

A83 Medium Term Solution
Options Assessment
Single Lane Forestry Track Option

Option Details	
Option	Single Lane Forestry Track
Option Description	<p>The Single Lane Forestry Track option generally follows the route of the existing Glen Croe Forestry Track as it rises up the south-west side of Glen Croe, within the lower slopes of Ben Donich.</p> <p>The Single Lane Forestry Track option commences at the existing at-grade direct access from the A83 Trunk Road into the now gated and closed original access to the Old Military Road (OMR), and then follows initially the alignment of the OMR before turning left to cross the Croe Water approximately 135m downstream of an existing structure across the watercourse. Beyond the Croe Water crossing, it turns right and then generally follows the route of the existing Glen Croe Lower Forestry Track along the western bank of Croe Water. After a short distance it rises away from the Croe Water and then follows the general alignment of the Glen Croe Lower Forestry Track for several kilometres within the lower slopes of Ben Donich. As it emerges from Glen Croe Forest, the Single Lane Forestry Track option follows the general alignment of another track, the Glen Mhor Forestry Track, which heads north to form an at-grade direct access with the B828 Glen Mohr local road. The Single Lane Forestry Track option then includes a length of the B828 Glen Mohr local road and concludes where this local road joins the A83 Trunk Road again via an at-grade junction.</p> <p>The Single Lane Forestry Track option is approximately 4.1 km long, measured between the two points at which it meets the A83 Trunk Road.</p>
Rationale for Option	<p>The feasibility of upgrading the Glen Croe Lower Forestry Track to an emergency route for trunk road traffic was considered in 2012 by the then Operating Company Scotland Transerv following instruction by Transport Scotland. This study also considered the feasibility of the OMR being opened as an emergency route for trunk road traffic. The study was instructed as a consequence of a number of landslips that had occurred in the preceding 5 years that had led to the A83 Trunk Road being closed on a number of occasions. That study showed that it was possible for a vehicle to travel both the Glen Croe Lower Forestry Track and OMR and therefore each route provided a possible alternative route in the event of future closures on the A83 Trunk Road with the caveat that further work would be required to ensure a resilient diversion route in the future. A number of issues were summarised in the report however for each proposal. Following this study, decisions were taken that led to the OMR becoming a recognised diversionary route, operating over most of its length under a convoy arrangement, when the A83 Trunk Road is closed. The Glen Croe Lower Forestry Track was not taken forward as recognised diversionary route when the A83 Trunk Road is closed.</p>

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In April 2021, the 'Rest and Be Thankful Campaign' group suggested use the existing Glen Croe Lower Forestry Track as a medium term solution.

The Single Lane Forestry Track option is considered to offer a potential emergency route for trunk road traffic, bypassing the main landslide risk area on the A83 Trunk Road at the Rest and Be Thankful, and is therefore included as an option that could form part of the overall Medium Term Solution Strategy.

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Project Objectives		
Objective		Performance against objective
1	Increase resilience of a temporary diversion route through Glen Croe by reducing the likelihood of it being closed during landslide, flooding and other incidents.	The premise of the single lane option is that it would operate either in a loop with the OMR or as an alternative to the OMR if that was closed. In both cases the risk of disruption to diversion traffic on the OMR is mitigated and the alternative route therefore provides increased resilience. There is the risk of landslides or debris flows on the southwestern slopes of Glen Croe, so there is the potential for the MTS to be closed also, but overall there is still increased resilience through creation of different diversion route options.
2	Maximise operational benefits of a temporary diversion through Glen Croe route for all vehicles by providing a route that achieves a proportionate balance of time to implement, cost and impact.	<p>Operation of the Single Lane Forestry Track option in a loop arrangement with the OMR potentially offers a reduced maximum wait time / gap between convoys for eastbound traffic, with resultant journey times generally the same as existing. This is due to the additional convoy resource that would be employed in the loop arrangement. In the westbound direction, this operation would again potentially offer a reduced maximum wait time / gap between convoys due to the additional convoy resource that would be employed in the loop arrangement. The resultant journey time in the convoy for westbound journeys would increase however, thereby offsetting any reduction in wait times achieved. This is due to the longer length of convoyed road compared to existing. Waiting times could be reduced further if a third convoy was adopted into the loop however having multiple convoys operating within the length of the OMR or forestry track would result in additional operational complexities should a breakdown or accident occur that needs recovery vehicles to reach the leading convoy.</p> <p>Operation of the Single Lane Forestry Track option on its own, with a two-way convoy over its length, introduces longer wait and journey times compared to the existing OMR arrangement. This is due to the longer length of convoy that exists along the Single Lane Forestry Track option.</p> <p>Journey times achieved are an improvement over the northern pre-planned diversion route however, particularly for journeys made between Tarbet and the Cowal peninsula. Instances when both the A83 Trunk Road and the OMR are closed however, necessitating the use of the northern pre-planned diversion route are infrequent.</p>

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3	Reduce the likelihood of accidents on a temporary diversion route through Glen Croe.	Specific design and operational measures are proposed to reduce the likelihood of accidents occurring on the Single Lane Forestry Access Traffic option. It is expected to operate at 10mph in a convoy, keeping vehicles speeds low along its length which in turn should reduce the likelihood of incidents occurring. Improvements to the existing track cross-section and drainage are proposed as well as provision of safety barrier and longitudinal edge markings to delineate the edge of the carriageway which should also reduce the likelihood of incidents occurring.

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Implementability		
Engineering	Topography and Alignment Considerations	<p>The length of the Single Lane Forestry Track option between the OMR/A83 Trunk Road at-grade direct access and the B828 Glen Mhor local road /A83 Trunk Road junction is approximately 4.1km.</p> <p>This comprises approximately:</p> <ul style="list-style-type: none"> - 100m of the lower end of the OMR; - 60m of offline construction on approach to and across the Croe Water; - 3,060m of the Glen Croe Lower Forest Track; - 265m of the Glen Mohr Forest Track; and - 590m of the B828 Glen Mhor local road. <p>The horizontal alignment of the Glen Croe Lower Forestry Track is variable over its entire length, with the route meandering its way up the north easterly facing slope of Ben Donich from its low point adjacent to the Croe Water, generally following the alignment of the existing lower forestry track.</p> <p>The proposed design is an online realignment, mostly following the existing geometry with minor improvements both horizontally and vertically. The minimum proposed horizontal curve is R=15m just to the west of the proposed Croe Water Crossing needed to re-join the existing track to the west of the river. Most of the remaining horizontal curves are over R=50m, except for the R=30m bend along the existing OMR immediately west of the A83 Trunk Road junction at the southern end. Some local widening is necessary on three curves to accommodate vehicle swept paths which ranged from 1m on R=25m to 2.5m on R=15m.</p> <p>Currently, the passage of vehicles along the forestry track from its eastern end is constrained by a number of factors, including the tight bends required to facilitate the crossing of the Croe Water via a small bridge structure with no edge protection, measuring 3050mm between the copes. The proposed realignment, which is approximately 160m longer (measured southwards from the existing structure over the Croe Water), starts off at the southern junction off existing A83 Trunk Road with the OMR, carries on the existing OMR for a short length before crossing the Croe Water over a new proposed structure and immediately joining the alignment of the existing Lower Forest Road.</p>

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		<p>Beyond the Croe Water, the lower length of the route of the Single Lane Forestry Track option is bounded by steep side slopes with a number of rock outcrops and tree lined tight bends hindering forward visibility.</p> <p>From the intersection point with the Glen Croe Upper Forestry Track, the horizontal geometry of the route is of a better standard, with longer straight sections of road more prevalent.</p> <p>The vertical alignment of the route of the Single Lane Forestry Track option is highly variable, with a significant number of sections having very steep gradients. The route rises from an elevation of 90.5 metres AOD at its tie-in with the A83 Trunk Road to a high point of 292 metres AOD, on approach to the B828 Glen Mhor local road, which equates to an average gradient of approximately 6.3% over its length.</p> <p>The route of the Single Lane Forestry Track option starts to rise sharply, just north of the existing structure, with the steepest gradient of approximately 14% measured over a short section of approximately 5m between a crest and sag curve. After this steep section, the profile of the route is found on a more constant rise with uphill gradients ranging between approximately 7% to 11%, and a short length of 12% over 15m.</p> <p>In terms of cross-section, the proposed width of this option comprises of a 3.5m running surface, with a formalised soft verge of 1.5m adjacent to any existing informal verge that exists on the downslope (eastbound) side. On the hillside (westbound) side a drainage ditch of width equal to 2.5m and depth equal to 0.5m is proposed to accommodate the expected rainfall/surface water run-off that will flow off the slope above the track.</p>
	<p>Geotechnical / Earthworks Considerations</p>	<p>The south western slopes of Glen Croe are steep and densely forested. The forestry is mature and closely spaced, with limited visibility of slope conditions possible from the existing forestry tracks and limited access possible through the plantations. The slopes above and below the existing Glen Croe Lower Forestry Track are observed to be steep over much of the route, with evidence of some localised failures associated with watercourses and over-steepened earthworks. Rock exposures are present adjacent to the Glen Croe Lower Forestry Track in places along much of its length.</p> <p>From a geotechnical perspective, delivery of this option will involve widening of the existing corridor to accommodate the required carriageway width, verges and roadside drainage ditch. Steepened cuttings, supported by geotechnical measures such as soil nails, would be required to limit the lateral extent and height of the cutting slopes. Such measures are also expected to be required in cuttings where soil is present overlying rock. Cuttings within rock may also be steepened subject to favourable conditions being present. Construction of the route</p>

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		<p>alignment on embankment on the downslope side onto steeply sloping terrain would be very difficult, measures would be required to limit the extent of the earthworks footprint and consequently the volume of material required for construction. These may include use of higher-grade fills and means of providing a secure foundation to support the toe of the embankment. Whilst both of the above scenarios present challenges, it is anticipated that cutting into the upper slope would be less problematic and the alignment has been developed along these principles.</p> <p>Further modelling of the alignment will be required using ground investigation data once it becomes available, to determine anticipated ground conditions including depth to rock to determine whether cut slopes will be in soil, rock or both, and to provide information on material properties including the orientation of discontinuities within bedrock. This will inform geotechnical design of the earthworks required. It is likely a substantial detailed ground investigation scope would be required. Due to the significant scale of the investigation, it is anticipated that this may result in a slower procurement process than a smaller investigation scope would require. In addition, a longer site operations phase would be required to deliver the necessary investigation works on a site with challenging access due to steep slopes and dense forestry.</p>
	<p>Geohazards</p>	<p>In relation to geohazards, the southwestern slopes of Glen Croe have been identified as being susceptible to a variety of forms of instability including debris flow, landslide, boulder fall and rock fall. The existing forestry offers a degree of protection to the forestry track and, following the principles of a 'do minimum' design, it has been assumed that this will continue. While some felling of forestry will be required to accommodate the necessary widening, it has been assumed that this will be the absolute minimum necessary, however it should be recorded that in November 2021, Scottish Forestry served a Statutory Plant Health Notice on FLS for a site at High Glencroe, due to the presence of <i>Phytophthora ramorum</i>. This will require local felling of trees that are affected by this disease.</p> <p>The appropriate extent of felling will be subject to discussion and agreement with FLS; if mature trees are left in place too close to the alignment, they pose a risk to the route associated with wind-blow. In addition to the hazard to traffic, the disturbance caused when the root plate is removed may exacerbate erosion and lead to slope instability. Conversely, felling operations undertaken adjacent to the route, or across a greater extent of the hillside above, may cause changes in the ground and groundwater conditions which could reactivate former failures or trigger new instability.</p>

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		The protection offered by the forestry could be supplemented locally by in-channel debris barriers, but for these to offer optimum protection, the requirements in terms of capacity, specification and location should be informed by further assessment of the geohazard threat across the western slopes.
	Hydrology and Drainage Considerations	No formal carriageway drainage is proposed as part this option. A ditch will be located at the toe of the upslope, similar to the current arrangement, which will collect surface run off from both the cut slope and, carriageway and western verge. It is proposed to have a fall on the eastern verge towards the downslope where surface runoff will be drained over the edge.
	Structures Considerations	<p>Access to the Forestry Track is via an existing single span bridge crossing Croe Water. There is currently no information available on this existing structure and of its current load capacity. There are no parapets on the existing structure. The crossing is in a known area of flood risk; the existing crossing road level is potentially below the flood zone.</p> <p>The proposed vertical alignment for the track at this watercourse crossing will have to consider the agreed design flood level; a minimum freeboard allowance of 600mm in accordance with CD 356 Clause 4.16; structural depth of new structure and road surface depth.</p> <p>Span of the existing crossing is approximately 8 metres; the span of any new crossing will have to consider the volume of water for the agreed design flood event.</p> <p>Form of new structure may depend on structural depth available and required span of structure. Structural depth of 1 metre can be achieved using prestressed TY and TYE beams with reinforced concrete infill deck. Half-through plate girder structure could be considered for longer spans where structural depth is an issue.</p> <p>A proprietary temporary structure could be considered as a temporary/permanent solution. An example would be a Bailey Bridge which are through type structures that can achieve large spans with structural depth approximately less than 1 metre. Cross section and loading requirements of a new crossing would have to be agreed.</p>
	NMUs / WCHs	From the junction between the Glen Croe Upper and Lower Forestry Tracks to the Glen Mhor Forestry Track, the

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		<p>proposed route of the Single Lane Forestry Track option will impact the existing LLTTNP core path.</p> <p>As the forestry track is the core path, it will be necessary to prohibit access for NMUs during operation, for safety reasons and avoid conflict of NMUs and vehicular traffic from the convoy. As the Glen Mhor Forestry Track will also form part of the route, it will be necessary to stop parking in the FLS parking area which in turn will impact access to Ben Donich hill path and mountain biking trails.</p> <p>Due to the limited NMu facilities in the adjacent area, only one possible diversion route has been identified which will not be suitable for all users and, depending on destination, could be considerably long. From a desktop review, the most likely destinations using the route are Rest and be Thankful carpark via the Glen Mhor Forestry Track, access to the Ben Donich hill path and Lochgoilhead, most likely for cyclists.</p> <p>Part of the core path network, NMUs could be diverted along a section of the Cowal Way by heading south at the Ardgartan visitor centre and then west through Coilessan Glen to Lochgoilhead. At this point, users can head north continuing on the core path network which will lead them to the top of the Glen Mhor Forestry Track at the top of the Single Lane Forestry Access Track.</p> <p>The diversion consists of steep terrain with varying quality of paths. It is likely that this would only be suitable for active walkers and not wheelers or cyclists. No obvious alternatives are available for cyclists other than joining the convoy.</p> <p>Approximate distances to destinations noted above from Ardgartan Visitor Centre:</p> <ul style="list-style-type: none"> • Lochgoilhead via the diversion route is approximately 10.8km compared to approximately 15.4km via the forestry Track. • Top of Glen Mhor Forestry Track / Start of Ben Donich hill path via the diversion route is approximately 18.7km compared to approximately 6.1km.
Constructability Considerations	Construction Sequencing & Methodology	<p>The construction phase will be challenging for several reasons. The primary challenge for a contractor will be the constrained working room which will result in lower productivity rates and a longer construction duration than a typical road upgrade scheme. This option has the advantage of being able to utilise the existing Forestry Track as a haul route during construction with minimal earthworks compared to the other medium-term options.</p> <p>Whilst it may be possible to work in multiple work fronts, the available working room limits the number of vehicle movements that can be carried out safely, therefore it is expected that two work fronts for the track would be</p>

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		<p>appropriate, working from either end. Steep side slopes present a safety risk and access to works on the downslope side will be challenging. Rockhead level appears to be at or close to existing track level with relatively thin overlying superficial deposits. It is likely that the majority of the cuttings will be at least partly in rock, although relatively small volumes compared to other medium-term options. Any soil overlying rock will also require excavation and some cuttings entirely within soil cannot be discounted. Earthworks movements on the track will be limited to one or two delivery wagons per work front. This significantly reduces the daily import/export outputs that can be achieved as construction vehicles will need to be reversed to a suitable turning area prior to driving off the track, at which point another delivery wagon can enter the track, this is a symptom of the constrained width of the track and lack of passing places.</p> <p>Excavations and material handling will be limited to one or two medium sized excavators per work front and 20t road going tippers for muck away. Large earth moving equipment such as articulated dump trucks (ADT's) would be too wide for use on the existing track. Due to the limited width of the track, the use of TTM (Temporary Traffic Management) and traffic light control for construction traffic may be needed to remove the need to reverse up/down the track. This methodology will reduce daily productivity.</p> <p>After the pre-earthworks drainage has been completed the box cut and drainage works would commence. Due to the need to use the track as a haul route for muck away it will be subject to heavy trafficking from construction equipment and temporary running surfaces may be needed. Typically, the staged construction for roads allows for an 'offline' haul route such that the 'new' road is not being trafficked; this would not be possible for these works. The dual use of haul road during construction will add time and cost to the construction process. Road construction will be hindered due to the number of items of plant needed to surface a road and the need for them to work concurrently. This will result in smaller items of plant being used and hence longer durations than what would typically be expected for a road upgrade scheme. The road pavement construction would most probably be constructed at the end of the earthworks campaign such that damage to the finished road is minimised which adds time to the overall duration.</p>
	Control of surface water and protection of surrounding environment	<p>Control of the volume and rate of flow of surface water runoff from upslope of the track along its full length is a significant risk and the contractor will need an engineered drainage solution during construction so that the works, the workforce and the surrounding environment are protected.</p> <p>Pre earthworks drainage will be needed in the form of upslope lined diversion drains and additional temporary culverts. Localised over pumping may be needed with backup systems as required if water builds up during</p>

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		<p>construction. Managing contaminated runoff from the works will be difficult and require complex and sizeable temporary treatment systems at the more significant cuttings, to deal with the volume of water, all of which will add time/cost to the project. Diverting clean water from the works will be the priority to reduce the risk of polluting any receiving watercourses. Dewatering excavations, runoff from exposed ground, runoff from the track itself and disturbance of the slopes will generate silty water. It is recommended the contractor engages with SEPA prior to the construction phase to discuss what level of treatment is sufficient and agree what final discharge is acceptable which will govern what type of treatment processes are required. Implementation of settlement lagoons would not be practical due to the proximity of suitable space to create the ponds and contaminated water may need to be removed from site by tanker directly from the workface. Alternatively, suitable diversionary drains could be created to smaller localised settlement ponds however the high volume of water coming from upslope may be prohibitive to this type of system due to the size of ponds needed and the lengths of pipes and pumping systems needed to reach the ponds. It is expected that treatment systems to control the pH levels will be installed at the workface which will allow discharge back to the natural environment and can be moved easily as the works progress.</p> <p>This option will require, as a minimum, improvements made to existing culverts including the headwalls and outfalls to ensure erosion of the surrounding material and material washout does not occur. In some cases, culverts may need to be replaced to increase the capacity which will further add time to the construction durations. In either case the existing culverts could be used as part of the pre-earthworks drainage offering an opportunity for a reduced construction time.</p>
	Site Location	<p>The site location presents challenges for procurement of materials and resources. The remote location will result in an uplift in rates and attract a premium in general from the supply chain. The haulage routes and distance to nearest quarries will result in higher unit rates for import/export/haulage of material. Site accommodation for labour/staff may need to be considered due to the remote location and limited local available accommodation which could add further costs to the scheme.</p>
	Logistics, access and working room	<p>Material laydown areas will be setup off the existing track. It is anticipated that two site compounds would be setup at the North and South ends. There may be opportunity to store materials at the localised widened points along the track, but these may be used as turning areas for construction traffic and need to be kept clear. Double handling of materials will be needed which further reduces efficiency and increases cost. Access to the site contains substandard width roads and narrow structures but it is not expected that any abnormal loads would be needed to transport material to site, although depending on the structure type chosen over Croe Water, precast beams may need to be transported to site which could be considered an abnormal load, however this will be risk assessed by</p>

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		the contractor / supplier as to the best route to site. Working room on the track is limited and congestion at the workface will create a health and safety risk.
	Earthworks Construction	The earthworks for this option is expected to be as minimal as possible to achieve the desired cross-section. As the proposed vertical and horizontal alignment is dictated by the existing forestry track so only re profiling upslope, the track itself and downslope of the track is necessary. This results in lower earthworks volumes than the medium-term solutions Forestry Track Option. Notwithstanding this, it is expected that excavations will mostly be into rock which will result in a longer construction duration than excavating into soft material. Forming embankments on the downslope side will be challenging from a safety perspective due to access being difficult on the steep side slopes; material retention of any embankments on such steep ground also presents a risk for the contractor.
	Temporary Works	There is not considered to be any complex temporary works needed on this option. There may be a need to support excavations, temporary accesses for downslope/upslope works, standard formwork, creation of working platforms and surface water management however these are expected to be standard solutions.
	Health & Safety Risks (Construction)	<p>Due to the elevation of the site, weather risk is significant, and it is anticipated that works would need to be undertaken over the winter period, possibly over two winter seasons. Heavy, prolonged rainfall and snowfall present a risk to the contractor that will need managed and will add time to the construction phase. If snowfall is particularly bad works may not be possible during this time and the site could be closed during the winter season – however, any winter closure is a contractor consideration depending on their appetite for risk, historical weather data and resource/supply chain resilience etc. and will be agreed at tender stage as to the possibility of such an event. If implemented a winter closure could add c. 3-4 months to the duration of the works.</p> <p>Other construction H&S residual risks include, working on steep ground in an active landslide risk zone, people/plant interface, access/egress, emergency access routes and control of temporary works.</p>
Environment Considerations	Biodiversity, Fauna and Flora	The removal of an extensive area of woodland to accommodate the track widening (and associated earthworks) has the potential to have a significant effect on any species present including protected species, some of which are likely to use the forestry track as a wildlife corridor. It should be recorded that in November 2021, Scottish Forestry served a Statutory Plant Health Notice on FLS for a site at High Glencroe, due to the presence of Phytophthora ramorum. This will require local felling of trees that are affected by this disease. Loss of habitat would occur during construction and operation. Disturbance (noise, vibration and light pollution), injury or mortality could also occur during construction. It is noted that this is commercial forestry and scheduled for removal felling in the next 5-10

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		<p>years, however this would also be subject of environmental assessment and likely re-planting. A new road introduces a new risk to existing species through direct contact and displacement and woodland would not be replaced in the location of the road.</p> <p>Depending on how the B828 Glen Mhor local road is widened, there could be a direct impact on the SSSI, with temporary or permanent loss of habitat within that designated area. This could have a significant negative environmental effect. The increase in traffic adjacent to the SSSI could also have moderate negative environmental effects as a result of nitrogen deposition. Mitigation may be feasible for all such impacts.</p> <p>Non-native species could be spread during construction, which could be an offence under the WCA.</p>
	<p>Population (land use and accessibility) and Human Health</p>	<p>This option would sit higher than the limited number of properties in the glen. Given the relative distance between this option and these properties, impacts on human health is highly unlikely.</p> <p>The Forestry Track route is used for recreation and if selected as the preferred option, would result in the loss of this recreational walking route (when in use). Moreover, the LLTNP Authority core path which partially follows the upper part of the forestry track, would be directly impacted by this alignment option, and would require partial realignment.</p> <p>The surrounding forestry commercial plantation is managed by FLS. Upgrading the track would result in forestry removal, most of which would not be re-planted and indeed may increase the windthrow/blow risk of the remaining stands. The forestry track itself is also required for use in management of the forestry crops and removal of timber. It should be recorded that in November 2021, Scottish Forestry served a Statutory Plant Health Notice on FLS for a site at High Glencroe, due to the presence of Phytophthora ramorum. This will require local felling of trees that are affected by this disease.</p> <p>As stated earlier, accidents or incidents (e.g. roadworks, landslips, flooding) occurring on any part of the A83 Trunk Road in Argyll and Bute can effectively cut off parts of the region for a period, significantly impacting residents, business and visitors due to the significant length of alternative routes and the travel times involved. Any alignment option to improve the resilience of this route and maintain the passage of vehicles, would be of benefit to the wider community.</p>

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	Water Environment	<p>This option crosses the Croe Water (a major crossing), 7 no. OS mapped watercourses and circa 107 no. existing culverts as it traverses the western slopes of Glen Croe.</p> <p><i>Flood risk</i></p> <p>The Croe Water crossing is in a known area of flood risk but the proposed road vertical alignment will be above the flood levels. Areas of the forestry track close to the existing structure that crosses the Croe Water are also potentially in the flood zone. Detailed assessment of this area is underway to determine accurate flood extents and levels for a range of storm events. Based on the crossing being an open span structure with significant embankments within the floodplain extent it is likely that the crossing will impact on flood storage and mitigation may be required to allow flood water to pass on either side of the bridge abutment in the form of flood relief culverts. The provision of Compensatory Flood Storage (CFS) is likely to be required however there appears to be local areas to the crossing where the topography would be suitable.</p> <p>The standard of protection is proposed at the 3.33%AEP (30-year) event based on the proposed operational timeframe of this medium-term solution. This provides a balance between avoiding flooding impacts and a proportionate level of upgrade to the culvert crossings.</p> <p>The Forestry Track has existing side of road drainage that discharges to the frequently spaced watercourse culverts, and this will be enhanced to manage run-off particularly in areas where there is a risk of channels breaking out of bank in the upslope reaches. Careful consideration of check dam structures will be required to prevent high flow velocity and scour and also maximising attenuation within the ditches.</p> <p>There are a total of 107 no. existing watercourse crossings and there is the potential for significant surface water flooding to the road if this hillslope run-off is not managed effectively. Where the road and earthworks footprint is greater than 12m it will be necessary to install 1200mm diameter culverts. Where the road and embankment is less than 12m then smaller culverts can be specified and this is likely to be more in line with the peak flows generated by the relatively small watercourses. Much of the Glen Croe Lower Forestry Track is narrower than 12m and this allows some flexibility in the diameter of culverts used to carry the watercourses with lower flows.</p> <p><i>Hydromorphology</i></p>
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		<p>The Croe Water is a WFD classified water body and the Croe Water crossing has the potential to alter river process and function although a clear span bridge and careful siting of the crossing will minimise the impacts on hydromorphology.</p> <p>Although a range of channel works is proposed the channels are relatively minor watercourses and have already been significantly altered by the Glen Croe Lower Forestry Track. 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 existing undersized culverts.</p> <p><i>Surface Water Quality</i></p> <p>Due to the significant earthworks there is a high risk of pollution during construction which could impact the Croe Water due to the number of tributaries impacted. Construction drainage and surface water management will be challenging and requires consideration and mitigation to reduce the risk to the water environment.</p> <p>The SuDS provision on the steep slopes and likely SuDS features are also challenging given the limited flat areas for attenuation and treatment.</p>
	Soils	<p>There is likely to be a certain amount of made ground associated with the forest track.</p> <p>The likelihood of contamination is low, although the presence of hydrocarbons is possible from vehicles using the forest track.</p> <p>The soils within the forest are likely to be significantly affected by the proposals with significant cut and fill required to achieve the gradients required for the road and the associated stabilisation. Soil contamination risks are low.</p>
	Air Quality	<p>This option is not expected to result in an increase in traffic and therefore it is not envisaged that air quality in the area would be significantly different from the baseline. As noted, bringing greater volumes closer to the B828 Glen Mhor local road could have negative environmental effects on the SSSI in terms of nitrogen deposition.</p>
	Material Assets	<p>During construction there is likely to be impacts in terms of materials and waste. A larger volume of material will be required to construct a new road although waste impacts would likely be from the construction process alone as no demolition is proposed, though consideration would need to be given to suitably licensed disposal facilities.</p> <p>The quantities of material required for this option would be less than the construction of a full new road given this</p>

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		would involve improvement works to an existing forestry track,
	Cultural Heritage	<p>There are no listed buildings or Scheduled monuments along the Single Lane Forestry Track option. There is a slight overlap with the OMR at the southern extent, however at this point there has already been significant modification to the original layout of the OMR. The OMR is listed on CANMORE and HER datasets.</p> <p>There are several other cultural heritage assets listed on CANMORE and HER on the western slopes of Glen Croe, however these are not directly on the line of the forestry track.</p>
	Landscape and Visual Amenity	<p>This option has the potential to cause adverse effects on the LLTNP, the local landscape character and elements, Argyll Forest Park as well as views from the nearby residential and outdoor receptors and viewpoints due to the construction and operation of the carriageway and supporting infrastructure.</p> <p>The upgrades to the existing forestry tracks traversing the lower slopes of Ben Donich are likely to involve embankments and cuttings affecting the adjacent forestry and potentially resulting in large areas of forest clear felling due to the resulting windthrow risk. This in turn would increase the overall effects on the landscape and visual receptors, in particular on the landscape elements and character of the forested glen and the Special Qualities of the LLTNP as well as the views experienced by people from the property at High Glencroe, the A83 Trunk Road / Argyll Coastal Route, the OMR, the Rest and Be Thankful and Gleann Mhor viewpoints and the hill walking trails and summits on the eastern side of the glen.</p> <p>However, the existing commercial forestry is likely to be affected by this route itself adversely affects the Special Qualities of the LLTNP and the local landscape character and visual amenity, being a non-native monoculture with man-made edges, and although any felling would lead to a temporary scar on the landscape it would allow in the long term to meet the objectives of the Glen Croe Land Management Plan 2019-2028 for the South & West Glen Croe Management Zone, by designing more naturalistic upper forest margins that relate to landform, developing a less even aged forest structure and increasing forest diversity which would secure positive effects for landscape as well as biodiversity.</p>
Operational Considerations	How it operates	It is proposed that this option operates in combination with the OMR as a loop arrangement where traffic travelling westbound on the A83 Trunk Road will use the Forestry Track and eastbound traffic will use the OMR.

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		<p>Both routes will operate under a 10mph convoy with top and tail convoy vehicles. Westbound traffic would be held on the A83 Trunk Road south of the original OMR access, where it will join the convoy queue. Proceeding up the route on the western slope, the convoy will end at the existing junction between the B828 Glen Mhor local road and the A83 Trunk Road adjacent to the Rest and Be Thankful viewpoint car park. As the Forestry Track would be acting as a replacement for the trunk road, priority could be given to the convoy traffic at the Glen Mhor Forestry Track /B828 Glen Mhor local road junction. This may need to be in the form of a temporary 'Give Way' during operation.</p> <p>The eastbound convoy will work similar to how it currently does where traffic will be stopped north of the A83 Trunk Road /B828 Glen Mhor local road junction and led down the OMR via the Rest and Be Thankful viewpoint car park. To facilitate the loop arrangement, the convoy would be extended to include that length of the OMR which is two-way. Traffic can then continue eastbound on the OMR, under a convoy operating at 15mph to then join the A83 at the existing A83/OMR junction.</p> <p>While the convoys can run simultaneously, the eastbound and westbound traffic will need to cross at the A83 Trunk Road /B828 Glen Mhor local road junction. Therefore, the eastbound convoy will need to be stopped in advance of the westbound traffic approaching to avoid a clash in vehicle movements, unless this length of the B828 Glen Mhor local road carriageway is widened to accommodate two lanes of traffic. Furthermore, this will also help minimise the likelihood of vehicles heading to Lochgoilhead interfacing with westbound convoy vehicles on the single track B828 Glen Mhor local road. While there are passing places and could likely be accommodated, it reduces the potential for inefficient running.</p> <p>Some consideration will also need to be given to the coordination of the bus services which use the A83 Trunk Road. Minor amendments to the northern bus turning circle may be required in order to allow westbound buses to manoeuvre into the stop.</p> <p>It will be necessary to provide breakdown support with both large and small recovery vehicles on stand-by in case of an incident occurring on either the Forestry Track or the OMR.</p> <p>For the Forestry Track, there could be two recovery scenarios depending on the location of the breakdown:</p>
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		<ol style="list-style-type: none"> 1. Between the junction of the Glen Croe Upper and Lower Forestry tracks, and the Glen Mhor Forestry track; and, 2. Between the eastern end of the route and the junction of the Glen Croe Upper and Lower Forestry tracks. <p>In both scenarios, traffic in front of the broken-down vehicle will continue westbound by following the lead convoy vehicle leaving the route from the upper end clear and allowing access for recovery vehicles.</p> <p>For the first scenario, it will be necessary for a recovery vehicle to reverse down Forestry Track from the Glen Mhor Forestry track in order to allow it to drive out forwards due to no turning opportunities being available. At this stage, interim turning heads have not been proposed to minimise the earthworks footprint.</p> <p>For the second scenario, a recovery vehicle will be able to drive down the Single Lane Forestry Access Track to the existing junction between the Glen Croe Upper and Lower Forestry tracks. At this point, the recovery vehicle will be able to turn and reverse the remaining distance. Similar to above, no interim turning heads are proposed at the stage.</p> <p>Given the circular nature of the proposed operation and potential for extensive reversing required, two sets of recovery vehicles should be considered to reduce recovery times; one positioned at the upper end of the Forestry Track, possibly at the existing parking area at Glen Mhor, and the other at the lower end of the OMR, possibly parked on the redundant lane of the two-lane section.</p> <p>It would be possible to use one set of recovery vehicles; however, if the Forestry Track or OMR require to be accessed from the opposite end at which they are positioned, it would be necessary to hold the non-impacted convoy. This would then allow the recovery vehicle to utilise the held route in order to move to the required end.</p>
	Risk of Closure – Highways	<p>It is considered that this option will operate at a minor risk of closure from the perspective of highway issues. The primary threat of full closure is from vehicle breakdowns and traffic incidents.</p> <p>With a 10mph convoy system and safety barrier present provided along the length in the eastern verge, the likelihood of major traffic incidents occurring, and the hazard are deemed to be low.</p>

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		While the likelihood of a vehicle breakdown is uncontrollable, it is generally considered to be low; however, if there is a breakdown, this will have a major impact on the route, where a temporary closure will be necessary until the vehicle can be recovered, A proposed recovery plan is outlined above in 'How it Operates'.
	Risk of Closure – Flooding	<p>Flooding at the Croe Water crossing may lead to closure during more extreme events. The period of closure would be short (hours) due to the flashy nature of the catchment with peak flows subsiding quickly.</p> <p>The design of watercourse culverts and drainage will mitigate the potential for flooding from streams and hillslope run-off. Culvert blockage is a risk from potential slope instability which could lead to closure for management and maintenance of watercourse crossings.</p>
	Risk of Closure – Geotechnical / Geohazards	<p>It is considered that this option has a high likelihood of closure with any such closures of potentially significant duration.</p> <p>It is not proposed to include measures to mitigate the geohazard threat other than possible debris barriers upslope of culvert locations locally. Landslides, debris flows, or other geohazard events may affect the route, with material potentially being deposited on the carriageway and restricting its use as a diversion.</p> <p>Geohazard occurrence and deposition of material on the carriageway or on the associated earthworks may also compromise the earthworks by causing instability or damage. This may also affect the route and restrict its use as a diversion.</p> <p>The risk of closure associated with geotechnical / geohazards is highly dependent on the extent and nature of geohazards present on the slope, and assumptions regarding the extent and effect of forestry felling required to facilitate the Single Lane Forestry Access Track option. There is considerable uncertainty in relation to these factors, and the resultant score may be subject to change should further information become available.</p>
	Safety	This option is expected to operate under 10mph convoy, keeping vehicles speeds low along its length which in turn should minimise the likelihood of incidents occurring. Longitudinal edge markings are also proposed to help delineate the carriageway, particularly if operated in hours of darkness. The proposed carriageway width of 3.5m should comfortably accommodate all vehicle types and has been widened in areas around curves to fully accommodate swept paths.

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		<p>Despite this, the existing downslope is steep, approximately 1 in 1.5, with dense tree growth creating a potentially significant hazard, even at slow speeds. As such, a vehicle restraint system in the form of a safety barrier is proposed along the full length, offering a level of protection to vehicles.</p> <p>While it is proposed to include a ditch on the northbound side which will present a hazard in itself, the slow travel speeds, presence of a verge and use of longitudinal edge markings have deemed this low risk. Furthermore, during detailed design, the ditch depth will be minimised, and side slopes slackened, where possible, to reduce the severity of the hazard.</p> <p>At culvert inlets on the western side, it may be necessary to provide localised lengths of safety barrier due to the anticipated level difference between finished road level and bed level of the watercourse as this will effectively be a sheer drop.</p>
	<p>Journey Times</p>	<p>Journey times have been calculated for two operational scenarios which make use of the Single Lane Forestry Track option. Scenario 1 is when this option is operating in conjunction with the OMR in a loop arrangement. Scenario 2 is when this option is operating independently of the OMR. Such a scenario may exist if for example the OMR required to be closed due to a landslide or debris flow event and all traffic would operate via the Single Lane Forestry Track option.</p> <p><u>Scenario 1 – ‘Single Lane Forestry Track and the OMR Operating in a Loop Arrangement’</u></p> <p>It is assumed that the same arrangement exists as per the current OMR convoy and that no vehicle would be left behind from the convoy if it had already joined the queue. As noted in the Scotland Transerv report, because of the length of time taken to travel the emergency route, it becomes untenable to operate if all of the waiting traffic is not accommodated with each passing convoy, because the delays suffered by drivers rise exponentially if not let through in the first convoy they meet. The assumed speed of the convoy on the Single Lane Forestry Track option is the same as the OMR at 10mph. Similarly, a 10mph speed limit is assumed along the single track length of the OMR, and a 15mph speed limit is assumed over the two lane length of the OMR. The wait times noted below are based on two pairs of convoys operating in the loop arrangement.</p> <p>Eastbound journeys on the OMR:</p>

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Time to travel single lane OMR in convoy = approximately 8.5 mins (taken from timed runs from BEAR)
Time to travel two lane length of the OMR / short length of the A83 Trunk Road, in convoy (approx 1070m) = approximately 2.6 mins
Total travel time = approximately 11.1 mins

Westbound journeys on the Single Lane Lower Forestry Track:

Time to travel upgraded Glen Croe Lower Forestry Track = approximately 11.9 mins
Time to travel Glen Mohr forestry track = approximately 1.0 min
Time to travel B828 Glen Mohr local road = approximately 2.1 min
Total travel time = approximately 15mins

Additional time allowed for convoy of vehicles to clear the end of convoy = approximately 2 minutes.

On the basis of the above timings, the wait time for eastbound journeys along the OMR would be up to between 13 minutes and 17 minutes (waiting for the westbound convoy to arrive from the forestry track and clear).

The wait time for westbound journeys on the forestry track would also be up to between 13 minutes and 17 minutes (waiting for the eastbound convoy to arrive from the OMR and clear).

The reason for the above varying wait times is due to the imbalance in journey lengths over the two sides of the loop. This results in slightly varying intervals between successive convoys leaving each end of the loop.

An example of this is shown in table below using 9am as reference start time

	Start	End	Journey time	Gap / Wait		Start	End	Journey time	Gap / Wait
EB 1	9:00	9:11	11 mins		WB1	9:00	9:15	15 mins	
EB 2	9:17	9:28	11 mins	17 mins	WB2	9:13	9:28	15 mins	13 mins
EB 3	9:30	9:41	11 mins	13 mins	WB3	9:30	9:45	15 mins	17 mins

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EB 4	9:47	9:58	11 mins	17 mins	WB4	9:43	9:58	15 mins	13 mins
EB 5	10:00	10:11	11 mins	13 mins	WB4	10:00	10:15	15 mins	17 mins

As noted above these wait times are based on two pairs of convoys operating in the loop arrangement. Wait times / convoy gap within the loop arrangement could be reduced by introducing a further convoy resource to make the total number of convoys operating in the loop 3 no.

Example Journey 1 - Tarbet to Inveraray or vice versa

Taking journey times either side of the convoy into consideration:

Journey time between Tarbet to convoy start location = approximately 9 mins

Journey time from convoy end location to Inveraray = approximately 20 mins

A journey from Tarbet to Inveraray or vice versa via the Single Lane Lower Forestry Track option, operating in a loop arrangement with the OMR, therefore could take between approximately 40 and 61 minutes depending on when a vehicle joins the convoy queue in relation to when the convoy has departed and direction of travel. A journey between Tarbet and Inveraray via the northern pre-planned diversion route takes between approximately 60 and 70 minutes by comparison.

Example Journey 2 - Tarbet to A815 or vice versa

Journeys that are potentially at most benefit from the Single Lane Lower Forestry Track option, operating in a loop arrangement with the OMR, are those to Lochgoilhead and destinations within Cowal. This is described below, using the junction between the A83 Trunk Road and the A815 local road near Cairndow as the western end of the route.

Taking journey times either side of the convoy into consideration first:

Journey time between Tarbet to convoy start location = approximately 9 mins

Journey time from convoy end location to the A815 junction = approximately 6 mins

A journey from Tarbet to the A815 junction or vice versa via the Single Lane Lower Forestry Track option, operating in a loop arrangement with the OMR, therefore could take between approximately 26 and 47 minutes depending on when a vehicle joins the convoy queue in relation to when the convoy has departed and direction of travel. A

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		<p>journey between Tarbet and the A815 local road via the northern pre-planned diversion route takes between approximately 80 and 90 minutes by comparison.</p> <p><u>Scenario 2 – ‘Single Lane Lower Forestry Track operating alone without the OMR’</u></p> <p>The first possible waiting situation under this operating scenario is where a vehicle arrives and does not have to wait for a convoy to continue their journey. The second possible waiting situation under this operating scenario is where a vehicle arrives and has just missed the departing convoy. Again, it is assumed that the same arrangement exists as per the OMR convoy and that no vehicle would be left behind from the convoy if it had already joined the queue. As noted in the Scotland Transerv report, because of the length of time taken to travel the emergency route, it becomes untenable to operate if all of the waiting traffic is not accommodated with each passing convoy, because the delays suffered by drivers rise exponentially if not let through in the first convoy they meet. The assumed speed of the convoy on Single Lane Lower Forestry Track option is the same as the current OMR at 10mph.</p> <p><u>No Wait for Convoy</u> Wait time = 0 mins Time to travel upgraded Glen Croe Lower Forestry Track = approximately 11.9 mins Time to travel Glen Mohr forestry track = approximately 1.0 min Time to travel B828 Glen Mohr local road = approximately 2.1 min Total travel time = approximately 15mins</p> <p><u>Wait for Convoy</u> Wait time = approximately 34 mins (15 minutes for departed convoy to travel along track, allowance of 2 minutes for convoy to clear, 15 minutes for it to return back down track and allowance of 2 minutes for convoy to clear) Time to travel upgraded Glen Croe Lower Forestry Track = approximately 11.9 mins Time to travel Glen Mohr forestry track = approximately 1.0 min Time to travel B828 Glen Mohr local road = approximately 2.1 min Total travel time = approximately 49mins</p>
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		<p><u>Example Journey 1 - Tarbet to Inveraray or vice versa</u></p> <p>Taking journey times either side of the convoy into consideration: Journey time between Tarbet to convoy start location = approximately 9 mins Journey time from convoy end location to Inveraray = approximately 20 mins</p> <p>A journey from Tarbet to Inveraray via the Single Lane Lower Forestry Track option therefore could take between approximately 44 and 78 minutes depending on when a vehicle joins the convoy in relation to when the convoy has departed. A journey between Tarbet and Inveraray via the northern pre-planned diversion route takes between approximately 60 and 70 minutes by comparison.</p> <p><u>Example Journey 2 - Tarbet to A815 or vice versa</u></p> <p>Taking journey times either side of the convoy into consideration first: Journey time between Tarbet to convoy start location = approximately 9 mins Journey time from convoy end location to the A815 junction = approximately 6 mins</p> <p>A journey from Tarbet to the A815 junction or vice versa via the Single Lane Lower Forestry Track option therefore could take between approximately 30 and 64 minutes depending on when a vehicle joins the convoy in relation to when the convoy has departed. A journey between Tarbet and the A815 junction via the northern pre-planned diversion route takes between approximately 80 and 90 minutes by comparison.</p> <p><u>Comparison to Existing Arrangement</u></p> <p>Operation of the Single Lane Lower Forestry Track option in a loop arrangement with the OMR potentially offers a reduced maximum wait time / gap between convoys for eastbound traffic, with subsequent journey times generally the same as existing. This is due to the additional convoy resource that would be employed in the loop arrangement. Currently the maximum wait times could be approximately 22 minutes. This could reduce to a maximum of approximately 13 to 17 minutes. In the westbound direction, this operation would again potentially</p>
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		<p>offer a reduced maximum wait time / gap between convoys due to the additional convoy resource that would be employed in the loop arrangement. Currently the maximum wait times could be approximately 22 minutes. This could reduce to a maximum of approximately 13 to 17 minutes. The subsequent journey time in the convoy for westbound journeys would increase however from approximately 10 minutes currently on the OMR to approximately 15 minutes along the Single Lane Lower Forestry Track option, thereby offsetting any reduction in wait times achieved. This is due to the longer length of convoyed road.</p> <p>Operation of the Single Lane Lower Forestry Track option on its own, with a two way convoy over its length, introduces longer wait times compared to the existing OMR arrangement. This is due to the longer length of convoy that exists along the Single Lane Lower Forestry Track option. Based on the BEAR timing runs, wait times currently could be up to approximately 22 minutes, whereas with a two way convoy in operation over its length, wait times could be up to approximately 34 minutes on the Single Lane Lower Forestry Track option.</p> <p>Journey times achieved are an improvement over the northern pre-planned diversion route, particularly for journeys made between Tarbet and the Cowal peninsula.</p>
Financial Considerations	Capital	<p>The initial cost estimate for the Single Lane Forestry Track option is within the range of £21M - £28M at 2021 prices. This cost estimate includes approximate structures cost, value for bulk earthworks, prelims, preparations, land and supervision costs, non-recoverable VAT and an optimum bias.</p> <p>No cost has been included for safety barrier, geotechnical hazard mitigation or works required for drainage requirements due to the preliminary nature of the design. It is likely significant costs will be required for these items due to the major earthworks proposed and the number of watercourses along the route.</p>
	Operational	<p>It is anticipated that this option will result in additional operational costs. This is due to the need for two pairs of convoy vehicles to allow the route to work as a 'loop' and the likely need for an additional pair of recovery vehicles should the situation arise that vehicle breakdowns occur concurrently on both the Single Lane Lower Forestry Track option and the OMR.</p>

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Estimated Time to Completion	Implementation	If progressed as a whole, depending on a number of factors such as decision to proceed, land purchase, Ground Investigation, EIA Reporting and consultation requirements, this option has the potential to be open to traffic by autumn 2025.
	Construction	<p>An outline construction programme was developed for this option to understand the expected range of construction duration. Consideration was given to various constraints, construction risks and challenges in constructing this option. One of the key risks to programme is weather and the impact this will have on the construction duration. As works will be undertaken over a winter season it is highly likely that the progress of the works will be impacted and may even result in a winter closure (typically Nov – Feb) if prolonged snowfall/rainfall occurs. To allow for such weather impact a time risk allowance of 20% has been included within the construction duration. This also includes procurement, supply chain and resource risks that will exist in a scheme of this nature given the location of the works.</p> <p>The anticipated construction duration range is between 13 and 19 months.</p>
Interface with FLS		<p>Due to the nature of the proposed improvements for this option, there will be significant interface with FLS managed assets. When in operation, FLS will not be able to use the lower forestry track, and unlikely use the Glen Mhor access track, unless timed with convoys. As a result, ongoing coordination and communication between FLS and the Operating Company will be necessary to ensure that both forestry operations can continue, and the diversion route can be implemented quickly in the event of a closure on the A83 Trunk Road.</p> <p>While the design of this option considers the FLS access track specifications, its purpose is to deliver a suitable route for trunk road traffic, and therefore some differences have arisen. Consultation with FLS will be required to confirm that they are content that the proposed design meets their requirements to accommodate forestry vehicles and undertake their ongoing operation.</p>
Consenting Considerations	Need for EIA	An assessment will be required to determine if an EIAR is needed. It is not certain that this will be required, although consideration will have to be given to the potential for significant effects within the LLTNP (a sensitive designation under the EIA Regulations), in particular considering the potential for significant landscape & visual effects.

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	Need for 3 rd party land	<p>The section of the proposed route located on the Glen Croe Lower Forestry Track lies entirely within Scottish Ministers land. Therefore, it is not expected that any third-party land will be required; however, burdens will need to be checked prior to its implementation.</p> <p>The improvements to the B828 Glen Mohr local road between Glen Mohr and A83 Trunk Road junction may need to acquire third-party land. This will depend on the extent of the proposed upgrades out with the carriageway footprint.</p>
	Need for Orders	<p>The need for an order on the length of the route on the forestry access track, between the eastern A83 Trunk Road junction and western B828 Glen Mhor local road junction, will be determined by Transport Scotland's preferred strategy for this Option forward. An approach may be to action a notification under a <i>Section 19 – Construction of new roads by Secretary of State as roads authority</i> of the Roads (Scotland) Act 1984.</p> <p>The need for an order on the B828 Glen Mhor local road will be determined by who undertakes any upgrade works, if they are deemed necessary. If these are completed by Transport Scotland, the likely approach will be to action a notification under <i>Section 12 – Powers as respects roads that cross or join public roads other than special roads</i> of the Roads (Scotland) Act 1984.</p>
Phasing Considerations with the LTS		<p>A significant length, approximately 1400m, of the Single Lane Lower Forestry Access Track option overlaps with the LTS Green Option. If both options are taken forward, it would not be possible to use the Single Lane Lower Forestry Access Track option as a diversion route during the construction of the LTS Green Option.</p>

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Implementability		RAG Rating		
		RED	AMBER	GREEN
Engineering	Topography and Alignment Considerations	RED		
	Geotechnical / Earthworks Considerations	RED		
	Geohazards	RED		
	Structures Considerations			GREEN
	NMUs/WCHs		AMBER	
Constructability Considerations	Construction Sequencing & Methodology		AMBER	
	Control of surface water and protection of environment		AMBER	
	Site Location		AMBER	
	Logistics, access and available working room	RED		
	Earthworks		AMBER	
	Temporary Works			GREEN
	Health & Safety Risks (Construction)		AMBER	
Environment	Biodiversity, Fauna and Flora	RED		
	Population (land use & accessibility) and Human Health	RED		
	Water Environment	RED		
	Soils		AMBER	
	Air Quality		AMBER	
	Material Assets		AMBER	
	Cultural Heritage		AMBER	
	Landscape and Visual Amenity	RED		
Operational	How it operates	RED		
	Risk of Closure – Highways		AMBER	
	Risk of Closure – Flooding			GREEN
	Risk of Closure – Geotechnical / Geohazards	RED		
	Safety		AMBER	
	Journey Times	Westbound	Eastbound	
Financial Considerations	Capital			GREEN
	Operational	RED		

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Estimated Time to Completion	Implementation			
	Construction			
Interface with FLS				
Consenting Considerations	Need for EIA			
	Need for 3 rd party land			
	Need for Orders			
Phasing Considerations				