Access to Argyll & Bute (A83) Strategic Environmental Assessment & Preliminary Engineering Services
Route Corridor Preliminary Assessment
Route Corridor 4 – A82 – Cowal - Cairndow

Route Corridor Details	
Route Corridor Option	Route Corridor 4 – A82 – Cowal – Cairndow
Route Corridor Description	This route corridor is a combination of new offline carriageway and online upgrading works which generally follows the existing road network with a new fixed link at Loch Long. The route corridor follows the existing A817 and A814 carriageways from the A82 Trunk Road to Whistlefield (near Garelochhead) with new sections of road and a 1.6km fixed link crossing at Loch Long to Barnacabber. The route corridor then generally follows the existing C09 and A815 to tie back into the A83 Trunk Road at Cairndow. The length of the route corridor where no road currently exists is approximately 5.5km with the full route corridor approximately 58km in length. Construction is required in the vicinity of the Ministry of Defence (MOD) bases of Faslane and Coulport with a section of the proposed route corridor utilising the MOD owned carriageway.
Rationale for Route Corridor	The A82 – Cowal – Cairndow route corridor was identified in the 'A83 Trunk Road Route Study, Part A - A83 Rest and Be Thankful' Report, published in 2013. This route corridor is considered to offer a potential alternative access route into Argyll and Bute bypassing the main landslide risk area on the A83 Trunk Road at the Rest and be Thankful and connecting to the main route to the central belt, the A82 Trunk Road.
Geographic Context	The route corridor lies within the Argyll & Bute region, which comprises solely of the entirety of the Argyll & Bute local authority area. The route corridor end points are located a straight line distance of approximately 20-37 miles from the city of Glasgow. The eastern extents of the route corridor are situated on the west shore of Loch Lomond and the A82 Trunk Road. The route corridor then heads north-west through Glen Fruin towards Garelochead where it changes direction to a south-westerly heading, across Loch Long and towards Ardentinny. It then travels north-west through Glen Finart and along the banks of Loch Eck until it reaches Strachur where it turns north-east along the banks of Loch Fyne. The northern extents of the route corridor is situated between Cairndow and Arrochar on the A83 Trunk Road. The route corridor is located partially within the Loch Lomond and The Trossachs National Park (LLTNP). With respect to transport links, the corridor joins the two aforementioned trunk roads and it also crosses the West Highland Line railway in proximity to Garelochhead.
Social Context	Given the geographically remote nature of large areas of Argyll & Bute, reducing the duration of journey times and improving journey time reliability for both strategic and local traffic has the potential to impact positively on deprivation levels, both geographic and economic.

	The Scottish Index of Multiple Deprivation (SIMD) identifies concentrations of deprived areas across Scotland. Argyll & Bute consists of 125 data zones, with 10 data zones (8%) identified as being amongst the 15% most overall deprived data zones in Scotland. These are located in the region's 5 main towns - Helensburgh, Oban, Dunoon, Campbeltown and Rothesay. The Geographic Access to Services considers deprivation in terms of drive times and public transport times to a selection of basic services such as schools, health services and retail centres. Forty-eight (38%) of Argyll and Bute's data zones are within the 15% most 'access deprived' data zones in Scotland – most of which are located outside the main towns. The region's population has been in decline for over a decade, against a backdrop of a population increase at the national level. Data from NHS Highland estimates that there are 26,000 referrals for Argyll & Bute patients each year, of which 44% are to hospitals within the region and 56% are to hospitals in the NHS Greater Glasgow and Clyde area. Disruption on the transport network can lead to missed appointments and have an adverse impact on patients' health and wellbeing. The region has twenty-three inhabited islands, more than any other local authority in Scotland, with seventeen percent of the regions' population inhabiting the islands. The A83 Trunk Road provides accessibility to services on the mainland via Kennacraig port, where ferry services depart to Islay with onward connections to Jura and Collonsay.
Economic Context	The A83 Trunk Road is one of only two east-west strategic trunk road network connections between Argyll & Bute and the central belt. The lack of a reliable strategic route linking Argyll & Bute with the rest of the country is understood to be constraining economic growth in the region. When the road connection via the A83 Trunk Road is severed, the impact on residents, visitors and businesses is severe due to the lack of alternative transport options. The A83 Trunk Road is known to carry goods of significant value to both the regional and national economy (including whisky and seafood). The A83 Trunk Road is also a key route for tourism, and a proposal to transform the Crinan Canal into a major tourism attraction in Mid-Argyll, could benefit significantly from improved resilience and / or access to the region. Anecdotal evidence suggests closures and restrictions cost the local economy £50k-£60k per day in addition to longer-term impacts on business investment within the region and, subsequently, the region's job market.

	This route corridor follows for part of its length, the route of the A815 road which is the main road link between Toward at the very south of the Cowal peninsula, the town of Dunoon, many smaller communities along its length including Sandbank and Strachur, and the A83 Trunk Road near Cairndow. This road provides an important link for businesses, residents and visitors in the Cowal peninsula with the wider strategic trunk road network. Due to a large proportion of the region's geographic remoteness from the major economic centres of the central belt, only a few large scale, high skill industries are located within the area. The region's economy tends to be heavily influenced by sectors with lower growth, such as agriculture and public services. Given the focus on economic recovery post-COVID-19, enhanced connectivity for the Argyll & Bute region could contribute towards increasing inward investment and job opportunities for local communities. Reliable access for Bute and Cowal and Mid-Argyll, Kintyre and Islay has the potential to have a transformational effect on local/regional economies.

Transport Planning Objectives		
Objective		Performance against planning objective
TPO1	Resilience – reduce the impact of disruption for travel to, from and between key towns within Argyll & Bute, and for communities accessed via the strategic road network.	This route corridor offers enhanced resilience, through the provision of an alternative route, for both strategic A83 Trunk Road traffic accessing Cowal & Bute and Mid-Argyll, Kintyre and the Islands, and for local traffic travelling to / from and between key towns and communities within Argyll & Bute. The impact of landslide induced closures on the existing A83 Trunk Road, between Cairndow and Tarbet, is largely mitigated for a proportion of strategic A83 trunk road traffic, as a result of this route corridor. The main landslide risk area on the A83 Trunk Road, at the Rest and be Thankful, is effectively bypassed by this route corridor. While this route corridor potentially includes fixed link crossings, which can be impacted by severe weather (particularly during the winter period) risks of disruption to traffic would be minimised through the design of any structures required. It should also be recognised, however, that the provision of fixed link crossings may remove the need for ferries to be used to complete certain trips. Ferry services can be impacted by severe weather and mechanical issues with vessels. This route corridor may, therefore, offer a more resilient means of travel for trips to and from areas of Cowal, including the key town Dunoon, which, due to the peninsular

		nature of the area, currently has a single road connection (the A815) linking the area to the wider road network. In providing an additional route to the existing A83 Trunk Road (assuming it remains operational) enhanced resilience will be provided for large parts of Argyll & Bute, offering a more reliable connection between the region, the central belt and beyond.
TPO2	Safety – positively contribute towards the Scottish Government's Vision Zero road safety target by reducing accidents on the road network and their severity.	For those trips that utilise the new route corridor, accident reductions would be expected due to the shorter journey times that have attracted them to the new route. During times when the A83 Rest And Be Thankful is closed, the new route corridor would also provide an alternative route on a standard of road likely to be higher than the current diversion route, which includes a section of the A82 Trunk Road, with a known safety record.
TPO3	Economy – reduce geographic and economic inequalities within Argyll & Bute through improved connectivity and resilience.	Through reducing the potential impact of landslides on the trunk road, this route corridor would improve resilience of access to key domestic and international markets. Additionally, as a result of the more reliable connections to the central belt provided, enhanced competitive access between Argyll & Bute and key markets could be realised. Through providing enhanced connectivity and a more direct route to Cowal the route corridor is likely to provide enhanced access to a larger geographical area. The route corridor offers the potential to reduce economic and geographic deprivation, particularly within the Bute & Cowal (Dunoon and Rothesay both have data zones within the most deprived 10%) and, to a lesser extent, Mid-Argyll, Kintyre and Islay regions of Argyll & Bute (Campbeltown has data zones within the most deprived 20%).
TPO4	Sustainable travel – encourage sustainable travel to, from and within Argyll & Bute through facilitating bus, active travel and sustainable travel choices.	Through the provision of fixed links to Cowal, improvements in mobility & inclusion and reductions in transport poverty could be facilitated through the enhanced connectivity provided by this route corridor.

		However, it should be recognised that the infrastructure provided by this route corridor on its own merely facilitate improvements in these areas. Further interventions (such as enhanced public transport services) would be required to score positively against these sub-objectives. It is judged that, as a result of the provision of trunk roads in currently largely rural areas (particularly in Cowal) potential negative impacts on active travel could be experienced by communities within these areas. This includes, but is not limited to, potential reductions in actual or perceived road safety and potential severance issues, which could adversely impact active travel. Investment in a new route corridor within the region would however provide an opportunity to include enhanced active travel provision as part of the design.
TPO5	Environment – Protect the environment, including the benefits local communities and visitors obtain from the natural environment, by enhancing natural capital assets and ecosystem service provision through delivery of sustainable transport infrastructure. An example of ecosystem service provision is improving water quality regulation.	The range and scale of potential environmental effects identified for this route corridor is such that it is likely that extensive environmental mitigation will be needed and there is the potential for a range of significant environmental impacts that could affect ecosystem service provision.

Existing Route Corridor Conditions		
Engineering	Route Corridor Length	The route corridor is approximately 58km long.
	Existing Roads	The route corridor intersects the A82 Trunk Road at its eastern extents and the A83 Trunk Road at its northern extents. The route corridor generally follows the Local Authority operated / maintained 'A' / 'B' / 'C' roads listed below: A817, A814, C09 and A815.

		The route corridor intersects the following Local Authority operated / maintained 'A' / 'B' / 'C' roads. A814, B872, C57, C56, A886 and B839. The route corridor also includes part of the Ministry of Defence owned and operated road between Garelochead and Coulport.
	Existing Accesses	A class road: 2 B class road: 2 C class road: 7 Unclassified road/direct access: 76 Relative to the other route corridors, the lower number of accesses noted above is attributed to a limited number of settlements which the route corridor passes through or bypasses and it's rural setting. All local accesses from the A83 Trunk Road in the area around Glen Croe would be retained should this route corridor be taken forward; however, the additional work to retain these accesses has not been included in the Preliminary Assessment of this route corridor.
	Topography and Land Use	Ground levels in the centre of the route corridor generally rise from the A82 Trunk Road near Shantron, at a height of approximately 17m above ordnance datum, to approximately 180m above ordnance datum north east of Ballymenoch. Thereafter levels generally fall and then undulate between 150m above ordnance datum and170m above ordnance datum for approximately 5 kilometres. To the north of the route corridor centre, levels typically rise steeply and to the south of the route corridor centre levels typically fall steeply. Levels in the centre of the route corridor then start to rise again as the route corridor passes round the southern slopes of 'The Strone', increasing to approximately 200m above ordnance datum. Thereafter ground levels in the centre of the route corridor generally fall towards the town of Garelochhead. Land use within this section of the route corridor is primarily agricultural with pockets of coniferous plantation woodland throughout. There are numerous commercial properties in the form of holiday accommodation towards the eastern extent of the route corridor. Towards the western extent of this section, there are numerous areas of defence land and buildings operated by the MOD. A pair of high voltage electricity transmission lines also pass through this section along the base of Glen Fruin from south to north.

		As the route corridor passes round the east, north and west of Garelochhead ground levels in the centre of the route corridor generally lie between approximately 90m above ordnance datum and 100m above ordnance datum. To the north of the route corridor centre, levels typically rise steeply and to the south of the route corridor centre, levels typically fall towards the town and the Gare Loch. As the route corridor then heads south, away from Garelochhead ground levels in the centre of the route corridor generally rise to approximately 155m above ordnance datum. To the west of the route corridor centre levels typically rise steeply and to the east of the route corridor centre levels typically fall steeply towards the Gare Loch. At this point the route corridor turns west, passing through a long ridge that extends up to approximately 220m above ordnance datum, before crossing Loch Long. Land use within this section of the route corridor is primarily residential and commercial, and mainly associated with properties within Garelochhead. On the eastern side of Loch Long, north of Garelochhead the West Highland Line railway crosses the corridor. Again, there are numerous areas of defence land and buildings, operated by the MOD, throughout this section. After crossing Loch Long the route corridor extends generally south and west, and encompasses an area of land that rises from sea level on the western shores of Loch Long up to the summit of Creachan Mor at approximately 657m above ordnance datum and several other summits to the north west in excess of 600m above ordnance datum. The route corridor also encompasses the base of Glen Finart which includes the Glen Finart Burn as it meanders towards Loch Long. As the route corridor heads north west along Glen Finart, generally following the route of the C09 road, the wide valley floor gradually narrows and ground levels starts to rise. Levels along the C-class road rise up to approximately 160m above ordnance datum, with higher ground extending above 200m above ordnance datum located both to the north and south of the C-class road in the route corridor centre. Ground levels in the centre of the route corridor then generally fall quite steeply, towards Whistlefield on the banks of Loch Eck which is elevated at between 25m and 50m above ordnance datum. Land use within this section is primarily coniferous plantation woodland, which covers most of the lower slopes of the surrounding hillsides. Along the base of the Glen Finart there are agricultural and residential/commercial properties generally located at Ardentinny on the banks of Loch Long and Whistlefield on the banks of Loch Eck. A high voltage electricity transmission line passes through this section from north to south.

		The route corridor then heads generally north, following the A815, which typically follows the eastern bank of Loch Eck for approximately 4 kilometres. Ground levels along the A815 in the route corridor centre are typically between 20m and 30m above ordnance datum. Ground levels to the east of the A815 in the route corridor typically rise steeply towards a line of summits which are in excess of 600m above ordnance datum. As the A815 heads north west and leaves Loch Eck, it typically follows the valley floor and the River Cur. Ground levels along this length of the A815 in the route corridor centre towards Strachur are typically between 30m and 50m above ordnance datum with ground levels in the route corridor both to the south west and north east of the A815, typically rising above the base of the valley. Land use within this section is primarily agricultural with residential/commercial properties located within Invernoaden, Glenbranter and Strachur and numerous other individual properties throughout the section. Again, the lower slopes within this section have significant coniferous planation woodland coverage. The route corridor then heads generally north then north east on the eastern shores of Loch Fyne. Ground levels in the centre of the route corridor, along the A815, are typically at sea level or within approximately20m of sea level. Ground levels to the east of the A815 in the route corridor typically rise steeply towards a line of summits which are generally between 300m and 600m above ordnance datum. Within proximity of the settlement of Ardno, the A815 rises slightly to an elevation of approximately 110m above ordnance datum, with ground again rising to the east within the route corridor and ground falling to sea level to the west of the corridor. As the route corridor heads east it approaches the A83 Trunk Road, and levels start to fall again with the junction between the A815 and the A83 Trunk road elevated at approximately 75m above ordnance datum. In this northernmost part of the route corridor, ground levels surrounding both roads rise steeply. Land use within this section is primarily coniferous plantation woodland, which covers most of the lower slopes of the surrounding hillsides. Along the banks of Loch Fyne there are numerous residential/commercial properties. There are also pockets of agricultural land throughout this section.
	Geology / Geomorphology	The route corridor heads west from the A82 Trunk Road north of Arden and follows the A817, traversing the south-eastern shoulder of Shantron Hill and then following the relatively wide valley of Glen Fruin along its northern margins, before passing over the flat upland terrain at the head of the valley and descending to Garelochhead. The terrain becomes more rugged to the west of Garelochhead, with rock exposed in places, particularly on the existing hillsides. Steep slopes are present on both sides of Loch Long, with forest cover on the slopes to the west of the proposed fixed link crossing.

		West of Loch Long, the route corridor widens, encompassing the steep, rocky terrain of Creachan Mor and the steep sided Glen Finart to the south. The terrain becomes steeper after Sligrachan as the route corridor climbs over the head of the valley and drops down to the A815. The route corridor then follows the A815 along the eastern shoreline of Loch Eck. The loch is bound to the east by steep sided slopes along its full length. Numerous channels provide drainage pathways from the hillsides above Glen Finart and Loch Eck, and it is notable that the majority of the lower slopes are currently forested. The River Cur flows within a steep sided U-shaped valley along the flat valley floor into the northern end of Loch Eck. The route corridor follows the valley to Strachur on the shore of Loch Fyne and then follows the shoreline north bound to the east by steep slopes, again with numerous channels draining the hillsides above, to the junction of the A815 and A83 Trunk Road at the northern end of the route corridor. The superficial geology beneath the route corridor between the A82 Trunk Road and Garelochead is mapped as comprising primarily glacial Till – Diamicton, with localised granular deposits at the eastern tie-in and alluvial deposits along the lower parts of Glen Fruin. Parts of the upper slopes have no deposits recorded, indicative of thin or absent superficial deposits. Extensive deposits of peat are located on the top of many of the hills to the northeast of the route corridor with smaller localised areas to the southwest. Very limited superficial cover is recorded to the west of Garelochead, on both sides of the proposed fixed link crossing and on the approach to Glen Finart. A localised area of peat is located close to the eastern end of the proposed fixed link crossing, and a thin ribbon of Marine Beach (gravel, silt, sand) and Raised Marine Deposits (clay, silt, sand) are recorded along the western shore of Loch Long. More extensive areas of Marine Beach Deposits, Raised Marine Deposits and Alluvium are recorded in Glen Finart, with localised areas of Hummocky (Moundy) Glacial Deposits (diamicton, sand, gravel) present further up the glen and locally on the upper slopes. Extensive deposits of Alluvium are recorded along the base of the valley between Loch Eck and Strachur; these may contain soft or loose deposits. An isolated area of peat is recorded above the A815 at Strachur. Further deposits of glacial Till remain on the slopes above the A815, within valleys around Strachur, and to the north of Ardno. The existing route of the A815 from Strachur to Ardno is shown to be located upon Raised Marine Deposits along the shoreline, with superficial deposits largely absent from the hillside slopes.

		No artificial ground is mapped within the corridor; however, made ground is anticipated within the route corridor in association with existing development. The proposed route corridor is underlain by Dalradian metamorphic rocks, comprising predominantly pelite, semi-pelite and psammite, with some phyllite north of Strachur. A number of igneous dykes of various ages cross the corridor; these are generally oriented east to west or north-northeast to south-southwest. Faulting is indicated throughout the corridor; the orientations are variable, although many are oriented north-northeast to south-southwest, parallel to the longer dyke swarms. Loch Long Fixed Link Crossing In the vicinity of the proposed fixed link crossing across Loch Long, existing information to inform ground conditions is variable. Previous ground investigations have been undertaken around Garelochead. These generally indicate shallow rockhead in the vicinity of the eastern end of the crossing, although some significant deposits of peat (up to 4m) were also recorded. There is no existing information from previous ground investigation at the western end of the crossing, although the absence of superficial deposits in the published mapping indicates they are anticipated to be thin or absent. Similarly, there is no existing information available along the waterline or within the loch at the proposed location of the crossing. The solid geology at the crossing location is recorded to comprise metamorphic rocks of the Beinn Bheula Schist Formation: pelite, semi-pelite and psammite. Descriptions from available borehole logs describe these rocks as 'well jointed' and moderately strong to strong. Additionally, faults of unknown displacement are indicated within the sections of route approaching the crossing across Loch Long. References: • British Geological Survey, Geological Survey of Scotland, 1:63,360/1:50,000 geological map series. Accessed via BGS maps portal https://www.bgs.ac.uk/information-hub/bgs-maps-portal/, October to December 2020. • British Geological Survey, Onshore GeoIndex, https://mapapps2.bgs.ac.uk/geoindex/home.html, accessed October to December 2020. Datasets used include National Landslide Database (NLD), Mass Movement Deposits (1:50,000 scale), Superficial Deposits (1:50,000 scale), Bedrock Geology (1:50,000 scale), Linear Features (1:50,000 scale), Borehole Records.

		• British Geological Survey, The BGS Lexicon of Named Rock Units, https://webapps.bgs.ac.uk/lexicon/home.cfm. Accessed October to December 2020.
	Hydrology and Drainage	This is covered under 'Water Environment' in the 'Environment' part of this table.
	Structures	The following structures are noted within this route corridor. • 2 no. Existing single span watercourse crossings. • 2 no. Existing 3 span watercourse bridges. • 129 no. Existing culverts. • 1 no. Existing rail underbridge on the MOD road to the west of the Portincaple roundabout.
Environment Considerations	Biodiversity, Fauna and Flora	17.5ha of Glen Etive and Glen Fyne SPA falls within the route corridor. 168.8ha of Beinn an Lochain SSSI falls within the route corridor. All of Ardchyline Wood SSSI (176.8ha) falls within the route corridor. 252.9ha of Loch Eck SSSI falls within the route corridor. All of Craighoyle Woodland SSSI (77.6ha) falls within the route corridor. Upper Loch Fyne and Loch Goil Marine Protected Area (MPA) is approximately 0.1km north of the route corridor at closest point. 7.4ha of Ross Park SSSI falls within the route corridor. 149 parcels of woodland listed on the AWI fall within the route corridor, particularly adjacent to the A815, adjacent to the C09 road towards Finart Bay from the A815 and north of Finart Bay towards the Loch Long crossing.
	Population and Human Health	The noise environment in the vicinity of the route corridor is characterised by the road traffic on existing A and B roads. The route corridor passes adjacent to or through settlements containing receptors at St Catherines, Ardnagowan and

		Creggans on Loch Fyne. The route corridor heads south-east at Strachur where it meets the A886 into a rural area, passing Invernoaden on the A815. Once across Loch Long, the route corridor passes through the larger settlement of Garelochhead on the A817 before finishing at Shantron. There are a number of settlements within the route corridor including Faslane, Garelochhead, Ardentinny, Strachur and St Catherine's. HMNB Clyde and Garelochhead Training Camp is located just outside the corridor at Faslane. There are several core paths within the route corridor, including: • C220b (Strachur village back road) • C221a and b (Cowal Way - Strachur to Balliebeg) • C466 (B833 to Dun Diamh part circular Garelochhead) • C280a, b, c and d (Garelochhead to Loch Long Way) • C279f (Helensburgh Pier to Garelochhead via Shandon) • C275b and c (Three Lochs Way, Helensburgh). Cowal Way and Three Lochs Way (long distance walking paths) are also located within the route corridor study area. Cowal Way intersects the corridor study area at Strachur and travels in a south-easterly direction alongside the A815 until it meets Loch Eck. Three Lochs Way follows a similar route to the corridor study area, travelling in a south-easterly direction from Garelochhead to the north of Helensburgh.
	Water Environment	The route corridor crosses or is in the vicinity of multiple water bodies classified under the Water Framework Directive, including: • Six river water bodies, River Cur (u/s Glenbranter), River Cur (Glenbranter to Loch Eck), River Finart, Fruin Water, Finlas Water and Kinglas Water; • One loch water body, Loch Eck; and • Two coastal water bodies, Loch Fyne – Upper Basin and Loch Long (South). The route corridor also crosses approximately 90-100 minor watercourses.

		SEPA Flood Maps (SEPA, 2020) indicates that the route corridor may be at existing fluvial and surface water flood risk on the A815 from Loch Eck, River Finart and River Cur and from existing fluvial flood risk from Allt Ruadh, Allt na h-Airigh, Eas Dubh, Allt Coire No and Kinglas Water during a medium likelihood event (0.5% Annual Exceedance Probability (200-year) event). The route corridor may also be at existing fluvial flood risk on and around the A817 from Fruin Water, Finlas Water, Allt a' Bhaile a' Mhuilinn, Auchengaich Burn and at Garelochhead from the McAulay Burn during a medium likelihood event (0.5% Annual Exceedance Probability (200-year) event). The corridor may be at existing coastal flood risk Loch Fyne and Loch Long during a medium likelihood event (0.5% Annual Exceedance Probability (200-year) event). The Loch Eck SSSI and the Upper Loch Fyne and Loch Goil Marine Protected Area are within the route corridor. The Loch Fyne Shellfish Water Protected Area is within the route corridor. There are Active Aquaculture Sites and Classified Shellfish Harvesting Areas within the vicinity of the route corridor. The route corridor passes through four surface water Drinking Water Protected Areas. No bathing waters are in the vicinity of the route corridor.
	Soils	The route corridor contains a mixture of peaty podzols and gleys, mineral gleys, alluvial soils and brown earths. The ground conditions in the route corridor contain significant peat reserves with a high carbon sink value. Land capability for agriculture (LCA) is generally mid to low value, and ranges from 3.2 – 6.3.[1] Soil type within the route corridor is mixed with peaty podzols, peaty gleys, mineral podzols, brown soils and alluvial soils all present. The route corridor where peat is present predominantly transects peat identified as Class 5 (no peatland habitat recorded, soils are carbon rich and deep peat) and Class 3 (not priority peatland habitat with carbon rich soils and some areas of deep peat) in the Carbon and Peatland 2016 Map. However, the route corridor also transects pockets of peat identified as Class 2 (nationally important carbon-rich soils, deep peat and priority peatland habitat, areas of potentially high conservation value and restoration potential)

[1] The LCA classification is used to rank land on the basis of its potential productivity and cropping flexibility. This is determined by the extent to which the physical characteristics of the land (soil, climate and relief) impose long term restrictions on its use. The LCA is a seven class system. Four of the classes are further subdivided into divisions. Class 1 represents land that has the highest potential flexibility of use whereas Class 7 land is of very limited agricultural value. (James Hutton Institute, 2020 https://www.hutton.ac.uk/learning/exploringscotland/land-capability-agriculture-scotland)

		around Garelochead, Ardentinny, Loch Eck and Strachur. Given the combination of soils, climatic conditions and topography the Land Capability for Agriculture (LCA) Class within the study area is predominantly Class 5 (Class 5.1, 5.2 and 5.3) with Class 4.2 on the more productive mineral soils and Class 6 (Class 6.1, 6.2 and 6.3) on the steeper and higher slopes.
	Air Quality	The route corridor passes through or adjacent to a number of settlements including Shantron, Blairglas, Inverlauren, Garelochhead, Portincaple, Ardentinny, Sligrachan, and Strachur. There are a number of settlements within the route corridor including Faslane, Garelochhead, Ardentinny, Strachur and St Catherine's. There are no Air Quality Management Areas (AQMAs) in the corridor or in the Argyll and Bute council area and current and past annual assessments suggest that it will be very unlikely to be necessary to declare any AQMAs in the future based on current air quality objectives (Argyll & Bute Air Quality Annual Progress Report, 2020). Air quality in Argyll and Bute is considered to be generally very good and complies with all the air quality objectives for Scotland (Argyll and Bute Air Quality Annual Progress Report, 2020). Modelling results for sources of nitrogen dioxide and fine particulates in the Argyll and Bute Air Quality Annual Progress Report (APR) illustrate that background concentrations are very low, with the traffic considered as the main potential source of pollution in the absence of industry hotspots in the region. The Argyll and Bute APR did not identify any areas where air quality objectives may be under threat and where specific actions would be required to improve air quality.
	Climatic Factors	The baseline for climatic factors is not considered to differ greatly between the 11 route corridors. As described in the 'Water Environment' there are several sections of the route corridor that may be at existing fluvial and surface water flood risk on the A815 from Loch Eck, River Finart and River Cur and from existing fluvial flood risk from Allt Ruadh, Allt na h-Airigh, Eas Dubh, Allt Coire No and Kinglas Water during a medium likelihood event. The route corridor may also be at existing fluvial flood risk on and around the A817 from Fruin Water, Finlas Water, Allt a' Bhaile a' Mhuilinn, Auchengaich Burn and at Garelochhead from the McAulay Burn during a medium likelihood event. The corridor may be at existing coastal flood risk Loch Fyne and Loch Long during a medium likelihood event (0.5% Annual Exceedance Probability (200-year) event).

		There are areas of forested land in the route corridor and areas identified in Argyll and Bute's Woodland and Forestry Strategy. Forested areas have a carbon sink value. As described in the Soils section, there are several areas of peatland in the corridor with high carbon sink value.
	Material Assets	The route corridor contains a variety of natural material assets. As indicated in the Climatic Factors section, there are areas of forestry within the route corridor and as listed in the Soils section, there are peat soils present. There are also several built material assets in the route corridor. These include assets for electricity generation at Glen Kinglas at the northern extent of the corridor. There are also several hydro schemes in the route corridor, including sites at Ardno, Ardchyline, Strachyr, Cnon Madaidh, Allt nan Crocan and Drynain. The route corridor generally follows existing road infrastructure including a mixture of 'A' 'B' and 'C' roads. The West Highland Line railway is also within the corridor in proximity to Garelochhead with and existing road crossing. There are waste disposal facilities located in close proximity to the route corridor at Dunoon and Dalinlongart. HMNB Clyde and Garelochhead Training Camp are in close proximity to the corridor at Faslane, likely resulting in a high military presence and heightened security level, particularly around the submarine base.
	Cultural Heritage	There are six Scheduled Monuments and 65 listed buildings, including concentrations near the villages of Strachur and Garelochhead within the route corridor, along with two Gardens and Designed Landscapes (GDLs). Rossdhu GDL abuts (and is partially within) the entire eastern boundary of the route corridor.
	Landscape and Visual Amenity	The route corridor is approximately 58km long. Starting at the north-eastern tip of Loch Fyne the route corridor mostly follows existing roads until Whistlefield (near Garelochhead) where a new road and crossing at Loch Long from Barnacabber to Rosneath Peninsula would be introduced. The route corridor then follows existing roads until it joins the A82 Trunk Road on the western shores of Loch Lomond. Approximately 11 km of the eastern part of the route corridor is located within the LLTNP of which approximately 5km is located the Loch Lomond National Scenic Area (NSA). In addition, another 15km or so of the route corridor is located within the LLTNP in Cowal between Loch Long and Loch Fyne. This section of the route corridor runs through Argyll Forest Park.

		The route corridor runs along existing roads within the North Argyll and East Loch Fyne (Coast) Areas of Panoramic Quality (APQs) on the eastern side of Loch Fyne and passes through Ardkinglas And Strone Garden and Designed Landscape (GDL). There are several Open Space Protection Areas within the study area around Garelochhead and Strachur. This route corridor would cross and likely be visible from two of Scotland's Great Trails, the Loch Lomond and Cowal Way (Strachur to Lochgoilhead section) and the Three Lochs Way (Garelochhead to Arrochar / Tarbet section). Parts of the corridor would also be visible from large sections of Loch Long and Loch Fyne coastline as well as nearby hill walking summits and residential receptor locations. This route corridor is located within the Rugged Mountains Landscape Character Type (LCT), Steep Ridges and Hills LCT, Rocky Coastland – Argyll LCT, Straths and Glens LCT, Straths and Glens with Lochs LCT, Lowland Loch Basin - Loch Lomond & the Trossachs LCT, Open Ridgeland - Glasgow & Clyde Valley LCT, Steep Ridges and Mountains LCT and Open Ridges LCT. There is a large number of Seascape Character Areas (SCAs) within the study area, namely Loch Fyne - Inveraray to St Catherines SCA, Gareloch - Head of Gareloch SCA, Loch Long - Shepherd's Point to Coilessan SCA, Loch Long - North of Blairmore to Shepherd's Point SCA, Loch Long Finnart Oil Terminal to Coulport SCA and Loch Fyne - St Catherines to Newton Bay SCA. Land cover within the corridor for this route option comprises small and scattered settlements, sea and freshwater lochs and coastland, open grassland and moorland, native woodland, coniferous forestry and numerous watercourses.
Traffic		Annual average daily traffic (AADT) flow levels on the A83 Trunk Road in 2019 were 2,300 vpd (vehicles per day) on the stretch between Campbeltown and Tarbert and 4,400 vpd west of Tarbet, with the HGV percentage between 5% and 9%. At the Rest and Be Thankful, A83 Trunk Road traffic volumes were in the order of 4,500 vpd in 2019, with the HGV percentage around 9%, suggesting that, on average, around 400 HGVs pass through Glen Croe, daily. Additionally, around 17% of average daily traffic in 2019, on the A83 Trunk Road within Glen Croe (approximately 800 vehicles) was a light goods vehicle. Approximately 100 buses and coaches per day passed through Glen Croe via the A83 Trunk Road, in 2019. AADT flow levels on the A817 in 2019 were around 2,800 vpd with the HGV percentage around 5%. On the A815, AADT flow levels in 2019 were in the order of 5,500 vpd (around 6% HGVs) north of Dunoon, reducing to around 2,000 vpd (around 8% HGVs) south of the junction with the A83 Trunk Road.

	Travel routes to/from, and within, Argyll & Bute are highly seasonal, with greater volumes of people movements within the region during the summer months (predominantly as a result of increased visitor levels). Due to the geography and topography of the region, seasonal fluctuations in traffic volumes and the presence of slow-moving vehicles, travel times via the A83 Trunk Road between the key main towns/cities can be long relative to the distances involved and unreliable.

Implementability		
Engineering	Topography and Alignment Considerations	Between the A82 Trunk Road at Shantron and Faslane, the centreline of route corridor 4 follows the existing A817. Generally, the topography would allow for compliant horizontal alignment geometry to be achieved throughout most of this length. Sub-standard sections of the existing road have been identified, and should this be utilised in an alignment, then this would require improvement works to be undertaken. While slopes fall towards the centreline from the north, the adjacent ground to the south is generally flatter with few properties immediately adjacent to the carriageway, which could be used for improvements. Compliant vertical alignment geometry should be achievable; however, depressions in the topography with localised steep contours have been identified near Faslane which will influence the alignment. Continuing to follow the A817 to the junction with the A814, both a horizontally and vertically compliant alignment geometry should be possible without extensive earthworks. The topography which the existing military road follows to Coulport is relatively steep, climbing from 90m above ordnance datum to a high point of 200m above ordnance datum over the shoulder of the hill. As the bridge across Loch Long is dictated by the required marine navigation minimum clearance of approximately 75m, the bridge will have significant influence on the vertical and horizontal alignment geometry on the approaches and could require Departures from Standard depending on location. A balance may need to be reached between the location of the structure and the approach alignment geometry. On the western side of Loch Long the topography is particularly steep and falling towards the loch. Alignment will be dictated by the structure, but due to the minimum landing height of approximately 85m above the water level (allowing for +75m navigation clearance and bridge deck), providing a compliant alignment design which follows the corridor centreline down towards Ardentinny will be very challenging. Essentially the route will need to turn

		perpendicularly off the structure and will likely be sub-standard for horizontal and vertical alignment geometry. The centreline of the route corridor travels up Glen Finart from Ardentinny to the junction with A815. A compliant alignment should be achievable for the most part up the wide floor of the valley although Glen Finart Burn, hillside topography and several properties do provide some constraints. Towards the top of the glen, elevation increases from 40m above ordnance datum to a saddle of 150m above ordnance datum over 1.2km and this steep incline will a provide a challenge. On the opposite side of the saddle down to the A815 at Whistlefield, there is a similarly steep drop. Again, this may cause issues for the alignment through this section. The topography will limit available alignment options and will likely result in sub-standard geometry Introducing a tunnel between Glen Finnart to Whistlefield will allow compliant geometry to be achieved. From Whistlefield to the top of Loch Eck, the route corridor centreline follows the existing A815 with steep slopes constraining on the east side and Loch Eck itself on the west. Along the length there are a number of properties which will need to be considered. It is likely that existing route of the A815 will need to be utilised. There are no obvious issues which may cause issue for vertical alignment geometry. Generally, the horizontal alignment geometry should be compliant; however, some sections of sub-standard geometry have been identified. The topography will constrain the available options to easily achieve a compliant design and cuttings/ rock cuts or structural solutions may be required. Heading north to Strachur, the valley floor widens offering more space to the west, although the River Cur meanders and does provide some constraint. On the east side, the centreline continues to be constrained by steep slopes. A compliant vertical alignment geometry is expected along the relatively flat valley floor. Generally, the horizontal alignment geometry will be to standard with available space where improvements are required. Some settlements and properties along the length will need to be considered. Between Strachur and Cairndow, the centreline of the route corridor continues to follow the A815. The centreline is significantly constrained on both sides with Loch Fyne on the west side and steep slopes as well as properties on the east, and any route will likely follow the existing A815 through this section. Along the length, the vertical alignment geometry is expected to be compliant, although localised sections of sub-standard existing geometry have been identified. Localised sections of horizontal alignment geometry are likely to be sub-standard and will need to be improved. At some points along this section of the route corridor achieving a compliant alignment and carriageway cross-section will be extremely challenging, especially at locations with properties immediately next to the existing

		carriageway on the east and Loch Fyne on the west side. To overcome these difficult locations additional engineering works such as retaining walls, steep cuttings or structures might be required.
	Geology / Geomorphology Considerations	The National Landslide Database records landslides to have occurred within the route corridor. It should be noted that additional landslides may have occurred which are not recorded within the database. Potential landslide hazards may require measures to protect any route alignment and this should be considered as part of detailed assessment should this route corridor be retained. The database records landslides to have occurred at the following locations: • To the northeast of Glen Finart (although this location is at the edge of the route corridor and any future landslide at the same location is considered unlikely to affect any road alignment within the corridor due to the slope aspect and topography). The British Geological Survey (BGS) records mass movement deposits in association with this record. • On the slopes of Beinn Bheula on the eastern margins of the route corridor to the east of Invernoaden (although this location is at the edge of the route corridor and any future landslide at the same location is considered unlikely to affect any road alignment within the route corridor due to the slope aspect and topography). Mass movement deposits are mapped in association with this record; however, they do not encroach on the corridor. • Between Strachur and St Catherine's (Loch Fyne). No mass movement deposits are mapped in association with this record. • On the north-facing slopes at the western end of Glen Kinglas close to the A815/A83 Trunk Road junction. The BGS records mass movement deposits in association with this record. • On the south-facing slopes at the western end of Glen Kinglas, close to the A815/A83 Trunk Road junction. Further mass movement deposits are mapped in association with these records, although it is unclear which records, if any, relate to the mapped deposits. Additionally, the local authority provided anecdotal evidence of localised, recurring landslide events at the following locations within this route corridor: • Invernoaden; • Close to St Catherine's, north of Strachur; and • On the A815, close to the junction with the A83 Trunk Road.

		Potential links to deforestation debris entering neighbouring watercourses and blocking culverts were identified in some locations, although no inspection / assessment has been undertaken at this stage. An assessment of other potential issues including potentially difficult ground conditions is summarised below: • Potential for compressible ground associated with deposits of peat, alluvium and raised marine deposits with possible implications for road alignment. These deposits may require excavation and replacement with fill or suitable improvement treatment. • Potential for peat slides to occur in cuttings due to presence of peat deposits on hillsides and at eastern end of fixed link crossing. • Potential presence of soft or loose deposits (Alluvium and Raised Marine Deposits). • Shallow rockhead and variability in rock strength due to the presence of igneous intrusions of high strength which may cause difficulties for shallow excavations and any tunnelled sections. • Faulting can create zones of weak and/or highly fractured rock which may be a significant hazard when tunnelling or excavating cuttings. Conversely, faulting can also create zones of extremely strong 'welded' fault rock, which again would create difficulties for tunnelling or areas of cutting in relation to excavatability. • The presence of faults may provide a preferential pathway for groundwater flow, and groundwater may pose significant issues for excavation in cuttings and for tunnelling if the groundwater table is high. • Faulting in the area of the fixed link crossings, creating zones of highly fractured rock with reduced bearing capacity.
	Hydrology and Drainage Considerations	This is covered under 'Water Environment' in the 'Environment' part of this table.
	Structures Considerations	The following structures are likely to be needed for a new road within this route corridor. • A tunnel approximately 380m long. The eastern approach to the Loch Long bridge is in tunnel. Optionally this may be a deep cutting. • An approximately 1,600m long (1,200m main span) suspension bridge over Loch Long. • A tunnel approximately 4,500m long. The western approach to the Loch Long bridge from Glen Finart. • A tunnel approximately 3,100m long. Under Larach Hill between Glen Finart and the A815 at Whistlefield.

		• An alternative to the above two tunnels could be a more direct tunnel, approximately 6,700m long between the western approach to the Loch Long bridge and the A815 at Whistlefield. • 1 no. New 400m length multispan steel composite viaduct near the tie in to the existing A83 Trunk Road. • Approximately 10 no. new culverts to be retained/upgraded between Whistlefield and Strachur. Constructability, operation and maintenance in relation to structures are discussed elsewhere within the document. Key issues associated with the likely structures are: <u>Loch Long Suspension Bridge</u> • Loch Long's central channel extends to a depth of between 72m and 82m. • The channel is a submarine exercise area. • Power lines cross to the north of the location of the crossing. • The route alignment relies on the use of a portion of the existing MOD road to Coulport (and so would require consent of the MOD). • If the MOD road cannot be utilised, then the approach alignment would have to originate from the Portincaple roundabout and cross the railway line to the west with a new rail underbridge. • The high and steep topography of the Loch Long shorelines dictates that a crossing is not principally governed by the plan arrangement but by the vertical profiles of the valley and the alignment and gradients of the crossing approaches. • The elevation of the existing MOD road on the east side is comparatively high in relation to the surface level of Loch Long. Moreover, the MOD road rises as it runs south from the Portincaple roundabout. • The bridge design aim would be to minimise its length while setting its deck level at a height above Loch Long to enable the passage of commercial and military marine vessels. The Defence Infrastructure Organisation (DIO) have advised that the required minimum clearance is +75m above sea level. For the purposes of initial estimation, an allowance of 5m is made for the maximum deflection of a suspension bridge deck and 5m for its construction depth. Thus, the carriageway height would require to be at least +85m above loch level. • Topography on east and west shores dictates that the bridge deck level must be set higher to minimise tunnel lengths on the east side from the MOD road. The carriageway level on the proposed crossing has

		therefore been set higher at a level of +110m above the surface level of Loch Long. The vertical alignment in the eastern approach tunnel therefore falls 20m over its length of 380m, a gradient of approximately 5%. • The loch's bathymetric profile has consequences for the towers, whether for suspension or cable stayed bridge forms. To minimise tower foundation depth, the towers would preferably be on the shorelines resulting in a lengthened single suspended or stayed span. Moreover, the towers would preferably be onshore to avoid interference with the submarine area, obviate ship collision measures and to avoid difficult foundation construction on steeply sloping sub-surfaces. The valley profile dictates that there is limited space for the backspans and cable foundations. • It is estimated that the suspension bridge solution would comprise a main span of approximately 1,200m with back spans of up to 150-200m (total length up to 1,600m). • The bridge must remain straight with consequences for the approach alignment on the west shore. • Suspension cables must anchor into rockhead above the tunnel entrance portals. • High tower construction on the Loch Long Bridge. If deck height is above 100m, tower heights are estimated to be 250 to 300m. • The bridge deck must be wind resilient and will require wind barriers similar in form to those provided on the Queensferry Crossing. However, a slender single carriageway long span suspension bridge presents a design challenge to ensure the adequacy of the deck's aerodynamic response. • Consideration should be given to winter resilience of the Loch Long cable supported bridge, principally deck surface and cable/tower de-icing. • The route joins the existing A83 Trunk Road at Cairndow by means of a 400m long structure, likely to be a composite steel multispan viaduct. The bridge would likely be of conventional design but consideration must be given to the possibility of cross-wind effects. <u>Approach tunnels required for Loch Long Fixed Link Crossing</u> This section will firstly consider the short tunnel to the east of the suspension bridge, then subsequently consider the longer tunnels options proposed. Eastern Approach Tunnel • A tunnel is considered to be required to satisfy a practical road alignment through hillside to the bridge. The proposed tunnel would be approximately 380m in length with a gradient of 4% descending to the bridge.

		• It is likely that the tunnel would be constructed as a single bore providing a single carriageway with bi-directional traffic through the tunnel. There are important fire life safety, and associated ventilation and escape provisions, backed up by European and National highways standards that will govern the tunnel configuration, but due to the short length of the tunnel, fire management and escape from an incident are greatly simplified. • Although a tunnel of this length does not specifically fall within the scope of the EU Directive or the Road Tunnel Regulations, and is too short for any significant build-up of pollutants, a semi-transverse ventilation system should be considered, based on traffic flow levels and climatic conditions. In addition, an escape duct should be considered as for the other longer tunnels, but no escape shafts would be necessary • A twin bore, dual carriageway tunnel may be more appropriate, particularly if the bridge design evolves into a dual carriageway. Western Approach Tunnel • A tunnel is considered to be required to satisfy a practical road alignment through the route corridor. The proposed tunnel would be approximately 4.5km in length with a constant gradient of about 2% descending in an elongated "S" from the bridge portal at the NE to the south-west to emerge at a portal in Glen Finart to the SW. • It is initially considered that the tunnel may be constructed by a single bore providing a single carriageway with bi-directional traffic through the tunnel; however, there are important fire life safety, and associated ventilation and escape provisions, backed up by European and National highways standards that will govern the tunnel configuration. • For a single carriageway, bi-directional tunnel, these provisions are quite complex. The ventilation system must be in permanent operation and in the event of a fire, smoke and heat have to be removed from the tunnel using semi-transverse ventilation, which draws the smoke and heat into an overhead duct. In a long tunnel such as this, exhausts are likely to be required through intermediate shafts. Escape from the fire is also more problematic in that an escape duct has to be provided within the tunnel section. People trapped in the tunnel cannot be expected to be able to walk far through such a narrow duct, and so intermediate shafts or a parallel escape bore must be provided to facilitate escape to free air. Given the depth of intermediate shafts of 300m deep or more, lifts and a recovery suite at the shaft head would have to be provided. Alternatively, a parallel rescue bore could be constructed parallel to the main bore with enough space for

		rescue vehicles. • Accordingly, a twin bore, dual carriageway tunnel may be more appropriate. In such tunnels, in the event of a severe vehicle fire, longitudinal jet fan ventilation is ramped up to full strength to blow the smoke and heat in the direction of flow of traffic, away from vehicles queued behind the incident, while those ahead of the incident escape by continuing as normal. For those trapped in the tunnel, they can escape into the other non-incident bore through cross-passages, at say 100-300m intervals, and can be evacuated by rescue vehicles. Intermediate shafts would not typically be required other than to vent pollution. <u>Other proposals for Western Approach Tunnel</u> The other proposals for a 3km tunnel under Larach Hill to Loch Eck and for a 6.7km tunnel from the western bridge portal to Loch Eck are proposed at reasonable gradients and alignments, and the text for Western Approach Tunnel above would apply also.
	Constructability Considerations	<u>Major Structures Constructability Considerations - Bridges</u> Loch Long Bridge The following key considerations apply to the construction of the Loch Long bridge: • Significant interfaces with the potential tunnel portal on the west bank of the loch which could delay commencement of the bridge construction due to the presence of the anchors near the portal entrance. • The design aim would be to locate the towers onshore avoiding interference with surface and submarine vessels and minimising or eliminating ship collision protection. This would also make construction of the towers simpler by removing the need to work in deep water and providing working platforms using barges or jetties. • There is minimal existing access to the bridge location on the west shore and no significant access on the east. Temporary access would need to be provided in advance both for the bridge and tunnel entrances. These works will likely involve use of some hill climbing plant and extensive construction of temporary retaining walls or permanent cuttings in the slope. • The single carriageway bridge deck will require high twin legged ‘A-frame’ towers founded on rock. Their proximity to the shoreline suggests that foundation installation may have to be designed for underwater construction or complex temporary works will be necessary to exclude water ingress for construction in the dry. The reinforced concrete towers would be constructed incrementally by jump forming with concrete

		being pumped up the towers as their height incrementally increases. Concrete volumes would warrant batching plants on site on the east and west shores (for the east shore, ready mix delivery may also be feasible). • Steel box deck segments would be fabricated nationally and/or internationally and delivered to a staging area at a nearby facility. This could be as far as Greenock or Helensburgh with facilities at the staging area for precasting of the composite deck slab, although with increased distance from staging area to site, weather, tidal and navigation management risks increase. • Segments would be transported by barge to below their location in the span. The cable anchorages would be formed first and the twin suspension cables formed by aerial spinning. Main span segments would be progressively lifted onto the suspension catenary progressing out from the towers until closure at midspan. • Lifting would require GPS placement of barges and their station protected by an exclusion zone on the main navigation channels in Loch Long. This will clearly affect marine vessel navigation. The duration of barges on station for the lift is expected to be comparatively lengthy at approximately 12 – 16 hours. This allows for anchoring (2- 3 hours) and strand jack lifting which, owing to the deck height, could take up to 12 hours to achieve. For the relatively prolonged operation, wave height and wind conditions may limit the number of available weather windows for lifting unexpected or variable conditions 'on the day' impede the lifting operations. • Climbing tower cranes fixed to the main towers will lift materials and equipment to deck level. • DIO consultation will be required for a number of specific security and operating restrictions such as; o potential restriction to deck access during the passage of military or large oil transportation vessels. o Construction activities effect on secure channel communications between RNAD Coulport and nearby refuelling and berthing/arming facilities. o The possible effect of a large-scale bridge structure on radar and sonar. o Security exclusion zones. • The suspension bridge construction could have a potential impact on commercial and fishing activities. • Construction of the short section of tunnel on the eastern side of Loch Long may be required to be completed in advance of the bridge construction both to enable improved access to the bridge and so that conflicts between the tunnel and anchor construction can be mitigated. The tunnel construction should be relatively standard for this type of structure with access from the road to Coulport in the east. Temporary diversion of this road may be needed to construct the new junction. • Access for construction traffic from the A815 from Whistlefield is limited by the existing road infrastructure both in the near field; in Glen Finart the approach tunnel(s) and road improvement may need to be significantly advanced to allow access to the west bridge landfall. In the far field, the supply/transport route

		through the A83 Trunk Road at Glen Croe will remain vulnerable to landslide closure throughout the construction period. <u>Major Structures Constructability Considerations – Tunnels within Route Corridor 4</u> This section will firstly consider the short tunnel to the east of the suspension bridge, then subsequently consider the longer tunnels proposed. Eastern Approach Tunnel • The tunnel could be advanced by drill and blast techniques or by using a large Tunnel Boring Machine (TBM). • Whichever technique is used, short sections of cut and cover tunnel would be required at each portal location to form a vertical portal face in reasonably competent rock from which the tunnel can be advanced. At each drill-and-blast advance the flat-bottomed "horseshoe"-shaped excavation of newly cut rock would be evaluated by a geologist and strengthened using a combination of rockbolts and sprayed concrete (SCL), to form a stable primary lining before the next advance is drilled and charged with explosive. Once the tunnel is completed an in-situ cast secondary lining can be installed to form a durable final structure. • Alternatively the tunnel can be bored using a large Tunnel Boring Machine (TBM), starting at one end and boring the 380m of tunnel consecutively. However this involves a large capital investment in a TBM and large site set-up at the portal locations, when compared with drill-and-blast, and it is very unlikely that it would be economic to use a TBM for this tunnel. Western Approach Tunnel • The tunnel could be advanced by drill and blast techniques or by using a large Tunnel Boring Machine (TBM). • Whichever technique is used, short sections of cut and cover tunnel would be required at each portal location to form a vertical portal face in reasonably competent rock from which the tunnel can be advanced. At each drill-and-blast advance the flat-bottomed "horseshoe"-shaped excavation of newly cut rock would be evaluated by a geologist and strengthened using a combination of rockbolts and sprayed concrete (SCL), to form a stable primary lining before the next advance is drilled and charged with explosive. Although this may seem a slow and laborious process it can be an economic method to construct tunnels in rock. The tunnel can be completed more quickly if the drill-and-blast sequence can be repeated at the opposite portal, or even from intermediate shafts. Once the tunnel is completed an in-situ cast secondary lining can be installed to form a durable final structure.

		• Alternatively the tunnel can be bored using a large Tunnel Boring Machine (TBM), starting at one end and boring the 9.3km of tunnel consecutively. Although this involves a large capital investment in a TBM and large site set-up at the portal locations, when compared with drill-and-blast, the final circular structural lining of pre-cast segments can be formed as the tunnel advances. The construction of a portal at the north-east end of the tunnel adjacent to the bridge over Loch Long is likely to be problematic due to the elevation, slope, and proximity to the bridge abutment. Access may be preferred from the SW end of the tunnel, via Loch Long and Glen Finan, and associated improvement of the existing road in Glen Finan. Other Tunnels The other proposals for a 3km tunnel under Balliemore to Loch Eck and for a 6.7km tunnel from the western bridge portal to Loch Eck are proposed at reasonable gradients and alignments, and the text for the Western Approach Tunnel above would apply also. <u>Other Constructability Considerations – Road and Small Structures</u> Coulport to Shantron (junction with A817/A82) Road improvement on this section of the A817 are currently assumed to require widening at existing road level only, so significant earthworks and other heavy civil engineering activities are not anticipated for this part of the scheme. The widening works would require the traffic to be restricted to a single lane on the opposite side of the road from where the work is being carried out with work progressing linearly along the road in small construction sections for each work front. The number of sections under progress may be restricted according to traffic modelling requirements. Some minor bridge replacements on the route may be required and would likely require extensive diversions to allow for road closures during demolition and construction, although it may be possible to utilise temporary bridges to open up the road or divert locally. At Coulport the route comprises a short tunnel and suspension bridge over Loch Long, which have been assessed above. Barnacabber to Whistlefield Inn This section is a new route that connects the A815 to the west side of Loch Long. The options for construction involve either a single 6.5km tunnel directly connecting the A815 to the loch west bank NE of Ardentinny, two tunnels in series from the A886 at Whistlefield linking via the Barnacabber valley or a combination of tunnels and new surface roads following the Loch Long shoreline from Barnacabber. The latter of these options would likely result in

		increased disruption to residents with the increased online works, but could be balanced with the reduced tunnelling and potential reduction in site traffic on the local roads. In addition to the observations for the tunnels raised above, the following are key considerations within this route corridor: • Access to the working areas is very limited by existing road with only the A815 at the western providing possible access from the west. Other widening works on this stretch of road are likely to impact the capacity of this road also, making its use undesirable for delivering materials and tunnelling spoil removal. As a result it may be desirable to establish a marine loading facility on Loch Long at the bottom of the valley and establish a haul road network from the works area to the facility. This would likely include a haul road up to the interface with the proposed bridge over Loch Long where the eastern tunnel portal is located, which could also be used to support construction of the bridge. If a haul road were created here then it may be easier to combine with a permanent road on the side of the mountain to connect from the bridge to Ardentinny and through the valley, making this option in combination with a smaller tunnel potentially more favourable. • Road construction on the side of the mountain would be relatively complex due to the slope. The work would likely involve use of soil nailing and retaining wall systems on the loch side to enable construction of the road from behind the retainment as it is built up, but in early stages hill climbing plant may be needed to get work started. • At the western end of the tunnel where the route joins the A815, the portal would be ideally relocated further from the road to provide adequate construction space. • Construction of the tunnels is very likely to require vertical shafts which could present a challenge for access, particularly under the mountain peak for the extended single tunnel, requiring extended access routes to accommodate the steep gradients. Whistlefield Inn to Cairndow (A815) Road improvement on this section of the A815 are currently assumed to require widening at existing road level only, so significant earthworks and other heavy civil engineering activities are not anticipated for this part of the scheme. The widening works would require the traffic to be restricted to a single lane on the opposite side of the road from where the work is being carried out with work progressing linearly along the road in small construction sections for each work front. The number of sections under progress may be restricted according to traffic modelling requirements. Some minor bridge replacements on the route may be required and would likely require extensive diversions to allow for road closures during demolition and construction, although it may be possible to utilise

		temporary bridges to open up the road or divert locally. The northernmost point of the route corridor is where the proposed new Trunk Road alignment meets the existing A83 Trunk Road at Cairndow. At this point, the new Trunk Road alignment is completed by a new 400m multispan steel composite bridge deck on leaf piers and piled foundations.
Environment Considerations	Biodiversity, Fauna and Flora	17.5ha of Glen Etive and Glen Fyne SPA falls within the route corridor. There could be temporary and permanent habitat loss within the SPA, which would be a major negative environmental effect. Disturbance to breeding golden eagle, a designated feature, could occur during construction and operation. This would be a major negative environmental effect. 168.8ha of Beinn an Lochain SSSI falls within the route corridor. There could be temporary and permanent habitat loss within the SSSI, including the loss of designated features tall herb ledge and upland assemblage, which would be a major negative environmental effect. Moderate negative environmental effects could also occur as a result of nitrogen deposition. All of Ardchyline Wood SSSI (176.8ha) falls within the route corridor. This could result in considerable temporary and permanent loss of SSSI habitat, including the loss of designated features upland oak woodland, which would be a major negative environmental effect. Moderate negative environmental effects could also occur as a as a result of nitrogen deposition. 252.9ha of Loch Eck SSSI falls within the route corridor. There could be temporary and permanent habitat loss within the SSSI, including the loss of designated features bryophyte assemblage, flood-plain fen and oligotrophic loch, which would be a major negative environmental effect. Moderate negative environmental effects could also occur as a result of nitrogen deposition. All of Craighoyle Woodland SSSI (77.6ha) falls within the route corridor. This could result in considerable temporary and permanent loss of SSSI habitat, including the loss of designated features bryophyte assemblage and oligotrophic loch, which would be a major negative environmental effect. Moderate negative environmental effects could also occur as a result of nitrogen deposition. Upper Loch Fyne and Loch Goil MPA is approximately 0.1km north of the route corridor at closest point. Pollution during construction and operation of crossing could adversely affect the MPA, which could be a major negative environmental effect. 4.7ha of Ross Park SSSI falls within the route corridor. There could be temporary and permanent habitat loss within the SSSI, including the loss of designated features lichen assemblage and Scottish dock, which would be a major

		negative environmental effect. Moderate negative environmental effects could also occur as a result of nitrogen deposition. There are 149 parcels of AWI within the route corridor. This could result in the loss of nationally important and irreplaceable habitat, which could require compensation, and would be a major negative environmental effect. During operation, there is potential for habitat loss and fragmentation for protected species as a result of tree and vegetation clearance and loss of AWI. There is potential for negative effects on terrestrial and aquatic species from construction activities, as follows: • Disturbance from noise and vibration and light pollution; • Injury or mortality from vegetation removal, vehicle movements, or becoming trapped in uncovered holes and pipes during construction; • Fragmentation and loss of habitat suitable for shelter, foraging and commuting; and • Changes in water flow conditions from runoff, or alterations to watercourses and groundwater.
	Population and Human Health	There is potential for localised noise and vibration effects on receptors close to the within the route corridor during the construction phase. For example, noise nuisance and vibration caused by traffic and activities associated with construction works could result in general annoyance and/or sleep disturbance for local residents. During the operation phase, there is potential for receptors close to the route to experience noise and vibration effects from increased vehicle traffic. It is uncertain at this stage whether noise and vibration impacts would be significant during construction and operation. Construction of watercourse crossings and tunnelling options in particular could result in a longer construction period and could involve activities such as piling, with high levels of noise and vibration. As there are a number of settlements within the route corridor, in addition to noise and vibration there is potential for other effects on population receptors resulting from construction traffic. Increased traffic volumes and construction activities could result in diversions and affect journey lengths for both vehicle travellers and non-motorised users (NMUs).

		During operation, the watercourse crossing from Cowal to Garelochead would provide significant journey time savings for vehicle travellers around Loch Long and the corridor would improve connectivity between the central belt and Argyll and Bute. It is expected that the route corridor would provide greater accessibility to the Cowal Way, Three Lochs Way and the core path network in and around the corridor. There is also potential for paths to be severed as a result of the corridor. Land-take from properties would be required to facilitate the operation of the route corridor. Land take and potentially demolition would also be required in order to construct the tunnels, as described in the 'Structures Considerations' section, that would be necessary to provide a road through the challenging topography to the west of Loch Long and north-west of Glen Finart. There is also potential for localised effects from air on human health; these are discussed further under Air Quality.
	Water Environment	Construction within the route corridor and operational structures and discharges may affect the hydromorphology and surface water quality of approximately six Water Framework Directive (WFD) classified river water bodies, two WFD coastal and one loch WFD water body and approximately 90-100 minor watercourses. SEPA Flood Maps (SEPA, 2020) indicates that the route corridor may be at fluvial and surface water flood risk on the A815 from Loch Eck, River Finart and River Cur and from fluvial flood risk from Allt Ruadh, Allt na h-Airigh, Eas Dubh, Allt Coire No and Kinglas Water during a medium likelihood event (0.5% Annual Exceedance Probability (200-year) event). The route corridor may also be at fluvial flood risk on and around the A817 from Fruin Water, Finlas Water, Allt a' Bhaile a' Mhuilinn, Auchengaich Burn and at Garelochhead from the McAulay Burn during a medium likelihood event (0.5% Annual Exceedance Probability (200-year) event). The route corridor may be at risk of coastal flooding along Loch Fyne and Loch Long during a medium likelihood event (0.5% Annual Exceedance Probability (200-year) event). Potential for coastal flooding from the new crossing on Loch Long, which could impact flooding on associated road infrastructure. • May affect the Loch Eck SSSI and the Upper Loch Fyne and Loch Goil Marine Protected Area. • Loch Fyne Shellfish Water Protected Area is within the route corridor and may be affected by the corridor.

		• Active Aquaculture Sites and Classified Shellfish Harvesting Areas within the vicinity of the route corridor may be affected. • Four surface water Drinking Water Protected Areas may be affected. Construction and operation within the route corridor could result in major negative environmental effects on the water environment.
	Soils	The route corridor is assessed as having a minor negative or uncertain environmental effect. This recognises the route corridor is likely to avoid potential effects on Class 2 peatland habitat (nationally important and of potentially high conservation value and restoration potential). Loss of existing commercial forestry and land identified as Preferred and Potential within the Argyll & Bute Woodland Strategy is likely to be unavoidable within the route corridor.
	Air Quality	There is potential for localised air quality effects on receptors within the route corridor during the construction phase: for example, dust generated from site activities, which includes construction of a large structure across Loch Long, and emissions from vehicular movements, which could result in annoyance for local residents. There is potential for receptors within the route corridor to be affected by pollutant emissions (e.g. carbon monoxide, sulphur dioxide, particulate matter) from vehicle traffic during operation. Although the existing air quality in the region is good, there are a number of settlements within the route corridor which could potentially experience air quality negative effects; however it is expected that these would be reduced through mitigation measures. Potential air quality impacts on ecological receptors are assessed under Biodiversity, flora and fauna.
	Climatic Factors	The route corridor generally follows the existing A817 and A814 carriageway. As outlined in the Material Assets section, major structures would be required, which could have major negative environmental effects on climate due to the release of embodied carbon emissions associated with the construction materials and installation process Once operational, forecast traffic levels (and associated vehicle-derived greenhouse gas emissions) are considered to be relatively moderate to high for this route corridor. With the predicted shift towards electric vehicles this would reduce in the future. Additionally, the corridor would reduce the driving distance for some journeys due to the introduction of the watercourse crossing at Loch Long, which over time would likely result in carbon savings. Effects on the corridor as a result of predicted changes to the climate and weather should also be considered. Sections of the route corridor are situated within or in close proximity to zones which may be at risk of coastal or

		fluvial flooding as indicated in the 'Water Environment' section. The anticipated increase in severity and frequency of rainfall events caused by climate change could pose greater risk from flash-flooding. As described in the 'Soils' section, the route corridor is assessed as having a minor negative or uncertain environmental effect as there are several areas of peatland in the corridor with high carbon sink value. Construction on these areas would degrade the land and release the sequestered carbon. As outlined in the Biodiversity, Flora and Fauna section, felling of forestry would be required in the route corridor which would reduce carbon sink value of forests and could result in major negative effects. Woodland and Forestry Strategy areas, including existing planted woodland, potential, preferred and sensitive sites, need to be considered in the route corridor selection process.
	Material Assets	As outlined in the Climatic Factors section, there are several natural material assets including woodland, peat soils and farmland that could be affected by the route corridor. Loss of these natural material assets would result in minor negative or uncertain environmental effects for soils and major negative effects on woodland. As outlined above in the 'Climatic Factors' section, there is likely to be a significant amount of material usage and waste generated to construct the route corridor, largely as a result of the watercourse crossing structures, carriageway construction and upgrades. The watercourse crossing structures in addition to the carriageway construction would require significant raw material inputs and energy usage, resulting in a major negative environmental effect from a built material assets perspective from the following: • 5.5km of upgrading and widening of the existing roads along the route corridor length of new carriageway is required to be constructed • Construction of an approximate 1,600m long (1,200 main span) structure over Loch Long. • Construction of tunnels as described in the 'Structures Considerations' section. • Construction of an approximate 400m long structure near the A83 Trunk Road tie in. • Considerable engineering works would be required to upgrade the existing single-track C09 road to trunk road standards as well as localised realignment works.

	Cultural Heritage	Due to the relatively high numbers of cultural heritage resources within the route corridor (compared to corridors 1 to 3) and the locations of these, it is considered unlikely that a route within this route corridor could be developed that would avoid major negative effects on these.
	Landscape and Visual Amenity	There is potential for major negative environmental effects on the, the special qualities of the LLTNP and the Loch Lomond NSA, the North Argyll and East Loch Fyne (Coast) APQs, one GDL and the local landscape and seascape character due to the construction and operation of the carriageway and supporting infrastructure. There is also potential for major negative visual effects for residential receptors in proximity to the route corridor, as well as vehicle travellers using the existing roads and people on long distance walking routes and Highland summits within the study area. Construction of the new structure at Loch Long would affect the landscape character and visual amenity of the area.
Traffic	Traffic Flows	Due to the improved road links to Cowal, associated with this route corridor, within the context of typical traffic levels on the existing A83 Trunk Road, traffic using this corridor is forecast to be relatively high, with a corresponding reduction in traffic on the A83 Trunk Road through the Rest and Be Thankful (potentially between 25 and 75%) in 2027. This assumes that the Rest and Be Thankful is operating under normal conditions. There will be a degree of local re-routing of trips for vehicles accessing the new route corridor, with traffic increases forecast on the A814 between Dumbarton and Arrochar, and on the A815 between Dunoon and its junction with the new road. Corresponding decreases are expecting on other routes, for example, the A82 Trunk Road between Dumbarton and its junction with the A817 and along the A83 Trunk Road / A815 corridor between Tarbet and Strachur.
	Accidents	For those trips that utilise the new route corridor, accident reductions would be expected due to the shorter journey times that have attracted them to the new route. During times when the A83 Rest And Be Thankful is closed, the new route corridor would also provide an alternative route on a standard of road likely to be higher than the current diversion route, which includes a section of the A82 Trunk Road, with a known safety record.
Operational Considerations		From a Trunk Road operation perspective, the main operational considerations within the route corridor are the risk of flooding and/or landslides where it passes through valleys and next to waterbodies, based on the steep topography in these areas. In some areas, the centreline of the route corridor has a maximum elevation of approximately 200m above ordnance datum, with significant adjacent peaks providing shelter. This means it is likely that in these areas, snow accumulates within the corridor during the winter months, with potential winter resilience

	operational issues. A further operational consideration in this route corridor is the ongoing MOD operations associated with Faslane and RNAD Coulport. It is possible that these operations could restrict access for periods of time, particularly along the MOD controlled section from the A814/ B872 and the new fixed link over Loch Long. Bridges within Route Corridor 4 Long span bridges will require the Trunk Road Operating Company to maintain an on-site bridge management and control facility with bridge traffic management and control, communications with Traffic Scotland, marine navigation and MOD liaison along with inspection, maintenance and repair capabilities. Additionally, facilities will be required for maintaining equipment and collecting telemetry from a Structural Health Monitoring System. Tunnels within Route Corridor 4 • There is a need for regular inspection and maintenance of the tunnels. A tunnel manager, tunnel safety officer and a tunnel design & safety consultative group (TDSCG) must be set up early in the design process and continue through operation. The location and type of tunnel operations centre would need to be reviewed and investigated further, depending on the final location and length of tunnel provided. • A sufficient power supply will be required to allow operation of the tunnel ventilation system, if used, and any other systems, particularly those required in the event of an emergency incident. • The use of the tunnel by vehicles carrying potentially hazardous materials or dangerous goods (such as fuel tankers) is largely dependent on fire safety and ventilation, and may require a tunnel ventilation system that allows for a larger design fire size. Dependent on the evaluation of risks, dangerous goods vehicles may need to be escorted through the tunnel in a convoy. It should be noted that a twin bore dual carriageway tunnel configuration is considered likely to result in fewer road traffic accidents (due to no bi-directional traffic flow), theoretically attracting a lower risk of emergency incidents. • The development of any tunnel design should be informed by consultation with emergency services and other relevant stakeholders and guided by European and National Standards to ensure that appropriately robust measures in the event of an emergency incident are put in place.
Financial Considerations	The estimate cost range of a scheme within this route corridor is approximately £3.34Bn - £4.40Bn.

Estimated Time to Completion	It is estimated it would take approximately 16-17 years to achieve a fully operational scheme in this route corridor assuming constructed as a single contract. If construction was phased with contracts in sequence, the time for completion would be greater.
Public Acceptability	Consideration of the feedback received during the public consultation held during September / October 2020 shows that the balance of positive and negative sentiment for this route corridor is more evenly balanced, or at least less clearly positive or negative overall.

STAG Criteria		
Criteria		Assessment Summary
Environment		Refer to Implementability Assessment – Environment
Safety		Refer to Implementability Assessment – Accidents
Economy	Transport Economic Efficiency	Based on traffic forecasting for 2027 using Transport Model for Scotland (TMfS14), journey time savings between Tarbert and Glasgow are forecast to be negligible (<5 minutes) in 2027. Journey time savings between Dunoon and Glasgow are expected to be moderate (in the region of 15-45 minutes) compared with existing road only options, following the construction of this route corridor. A high-level cost-benefit analysis undertaken for the different route corridor options proposed suggests that, assuming normal operation of the existing A83 Trunk Road, the benefit to cost ratio for the proposed corridor is expected to be very low. Quantification of the economic benefits of the scheme will require further analysis of the cost of closures to the economy.
	Wider Economic Impacts	This route corridor offers substantial changes in connectivity and, therefore, is best not solely characterised as a solution to unreliability at the Rest and Be Thankful. Rather, it provides the opportunity to radically improve connectivity to some of the remote communities of Argyll and Bute. The route corridor offers more direct connections from Cowal to the more populous areas of Garelochead and Helensburgh, providing substantial improvements in onward journeys to the central belt. The route corridor, therefore, has the potential to provide a significant positive contribution towards wider economic benefits for Argyll & Bute. Significant benefits would likely be provided for key sector businesses, such as whisky, aquaculture and tourism, through enhanced access to both national and global markets. It is also worth noting that, while rural depopulation (a significant issue within Argyll & Bute) is linked to wider economic outcomes, indications are that headline economic conditions are not the main driver of this. Transport interventions could likely play a part in arresting population decline, but only if considered alongside an integrated package of economic, cultural and social regeneration measures. A

STAG Criteria		
Criteria		Assessment Summary
		package of measures of this type, coupled with upgraded access to Kintyre, Bute and Cowal, has the potential to arrest population decline and reinvigorate local communities within Argyll & Bute.
Integration	Transport Integration	An integrated transport system aids accessibility by connecting people to opportunities and goods to markets. This route corridor may provide multi-modal opportunities to enhance transport integration. The intervention provides the opportunity to enhance linkages to walking and cycling routes and core paths. As part of the design process, it will be ensured that NMU facilities provided as part of the intervention address the needs of recreational walkers, cyclists and equestrians, as well as commuters, who may be given the opportunity to travel via active modes to transport interchanges. The intervention may help to reduce issues regarding actual and perceived severance, due to the provision of fixed links, with active travel infrastructure benefiting communities in Cowal, with improved linkages across the corridor to Garelochead and beyond. The intervention will provide enhanced resilience and potential journey time and journey time reliability benefits for strategic and local bus and coach services. The resilience and enhanced connectivity provided may provide bus and coach operators with an opportunity to review timetables, translating to more efficient operations and, potentially, a change in service frequency, scope for interchange between services and the number of communities served. Landslide induced incidents on the A83 Trunk Road at the Rest & Be Thankful can lead to road closures and diversions. Should the Old Military Road also be closed, the diversionary route for A83 traffic between Tarbet and Inveraray is approximately 25 miles longer in length than if using the A83. Depending on journey origin and destination, the longest diversion length experienced by travellers would be over 60 miles. The improved resilience may contribute towards a reduction in the variability of bus journey times and the likelihood of full closures, leading to service cancelations. This may also provide a health and welfare benefit to bus drivers, due to the reduction in instances where bus services are force to travel via longer diversion routes.

STAG Criteria		
Criteria		Assessment Summary
		This route corridor is not expected to have a major impact on the perception of a seamless public transport journey, as ticketing will not be affected to any great extent. However, there is potential for enhanced interchange between bus services, due to the enhanced connectivity provided. The intervention will improve journey time reliability and resilience, providing more efficient opportunities for freight transport, facilitating more efficient and effective transportation of goods of significant value to the regional and national economies, including high value aquaculture produce and whisky.
	Transport and Land Use Integration	The main aspect of appraisal within the transport and land-use integration criteria is identifying and mitigating any conflicts between the intervention and land-use planning policy and environmental designations. If selected as the preferred route corridor, a strategic assessment of the impact of the route corridor on the environment would be carried out in the Strategic Environmental Assessment (SEA). More detailed Environmental Impact Assessment would be carried out as part of the DMRB Assessment Process. The route corridor is expected to support enhanced accessibility to and from developments in the wider region, and may support investment decisions in Argyll & Bute, more generally. The route corridor is, however, judged to deliver slight negative impacts in terms of promoting sustainability and reducing the need to travel. The enhanced connectivity for Cowal provided by this corridor could result in higher levels of traffic as a result of the improved access provided for currently geographically remote communities. While this could result in a short-term negative impact, in terms of delivery against the climate action goals, cognisance of the likely timescales for the delivery of an intervention of this scale should be made, given that it is likely that the regional / national vehicle fleet may be largely decarbonised, by this stage. The overall impact on Land Use Transport Integration is considered to be Minor Negative.

STAG Criteria		
Criteria		Assessment Summary
	Policy Integration	The route corridor contributes to strategic policy objectives set by the Scottish Government and Transport Scotland. A wide range of national and regional level policies from various plans, programmes and strategies have been reviewed, including Argyll and Bute's Local Development Plan, its' Strategic Environmental Assessment and the LLTNP Local Development Plan. The various relevant policies contained within these documents have been taken into account in the TPOs, the existing corridor conditions and the implementability assessment. No over-riding conflicts have been identified and, in specific instances, the route corridor may contribute towards the delivery of specific policies. The A83 Trunk Road was identified in Transport Scotland's STPR as a route requiring network optimisation through route management and targeted investment. Transport Scotland's emerging STPR2 continues to appraise the need for investment in improved access to Argyll & Bute. It is likely that this route corridor will contribute positively to the NTS2 vision and several of the underpinning priorities and outcomes, including 'takes climate action' and 'helps deliver inclusive economic growth'. Achieving positive outcomes against several of the priorities and outcomes, however, will be dependent on the quality and nature of the infrastructure provided, particularly related with the facilitation and promotion of travel via active modes. This route corridor is likely to contribute positively towards the NPF3 vision, in terms of delivering 'a successful, sustainable place', 'a low carbon place' 'a natural resilient place' and 'a connected place'. NPF3 recognises that Scotland's varied coast and islands have an exceptional, internationally recognised environment and notes the opportunity to secure growth from renewable energy generation as well as other key economic sectors including tourism and food and drink (of key importance to the regional economy). It is recognised that infrastructure investment, including improved transport links are required to bring employment, reverse population decline and stimulate demand for development and services in rural areas. This route corridor is likely to contribute positively towards key objectives as set out within Argyll & Bute's Local Development Plan. An intervention within this route corridor will likely assist in the improvement of:

STAG Criteria		
Criteria		Assessment Summary
		- Argyll and Bute's connectivity, transport infrastructure, integration between land use, transportation and associated networks. - Argyll and Bute's main towns and key settlements, as increasingly attractive places where people want to live, work and invest. - the economic and social regeneration of smaller rural communities. - the continued diversification and sustainable growth of Argyll and Bute's economy, with a particular focus on sustainable assets in terms of renewables, tourism, forestry, food and drink, including agriculture, fishing, aquaculture and whisky production. - addressing climate change impacts and reducing the region's carbon footprint. This route corridor is likely to contribute positively towards the strategic principles set out within the LLTNP Local Development Plan. An intervention within this route corridor will contribute to the National Park by aiding the delivery of 'a successful, sustainable place', 'a low carbon place', 'a natural, resilient place' and 'a more connected place'. While the route corridor is likely to largely fit with policies related with transport based emissions, the nature of the construction and engineering activities required to deliver this route corridor are likely to result in significant emissions, on the basis of existing technologies. It is anticipated, however, that efficiencies in construction practices and the materials used, could be identified e.g. sustainably sourced materials, with a lower embodied carbon content. This would aid in ensuring that any emissions associated with construction activities are minimised, as far as practicably possible, making best use of advances in emerging decarbonisation technology. It is expected that the route corridor would be delivered in-line with measures, as set out within the Scottish Government's 'Update to the Climate Change Plan' (2018 – 2032), and associated documents, including the emerging findings from the 'Deep Decarbonisation Pathways for Scottish Industries: Research Report' relating with the decarbonisation of industry, including the construction sector. A further assessment of carbon, and opportunities for carbon reduction in design, would be considered in later stages of the project assessment process.

STAG Criteria		
Criteria		Assessment Summary
Accessibility and Social Inclusion	Community Accessibility	It is considered that this route corridor offers the potential for positive impacts on accessibility, in terms of public transport usage, with enhanced access provided for Cowal. It is considered unlikely, however, that this route corridor would have any significant impact on reducing transport poverty or reducing reliance on private cars. This is primarily due to the nature of the route corridor and the areas within which it is located. There exists an opportunity, through the infrastructure provided, to positively impact on the level of active travel undertaken within the route corridor. While there is the potential for local trips to be made via active modes, and for additional trips to be generated resulting from increased use of the infrastructure provided by visitors and tourists, it is unlikely, however, that the future level of active travel trips within the corridor would be significant. This route corridor provides a potential opportunity for the provision of enhanced parking facilities, improving access to the scenic area within which the route corridor sits. This could provide enhanced access to the natural environment, and to the fixed link which, in and of itself, may be an attractor for visitors and tourists, wishing to park and proceed via active modes. Potential enhancements in resilience provided as a result of mitigating landslide induced closures could aid community accessibility, through better, more reliable access to services, both locally and further afield.
	Comparative Accessibility	Due to the rural nature of the Argyll & Bute region, the distances between key towns and a lack of suitable public transport services (in some areas) car ownership levels are greater than the national average. Due to the current high dependency for travel by car, the scale of accessibility benefits that would be delivered to this main user group through delivery of an intervention within this route corridor include more reliable journeys to employment opportunities, recreation, education and health services located both within and outwith the region.

STAG Criteria		
Criteria		Assessment Summary
		Visitors and leisure users would also likely benefit from NMU infrastructure provided, linking to core paths, existing cycle networks, outdoor activities and viewpoints. The design of such infrastructure should ensure that local communities benefit fully from such facilities and are not adversely impacted by them. Freight users may see health and wellbeing benefits from the enhanced resilience provided by this route corridor, with fewer closures resulting in the need for lengthy diversion routes, which can add a significant duration to journeys, contributing towards driver fatigue and stress. Given the rural nature of the region, journeys made using the A83 Trunk Road, may already be several hours in length. Positive impacts can be expected, in terms of mitigating impacts on socially excluded groups - Argyll & Bute has a higher proportion of older residents than the national average. Enhanced resilience may provide more reliable access to key services, including healthcare. This route corridor could contribute significantly towards reducing economic and geographic deprivation for currently socially disadvantaged groups (Argyll & Bute has several areas within the 10% most deprived communities in Scotland) through the significant improvement of accessibility to Cowal and the enhancement of business confidence driving an associated increase in inward investment and jobs.

Assessment Summary

Transport Planning Objectives		Assessment						
Objective		Major Negative	Moderate Negative	Minor Negative	Neutral	Minor Positive	Moderate Positive	Major Positive
TPO1	Resilience – reduce the impact of disruption for travel to, from and between key towns within Argyll & Bute, and for communities accessed via the strategic road network.						✓	
TPO2	Safety – positively contribute towards the Scottish Government's Vision Zero road safety target by reducing accidents on the road network and their severity.					✓		
TPO3	Economy – reduce geographic and economic inequalities within Argyll & Bute through improved connectivity and resilience.						✓	
TPO4	Sustainable travel – encourage sustainable travel to, from and within Argyll & Bute through facilitating bus, active travel and sustainable travel choices.					✓		
TPO5	Environment – Protect the environment, including the benefits local communities and visitors obtain from the natural environment, by enhancing natural capital assets and ecosystem service provision through delivery of sustainable transport infrastructure.	✓						

Access to Argyll & Bute (A83) Strategic Environmental Assessment & Preliminary Engineering Services
Route Corridor Preliminary Assessment
Route Corridor 4 – A82 – Cowal - Cairndow

Implementability		RAG Rating		
		RED	AMBER	GREEN
Engineering	Topography and Alignment Considerations			
	Geology / Geomorphology Considerations			
	Structures Considerations			
	Constructability Considerations			
Environment	Biodiversity, Fauna and Flora			
	Population and Human Health			
	Water Environment			
	Soils			
	Air Quality			
	Climatic Factors			
	Material Assets			
	Cultural Heritage			
	Landscape and Visual Amenity			
Traffic	Traffic Flows			
	Accidents			
Operational Considerations				
Financial Considerations				

Access to Argyll & Bute (A83) Strategic Environmental Assessment & Preliminary Engineering Services
Route Corridor Preliminary Assessment
Route Corridor 4 – A82 – Cowal - Cairndow

STAG Criteria		Assessment						
Criteria		Major Negative	Moderate Negative	Minor Negative	Neutral	Minor Positive	Moderate Positive	Major Positive
Environment		Refer to Implementability Assessment – Environment						
Safety		Refer to Implementability Assessment – Accidents						
Economy	Transport Economic Efficiency	✓						
	Wider Economic Impacts					✓		
Integration	Transport Integration				✓			
	Transport and Land Use Integration			✓				
	Policy Integration				✓			
Accessibility and Social Inclusion	Community Accessibility						✓	
	Comparative Accessibility						✓	