3. Alternatives Considered

3.1. Introduction

3.1.1. This chapter provides a summary of the main alternatives evaluated during the development of a preferred design for the Proposed Scheme. It outlines the key aspects taken into account that informed the decision-making process with respect to the assessment of route alignments for the Medium-Term Solution (MTS) within Glen Croe.

3.2. Medium Term Strategy Options Assessment Report

3.2.1. The Medium Term Strategy (MTS) Options Assessment Report published in January 2023, sets out the option development and assessment process for the Proposed Scheme to provide a safe diversion route for the A83 Trunk Road in future during a landslide or the risk thereof. The option development and assessment process considered a range of options within Glen Croe, including both 'Online' options, which generally followed the route of the Old Military Road (OMR), and 'Offline' options, which had route alignments away from the OMR, as well as single track and two-way carriageways to meet the objectives above

3.2.2. For the assessment, a total of 18 options were developed, reviewed and sifted out at various points throughout the process to determine a final short list of options which were assessed to ultimately identify a recommended preferred option.

3.2.3. Following an initial sifting exercise, a total of eight options were taken forward for the Sifting Assessment. These comprised of:

- three Online OMR Options (Existing OMR Option, Option G and Option K):
    - Existing OMR Option – approximately 4.0km in length this option was developed based on a maximum vertical gradient of 8% over the majority of the route but using the existing sub-standard horizontal alignment. This design of this option resulted in the requirement for large embankments of over 58m in height.

  - Option G – approximately 4.0km in length this option was developed based on the existing sub-standard horizontal alignment but re-aligned at the hairpin bend. A relaxation to a 10% gradient was applied to the climbing section to reduce the large embankment in the Existing OMR Option. However, the height of the embankment was still over 40m and large cuttings of over 32m were required at the hairpin bend.
  - Option K - approximately 4.0km in length this option was developed to realign the northern section of the OMR horizontally to follow the existing contours at a 10% gradient. The realignment reduced the size of the embankment to approximately 30m, the realignment required a steep embankment of over 80m in height and large cuttings of over 45m.
- two Offline OMR Options within Glen Croe (Options H and J):
  - Option H – approximately 3.3km in length and avoids overlap with the OMR. The embankment present on the switchback section reaches a height of over 76m sitting on the deep slope the Glen Croe. The option ties in the B828 road instead of the existing OMR.
  - Option J - approximately 3.2km in length with a switchback provided at the south/east end to allow the alignment to follow along the western hillside. Option J tied in to the B828 instead of the OMR and required cuttings of over 172m in height.
- three offline options aligning with the Forestry Track to the south-east of the OMR with a gradient limited to 8% (Option L, Option M and Option N).
  - Option L - approximately 3.2km in length this option began at the junction with the A83 and joins the lower forestry track, keeping close to the track for its full length and ending at a junction with the B828.. Similar to Option J, its location meant the requirement for cuttings of over 169m in height along the majority of the length.
  - Option M - approximately 3.2km in length this option began at the junction with the A83 and joins the lower forestry track, keeping close to the track for its full length while avoiding any overlap with the LTS Green Route being developed at the time. This option ends at a junction with the B828 and required a maximum height of cutting of over 177m.

- Option N - approximately 3.4km in length it began at the old junction with the A83 and crossed the hillside to join the upper forestry track, keeping close to the track for its full length and ending at a junction with the B828. The positioning of Option N produced cuttings of over 150m in height along the majority of its length.

3.2.4. At the initial options sifting stage a simple colour based (Red-Amber-Green or RAG) traffic light reporting system was used to demonstrate how each option performed against twelve assessment criteria (which included environmental considerations). The RAG concluded that four of the offline options were the worst performing from an environmental perspective with each of them afforded red RAG status, and only one of the offline options afforded amber. The remaining three online OMR options were all afforded an amber RAG status.

3.2.5. The outcome of the sifting stage was that in addition to targeted interventions on the existing OMR, a single optimum Glen Option and a single optimum Forestry Track Option were progressed. Option L was chosen as the Forestry Track Option to be taken forward because options M and N costs were considered prohibitive. Option H was chosen as the Glen Option to be taken forward because it was considered to be the better alignment. The remaining options, G, K, Existing OMR, J, M and N, were not taken any further.

3.2.6. In summary the three options were taken forward for further development and assessment, which included:

- targeted interventions on the existing OMR
- a single optimum Glen Option (Option H) and
- a single optimum Forestry Track Option (Option L).

3.2.7. In order to minimise the long-term impact on Glen Croe and minimise abortive works, Options H and L were further developed.

Glen Option (H) Further Development and Assessment

3.2.8. Various options for refining Option H were considered but there were significant constraints to development including:

- Steep gradients (c.8%) over significant lengths which would affect vehicle speeds uphill and safety for vehicles travelling downhill, particularly where steep gradients coincided with switchback sections of the alignment. This means this option would potentially require a convoy as a safety measure, as on the current OMR diversion.
- Earthwork cuttings interfacing with the Green Option presented significant constructability challenges. There were limited opportunities to realign the Green Option to avoid this effect without significant adverse effects on alignment, earthworks, and the overall footprint.
- Embankments up to over 80m high would be required which would be extremely complex to construct and present stability issues due to the underlying ground, requiring extensive geotechnical or structural measures to reduce the risk of embankment instability.

3.2.9. Overall, it was not considered that Option H would offer any significant advantages compared to Option L. Given the impact of the option on Glen Croe, likely high costs and earthwork cuttings interfacing with the Green Option, Option H was not recommended for further consideration

Forestry Track Option (L) Further Development and Assessment

3.2.10. Taking into account its interaction with one of the wider LTS options referred to as the 'Green Route' (as detailed in Section 3.4 of the DMRB Stage 1 PES Report). Two interaction scenarios were considered:

- Scenario 1 – an alignment where the MTS follows the line of the LTS Green Option. In this case the MTS could potentially then be upgraded to become the LTS.
- Scenario 2 – an alignment that keeps the MTS independent of the Green Option. In this case the MTS could either remain as an access route through forestry land once the LTS is provided or be removed.

3.2.11. The two different scenarios considered related to constructability of the Green Option. If it is not possible for the MTS to remain open as a diversion route during the upgrade to become the LTS (Scenario 1), then an additional diversion route would be needed which was considered to likely involve upgrading the OMR. For Scenario 2, the MTS could remain as the diversion route during construction of the Green Option.

3.2.12. The assessment concluded that whilst construction is expected to be complex, it was feasible to maintain a diversion route during construction of the Green Option and that in order to avoid the construction of two separate new roads on the southwestern slopes of Glen Croe, Scenario 2 was not recommended for further consideration.

3.2.13. Following consultation with the A83 Campaign Group, a single lane option of Scenario 1 was also taken forward (referred to as the Single Lane Forestry Track Upgrade) in order to consider whether the significant earthworks and associated impacts, costs and construction implications could be reduced.

3.2.14. The process concluded with a final shortlisting of three options (as shown on Volume 3, Figure 3.1) which were subject to further assessment:

- Option 1 - Single Lane Forestry Track Upgrade (Developed from Scenario 1 as noted above) – approximately 4.1km long and generally followed the route of the existing Glen Croe lower forestry track as it rises up the southwest side of Glen Croe, within the lower slopes of Ben Donich.
- Option 2 - Developed Option L (Scenario 1 as noted above) – Two Way Offline MTS along the line of the ‘Green Route’ – approximately 3.5km long and generally followed the LTS Green Route on the western slopes of Glen Croe within the lower slopes of Ben Donich. It consists of a two-way single carriageway with verges.

- Option 3 - OMR Interventions - included an increased length of two-way working; curve widening to reduce risk of incidents on the tight bends; improved resilience of existing structures and culverts; potential realignment of the southern A83/OMR junction to reduce flooding impacts; and geohazard mitigation measures for debris flows and boulder falls in the form of bunds and catch fences.

3.3. Assessment of Short-Listed Options

3.3.1. Each option was assessed against a range of Engineering, Constructability, Environmental, Operational, Financial, Public Acceptability, and Reputational criteria, as well as the Estimated Time to Completion, Interface with Forestry and Land Scotland, Consenting and Phasing Considerations.

3.3.2. Options assessment summary tables for the three shortlisted options were produced and summary Red-Amber-Green (RAG) ratings used to present a clear picture of the potential impacts. Environmental considerations included an assessment of the potential impacts relating to biodiversity, flora and fauna, population and human health, water environment, geology and soils, air quality, materials assets, cultural heritage and landscape and visual amenity. The options assessment tables were presented in Appendix D of the Options Assessment Report.

3.3.3. The following presents a summary of the environmental assessment findings for each of the three options. Each of the options were also assessed against the Proposed Scheme Objectives (detailed in Chapter 2: Need for the Proposed Scheme).

Option 1 Single Lane Forestry Track Upgrade

3.3.4. The environmental assessment for Option 1 presented in Appendix D of the Options Assessment Report highlights several impacts on biodiversity, fauna, and flora. The removal of extensive woodland could disrupt the wildlife corridor, and any protected species. Depending on how the B828 Glenmore local road is widened, there could be a direct impact on the Beinn an Lochain Site of Special Scientific Interest (SSSI), with temporary or permanent loss of habitat within that designated area. The spread of non-native species during construction also poses legal and ecological risks however mitigation measures are feasible for such impacts.

3.3.5. This option crosses the Croe Water (a major crossing), seven OS mapped watercourses and circa 107 existing culverts as it traverses the western slopes of Glen Croe. There could be impacts to the water environment relating to flood risk and potential pollution during construction, requiring careful design and mitigation. While air quality is not expected to deteriorate significantly, the option did present challenges related to material use and waste management with large volumes of materials to construct the road. The alignment was noted as potentially impacting upon cultural heritage features including the OMR which is listed on CANMORE and other Historic Environment Record (HER) datasets, and cultural heritage preservation. This option had the potential to cause adverse effects on the Loch Lomond and The Trossachs National Park (LLTNP) with the local landscape character, Argyll Forest Park as well as views from the nearby residential and outdoor receptors and viewpoints potentially affected by the construction and operation of the carriageway and supporting infrastructure. Long-term forest management plans may eventually enhance biodiversity and landscape character. Any alignment option to improve the resilience of this route and maintain the passage of vehicles, would be of benefit to the wider community.

3.3.6. This option was RAG Rated Red for Biodiversity, Flora and Fauna, Population (land use and accessibility) and human health and Water Environment. Amber RAG ratings were assessed for Soils, Air Quality, Material Assets, Cultural Heritage and Landscape and Visual Amenity.

Option 2 Two Lane Offline Road

3.3.7. The environmental assessment for Option 2 highlights similar impacts to Option 1 in relation to biodiversity, flora and fauna. The removal of extensive woodland could disrupt the wildlife corridor, and any protected species. Depending on how the B828 Glenmore local road is widened there could be a direct impact on the Beinn an Lochain SSSI, with temporary or permanent loss of habitat within that designated area. The spread of non-native species during construction also poses legal and ecological risks, however mitigation measures are feasible for such impacts.

3.3.8. Option 2 crosses the Croe Water, six OS mapped watercourses and 201 mapped flow pathways as it traverses the southwestern slopes of the valley. The option has significant slope cuttings and impacts on many watercourses with realignment and cascades being the dominant engineering features with the culvert under the road. While air quality is not expected to deteriorate significantly, the option was identified as likely to have impacts in terms of materials and waste with a large volume of material required for construction. There are no designated areas of built heritage along this alignment option. The alignment option was assessed as likely to result in a significant landscape and visual impact during both construction and operation through loss of forestry, slope reprofiling and the introduction of significant new earthworks which were also assessed as resulting in a cumulative impact upon the visual impact on the setting of the LLTNP. The option would also introduce a third (and new) road into the landscape. The alignment option would lead to a permanent visual and landscape impact on the western slope of the glen.

3.3.9. This option was RAG Rated Red for Biodiversity, Flora and Fauna, Population (land use and accessibility) and human health, Water Environment and Landscape and Visual Amenity. Amber RAG ratings were assessed for Soils, Air Quality, Material Assets and Cultural Heritage.

Option 3 OMR Interventions

3.3.10. The environmental assessment for Option 3 highlighted the route of the OMR is not in a sensitive ecological location and any improvement works are unlikely to have significant effects on biodiversity, flora and fauna, subject to relevant controls, particularly to reduce any water quality impacts. In relation to population and human health, the A83 Trunk Road is an important route for access in Argyll and Bute and its closure has a detrimental effect on local communities and businesses. The provision of an alternative route, over a short length, and without significant delay, would have a positive environmental effect for this alignment option.

3.3.11. The OMR crosses the Croe Water and numerous minor watercourses as it traverses the glen. Although a range of channel works is proposed, the channels are relatively minor watercourses and have already been significantly altered by the OMR. The Option may result in relatively minimal increases to the extent of morphological pressures but also interventions provide the opportunity to improve sediment continuity by improving sediment conveyance through culverts. While air quality is not expected to deteriorate significantly, the project would have a temporary impact to materials and waste though the quantities required for this option were identified as being less significant than that need for construction of a full new road. The OMR itself is regarded as a cultural heritage asset, it has historical and cultural value given its age and historical purpose, however alterations have already been made to the OMR. Further widening of the road along the floor of the glen is unlikely to significantly affect the character of the OMR. Lastly, the visual and landscape impacts would be significant but localised, when viewed in the larger context of the glen itself it may not be as considerable. Minimising the retaining works and using appropriate materials and design for the landscape would help reduce the impact.

3.3.12. This option was RAG Rated Red for Cultural Heritage with Amber RAG ratings for Biodiversity, Flora and Fauna, Population (land use and accessibility) and human health, Water Environment, Landscape and Visual Amenity, Soils, Air Quality and Material Assets.

Comparative Assessment

3.3.13. With regard to the Offline MTS (Option 2), whilst it would provide improved resilience and the shortest journey times, its impact, cost and time to complete made it difficult to justify as a temporary diversion only intended to operate until the LTS is in place.

3.3.14. When considering the potential impacts of the Single Lane Forestry Track Option (Option 1) along with the resilience, journey time and other factors, it is difficult to justify as a temporary diversion as the benefit in journey times was not significant for all traffic, and any potential benefits of the Single Lane Forestry Track Option (Option 1) did not justify the cost and impact of providing it. However, the main benefit was that it could be used as a diversion route if the existing OMR was not available at all and then it would provide benefits over the standard diversion route in terms of journey time.

3.3.15. In relation to the environmental assessment undertaken:

- The OMR Interventions (Option 3) were identified as being smaller scale, discrete improvements in comparison to the other options and as such the environmental impacts were assessed as being less significant than the other options overall. The assessment concluded that it was not certain whether an Environmental Impact Assessment (EIA) Report would be necessary, but there would be environmental considerations that would need to be addressed.
- The scale of the Offline MTS (Option 2) and its position on the hillside resulted in a complex engineering solution which meant that potentially significant environmental impacts would occur, particularly across areas such as biodiversity, fauna and flora, water environment and landscape and visual. An EIA Report was identified as being likely to be required to support promotion of the scheme due to the potential environmental impacts.
- The Single Lane Forestry Track Option (Option 1), whilst narrower in width than the Offline MTS was still identified as being a significant upgrade of that track along the southern slopes of Glen Croe which presented similar challenges to the Offline MTS in some areas with potential impacts, particularly around the complexity of the design, logistics around construction and environmental

impacts. An EIA Report was considered likely to be required in order to promote the scheme due to the potential environmental impacts.

3.3.16. Of all the options under consideration, the most appropriate option for the MTS was the OMR Interventions (Option 3), as it would:

- improve the resilience of the route as a temporary diversion
- improvement in the journey time reductions compared to the existing OMR
- although not the lowest cost option, it was not significantly more costly than the Single Lane Forestry Track Option and
- can be delivered at appropriate timescales to meet the need of a temporary solution to A83 road closure. However, this would depend in particular on the ability to secure the land or rights needed to construct the improvements without significant delay. On this aspect, the OMR at its eastern end is within land owned by the Scottish Ministers.

3.3.17. Based on the assessments undertaken, the OMR Interventions (Option 3) was recommended as the preferred option for the MTS.

Relationship between MTS and LTS

3.3.18. It is noted within the Options Assessment Report that the preferred solution for the MTS must also be cognisant of the wider development of the LTS within Glen Croe. The report, which was published in January 2023, concludes that the OMR Interventions (Option 3) would be capable of being used as a diversion route by traffic during construction of any of the LTS options.