Report

Access to Argyll & Bute [A83]

DMRB Stage 2 Scheme Assessment Report

Volume 1 - Part 5 Assessment Summary and Recommendation

Transport Scotland

May 2023

A83AAB-AWJ-GEN-LTS_GEN-RP-ZZ-000005

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This document has 24 pages including the cover.

Revision	Status	Purpose description	Originated	Checked	Reviewed	Authorised	Date
P01	A1	Final	AB	CS	IA	RHG	30/05/23

Client signoff

Client	Transport Scotland
Project	Access to Argyll & Bute [A83]

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Contents

Tables

Figures

None

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1. Assessment Summary

1.1. Introduction

The following section gives a summary of the main findings of this DMRB Stage 2 Scheme Assessment Report. The summary is based on the information provided in the Engineering Assessment (Part 2), Environmental Assessment (Part 3) and Traffic and Economic Assessment (Part 4).

1.2. Engineering Assessment

The Engineering Assessment has identified a number of factors which differentiate between the Scheme Options, these can be summarised as follows.

1.2.1. Mainline and Local Roads and Access

Given the nature of the glen and scheme objectives of providing a long term, safe and resilient solution to address the issue of landslides closing the A83, significant engineering interventions are required. The type of interventions will protect the road and its users from landslide and rock fall, with options considered generally comprising tunnels, viaducts and debris flow shelters.

For each of the Scheme Options, the mainline alignment and how it integrates with local roads and accesses is therefore intrinsicality linked with the form of protection considered, i.e. a tunnel can only be achieved by an alignment that enters the hillside.

Whilst the mainline alignment varies between options, it in itself is not considered a differentiator, as each alignment achieves its intended function.

The equivalent is true for the way the Scheme Options integrate with local roads and accesses. However, whilst all options share an opportunity to upgrade the junction to the B828 Glen Mhor Road; the Brown, Yellow and Green Options will do so in broadly the same location as the existing, yet the Pink and Purple Options require a new junction to be formed further north. This means the local road would require to use a section of the de-trunked A83 as part of an extended B828, thereby slightly increasing the journey times for traffic accessing the B828 from the south. This makes the Pink and Purple Options slightly less

favourable in the context of local accesses, however this is not considered a significant differentiator.

1.2.2. Geotechnics and Earthworks

Taking due consideration of the geotechnical constraints, there are no significant differentiators between the Scheme Options. The Yellow Option is marginally more favourable in terms of having the lowest total volume of earthworks, and the geotechnical works are comparably slightly less complex.

The Green Option is least favourable as, along with the Pink Option, it produces the highest total volume of earthworks and similar to the Brown Option also requires excavation into a hillside that is considered vulnerable to landslide therefore is considered a complex geotechnical operation.

1.2.3. Structures

Each Scheme Option is fundamentally different, in terms of the way it protects road users from landslide and rock fall through its resultant structural from, ie tunnels, viaducts and debris flow shelters.

The form of structure has therefore driven the footprint of the Scheme Options which have been assessed against the various engineering and environmental criteria, in addition to informing the scheme cost estimates and programme.

The form of structure is not therefore considered to be a specific differentiator in its own right, as the impacts and benefits of the structure, which are integral to the Scheme Options, have been considered elsewhere (i.e. footprint, cost and programme).

It should be noted however that the design complexity of the structures does vary between the Scheme Options, with the Yellow, Purple and Green Options all containing major viaducts which by their nature are more structurally complex. Conversely, whilst the geotechnical aspects of the Brown and Pink options are complex, the structural aspects of these are less so and therefore are considered more favourable in the context of structures alone. The debris flow shelter (Brown and Green) also provides greater opportunity for modular and / or offsite construction.

1.2.4. Departures from Standard

All Scheme Options have departures from standard associated with them, however, they all are considered to provide a safe and appropriately designed solution, which will achieve the operational requirements of the road. Departures from standard are therefore not considered a differentiator between Scheme Options.

1.2.5. Hydrology

All Scheme Options have the potential to be developed in accordance with the relevant legalisation and guidance with respect to the water environment, drainage and flooding.

The Green and Brown Options are considered least favourable as they both include debris flows shelters which require more complex solutions to maintain water and sediment transfer from the upper to lower slopes, which is more straightforward for the viaduct and tunnel options.

It should be noted however that the Green Option is further complicated as the terrain on the west side of the glen, coupled with its increased length, will make traditional SuDS more difficult to incorporate.

1.2.6. Public Utilities

In general, there are no major or significant items of utility apparatus or assets present within the corridor which are considered to have a high cost or programme impact should diversion or protection measures be required.

The lack of existing utilities in the area, particularly with respect to power and water, does represent a challenge for all Scheme Options, as both power and water supplies will need to be brought to site to facilitate construction.

In the case of the tunnel options; Pink and Purple Options; water and power is also required to facilitate the ongoing operation of the asset which may include the requirement for redundant supplies by means of an independent supply or on site generator/reservoir.

Utilities are therefore not considered a significant differentiator between Scheme Options. However, the Pink and Purple Options are considered marginally least favourable as significant permanent and potentially redundant supplies are also required.

1.2.7. Constructability

All options have significant engineering measures associated with them as described in Part 2.

Due to the type of options considered, a key part of the DMRB Stage 2 was an assessment of constructability, which drove a series of design developments and refinements with respect to both the permanent and temporary works.

The engineering measures, including the form of structure, excavation and resultant traffic management has therefore driven the footprints of the Scheme Options which have been assessed against the various engineering and environmental criteria. It has also driven the scheme cost estimates as presented in Table 1-3 and the construction programmes summarised in Table 1-1 below.

Table 1-1 - Estimated construction durations

Scheme Option	Yellow Option	Brown Option	Green Option	Purple Option	Pink Option
Construction Period	3.5yrs	3 – 4yrs*	5 – 7yrs*	3.5yrs	4.25yrs

*Indicates most likely estimated range due to potential stand down period caused by potential instability of the hillside.

As the constructability of the option is generally considered as part of the broader assessment, the main differentiator is the potential disruption to road users during construction of the Scheme Options.

As the Brown Option is online of the existing A83, this represents the greatest potential disruption to road users during construction, as traffic will be diverted to the medium-term solution (improved Old Military Road) for significant periods of construction.

All other options are predominately offline of the existing A83, meaning the disruption to road users will be limited to the two tie-ins and other isolated areas.

The disruption caused by the Pink and Green Options is considered the least of all options as the extent of works required at the tie-ins are the most limited.

Conversely the Yellow and Purple Options have proportionally higher disruption at the tie-ins and also require access along part of the Old Military Road for construction vehicles, noting the Old Military Road will remain as the local diversion to the A83.

1.2.8. Operation and Maintenance

All Scheme Options have significant engineering measures associated with them as described in Part 2.

Due to the type of options considered, a key part of the DMRB Stage 2 was an assessment of constructability, operation and maintenance which drove a series of design developments and refinements with respect to both the permanent and temporary works.

The operation and maintenance requirements of tunnels, viaducts and debris flow shelters varies considerably. However, regardless of the main engineering intervention, many of the general operation and maintenance requirements are shared across each option, such as pavement, embankments and street furniture. The relative costs associated with the operation and maintenance of each option is illustrated in Table 1-2, below, with the lowest cost option benchmarked at 100%.

Table 1-2 - Operation and Maintenance Cost Comparison of Scheme Options

Scheme Option	Yellow Option	Brown Option	Green Option	Purple Option	Pink Option
Option Comparison	144%	100%	256%	564%	477%

It is noted that the tunnel options also require either an on, or off-site control facility to provide full time monitoring of the asset. The cost of such facility has been included for in Table 1-2 above.

1.2.9. Sustainable Travel

Within the preferred route corridor there is a variety of recreational walking and cycling routes in addition to bus provision close to the Rest and Be Thankful Viewpoint car park.

In terms of walking and cycling routes, the Green and Pink Options are considered neutral as they both require a permanent diversion in the operational phase to existing routes. For the Green Option this relates to Local Route 1 for which mitigation would likely be diversion to the parallel core path and for the Pink Option this relates to road cyclists who wish to use the A83 which is precluded by tunnels. Possible mitigation for road cyclists would include diversion to the Old Military Road.

The Brown, Yellow and Purple Options are all considered favourable as during operation there will be no material impacts to the existing routes, noting the tunnel associated with the Purple Option can be bypassed by road cyclists by joining the existing A83 which will be de-trunked from the northern end of the viaduct. Some impacts are expected during construction from all Scheme Options but again there are various opportunities available to mitigate these during Stage 3.

All Scheme Options have the potential to consider opportunities for walking, cycling and wheeling within the corridor including the Old Military Road on the eastern side and the Core Path on the western side of the glen.

All Scheme Options will also retain/replace and have the potential to improve bus integration, however space to do so is most limited by the Green Option.

1.2.10. Cost Estimates

Cost estimates have been prepared for each of the Scheme Options. To establish the cost estimates, the Scheme Options were broken down into key components including structures, complex structures, earthworks and geotechnical measures, pavement and other considerations. For each component a bill of quantities was produced.

The figures presented within Table 1-3, below, are estimates based upon preliminary designs and comprise the direct cost of construction and preparation adjusted for risk/opportunity, optimism bias, and Value Added Tax (VAT).

With respect to risk and opportunity, the Most Likely (mid-range) quantified risk and opportunity outcomes have been included, in addition to the Plausible Worst-Case, Plausible Best-Case cost estimates, and Variation as explained in Part 2.

Table 1-3 – DMRB Stage 2 Cost Comparison of Scheme Options (2023 prices)

	Yellow Option	Brown Option	Green Option	Purple Option	Pink Option
Plausible Most Likely Cost	**£554,280k**	**£432,749k**	**£877,111k**	**£1,048,449k**	**£1,337,882k**
Option Comparison – Most Likely	**128%**	**100%**	**203%**	**242%**	**309%**
Plausible Worst-Case Cost	£595,545k	£465,373k	£932,498k	£1,128,561k	£1,377,982k
Plausible Best-Case Cost	£514,566k	£404,229k	£821,695k	£968,304k	£1,300,645k
Variation: Plausible Worst-Case - Plausible Best-Case	£80,979k	£61,144k	£110,803k	£160,257k	£77,337k

*Note: For the option comparison the lowest has been benchmarked at 100%

The range of costs across the five Scheme Options is consistent with the scale of interventions considered. The Scheme Option with the lowest Most Likely Scheme Cost is the Brown Option. The Brown Option also has the lowest Plausible Best-Case and Worst-Case Costs considering the assessed risk and opportunity and the lowest Variation between the Best-Case and Worst-Case plausible costs.

1.3. Environmental Assessment

The main findings of the environmental assessment, focusing on key differentiators are summarised as follows:

1.3.1. Air Quality

The potential changes in air quality at human health receptors are not considered to be significant as total concentrations will remain well below the Air Quality Standard (AQS) objectives. Therefore, none of the Scheme Options are necessarily favoured from an air quality perspective and the differentiators are the potential impacts on ecological sites.

Overall, the Green, Brown and Yellow Options are considered to have minor or negligible impacts while the Pink and Purple Options are considered to be least favourable due to the potential operational impacts on the SSSI due to the introduction of a tunnel portal which may concentrate emissions in its vicinity.

1.3.2. Cultural Heritage

The assessment of the Scheme Options indicates that during construction, all Scheme Options have the potential to impact on both known and currently unrecorded elements of the Historic Environment. The Green Option would have a Slight adverse significance of effect on ten assets. There would be three Slight adverse effects caused by the Brown Option. The Pink Option would have a Slight adverse effect on one asset and the Purple Option would have one Moderate adverse (significant) effect and two Slight adverse impacts. The Yellow Option has one Moderate adverse (significant) effect, three Slight adverse and three Neutral effects.

The operation of the Proposed Scheme would result in nine Slight adverse effects by the Green Option, three Slight adverse effects from the Brown Option, no effects from the Pink Option, two Slight adverse effects from the Purple Option and three Slight adverse effects from the Yellow Option.

In conclusion, the greatest residual significance of effect on the historic environment is caused by the Purple and Yellow Options. While the Green Option and Brown Option would impact on a number of assets, this is lesser than by the Purple and Yellow Options. The Pink Option would be the most favourable in terms of the Historic Environment.

1.3.3. Landscape and Visual

1.3.3.1. Landscape

There are no differentiators for landscape designations (Loch Lomond and Trossachs National Park, Argyll Forest Park, Ben Lui Wild Land Area, North Argyll Area of Panoramic Quality) as there are no significant effects resulting from any of the Scheme Options upon them.

During Construction, all the Scheme Options would result in significant effects on Landscape Character Types (LCTs) in the study area. The Green Option would have a Very Large adverse effect on one LCT, a Large adverse effect on three LCTs and a Slight (non-significant) adverse effect on one LCT. The Brown Option would result in Large adverse effects on three LCTs and Moderate adverse effects on two LCTs. The Pink and Purple Options would both result in Large adverse effects on four LCTs, and Slight / Moderate adverse effects on one LCT respectively. The Yellow Option would result in Large adverse effects on two LCTs, Moderate adverse effects on two LCTs, and Slight (non-significant) effects on one LCT.

During Operation, four of the Scheme Options would result in significant residual effects on one or more LCTs, with the Brown Option having a Large adverse effect on three LCTs and a Moderate adverse effect on one LCT. The Purple Option would have a Large adverse effect on one LCT and a Moderate adverse effect on one LCT. The Green Option would have a Large adverse effect on one LCT, and the Yellow Option a Large adverse effect on one LCT and a Moderate adverse effect on four LCTs. Only the Pink Option would result in no significant residual effects on LCTs within the study area during Operation.

Overall, the Pink Option is the most favourable with the Green and Brown Options being the least favourable from a Landscape perspective. The Purple and Yellow Options lie between these two thresholds.

1.3.3.2. Visual effects

For Views from the Road, the Pink Option is less adverse during construction as A83 users are diverted but during operation has the largest adverse impact as there will be no view from the tunnel. The Purple Option varies from beneficial to adverse during operation as the viaduct views will be an improvement to the existing, but the tunnel section will not afford

any view. The Yellow Option is the only option that would result in a beneficial residual effect.

For residential receptors, the Green Option is the only option with theoretical visibility from Lararchpark and Creagdhu. Similarly, the Green Option is also considered to result in greatest residual effect on recreational receptors (Rest and Be Thankful car park, Forest Paths/Cycle Paths, The Cobbler (Ben Arthur), whereas the Brown Option would have less of an impact on the Old Military Road as it is further removed and on the existing A83 so that road infrastructure is not a new addition in the view.

The Yellow Option has most residual impact due to the open nature of the view towards it from Laigh Glencroe (Roadmans Cottage) and High Glencroe, the scale of the viaduct and its greater proximity to the receptors.

Overall, the Purple and Brown Options result in being the most favourable with the Green Option resulting in the most overall significant effects and therefore considered least favourable from a visual perspective.

1.3.3.3. Overall Landscape and Visual conclusion

In accordance with DMRB, a combined conclusion for landscape and visual is that the Pink and Purple Options are considered most favourable.

1.3.4. Biodiversity

It is considered that mitigation measures would remove significant impacts from the construction and operation phases for all options. Based on the information available, most predicted impacts are of neutral or slight significance of effect, but on a precautionary basis moderate significance of effect is identified for designated site receptors where applicable to specific options.

The Brown Option is most favourable in terms of residual impacts on designated sites (Glen Etive and Glen Fyne Special Protection Area and Beinn an Lochain SSSI).

For Annex I habitats the Green Option would result in the least temporary loss of Annex I habitat, followed by the Pink Option, and the least favourable would be the Purple Option. The area of permanent habitat loss is highest in the Brown and Yellow Options. The

smallest area of Annex I habitat loss would be in the Green Option since this option primarily bisects other habitat types.

For UK BAP habitats the Purple Option would be anticipated to result in the largest area of temporary habitat loss. The smallest area of UK BAP habitat temporary loss would be the Brown Option. The Pink and Purple Options would be anticipated to result in the largest area of permanent habitat loss. The smallest area of UK BAP permanent habitat loss would be the Brown Option.

For Aquatic habitats (Headwaters, Priority Habitat), the Brown Option would have the highest impact on aquatic receptors and the Yellow Option the least. The Yellow Option is associated with the lowest watercourse loss of all the route options. The Brown Option is associated with high watercourse loss (relative to most other options other than the Pink Option) as it is an overland (as opposed to tunnelled) option which relies on numerous culverts (as opposed viaducts) to span the watercourses with which it interacts. It is noted that the Croe Water is only crossed by the Green Option (albeit by a viaduct crossing).

Regarding Protected and Notable Species differentiators were identified for mammals and birds, with potential loss of rest sites, disturbance to rest sites and individuals, mortality, injury, habitat loss and habitat severance. While all the Scheme Options have Slight adverse significance of effect, the predicted impacts are greater for the Green Option because of the larger additional land take, which could affect a number of protected species.

1.3.5. Geology and Soils

The Stage 2 assessment has concluded that the Green Option is the most favourable, as whilst potential for direct and indirect losses to potential GWDTEs within the SSSI was identified resulting in a moderate impact significance, all other impacts to the geology soils and groundwater receptors have been identified to be of slight (non-significant) significance.

The assessment for the Brown Option identified a slight impact significance to all receptors except for GWDTEs both within the study area and the SSSI, where the potential impacts were identified as Moderate. However, it is recognised that this is likely to be a conservative assessment due to the proximity of the existing A83 road to this option, suggesting that the Brown Option may also be considered to be a favourable option.

The Yellow Option was found to have a potential moderate impact on peat and GWDTEs in both the study area and the SSSI. All other impacts on the geology, soils and groundwater receptors that were assessed were found to be of slight significance. Due to the potential impacts on both GWDTEs and peat, the Yellow Option is slightly less favourable than the Green and Brown Options.

The Assessment identified the Pink and Purple Options as the least favourable. The Purple Option has a moderate impact on peat due to direct losses of class 3 and class 5 peat under both the temporary and permanent footprint. Both the Pink and Purple Options have the largest direct and indirect losses to GWDTEs both across the study area and specifically within the SSSI resulting in Large and Very Large impact significances respectively. The Pink Option has the largest tunnelled section which suggests there could be a larger loss or change to groundwater aquifers under the footprint of the scheme and has resulted in a potential moderate impact significance during both construction and operational phases.

1.3.6. Material Assets and Waste

Based on the findings of the Stage 2 Assessment, there are no differentiators in terms of significance of effects for the Scheme Options for both materials and waste. However, for materials it is evident that the Pink Option is the favourable option as it has the highest percentage of quantity of overall material recovery, whereas the Purple and Yellow Options are the least favourable options due to these options achieving the lowest percentage of overall material recovery.

At this stage of the project the waste quantities would all lead to a significant reduction in available landfill capacity, based on the current data. Therefore, based on this worst-case scenario the most favourable option is the Brown Option as this generates the lowest volume of waste to be potentially disposed to landfill with a resulting lowest impact on available landfill capacity. The Purple Option is the least favourable option as this generates the highest quantity of waste to be potentially disposed to landfill, with a corresponding greater impact on available capacity in the region.

1.3.7. Noise and Vibration

The qualitative assessment of the Scheme Options has determined that the Pink Option is most favourable for both construction and operational phase impacts, this is primarily

because the tunnel would screen and protect the Glen from most of the noise and vibration impacts.

The Purple Option is considered the least favourable option because the road alignment is closest to the sensitive receptor High Glencroe. It is likely that temporary construction and permanent operational impacts would be greater at this property, including vibration impacts resulting from the formation of the tunnel. The Green Option is also considered to be a least favourable option, this is because this option has the longest construction duration in conjunction with a large cut/fill requirement which would result in construction traffic impacts outside the Glen.

1.3.8. Population and Human Health

The construction and operation of the Scheme Options would result in effects on population and human health. For the most part effects are confined to the construction phase and in some instances, it is anticipated that effects could be significant due to the nature of construction activities, including the requirement to close or divert walking routes and disruption to access. However, it is anticipated that such effects can be mitigated and would be temporary to the construction phase.

During the construction stage, the Brown Option is considered the most favourable option from consideration of Population and Human Health issues. As the Brown Option is online it has little direct impact on Agricultural Land Use or WCH routes. Both the Purple and Pink Options are anticipated to have the least impact on the Rest and Be Thankful Viewpoints, but this is offset by impacts on WCH routes.

The Pink Option would result in the loss of a residential property, and as such is considered the least favourable along with Green and Yellow Options which both have potentially significant impacts on the Rest and Be Thankful Viewpoint and loss of (or significant and prolonged disruption to) important and popular WCH routes.

From a health perspective, during operation no significant differentiators between any of the Scheme Options have been identified at this stage. It is anticipated that the Proposed Scheme (whichever Scheme Option is chosen) will provide robust and safe connections through the region, reducing severance and allowing people to access the health, educational, economic and leisure facilities and opportunities that they require.

1.3.9. Effects on Climate

In terms of construction phase emissions, the Green Option would generate the highest amount of emissions whereas the Brown Option would generate the least. All of the Scheme Options were rated High for construction activity emissions, meaning that this lifecycle module is expected to contribute at least an additional 20% more emissions to the construction phase once quantified. In line with the conclusions drawn in DMRB LA114, it is not deemed that any of the Scheme Options would have a significant impact on climate.

Therefore, the Green Option is considered the least favourable option when considering impacts on climate from carbon emissions and the Brown Option is considered the most favourable option.

1.3.10. Climate Vulnerability

The climate change risk assessment finds that all the Scheme Options could be vulnerable to impacts linked to these changes in the climate. After consideration of mitigation none of the potential climate vulnerability impacts are found to be significant adverse.

It has however been possible to identify differentiators between the Scheme Options and with regard to minimising climate vulnerability impacts the most favourable option is considered to be the Pink Option.

1.3.11. Major Accidents and Disasters

The Stage 2 assessment has identified that in accordance with the standard all the Scheme Options are potentially vulnerable to the risk of one or more of a number of major event types, including Landslides, Flooding, ground movement, Bridge failure, Flow shelter failure, and Tunnel failure / fire.

From the perspective of the vulnerability of the Proposed Scheme to major events, the Pink Option followed by the Brown and Yellow Options are considered most favourable, as these Scheme Options are vulnerable to the fewest major event types.

1.3.12. Road Drainage and the Water Environment

1.3.12.1. Water Quality

The Pink Option has least adverse construction effect in terms of water quality, with the lengthy 'drill and blast' tunnel section requiring less interaction and disruption to watercourse channels and adjacent working zones. The Green and Brown Options both involve the construction of debris flow shelters, with associated challenges anticipated in preventing sediment transport into adjacent channels from extensive cross-slopes during installation. However, the Brown Option has a baseline of catchpits and altered channel morphology for existing A83 slope management and watercourse crossings and, requires less further modification necessary than for construction when compared to the Green Option.

For the operational phase, all options offer beneficial effects to receptors from the introduction of road runoff treatment within a SuDS treatment train. The Pink and Purple Options are considered more favourable, as both avoid any routine runoff discharging into Loch Restil within the Beinn an Lochain SSSI, which would represent a significant (moderate beneficial) residual impact to Loch Restil water quality, in comparison to the untreated drainage from the existing road network.

1.3.12.2. Hydromorphology

The construction is complex for all Scheme Options resulting in a similar significance of effect on the watercourses (Slight / Moderate Adverse).

The Pink Option displays the least direct interaction with watercourses so would be most favoured, followed by the Yellow Option. For operation, the Yellow Option is most favourable (with the assumption of no in-channel piers), with the Pink Option second and Purple Option third (all Slight Adverse).

The Green and Brown Options would require substantial physical modification to watercourses and result in a Moderate Adverse residual effect, these are least favourable from a hydromorphology perspective.

1.3.12.3. Flood Risk

The Brown and Pink Options have the least construction activities planned on floodplain, with the Brown Option considered to be of lower residual effect. A key differential in relation to flood risk impacts are that the Yellow and Purple Options (and to a lesser extent, the Green Option) require the installation of pier supports into the Glen Croe (Croe Water) floodplain, with an associated impact during construction phase but principally causing impact during the operational phase and which may require compensatory storage to avoid reducing the capacity of the floodplain.

Therefore, the most favourable in terms of flood risk is the Brown Option, as it is expected that the debris flow shelter may allow for flows to be attenuated in addition to having the lowest residual effects.

1.4. Traffic and Economic Assessment

Traffic flows along the A83 corridor are generally low across the year with fluctuations between the Winter and Summer periods. Due to the nature of the Proposed Scheme, which is to address an issue of landslide opposed to improving capacity or to create a bypass, there is little variation in the overall trunk road length associated with each Scheme Option, noting each Scheme Option marginally improves the journey time between Inverary and Tarbet compared to the existing situation.

Due to the low traffic volumes and little variance in trunk road length, the economic performance of all Scheme Options is primarily influenced by the cost estimates for each. Due to the scale of the options considered and their associated costs, when compared to the modest traffic flows, all BCRs are significantly less than 1.

On this basis, the Brown Option performs most favourably in comparison to the other options with a BCR of 0.14 (inclusive of policy ambition), and a Most Likely scheme cost estimate of £432M.

The Brown Option does represent the greatest impact to traffic during the construction phase. This has been taken into account in assessing the economic performance, but given the traffic flows on the A83, this does not influence the economic assessment sufficiently to show any other option performing better than the Brown Option.

The Purple and Pink Options give the lowest BCR's due to the scheme costs as both contain tunnel sections, highlighting that tunnelling in this area is a relatively high-cost process.

2. Preferred Route Recommendation

2.1. DMRB Stage 2 Preferred Route Recommendation

On the basis of the DMRB Stage 2 Scheme Assessment, it is recommended that the Brown Option is taken forward as the preferred route for the Access to Argyll and Bute (A83) project. This is based on a balanced assessment across Engineering, Environmental and Traffic and Economic criteria.

The key reasons to support the recommendation are as follows.

- Improved resilience and operational safety of the trunk road network by reducing the impact of disruption for travel to, from and between Argyll and Bute and the Central Belt of Scotland
- Most favourable performance across a broad range of environmental criteria
- The greatest potential to be delivered quickly
- The greatest opportunity to encourage sustainable travel

A full summary of the Assessment is illustrated in Part 6 Appendix A: Comparative Assessment Matrix.

2.2. Stage 3 Key Considerations

During Stage 3 of the assessment process, the preferred route will be subject to design development, including refinement of the mainline, side road and local accesses, structural form, water environment, drainage and the approach to excavation, with focus on ways to limit disruption to road users during construction.

Impacts on the environment will be assessed in detail and mitigation measures proposed and developed as necessary to remove or minimise impacts.

Essential survey work will continue throughout the Stage 3 process to inform the ongoing design and assessment, specifically ground investigation works.

The following key issues have been identified by AWJV as requiring specific focus as part of the preferred route development and Stage 3 assessment:

- Constructability.
    - Consideration of traffic management and mitigating disruption to road users.
    - Consideration of advanced works packages.
    - Identification of areas appropriate for construction compounds, temporary working areas, available quarries batching facilities.
- Materials management (import and export)
- Structural form – opportunities for off-site manufacture and modular construction.
- Statutory Undertakers (Utilities).

- Utilities necessary for construction/operation.
- Request NRSWA C3 Budget and C4 Detailed Cost Estimates as appropriate.

- Sustainability Strategy
- Road geometry and cross section - relaxations and departures from standard
- Active travel, (walking, cycling and wheeling) and bus integration.
    - Enhancements and connections
    - Consultation with key stakeholders
- Drainage
    - Development of SuDS facilities (temporary during construction and permanent)
    - Water Environment and licencing.

The above development will include ongoing consultation with statutory and non-statutory bodies alike, where the project will continue to consider opportunities to maximise the benefits of the Scheme in relation to the scheme objectives.