achintee/A890;</li> <li>• Attadale Estate;</li> <li>• Carron Restaurant pottery and art gallery, and;</li> <li>• Home Farm, Attadale.</li> </ul> <p>The land-take required for these private assets may also relate to crofting land-take for the options. Option S4 will potentially require land-take of 8 crofting areas.</p>	<p>High</p>	<p>Moderate/ Minor</p>	<p>Ensure consultation is undertaken with landowners.</p> <p>Minimise severance through design.</p> <p>Ensure appropriate compensation to land owners for permanent loss of private land areas required to accommodate the bypass design.</p>	<p>Slight / Moderate adverse</p>

Loss of agricultural land	<p>Permanent access disruption to individual properties is a possibility but should be minimised through mitigation measures and will be further identified for individual receptors at Stage 3.</p>	Medium	Minor / Moderate	<p>Ensure consultation is undertaken with landowners.          Minimise severance through design.          Ensure appropriate compensation to land owners for permanent loss of agricultural land areas required to accommodate the bypass design.</p>	Slight adverse
Land take of Community assets	<p>Option S4 will not have any effects on prime agricultural land, but passes through land classified between 4<sub>2</sub> (Narrow Range of crops) within Strathcarron (the most valuable within the study area) and 6<sub>3</sub> (Used Only as Rough Grazing).          This Route may also have a permanent impact upon agricultural land at Home Farm (Attadale) and crofting land-take may occur, in those areas identified in 'land-take of private assets' (above).          Permanent access disruption and field alteration to individual farms, fields and crofting areas is a possibility but should be minimised through mitigation measures and will be further identified for individual receptors at Stage 3.</p>	High	Moderate / Minor	<p>Ensure detailed scheme design minimises land take where possible and appropriate compensation to FCS for permanent loss of woodland areas required for accommodating the Scheme design.</p>	Slight / Moderate adverse
	<p>Option S4 is not likely to cause permanent land-take of community assets within the study area.          This Route Option is likely to require permanent land-take at Forestry Commission and Dedicated Woodlands along Glean Udalain and at the Attadale Estate Woodlands.          Permanent access disruption to individual community assets is a possibility but should be minimised through mitigation measures and will be further identified for individual receptors at Stage 3.</p>				

### 9.1.7 **Potential Mitigation Measures**

Careful consideration of the detailed route alignment and design will be an important part of the options appraisal and design development process. The following outlines a number of key principles that could help minimise negative impacts upon community and private assets:

- Where appropriate, planting to maintain and/or restore the existing landscape character. A landscape treatment, which responds to and fits with the existing landscape character, should be adopted and should extend right to the paved edges of the road;
- Exploring opportunities for additional on and off-site screening to reduce the impact of existing sections of improved road;
- Ensure detailed design minimises land-take where possible, especially where it can impact upon agricultural, crofting, private assets and forestry land;
- Appropriate compensation to land owner for permanent loss of private land, agricultural land and managed forest areas required to accommodate the bypass design;
- Provide temporary signposting and barriers to separate recreationalists from construction activity;
- Ensure access is maintained at all times and consultation is undertaken with landowners; and
- Construction programme timing to ensure any new access are in place to avoid temporary severance.

Site specific measures will be developed for the preferred Scheme at Stage 3 and would be incorporated into a Project Environmental Management Plan. A Schedule of Environmental Commitments would also be produced at Stage 3 which Contractors will require to comply with.

### 9.1.8 **Residual Impacts**

All options have the potential to cause residual impacts through:

- Permanent land-take of private assets, agricultural/crofting land and forested areas.
- Permanent access alterations for private assets, agricultural and crofting land, community assets and forested areas.

However, these impacts will be reduced due to the implementation of those mitigation measures identified above, and any detailed/specific mitigation measures identified within Stage 3.

### 9.1.9 **Difficulties Encountered/Limits to Assessment**

The data gathered from desk research, site visits and consultation with stakeholders does not provide a specific number of properties, private assets, businesses, community resources and crofting land within the study area and it is recommended that detailed surveys and ownership details should be completed at DMRB Stage 3 when a preferred route has been selected for assessment.

9.1.10 **Summary**

All of the route options will cause temporary access disruption during construction, however these will be temporary. Permanent access disruption is a possibility but should be minimised through mitigation measures and will be further identified for individual receptors at Stage 3.

All of the route options will impact upon the scheduled bus services to varying degrees during the construction period. This is likely to be short term during construction allowing long term benefits. Further information on transport effects is included in Chapter 8 Effects on All Travellers.

All of the route options will cause permanent land take and access disruption within the study area. However, the extent of these will vary dependent upon the route option.

The northern route options (N6 and N9) are likely to have a greater impact upon private and community assets as they both travel in close proximity to Lochcarron. Of these two options, Option N9 will cause a greater impact upon land take of private assets (as the bypass of Lochcarron will require greater land take) and Option N6 will cause greater disruption to community assets (as it travels through Lochcarron).

Although none of the route options pass through agricultural areas designated as prime agricultural land, both the southern route (S4) and the online route options (O2 to O7) will impact upon the area of land with the best agricultural value within the study area (surrounding Strathcarron).

Option N9 is the only option which is likely to cause permanent land take to areas designated for development in the Local Development Plan.

The south route (S4) Option will require the greatest land-take, the majority of which is the forested areas along the Gleann Udalain Valley to Attadale. Large parts of this area are Forestry Commission and Dedicated Woodland.

Table 9.10 provides an overall summary table for the assessment of effects on community and private assets.

**Table 9.10: Community and Private Assets Assessment Summary**

Option	Preferred Option	Intermediate Option	Least Preferred Options
O2 (Sidelong Viaduct)	✓		
O3 (Inland Tunnel)	✓		
O5 (Share road/rail)	✓		
O7 (Avalanche Shelter extension)	✓		
N9 (Lochcarron Bypass)			✓
N6 (Through Lochcarron)		✓	
S4 (Glean Udalain)		✓	



**9.1.11      *Recommendations for further work***

Should a DMRB Stage 3 Report be commissioned, a more detailed assessment should be undertaken to assess the likely effects of the preferred route option on the community and private assets.

## 10 GEOLOGY AND SOILS

### 10.1 Introduction

#### 10.1.1 *Purpose and scope of the assessment*

This assessment considers the potential effects of the proposed development on the study area geology and soils, and has been carried out in accordance with the Design Manual for Roads and Bridges (DMRB) Vol 11, Sec 3, Part 11 (Geology and Soils).

Its aim is to undertake sufficient assessment in order to identify the factors (and the significance of effects upon them), to be taken into account when developing and refining a preferred route and to identify any constraints that may be associated with each of the proposed route options.

This assessment considers:

- Direct impact on underlying geology and soils;
- Direct impact on geological or geomorphological features which are of specific interest or importance;
- Direct impact on soils through loss and destruction of agricultural soils (refer also to Chapters 5 – Landscape and Visual, 6 – Nature Conservation and, 9 – Community and Private Assets, for an assessment of the impact of the proposed scheme on agricultural practises); and
- Impact on contaminated land.

This assessment should also be read in conjunction with Chapter 13 – Road Drainage and the Water Environment, for an assessment of the water quality and drainage impacts of the proposed route options on groundwater, surface water, flooding areas and designated sites.

#### 10.1.2 *Study Area*

The Soil and Geology review study area includes the three proposed route corridors (Northern, Online and Southern – consisting of 8 options) and associated geology by which the proposed schemes may impact or be impacted by.

### 10.2 Methodology

#### 10.2.1 *Stages of Assessment*

The assessment has included the following stages:

- Consultation with relevant statutory and non-statutory bodies to establish geological receptors within the study area;
- Identification of potential effects and consideration of the interactions between the proposed development and current site conditions;
- Assessment of the significance of potential effects by taking into account the sensitivity of the receiving environment and the potential magnitude of each effect;
- Mitigation measures devised to avoid or reduce any significant adverse effects.

### 10.2.2 **Consultations**

Consultations were carried out with statutory and non-statutory bodies as indicated in Chapter 3.

SEPA raised a number of considerations of relevance to the geology and soils assessment. These included consideration of the likely aggregate requirements for each option, the likely sources of material (i.e. site won, imported quarry fill, borrow pits etc.) and the related environmental implications of this. Specific consideration of the potential impacts each option could have on peat was also raised, including minimising disruption to peatland and the volume of peat requiring excavation. SEPA also requested that peat probing is undertaken for each of the route corridors and should include a high level estimate or comparison of the quantity of peat that is likely to be disturbed. On this basis, the following information was provided:

- A briefing note on peat management;
- Peat and soils map based on the BGS soils map;
- Peat Management Plan.

Following further discussion after the above information was submitted SEPA were satisfied that peat probing would be suitable at DMRB Stage 3.

### 10.2.3 **Review of Available Sources**

The following sources of information have been reviewed for this study:

- British Geological Survey (BGS):
  - BGS 1:50,000 Solid and Drift Geological Sheet 82, Lochcarron.
  - BGS 1:50,000 Solid and Drift Geological Sheet 81E, Loch Torridon.
  - BGS 1:10560 Geological Sheets.
- The National Library of Scotland – Information regarding current and historical Ordnance Survey (OS) maps;
- Scotland's Environment website ([www.environment.scotland.gov.uk](http://www.environment.scotland.gov.uk));
- Scottish Environment Protection Agency (SEPA);
- The Highland Council: Contaminated Land and Petroleum Officers;
- Scottish Natural Heritage (SNH) – Information on Site of Special Scientific Interest (SSSI) locations and ecological issues within the site area;
- The Royal Commission of the Ancient and Historical Monuments of Scotland (RCAHMS) – Information on ancient monuments and historical aerial photography; and
- URS in-house information.

Previous reports reviewed and consulted for this study include:

- Strome ferry Options Appraisal, Geotechnical Desk Study Report, URS, March 2013 (ref. 47065084/GLRP0001).

10.2.4 **Field work**

A walkover survey was conducted by URS between 20<sup>th</sup> and 22<sup>nd</sup> August 2013. With the exception of parts of the southern route corridor all survey corridors were assessed either by car or on foot. Selected parts of the southern corridor were accessed on foot in order to gain a broader perspective of the extent of the route. All key highway junction points were also considered, including those on the existing A890. The weather conditions during the survey were dry with good visibility throughout.

10.2.5 **Assessment of Effects**

The significance of the potential effects of the proposed development has been characterised taking into account the sensitivity of the receiving environment and the potential magnitude of this effect. This assessment methodology is based on experience of carrying out such assessments for a range of developments including knowledge of geology and soil characteristics in Scotland and cognisance of best practise and guidance.

10.2.6 **Significance of Effects**

The sensitivity and importance of the receiving environment was defined when taking into account the following range of criteria (based on the DMRB Vol. 11, Sec. 2, Part 5: Table 2.1), as defined in Table 10.1.

**Table 10.1 – Environmental Sensitivity Value**

Sensitivity	Typical Descriptors
<b>Very High</b>	Very high importance and rarity, international scale and very limited potential for substitution.
<b>High</b>	High importance and rarity, national scale, and limited potential for substitution.
<b>Medium</b>	High or medium importance and rarity, regional scale, limited potential for substitution.
<b>Low</b>	Low or medium importance and rarity, local scale.
<b>Negligible</b>	Very low importance and rarity, local scale.

10.2.7 **Magnitude of Impact**

The magnitude is influenced by the timing, scale, size and duration of the potential effect. For the purposes of this assessment the magnitude (based on the DMRB Vol. 11, Sec. 2, Part 5: Table 2.2) is defined in Table 10.2. The level of magnitude can be difficult to quantify and professional judgement is often necessary to make an objective assessment.

**Table 10.2 – Assessing Magnitude of Impact**

Scale of Impact	Description of Degree of Effect
<b>Major</b>	<ul style="list-style-type: none"> <li>• Loss of resource and/or quality and integrity of resource; severe damage to key characteristics, features or elements (Adverse)</li> <li>• Large scale or major improvement of resource quality; extensive restoration or enhancement; major improvement of attribute quality (Beneficial)</li> </ul>
<b>Moderate</b>	<ul style="list-style-type: none"> <li>• Loss of resource, but not adversely affecting the integrity; partial loss of/damage to key characteristics, features or elements (Adverse)</li> <li>• Benefit to, or addition of, key characteristics, features or elements; improvement of attribute quality (Beneficial).</li> </ul>
<b>Minor</b>	<ul style="list-style-type: none"> <li>• Some measurable change in attributes, quality or vulnerability; minor loss of, or alteration to, one (maybe more) key characteristics, features or elements (Adverse).</li> <li>• Minor benefit to, or addition of, one (maybe more) key characteristics, features or elements; some beneficial impact on attribute or a reduced risk of negative impact occurring (Beneficial).</li> </ul>
<b>Negligible</b>	<ul style="list-style-type: none"> <li>• Very minor loss or detrimental alteration to one or more characteristics, features or elements (Adverse).</li> <li>• Very minor benefit to or positive addition of one or more characteristics, features or elements (Beneficial).</li> </ul>
<b>No Change</b>	<ul style="list-style-type: none"> <li>• No loss or alteration of characteristics, features or elements; no observable impact in either direction.</li> </ul>

10.2.8 **Significance of Effect**

The sensitivity of the receiving environment together with the magnitude of the effect defines the significance of the effect as outlined in Table 10.3.

**Table 10.3 – Matrix for Determination of Level of Impact**

		<i>Sensitivity of Receptor</i>				
		<i>Very High</i>	<i>High</i>	<i>Medium</i>	<i>Low</i>	<i>Negligible</i>
<i>Magnitude of Impact</i>	<i>Major</i>	Very Large	Large or Very Large	Moderate or Large	Slight or Moderate	Slight
	<i>Moderate</i>	Large or Very Large	Moderate or Large	Moderate	Slight	Neutral or Slight
	<i>Minor</i>	Moderate or Large	Slight or Moderate	Slight	Neutral or Slight	Neutral or Slight
	<i>Negligible</i>	Slight	Slight	Neutral or Slight	Neutral or Slight	Neutral
	<i>No Change</i>	Neutral	Neutral	Neutral	Neutral	Neutral

These significance ratings have been used in the assessment and potential effects are therefore concluded to be of very large, large, Moderate, slight or neutral significance, once appropriate mitigation measures have been implemented. It is reiterated that this assessment relies on professional judgement. Effects of 'Moderate' significance or greater are considered significant in terms of EIA regulations.

10.2.9 ***Significance of Cumulative Effects***

Cumulative effects may impact on the project where singularly there is no/minor significance. The typical significance of these effects is outlined in Table 10.4.

**Table 10.4 – Environmental Sensitivity Value**

<b>Significance</b>	<b>Effect</b>
<b><i>Severe</i></b>	Irretrievably compromised receptor/resource.
<b><i>Major</i></b>	Key decision-making issue.
<b><i>Moderate</i></b>	Unlikely to become issue on whether project design is selected, but may need future works to improve on current performance.
<b><i>Minor</i></b>	Locally significant.
<b><i>Not Significant</i></b>	Beyond current abilities or within the ability of the resource to absorb any changes.

10.2.10 ***Limitations***

At this stage no historical or current detailed geological / geotechnical data is available for any of the proposed route corridors. To take account of this, the determination of significance of

residual effects has been undertaken using a conservative approach. The assessment is therefore considered robust and the level of investigation appropriate for the purposes of EIA.

**10.3 Baseline Conditions**

**10.3.1 Site Location**

The site comprises eight route options, which are split into three distinct corridors (Northern, Online and Southern). The proposed routes are intended to bypass or improve a stretch of the A890 situated adjacent to Loch Carron, in the Scottish Highlands.

The routes are centred on Loch Carron and generally connect the A890 at Achmore to the A890 at Strathcarron Junction. The approximate site centre is at national grid O.S. co-ordinate 190891, 838781.

**10.3.2 Options Description**

Each of the proposed route options are described in Chapter 4 of this report.

**10.3.3 Geology**

Information regarding the geological conditions at the site was obtained from available published geological sheets <sup>(5,6)</sup> and is summarised in Table 10.5 below, for each of the proposed corridor options.

**Table 10.5 – Geological Conditions**

Route Name	Geology Description
<b>Northern Route Corridor Options (N6, N9)</b>	<p>Where mapped, the superficial deposits along the majority of the northern route corridor are recorded to comprise moraine and undifferentiated drift, with the exception of the area between Kirkton and Strathcarron Junction, which is recorded to be underlain by freshwater alluvia. No indication of the depth of the superficial deposits is given; however superficial deposits were not consistently mapped across the site indicating that they are thin or absent.</p> <p>Around Stromeferry and Ardnarff the solid strata is changeable with massive and foliated pyroxenic hornblendic and micaceous gneiss affected by post-Cambrian movement; epidiorite and hornblende-schist affected by post-Cambrian movement; and flaggy quartz-feldspar granulite being recorded. Around Stromemore the routes were recorded to be underlain by massive and foliated pyroxenic hornblendic and micaceous gneiss affected by post-Cambrian movement and epidiorite and hornblende-schist affected by post-Cambrian movement. Beyond that, mylonite was recorded up to, and around, Slumbay Island, with the remainder of the routes being underlain by undifferentiated granulitic schists of the Moine Series.</p> <p>The solid strata were generally recorded to dip east towards Loch Carron at an unspecified angle.</p>
<b>Online Route Corridor Options (O2, O3, O4, O7)</b>	<p>Where superficial deposits are mapped they are generally recorded to comprise moraine and undifferentiated drift of unspecified thickness. No indication of the depth of the superficial deposits is given; however superficial deposits were not consistently mapped across the site indicating that they are thin or absent.</p> <p>The solid strata are noted to vary across the proposed route corridor. Around Stromeferry and Ardnarff the strata is particularly changeable with massive and foliated pyroxenic hornblendic and micaceous gneiss affected by post-Cambrian movement; epidiorite and hornblende-schist affected by post-Cambrian movement;</p>

<sup>5</sup> British Geological Survey, 1:50,000 Geological Sheets, 82: Lochcarron and 81E: Loch Torridon.

<sup>6</sup> British Geological Survey, 1:10,560 Geological Sheets.

Route Name	Geology Description
	and flaggy quartz-feldspar granulite being noted. Along the remainder of the route, granulitic schists of the Moine series are noted to underlie the route. However, the strata immediately to the south of the routes along Loch Carron are recorded to comprise acid and hornblende gneiss, amphibolite; and pelitic gneiss. The recorded dip varied from south east, to east, to north east.
<b>Southern Route Corridor Option (S4)</b>	Where mapped, the superficial deposits along the routes were recorded to comprise morainic deposits with some undifferentiated drift and peat. No indication of the depth of the superficial deposits is given; however superficial deposits were not consistently mapped across the site indicating that they are thin or absent.  The solid strata were recorded to comprise undifferentiated granulitic schists of the Moine Series, and were noted to dip to the south east.

### 10.3.4 *Seismic Activity*

The BGS has recorded several historical earthquake events in the vicinity (approx. 20km radius) of the proposed route corridors. Their location and associated magnitude are listed in Table 10.6 below:

**Table 10.6 – Historical Earthquake Events**

Date	Location	Magnitude
03/12/1878	Kintail	3.3
06/08/1974	Kintail	4
10/08/1974	Kintail	4.4
27/11/1975	Kintail	4.1
12/02/1975	Loch an Lasaich	2.2
06/04/1978	Lochan Dubha	1.9
28/05/1978	Lochan Dubha	1.9
11/06/1978	Creag Mhor	2.3
11/08/1979	Carn Mor	1.5
30/08/1979	Loch Carron (near avalanche shelter)	2.3
07/02/1988	Criag Mhaol	2.4
08/02/1988	Criag Mhaol	1.9

### 10.3.5 *Mining and Quarrying*

Due to the nature of the underlying metamorphic bedrock, it is considered that the risk to the development with respect to mineral stability is very low.

In addition, from a review of historical maps of the area, no quarries have been recorded on, or within 250m, of the proposed route corridors.



10.3.6 **Soil Quality**

A map showing the soils present within the Strome ferry Bypass study area is shown in Drawing 10.2 – Soil Types. The soil types indicated to be present within each route corridor are presented in Table 10.7 below:

**Table 10.7 – Soil Types**

Route Name	Soil Types
<b>Northern Route Corridor</b>	The majority of the northern route corridor is underlain by Arkaig soils (peaty soils, although they also contain some mineral and mountain soil) in the area around Lochcarron and Kirkton. Lochinver soils (described as brown forest soils and humous-iron podzols), are located in the southern part of the corridor and in the area of the Strome Narrows crossing.
<b>Online Route Corridor</b>	The on-line route corridor is underlain by alluvial, organic, corby/boyndie/dinnet and Arkaig soils between Strathcarron Junction and Attadale. From Attadale to Strome ferry, the on-line corridor is underlain by Lochinver soils.
<b>Southern Route Corridor</b>	The southern route corridor is underlain by alluvial, organic, corby/boyndie/dinnet and Arkaig soils between Strathcarron and Attadale. As the route traverses to the south it crosses Lochinver and Arkaig soils and then Lochinver soils only as the route corridor traverses to the west towards Achmore.

Consultation with SEPA has resulted in concerns being raised in relation to the presence of peat within the proposed route corridors. The location of areas of peat in relation to the proposed route corridors is indicated on Figure 10.1 – Peat Locations. In response to SEPA's concerns, a technical note Constructing Roads Over Peat and Peat Management has been prepared (Appendix 4). This document provides a summary of the geotechnical constraints peat can have on road construction, current guidance / best practice for the construction of roads in areas of peat land to assist in the appraisal of the re-route options, guidance on the management of peat and information on ground investigation works that may be required to investigate peat conditions within the selected road alignment corridors.

10.3.7 **Hydrology**

Several watercourses were noted in vicinity of the route corridors. The main water bodies encountered are detailed in Chapter 13 Road Drainage & the Water Environment.

10.3.8 **Hydrogeology**

The BGS aquifer maps <sup>(7)</sup> and accompanying report <sup>(8)</sup> indicate that:

- Alluvial and drift deposits recorded to underlie the majority of the site are regarded as a non-aquifer due to their low permeability;
- Groundwater flow within bedrock underlying the site is recorded to be through fractures (bedding planes, joints and faults). These rocks are classified as aquifers with a low to very low productivity.

Groundwater flow directions within aquifer units in the drift deposits will be influenced by the local topography and also by nearby surface waters. A hydraulic connection between groundwater below the site and surface water is unknown.

<sup>7</sup> BGS/SEPA, 2004. *Bedrock Aquifer Map and Superficial Aquifer Map*, Scale 1:100,000.

<sup>8</sup> BGS, 2004. *A GIS of aquifer productivity in Scotland: explanatory notes*. Commissioned Report CR/04/047N.

The Scotland and Northern Ireland Forum for Environmental Research (SNIFFER) groundwater vulnerability map <sup>(9)</sup> and accompanying report <sup>(10)</sup> have been consulted and the site has been given a vulnerability classification of 4, based on the assumption of there being approximately 1-3m of superficial deposits overlying bedrock. A vulnerability classification of 4 indicates that groundwater within bedrock beneath the site will be vulnerable to those pollutants not readily absorbed or transformed.

Where bedrock is exposed, or only a thin layer of topsoil is present, a vulnerability classification of 5 would be more appropriate. A vulnerability classification of 5 indicates that groundwater within the bedrock will be vulnerable to most water pollutants with rapid impact in many scenarios.

Groundwater bodies are classified by SEPA, from which the water quality ratings range from Good to Poor. A search of SEPA's River Basin Management Plan (RBMP) database was conducted regarding the groundwater quality beneath the site, and was found to be classified as "good".

#### 10.3.9 ***Man Made Features***

The following existing man-made features (which potentially have associated made ground materials) have been recorded within the study area and include:

- Kyle of Lochalsh to Inverness Railway and its associated infrastructure including bridges and footbridges;
- Bridges;
- Existing road pavement with associated structures and earthworks;
- Side roads, farm tracks and footpaths; and
- Developments within the local area.

#### 10.3.10 ***Contaminated Land***

There is at present no information with regard to the presence of any potentially contaminated land sites within the study area. Given the rural nature of the study area, it is not anticipated that there will be any areas of potential contamination with the exception of the presence of made ground that may be associated with the man-made features referred to in Section 10.3.9 above. No areas of land have been highlighted during the consultation process.

#### 10.3.11 ***Site History***

The following descriptions of the historical development of the study area are based upon an examination of available current and historical Ordnance Survey (OS) maps obtained from the NLS, along with information gleaned from historical reports. Copies of relevant historical maps are included in Appendix 1.

<sup>9</sup> Scotland and Northern Ireland Forum for Environmental Research (SNIFFER), 2004. *Vulnerability of Groundwater in the Uppermost Aquifer*, Scale 1:100,000.

<sup>10</sup> SNIFFER, 2004. *Development of a groundwater vulnerability screening methodology for the Water Framework Directive*.

**Table 10.8 – Study Area History**

Map/Date Reference	Identified Features
1875 – 1880	<ul style="list-style-type: none"> <li>• Several settlements within the site area were identified as Stromeferry, Stromemore, Kirkton and Achintee along with associated dwellings, buildings and infrastructure;</li> <li>• An east-west trending unnamed road was noted in the far north of the study area, running from off-site to the settlement of Lochcarron;</li> <li>• A northeast-southwest trending railway line denoted “Dingwall and Skye Line” was noted along the south bank of Loch Carron;</li> <li>• An unnamed road trending north-south was noted running off-site from Stromeferry;</li> <li>• An unnamed road was noted trending southwest to northeast along the north bank of Loch Carron to a junction just to the north of the loch.</li> </ul>
1947 - 1957	<ul style="list-style-type: none"> <li>• Attadale House and a pier were noted in the approximate centre of the south bank of Loch Carron;</li> <li>• The road identified at Stromeferry and on the north bank of Loch Carron was denoted as “A890”;</li> <li>• The road noted along the far north of the site was denoted the “B857”.</li> </ul>
1971	<ul style="list-style-type: none"> <li>• The construction of the existing A890 bypass was completed. A major landslip was noted to have occurred during construction, resulting in the added construction of the avalanche shelter present along the route in the present day. At least three other smaller failures also occurred during construction.</li> </ul>

Records of historical landslide/rock fall events along the existing rock slope have been taken from historical reports reviewed as part of the URS Geotechnical Desk Study Report and from information obtained from The Highland Council (THC). This information is summarised in Table 10.9:

**Table 10.9 – Landslide / Rock Fall History**

Date	Details of Event
March 1990	200 tonnes failed blocking road and railway. Works were carried out on the slopes starting in September 1990, night working for ten weeks by Albion Drilling. Traffic was in diversion for eight weeks.
May 1998	May the 4th 1998, eight tonnes of rock failed, not on road; May the 11th 1998, 1.5 tonnes of rock failed, not on road.
May 1999	40 tonnes of rock came down with one small block reaching the road.
October 2001	Emergency inspection, following landslide on 29 <sup>th</sup> October 2001. 500m <sup>3</sup> of soil failed resulting in a debris flow that blocked the road and railway. EDGE inspected the landslide between 31 <sup>st</sup> October - 2 <sup>nd</sup> November.
October 2004	Two debris flows occurred. 4m <sup>3</sup> and 1m <sup>3</sup> minor and unlikely to have caused further destabilisation.
Jan - Feb 2007	20m <sup>3</sup> failed but was contained by verge and ditch.
May 2007	0.5m <sup>3</sup> to 1m <sup>3</sup> rock falls from upper slopes of the A890 bypass, reaching the road and railway.
August 2008	Rock fall (two blocks) from upper slopes of the A890 bypass, reaching the road and cleared by THC.
June 2009	Block falling from the upper slopes of the A890 bypass, contained by rock fall netting.
September 2009	Rock fall from slope adjacent to the A890 bypass, reaching the road and railway boundary.
Feb 2010 – Dec 2011	Several small scale rock falls along the A890 bypass were noted by THC during their monthly inspections. These were generally contained by rock netting and ditches, although some did reach the road.
December 2011	A major rock fall occurred leading to the closure of the A890 bypass until April 2012.
November 2012	A minor landslide occurred leading to disruption, but not closure, of the A890 bypass.

Date	Details of Event
December 2012	The A890 bypass was closed for two days due to a major rock fall.

To summarise, the site has remained largely unchanged since records began in 1875, with the exception of the A890 bypass which was opened in 1971 following the excavation of a number of rock slopes for road alignment.

There has been a history of rock falls along the existing A890 Stromeferry Bypass since its construction through to the present day. These incidents have included small events which were contained by remedial measures, to large scale events, which have led to closure of the road and/or major remediation works.

### 10.3.12 **Other Sources of Information**

#### **Scottish Environment Protection Agency (SEPA)**

SEPA implement a monitoring scheme and classification system to meet the requirements of the Water Framework Directive, whereby water bodies in Scotland are classified as High, Good, Moderate, Poor or Bad.

A search on SEPA's online database <sup>(11)</sup> was conducted with regard to water quality in the vicinity of the site. Of the watercourses identified on site, those noted to be assessed by SEPA are provided in Table 10.10 below:

**Table 10.10 – Surface Water Data**

<b>Watercourse</b>	<b>Status</b>
Abhainn Cumhang a Ghlinne	Good
River Carron	Good
River Attadale	High
Allt Cadh an Eas	Good
Allt Gleann Udalain	Good
Allt Loch Innis nan Seangan	Good
Loch Carron	Good

Groundwater beneath the site falls within the grouping 'Morar and Torridon', which was given a status of *Good* in 2008.

#### **Scottish National Heritage (SNH)**

A search on the online SNH database <sup>(12)</sup>, identified a number of statutory designations on, or within the study area and these are identified in the Nature Conservation chapter.

#### **The Royal Commission on the Ancient and Historical Monuments of Scotland (RCAHMS)**

The Royal Commission on the Ancient and Historical Monuments of Scotland (RCAHMS) online database <sup>(13)</sup> was consulted regarding the site's archaeological significance.

<sup>11</sup> SEPA, 2009. *RBMP Interactive Map*. Available: <http://213.120.228.231/rbmp>. Last accessed 09 November 2011.

<sup>12</sup> SNH, 2012. *Sitelink*. Available: <http://gateway.snh.gov.uk/sitelink/index.jsp>

<sup>13</sup> RCAHMS, 2009. *Pastmap*. Available: <http://jura.rcahms.gov.uk/PASTMAP/start.jsp>

Numerous entries were recorded for the various routes. Full details of the entries recorded are included in Chapter 7 Cultural Heritage and shown on Drawings 7.3.1 – 7.3.4 in Appendix 1.

### 10.3.13 **Relevant Planning Policy & Guidance**

The planning policies which are identified as relevant to the Stromeferry By-Pass scheme with respect to geology and soils are listed below:

#### **Scottish Planning Policy (2010)**

The published Scottish Planning Policy (SPP) includes planning policy for a number of subjects. The Rural Development policy is most relevant to geology and soils:

The planning system has a significant role in supporting sustainable economic growth in rural areas. By taking a positive approach to new development, planning authorities can help to create the right conditions for rural businesses and communities to flourish. The aim should be to enable development in all rural areas which supports prosperous and sustainable communities whilst protecting and enhancing environmental quality. Paragraph 97 states that:

- *'Prime quality agricultural land is a finite national resource. Development on prime agricultural land should not be permitted unless it is an essential component of the settlement strategy or is necessary to meet an established need, for example for major infrastructure development, where no other suitable site is available'.*

#### **Planning Advice Notes (PAN)**

PAN 33 Development of Contaminated Land (October 2000) – This guidance document provides information on contaminated land and the ways that the planning system can assist in dealing with contaminated soils or material and how it interacts with contaminated land regimes.

#### **The Highland Wide Local Development Plan (2012)**

**Previously Used Land (Policy 42)** – The Highland Council will support development proposals that bring previously used land back into beneficial use provided:

- Site investigation and risk assessment are undertaken and demonstrate that the site is in, or is capable of being brought into, a condition suitable for the proposed development; and
- The proposed development accords with all other relevant policies of this plan.

**Peat and Soils (Policy 55)** – Development proposals should demonstrate how they have avoided unnecessary disturbance, degradation or erosion of peat and soils.

Unacceptable disturbance of peat will not be permitted unless it is shown that the adverse effects of such disturbance are clearly outweighed by social, environmental or economic benefits arising from the development proposal.

Where development on peat is clearly demonstrated to be unavoidable The Highland Council may ask for a peatland management plan to be submitted which clearly demonstrates how impacts have been minimised and mitigated.

**Natural, Built and Cultural Heritage (Policy 57)** – All development proposals will be assessed taking into account the level of importance and type of heritage features, the form

and scale of the development, and any impact on the feature and its setting, in the context of the policy framework. The following criteria will also apply:

- For features of local/regional importance we will allow developments if it can be satisfactorily demonstrated that they will not have an unacceptable impact on the natural environment, amenity and heritage resource.
- For features of national importance we will allow developments that can be shown not to compromise the natural environment, amenity and heritage resource. Where there may be any significant adverse effects, these must be clearly outweighed by social or economic benefits of national importance. It must also be shown that the development will support communities in fragile areas who are having difficulties in keeping their population and services.
- For features of international importance developments likely to have a significant effect on a site, either alone or in combination with other plans or projects, and which are not directly connected with or necessary to the management of the site for nature conservation will be subject to an appropriate assessment. Where we are unable to ascertain that a proposal will not adversely affect the integrity of a site, we will only allow development if there is no alternative solution and there are imperative reasons of overriding public interest, including those of a social or economic nature. Where a priority habitat or species would be affected, development in such circumstances will only be allowed if the reasons for overriding public interest relate to human health, public safety, beneficial consequences of primary importance for the environment, or other reasons subject to the opinion of the European Commission (via Scottish Ministers). Where we are unable to ascertain that a proposal will not adversely affect the integrity of a site, the proposal will not be in accordance with the development plan within the meaning of Section 25(1) of the Town and Country Planning (Scotland) Act 1997.

**Geodiversity (Policy 62)** – Development proposals that include measures to protect and enhance geodiversity interests of international, national and regional/local importance in the wider countryside will be supported. The Highland Council will also support improvement of accessibility and interpretation as an educational or geo-tourism resource, where it is possible to integrate, sympathetically, development, geodiversity and other existing interests.

**SEPA Guidance – Developments on Peatland: Site Surveys** – Given an increased number of proposed developments on peatland (including road widening/construction) and the importance of peatlands for carbon storage and the habits that they support, this guidance document was written by the Scottish Government to assist with conducting site surveys. The documents identified the key principles for surveying peatland for use in a wide range of applications.

## 10.4 Options Appraisal

### 10.4.1 *Impacts and Mitigation*

Table 10.11 below describes the potential effects on geology and soils that could arise during the scheme construction and operation, including possible mitigation measures and likely residual impacts following application of these measures.

Note – The potential impacts will be dependent on the preferred route option adopted.



**Table 10.11 – Impacts on Geology and Soils**

Impact	Design Route Option	Environmental Sensitivity (Construction)	Magnitude of Impact (Construction)	Significance of Effect (Construction)	Mitigation	Environmental Sensitivity (Operation)	Magnitude of Impact (Operation)	Significance of Effect (Operation)	Cumulative Effect (Operation)
Site of Special Scientific Interest – Impact upon SSSI's.	North (N9)	Low	Moderate (Adverse)	Slight – Route option passes through Allt nan Carman SSSI (woodland) on new road and bridge. Impact to SSSI during construction likely.	Further consultation with regulatory authorities would be required to determine appropriate working methods that will help protect the SSSI.	Low	Minor (Adverse)	Neutral – Route option would have minimal impact on SSSI during operation.	Minor
	North (N6)	Negligible	No Change	Neutral – Route does not intercept any SSSI sites.	None required.	Negligible	No Change	Neutral	Not Significant
	Online (O2, O3, O4, O5, O7)	Low	Moderate (Adverse)	Slight – All online route options pass through / in proximity to Attadale SSSI (geological) and have the potential to impact upon it.	Area of SSSI unstable and rock falls / landslides are possible. Slope stability analysis and remedial options appraisal required.	Low	Moderate (Beneficial)	Slight – Remedial works will help stabilise the rock slope and preserve the SSSI.	Minor
	South (S4)	Negligible	No Change	Neutral - Routes do not intercept any SSSI sites.	None required	Negligible	No Change	Neutral	Not Significant

Impact	Design Route Option	Environmental Sensitivity (Construction)	Magnitude of Impact (Construction)	Significance of Effect (Construction)	Mitigation	Environmental Sensitivity (Operation)	Magnitude of Impact (Operation)	Significance of Effect (Operation)	Cumulative Effect (Operation)
<b>Underlying Geology –</b> Potentially compressible soils (inc. alluvial / organic soils and peat) may be encountered.	<b>North (N6 , N9)</b>	<b>High</b>	<b>Moderate (Adverse)</b>	<b>Moderate or Large –</b> Works to be undertaken on existing network along with the construction of new roads. Some cut and fill will take place. Arkaig/peaty soil and alluvium are present along route.	Desk study and ground investigation (including peat probing) to confirm ground conditions. Ground improvement design – floating tracks, cut/fill balance and re-routing where possible.	<b>Medium</b>	<b>Negligible (Adverse)</b>	<b>Neutral or Slight –</b> Secondary compression may occur locally.	<b>Minor</b>
	<b>Online (O2, O3, O4, O5, O7)</b>	<b>Low</b>	<b>Minor (Adverse)</b>	<b>Neutral or Slight –</b> With the exception of O2 (viaduct) and O3 (tunnel) the majority of the works in this corridor will be undertaken on existing road network with some cut and fill. Alluvial/organic soils are present in northern part of corridor.	Desk study, ground investigation to confirm ground conditions. Ground improvement design – floating tracks, cut/fill balance and re-routing where possible.	<b>Low</b>	<b>Negligible (Adverse)</b>	<b>Neutral or Slight –</b> Secondary compression may occur locally.	<b>Not Significant</b>

Impact	Design Route Option	Environmental Sensitivity (Construction)	Magnitude of Impact (Construction)	Significance of Effect (Construction)	Mitigation	Environmental Sensitivity (Operation)	Magnitude of Impact (Operation)	Significance of Effect (Operation)	Cumulative Effect (Operation)
	South (S4)	High	Moderate (Adverse)	<b>Moderate or Large</b> – Majority of route will comprise new road. Cut and fill operations will take place. Alluvial/organic and Arkaig/peaty soils are present in the western part of the corridor. Peat is also likely to be present.	Desk study and ground investigation (including peat probing) to confirm ground conditions. Ground improvement design – floating tracks, cut/fill balance and re-routing where possible.	Medium	Negligible (Adverse)	<b>Neutral or Slight</b> – Secondary compression may occur locally.	Minor
Geomorphology – Impact upon existing rock.	North (N6, N9)	High	Moderate (Adverse)	<b>Moderate or Large</b> - Works to be undertaken on existing network along with construction of new road. Some cut and fill will take place which may expose bedrock. Bridge proposed to be constructed at Strome Narrows may impact upon underlying rock.	Desk study, subsequent ground investigation to confirm ground conditions and slope stability analysis.	Low	Minor (Adverse)	<b>Neutral or Slight</b> – Scheme design to assess and mitigate risks where present.	Minor
	Online (O2, O3, O4, O5, O7)	High	Moderate (Adverse)	<b>Moderate or Large</b> - Majority of works to be undertaken on existing network. Some cut and fill will take place which may expose bedrock. Tunnel to be	Desk study, subsequent ground investigation to confirm ground conditions, slope stability analysis and remedial options	Low	Minor (Adverse)	<b>Neutral or Slight</b> – Scheme design to assess and mitigate risks where present.	Minor

Impact	Design Route Option	Environmental Sensitivity (Construction)	Magnitude of Impact (Construction)	Significance of Effect (Construction)	Mitigation	Environmental Sensitivity (Operation)	Magnitude of Impact (Operation)	Significance of Effect (Operation)	Cumulative Effect (Operation)
				incorporated into route O3, which will impact upon underlying rock. Existing rock slopes unstable and may be impacted by construction works.	appraisal required.				
	<b>South (S4)</b>	<b>Low</b>	<b>Minor (Adverse)</b>	<b>Neutral or Slight -</b> Majority of route will comprise new road. Cut and fill operations will take place which may expose rock.	Desk study, subsequent ground investigation to confirm ground conditions and slope stability analysis.	<b>Low</b>	<b>Negligible (Adverse)</b>	<b>Neutral or Slight -</b> Scheme design to assess and mitigate risks where present.	<b>Not Significant</b>
<b>Quarrying –</b> Impact of quarrying on construction / operation.	<b>North (N6, N9)</b>								
	<b>Online (O2, O3, O4, O5, O7)</b>	<b>Negligible</b>	<b>No Change</b>	<b>Neutral –</b> Routes will not impinge upon any quarries.	Desk study and subsequent ground investigation to confirm ground conditions.	<b>Negligible</b>	<b>No Change</b>	<b>Neutral –</b> Routes will not impinge upon any quarries.	<b>Not Significant</b>
	<b>South (S4)</b>								

Impact	Design Route Option	Environmental Sensitivity (Construction)	Magnitude of Impact (Construction)	Significance of Effect (Construction)	Mitigation	Environmental Sensitivity (Operation)	Magnitude of Impact (Operation)	Significance of Effect (Operation)	Cumulative Effect (Operation)
Contaminated Land – Potentially contaminated land uses have been identified (primarily the existing road network and railway).	North (N6, N9)	Negligible	Minor (Adverse)	Neutral or Slight – Potential for contaminated material to be present in areas of development / made ground such as beneath the existing road network, railway and other man-made structures.	Desk study, subsequent ground investigation to confirm ground conditions and risk assessment (where required).	Negligible	Minor (Beneficial)	Neutral or Slight – The scheme design will mitigate against risks from contamination, if present. Contamination would be capped preventing direct contact / water infiltration.	Not Significant
	Online (O2, O3, O4, O5, O7)								
	South (S4)								
Soil Erosion – Caused by stripping of vegetation, excavations, ground disturbance.	North (N6, N9)	Low	Moderate (Adverse)	Slight – Sections of new road are proposed to be constructed, particularly for option N6, which will result in ground disturbance and may lead to some soil erosion.	Programme soil strips, excavations and ground disturbance to consider weather.	Low	Minor (Adverse)	Neutral or Slight – Soil erosion may occur however, this will be minimised upon completion of the scheme.	Not Significant
	Online (O2, O3, O4, O5, O7)	Low	Minor (Adverse)	Neutral or Slight – Online routes predominantly involve work on existing road network with minimal cut and fill. Minimal vegetation clearance	Programme soil strips, excavations and ground disturbance to consider weather.	Low	Negligible (Adverse)	Slight – Soil erosion may occur however, this will be minimised upon completion of the scheme.	Not Significant

Impact	Design Route Option	Environmental Sensitivity (Construction)	Magnitude of Impact (Construction)	Significance of Effect (Construction)	Mitigation	Environmental Sensitivity (Operation)	Magnitude of Impact (Operation)	Significance of Effect (Operation)	Cumulative Effect (Operation)
				will be required.					
	<b>South (S4)</b>	<b>Low</b>	<b>Moderate (Adverse)</b>	<b>Slight</b> – Option comprises the construction of a new road which will result in ground disturbance and may lead to some soil erosion.	Programme soil strips, excavations and ground disturbance to consider weather.	<b>Low</b>	<b>Minor (Adverse)</b>	<b>Slight</b> – Soil erosion may occur however, this will be minimised upon completion of the scheme.	<b>Not Significant</b>
<b>Compaction of Soil</b> – Loss of agricultural soil, increase in run off, slope instability, peat slide.	<b>North (N6, N9)</b>	<b>Low</b>	<b>Moderate (Adverse)</b>	<b>Slight</b> - Sections of new road are proposed to be constructed, particularly for option N6, which may result in ground compaction during construction. Peat slide may occur within peat land areas.	On-Site planning, minimise haul distances over exposed ground, avoid agricultural areas where possible, minimise land take consideration at design stage. Peat stability assessment / Peat management plan.	<b>Low</b>	<b>Minor (Adverse)</b>	<b>Neutral or Slight</b> – Some compaction of soil may occur at access points / service locations.	<b>Not Significant</b>
	<b>Online (O2, O3, O4, O5, O7)</b>	<b>Low</b>	<b>Minor (Adverse)</b>	<b>Neutral or Slight</b> - Online routes predominantly involve work on the existing road network with minimal cut and fill.	On-Site planning, minimise haul distances over exposed ground, avoid agricultural areas where possible,	<b>Low</b>	<b>Minor (Adverse)</b>	<b>Neutral or Slight</b> – Some compaction of soil may occur at access points / service	<b>Not Significant</b>

Impact	Design Route Option	Environmental Sensitivity (Construction)	Magnitude of Impact (Construction)	Significance of Effect (Construction)	Mitigation	Environmental Sensitivity (Operation)	Magnitude of Impact (Operation)	Significance of Effect (Operation)	Cumulative Effect (Operation)
				Some ground compaction may occur.	minimise land take consideration at design stage.			locations.	
	<b>South (S4)</b>	<b>Low</b>	<b>Moderate (Adverse)</b>	<b>Slight</b> – Option comprises the construction of a new road which will result in ground compaction during construction. Peat slide may occur in peat land areas.	On-Site planning, minimise haul distances over exposed ground, avoid agricultural areas where possible, minimise land take consideration at design stage. Peat stability assessment / peat management plan.	<b>Low</b>	<b>Minor (Adverse)</b>	<b>Neutral or Slight</b> – Some compaction of soil may occur at access points / service locations.	<b>Not Significant</b>
<b>Requirement to Import Material</b> – Reduced cost and emissions. Non-sustainable construction.	<b>North (N6, N9)</b>	<b>Very High</b>	<b>Major (Adverse)</b>	<b>Very Large</b> – Limited cuttings during construction would require the importation of fill materials from borrow pits or nearby quarries. It is anticipated that any	Undertake cut / fill balance at design stage to maximise re-use of site won material and minimise requirement for imported fill.	<b>Low</b>	<b>Negligible</b>	<b>Neutral or Slight</b> – Fill material not required once operational.	<b>Not Significant</b>
	<b>Online (O2, O3, O4, O5, O7)</b>								

Impact	Design Route Option	Environmental Sensitivity (Construction)	Magnitude of Impact (Construction)	Significance of Effect (Construction)	Mitigation	Environmental Sensitivity (Operation)	Magnitude of Impact (Operation)	Significance of Effect (Operation)	Cumulative Effect (Operation)
	South (S4)			surplus rock / soil would be suitable for use in embankments but not for road makeup.					
Material Re-use – Reduced cost and emissions.	North (N6, N9)	Very High	Major (Adverse)	Very Large – Limited cuttings during construction will not produce sufficient quantities of material for re-use resulting in the need for importing material from borrow pits or local quarries. Surplus material would need to be re-used or disposed of off-site.	Undertake cut / fill balance at design stage to minimise requirement for importing/disposing material. Carefully stockpile excess material on-site.	Low	Negligible	Neutral – Excess material will not be generated once scheme is operational.	Not Significant
	Online (O2, O3, O4, O5, O7)								
	South (S4)								
On-site Storage of Oils, Fuels and Chemicals and	North (N6, N9)	Medium	Moderate (Adverse)	Moderate – Spillage of fuel or release of vapour from fuel	Use of best practise at all times, use of re fuelling bays, ensure	Medium	Minor (Adverse)	Slight – Should a spillage occur, its impact may	Minor



Impact	Design Route Option	Environmental Sensitivity (Construction)	Magnitude of Impact (Construction)	Significance of Effect (Construction)	Mitigation	Environmental Sensitivity (Operation)	Magnitude of Impact (Operation)	Significance of Effect (Operation)	Cumulative Effect (Operation)
<b>Vehicle Maintenance</b> – Pollution incidents and operative safety.	<b>Online (O2, O3, O4, O5, O7)</b>			storage tanks / site plant.	fuel tanks are within bunded storage areas, undertake a programme of regular checks / inspections, enforce site safety and maintenance plans			continue following completion of the works.	
	<b>South (S4)</b>								
<b>Stockpile Management</b> – Runoff and sediment to watercourses.	<b>North (N6, N9)</b>	<b>Medium</b>	<b>Moderate (Adverse)</b>	<b>Moderate</b> – Peat and surplus soil / rock materials may require to be stockpiled along some routes. Sediment and surface water run off may impact upon nearby water courses.	On-site planning of excavations and haulage to minimise stockpiling of surplus materials. Use of current best practise if stockpiles required to be formed – keep stockpiles away from watercourses, cover stockpiles where required.	<b>Negligible</b>	<b>No Change</b>	<b>Neutral</b> – Stockpiles of material will not be formed once scheme is in operation.	<b>Minor</b>
	<b>Online (O2, O3, O4, O5, O7)</b>  <b>South (S4)</b>								

## 10.5 Summary and Conclusion

The main impacts identified as a result of the proposed scheme include:

- Compressible soils (i.e. alluvial / organic soils and peat) - It is considered that this would particularly impact construction of new sections of road proposed along the Northern and Southern routes and may result in a requirement for ground improvement works to be undertaken. The remainder of the options primarily involve upgrade of existing routes and would not be impacted as severely.
- Impact to underlying bedrock – For the majority of the proposed routes this would generally only occur during any cut and fill works, where bedrock may be exposed. It is considered that more significant impact would occur for online route option O3, where an inland tunnel is proposed to be constructed.
- Soil Erosion / Compaction – It is considered that this would particularly impact construction of new sections of road proposed within the Northern and Southern routes, where more significant cut and fill operations may be required resulting in soil being exposed and also compacted. Peat is also likely to be exposed along these route corridors, which will increase the potential risk of peat slides. The remaining options primarily involve upgrade of existing routes which will require minimal excavation works.
- Presence of SSSI's – The Attadale SSSI located along the proposed Online options is a key area due to its nature and the significant potential for rock fall and landslides to occur. Impact upon the SSSI may occur during construction and significant remedial works are considered likely to be required in order to stabilise the rock slope and prevent further movement, for these routes to be a viable option. The SSSI located within the northern route corridor (Allt nan Carnan), will be impacted by the Option N9 (North Lochcarron Bypass), although through consultation with appropriate regulatory bodies, it is considered that this impact could be minimised.

On the basis of the options appraisal conducted, the preferred route option would be the Southern route corridor (S4 – South Glen Udalain). Although the proposed route primarily comprises the construction of a new road that will traverse areas of peat land (which will have an impact upon road design and the surrounding environment), it is considered that this option could be designed and constructed to minimise impact on the geology and soils of the study area if the mitigation measures included in Table 10.11 are adopted. This route option would effectively by-pass the existing problem area on the A890 whilst avoiding the construction of tunnels/bridges and the requirement for undertaking significant slope stability remedial works.

It is considered that the second best route option would be the Online route corridor (any options from O2, O5, O7), with the exception of route O3, which would include the excavation of an inland tunnel. The routes within the proposed online corridor would primarily utilise the existing road network, which would have a reduced impact upon the underlying geology and soil compared to the northern and southern route corridors, where new roads are required to be constructed. It is considered that all route options would require significant slope stability remedial work to be undertaken, which would be costly and may require future maintenance/monitoring, but would have an overall long term beneficial impact to the road, the adjacent railway line and the Attadale SSSI. These options would also avoid potential issues that may arise in relation to peat, which would affect the northern and southern route corridors and would negate any potential environmental effects that this may have.

It is considered that the Northern route options would be least preferred. Both of the proposed options within this corridor would require the construction of a crossing over the Strome Narrows (via bridge), which would have a greater impact upon geology and soils. The proposed route options in the northern corridor comprise utilisation of the existing road network and construction of new road. Part of the proposed new road will cross the Allt nan Carnan SSSI (Option N9), which may require specific mitigation measures to be put in place to reduce impact on the SSSI. Areas of peat are also likely to be encountered along the proposed routes, which may have an impact upon the road design and the surrounding environment. The proposed route options within the northern corridor would, however, bypass the area of slope instability along the existing A890 and would avoid the requirement for significant slope stability remedial works.

## 11 AIR QUALITY

### 11.1 Introduction

This section describes the potential air quality impacts associated with the proposed alignment options for the Stromeferry Bypass, taking into consideration local effects on human and ecological receptors.

#### 11.1.1 *Purpose and scope of the assessment*

The Proposed Scheme options have the potential to change local air quality at sensitive receptor locations in the vicinity of the current A890 Stromeferry to Achintee road and the alternatives due to the change in road traffic movements associated it.

The current Air Quality section of the DMRB HA207/07 (Highways Agency, 2007), no longer includes Stage 1, 2 and 3 assessments. Instead, it focuses on a 'fit-for-purpose' approach based on four assessment levels:

- Scoping;
- Simple;
- Detailed; and
- Mitigation/enhancement and monitoring.

For this Stage 2 Assessment, the simple assessment procedure has been followed for each element of the assessment.

This assessment is based on the traffic data currently available for the Proposed Scheme at the time of the assessment, which has been provided by the URS Transport team. The data has been sourced from project specific surveys and Department for Transport data collected within the study area.

#### 11.1.2 *Study Area*

The study area includes sensitive receptor locations within 200 m of roads affected by the Options.

### 11.2 Methodology

#### 11.2.1 *Legislation and Planning Policy*

The UK National Air Quality Strategy (Defra, 2000) was initially published in 2000, under the requirements of the Environment Act 1995 (H.M. Government 1995). The most recent revision of the strategy (Defra, 2007) sets objective values for key pollutants as a tool to help Local Authorities manage local air quality improvements in accordance with the EU Air Quality Framework Directive. Some of these objective values have subsequently been laid out within the Air Quality (Scotland) Regulations 2000 (H.M. Government, 2000) and later amendments (H.M. Government, 2002).

The EU Limit Values are prescribed under the Air Quality Standards Regulations 2010 (H.M. Government, 2010). The Air Quality Standards Regulations transfer EU Directives on ambient air quality into UK law. Unlike the air quality objectives the Air Quality Limit Values are legally binding on central government.

The relevant air quality objective values for Scotland for the pollutants of relevance to this assessment are displayed in Table 11.1.

**Table 11.1 – Air Quality Objective Values**

Pollutant	Averaging Period	Value	Maximum Permitted Exceedances	Target Date
<b>Set for the Protection of Human Health</b>				
Nitrogen dioxide (NO <sub>2</sub> )	Annual Mean	40 µg/m <sup>3</sup>	None	31/12/05
	1 Hour Mean	200 µg/m <sup>3</sup>	18 times per year	31/12/05
Particulate Matter (PM <sub>10</sub> )	Annual Mean	18 µg/m <sup>3</sup>	None	31/12/10
	24 Hour Mean	50 µg/m <sup>3</sup>	7 times per year	31/12/10
Fine Particulate Matter (PM <sub>2.5</sub> )	Annual Mean	12 µg/m <sup>3</sup>	None	2010
<b>Set for the Protection of Vegetation and Ecosystems</b>				
Oxides of nitrogen (NO <sub>x</sub> )	Annual Mean	30 µg/m <sup>3</sup> (NO <sub>x</sub> expressed as NO <sub>2</sub> )	None	19/07/01

The Scottish Planning Policy (SPP) is a statement of Scottish Government policy on nationally important land use. The SPP was published in February 2010 and consolidated a series of topic specific policy statements into a single, more concise statement. The SPP is currently under review and is due to be finalised in Summer 2014.

The National Planning Framework 2 (The Scottish Government, 2009) identifies the need for an effective national transport infrastructure that can accommodate sustainable economic growth, along with the need to reduce carbon emissions and improve air quality.

Planning Advice Note 51 (The Scottish Executive, 2006) states that the planning authority should have regard to the impact of a proposal on air quality, and refers to the Scottish Government's Land Use and Planning Guidance. This guidance outlines that air quality is capable of being a material planning consideration. Whether it actually is will depend upon the individual circumstances. The impact on ambient air quality is likely to be particularly important where:

- The proposed development is inside or adjacent to an AQMA;
- The development could result in designation of a new AQMA; and
- The granting of planning permission would conflict with, or render unworkable, elements of a local authority's air quality action plan.

The Highland Wide Local Development Plan (2012), the Wester Ross Local Plan (2006) and the West Highland & Islands Local Plan (2010) have also been considered as part of the assessment.

11.2.2 **Assessment Approach**

This assessment is based on the determination of air quality impacts at the local and regional scale during the operation of the Proposed Scheme, including localised impacts on any Sites of Importance for Nature Conservation (SINCs) that are located nearby. In addition, impacts during the construction works are also considered.

**Local**

At the local scale the assessment of the magnitude of pollutant concentrations and the significance of the change in pollution levels, due to each option, is quantified at relevant receptors.

The local air quality study area covers a zone within 200 m of the extent of the existing A890 between Stromeferry and Achintee (Online Route) and the proposed alternative option routes, including the Online Route options, the North Shore Route options and the Southern Route options, see Figure 11.1, and 200 m of any surrounding affected roads. Within this distance of a road, emissions from vehicles will affect air quality and, therefore, the level of pollutants. Beyond 200 m, emissions will have dispersed sufficiently for concentrations to remain at background levels.

It is understood that the Stromeferry Bypass route options will not lead to a change in traffic flow or composition on surrounding road links, beyond that associated with the rerouting of baseline flows from the existing A890 Stromeferry to Achintee road onto the various route option links themselves. Following the DMRB Scoping Criteria in HA207/07 (Highways Agency, 2007), each route option is considered to be an affected link, due to the change in alignment of the existing route being 5 m or more and the addition of the existing flow on the A890 Stromeferry to Achintee road (AADT +1000) being added to the potential route option links.

There are numerous sensitive receptors located adjacent to the existing A890 Stromeferry to Achintee road and the proposed route options. Pollution levels at the selected sensitive receptors have been predicted using the DMRB 'screening level' model (v1.03c). Each of the receptors chosen represents the maximum level of exposure that would be experienced at other receptors in their vicinity. The location of the selected receptors is shown on Figure 11.1 and set out in Table 11.2.

**Table 11.2 – Selected Air Quality Sensitive Receptors**

Name	Location	Grid Reference	
		x	y
R1	Smithy, A896 at Strath Carron	192615	842631
R2	Shepherd's Cottage	192154	842137
R3	Kinloch House, Kirkton	191324	841240
R4	Lochcarron Primary School	191245	840637
R5	Rose Cottage, Lochcarron	190565	839931

R6	Bay View, Lochcarron	190295	838986
R7	The Weavers Cottage, Strome Wood	187728	837035
R8	Residential property at North Strome	186415	835730
R9	Residential property at Portchullin	184766	834829
R10	An Cuilion, near Achmore	185398	833882
R11	Tigh Na Bruaich, Achmore	185845	833655
R12	1 Kelso Lodge Cottages, near Strathcarron	193721	842641
R13	The Strathcarron Hotel, Strathcarron	194169	842113
R14	Residential property at Achintee	194099	841695
R15	Residential property at Achintee	194601	841732
R16	Residential property at Cnoc Ban	193277	840740
R17	Attadale House, Attadale	192572	839043
R18	Home Farm, near Attadale	192572	838575
R19	Railway Cottage, near Attadale	192204	838518
R20	Residential property at Ardnarff	189003	835679
R21	Tigh Iseabail, Stromeferry	186291	834366

DMRB Guidance HA207/07 includes procedures to verify baseline estimates of pollutant concentrations against measurement data, and where necessary to adjust for model bias in reported values. At this time there is no air quality measurement data available for the scheme corridor, so the values reported have not been subject to any bias adjustment procedure. The verification step is intended to fine tune model performance, especially in situations where predicted pollutant concentrations are close to assessment criteria. In this location the baseline air quality is of a very good standard already and the assessment of significance is likely to be insensitive to the omission of this check.

The significance of the predicted changes in local air quality due to the proposed options at the 21 selected sensitive receptors has been based on professional judgement and has been assessed by consideration of:

- The magnitude of the improvement or worsening in local air quality between the corresponding Do-Minimum and Do-Something scenarios; and

- By comparing the estimated future air pollutant statistics with the current air quality strategy objectives and EU limit values.

### Ecological

DMRB also requires an assessment to be carried out at any nature conservation sites (designated sites) located in the local air quality study area.

Only the North Shore Route options pass within 200 m of a Nature Conservation site that has been designated for ecological value. The North Shore Route option passes by and the North Shore (Alternative) Route option passes through the Allt nan Carnan Site of Special Scientific Interest (SSSI), designated for its upland Birch Habitat. Therefore an assessment of the impact on air quality on the SSSI, in terms of NO<sub>x</sub> concentrations and nitrogen deposition rates, has been undertaken. Critical loads and background nitrogen deposition rates for SSSI type (upland deciduous woodland) have been obtained from the Air Pollution Information System (APIS) (APIS, 2013).

The Online Route options pass within 200 m of the Attadale SSSI. However, that particular designation has been selected for its geological rather than ecological value, and the deposition of nitrogen or annual mean concentrations of NO<sub>x</sub> are unlikely to have a detrimental effect there.

### Regional

At the regional scale the assessment focuses on total annual pollution emissions. The DMRB sets a range of criteria regarding changes in traffic flows, composition and speed, which if met, requires an assessment of regional impacts. Therefore, total annual pollution emissions for the traffic model study area are predicted using the DMRB 'screening level' model (v1.03c) for the opening year (2015) and design year (2030) for the Do-Minimum scenarios and the opening year and design year for each of the 5 Do-Something options.

The predicted changes in regional air quality has been assessed based on consideration of the magnitude of the change in total emissions between the corresponding Do-Minimum and Do-Something scenarios for each pollutant.

### Construction

Fugitive emissions of airborne particulate matter are readily produced through the action of abrasive forces on materials and therefore a wide range of site preparation and construction activities have the potential to generate this type of emissions, including;

- Demolition work;
- Handling, working and storage of materials; and
- Movement of vehicles.

'Dust' is defined in BS 6069 as particulate matter in the size range 1 µm – 75 µm in diameter, and is primarily composed of mineral materials and soil particles.

Respirable particulate matter (PM<sub>10</sub>) is composed of particles with an aerodynamic diameter of less than 10 micrometers (µm) in diameter, and includes the size fractions of greatest concern to impacts on human health. The majority of construction dust is larger than 10 µm in diameter and, therefore, increased levels of dust in the air do not necessarily equate to an increase in levels of PM<sub>10</sub>. In general construction dusts rarely represent an adverse risk to



human health and are more typically associated with causing annoyance to the public through visible deposits soiling property.

When assessing the impact of dust emissions generated during demolition and construction works, receptors are defined as the nearest potentially sensitive receptor to the perimeter of the site in each direction. These receptors have the potential to experience impacts of greater magnitude due to dusts generated by the works, when compared with other more distant receptors, or less sensitive receptors, and as such represent examples of worst-case exposure. The identification of sensitive receptors considers residential properties and other potentially sensitive properties such as schools and hospitals.

There are limitations to quantitatively predicting likely deposition rates of nuisance dust or any changes in fugitive PM<sub>10</sub> levels at nearby receptors during construction. Therefore a qualitative assessment has been carried out to assess the potential impact of construction dust on receptors, based on the proximity of the works to receptors. Ideally, the likely duration of the works would also be taken into account. However, at this stage such information is not available.

### 11.3 Consultations

No specific consultations have been undertaken for air quality.

### 11.4 Baseline

#### 11.4.1 *Background Pollutant Concentrations*

Annual average background pollutant concentrations within the study area have been obtained from Defra’s background pollutant maps (Defra, 2012). The background concentrations and corresponding current Scottish air quality objectives are provided in Table 11.3 to put the background levels in context.

**Table 11.3 – Background Pollutant Concentrations (2015)**

ID	Location	Annual Mean Conc. (µg/m <sup>3</sup> )	
		NO <sub>2</sub>	PM <sub>10</sub>
R1	Smithy, A896 at Strath Carron	1.3	7.3
R2	Shepherd’s Cottage	1.3	7.3
R3	Kinloch House, Kirkton	1.3	7.4
R4	Lochcarron Primary School	1.3	7.5
R5	Rose Cottage, Lochcarron	1.4	7.6
R6	Bay View, Lochcarron	1.2	7.5
R7	The Weavers Cottage, Strome Wood	1.2	7.5
R8	Residential property at North Strome	1.3	7.5

R9	Residential property at Portchullin	1.3	7.4
R10	An Cuillion, near Achmore	1.4	7.3
R11	Tigh Na Bruaich, Achmore	1.4	7.3
R12	1 Kelso Lodge Cottages, near Strathcarron	1.3	7.4
R13	The Strathcarron Hotel, Strathcarron	1.3	7.4
R14	Residential property at Achintee	1.3	7.3
R15	Residential property at Achintee	1.3	7.3
R16	Residential property at Cnoc Ban	1.3	7.4
R17	Attadale House, Attadale	1.3	7.4
R18	Home Farm, near Attadale	1.4	7.4
R19	Railway Cottage, near Attadale	1.4	7.4
R20	Residential property at Ardnarff	1.3	7.5
R21	Tigh Iseabail, Stromeferry	1.4	7.4
<b>National Air Quality Objective</b>		<b>40</b>	<b>18</b>

As would be expected based on the rural nature of the route options, the background levels in the study area are very low and well below the current Scottish air quality objectives.

#### 11.4.2 *Local Air Quality Management*

Under the requirements of Part IV of the Environment Act (1995), The Highland Council (THC) are required to carry out a phased review and assessment of local air quality within their area against the objective values within the Air Quality Strategy for seven key pollutants. If it is predicted that pollutant concentrations will exceed the relevant objective value then the council must declare an Air Quality Management Area (AQMA) and prepare an Air Quality Action Plan (AQAP) with the aim of achieving the objective values.

The phased review of air quality undertaken by THC has not identified any specific air quality issues in the Lochcarron, Achintee or Stromeferry areas. The report elevated concentrations at locations within the busier urban centres, such as Inverness and Fort William, but report near background concentrations in rural areas (THC, 2013).

#### 11.4.3 *Predicted Baseline Pollutant Concentrations*

##### **Local**

Do-Minimum annual mean NO<sub>2</sub> and PM<sub>10</sub> concentrations, and the number of exceedances of the 24hr PM<sub>10</sub> objective, for the year of opening 2015 have been predicted at each of the selected receptors for the local assessment and are presented in Table 11.4.

**Table 11.4 – Predicted Do-Minimum Pollutant Concentrations (2015)**

ID	Location	Annual Mean Conc.		No. Exceedances of the 24hr PM <sub>10</sub> Objective
		NO <sub>2</sub>	PM <sub>10</sub>	
R1	Smithy, A896 at Strath Carron	1.7	7.4	<1
R2	Shepherd's Cottage	1.8	7.4	<1
R3	Kinloch House, Kirkton	1.4	7.4	<1
R4	Lochcarron Primary School	1.7	7.6	<1
R5	Rose Cottage, Lochcarron	2.3	7.8	<1
R6	Bay View, Lochcarron	1.3	7.6	<1
R7	The Weavers Cottage, Strome Wood	1.3	7.5	<1
R8	Residential property at North Strome	1.3	7.5	<1
R9	Residential property at Portchullin	1.3	7.4	<1
R10	An Cuilion, near Achmore	1.3	7.3	<1
R11	Tigh Na Bruaich, Achmore	1.8	7.4	<1
R12	1 Kelso Lodge Cottages, near Strathcarron	1.9	7.4	<1
R13	The Strathcarron Hotel, Strathcarron	2.0	7.5	<1
R14	Residential property at Achintee	1.7	7.4	<1
R15	Residential property at Achintee	1.5	7.4	<1
R16	Residential property at Cnoc Ban	1.7	7.5	<1
R17	Attadale House, Attadale	1.4	7.4	<1
R18	Home Farm, near Attadale	1.4	7.4	<1
R19	Railway Cottage, near Attadale	1.5	7.4	<1

R20	Residential property at Ardnarff	1.5	7.5	<1
R21	Tigh Iseabail, Stromeferry	1.4	7.4	<1
<b>National Air Quality Objective</b>		<b>40</b>	<b>18</b>	<b>7</b>

**Regional**

Total annual emissions in the do-minimum scenario for the traffic model study area are displayed in Table 11.5. Table 11.6 outlines the total vehicle kilometres travelled in the traffic model study area in the do-minimum scenario.

**Table 11.5 – Do-Minimum Annual Emissions**

Scenario	CO	THC	NO <sub>x</sub>	PM <sub>10</sub>	Carbon
2015	6	1	3	<1	422
2030	7	1	4	<1	512

Emissions for pollutants carbon monoxide (CO), total hydrocarbons (THC), oxides of nitrogen (NO<sub>x</sub>), particulate matter (PM<sub>10</sub>) and carbon dioxide as carbon.

**Table 11.6 – Total Vehicle Kilometres in the Do-Minimum Scenario**

Scenario	Actual (Vehicle km)
2015 DM	24163
2030 DM	30696

**Ecological**

The baseline results are presented for a transect made up of three distances from the centreline of the existing A896. Do-minimum nitrogen deposition rates and annual mean NO<sub>x</sub> concentrations for the SSSI are presented in Table 11.7 and Table 11.8 respectively.

**Table 11.7 – Estimated Do-Minimum Nitrogen Deposition Rates at Allt nan Carnan SSSI near to the A896**

Scenario	Distance from Road Link	Nitrogen Deposition Rate (kg N/ha/yr)		
		Background (Average rate in 5 km square)	Road Contribution	Total
2015 DM North Shore Route Option	115	8.0	0.006	8.0
	133		0.004	8.0
	150		0.003	8.0
2015 DM North Shore (Alternative) Route Option	5		0.006	8.0
	25		0.006	8.0
	50		0.006	8.0

Critical Load for Habitat: 10 – 15 kg N/ha/yr

<sup>a</sup> Distance from nearest link. For the 2015 DM North Shore (Alternative) Route Option, the values represent the distance to a new stretch of highway that is not present in the baseline scenario. The predictions listed represent the closest point of the SSSI to the existing A896 (115 m)

**Table 11.8 – Estimated Do-Minimum NOX Concentrations at Allt nan Carnan SSSI near to the A896**

Scenario	Distances from Road Link	Annual Mean NO <sub>x</sub> (µg/m <sup>3</sup> )
2015 DM North Shore Route Option	115	1.8
	133	1.7
	150	1.7
2015 DM North Shore (Alternative) Route Option	2	1.8
	25	1.8
	50	1.8

<sup>a</sup> Distance from nearest link. For the 2015 DM North Shore (Alternative) Route Option, the values represent the distance to a new stretch of highway that is not present in the baseline scenario. The predictions listed represent the closest point of the SSSI to the existing A896 (115 m)

Do-minimum nitrogen deposition rates at the site are less than the critical load for such a habitat ('upland deciduous woodland': 10-15 Kg N/ha/yr). Do-minimum nitrogen deposition rates predicted at the Allt nan Carnan SSSI are well the national air quality objective value of 30 µg/m<sup>3</sup>.

## 11.5 Options Appraisal

### 11.5.1 *North Shore Route Option N9*

#### **Construction**

As with all of the Strome ferry route options considered in this assessment, the construction of the North Shore Route (North Lochcarron Bypass) works are expected to last for about two years. This particular option involves the construction of new highway from the A890 at Achmore to the southern shore of Loch Carron to the east of Portchullin. A bridge crossing will be constructed as a means of traversing the Loch, before a short stretch of new highway will link the northern shore of Loch Carron to an existing unclassified road at Leacanashie. Option N9 will then follow the route of this existing unclassified road east to Strome Wood, where it will split from the existing road and bear north east to meet the A896 north of Lochcarron. Here, it will pass over the A896 and a further stretch of new link road will re-join the A896 at Kirkton.

The North Shore Route Option N9 construction works with the greatest potential to generate dust include the earthworks associated with the construction of new sections of highway, the widening of existing highway, where required, and the erection of a bridge crossing or the digging of a tunnel to traverse Loch Carron. There is less potential for dust emissions to occur where the North Shore Route option follows the existing A896 from Kirkton to Strath Carron, as this is an existing A road, therefore the works required along this stretch are likely to be less.

For a large scale construction project such as this, involving a considerable amount of earthworks, the potential for significant adverse fugitive dust impacts is likely to be limited to a maximum of 100 m from the works. There are numerous sensitive receptors within 100 m of this North Shore Route option, including residential properties at Achmore, Stromemore, North Strome, Mid Strome, Strome Wood, Kirkton and Strathcarron.

Where there is the potential for construction activities to generate dust, the implementation of standard dust control measures, which are the norm on all well managed construction sites across the UK, would be sufficient in controlling emissions so that any impact is likely to be negligible to minor. The effect of such an impact is not considered to be significant. An example of standard practice dust control measures typically implanted on construction sites across the UK can be seen in Building Research Establishment (BRE) guidance (BRE, 2003).

#### **Local Air Quality**

The predicted pollution concentrations and the change from do-minimum to do-something at the 20 air quality sensitive receptors for the North Shore Route Option N9 are presented in Table 11.9

**Table 11.9 – Predicted Pollutant Concentration and Change with the North Shore Route Option N6 (North Lochcarron Bypass) in Operation**

Receptor	NO <sub>2</sub>		PM <sub>10</sub>		No. of Exceedances of the 24hr PM <sub>10</sub> Objective	
	Annual Mean	Change	Annual Mean	Change	Days	Change
R1	2.3	+0.6	7.5	+0.1	<1	+<1
R2	2.4	+0.6	7.5	+0.1	<1	+<1
R3	1.4	+0.1	7.4	+<0.1	<1	+<1
R4	1.7	+<0.1	7.7	+0.1	<1	+<1
R5	2.3	+<0.1	7.9	+0.1	<1	+<1
R6	1.3	+<0.1	7.5	+<0.1	<1	+<1
R7	1.3	+0.1	7.6	+0.1	<1	+<1
R8	1.4	+0.1	7.6	+0.1	<1	+<1
R9	1.3	+0.1	7.4	+<0.1	<1	+<1
R10	1.7	+0.4	7.4	+0.1	<1	+<1
R11	2.0	+0.1	7.4	+<0.1	<1	+<1
R12	1.9	+<0.1	7.4	+<0.1	<1	+<1
R13	2.0	+<0.1	7.5	+<0.1	<1	+<1
R14	1.7	+<0.1	7.4	+<0.1	<1	+<1
R15	1.5	+<0.1	7.4	+<0.1	<1	+<1
R16	1.7	+<0.1	7.5	+<0.1	<1	+<1
R17	1.4	+<0.1	7.4	+<0.1	<1	+<1
R18	1.4	+<0.1	7.4	+<0.1	<1	+<1
R19	1.5	+<0.1	7.4	+<0.1	<1	+<1
R20	1.5	+<0.1	7.5	+<0.1	<1	+<1

R21	1.4	+<0.1	7.4	+<0.1	<1	+<1
<b>Air Quality Objective</b>	<b>40</b>		<b>18</b>		<b>7</b>	

The operation of the North Shore Route Option N9 would lead to a perceptible (minor to moderate) increase in annual mean concentrations of NO<sub>2</sub> at sensitive receptors located immediately adjacent to the Route at Strathcarron and Achmore. Elsewhere along the route, there would be an imperceptible (negligible) change in annual mean concentrations of NO<sub>2</sub>.

There would be an imperceptible change in annual mean concentrations of PM<sub>10</sub> and the number of exceedances of the 24hr PM<sub>10</sub> objective. Despite the perceptible changes, annual mean concentrations of NO<sub>2</sub> and PM<sub>10</sub>, and the number of exceedances of the 24hr PM<sub>10</sub> objective, are still well below their respective air quality objectives. As such, the overall significance of impact on local air quality, due to the operation of the North Shore Route Option N9 would be negligible (neutral to slight adverse).

The predicted pollution concentrations and the change from do-minimum to do-something at the 20 air quality sensitive receptors for the North Shore Route Option N9 are presented in Table 11.10

### Regional

Table 11.10 outlines the total annual emissions in the traffic study area for the North Shore Route Option do-something scenario, and the change for the corresponding do-minimum scenario. Table 11.11 outlines the total vehicle kilometres travelled in the traffic model study area.

**Table 11.10 – Total Annual Emissions and Change with the North Shore Route Option N9 (North Lochcarron Bypass) in Operation**

Scenario	CO	THC	NO <sub>x</sub>	PM <sub>10</sub>	Carbon
2015 DS	7	1	4	<1	520
Change	+1	+<1	+1	+<1	98
% Change	24.1	25.1	23.8	23.4	23.1
2030 DS	9	1	5	<1	631
Change	2	+<1	+1	+<1	119
% Change	24.1	25.1	23.7	23.3	23.2

Emissions for pollutants carbon monoxide (CO), total hydrocarbons (THC), oxides of nitrogen (NO<sub>x</sub>), particulate matter (PM<sub>10</sub>) and carbon dioxide as carbon.



**Table 11.11: Total Vehicle Kilometres and Change with the North Shore Route Option N9 (North Lochcarron Bypass) in Operation**

Scenario	Actual (Vehicle km)	Change (Vehicle km)	% Change
2015 DS	29586	5423	22.4
2030 DS	37586	6890	22.4

As the purpose of the Proposed Bypass is to divert existing traffic via an alternative route, the North Shore Route option will lead to an increase in the number of vehicle kilometres travelled and the total pollutant concentrations emitted. This is mainly due to the operation of a new stretch of highway to the east and west of the A896 near Lochcarron. However, as the baseline vehicle kilometres travelled and total pollutant emission values are so small, such a change can be considered to be minor and the significance slight adverse.

**Ecology**

The predicted impact of the North Shore Route Option N9 on nitrogen deposition and annual mean NO<sub>x</sub> concentrations at the Allt nan Carnan SSSI for 2015 are presented in Table 11.12 and Table 11.13 respectively.

**Table 11.12 – Estimated Nitrogen Deposition Rates and Change at the Allt nan Carnan SSSI with the North Shore Route Option N9 (North Lochcarron Bypass) in Operation**

Scenario	Distance from A896	Nitrogen Deposition Rate (kg N/ha/yr)			
		Background Nitrogen Deposition Rate	Road Contribution	Total Nitrogen Deposition Rate	Change (DS – DM)
North Shore Route Option (2015 DS)	115	8.0	0.009	8.0	+<0.1
	133		0.006	8.0	+<0.1
	150		0.005	8.0	+<0.1

Critical Load for Habitat: 10 – 15 kg N/ha/yr

**Table 11.13 – Annual Mean NO<sub>x</sub> Concentrations and Change at the Allt nan Carnan SSSI with the North Shore Route Option N9 (North Lochcarron Bypass) in Operation**

Scenario	Distance from A896	Annual Mean NO <sub>x</sub> (µg/m <sup>3</sup> )	Change (DS – DM)
North Shore Route Option (2015 DS)	115	1.9	+0.1
	133	1.8	+0.1
	150	1.8	+<0.1

Nitrogen deposition is a natural process which occurs without the presence of vehicle emissions. As a result there is a background level of nitrogen deposition, which has no significant impact on sensitive ecosystems. However, each ecosystem has a critical load for nitrogen deposition, which is the threshold level for the deposition of a pollutant above which harmful indirect effects can be identified on a habitat or species. The United Nations Economic Commission for Europe (UNECE) published critical loads for a variety of habitats in 2003. The most relevant of these to the Allt nan Carnan SSSI is ‘upland deciduous woodland’ as this represents the upland birch woodland that is present. Such a habitat has a critical load of 10-15 Kg N/ha/yr. With the North Shore Route Option in operation, nitrogen deposition rates remain below the critical load for that habitat.

Annual mean NO<sub>x</sub> concentrations are well below the limit for ecological sites of 30 µg/m<sup>3</sup> with the North Shore Route Option in operation, with a very small increase compared to the corresponding do-minimum scenario and locations closest to the A896, and no change further away.

With such a small increase in nitrogen disposition and NO<sub>x</sub> concentrations at an area where do-minimum levels are well below the respective environmental assessment levels, the magnitude of impact is considered to be negligible and the significance of effect neutral.

**Summary**

Table 11.14 provides a summary of air quality impacts associated with the North Shore Route Option N9.

**Table 11.14 – Summary Air Quality Effects with the North Shore Route Option N9 in Operation**

Receptor	Sensitivity	Potential impacts	Magnitude of Impact	Mitigation measures	Residual Significant Effects
R1 to R20	Medium	Construction dust	Minor	Standard Dust Control Measures	Neutral
		Road traffic emissions	Minor	None required	Neutral
Allt nan Carnan SSSI	Medium	Road traffic emissions	Negligible	None required	Neutral

11.5.2 **North Shore Route (Online through Lochcarron) Option N6**

**Construction Dust Emissions**

As with all of the Strome ferry route options considered in this assessment, the construction of the North Shore (Online through Lochcarron) Route Option N6 works are expected to last for about two years. This particular option is much the same as the North Shore Option. However, instead of passing through Lochcarron, it veers from the A896 to the north of the town and re-joins the A896 at Kirkton.

The North Shore (Online through Lochcarron) Route Option N6 construction works with the greatest potential to generate dust include the earthworks associated with the construction of new highway, the widening of existing highway, where required, and the erection of a bridge crossing or the digging of the tunnel. There is less potential for dust emissions to occur where the North Shore Route option follows the existing A896 to the east of Lochcarron.

For a large scale construction project such as this, involving a considerable amount of earthworks, the potential for significant adverse fugitive dust impacts is likely to be limited to a maximum of 100 m from the works. There are several sensitive receptors within 100 m of the North Shore Route option, including residential properties at Achmore, Stromemore, North Strome, Mid Strome, Strome Wood, Lochcarron, Kirkton and Strath Carron.

Where there is the potential for construction activities to generate dust, the implementation of standard dust control measures, which are the norm on all well managed construction sites across the UK, would be sufficient in controlling emissions so that any impact is likely to be negligible to minor. The effect of such an impact is not considered to be significant. An example of standard practice dust control measures typically implanted on construction sites across the UK can be seen in Building Research Establishment (BRE) guidance (BRE, 2003).

**Local Air Quality**

The predicted pollution concentrations and the change from do-minimum to do-something at the 20 air quality sensitive receptors for the North Shore (Online through Lochcarron) Route Option N6 are presented in Table 11.15.

**Table 11.15 – Predicted Pollutant Concentration and Change with the North Shore Route Option N6 (Online through Lochcarron) in Operation**

Receptor	NO <sub>2</sub>		PM <sub>10</sub>		No. of Exceedances of the 24hr PM <sub>10</sub> Objective	
	Annual Mean	Change	Annual Mean	Change	Days	Change
R1	2.3	+0.6	7.5	+0.1	<1	+<1
R2	2.4	+0.6	7.5	+0.1	<1	+<1
R3	1.4	+0.1	7.4	+<0.1	<1	+<1
R4	2.3	+0.5	7.7	+0.1	<1	+<1
R5	3.0	+0.7	7.9	+0.1	<1	+<1

R6	1.9	+0.6	7.7	+0.1	<1	+<1
R7	1.9	+0.6	7.6	+0.1	<1	+<1
R8	1.9	+0.6	7.6	+0.1	<1	+<1
R9	1.4	+0.1	7.4	+<0.1	<1	+<1
R10	1.6	+0.3	7.4	+<0.1	<1	+<1
R11	1.8	+<0.1	7.4	+<0.1	<1	+<1
R12	1.9	+<0.1	7.4	+<0.1	<1	+<1
R13	2.0	+<0.1	7.5	+<0.1	<1	+<1
R14	1.7	+<0.1	7.4	+<0.1	<1	+<1
R15	1.5	+<0.1	7.4	+<0.1	<1	+<1
R16	1.7	+<0.1	7.5	+<0.1	<1	+<1
R17	1.4	+<0.1	7.4	+<0.1	<1	+<1
R18	1.4	+<0.1	7.4	+<0.1	<1	+<1
R19	1.5	+<0.1	7.4	+<0.1	<1	+<1
R20	1.5	+<0.1	7.5	+<0.1	<1	+<1
R21	1.4	+<0.1	7.4	+<0.1	<1	+<1
<b>Air Quality Objective</b>	<b>40</b>		<b>18</b>		<b>7</b>	

The operation of the North Shore Route (Online through Lochcarron) Option N6 would lead to a perceptible (minor to moderate) increase in annual mean concentrations of NO<sub>2</sub> at sensitive receptors located immediately adjacent to the Route at Strathcarron, Lochcarron, Strome Wood and North Strome. Elsewhere along the route, there would be an imperceptible (negligible) change in annual mean concentrations of NO<sub>2</sub>.

There would be an imperceptible change in annual mean concentrations of PM<sub>10</sub> and the number of exceedances of the 24hr PM<sub>10</sub> objective. Despite the perceptible changes, annual mean concentrations of NO<sub>2</sub> and PM<sub>10</sub>, and the number of exceedances of the 24hr PM<sub>10</sub> objective, are still well below their respective air quality objectives. As such, the overall significance of impact on local air quality, due to the operation of the North Shore Route Option N6 would be negligible (neutral to slight adverse).

### Regional

Table 11.16 outlines the total annual emissions in the traffic study area for the North Shore (Online through Lochcarron) Route Option do-something scenario, and the change for the corresponding do-minimum scenario. Table 11.18 outlines the total vehicle kilometres travelled in the traffic model study area.

**Table 11.16: Total Annual Emissions and Change with the North Shore (Online through Lochcarron) Route Option N6 in Operation**

Scenario	CO	THC	NO <sub>x</sub>	PM <sub>10</sub>	Carbon
2015 DS	8	1	4	<1	511
Change	+2	+<1	+1	+<1	+89
% Change	32.5	33.9	18.3	22.5	21.0
2030 DS	9	1	4	<1	622
Change	+2	+<1	+1	+<1	+131
% Change	32.9	25.1	8.2	23.3	21.4

Emissions for pollutants carbon monoxide (CO), total hydrocarbons (THC), oxides of nitrogen (NO<sub>x</sub>), particulate matter (PM<sub>10</sub>) and carbon dioxide as carbon.

**Table 11.18 – Total Vehicle Kilometres and Change with the North Shore (Online through Lochcarron) Route Option N6 in Operation**

Scenario	Actual (Vehicle km)	Change (Vehicle km)	% Change
2015 DS	29034	4870	20.2
2030 DS	36885	6189	20.2

As with the previous option, the North Shore (Online through Lochcarron) Route Option N6 will lead to an increase in the number of vehicle kilometres travelled and the total pollutant concentrations emitted. This is mainly due to the operation of new stretches of highway to the north of Lochcarron and to the west of the A896, near Lochcarron. However, as the baseline vehicle kilometres travelled and total pollutant emission values are so small, such a change can be considered to be minor and the significance slight adverse.

### Ecology

The Allt nan Carnan SSSI is located beyond 200 m from the North Shore (Online through Lochcarron) Route Option N6. As such, this option would not have an impact on the SSSI that is considered significant.

**Summary**

Table 11.19 provides a summary of air quality impacts associated with the North Shore (Online through Lochcarron) Route option.

**Table 11.19 – Summary Air Quality Effects with the North Shore (Online through Lochcarron) Route Option N6 in Operation**

Receptor	Sensitivity	Potential impacts	Magnitude of Impact	Mitigation measures	Residual Significant Effects
R1 to R20	Medium	Construction dust	Minor	Standard Dust Control Measures	Neutral
		Road traffic emissions	Minor	None required	Slight
Allt nan Carnan SSSI	Medium	Road traffic emissions	Negligible	None required	Neutral

11.5.3 **Online Route Options**

**Construction Dust Emissions**

As with all of the Stromeferry route options considered in this assessment, the construction of the Online Route options (Sidelong Viaduct, Inland Tunnel, Shared Road and Avalanche Shelter) works are expected to last for about two years. These particular options follow much of the existing route from Stromeferry to Achintee. The Online Route options also include a series of local improvements to sections of the existing A890 carriageway, which are focused on road alignments and gradients.

It is the construction of the design elements that differ from the existing alignment of the A890 that would have the greatest potential for the generation of dust emissions, such as the viaduct and tunnel. However, there are no sensitive receptors within 100 m of these works. Elsewhere, where the Online Route options follow the existing alignment of the A890, there will be a series of carriageway improvements that will have the potential to generate dust emissions. Due to the location of these works, this would only have the potential to affect receptors in Strathcarron and Achintee.

Where there is the potential for construction activities to generate dust, the implementation of standard dust control measures, which are the norm on all well managed construction sites across the UK, would be sufficient in controlling emissions so that any impact is likely to be negligible to minor. The effect of such an impact is not considered to be significant. An example of standard practice dust control measures typically implanted on construction sites across the UK can be seen in Building Research Establishment (BRE) guidance (BRE, 2003).

**Local Air Quality**

The predicted pollution concentrations and the change from do-minimum to do-something at the 20 air quality sensitive receptors for the Online Route options are presented in Table 11.20

**Table 11.20 – Predicted Pollutant Concentration and Change with the Online Route Options in Operation**

Receptor	NO <sub>2</sub>		PM <sub>10</sub>		No. of Exceedances of the 24hr PM <sub>10</sub> Objective	
	Annual Mean	Change	Annual Mean	Change	Days	Change
R1	1.7	+<0.1	7.4	+<0.1	<1	+<1
R2	1.8	+<0.1	7.4	+<0.1	<1	+<1
R3	1.4	+<0.1	7.4	+<0.1	<1	+<1
R4	1.7	+<0.1	7.6	+<0.1	<1	+<1
R5	2.3	+<0.1	7.8	+<0.1	<1	+<1
R6	1.2	+<0.1	7.5	+<0.1	<1	+<1
R7	1.3	+<0.1	7.5	+<0.1	<1	+<1
R8	1.3	+<0.1	7.5	+<0.1	<1	+<1
R9	1.3	+<0.1	7.4	+<0.1	<1	+<1
R10	1.4	+<0.1	7.3	+<0.1	<1	+<1
R11	1.8	+<0.1	7.4	+<0.1	<1	+<1
R12	1.9	+<0.1	7.4	+<0.1	<1	+<1
R13	1.5	-0.5	7.4	-0.1	<1	+<1
R14	1.3	-0.4	7.3	-0.1	<1	+<1
R15	1.5	+0.2	7.4	+<0.1	<1	+<1
R16	1.7	+<0.1	7.5	+<0.1	<1	+<1
R17	1.4	+<0.1	7.4	+<0.1	<1	+<1
R18	1.5	+0.1	7.4	+<0.1	<1	+<1
R19	1.5	+0.1	7.5	+0.1	<1	+<1
R20	1.4	-0.1	7.4	-0.1	<1	+<1

R21	1.9	+<0.1	7.4	+<0.1	<1	+<1
<b>Air Quality Objective</b>	<b>40</b>		<b>18</b>		<b>7</b>	

The operation of the Online Route options would lead to a perceptible (minor) improvement in annual mean concentrations of NO<sub>2</sub> at locations in Strath Carron and Achintee, where the alignment of the A890 shifts. Elsewhere the change in annual mean concentrations of NO<sub>2</sub> and PM<sub>10</sub> is imperceptible at the sensitive receptors considered in this assessment. Annual mean concentrations of NO<sub>2</sub> and PM<sub>10</sub>, and the number of exceedances of the 24hr PM<sub>10</sub> objective, are well below their respective air quality objectives. The significance of impact on local air quality, due to the operation of the Online Route options would be neutral.

**Regional**

Table 11.21 to Table 11.24 outline the total annual emissions in the traffic study area for the Online Route Option do-something scenarios, and the change for the corresponding do-minimum scenario. Table 11.25 to Table 11.28 outline the total vehicle kilometres travelled in the traffic model study area for the same scenarios.

**Table 11.21 – Total Annual Emissions and Change with the Online (Sidelong Viaduct) Option in Operation**

Scenario	CO	THC	NO <sub>x</sub>	PM <sub>10</sub>	Carbon
2015 DS	6	1	3	0	423
Change	+<1	+<1	+<1	+<1	1
% Change	0.2	0.2	0.2	0.2	0.2
2030 DS	7	1	4	0	513
Change	+<1	+<1	+<1	+<1	1
% Change	0.2	0.2	0.2	0.2	0.2

Emissions for pollutants carbon monoxide (CO), total hydrocarbons (THC), oxides of nitrogen (NO<sub>x</sub>), particulate matter (PM<sub>10</sub>) and carbon dioxide as carbon.



**Table 11.22 – Total Annual Emissions and Change with the Online (Inland Tunnel) Option in Operation**

Scenario	CO	THC	NO <sub>x</sub>	PM <sub>10</sub>	Carbon
2015 DS	6	1	3	0	424
Change	+<1	+<1	+<1	+<1	2
% Change	0.5	0.5	0.5	0.5	0.5
2030 DS	7	1	4	0	515
Change	+<1	+<1	+<1	+<1	3
% Change	0.5	0.5	0.5	0.5	0.5

Emissions for pollutants carbon monoxide (CO), total hydrocarbons (THC), oxides of nitrogen (NO<sub>x</sub>), particulate matter (PM<sub>10</sub>) and carbon dioxide as carbon.

**Table 11.23 – Total Annual Emissions and Change with the Online (Shared Road/Rail) Option in Operation**

Scenario	CO	THC	NO <sub>x</sub>	PM <sub>10</sub>	Carbon
2015 DS	6	1	3	0	422
Change	<1	<1	<1	<1	<1
% Change	<0.1	<0.1	<0.1	<0.1	<0.1
2030 DS	7	1	4	0	512
Change	<1	<1	<1	<1	<1
% Change	<0.1	<0.1	<0.1	<0.1	<0.1

Emissions for pollutants carbon monoxide (CO), total hydrocarbons (THC), oxides of nitrogen (NO<sub>x</sub>), particulate matter (PM<sub>10</sub>) and carbon dioxide as carbon.

**Table 11.24 – Total Annual Emissions and Change with the Online (Avalanche Shelter Extension) Option in Operation**

Scenario	CO	THC	NO <sub>x</sub>	PM <sub>10</sub>	Carbon
2015 DS	6	1	3	0	422
Change	<1	<1	<1	<1	<1
% Change	<0.1	<0.1	<0.1	<0.1	<0.1
2030 DS	7	1	4	0	512
Change	<1	<1	<1	<1	<1
% Change	<0.1	<0.1	<0.1	<0.1	<0.1

Emissions for pollutants carbon monoxide (CO), total hydrocarbons (THC), oxides of nitrogen (NO<sub>x</sub>), particulate matter (PM<sub>10</sub>) and carbon dioxide as carbon.

**Table 11.25 – Total Vehicle Kilometres and Change with the Online (Sidelong Viaduct) Option in Operation**

Scenario	Actual (Vehicle km)	Change (Vehicle km)	% Change
2015 DS	24203	+39	0.2
2030 DS	30746	+50	0.2

**Table 11.26 – Total Vehicle Kilometres and Change with the Online (Inland Tunnel) Option in Operation**

Scenario	Actual (Vehicle km)	Change (Vehicle km)	% Change
2015 DS	24289	+125	0.5
2030 DS	30856	+159	0.5

**Table 11.27 – Total Vehicle Kilometres and Change with the Online (Shared Road/Rail) Option in Operation**

Scenario	Actual (Vehicle km)	Change (Vehicle km)	% Change
2015 DS	24163	<1	<0.1
2030 DS	30696	<1	<0.1

**Table 11.28 – Total Vehicle Kilometres and Change with the Online (Avalanche Shelter Extension) Option in Operation**

Scenario	Actual (Vehicle km)	Change (Vehicle km)	% Change
2015 DS	24289	125	0.5
2030 DS	30856	159	0.5

The Online Route options will lead to a negligible increase in the number of vehicle kilometres travelled and the total pollutant concentrations emitted. Of the Online options, the Inland Tunnel will have the greatest impact on regional air quality. However, as the baseline vehicle kilometres travelled and total pollutant emission values are so small, such a change can be considered to be negligible and the significance neutral.

**Summary**

Table 11.29 provides a summary of air quality impacts associated with the Online Route options.

**Table 11.29 – Summary Air Quality Effects – Online Route Options**

Receptor	Sensitivity	Potential impacts	Magnitude of Impact	Mitigation measures	Residual Significant Effects
R1 to R20	Medium	Construction dust	Minor	Standard Dust Control Measures	Neutral
		Road traffic emissions	Negligible	None required	Neutral

11.5.4

***Southern Route Options***

**Construction Dust Emissions**

As with all of the Stromeferry route options considered in this assessment, the construction of the Southern Route option (with and without a link from Achmore) is expected to last for about two years. The western section of the Southern Route options includes the construction of a new stretch of highway from the A890, south of Braeintra, east through the Glen Udalain

Valley to Attadale. From here, the eastern section will follow the existing route through to Achintee. The Southern Route option may also include an additional new link road running east from the A890 at Achmore to eventually meet the main Southern Route option highway.

It is the construction of the stretches of new highway from south of Braeintrra to Attadale (and the link from Achmore east) that would have the greatest potential for the generation of dust emissions. However, there are no sensitive receptors within 100 m of these construction works. Elsewhere, where the Southern Route options follow the existing alignment of the A890, east of Attadale, potential dust emissions will be associated with the series of carriageway improvements. Due to the location of these works, this would only have the potential to affect receptors in Strathcarron and Achintee.

Where there is the potential for construction activities to generate dust, the implementation of standard dust control measures, which are the norm on all well managed construction sites across the UK, would be sufficient in controlling emissions so that any impact is likely to be negligible to minor. The effect of such an impact is not considered to be significant. An example of standard practice dust control measures typically implanted on construction sites across the UK can be seen in Building Research Establishment (BRE) guidance (BRE, 2003).

### Local Air Quality

The predicted pollution concentrations and the change from do-minimum to do-something at the 20 air quality sensitive receptors for the Southern Route options are presented in Table 11.30.

**Table 11.30 – Predicted Pollutant Concentration and Change with the Southern Route Options in Operation**

Receptor	NO <sub>2</sub>		PM <sub>10</sub>		No. of Exceedances of the 24hr PM <sub>10</sub> Objective	
	Annual Mean	Change	Annual Mean	Change	Days	Change
R1	1.7	+<0.1	7.4	+<0.1	<1	+<1
R2	1.8	+<0.1	7.4	+<0.1	<1	+<1
R3	1.4	+<0.1	7.4	+<0.1	<1	+<1
R4	1.7	+<0.1	7.6	+<0.1	<1	+<1
R5	2.3	+<0.1	7.8	+<0.1	<1	+<1
R6	1.2	+<0.1	7.5	+<0.1	<1	+<1
R7	1.3	+<0.1	7.5	+<0.1	<1	+<1
R8	1.3	+<0.1	7.5	+<0.1	<1	+<1
R9	1.3	+<0.1	7.4	+<0.1	<1	+<1

R10	1.4	+<0.1	7.3	+<0.1	<1	+<1
R11	1.8	+<0.1	7.4	+<0.1	<1	+<1
R12	1.9	+<0.1	7.4	+<0.1	<1	+<1
R13	2.0	+<0.1	7.5	+<0.1	<1	+<1
R14	1.7	+<0.1	7.4	+<0.1	<1	+<1
R15	1.7	+<0.1	7.5	+<0.1	<1	+<1
R16	1.4	+<0.1	7.4	+<0.1	<1	+<1
R17	1.4	+<0.1	7.4	+<0.1	<1	+<1
R18	1.4	+0.1	7.4	+<0.1	<1	+<1
R19	1.5	+<0.1	7.4	+<0.1	<1	+<1
R20	1.5	+<0.1	7.5	+<0.1	<1	+<1
R21	1.4	+<0.1	7.4	+<0.1	<1	+<1
<b>Air Quality Objective</b>	<b>40</b>		<b>18</b>		<b>7</b>	

The operation of the South Route option would lead to an imperceptible (negligible) change in annual mean concentrations of NO<sub>2</sub> and PM<sub>10</sub> at all of the sensitive receptors considered in this assessment. Annual mean concentrations of NO<sub>2</sub> and PM<sub>10</sub>, and the number of exceedances of the 24hr PM<sub>10</sub> objective, are well below their respective air quality objectives. The significance of impact on local air quality, due to the operation of the Online Route options would be neutral.

### Regional

Table 11.31 and Table 11.32 outline the total annual emissions in the traffic study area for the Southern Route Option do-something scenarios, and the change for the corresponding do-minimum scenario. Table 11.33 and Table 11.34 outline the total vehicle kilometres travelled in the traffic model study area for the same scenarios.

**Table 11.31 – Total Annual Emissions and Change with the Southern (without Achmore Link) Option in Operation**

Scenario	CO	THC	NO <sub>x</sub>	PM <sub>10</sub>	Carbon
2015 DS	8	1	4	0	575
Change	+2	+<1	+1	+<1	+153
% Change	34.5	34.1	36.5	36.0	36.3
2030 DS	9	1	5	0	698
Change	+2	<+1	+1	<+1	+186
% Change	34.5	34.1	36.5	36.2	36.3

Emissions for pollutants carbon monoxide (CO), total hydrocarbons (THC), oxides of nitrogen (NO<sub>x</sub>), particulate matter (PM<sub>10</sub>) and carbon dioxide as carbon.

**Table 11.32 – Total Annual Emissions and Change with the Southern (with Achmore Link) Option in Operation**

Scenario	CO	THC	NO <sub>x</sub>	PM <sub>10</sub>	Carbon
2015 DS	9	1	5	0	677
Change	+3	+<1	+2	+<1	+255
% Change	57.5	56.9	60.9	60.1	60.5
2030 DS	11	1	6	0	822
Change	+4	+1	+2	+<1	+310
% Change	57.6	56.9	61.0	60.4	60.5

Emissions for pollutants carbon monoxide (CO), total hydrocarbons (THC), oxides of nitrogen (NO<sub>x</sub>), particulate matter (PM<sub>10</sub>) and carbon dioxide as carbon.

**Table 11.33 – Total Vehicle Kilometres and Change with the Southern Route (without Achmore Link) Option in Operation**

Scenario	Actual (Vehicle km)	Change (Vehicle km)	% Change
2015 DS	32972	8808	36.5
2030 DS	41891	11195	36.5

**Table 11.34 – Total Vehicle Kilometres and Change with the Southern Route (with Achmore Link) Option in Operation**

Scenario	Actual (Vehicle km)	Change (Vehicle km)	% Change
2015 DS	38861	14698	60.8
2030 DS	49376	18680	60.9

As the purpose of the Proposed Bypass is to divert existing traffic via an alternative route, the Southern Route option will lead to an increase in the number of vehicle kilometres travelled and the total pollutant concentrations emitted. This is due to the operation of the new stretches of highway to the east of the A890 near Braeintra and Achmore. However, as the baseline vehicle kilometres travelled and total pollutant emission values are so small, such a change can be considered to be minor and the significance slight adverse.

**Summary**

Table 11.35 provides a summary of air quality impacts associated with the Southern Route option.

**Table 11.35 – Summary Air Quality Effects – Southern Route Options**

Receptor	Sensitivity	Potential impacts	Magnitude of Impact	Mitigation measures	Residual Significant Effects
R1 to R20	Medium	Construction dust	Minor	Standard Dust Control Measures	Neutral
		Road traffic emissions	Negligible	None required	Neutral

**11.6 Encountered/Limits to Assessment**

This air quality assessment has made use of the traffic data that is available at the time of the assessment. The traffic data consists of do-minimum flows on the existing A890 and A896 and Church Street, Lochcarron. Do-something flows have been calculated by adding the do-minimum flow for the A890 onto the do-minimum flow of each option route.

No pollutant monitoring or measurement data has been gathered within the study area and, as such, the predictions reported in this assessment have not been verified against measured pollutant concentrations.

## 11.7 Summary & Conclusions

It is recommended that if one of the route options considered is chosen as a preferred option to be taken forward, then this assessment is updated at that time with the latest traffic data and design information.

Any further assessment should make use of measurement data gathered during a baseline NO<sub>2</sub> survey for the verification of estimated pollutant concentrations.

This chapter has considered the impact of the Proposed Scheme options and their effects on local and regional air quality, and on Sites of Importance for Nature Conservation.

Existing and future baseline air quality in the do-minimum scenario is of a good standard, with the pollutant concentrations of concern to this assessment being well below their respective national air quality objective values.

With the proposed North Shore Route options in operation, there would be a neutral to slight adverse impact on local air quality at some receptors, although due to the good standard of air quality within the study area, the overall effect on local air quality would be negligible. With the Online Route options and Southern Route option in operation, there would be a neutral impact on local air quality. The effect of any of these impacts is not considered to be significant.

Because baseline air quality in the study area is so good, none of the proposed route options would lead to an impact that would have a significant effect on regional air quality. However, the North Shore and Southern Route options would lead to an increase in the number of vehicle kilometres travelled, and therefore the amount of pollutants emitted on a regional scale, due to the construction of new highway.

The North Shore Route options would pass within 200 m of the Allt nana Carnan SSSI. Despite the additional vehicle flow associated with the rerouted A890, the effect on nitrogen deposition and annual mean NO<sub>x</sub> concentrations at the SSSI would not be significant.



## 12 NOISE & VIBRATION

### 12.1 Introduction

This chapter assesses potential for noise and vibration impacts relating to the proposed options.

Noise from a flow of road traffic is generated by both vehicles' engines and the interaction of tyres with the road surface. The traffic noise level at a receptor, such as an observer at the roadside or residents within a property, is influenced by a number of factors including traffic flow, speed, composition (% HGV), gradient, type of road surface, distance from the road and the presence of any obstructions between the road and the receptor.

Noise from a stream of traffic is not constant; therefore, to assess the noise impact a single figure estimate of the overall noise level is necessary. The index adopted by the UK in 'The Calculation of Road Traffic Noise' (CRTN)<sup>1</sup> to assess traffic noise is  $L_{A10,18h}$ . This value is determined by taking the highest 10 % of noise readings in each of the eighteen 1 hour periods between 06:00 and 24:00, and then calculating the arithmetic mean. A reasonably good correlation has been shown to exist between this index and residents' perception of traffic noise over a wide range of exposures.

The Design Manual for Roads and Bridges (DMRB) suggests that people's perception of road traffic noise is different in the short and longer term. It therefore categorises changes in traffic volume on existing roads or new routes separately over the short and longer term. It suggests that negligible noise impacts in the short term result from road traffic noise level changes of up to 1 dB(A), and in the longer term up to 3 dB(A).

A change in the noise level of up to 1 dB(A)  $L_{A10,18h}$  is equivalent to a 25% increase or a 20% decrease in road traffic flows, and a 3 dB(A)  $L_{A10,18h}$  change is equivalent to a 100% increase or 50% decrease in traffic flow. This assumption does however rely on other factors remaining unchanged, for instance that there is no significant change in the traffic composition (i.e. percentage HGV traffic).

Vibration from traffic can be transmitted through the air or through the ground. Airborne vibration is produced by the engines and exhausts of road vehicles, with dominant frequencies typically in the range 50 - 100 Hz. Ground borne vibration is produced by the interaction of the vehicle tyres and the road surface with dominant frequencies typically in the range 8 - 20 Hz. The passage of vehicles over irregularities in the road surface can be a source of ground borne vibration.

Traffic vibration can potentially have an effect on buildings and cause disturbance to occupiers. DMRB reports that extensive research on a wide range of buildings has found no evidence of traffic induced ground borne vibration being a source of significant damage to buildings. And also, that there is no evidence that exposure to airborne vibration has caused even minor damage.

Airborne vibration is noticed by occupiers more often than ground borne vibration as it may result in detectable vibrations in building elements such as windows and doors.

DMRB states that perceptible vibration only occurs in rare cases and identifies that the normal use of a building, such as closing doors and operating domestic appliances can generate similar levels of vibration to that from traffic.

### 12.1.1 ***Purpose and scope of the assessment***

The purpose of the assessment is to appraise the potential noise and vibration impacts associated with the construction and operation of the various route options being considered.

The scope of the assessment has considered the potential impacts of noise and vibration on sensitive receptors neighbouring the various aligned options, and is limited to the consideration of noise impacts on noise sensitive dwelling, primarily residential dwellings and schools.

### 12.1.2 ***Study Area***

For each option, the study area has been defined as a corridor 300 metres either side of the alignment.

## 12.2 **Methodology**

The current Noise and Vibration section of the DMRB HA213/11 Revision 1 (issued November 2011) focuses on a risk based approach using three assessment levels:

- Scoping;
- Simple; and
- Detailed.

All three assessment levels require traffic data for the proposed scheme and surrounding existing roads to be available. At this stage no traffic data is available for the A890 Stromeferry scheme. Therefore, a limited scoping level assessment has been carried out based on the design and location of each option in relation to potentially sensitive receptors.

The objective of a scoping assessment is to gather data to provide an appreciation of the likely noise and vibration consequences associated with the project. It involves determining if any of the following conditions are met:

1. the project alters the alignment of any existing carriageways or introduces a new section of road, junction, slip road;
2. changes in traffic volumes on existing or new roads cause an increase in traffic noise of 1dB(A) or more in the short term (on opening) or 3dB(A) or more in the long term (between opening and 15 years after opening);
3. changes in traffic speed or the proportion of heavy vehicles on existing roads or new roads cause a change in noise level of 1 dB(A) or more in the short term of 3 dB or more in the long term;
4. if sufficient traffic flow information is available, then it is acceptable to use this to determine whether there is likely to be a change of 1 dB(A) in the short term or 3 dB(A) in the long term which will result from a combination of traffic flow, speed and composition, instead of using 2 and 3 above in isolation;
5. changes in traffic volume, composition and speed on existing roads or new routes during the night may cause the long-term night time threshold value to be exceeded;
6. any changes to the infrastructure surrounding the road, or any change in the way in which an existing road is used, that could cause a change in traffic noise level of 1 dB(A) or more in the short term or 3 dB(A) or more in the long term.

If any of the conditions are met the assessment should progress to the simple stage, or direct to the detailed stage. As most of the options involve the construction of a new road, and new junctions on existing roads, criteria 1 and 6 are met. Therefore, if the scheme progresses a simple or detailed level assessment will be required. A decision on which assessment level is most appropriate can be made once traffic data is available and a full scoping assessment completed.

However, in the absence of sufficient information be able to provide a quantitative assessment at this stage, property counts along the proposed route corridors have been undertaken in order to provide an appraisal of the options.

Residential buildings and other sensitive receptors within 300m of the various scheme options have been identified from OS mapping and aerial photography. The likelihood of noise and vibration impacts occurring at the identified receptors has been considered in a qualitative manner, by property counts in 100 metres bands from the road centreline up to a distance of 300 metres.

### 12.3 Consultations

No consultations have been undertaken as part of this assessment.

### 12.4 Baseline

The 'Do Minimum' option is defined as the Online Route 4 Option and defines the baseline case. The existing A890 road corridor runs along the southern edge of Loch Carron from Stromeferry to Strathcarron Junction to the north-east of the Loch.

The Baseline indicates a total of 19 properties within 300m of the existing road corridor, with 7 properties within 100m, 8 between 100m and 200m, and 4 between 200m and 300m of the road.

### 12.5 Guidance & Policy

The following legislation and policy has been referred to as part of this assessment:

- National Planning Framework 2 (NPF2);
- Scottish Planning Policy (SPP) (2010);
- PAN 1/2011 'Planning and Noise.

The Highland Wide Local Development Plan (2012), the Wester Ross Local Plan (2006) and the West Highland & Islands Local Plan (2010) have also been considered as part of the assessment.

### 12.6 Options Appraisal

#### ***Option N6, North Online through Lochcarron***

This North Shore Route Option would seek to cross Loch Carron at Strome Narrows before connecting with the existing road network, traveling through Stromemore, Strome Wood, Lochcarron and Kirkton until Strathcarron Junction.

The proposed option would greatly increase the overall number of properties within 300m of the road corridor to 327. Furthermore the majority of these properties would lie within 100m of

the proposed route. It is considered that the route option would result in a major negative impact.

#### ***Option N9, North Lochcarron Bypass***

The North Lochcarron Bypass Option would seek to cross Loch Carron at Strome then passing north of Stromemore, Slumbay and Lochcarron, crossing the existing A896 before returning online at Kirkton until Strathcarron Junction.

The proposed option would increase the overall number of properties within 300m of the road corridor to 86, from the baseline 19. It is considered that the route option would result in a moderate negative impact.

#### ***Option O2, Online Rail Viaduct***

The Online Route 2 Option would seek to follow the existing A890 route from Strome ferry until Ardnaff. The alignment would then run offline for a length of approximately 1.8km along an embankment/viaduct along Loch Carron to a location to the west of Cuddie's Point where it would then follow the existing A890 alignment to Strathcarron Junction, looping east of Achintee.

The proposed option would marginally increase the overall number of properties within 300m of the road corridor to 21, from the baseline 19. It is considered that the route option would result in a neutral impact.

#### ***Option O3, Online Tunnel***

The Online Route 3 Option would seek to follow the existing A890 route from Strome ferry until Ardnaff. The alignment would then run inland for a length of 1.5km through a tunnel to navigate away from the worst section of the rock fall area, before re-joining at a location to the west of Cuddie's Point where it would then follow the existing A890 alignment to Strathcarron Junction, looping east of Achintee.

Whilst there are no sensitive receptor within 300m of the tunnel, properties on the northern side of Loch Carron at a distance of approximately 500m may experience a minor reduction in road traffic noise levels as a result. This is, however, not identified within the qualitative property count assessment.

The proposed option would marginally increase the overall number of properties within 300m of the road corridor to 21, from the baseline 19. It is considered that the route option would result in a neutral impact.

#### ***Option O5, Online Road Rail Share***

The Online Route 5 Option would seek to follow the existing A890 route from Strome ferry until Ardnaff. The route would be aligned to share the railway line for a distance of approximately 1.8km to a location to the west of Cuddie's Point where it would then follow the existing A890 alignment to Strathcarron Junction, looping east of Achintee.

The proposed option would marginally increase the overall number of properties within 300m of the road corridor to 21, from the baseline 19. It is considered that the route option would result in a neutral impact.

**Option O7, Online Avalanche Shelter**

The Online Route 7 Option follows the baseline alignment but includes approximately 1.7 km of extended avalanche sheltering to the west of Cuddie’s Point then follows the existing A890 alignment to Strathcarron Junction, looping east of Achintee.

The proposed option would marginally increase the overall number of properties within 300m of the road corridor to 21, from the baseline 19. It is considered that the route option would result in a neutral impact.

**Option S4, South Glen Udalain**

The Southern Route Option leaves the A890 to the south of Braeintra and heads through the Glen Udalain Valley in the direction of Glen Ling, before turning north towards the River Attadale Valley, tying in with the A890 at Attadale, continuing to Strathcarron Junction, looping east of Achintee.

The proposed option would result in the same number of properties within 300m of the road corridor as the baseline i.e. 19. It is considered that the route option would result in a neutral impact.

A summary of the respective property counts for the Baseline (Option Route 4 Option) and the considered options is given below in Table 12.1.

**Table 12.1 – Property Counts**

Route Option	Estimated Number of Properties			
	0 – 100m	100 – 200m	200 – 300m	Total
Online Route 4 (Baseline)	7	8	4	19
N6, North Online through Lochcarron	193	114	20	327
N9, North Lochcarron Bypass	16	22	48	86
O2, Online Rail Viaduct	6	11	4	21
O3, Online Tunnel	6	11	4	21
O5, Online Road Rail Share	6	11	4	21

O7, Online Avalanche Shelter	6	11	4	21
S4, South Glen Udalain	5	10	4	19

For option N6, the proposed road would run in close proximity to existing properties that line the roadside. As such the implementation of mitigation in the form of noise barriers would not be practicable.

For the other route options mitigation measures in the form of noise barriers could be considered. However, as the areas are sparsely populated, the cost/benefit of the inclusion of barriers is likely to be prohibitive.

A summary of the magnitude of impacts is given below in Table 12.2 for the various options.

**Table 12.2 – Magnitude of Impacts**

Route Option	Sensitivity	Magnitude of Impact	Mitigation measures	Residual Magnitude of Impact
N6, North Online through Lochcarron	High	Major	None Identifiable	Major
N9, North Lochcarron Bypass	High	Moderate	None Identifiable	Moderate
O2, Online Rail Viaduct	High	Neutral	None Identifiable	Neutral
O3, Online Tunnel	High	Neutral	None Identifiable	Neutral
O5, Online Road Rail Share	High	Neutral	None Identifiable	Neutral
O7, Online Avalanche Shelter	High	Neutral	None Identifiable	Neutral
S4, South Glen Udalain	High	Neutral	None Identifiable	Neutral

**12.7 Difficulties Encountered/Limits to Assessment**

The assessment has been based on property counts of noise sensitive properties within 300 metres of the alignment of the various options. Owing to a lack of traffic information, detailed calculations are not possible at this stage. However, it is considered that the assessment undertaken using property count data does provide a robust approach to the appraisal of the potential difference in impacts from the various options considered.

**12.8 Summary & Conclusions**

An assessment of the various options has shown that, with the exception of the North Shore Options, all of the assessed options give rise to a Neutral Impact. This is as a result of no significant change in the number of noise sensitive properties neighbouring the alignment in comparison with the baseline case.

Assessment of option N9 has indicated that there would be a very large increase in the number of properties within 300 metres of the alignment, compared with the baseline case. This is considered to result in a Major Impact.

Assessment of option N6 has indicated that there would be a large increase in the number of properties within 300 metres of the alignment, compared with the baseline case. This is considered to result in a Moderate Impact.

## 13 ROAD DRAINAGE & THE WATER ENVIRONMENT

### 13.1 Introduction

#### 13.1.1 *Purpose and scope of the assessment*

This chapter assesses the potential impacts on the surface water environment and takes into account surface and groundwater quality and hydrology; including coastal and fluvial geomorphology and flood risk. A preliminary desktop study of the hydrological and hydrogeological features associated with eight proposed route options has been undertaken. A further walkover survey was carried out in August 2013 and covered much of the proposed routes to be assessed.

Apart from general statutory and planning requirements for a development of this nature, the water environment aspects are regulated by two key pieces of legislation, namely; the EU Directive 2000/60/EC (Water Framework Directive) transposed into the Water Environment and Water Services Act (Scotland) 2003 and The Water Environment (Controlled Activities) (Scotland) Regulations 2011 in respect of abstractions, discharges, impoundments, or engineering works in the water environment. This legislation aims to protect and enhance the status of aquatic ecosystems, prevent further deterioration to such ecosystems, promote sustainable use of available water resources, and contribute to the mitigation of floods and droughts.

#### 13.1.2 *Study Area*

The proposed options for the Strome ferry route cover the north and south shores and inland routes, and encounter a large number of watercourses. The topography is such that the hills to the north of the A896 (Strathcarron junction to Leacanasigh) slope from the north west towards the loch, with watercourses draining at approximately 90 degrees to the road through culverts and into Loch Carron. Similar is true of the A890 (Strathcarron to Strome ferry), where the hills slope down to the road from the south east side and watercourses drain at approximately 90 degrees to the road through culverts and into Loch Carron. For the purposes of the assessment the watercourses have been grouped by route option and type.

The significant water features included in this assessment are given below:

- Loch Carron;
- Seven groups of major and minor watercourses, divided by route options;
- The Groundwater beneath the route options.

A full description of the proposed bypass is included in Sections 4 of this report, but the details that have an effect on this assessment are highlighted in the bullet points below:

- The North Shore routes utilise parts of the existing road network and include a bridge crossing at Strome Narrows. Route N6 is the North Online through Lochcarron and the N9 is the North Lochcarron Bypass. A large number of morphologically similar, small watercourses are encountered along both of these routes, with existing road crossings which would require extending and upgrading in the case of option N6 and many new crossings required for option N9.
- The Online routes generally utilise the existing road along the south shore of Loch Carron and all include some road layout improvements. The causeway option would



impact upon the loch and its shoreline. The tunnel route is likely to cross a number of watercourses which would require being diverted or culverted. The other options and general improvements of the road would require extending and upgrading of existing culverts.

- The Offline route requires a large number of new crossings on mainly medium sized watercourses, and will come into contact with areas where groundwater is close to the surface (seen as flushes, bogs and standing water). Part of the route utilises existing forestry roads.

### 13.1.3 **Legislation & Policy**

The following legislation and policy has been referred to as part of this assessment:

- EU Directive 2000/60/EC (Water Framework Directive (WFD)), transposed into the Water Environment and Water Services Act (Scotland) 2003 (the "WEWS" Act);
- The Water Environment (Controlled Activities) (Scotland) Regulations 2005 in respect of discharges to surface or groundwater;
- National Planning Framework 2 (NPF2);
- SPP (Scottish Planning Policy), Flood and drainage sections;
- SEPA Policy No.22 (Flood Risk Assessment Strategy);
- SEPA Policy No. 41 (SEPA – Planning Authority Protocol, Development at Risk of Flooding: Advice and Consultation);
- SEPA Policy No. 19 (Groundwater Protection Policy for Scotland).

The Highland Wide Local Development Plan (2012), the Wester Ross Local Plan (2006) and the West Highland & Islands Local Plan (2010) have also been considered as part of the assessment.

## 13.2 **Methodology**

This Stage 2 assessment of potential effects on the water environment has been carried out in accordance with the guidance and techniques presented within the "*Design Manual for Roads and Bridges*" (DMRB), Volume 11, Section 3, Part 10 "Road Drainage and the Water Environment".

The study area is defined as the area within the corridor boundaries indicated on Drawing 13.1 – Watercourses and Water bodies. A number of sources were used to gather background information on the identified water resources features and these are provided in Section 13.4 Baseline.

### 13.2.1 **Receptor Sensitivity**

The sensitivity of a water environment feature is a synthesis of its environmental importance, socio-economic value, recreational value, and also its resilience to cope with change. The sensitivity of a water environment feature was evaluated using the guidance provided in DMRB Volume 11, Section 3, Part 10, Tables A4.1 "Water Features: Attributes and Indicators of Quality" and A4.3 "Estimating the Importance of Water Environment Attributes" as well as additional criteria based on the professional experience of the assessment team. From this guidance the following objective tests have been used in this Chapter to assess sensitivity: -

The environmental importance of the water environment feature; e.g. if it has a designation at an international or national level (e.g. Special Area of Conservation, SSSI, etc.) or if the water body has a high or good status and is therefore a valuable pristine habitat, then this would tend to increase the sensitivity value of the receptor,

The socio-economic value of the water body e.g. if the water body has notable aquatic ecological resources (e.g. an important local or national fishery) or if the surface water or groundwater is in a drinking water protected area as defined in the SEPA Water Framework Directive (WFD) Protected Areas Register, then this would tend to increase the sensitivity value of the receptor,

The recreational value of the water body e.g. if an area is a SEPA designated bathing area or if a watercourse is an important local fishery this would tend to increase the sensitivity value of the receptor, and

The size of the water body and its ability to buffer flow and water quality changes e.g. if a water body has high dilution characteristics compared to a small proposed discharge then its sensitivity value would tend to be lower.

In accordance with the generic methodology provided in Chapter 2 – Methodology, sensitivity has been scaled from Negligible to Low to Medium to High to Very High. In this Chapter a Negligible or Low sensitivity attribute are both considered to be equivalent to the Low Importance stated in Table A4.3 (DMRB). To ensure the transparency of this assessment, the key environmental, socio-economic, recreational, and resilience indicators used to derive the sensitivity of each water body are identified in Section 13.4 'Baseline'.

### 13.2.2 *Impact Magnitude*

Identification of the possible range and magnitude of potential impacts was based on; the guidance within DMRB Volume 11, Section 3, Part 10 (HD 45/09), the professional experience of the assessment team, previous reports, and liaison with the other members of the environmental assessment team.

The magnitude of a potential effect on the water resources features was evaluated using the criteria provided in Table A4.4 "Estimating the Magnitude of an Impact on an Attribute" (DMRB), with the addition of the following criteria to cover areas not specifically dealt with in the DMRB criteria. It is noted that impact magnitudes described below are all phrased assuming adverse impacts, but these general classifications have also been used, where appropriate, to describe beneficial impacts from the Scheme: -

**Major – (equivalent to "Major Adverse" in DMRB see below for DMRB "typical examples") – results in loss of attribute and / or quality and integrity of attribute.**

Surface Water: Failure of both soluble and sediment-bound pollutants in HAWRAT (Method A, Annex I) and compliance failure with EQS values (Method B). Calculated risk of pollution from a spillage >2% annually (Spillage Risk Assessment, Method D, Annex I). Loss or extensive change to a fishery. Loss or extensive change to a designated Nature Conservation Site.

Groundwater: Loss of, or extensive change to an aquifer. Potential high risk of pollution to groundwater from routine runoff – risk score >250 (Groundwater Assessment, Method C, Annex I). Calculated risk of pollution from spillages >2% annually (Spillage Risk Assessment, Method D, Annex I). Loss of, or extensive change to, groundwater supported designated wetlands.

Flood Risk: Increase in peak flood level (1% annual probability) >100 mm (Hydrological Assessment of Design Floods and Hydraulic Assessment, Methods E and F, Annex I).

Additional criteria used in this assessment: -

Degrading of the existing water quality classification,

Loss of or serious effect on the integrity of an internationally or nationally designated aquatic ecological resource,

Gross changes to geo-morphological or hydraulic characteristics e.g. loss of natural bank and bed over a length of 50m or more, reduction in flow capacity of an existing river channel by 20% or more, and

Widespread effect on groundwater movement with a gross change to overall groundwater transfer from up gradient to down gradient resources. Widespread and gross effects on groundwater quality.

**Moderate – (equivalent to “Moderate Adverse” in DMRB see below for DMRB “typical examples”) – results in effect on integrity of attribute or loss of part of attribute.**

Surface Water: Failure of both soluble and sediment-bound pollutants in HAWRAT (Method A, Annex I) but compliance with EQS values (Method B). Calculated risk of pollution from spillages >1% annually and <2% annually. Partial loss in productivity of a fishery.

Groundwater: Partial loss or change to an aquifer. Potential medium risk of pollution to groundwater from routine runoff – risk score 150-250. Calculated risk of pollution from spillages >1% annually and <2% annually. Partial loss of the integrity of groundwater supported designated wetlands.

Flood Risk: Increase in peak flood level (1% annual probability) >50 mm

Additional criteria used in this assessment:

Degrading of either the combined chemical or ecological status indicators (in the case of watercourses) one or more classifications, but no change in overall classification,

Slight impact on an internationally or nationally designated aquatic ecological resource, or a loss or serious effect on the integrity of a nationally or locally important aquatic ecological resource that is not designated,

Significant, but not gross, changes to geo-morphological or hydraulic characteristics e.g. loss of natural bed and bank over a length of 20m or more, reduction in the area of an existing watercourse channel by less than 20%, and

Widespread effects on groundwater movement with a measurable, but not gross, effect on overall groundwater transfer from up gradient to down gradient resources. Widespread, but not gross, effects on groundwater quality.

**Minor – (equivalent to “Minor Adverse” in DMRB see below for DMRB “typical examples”) results in some measurable changes in attributes quality or vulnerability.**

Surface Water: Failure of either soluble or sediment-bound pollutants in HAWRAT Calculated risk of pollution from spillages >0.5% annually and <1% annually.

Groundwater: Potential low risk of pollution to groundwater from routine runoff – risk score <150. Calculated risk of pollution from spillages >0.5% annually and <1% annually. Minor effects on groundwater supported wetlands.

Flood Risk: Increase in peak flood level (1% annual probability) >10mm

Additional criteria used in this assessment:

Degrading of two or more chemical or ecological status indicators (in the case of watercourses), but with no change in either overall or the individual water or biological quality classifications,

Slight impact on a nationally or locally important aquatic ecological resource, or the loss of a moderate area of an abundant aquatic ecological resource,

Minor changes to some geo-morphological or hydraulic characteristics e.g. loss of natural bed and bank over a length of less than 20m, reduction in the area of an existing watercourse channel by less than 5%, and

Localised effect on groundwater movement but no measurable effect on overall groundwater transfer from up gradient to down gradient resources. Localised, measurable but not gross effects on groundwater quality.

**Negligible – (equivalent to “Negligible” in DMRB see below for DMRB “typical examples”) – results in effect on attribute, but of insufficient magnitude to affect the use or integrity.**

Surface Water: No risk identified by HAWRAT (Pass both soluble and sediment-bound pollutants). Risk of pollution from spillages <0.5%.

Groundwater: No measurable impact upon an aquifer and risk of pollution from spillages <0.5%.

Flood Risk: Negligible change in peak flood level (1% annual probability) <+/- 10 mm

Additional criteria used in this assessment:

Degrading of one individual chemical or ecological status indicators (in the case of watercourses), but with no change in either the overall or the chemical or ecological quality classifications,

Slight impact on a small area of an abundant aquatic ecological resource,

Highly localised but not measurable changes in some geo-morphological or hydraulic characteristics, and

Highly localised effect on groundwater movement but no effect on overall groundwater transfer from up gradient to down gradient resources. Localised, but not measurable, effects on groundwater quality.

### 13.2.3

#### ***Impact Significance***

Overall Significance is considered to be a product of both the sensitivity of the receptor and the magnitude of the effect. Significance is scaled from Neutral to Slight, and Moderate, to Large or Very Large. In assessing the product of sensitivity and magnitude, a Matrix for Determination of Level of Impact has been adopted, see Chapter 4 – Methodology and presented in Table 13.1 below. This is in lieu of Table A4.5 ‘Estimating the Significance of Potential Effects’ in the DMRB. This approach provides a transparent assessment for each water resources feature.

**Table 13.1 Significance of Impact**

		<i>Sensitivity of Receptor</i>				
		<i>Very High</i>	<i>High</i>	<i>Medium</i>	<i>Low</i>	<i>Negligible</i>
<i>Magnitude of Impact</i>	<i>Major</i>	Very Large	Large or Very Large	Moderate or Large	Slight or Moderate	Slight
	<i>Moderate</i>	Large or Very Large	Moderate or Large	Moderate	Slight	Neutral or Slight
	<i>Minor</i>	Moderate or Large	Slight or Moderate	Slight	Neutral or Slight	Neutral or Slight
	<i>Negligible</i>	Slight	Slight	Neutral or Slight	Neutral or Slight	Neutral
	<i>No Change</i>	Neutral	Neutral	Neutral	Neutral	Neutral

Only impacts that are “Moderate”, “Large” or “Very Large” (shaded) are considered to be Significant. The significance of a potential effect on the water resources features has been evaluated using the guidance provided in Table A4.6 “Qualifying Conditions for Overall Assessment Scores” (DMRB).

It is also noted that it is considered valuable to attribute a level of confidence to the predicted impact. In this assessment all impacts have been given at a medium confidence level (on a scale of low, medium, and high) except where stated otherwise. This is because the design details are at corridor and option selection stage, with individual options designed in plan form only, therefore preliminary concept designs are understood but no detailed concept designs or specific design details are available at this stage.

**13.2.4 Mitigation**

Some primary mitigation measures have been included in the assessment; these represent what are considered to be standard mitigation measures that would be applied to the construction and operation of such a road scheme. The requirement for secondary mitigation measures would need to be assessed at DMRB Stage 3 when an option has been selected.

**13.3 Consultations**

Consultation with the relevant statutory and non-statutory organisations was undertaken for the Stage 2 assessment, see Chapter 3. SEPA provided feedback on the key issues required to be addressed during the Stage 2 assessment, and those relevant to the water environment are listed below:

**WFD and RBMP**

- Identify if there will be a deterioration in status of affected water bodies as a result of the proposed works.

### Engineering activities in the water environment

- Map of the location of all proposed engineering activities/structural solutions in the water environment;
- Provide a table systematically outlining the type of activity, its scale and justification for it with photographs;
- Outline the likely level of Controlled Activities Regulations (CAR) authorisation required for each work.

### Impacts on groundwater

- Provide a list of groundwater abstractions within a radius of i) 100 m from roads, tracks and trenches and ii) 250 m from borrow pits, significant cuttings and large foundations;
- Assess likely impacts.

### Sustainable Urban Drainage

- Assess if any locations will present issue for providing 2 levels of SuDS treatment.

### Flood Risk

- Assess flood risk from all sources for each option;
- Present any information on proposals to defend any part of routes from coastal flooding.

### Pollution Prevention and Environmental

- Consider whether any options are more environmentally risky than others.

Consultation with SEPA has been ongoing and a number of these issues have been addressed. For details please refer to Appendix 4.

## 13.4 Baseline

Waterbodies and watercourses within the study area are shown on Figure 13.1 – Watercourses and Water bodies. The principal water bodies and types of watercourse are described below. Details for each waterbody were gained from desktop studies and a walkover survey was conducted by two suitably experienced URS staff over 20<sup>th</sup> to 22<sup>nd</sup> August 2013. Summaries of the survey information and sensitivity of each receptor are provided in Tables 13.3 – 13.5.

### 13.4.1 *Large waterbodies*

**Loch Carron** is the principal surface water resource feature within the study area and portions of the loch fall within all three of the route corridors (see Figure 13.1). The loch is a sea loch with a surface area of 25km<sup>2</sup> and is the point where the River Carron, and a number of other watercourses described below, outlet to the sea.

The upper end of Loch Carron is characterised by a delta like tidal zone of approximately 1.5km between mean high and mean low water springs, and tidal pools are exposed in this zone as the tide recedes. Loch Carron is long and relatively narrow with a constricted section near Stromeferry called the Strome Narrows, beyond the narrows the loch opens out to the outer bay which continues to the west until it enters the Inner Sound. Tidal currents can reach up to 3 knots at the narrows. Whilst the loch catchment contains a number of national

designations, the loch itself does not possess any specific ecological designation. However, it does provide a valuable habitat for fish, most notably salmon.

The southern loch shoreline in the vicinity of the proposals is very steep, rocky in places and heavily vegetated with trees and scrub. The northern shore is less steep. There is a fish farm on the loch and it is otherwise used as a recreational fishery and for water sports.

Loch Carron is a coastal water body and is currently classified by SEPA under the Water Framework Directive River Basin Management Plan (RBMP) as having an overall status of 'Good' with High confidence (2008) with overall ecological status of Good and overall chemical status of Pass. No pressures on the water body have been identified. The SEPA Flood Management Map indicates that the tidal zone of Loch Carron and the flood plain area of the River Carron upstream of the tidal zone is prone to a combination of coastal and fluvial flooding in high to low probability events.

The **Morar and Torridon Groundwater Body** underlies all of the study corridors and is classified as a drinking water protection zone. The overall WFD status of the waterbody is 'Good' with High confidence (2008). The quality and quantity of the groundwater has been classified as Good with High confidence, with no trend for pollutants or pressures identified for the water body. At this stage, the location of any Groundwater Dependant Terrestrial Ecosystems (GWDEs) has not been identified but a detailed assessment will be carried out during a Stage 3 assessment. The bedrock aquifer underlying the study area is composed of Morar Group and Lewisian metamorphic rocks, with a small section of Moine Thrust Zone Mylonites. They are generally classified as fracture dominated flow with very low productivity due to the impermeability of the bedrock. The superficial aquifer is formed from glacial till, beach, raised beach deposits, and small areas of alluvium. Flow is intergranular in places with a range of low to high productivity. The medium to high productivity areas are generally associated with the alluvial deposits, particularly around Strathcarron, but otherwise the groundwater quantity is generally very low across the area.

BGS maps indicate that the vulnerability of the uppermost aquifer is likely to be relatively high in the study area (categories 4a and 5). This is because the bedrock is weathered near the surface and has secondary fracturing, which allows for quick transport of contaminants. There is unlikely to be abundant clay within the superficial deposits which can impede the transport of contaminants from the surface to groundwater, thus making it more vulnerable.

A baseline description of the key water resource features encountered along each of the route corridors is given in the following sections.

#### 13.4.2 ***North Shore Corridor Options***

There are two options for the North Shore Corridor route; the N6 and the N9 options. For either option a bridge crossing at the Strome Narrows would be required. These options have the potential to negatively impact **Loch Carron** and its shoreline (see baseline description above).

The downstream reach of the **Ailt Cadh an Eas** watercourse (Image 13.1) lies within the North Shore Corridor and is located to the south of Loch Carron, draining into the loch west of Strome Narrows. Forestry plantations dominate the upper catchment and in its lower reaches, the watercourse flows through low lying farmland. Gradients are generally low on the main stem, though many tributaries flow from steeper slopes. The planform in the low lying areas is gently meandering. This watercourse is classified under the WFD system as having 'Good' overall status with Medium confidence (2008), with overall ecological status of Good and overall chemical status of Pass and no identified pressures. The SEPA Flood Management

Map indicates that within the study area the Allt Cadh an Eas watercourse is at risk from out of bank flooding in high to low probability events.



**Image 13.1 Allt Cadh an Eas at road bridge from Achmore to Braeintra**

Following the proposed crossing at the Narrows, the corridor of both options crosses various unnamed and unclassified drainage paths flowing to the northern shore of Loch Carron between the Strome Narrows and Lochcarron. The corridor crosses the **Allt Torr nan Daoine** (Image 13.2) an unclassified watercourse which outlets to the north shore of Loch Carron south of Strome Wood. Much of the catchment is covered by woodland and slopes are steep and rocky in the upper reaches, with one small loch providing an outflow. The N9 route would require a new crossing, upstream of the Weavers' Cottage but the N6 route would utilise the existing crossing.





**Image 13.2 Road bridge on the Allt Torr nan Daoine**

The N9 corridor option crosses one branch of the **Allt a' Bheatha** (Image 13.3) to the north of Lochcarron. The watercourse originates from the outlet of the Loch a' Choire Leith and flows north east to join the Allt nan Carnan above Lochcarron. The catchment is almost entirely open hillsides, with moderate gradients.



**Image 13.3 Allt a' Bheatha**

Both of the route options then cross the **Allt nan Carnan** (Image 13.4), which is a watercourse that flows south from steep hillslopes, with a number of small lochans and multiple waterfalls. The section above Lochcarron is contained within a wooded gorge. The N9 route would require a new crossing, upstream of Lochcarron, and the N6 route would utilise the existing road bridge at Lochcarron. The watercourse is not classified as part of the WFD system; however the upstream gorge section is a recognised Site of special Scientific interest (SSSI); designated for its rare gorge woodland. The N9 route would cross the watercourse within the designated section, but the N6 route would not. The SEPA Flood Management Map indicates that the Allt nan Carnan watercourse is at risk of flooding in high to low probability events along much of its length, and particularly around the road bridge at Lochcarron.



**Image 13.4 Allt nan Carnan from A896 road bridge**

Between the Allt nan Carnan and Kirkton, the corridor of the N6 route crosses a number of unclassified watercourses which flow directly or indirectly to the North Shore of Loch Carron. They are generally relatively straight, with small catchments, flowing from fields or forestry. The N9 route does not encounter many of these watercourses. At Kirkton the routes converge and between here and the Strathcarron Junction, they cross a number of small, unclassified watercourses. The SEPA Flood Management Map indicates that the **Abhainn Bhuachaig** (Image 13.5) watercourse is at risk from out of bank flooding in high to low probability events and the floodplain at the top end of Loch Carron is also a flood risk area, including a portion of the existing A896. The watercourse flows from the mountainous area to the north of the road and there are a number of small lochans within the catchment. The main stem flows in a relatively flat valley area, and in the lower reaches it flows around an area of woodland towards the road.



**Image 13.5 Abhainn Bhuachaig**

13.4.3

***Online Corridor Options***

The Online corridor options cross various unnamed and unclassified drainage paths flowing to the southern shore of Loch Carron between Strome Ferry and New Kelso. Many of these originate from lochans on the upper plateaux, and above the road are steep, on bedrock and with abundant waterfalls (Image 13.6). These watercourses carry very little sediment except what has been eroded locally from the rock face. In places, drainage from several minor watercourses is captured by a roadside ditch and conveyed by pipe to the loch side of the road. The larger watercourses are conveyed by culverts across the road.



**Image 13.6 Watercourse typical of central section of the Online Corridor (Allt an Fhrangeich)**

The corridor also crosses the **River Attadale** (Image 13.7) in its lower reaches near Attadale which drains to the south east corner of Loch Carron. The river has a large catchment area, encompassing a number of lochs and small waterbodies. Land use is dominated by open hillslopes but there are also areas of forestry. There are several large tributaries, which flow in pronounced river valleys, although the sediment load is generally low from these. In areas of low slope, soils are wet and boggy, with some areas of standing water and also peaty soils. In the lower reaches, the river banks are heavily wooded and there are abundant erosional and depositional features within the channel and along its margins. The valley is flat and wide, and land use is dominated by farming here.

The overall WFD status of the watercourse is 'Good' with Medium confidence (2008). The overall ecological status is Good and overall chemical status of Pass with no identified pressures on the watercourse. The SEPA Flood Management Map indicates that the River Attadale is at risk from out of bank flooding in high to low probability events, particularly in the low lying areas upstream of the bridge and towards the coast. The road and rail bridges are adjacent to each other, with sedimentation around the piers and evidence of some scouring.



**Image 13.7 River Attadale upstream of the A890 road crossing**



**Image 13.8 Glen Attadale showing the confluence of the Allt a Ghiubhais and River Attadale**

The **Allt a' Ghiubhais** (Image 13.8) flows from the outlet of the Loch a' Chairn Bhain and enters the River Taodail to the north of Achintee, immediately upstream of the A890 road bridge. The watercourse is classified under WFD as a drinking water source with a status of 'Pass. It supplies a covered reservoir to the east of Achintee but no details have been provided by SEPA or THC.

Near Strathcarron, the online routes cross the **River Taodail** (Images 13.9 and 13.10). The river generally flows east to west, following the trend of the bedrock. There is little vegetation within the catchment and there are a number of lochans. There is an erosion issue on the watercourse, upstream of the road and rail bridges. At this location, the river follows a sharp bend and flows adjacent to the road, followed by the confluence with the Allt an t-Sagairt. The force of the water flowing from the right bank beside the road, to the left bank at the confluence, is likely to increase scouring of the steep, gravel dominated left bank. A large volume of sediment has been deposited locally and a bar has developed on the right bank, opposite the erosion site (Image 13.9).

The overall WFD status of the watercourse is 'Good' with Medium confidence (2008). The overall ecological status is Good and overall chemical status of Pass with no identified pressures on the watercourse. The SEPA Flood Management Map indicates that the downstream reach of the River Taodail is at risk from out of bank flooding in high to low probability events.



**Image 13.9 River Taodail upstream of A890 road crossing**



**Image 13.10 River Taodail at A890 road crossing**

The far north western portion of the Online Corridor crosses the **River Carron** near Strathcarron (Image 13.11). This is the largest river in the study area, with a catchment of 140km<sup>2</sup>. The river rises at high elevations, where snow is common in the winter. Land use is dominated by open hillsides, with some areas of forestry and grassland, and flows are buffered somewhat by Loch Dughail. The channel substrate in the lower reaches is dominated by mobile gravel where there are abundant erosion and deposition features.

The overall WFD status of the watercourse is 'Good' with Medium confidence (2008). The overall ecological status is Good and overall chemical status of Pass with no identified pressures on the watercourse. The River Carron is designated as a Freshwater Fish protection area and a Salmonoid Water. The SEPA Flood Management Map indicates that the downstream reach of the River Carron is at risk from extensive out of bank flooding in high to low probability events. The A890 road bridge is currently a single lane structure.



**Image 13.11 River Carron at A890 road crossing**

13.4.4

***Southern Corridor***

The upper reaches of **Allt Gleann Udalain** (Image13.12) lie within the Southern Corridor study area. The watercourse has a moderate gradient and flows alongside areas of forestry. Much of the catchment has undergone tree felling in recent times. Tributaries tend to be steep, flowing from hillslopes to the south and introducing very little sediment.

This watercourse is classified under the WFD system as being a heavily modified water body (HMWB) with an overall status of 'Good ecological potential' with Medium confidence in 2008 with overall ecological status of Poor and overall chemical status of Pass. The pressures associated with this water body are identified as Abstraction, Flow Regulation and Morphological Alterations (impoundment). This is related to Scottish Water and Scottish & Southern Energy activities downstream of the proposed route. The SEPA Flood Management Map indicates that the Allt Gleann Udalain is at risk of out of bank flooding along much of its length in high to low probability events.





**Image 13.12 Allt Gleann Udalain at proposed crossing point**

The mid to upper reaches of **Allt Loch Innis nan Seangan** lie within the Southern Corridor study area. The watercourse flows generally west to east, where it joins the River Ling out with the study area. Tributaries are relatively steep and there are numerous small lochs throughout the catchment. The overall WFD status of the watercourse is 'Good' with Medium confidence (2008). The overall ecological status is Good and overall chemical status of Pass with no identified pressures on the watercourse. The watercourse is a relatively major tributary of the River Ling which is designated as a Freshwater Fish protection area. The SEPA Flood Management Map indicates that the watercourse is at risk of a small amount of flooding within the study area in high to low probability events.

The route crosses a number of steep, bedrock burns similar to the **Allt na Dalach Moire** (Image 13.13), which are unclassified and relatively unmodified. Their character is typical of many other watercourses flowing from the elevated plateaux. Some flooding is indicated by the SEPA map, particularly around the confluences with the River Attadale.

The Highland Council have granted consent for a hydropower scheme in the Attadale Valley, utilising water from three intakes on the Allt a Ghiubhais and two of its tributaries, linking them via pipeline and a buried aqueduct. Water will be conveyed via pipeline to the powerhouse located at the confluence with the River Attadale.



**Image 13.13 Allt na Dalach Moire**

It is worth noting that much of the route is characterised by boggy, peaty soils with frequent flushes, minor and disparate flow routes and low areas with intermittent pools. A number of standing water bodies also lie within the Southern Corridor study area, these are generally relatively small and unclassified and form the headwaters of tributaries flowing to the rivers Ling and Attadale.

The Southern Corridor shares a common area with the Online Corridor in relation to the River Carron and River Taodail, baseline information on these watercourses can be found in the section above.

13.4.5 **Water Resources**

**Private Water Supplies**

THC was consulted as the statutory record holders for information concerning Private Water Supplies (PWS). They have provided data for 13 PWS in the vicinity of the proposed route corridors (Table 13.2). No details are given of their condition or the number of people supplied by each. There are likely to be a mixture of surface water or groundwater sources.

**Table 13.2 Details of Private Water Supplies in the Lochcarron Area**

Property Name	Supply Type
Attadale Estate	Commercial
Attadale Strathan	Commercial
Attadale Craigton	Domestic
Arinackaig Croft	Commercial
North Strome The Old Bull Pen	Domestic

Property Name	Supply Type
North Strome Carafric	Domestic
North Strome Castle View	Domestic
North Strome Fern Villa	Domestic
North Strome Park House	Commercial
Strathcarron New Borehole	Domestic
Leachanashie	Commercial
Ribhuachan House	Domestic
Cana House	Commercial

**Public Water Supplies**

No public water supplies have been identified within 1 km of the route corridors.

**Abstractions and Discharges**

SEPA were consulted regarding abstractions and discharges in the Lochcarron area and they have provided details for 369 locations around the wider area. Within 1km of the proposed routes, there are 52 reported CAR licences and these are discussed below.

The majority of licences are for discharges, primarily sewage. One licence exists for impoundment hydropower, three for hydropower abstraction return, two for marine cage fish farming, one for a freshwater tank or hatchery and one for water abstraction for a fish farm.

13.4.6 **Flood Risk for all Routes**

It should be noted that the existing flood risk has been assessed based on the SEPA Flood Risk Management Maps (2014) and this highlights that flood risk from the coast appears to be greater for the North Shore Corridor than for the Online or Southern Corridors. Flood risk from the major watercourses affects all routes, particularly in the Strathcarron Junction area. Should a route option be progressed to a Stage 3 assessment, a flood risk assessment will be required to inform the design of the Scheme. It is not currently known if flood defences will be required or included in any of the proposed options.

13.4.7 **Grouping of watercourses**

In order to reasonably assess the potential impacts on watercourses in the route corridors, it is necessary to group them. Using data from the field survey, they have grouped by route, watercourse type and significance. The resultant groupings are provided in Table 13.13 and list all named watercourses in each group. Some groups will contain a number of unnamed watercourses (reflected in the 'Number of Watercourses' column). Watercourses are grouped by their character in the vicinity of the route corridor only (250m on either side of proposed route), as the character may differ up or downstream of the proposed road option.

**Table 13.3 Grouping of watercourses in the study areas**

Route	Group No.	Description	Named Watercourses (1:10,000 scale map)	No. of watercourses (named and unnamed)	Approx. Width Range (m)
All	Loch Carron		-	-	-
All	Groundwater		-	-	-
Online Routes	1	Major watercourses	- River Carron	4	6-60
			- River Taodail		
			- River Attadale		
	2	Minor, steep watercourses on bedrock	- Allt Port na Cloiche	Approx. 27	0.3-4
			- Allt an Donn		
			- Eas Choinnich		
			- Allt Phadruig		
			- Allt an Ard-Achaidiah		
			- Allt na Beiste		
			- Allt an Fhrangeich		
- Allt Suidh na Banaich					
Southern Route	3	Major watercourses	- Cuddies Point Burn	4	3-20
			- An Cam Allt		
			- Allt Cul an Lin		
			- Allt na Faing		
	4	Steep, incised watercourses on bedrock	- Allt a' Ghiubhais (Allt an t Sagairt)	Approx. 34	1-5
			- River Attadale		
			- Allt Loch Innis nan Seangan		
			- Allt Gleann Udalain		
			- Allt Cadh an Eas		
			- Allt na Dalach Moire		
- Allt Creag a' Chroicinn					
- Allt a Ghiubhais					
- Allt na Feithe Seilich					
- Allt an Reidh Bhrìc					
- Allt Dearg					
- Allt Loch nam Breac Mora					

Route	Group No.	Description	Named Watercourses (1:10,000 scale map)	No. of watercourses (named and unnamed)	Approx. Width Range (m)
North Shore Routes			<ul style="list-style-type: none"> <li>- Allt na h-Innse Duibhe</li> <li>- Allt na Lucha</li> <li>- Allt Loch Anna</li> <li>- Allt an Lochain Sgeirich</li> <li>- Allt Cadh an Eas</li> <li>- Allt Torr nan Daoine</li> <li>- Allt nan Carnan</li> <li>- Abhainn Bhuachaig</li> <li>- Allt Camas na Fearna</li> <li>- Allt a Bheatha</li> <li>- Allt A Phris Mhoir</li> <li>- Balaiglagh Burn</li> <li>- Allt Cosach</li> <li>- Allt a Chalachain</li> </ul>		
	5	Major watercourses		3	3-6
	6	Steep, incised watercourses on bedrock		Approx. 26	0.3-1.5
	7	Low gradient, with sediment		Approx. 7	2-3

**Table 13.4 Sensitivity and Importance of water bodies in the study area**

Water Body / Group	Water Supply / Quality	Dilution / Removal of Waste Products	Recreation	Value to Economy	Conveyance of Flow	Biodiversity	Overall Sensitivity
Loch Carron	WFD chemical status (2008) 'Pass'	Large with reasonable ability to buffer discharges	Used for pleasure craft / water sports / and fishing	Tourism, fish farming, sailing club	Large waterbody, significant floodplain (Coastal)	WFD biological status (2008) 'Good'	<b>High</b>
Groundwater	WFD chemical status (2008) 'Good', the uppermost aquifer is likely to be "highly vulnerable"	Overall groundwater body flowing to the study area is likely to be relatively large	Not directly applicable to groundwater (but indirectly related to water quality of the Loch and fisheries)	Classified as a drinking water protection zone	Shallow groundwater resource, fracture flow	Not identified	<b>Medium</b>
1	WFD chemical status (2008) 'Pass'.	Reasonable ability to buffer discharges	Used for recreational fishing	Tourism	Large watercourses, significant floodplain	<ul style="list-style-type: none"> <li>- WFD biological status (2008) 'High'</li> <li>- Salmonid Water (Carron)</li> <li>- Freshwater Fish (Carron and Taodail)</li> </ul>	<b>Very High</b>
2	<ul style="list-style-type: none"> <li>- Allt a' Ghiubhais WFD classified as drinking water protection zone with DWPA status 'Pass'</li> <li>- All others are unclassified</li> </ul>	Low ability to buffer discharges as small catchment and low flows	No direct uses but indirectly related to water quality of the Loch	- Allt a' Ghiubhais drinking water protection zone	Large number of medium-minor watercourses, limited floodplain	Typical of an upland watercourse of this nature	<b>Medium-Low</b>
3	WFD chemical status (2008) 'Pass'.	Medium ability to buffer discharges given medium catchment areas	No direct uses but indirectly related to water quality of the Loch	Tourism, local fishing, Udalain for SW and SSE abstraction & impoundment, Attadale small fishery	Large watercourses, significant floodplain	<ul style="list-style-type: none"> <li>- WFD biological status (2008) Attadale and Allt Cadh an Eas 'High'</li> <li>- Allt Loch Innis nan Seangan 'Good'</li> <li>- Allt Gleann Udalain 'Poor'</li> </ul>	<b>High</b>
4	Unclassified	Low ability to buffer discharges given small	No direct uses but indirectly related to	N/A	Large number of medium-minor	Typical of an upland watercourse of this nature	<b>Low</b>

Water Body / Group	Water Supply / Quality	Dilution / Removal of Waste Products	Recreation	Value to Economy	Conveyance of Flow	Biodiversity	Overall Sensitivity
		catchment areas	water quality of the Loch		watercourses, limited floodplain		
5	Unclassified	Medium ability to buffer discharges given medium catchment size	No direct uses but indirectly related to water quality of the Loch	Tourism (Allt nan Carnan)	Medium watercourses, limited floodplain	Allt nan Carnan designated SSSI woodland	<b>Medium</b>
6	Unclassified	Low ability to buffer discharges given small catchment and low flows	No direct uses but indirectly related to water quality of the Loch	N/A	Large number of minor watercourses, limited floodplain	Typical of an upland watercourse of this nature	<b>Low</b>
7	Unclassified	Low ability to buffer discharges given small catchment and low flows	No direct uses but indirectly related to water quality of the Loch	N/A	Few minor watercourses with moderate floodplain	Typical of an upland watercourse of this nature	<b>Low</b>

**Table 13.5 Characteristics of water bodies by group**

Waterbody / Group	Channel Substrate	Bank Material	Catchment Vegetation	Structures / Modifications	Catchment Land Use	Significant Features	Catchment Characteristics
1	Bedrock, gravel and cobbles	Bedrock, earth	Long grass, ferns, trees	Bridges in lower reaches	Open hillsides, woodland, grazing		Large catchment areas, Low groundwater input, some attenuation by lochs, high rainfall, wet soils, steep gradients, sand-clay loam soils, small areas of peaty soil
2	Bedrock	Bedrock	Long grass, ferns	Culverts at road	Open hillsides	Many waterfalls at cliff face along existing road	Small catchment areas, generally steep gradients, other characteristics as group 1
3	Bedrock, gravel and cobbles	Bedrock, earth	Long grass, ferns, trees	Bridges in lower reaches	Open hillsides, woodland, grazing		Medium catchment area, moderately steep, some flows attenuated by lochs, other characteristics as group 1
4	Bedrock	Bedrock	Long grass, ferns	No	Open hillsides	Many fed by small lochans, abundant waterfalls, many tributaries	Boggy, peaty soils throughout much of the upper catchment areas. Abundant seeps, flushes and small lochans. Steep gradients, very high rainfall and very low groundwater input, may be more clay rich loam soils
5	Bedrock, gravel and cobbles	Bedrock, earth	Trees	Road bridges	Woodland		Moderate groundwater input, generally steep slopes, otherwise characteristics as group 1
6	Bedrock	Bedrock	Trees, grass	Small stone culverts for road crossings	Woodland, open hillsides	Short drainage paths, few tributaries	Similar to group 5, except smaller catchments and almost no attenuation by lochs
7	Gravel	Earth, gravel	Grass, rough pasture, occasional trees	Small stone culverts for road crossings	Pasture, golf courses, gardens	Low gradient, floodplain	Similar to group 5 and 6



## 13.5 Options Appraisal

### 13.5.1 *Predicted Impacts*

Construction effects on the water environment are often of temporary and short term duration. Generally speaking, effects are more concentrated during construction compared with the operational phase due to activity levels and actions resulting in a higher likelihood of and potential for pollution and spillages during this period. Effects on the water environment during the operational phase include road drainage, watercourse crossings and alterations to floodplains and natural drainage pathways.

The potential impact on CAR licenced activates will be assessed fully at Stage 3, however, some general comments are made here. It may be necessary to maintain the same flow rates in watercourses affected by discharges in order to ensure adequate dilution and dispersion of waste. The majority of sewage discharges are private sources and are generally downstream of the proposed routes. Assuming that culvert sizes are maintained or increased, there should be no impact on licenced discharges in the vicinity of the proposed works. The one abstraction licence is upstream of the existing A896 on the North Shore, at a location where the proposed routes are online; therefore the source would be unlikely to be affected by proposed changes.

At Stage 3, a detailed survey of existing PWS would be required to allow a full assessment of any potential impact. However, as the majority of sources appear to be from surface water, and are generally upstream of the proposed routes, it is unlikely that there will be a significant impact.

Flood risk to the existing routes has not been considered in the tables, only whether the proposed works are likely to cause an increase in flood risk. Should an option be progressed to Stage 3, a full flood risk assessment may be required to ensure that the route can be protected and to prevent increasing flood risk elsewhere.

The following tables set out the range of potential effects expected, their magnitude, and the overall significance based on the sensitivity of the receptor. The effects are split into construction (Tables 13.6 and 13.7) and operation (Tables 13.8 and 13.9) phase effects. The magnitude of effect is stated based on the inclusion of the primary mitigation measures noted in Section 13.5.5.

Potential impacts on watercourses are discussed throughout the tables at a high level to allow comparison of the proposed options, the detailed impacts will be determined during a Stage 3 assessment. It is anticipated that there will not be any factors preventing suitable networks being produced in order to achieve effective drainage solutions. Even though Loch Carron and its various tributaries present a constraint to the corridor options, they also present a potential drainage solution in terms of outfall locations.

Effects have generally been assessed by corridor, individual route options have not been assessed at this stage unless the impacts of a particular option vary from the impacts generally identified for the corridor. Despite this consideration has been given, in a general sense, to the average proportion of corridor utilising existing roads and the requirement for new crossings of the Loch or sensitive watercourses. These are outlined briefly below:

- North Shore Corridor – two options are proposed: N6 (online) and N9 (offline). For the N9 route, there is a small online section at Mid Strome and from Kirkton to Strathcarron Junction. A small offline section is required for the N6 route at Stromemore, otherwise this route is entirely online.

- Online Corridor – generally most of the route will utilise the existing road, with the exception of O2 which includes a 2km sidelong viaduct on the loch shore side of the rail line and O3 which will require a tunnel. The changes common to all the online options have been assessed together, then in a separate table, the unique aspects of each option have been assessed separately.
- Southern Corridor – majority of proposed route is outwith a current line.

Table 13.6 Construction Impacts – All Options

		Corridor Option															
		North Shore Routes			N6 (Online)			N9 (Offline)			Online Routes (Common aspects)				Southern Route		
Issue	Receptor & Sensitivity	Magnitude (and Type) of Effect	Overall Significance	Magnitude (and Type) of Effect	Overall Significance	Magnitude (and Type) of Effect	Overall Significance	Receptor & Sensitivity	Magnitude (and Type) of Effect	Overall Significance	Receptor & Sensitivity	Magnitude (and Type) of Effect	Overall Significance	Receptor & Sensitivity	Magnitude (and Type) of Effect	Overall Significance	
Surface Water Quality - Sediment mobilisation and spillage or discharge of other pollutants in water bodies	Loch Carron (High), Group 5 Watercourses (Medium) and Group 6&7 Watercourses (Low)	Minor Localised at Strome Narrows bridge crossing, temporary and highly localised at watercourse crossings, temporary	Slight / Moderate for the Loch, Slight for the affected Group 5 Watercourses, Neutral for the Group 6&7 watercourses	Minor Localised at Strome Narrows bridge crossing, temporary, also at new watercourse crossings, temporary	Slight / Moderate for the Loch, Moderate for the affected Group 5 Watercourses, Slight for the Group 6&7 watercourses	Minor Localised to area of works along southern loch shore and highly localised at new watercourse crossings, temporary	Loch Carron (High), Group 1 Watercourses (Very High) and Group 2 Watercourses (Medium-Low)	Loch Carron (High), Group 3 Watercourses (High) and Group 4 Watercourses (Low)	Minor Localised to area of works, temporary	Slight for the Loch, Slight to Moderate for the Group 1 Watercourses and Neutral for the Group 2 watercourses	Loch Carron (High), Group 3 Watercourses (High) and Group 4 Watercourses (Low)	Minor Localised to area of works, temporary	Slight for the Loch, Slight to Moderate for the Group 3 Watercourses and Neutral for the Group 4 watercourses	Loch Carron (High), Group 3 Watercourses (High) and Group 4 Watercourses (Low)	Minor Localised around watercourses, temporary	Slight for the Loch, Slight to Moderate for the Group 3 Watercourses and Neutral for the Group 4 watercourses	
Flooding - Flood risk to surrounding land from development and loss of floodplain	Surrounding Land & Infrastructure (Low - Medium - based on rural land and village)	Negligible Localised to watercourses, temporary	Neutral for the surrounding land and properties	Minor Localised to watercourses, temporary	Slight for the surrounding land and properties	Negligible Localised to watercourses, temporary	Surrounding Land & Infrastructure (Low - based on rural land)	Surrounding Land & Infrastructure (Low - based on rural land)	Negligible Localised to watercourses, temporary	Neutral for surrounding land	Surrounding Land & Infrastructure (Low - based on rural land)	Minor Localised around watercourses, temporary	Neutral for surrounding land	Surrounding Land & Infrastructure (Low - based on rural land)	Minor Localised around watercourses, temporary	Slight for surrounding land	

		Corridor Option										
		North Shore Routes		N6 (Online)		N9 (Offline)		Online Routes (Common aspects)		Southern Route		
Issue	Receptor & Sensitivity	Magnitude (and Type) of Effect	Overall Significance	Magnitude (and Type) of Effect	Overall Significance	Magnitude (and Type) of Effect	Receptor & Sensitivity	Magnitude (and Type) of Effect	Overall Significance	Receptor & Sensitivity	Magnitude (and Type) of Effect	Overall Significance
Geomorphology and Hydrology - Alteration of water bodies	Loch Carron (High), Group 5 Watercourses (Medium) and Group 6&7 Watercourses (Low)	Moderate Localised to Strome Narrows Minor Highly localised, temporary for watercourses	Moderate / Large for the Loch and Neutral to Slight for the affected watercourses	Moderate Localised to Strome Narrows, also at new watercourse crossings, temporary	Moderate / Large for the Loch, Moderate for the affected Group 5 Watercourses, Slight for the Group 6&7 watercourses	Loch Carron (High) and Watercourses Group 1 (Very High) and Group 2 Watercourses (Medium-Low)	Negligible Temporary, for the Loch Minor Highly localised, for affected watercourses	Neutral for the Loch and Neutral to Slight for the affected watercourses	Loch Carron (High), Group 3 Watercourses (High) and Group 4 Watercourses (Low)	Minor Localised, for the Loch Moderate Highly localised but high numbers of crossings, corridor through virgin ground for affected watercourses	Slight for the Loch and Slight to Moderate for watercourses	
Groundwater Quality and Quantity / Movement	Groundwater beneath the site (Medium)	Minor Localised to shallow aquifer in vicinity of proposed route, temporary	Slight for groundwater	Moderate Localised to shallow aquifer in vicinity of proposed route, temporary	Moderate for groundwater	Groundwater beneath the site (Medium)	Groundwater beneath the site (Medium)	Minor Localised to shallow aquifer in vicinity of proposed route, temporary	Slight for groundwater	Groundwater beneath the site (Medium)	Localised to shallow aquifer in vicinity of proposed route which is long and offline, temporary	Moderate for groundwater

**Table 13.7 Construction Impacts – Online Corridor Options**

Issue	Receptor & Sensitivity	Route Option							
		Online 2 – Sidelong Viaduct		Online 3 – Inland Tunnel		Online 5 – Share road / rail		Online 7 - Avalanche shelter extension	
		Magnitude (and Type) of Effect	Overall Significance	Magnitude (and Type) of Effect	Overall Significance	Magnitude (and Type) of Effect	Overall Significance	Magnitude (and Type) of Effect	Overall Significance
Surface Water Quality - Sediment mobilisation and spillage or discharge of other pollutants in water bodies	Loch Carron (High), Group 1 Watercourses (Very High) and Group 2 Watercourses (Medium-Low)	Moderate Localised to area of works along southern loch shore and Minor Highly localised at new watercourse crossings, temporary	Moderate for the Loch, Slight to Neutral for the Group 2 watercourses	Negligible Localised to area of works and highly localised at new watercourse crossings, temporary	Slight for the Loch, Neutral for the Group 2 watercourses	Minor Localised to area of works along southern loch shore and highly localised at new watercourse crossings, temporary	Slight for the Loch, and Slight to Neutral for the Group 2 watercourses	Minor Localised to area of works along southern loch shore and highly localised at new watercourse crossings, temporary	Slight for the Loch, and Slight to Neutral for the Group 2 watercourses
Flooding - Flood risk to surrounding land from development and loss of floodplain	Surrounding Land & Infrastructure (Low – based on rural land)	Negligible Localised to watercourses, temporary	Neutral for the surrounding land	Negligible Localised to watercourses, temporary	Neutral for the surrounding land	Negligible Localised to watercourses, temporary	Neutral for the surrounding land	Negligible (localised to watercourses, temporary)	Neutral for the surrounding land
Geomorphology and Hydrology - Alteration of water bodies	Loch Carron (High) and Group 1 Watercourses (Very High) and Group 2 Watercourses (Medium-Low)	Moderate for the Loch Minor Highly localised, for affected watercourses	Moderate for the Loch and Slight to Neutral for the Group 2 watercourses	Negligible for the Loch Negligible Highly localised, for affected watercourses	Slight for the Loch, Slight for the Group 2 watercourses	Negligible for the Loch, highly localised for affected watercourses	Neutral for the Loch, and for the affected watercourses	Negligible for the Loch, highly localised for affected watercourses	Neutral for the Loch, and for the affected watercourses
Groundwater Quality and Quantity / Movement	Groundwater beneath the site (Medium)	Negligible Localised to shallow aquifer in vicinity of proposed route, temporary	Neutral for groundwater	Minor Localised to shallow aquifer in vicinity of proposed route	Slight for groundwater	Negligible Localised to shallow aquifer in vicinity of proposed route, temporary	Neutral for groundwater	Negligible Localised to shallow aquifer in vicinity of proposed route, temporary	Neutral for groundwater

Table 13.8 Operational Impacts – All Options

Issue	Corridor Option										
	North Shore Routes		N6 (Online)		N9 (Offline)		Online Routes (Common Aspects)			Southern Routes	
	Receptor & Sensitivity	Magnitude (and Type) of Effect	Overall Significance	Magnitude (and Type) of Effect	Overall Significance	Receptor & Sensitivity	Magnitude (and Type) of Effect	Overall Significance	Receptor & Sensitivity	Magnitude (and Type) of Effect	Overall Significance
Surface Water Quality - Discharge of road watercourses / loch, pollution from road and infrastructure maintenance	Loch Carron (High) and Group 5 Watercourses (Medium) and Group 6&7 Watercourses (Low)	Negligible Localised to chosen point of dispersion, permanent	Slight for the Loch Neutral for all other waterbodies	Minor Localised to chosen point of dispersion, permanent	Moderate to Slight for all waterbodies	Loch Carron (High) and Group 1 Watercourses (Very High) and Group 2 Watercourses (Medium-Low)	Negligible (localised to chosen route/point of dispersion, permanent)	Slight for Loch Carron and Group 1 watercourses, Neutral for Group 2 watercourses	Loch Carron (High) and Group 3 Watercourses (High) and Group 4 Watercourses (Low)	Minor Localised to chosen route/point of dispersion, permanent	Slight to Moderate for all watercourses
Flooding - Flood risk to surrounding land from development and loss of floodplain	Surrounding Land & Infrastructure (Low - Medium - based on rural land and village)	Negligible Localised to watercourses, permanent	Neutral for the surrounding land and properties	Minor Localised to watercourses, permanent	Slight for the surrounding land and properties	Surrounding Land and Infrastructure (Low - based on rural land)	Negligible (localised to watercourses, permanent)	Neutral for the surrounding land	Surrounding Land and Infrastructure (Low - based on rural land)	Minor Localised to watercourses, permanent	Slight for the surrounding land
Geomorphology and Hydrology - Alteration of water bodies and drainage patterns	Loch Carron (High), Group 5 Watercourses (Medium) and Group 6&7 Watercourses (Low)	Moderate Localised to Strome Narrows, permanent	Moderate / Large for the Loch and Neutral to Slight for the affected watercourses	Moderate Localised to Strome Narrows, permanent	Moderate / Large for the Loch and Slight to moderate for the affected watercourses	Loch Carron (High), Group 1 Watercourses, (Very High) and Group 2 Watercourses (Medium-Low)	Minor Highly localised, permanent for watercourses	Slight to Moderate for the Loch and Neutral to Slight for the affected watercourses	Loch Carron (High), Group 3 Watercourses (High) and Group 4 Watercourses (Low)	Minor for the Loch Moderate High number of new crossing required but localised, permanent for affected watercourses	Slight for the Loch Moderate to slight for the watercourses
Groundwater	Groundwater	Negligible	Neutral for	Minor	Slight for	Groundwater	Negligible	Neutral for	Groundwater	Minor	Slight for

Corridor Option											
North Shore Routes		N6 (Online)		N9 (Offline)		Online Routes (Common Aspects)			Southern Routes		
Issue	Receptor & Sensitivity	Magnitude (and Type) of Effect	Overall Significance	Magnitude (and Type) of Effect	Overall Significance	Receptor & Sensitivity	Magnitude (and Type) of Effect	Overall Significance	Receptor & Sensitivity	Magnitude (and Type) of Effect	Overall Significance
Quality and Quantity / Movement	beneath the site ( <b>Medium</b> )	Localised to shallow aquifer in vicinity of proposed route	groundwater	Localised to shallow aquifer in vicinity of proposed route	groundwater	beneath the site ( <b>Medium</b> )	Localised to shallow aquifer in vicinity of proposed routes	groundwater	beneath the site ( <b>Medium</b> )	Localised to shallow aquifer in vicinity of proposed route, permanent	groundwater

**Table 13.9 Operational Impacts – Online Corridor Options**

Issue	Receptor & Sensitivity	Route Option									
		Online 2 – Sidelong Viaduct		Online 3 – Inland Tunnel		Online 5 – Share road / rail		Online 7 - Avalanche shelter extension			
		Magnitude (and Type) of Effect	Overall Significance	Magnitude (and Type) of Effect	Overall Significance	Magnitude (and Type) of Effect	Overall Significance	Magnitude (and Type) of Effect	Overall Significance		
Surface Water Quality - Sediment mobilisation and spillage or discharge of other pollutants in water bodies	Loch Carron ( <b>High</b> ) and Group 2 Watercourses ( <b>Medium-Low</b> )	<b>Negligible</b> Localised to point of dispersion, permanent	<b>Slight</b> for Loch Carron, <b>Neutral</b> for all watercourses	<b>Negligible</b> Localised to point of dispersion, permanent	<b>Slight</b> for Loch Carron, <b>Neutral</b> for all watercourses	<b>Negligible</b> Localised to point of dispersion, permanent	<b>Negligible</b> Localised to point of dispersion, permanent	<b>Negligible</b> Localised to point of dispersion, permanent	<b>Slight</b> for Loch Carron, <b>Neutral</b> for all watercourses	<b>Slight</b> for Loch Carron, <b>Neutral</b> for all watercourses	
Flooding - Flood risk to surrounding land from development and loss of floodplain	Surrounding Land & Infrastructure ( <b>Low</b> – based on rural land)	<b>Negligible</b> Localised to watercourses, permanent	<b>Neutral</b> for the surrounding land	<b>Negligible</b> Localised to watercourses	<b>Neutral</b> for the surrounding land	<b>Negligible</b> Localised to watercourses	<b>Negligible</b> Localised to watercourses	<b>Negligible</b> Localised to watercourses	<b>Neutral</b> for the surrounding land	<b>Neutral</b> for the surrounding land	
Geomorphology and Hydrology - Alteration of water bodies	Loch Carron ( <b>High</b> ) and Group 2 Watercourses ( <b>Medium-Low</b> )	<b>Moderate</b> Permanent for the Loch, <b>Minor</b> Highly localised, permanent for affected watercourses	<b>Moderate</b> for the Loch and <b>Slight</b> for the Group 2 watercourses	<b>Negligible</b> for the Loch, <b>Minor</b> Highly localised, permanent for affected watercourses	<b>Slight</b> for the Loch and for the Group 2 watercourses	<b>Negligible</b> for the Loch, <b>Negligible</b> Highly localised, permanent for affected watercourses	<b>Negligible</b> for the Loch, <b>Negligible</b> Highly localised, permanent for affected watercourses	<b>Negligible</b> for the Loch, <b>Negligible</b> Highly localised, permanent for affected watercourses	<b>Slight</b> for the Loch and <b>Neutral</b> for the affected watercourses	<b>Slight</b> for the Loch and <b>Neutral</b> for the affected watercourses	
Groundwater Quality and Quantity / Movement	Groundwater beneath the site ( <b>Medium</b> )	<b>Negligible</b> Localised to shallow aquifer in vicinity of proposed route	<b>Neutral</b> for groundwater	<b>Minor</b> Localised to shallow aquifer in vicinity of proposed route	<b>Slight</b> for groundwater	<b>Negligible</b> Localised to shallow aquifer in vicinity of proposed routes	<b>Negligible</b> Localised to shallow aquifer in vicinity of proposed routes	<b>Negligible</b> Localised to shallow aquifer in vicinity of proposed routes	<b>Neutral</b> for groundwater	<b>Neutral</b> for groundwater	



Notes for all tables: -

- The assessments above are based on the options corridor level 'design' information (i.e. not detailed scheme design) and are meant to enable differences between the options to be highlighted rather than a definitive assessment of significant potential effects;
- All magnitudes and significances are adverse except where noted as beneficial.

### 13.5.2

#### **Cumulative Impacts**

Residual impacts from the Scheme have been identified as being negligible to moderate throughout the life of the project and none of the options are considered to have any significant impact on hydrology of the study area. Where moderate impacts have been identified, these are generally considered to be local to the site and not expected to cause any impacts when considered in the context of the wider catchment area. Therefore the Stroneferry Bypass options are not expected to contribute to any cumulative impacts in combination with other developments in the area. However, each route corridor has been assessed separately below.

#### **North Shore Routes**

Overall the impacts on the water environment as a result of the proposed north shore route are neutral to moderate and there are no known planned developments with which it would coincide, therefore there will be no cumulative impact as a result of the construction and operation of these options.

#### **Online Route Options**

THC have granted consent for four run of river hydropower schemes on the River Taodail and in Glen Attadale. These types of hydro schemes are designed to divert water from the watercourse and convey it downslope to a powerhouse, from where it is returned to the channel via a tailrace. Between the intake and powerhouse locations there is a reduction in flow under certain conditions (generally medium flows) but downstream there is no impact on flow. The types of watercourses included in the Attadale Estate scheme are generally based on bedrock, with abundant steps and pools, and a chaotic morphology, and therefore the introduction of a concrete intake structure will have little effect on the morphology of the watercourse. The intake structure will allow both low flows (hands off and compensation) and high flows to pass through to ensure the protection of the watercourse and its habitat.

In the region of the proposed Online Route options, the affected watercourse will be the River Taodail, however, the impact on the hydrology and morphology of this watercourse is likely to be minimal as a result of the hydropower development. The impacts of the proposed road Scheme are assessed to be neutral to moderate, with any impact being highly localised. Therefore it is assessed that there will be no cumulative impact on the River Taodail as a result of the planned and proposed works.

There are no other known planned developments within the region of the online route which could cause a cumulative impact.

#### **Southern Corridor**

It is not proposed that the Southern Corridor would cross the Allt a' Ghiubhais and therefore there would be no direct impact of the road Scheme, and subsequently, no cumulative impact with the hydropower scheme. No other known developments are planned in this area.

13.5.3 ***Residual Impacts***

The residual impacts are deemed to be impacts remaining following the primary mitigation and are outlined in the summary tables in Section 13.5.6.

13.5.4 ***Construction Impacts / Disruption Due to Construction***

All construction disruption to water environment features has been identified and assessed in Table to “Construction Stage (impacts)”.

13.5.5 ***Potential Mitigation Measures***

As this report presents the findings of the Stage 2 study only, there are no detailed designs for the options and therefore specific mitigation measures cannot be included. However, some primary measures are presented here and predicted mitigation proposed.

Primary mitigation measures have been assumed to be included in the above assessments, and these measures represent what are considered to be standard mitigation measures that would be applied to the design, construction, and operation of such a scheme. These would include standard conditions that would usually be required by statutory authorities or measures that a designer or contractor would be expected to take based on current best practice. A summary of some of the key primary mitigation measures assumed are noted below:

- The development and implementation of a detailed site management plan based on the best practice guidance detailed in Pollution Prevention Guidelines published by SEPA and CIRIA Report C532 & C648, as a minimum. In particular, the control of sediment disturbance on the bed of the loch and the control of concrete use in or over the loch should be covered in detail;
- The Contractor should have detailed method statements for working within the loch or a watercourse, and these should cover setting out a minimum working area to limit disturbance and surveying and recording the baseline conditions in advance of the works for reinstatement purposes.
- New surface water drainage infrastructure should be designed in accordance with Sustainable Urban Drainage System principles e.g. measures to attenuate and provide primary treatment of the surface water run off before discharge. The extent of these provisions and the discharge point should be derived based on the advice within the Stage 3 assessment. At this stage it is identified that it may be challenging in some locations to incorporate a two stage (best practice guidance) SuDS due to the physical constraints of the existing infrastructure and topography. In particular the road section between Cuddies Point and Ardnarff on the Online routes may cause some difficulty. This will be assessed in detail during the design phase of any Scheme and every effort will be made to ensure the most appropriate and effective SuDS is included.
- New road drainage outfalls and extensions to culverts should be designed in accordance with best practice to reduce loss of natural bed / bank and prevent erosion. Discharges from new road drainage outfalls should be limited to an appropriate rate for each watercourse.
- In addition, it is recommended that a detailed method statement be prepared for the tunnelling operation, and this should cover the storage, containment, treatment, etc. of the drilling fluids/lubricants used.

13.5.6

**Summary and Preferred Route**

A summary of the overall impacts, mitigation and residual impacts for each route corridor is provided in Tables 13.10 to 13.12.

**Table 13.10 North Shore Routes**

Receptor	Sensitivity	Potential impacts	Overall Significance	Possible additional mitigation measures required	Residual Significant Effects
Loch Carron	High	Water quality, morphology and hydrology at narrows	Slight to large	None identified at this stage	Yes
Groundwater	Medium	Quality and movement of groundwater	Slight to moderate	None identified at this stage	Yes
Group 5 watercourses	Medium	Water quality, morphology and hydrology	Slight to moderate	None identified at this stage	Yes
Group 6 watercourses	Low	Water quality, morphology and hydrology	Slight to neutral	None identified at this stage	None
Group 7 watercourses	Low	Water quality, morphology and hydrology	Slight to neutral	None identified at this stage	None

**Table 13.11 Online Routes**

Receptor	Sensitivity	Potential impacts	Overall Significance	Possible additional mitigation measures required	Residual Significant Effects
Loch Carron	High	Water quality, morphology and hydrology along shore	Slight to moderate	Possible need to consider mitigation of viaduct effects on loch shore	Yes
Groundwater	Medium	Quality and movement of groundwater	Neutral to moderate	None identified at this stage	Yes
Group 1 watercourses	Very High	Water quality, morphology and hydrology	Slight to moderate	Site management plan adopted, bridge design best practice, good quality SuDS used	Yes
Group 2 watercourses	Medium-Low	Water quality, morphology and hydrology	Neutral to slight	None identified at this stage	None

**Table 13.12 Southern Route**

Receptor	Sensitivity	Potential impacts	Overall Significance	Possible additional mitigation measures required	Residual Significant Effects
Loch Carron	High	Water quality, morphology and hydrology along shore	Slight	None identified at this stage	None
Groundwater	Medium	Quality and movement of groundwater	Slight to moderate	None identified at this stage	Yes

Group 3 watercourses	High	Water quality, morphology and hydrology	Slight to moderate	Site management plan adopted, bridge design best practice, good quality SuDS used	Yes
Group 4 watercourses	Low	Water quality, morphology and hydrology	Neutral to slight	None identified at this stage	None

Based on the assessment of impacts, the least preferred options in relation to hydrology are the Southern Corridor and the N9 route on the North Shore, as they impinge the most on undeveloped land. The N9 route also include a bridge crossing at the Strome Narrows which has the potential to cause damage to habitats and change the geomorphology and hydrology of Loch Carron.

For the Southern Route a large number of new crossings would be required, including the Allt Gleann an Udalain, which currently has an WFD status of 'Poor' due to SSE and Scottish Water abstraction and impoundments. This route will encounter areas of bogs and peaty soils and may have some impact on groundwater movement and quality.

In terms of the water environment, the best option is the Online Route with either the share road/rail or extended avalanche shelter option as these utilise the greatest length of existing road, only requiring extension of culverts and few, if any new crossings.

#### WFD status of water bodies

Based on the assessment in the preceding tables and proposed mitigation, a brief assessment has been made of the potential for degrading of the status of classified bodies as a result of the proposed route options. Creating obstacles to fish passage or changing the morphology are the most likely impacts in relation to the WFD status related to a Scheme of this nature.

Those options which directly affect Loch Carron have the potential to cause a reduction in its status. The options include the sidelong viaduct on the Online Route and the Strome Narrows bridge option which may affect sediment transport and create obstacles to fish passage. Careful design of any new structures including the Narrows crossing or major watercourse crossings in conjunction with appropriate mitigation measures should reduce the likelihood of reduction in status occurring to the Loch or any watercourses. This will be assessed more fully during a Stage 3 assessment.

### 13.6 Difficulties Encountered and Limits to Assessment

A number of factors imposed limitations on the field survey including access and time. The majority of watercourses on the North Shore and Online routes were assessed but a large section of the Southern Corridor was not accessed. This was due to the time required to access it as it was necessary to walk over rough, wet ground. Forestry tracks extend over part of the route but in order to visit some of the key watercourses, it was not possible to utilise these. Therefore parts of the route were accessed from either end but the middle section was not viewed. At a Stage 3 assessment, it will be essential that detailed surveys on watercourses, lochans and lochs are carried out.

### 13.7 Summary & Conclusions

During construction the potential effects will be of a similar nature between the corridor options but will vary in extent, dependent on the length of new road being installed and the nature of any new watercourse crossings required. The preferred options are generally those with the potential to use a high proportion of existing road alignment especially where crossings of major water features are already in place.

## 14 MATERIALS ASSESSMENT

### 14.1.1 *Introduction*

The consideration of the effects of the A890 Strome ferry Bypass scheme on Materials has been undertaken with reference to Interim Advice Note 153/11 'Guidance on the Environmental Assessment of Material Resources'. The assessment has been limited to a simple comparative assessment of approximate volumes of materials used and waste generated to inform future decision making regarding a preferred option to be taken forward for more detailed assessment at DMRB Stage 3..

The Waste Hierarchy is defined in the Article 4 of the Revised Waste Framework Directive (2008/98/EC), which states: The following waste hierarchy shall apply as a priority order in waste prevention and management legislation and policy:

- Prevention;
- Preparing for re-use;
- Recycling;
- Other recovery, e.g. energy recovery; and
- Disposal.

The efficient use of materials reduces the quantity of materials required in the first instance, lowers the material purchasing costs, minimises waste and eliminates the need for subsequent handling and disposal costs. Developing a strategy to reduce waste is one of the most effective ways to address waste in construction. Once effective waste reduction measures are in place, it is then necessary to also consider how to reuse, recycle, recover or finally dispose of waste in a structured way.

### 14.1.2 *Approach & Methodology*

The construction of any of the options will necessitate the consumption of materials and will also generate waste. The draft guidance identifies two levels of assessment which may be undertaken, a simple assessment or a detailed assessment.

For the purpose of this Stage 2 study, a simple assessment methodology will be used to inform a comparative assessment of the options as discussed in the introduction.

Project and baseline data will be assembled to come to a better understanding of the likely environmental impacts of the options. The outcomes will inform the final design or contribute to reaching an understanding of the likely environmental impacts which identify the need for detailed assessment at Stage 3 for the preferred option, if required. Information will be gathered on:

- Description of the site and type of scheme;
- Information about construction methods and techniques (where this is available at the time of assessment);

- Statutory requirements, such as the need for a Site Waste Management Plan and other regulatory requirements;
- High Level policy and strategy targets influencing materials use and waste management; and
- Data on material resource use and waste.
- Assessment of available waste management infrastructure including:
  - Types of waste management facilities, including landfill sites, materials recovery facilities, transfer stations and locations relative to the site.

In order to provide a meaningful assessment of waste it is necessary to identify and estimate all the likely waste arising as a result of the scheme. Likely waste arising will be estimated for site clearance and excavation as well as surplus construction waste.

The assessment will also consider potential for onsite reuse to meet material need for the scheme. The cut and fill balance will also be assessed and the potential for reuse of materials on site estimated.

Mitigation measures will be proposed in the form of measures to minimise the impacts associated with material need and waste generation.

#### 14.1.3 **Consultation**

A copy of all consultation relating to the scheme can be found in Appendix 4.

With reference to materials, SEPA requested that the amount of aggregate required for construction be assessed. Specifically that the Stage 2 include an estimate of the construction material required for each route accompanied by information on where this material will be sourced from (e.g. won from the site, new borrow pit on site or elsewhere, use of existing quarry) and likely environmental implications.

#### 14.1.4 **Baseline Conditions**

##### **Description of the site and type of scheme**

The study area and the route options are described in Chapters 1 and 4 of this report. For details of the proposed type of construction/improvement, refer to Volume 1 of the DMRB Stage 2 report.

##### **Policy Drivers / Regulatory Framework**

The following sections summarise the policy and legal framework for the sustainable use of resources. This is provided as baseline information, therefore no assessment is provided against the policy framework as the drivers detailed below support the production of this assessment and its aspiration to reduce the environmental impacts associated with material resource use and waste generation.

##### *Climate Change (Scotland) Act*

In 2009 the Climate Change (Scotland) Act was passed through Parliament. The Act is key commitment of the Scottish Government to address climate change by reducing greenhouse gas emissions and transitioning to a low carbon economy. Part 1 of the Act, creates the

statutory framework for greenhouse gas emissions reductions in Scotland by setting an interim 42 per cent reduction target for 2020, with the power for this to be varied based on expert advice, and an 80 per cent reduction target for 2050.

Part 4 of the Act places duties on public bodies relating to climate change. These duties require that a public body must, in exercising its functions, act in the way best calculated to contribute to the delivery of emissions reduction targets (known as 'mitigation'), in the way best calculated to help deliver any statutory climate change adaptation programme, and in a way that it considers is most sustainable.

#### *Scotland's Zero Waste Plan*

Scotland's Zero Waste Plan (2010) outlines a vision for a zero waste society where all types of waste are dealt with regardless of where they come from. The plan sets out several objectives which include:

- Eliminating the unnecessary use of raw materials. This leads to further reductions in Greenhouse Gas Emissions in areas such as mining of raw materials, manufacturing and transport. There are also financial savings; and
- Producing energy savings from making products from recycled materials, rather than from virgin materials.

The Plan considers C&D waste and outlines ways in which future policy can be developed to support higher targets in recycling and recovery levels in this area.

#### *Transport Scotland Corporate Plan (2012-2015)*

- The Scottish Government aims to lead the way in tackling climate change. The Government's Economic Strategy includes sustainability targets to reduce greenhouse gas emissions over the period to 2015 and to reduce emissions by 80 per cent by 2050. Transport Scotland through its management of Scotland's road and rail networks can make significant positive contributions to the Government's targets to mitigate climate change and to promote both economic growth and environmental quality and responsibility.
- The Corporate Plan sets out the role of Transport Scotland for the period between 2012 and 2015, as it helps to deliver increased sustainable economic growth, set in the context of the Government Economic Strategy's six strategic priorities which are critical to economic growth. Transport Scotland will continue its efforts to deliver a single integrated focus for developing national transport projects and policies, and the low carbon economy.
- The Corporate Plan period 2012 to 2015 makes commitments, which are relevant to this Materials Assessment, to;
- 'Fully integrate our Carbon Management System (CMS) to influence and support low carbon decision-making across the design and delivery of transport infrastructure projects and network maintenance
- Utilise our CMS - in tandem with our Carbon Management Plan - to facilitate annual sustainability reporting

- Embed resource efficiency into our practices and adopt the next generation of Waste & Resources Action Programme (WRAP) Construction Commitments; and
- Support sustainable design, construction, maintenance and operations through the adoption of infrastructure assessment schemes'

*Highland-wide Local Development Plan (HWLDP) and the Highland Council Waste Management Strategy (HCWMS)*

As the project falls within the Highland's local authority area, The Highland Council has responsibility for management and disposal of waste.

The HWLDP and HCWMS both acknowledge the important role that the planning system has in the delivery of a waste management network capable of processing waste arising from all sectors including construction and demolition.

The HWLDP also indicates that the Council are signed up to the Zero Waste Plan which sets a target of 70% recycling for all waste arising in Scotland, restrictions on inputs to energy from waste plants, as well as progressive bans on the types of materials permitted for landfill, will also be introduced. The waste plan also sets targets, using the waste hierarchy of prevention, reduction, recycling, other recovery (e.g. energy recovery) and finally disposal, which is endorsed by the HWLDP.

### Legislation

There is a range of legislation that is applicable to the management of waste from European Directives through to a national Acts and Regulations. This includes but is not limited to the following:

- *Directive on Waste (2008/98/EC) - Known as the Waste Framework Directive (WFD)*, the Directive establishes a framework for the management of waste across the European Community. It requires Member States to give priority to waste prevention and encourage reuse and recovery of waste.
- *Environmental Protection Act 1990, Part II* - This Act provides the basis for licensing controls and other provisions aimed at ensuring that waste handling, disposal and recovery options do not harm the environment
- *Environmental Protection (Duty of Care) Regulations 1991, as amended* - These regulations impose a duty of care on anyone who imports, produces, carries, keeps, treats or disposes of controlled waste to ensure it is not unauthorised or harmfully deposited, treated or disposed of; and if transferred, is only given to an authorised person.
- *Landfill (Scotland) Regulations 2003* - The Landfill (Scotland) Regulations transposes the requirements of the Landfill Directive (Council Directive 1999/31/EC), which aims to prevent, or to reduce as far as possible, the negative environmental effects of landfill.
- *Waste Management Licensing (Scotland) Regulations 2011* - these regulations implement the revised Waste Framework Directive 2008 and cover applications for waste management licences, which authorise the deposit, disposal and treatment of controlled waste.
- *Waste (Scotland) Regulations 2011* - These regulations implement the remaining parts of the Waste Framework Directive 2008 that are not covered by the Waste



Management Licensing (Scotland) Regulations 2011. A number of amendments to related legislation are included, such as the Environmental Protection Act 1990, the Environment Act 1995 and the National Waste Management Plan for Scotland Regulations 2007 amongst others.

### **Waste Treatment in Scotland and local area**

It is assumed that a large amount of waste generated from the project will be Construction and Demolition (C&D) waste. WRAP defines Construction and Demolition (C&D) wastes as waste materials arising from UK commercial C&D sites. It includes, but not limited to, off-cuts and waste timber, plastics (such as uPVC & HDPE), glass (such as windows), packaging waste materials (for example card, wood and plastic film) and inert materials such as soils. The definition also includes aggregate materials (such as masonry, brick and block, paving, tiles and ceramics) and plasterboard in mixed waste.

SEPA produces reports relating to C&D waste arising and treatment in Scotland. In their report, 'Construction and Demolition waste produced and managed in Scotland' (2009) identified that the C&D waste managed in the Highland Council area for 2009 was 231,229 tonnes. Of this 143,656 tonnes were exempt activities, 7,311 tonnes was disposed of to landfill, 6,171 tonnes was treated by metal recycler, 23,551 tonnes was treated at multiple activity site, 49,132 tonnes was treated at a transfer station and 1,408 tonnes was processed through a treatment plant.

### **Existing Waste management infrastructure**

SEPA produces maps that illustrate the waste management facilities in Scotland at a national and local authority scale. The most recent of these shows available facilities in 2011 and was produced in 2010. Figure 14.1 provides a map of Waste Management Facilities in the Highland area by type.

It is clear from the SEPA map of Waste Management Facilities in the Highland and also the breakdown of waste treatment in the Highland that facilities exist in the local area for both disposal and recycling of construction and demolition waste.

#### **14.1.5 Construction Methods and Techniques**

Construction techniques will be similar for all options. The construction of the scheme will consist of several stages which will be programmed to ensure disruption is kept to a minimum. The proposed stages are as follows:

- Site setup, preparation and clearance;
- Construction of offline works, including structures and accesses where possible;
- Construction of online tie-in works; and

The works will require the disposal of materials off site. The works will also require the importation of construction materials.

It is expected that most of the waste generated on site will be Construction and Demolition (C&D) waste.

14.1.6 ***Assessment***

This assessment will consider the material requirements for each option and also the likely waste arising based on current available information. A comparative assessment will then be undertaken and impacts discussed in terms of material use and waste. An assessment of the embedded carbon utilising the Transport Scotland Carbon Management System (CMD) arising from the options is not considered at this stage, but any further assessments should consider the impact of embedded carbon, if possible. Details of materials resource use and waste arising are presented in Tables 14.1 and 14.2 respectively.

**Table 14.1 – Material Resources Use**

Project Activity	Material resources required for the project	Quantities of material resources required (Variation between each option is noted where possible)								Additional Information	
		N6 Online through Lochcarron	N9 Lochcarron Bypass	O2 Viaduct	O3 Tunnel	O5 Shared Use	O7 Developed Avalanche Shelter	S4 Glen Udalain	All Options		
Construction	Fencing	9,000m timber fencing 4,500m steel barrier	9,000m timber fencing 4,500m steel barrier	8,500m timber fencing 4,500m steel barrier	8,500m timber fencing 4,500m steel barrier	7,000m timber fencing 3,500m steel barrier	8,500m timber fencing 4,500m steel barrier	12,000m timber fencing 6,000m steel barrier	Ensure materials / suppliers are sourced as close to the site as possible to minimise transport emissions.	All Options	
	Road Restraint System	1,500 No. posts in concrete foundations 14,500m Vitrified clay pipe	1,500 No. posts in concrete foundations 14,500m Vitrified clay pipe	1,500 No. posts in concrete foundations 13,500m Vitrified clay pipe	1,500 No. posts in concrete foundations 13,500m Vitrified clay pipe	1,500 No. posts in concrete foundations 11,500m Vitrified clay pipe	1,500 No. posts in concrete foundations 13,500m Vitrified clay pipe	2,000 No. posts in concrete foundations 19,500m Vitrified clay pipe	Re-use as much material as possible to reduce overall demand from external sources.  All excavated hard material to be re-used as fill.		
Construction	Drainage	150 No. Precast concrete gullie 170,000m <sup>3</sup> excavated material	150 No. Precast concrete gullie 270,000m <sup>3</sup> excavated material	150 No. Precast concrete gullie 309,000m <sup>3</sup> excavated material	150 No. Precast concrete gullie 376,500m <sup>3</sup> excavated material	150 No. Precast concrete gullie 295,000m <sup>3</sup> excavated material	150 No. Precast concrete gullie 302,500m <sup>3</sup> excavated material	200 No. Precast concrete gullie 570,500m <sup>3</sup> excavated material	Procurement of products and materials with high levels of recycled content.  Minimise use of virgin material where possible.		
	Earthworks Excavated Materials (Acceptable Cut) Imported soil Exported Material (Disposed) Rock Remodelling	133,500m <sup>3</sup> imported soil 89,000m <sup>3</sup> exported material 100m rock	171,500m <sup>3</sup> imported soil 53,000m <sup>3</sup> exported material 1000m rock	235,500m <sup>3</sup> imported soil 127,000m <sup>3</sup> exported material 1,500m rock	190,000m <sup>3</sup> imported soil 127,000m <sup>3</sup> exported material 1,500m rock	228,000m <sup>3</sup> imported soil 127,000m <sup>3</sup> exported material 1,500m rock	404,000m <sup>3</sup> imported soil 127,000m <sup>3</sup> exported material 1,500m rock	495,000m <sup>3</sup> imported soil 148,500m <sup>3</sup> exported material 1000m rock	Materials should be ordered to arrive when required for construction and the quantities should be accurately predetermined.  Use of renewable materials		

Project Activity	Material resources required for the project	Quantities of material resources required (Variation between each option is noted where possible)								Additional Information
		N6 Online through Lochcarron	N9 Lochcarron Bypass	O2 Viaduct	O3 Tunnel	O5 Shared Use	O7 Developed Avalanche Shelter	S4 Glen Udalain	All Options	
		netting	netting	netting 400m rockfall catch fence	netting 900m rockfall catch fence 100m rockfall debris flow barrier	netting 400m rockfall catch fence	netting	netting	netting	from legal and sustainable sources.  Damage during reception and storage should be minimised by ensuring storage in accordance with manufacturers' guidelines and in designated areas with offloading supervised by competent personnel using appropriate equipment.
	Road Pavements Sub-base (200mm) Base(200mm) Binder (50mm) Surfacing (30mm)	21,500m <sup>3</sup> sub-base	21,500m <sup>3</sup> sub-base	20,000m <sup>3</sup> sub-base	20,000m <sup>3</sup> sub-base	20,000m <sup>3</sup> sub-base	16,500m <sup>3</sup> sub-base	20,000m <sup>3</sup> sub-base	28,500m <sup>3</sup> sub-base	Ensure borrow pits are sourced as close to the site as possible to reduce transport emissions.
		21,500m <sup>3</sup> bitumen binder	21,500m <sup>3</sup> bitumen binder	20,000m <sup>3</sup> bitumen binder	20,000m <sup>3</sup> bitumen binder	20,000m <sup>3</sup> bitumen binder	16,500m <sup>3</sup> bitumen binder	20,000m <sup>3</sup> bitumen binder	28,500m <sup>3</sup> bitumen binder	Minimise haul routes and double handling of materials.
		5,500m <sup>3</sup> bitumen binder	5,000m <sup>3</sup> bitumen binder	5,000m <sup>3</sup> bitumen binder	5,000m <sup>3</sup> bitumen binder	5,000m <sup>3</sup> bitumen binder	4,500m <sup>3</sup> bitumen binder	5,000m <sup>3</sup> bitumen binder	7,500m <sup>3</sup> bitumen binder	
		3,500m <sup>3</sup> bitumen surfacing	3,000m <sup>3</sup> bitumen surfacing	3,000m <sup>3</sup> bitumen surfacing	5,000m <sup>3</sup> bitumen surfacing	3,000m <sup>3</sup> bitumen surfacing	2,500m <sup>3</sup> bitumen surfacing	3,000m <sup>3</sup> bitumen surfacing	4,500m <sup>3</sup> bitumen surfacing	
Operation and maintenance of Asset	It is expected that all scheme Options will have similar use of materials as the current arrangement and management associated with the A890. Therefore, no additional impact expected.									
Demolition (if applicable)	Options O2 Viaduct, O3 Tunnel and O7 Avalanche Shelter each include for demolition of the existing concrete avalanche shelter and resources will be required in accordance with demolition procedure.									

**Table 14.2 – Wastes Arising**

Project Activity	Material resources required for the project	Quantities of material resources required (Variation between each option is noted where possible)							Additional Information
		N6 Online through Lochcarron	N9 Lochcarron Bypass	O2 Viaduct	O3 Tunnel	O5 Shared Use	O7 Developed Avalanche Shelter	S4 Glen Udalain	
Construction	<p>The anticipated wastes arising from the project, include:</p> <ul style="list-style-type: none"> <li>• Unsuitable excavated material including peat</li> <li>• Road Planning</li> <li>• Construction wastes.</li> </ul>	52,000m <sup>3</sup> unsuitable material disposed of	16,000m <sup>3</sup> unsuitable material disposed of	97,000m <sup>3</sup> unsuitable material disposed of	97,000m <sup>3</sup> unsuitable material disposed of	97,000m <sup>3</sup> unsuitable material disposed of	97,000m <sup>3</sup> unsuitable material disposed of	101,000m <sup>3</sup> unsuitable material disposed of	<p>At this stage in the project, there is little additional information available on the likely waste arisings from the maintenance of the proposed scheme to support the assessment.</p> <p>A Materials and Waste Management Strategy (M&amp;WMS) shall be put in place to address the likely waste arising.</p> <p>A Site Waste Management Plan (SWMP) shall also be produced.</p>
Operation and maintenance of Asset	It is expected that the new scheme Options will have a similar production of waste as the current arrangement. Therefore, no additional impact is expected.								Materials should be ordered to arrive when required for construction and the quantities should be accurately predetermined.
Demolition (if applicable)	There are no proposed demolition works for this project and therefore no anticipated material requirements at	N/A		2000m <sup>3</sup> concrete from demolition of existing avalanche shelter	2000m <sup>3</sup> concrete from demolition of existing avalanche shelter	N/A	2000m <sup>3</sup> concrete from demolition of existing avalanche shelter	N/A	Use of renewable materials from legal and sustainable sources.

Project Activity	Material resources required for the project	Quantities of material resources required (Variation between each option is noted where possible)							Additional Information
		N6 Online through Lochcarron	N9 Lochcarron Bypass	O2 Viaduct	O3 Tunnel	O5 Shared Use	O7 Developed Avalanche Shelter	S4 Glen Udalain	
	demolition.								<p>Damage during receiving and storage should be minimised by ensuring storage in accordance with manufacturers' guidelines and in designated areas with offloading supervised by competent personnel using appropriate equipment.</p> <p>Explore material exchange with other construction projects within the vicinity.</p> <p>Re-use as much material on site if possible prior to recycling or disposal to reduce overall waste.</p> <p>Ensure disposal / treatment / recycling facility is located as close to the site as possible to minimise transport emissions.</p> <p>Topsoil can be removed, stockpiled and reused as landscape material.</p>

Project Activity	Material resources required for the project	Quantities of material resources required (Variation between each option is noted where possible)							Additional Information
		N6 Online through Lochcarron	N9 Lochcarron Bypass	O2 Viaduct	O3 Tunnel	O5 Shared Use	O7 Developed Avalanche Shelter	S4 Glen Udalain	
									All Options Soft materials from excavated cut should be reused on site where suitable. Hard materials from excavated cut should be reused on site. Peat and other organic rich soils may be present in localised areas; this material is unsuitable for re-use and will require removal off site.

The main impact regarding materials and waste will arise from the Construction (clearance, preparation and earthworks stage) of the options. This arises as there are no proposed demolition works for Options N6, N9 O5 and S4, and those which do require demolition (options O2, O3 and O7) only require if for the existing concrete avalanche shelter. In addition, it is expected that the new scheme will have a similar use of materials and production of waste as to the current arrangement. Therefore, resulting in no additional impacts expected for the operation and maintenance of the asset.

For material use, the construction of fencing, the road restraint system, road pavements and drainage will be greater for Option S4, least for Option O5 and similar for the remaining Options. In addition, the earthworks stage material use will be greater for Option S4 and least for Option N6. However the Online Options (O2, O5, O7 & O3) require additional rockfall catch fence and the latter requires rockfall debris flow barrier.

With regards to waste, Option S4 is likely to have a greater impact during the construction stage with N9 requiring the least. Only Options O2, O3 and O7 require demolition which is associated with the demolition of the existing avalanche shelter along the A890.

The materials and waste use as shown above is likely to be the least for Option O5 (Online with shared road and rail use). In addition, the greatest out of all the Options for Option S4, the principal reason for this being this Option has a greater overall length compared to the other Options and the resultant surplus excavated material required.

#### 14.1.7 ***Mitigation Measures / Good Practice Measures***

Prescribing detailed mitigation measures at the options development stage is considered not feasible and may prejudice the final chosen option ahead of an Environmental Impact Assessment; however a number of mitigation measures can be recommended which include the following:

- Minimise the total material demand of the design by ensuring that material inputs match demand as closely as possible;
- Minimise waste by matching material demand with material supply as closely as possible. Material supply can be met from the following prioritised sources:
  1. On-site reuse/ recycled;
  2. Off-site reuse/ recycled/ secondary materials/ sustainable sources; and
  3. Off-site primary material.
- Seek source materials in descending order of priority shown above, taking account of the associated impacts from transport and supply of materials;
- Conform to waste hierarchy as strategy for dealing with any waste generated on site;
- Reduce the carbon emissions associated with the design as far as possible; and
- Devise a Materials and Waste Management Strategy (M&WMS) for both material procurement and waste management (this would include a Site Waste Management Plan).



The following mitigation measure should be adhered to:

**A Materials and Waste Management Strategy (M&WMS) should be developed for both material procurement and waste management.**

- As part of the M&WMS a Site Waste Management Plan (SWMP) should be produced.

Based on the assessment of likely waste arising, the following assumptions should be taken forward for treatment of waste generated on site:

- Existing A890 road pavement should be recycled for use; and
- Soft material from excavated cut should be reused on site.

Standard Practice requires compliance with legal requirements; Good and Best Practice goes beyond this to identify and implement ways to achieve significant reductions in waste and improvement in the materials resource efficiency of the project. At a minimum any strategy for dealing with waste arising from the project should seek to align choices to the waste hierarchy.

The Contractor shall carry out the Works in such a way that, as far as is practicable, the amount of spoil and waste to be disposed of is minimised.

The Contractor shall identify the waste category and quantities, opportunities for recycling and or reuse, disposal routes and licensing requirements for all spoil and waste arising from the Works.

#### ***Material Resource Strategy***

The procurement process is essential to cutting waste in construction. Waste minimisation in procurement involves producing accurate and reliable estimates of material quantities required on a project and sourcing more resource efficient materials. The following recommendations should be taken into account:

- Procurement of products and materials with good practice levels of recycled content (relative to other products meeting the same specification);
- Material exchange with other construction projects within the vicinity of the works should be explored;
- Materials should be ordered to arrive when required for construction and the quantities should be accurately predetermined;
- Damage during receiving and storage should be minimised by ensuring storage in accordance with manufacturers' guidelines and in designated areas with offloading supervised by competent personnel using appropriate equipment;
- Ensure storage areas are safe, secure and weatherproof (where required); and
- Use of renewable materials from legal and sustainable sources (such as timber with appropriate certification).

Make use of existing waste management infrastructure for sourcing non-virgin and recycled materials. The baseline section identified a range of waste management facilities within the area. These facilities are also a source for recycled construction materials in Scotland in addition to accepting C&D waste for recycling. Sourcing materials as locally as possible will

reduce impacts associated with transportation, and the identification of these sites in the locale confirm that recycled construction materials are readily available.

14.1.8 **Summary and Conclusions**

It is clear from the assessment that the Online Options and Northern Options have similar resource requirements. Option S4 would require a greater number of material resources which principally relates to the length of this option in comparison to the others.

In terms of waste production Option S4 performs worst, generating the most amount of waste when the options are compared. The amount of unsuitable material and excavated peat required for Option S4, 101,000m<sup>3</sup> and 47,500m<sup>3</sup> are the greatest influence upon waste totalling 95,000m<sup>3</sup> greater than that of Option N9, 16,000m<sup>3</sup> and 37,500m<sup>3</sup> respectively.

When material need and waste generation are considered together then Option O5 is the better of the all the Options. However Option N6 and the other Online Options have very similar requirements.

As the project progresses and a preferred option is taken forward, there will be opportunities to reduce the materials impacts associated with the design.

It should be noted that a simple materials assessment does not determine the likely magnitude of impacts for waste and material requirements and the Assessment Summary Table (AST) in Chapter 15 is not completed for material at this stage. However Table 14.3 below compares each of the Route options based on information available at Stage 2 and provided above in Tables 14.1 and 14.2 above.

A detailed materials assessment should be undertaken at DMRB stage 3 where the likely magnitude of impact can be determined.

**Table 14.3 Materials Summary Table**

Route Option	Preferred Option	Intermediate Option	Least Preferred Options
O2 (Sidelong Viaduct)		✓	
O3 (Inland Tunnel)		✓	
O5 (Share road/rail)	✓		
O7 (Avalanche Shelter extension)		✓	
N6 (Through Lochcarron)		✓	
N9 (Lochcarron Bypass)		✓	
S4 (Glen Udalain)			✓

**15 SUMMARY TABLES**

The assessment has been summarised in Table 15.1 below as required by DMRB guidance.

Note: It should be noted that a simple materials assessment does not determine the likely significance of effect for waste and material requirements and the Assessment Summary Table does not include materials and waste at this stage. A detailed materials assessment should be undertaken at DMRB stage 3 where the likely magnitude of impact can be determined.

Options have been assessed using the seven point scale identified in Chapter 2 Methodology.

Summary Table Key:

Major positive impact	✓✓✓
Moderate positive impact	✓✓
Minor positive impact	✓
Negligible/No benefit or impact	0
Minor negative impact	x
Moderate Negative Impact	xx
Major negative impact	xxx

**Table 15.1 DMRB Stage 2 Environmental Assessment Summary Table**

Option	Landscape	Nature Conservation	Road Drainage and Water Environment	Noise	Air	Geology and Soils	Cultural Heritage	Effects on all Travellers	Community and Private Assets
N6 – North Online through Lochcarron	<p>xx Moderate negative landscape and visual impact due to increased traffic through Lochcarron and introduction of a bridge at Strome Narrows.</p>	<p>xx Moderate negative impact due to habitat loss/fragmentation and disturbance/mortality of protected species. Degradation of benthic/intertidal habitats.</p>	<p>x Minor negative impact as may be slight change in water quality, geomorphology and hydrology</p>	<p>xxx Major negative impact due to increase in number of properties within 300m of route increases from 19 to 327 when compared within baseline scenario.</p>	<p>x Minor negative impact due to increase in vehicle emissions in Lochcarron</p>	<p>x Minor negative impact – Although primarily utilises existing road, the route includes construction of a bridge across Strome Narrows, which will impact upon underlying geology.</p>	<p>x Possible setting impacts on Strome Castle from bridge and upon Lochcarron Old Parish Church</p>	<p>✓ Minor positive impact / 0 Neutral impact as this option may decrease through journey times but will also sever paths and may increase local journey times</p>	<p>xx Moderate negative impact due to slight land-take of agricultural/crofting and woodland areas and disruption to private and community assets within Lochcarron.</p>
N9 – North Lochcarron Bypass	<p>xx Moderate negative landscape and visual impact due to the introduction of a bridge at Strome Narrows.</p>	<p>xx Moderate negative impact due to habitat loss/fragmentation and disturbance/mortality of protected species. Degradation of benthic/intertidal habitats.</p>	<p>xx Moderate Negative Impact as may be change in water quality, geomorphology, hydrology and groundwater movement</p>	<p>xx - Moderate negative impact number of properties within 300m of route increases from 19 to 86 when compared</p>	<p>- Negligible/No benefit or impact when compared to baseline</p>	<p>xx Moderate negative impact – Route utilises existing road and construction of new stretches of road, which pass through Allt nan Carnan SSSI and potential areas of peat land.</p>	<p>xxx Major physical impacts on non-designated assets on offline section south and north of Lochcarron</p>	<p>✓ Minor positive impact / 0 Neutral impact as this option may decrease through journey times but will also sever paths and may</p>	<p>xx Moderate negative impact due to land-take of agricultural/crofting, private assets and woodland areas, and disruption to private and community assets within Lochcarron.</p>

<p>O2 – Online with Rail Viaduct</p>	<p>x Minor negative landscape impact  x Minor to moderate negative visual impact due to widening of the road/ rail corridor and introduction of new structure along loch edge.</p>	<p>xx Moderate negative impact due to habitat loss/ fragmentation and disturbance/mortality of protected species. Degradation of benthic/Intertidal habitats.</p>	<p>xx Moderate Negative Impact as may be moderate change in water quality, geomorphology and hydrology</p>	<p>0 – No benefit or impact, no significant change in the number of properties within 300 metres of the alignment</p>	<p>- Negligible/No benefit or impact when compared to baseline</p>	<p>0 Negligible impact –Utilises existing road, minimising impact to geology and soils but will include construction of rail viaduct and will require remedial works to be undertaken on unstable rock slope.</p>	<p>x Possible impacts upon loch bed deposits, palaeo-environmental remains, lithic scatters</p>	<p>✓✓ Moderate positive impact as may decrease journey times, reducing driver stress</p>	<p>x Minor negative / 0 Neutral impact due to minimal land-take of agricultural/crofting and woodland areas.</p>
<p>O3 – Online with Tunnel</p>	<p>0 Neutral landscape impacts  x Minor negative visual impact due to localised significant</p>	<p>xx Moderate negative impact due to habitat loss/ fragmentation and disturbance/mortality of protected species. Degradation of aquatic habitats.</p>	<p>x Minor negative impact as may be slight change in water quality, geomorphology, hydrology and groundwater movement</p>	<p>0 - No benefit or impact, no significant change in the number of properties within 300</p>	<p>- Negligible/No benefit or impact when compared to baseline</p>	<p>xx Moderate negative impact – Utilises existing road, although includes construction of a tunnel which will have greater</p>	<p>x Possible impacts upon, lithic scatters, setting impacts</p>	<p>✓✓ Moderate positive impact as may decrease journey times, reducing driver stress</p>	<p>x Minor negative / 0 Neutral impact due to minimal land-take of agricultural/crofting and woodland areas.</p>

	impacts on a small number of receptors and limited change on the majority.			metres of the alignment	impact on geology and soils. Will require remedial works to be undertaken on unstable rock slope.				
O4 – Do Minimum	0 No landscape or visual impacts.	× Minor negative impact during road repairs due to localised disturbance.	0 Negligible/No benefit or impact	Baseline case not assessed, other routes assessed against this scenario.	✓ Minor positive impact - utilises existing road, which will minimise impact to geology and soils but will require remedial works to be undertaken on unstable rock slopes.	0	No change to existing baseline	0 No Effects on All Travellers.	0 No Community and Private Asset impacts.
O5 – Online with Road/Rail Share	× Minor negative landscape and visual impacts due to localised significant impacts on a small number of receptors and limited change on the majority.	×× Moderate negative impact due to habitat loss/fragmentation and disturbance/mortality of protected species. Degradation of benthic/intertidal habitats.	0 Negligible/No benefit or impact	0 – No benefit or impact, no significant change in the number of properties within 300 metres of the alignment	✓ Minor positive impact - Utilises existing road/rail line, which will minimise impact to geology and soils but will require remedial works to be undertaken on unstable rock slopes.	×	Possible impacts upon, lithic scatters, setting impacts	✓ Minor positive impact as this option may decrease journey times but may also disrupt rail services more than other options.	× Minor negative / 0 Neutral impact due to minimal land-take of agricultural/crofting and woodland areas.

<p>O7 – Online with Developed Avalanche Shelter</p>	<p>xx Minor or moderate negative landscape impacts and moderate visual impact due to introduction of new large structure.</p>	<p>x Minor negative impact due to habitat loss/ fragmentation and disturbance/mortality of protected species.</p>	<p>0 Negligible/No benefit or impact</p>	<p>0 – No benefit or impact, no significant change in the number of properties within 300 metres of the alignment</p>	<p>- Negligible/No benefit or impact when compared to baseline</p>	<p>0 Negligible impact - Utilises existing road, minimising impact to geology and soils but will include extension of avalanche shelter and will require remedial works to be undertaken on unstable rock slopes.</p>	<p>x Possible impacts upon, lithic scatters, setting impacts</p>	<p>✓✓ Moderate positive impact as may decrease journey times, reducing driver stress.</p>	<p>x Minor negative / 0 Neutral impact due to minimal land-take of agricultural/crofting and woodland areas.</p>
<p>S4 – South Glen Udalain</p>	<p>xx Moderate negative landscape impact due to introduction of road and traffic into otherwise undeveloped landscape. x Minor negative visual impacts due to limited visibility from most receptors.</p>	<p>xxx Major negative impact due to habitat loss/ fragmentation and disturbance/mortality of protected species.</p>	<p>xx Moderate Negative Impact as may be moderate change in water quality, geomorphology, hydrology and groundwater movement</p>	<p>0 – No benefit or impact, no significant change in the number of properties within 300 metres of the alignment</p>	<p>- Negligible/No benefit or impact when compared to baseline</p>	<p>✓✓ Moderate positive impact – Route comprises construction of a new road over peat land, which can be managed. Avoids unstable rock slopes along the A890, negating the requirement for remedial works and does not involve construction of tunnels/bridges.</p>	<p>x Possible impacts upon unknown archaeological assets</p>	<p>x Minor negative impact as this option may decrease journey times but will also sever many RoWs and may increase local journey times considerably</p>	<p>x Minor negative impact due to minimal land-take of agricultural/crofting areas and sizable land-take required within woodland areas.</p>

**REFERENCES & SOURCES**

Chapter	References
<b>5. Landscape</b>	<ul style="list-style-type: none"> <li>Guidelines for Landscape and Visual Impact Assessment (GLVIA), Third Edition, 2013</li> <li>National Planning Framework 2 (NPF2)</li> <li>Scottish Planning Policy (SPP)</li> <li>Highland-wide Local Development Plan 2012, THC</li> <li>Wester Ross Local Plan (2006), THC</li> <li>West Highland and Islands Local Plan (2010), THC</li> <li>Planning Advice Note 60: Planning for Natural Heritage; and</li> <li>Fitting Landscapes – Securing more sustainable landscapes</li> </ul>
<b>6. Nature Conservation</b>	<ul style="list-style-type: none"> <li>National Planning Framework 2 (NPF2)</li> <li>Scottish Planning Policy (SPP)</li> <li>Highland-wide Local Development Plan 2012, THC</li> <li>Wester Ross Local Plan (2006), THC</li> <li>West Highland and Islands Local Plan (2010), THC</li> <li>SNH SiteLink and Natural Spaces webpages <a href="http://www.snh.gov.uk/publications-data-and-research/snhi-information-service/">http://www.snh.gov.uk/publications-data-and-research/snhi-information-service/</a></li> <li>NBN Gateway (<a href="http://data.nbn.org.uk/">http://data.nbn.org.uk/</a>)</li> <li>The Skye &amp; Lochalsh Biodiversity Action Plan</li> <li>The Wester Ross Biodiversity Action Plan</li> <li>UK Biodiversity Action Plan (<a href="http://ukbars.defra.gov.uk/plans/national.asp">http://ukbars.defra.gov.uk/plans/national.asp</a>)</li> <li>JNCC Taxon Designation spread sheet (<a href="http://jncc.defra.gov.uk">http://jncc.defra.gov.uk</a>)</li> </ul>
<b>7. Cultural Heritage</b>	<ul style="list-style-type: none"> <li><a href="http://www.maps.nls.co.uk">www.maps.nls.co.uk</a></li> <li><a href="http://www.canmore.rcahms.gov.uk">www.canmore.rcahms.gov.uk</a></li> <li><a href="http://www.pastmap.org.uk">www.pastmap.org.uk</a></li> <li><a href="http://www.historic-scotland.gov.uk">www.historic-scotland.gov.uk</a></li> <li>Highways Agency, 2007. Design Manual for Roads and Bridges. Volume 11: Environmental Assessment – Section 3: Environmental Topics- Part 2: HA208/7 – Cultural Heritage</li> <li>Historic Scotland, 2011, Managing Change in the Historic Environment: Setting</li> <li>The Scottish Planning Policy, 2010</li> <li>Scottish Environment Historic Environment Policy, 2011</li> <li>Highland-wide Local Development Plan 2012, THC</li> <li>Wester Ross Local Plan (2006), THC</li> <li>West Highland and Islands Local Plan (2010), THC</li> </ul>
<b>8. Effects on All Travellers</b>	<ul style="list-style-type: none"> <li>Scottish Natural Heritage (SNH) (EIA Handbook Appendix 5: Outdoor Access Impact Assessment - 2009)</li> <li>Ordnance Survey (OS) Explorer Maps 428 and 429</li> <li>The Highland Council Core Path Network Plans for the Map 35:Lochcarron ( Ross &amp; Cromarty area) 2011</li> <li>The Highland Council Core Path Network Plans for the Map 21:Dornie, Plockton, Achmore &amp; Kyle (Skye &amp; Lochalsh area) 2011</li> <li>Scottish Paths Record (SNH)</li> <li>URS' GIS Database</li> <li>Forestry Commissions GLADE Land Information Search (available at time of assessment)</li> <li>Ref 8-1: SUSTRANS: Map. Available at: <a href="http://www.sustrans.org.uk/ncn/map">http://www.sustrans.org.uk/ncn/map</a> [Accessed on 10 January 2014]</li> <li>Ref 8-2: British Horse Society (BHS): Approved Riding Centre Establishments. Available at: <a href="http://www.bhs.org.uk/bhs-in-your-area">http://www.bhs.org.uk/bhs-in-your-area</a> [Accessed on 11 January 2014]</li> <li>Highland-wide Local Development Plan 2012, THC</li> <li>Wester Ross Local Plan (2006), THC</li> </ul>



	<ul style="list-style-type: none"> <li>West Highland and Islands Local Plan (2010), THC</li> </ul>
<p><b>9. Community &amp; Private Assets</b></p>	<ul style="list-style-type: none"> <li>Ref 9-1: Scottish Crofting Federation (SCF): Crofting FAQs, Available at: <a href="http://www.crofting.org/">http://www.crofting.org/</a> [Accessed 05 January 2014]</li> <li>The Highland-Wide Local Development Plan (2012)</li> <li>Wester Ross Local Plan (2006)</li> <li>West Highlands and Islands Local Plan (2010)</li> <li>The National Records of Scotland (NRS): Wester Ross, Strathpeffer and Lochalsh Ward of the Highland Council administrative area: Population</li> <li>Scotland's Census 2011 Shaping Our Future: Data Explorer (<a href="http://www.scotlandscensus.gov.uk/ods-web/home.html">http://www.scotlandscensus.gov.uk/ods-web/home.html</a>)</li> <li>National Public Transport Data Repository (NPTDR), published by Transport Direct (<a href="http://data.gov.uk">data.gov.uk</a>)</li> <li>Lochcarron and District Business Association (<a href="http://www.lochcarron.org.uk/">http://www.lochcarron.org.uk/</a>)</li> <li>URS' internal GIS Database</li> <li>Desk-top documentation review and web-based information sources (relevant references/links provided)</li> <li>Land Capability for Agriculture Map Sheet 4 (The Macaulay Institute for Soil Research (MLURI))</li> <li>Ordnance Survey (OS) Explorer Maps 428 and 429</li> <li><a href="http://www.networkrail.co.uk/browse%20documents/eNRT/Dec13/timetables/Table%20239.pdf">http://www.networkrail.co.uk/browse%20documents/eNRT/Dec13/timetables/Table%20239.pdf</a>.</li> </ul>
<p><b>10. Geology &amp; Soils</b></p>	<ul style="list-style-type: none"> <li>Refer to footnotes provided throughout the Geology &amp; Soils chapter</li> </ul>
<p><b>11. Air Quality</b></p>	<ul style="list-style-type: none"> <li>Air Pollution Information System (APIS), Critical Loads for Nitrogen Deposition and Background Nitrogen Deposition Rates, Available Online at: <a href="http://apis.ac.uk">http://apis.ac.uk</a>, Accessed on 20/11/13</li> <li>British Standard Institute (BSI) (1994), BS6069 (Part 2) Characterisation of Air quality – Glossary, British Standards Institute</li> <li>Building Research Establishment (2003), Control of dust from construction and demolition activities</li> <li>Department for the Environment Food and Rural Affairs (DEFRA) (2012), Background Pollutant Concentration Maps, Available at: <a href="http://uk-air.defra.gov.uk/">http://uk-air.defra.gov.uk/</a></li> <li>Department for the Environment Food and Rural Affairs (DEFRA) (2009), Technical Guidance LAQM, TG(09)</li> <li>Department for the Environment Food and Rural Affairs (DEFRA) (2007) The Air Quality Strategy for England, Scotland, Wales and Northern Ireland</li> <li>H.M. Government (2010) The Air Quality Standards Regulations (2010)</li> <li>H.M. Government (2002), Air Quality (Scotland) (Amendment) Regulations (2002)</li> <li>H.M. Government (2000), Air Quality (Scotland) Regulations (2000)</li> <li>H.M. Government (1995) The Environment Act</li> <li>Highways Agency (2007) Design Manual for Roads and Bridges (DMRB). Part 1, HA 207/07, Volume 11, Section 3</li> <li>The Highlands Council (2013) Local Air Quality Management Progress Report (2013)</li> <li>The Scottish Executive (2004, Air Quality and Land Use Planning</li> <li>The Scottish Executive (2006), Planning Advice Note 51</li> <li>The Scottish Government (2010), Scottish Planning Policy</li> <li>The Scottish Government (2009), National Planning Framework 2</li> <li>Highland-wide Local Development Plan 2012, THC</li> <li>Wester Ross Local Plan (2006), THC</li> <li>West Highland and Islands Local Plan (2010), THC</li> </ul>
<p><b>12. Noise &amp; Vibration</b></p>	<ul style="list-style-type: none"> <li>Calculation of Road Traffic Noise, Department of Transport, Welsh Office, 1998</li> <li>Design Manual for Roads and Bridges, Volume 11, Section 3, Part 7, HD 213/11 – Revision 1, November 2011</li> </ul>

	<ul style="list-style-type: none"> <li>• National Planning Framework 2 (2009), Scottish Government</li> <li>• Scottish Planning Policy (2010), Scottish Government</li> <li>• Highland-wide Local Development Plan 2012, THC</li> <li>• Wester Ross Local Plan (2006), THC</li> <li>• West Highland and Islands Local Plan (2010), THC</li> </ul>
<p><b>13. Road Drainage &amp; the Water Environment</b></p>	<ul style="list-style-type: none"> <li>• Ordinance Survey Maps (1:25,000 and 1:10,000)</li> <li>• Field surveys carried out by URS staff</li> <li>• SEPA CAR licence details for the Lochcarron area</li> <li>• Private water supplies data provided by THC</li> <li>• Previous Reports including the Stromeferry Bypass Feasibility Study (DRT, 1994) and STAG Part 1 / DMRB Stage 1 Report (May 2013)</li> <li>• EU Directive 2000/60/EC (Water Framework Directive (WFD)), transposed into the Water Environment and Water Services Act (Scotland) 2003 (the “WEWS” Act)</li> <li>• The Water Environment (Controlled Activities) (Scotland) Regulations 2011 in respect of discharges to surface or groundwater</li> <li>• SPP (Scottish Planning Policy), Flood and drainage sections</li> <li>• Highland-wide Local Development Plan 2012, THC</li> <li>• Wester Ross Local Plan (2006), THC</li> <li>• West Highland and Islands Local Plan (2010), THC</li> <li>• Flood Risk Management (Scotland) Act 2009</li> <li>• SEPA Policy No. 41 (SEPA – Planning Authority Protocol, Development at Risk of Flooding: Advice and Consultation)</li> <li>• SEPA Policy No. 19 (Groundwater Protection Policy for Scotland)</li> <li>• National River Flow Archive (Centre for Ecology and Hydrology (CEH), 2012);</li> <li>• Scottish Environment Protection Agency, Water-body Data Sheets and WFD Interactive Map (2012)</li> <li>• Map of Freshwater for Fish Directive: Monitoring and Designations Version 4 (SEPA, 2007);</li> <li>• Online Flood Management Map (Scotland) (SEPA, 2014)</li> <li>• Bing maps aerial images dated 2010 and 2013</li> <li>• Flood Estimation Handbook (FEH) CD-ROM3 (2009), Volumes 3 and 4 (1999)</li> <li>• British Geological Survey (BGS), online geology maps, 1:50,000 (2013)</li> <li>• SNIFFER, Vulnerability of Groundwater in the Uppermost Aquifer, version 2, Scale 1:100,000 (2011)</li> <li>• BGS/SEPA, Bedrock Aquifer Map and Superficial Aquifer Map, Scale 1:100,000 (2004)</li> <li>• BGS, ‘User guide: Aquifer Productivity (Scotland) GIS Datasets. Version 2’ (2011)</li> <li>• Design Manual for Roads and Bridges, Volume 11, Section 3, Part 10, HD 45/09, Highways Agency / Scottish Executive Development Department (2009)</li> <li>• CIRIA, Report C697 – SUDS Manual (2007)</li> <li>• CIRIA, Report C551 Manual on Scour at Bridges and other Hydraulic Structures (2002)</li> <li>• CIRIA, Report C532 “Control of water pollution from construction sites” (2001)</li> <li>• CIRIA, Report C648 “Control of water pollution from linear construction projects” (2006)</li> </ul>
<p><b>14. Materials Assessment</b></p>	<ul style="list-style-type: none"> <li>• Directive on Waste (2008/98/EC) - Known as the Waste Framework Directive (WFD)</li> <li>• Environmental Protection Act 1990, Part II</li> <li>• Environmental Protection (Duty of Care) Regulations 1991, as amended</li> <li>• Landfill (Scotland) Regulations 2003</li> <li>• Waste Management Licensing (Scotland) Regulations 2011</li> <li>• Waste (Scotland) Regulations 2011</li> <li>• Scotland’s Zero Waste Plan</li> <li>• Transport Scotland Corporate Plan (2012-2015)</li> <li>• Highland-wide Local Development Plan 2012, THC</li> <li>• Wester Ross Local Plan (2006), THC</li> <li>• West Highland and Islands Local Plan (2010), THC</li> </ul>