

Access to Argyll & Bute (A83) Strategic Environmental Assessment & Preliminary Engineering Services
Route Corridor Preliminary Assessment
Route Corridor 6 – Inverclyde – Cowal - Cairndow

Route Corridor Details	
Route Corridor Option	Route Corridor 6 – Inverclyde – Cowal – Cairndow
Route Corridor Description	This route corridor includes a connection from the A78 Trunk Road to Cowal via an approximate 3.9km fixed link crossing of the Firth of Clyde and upgrades along the A815 route corridor, to its connection with the A83 Trunk Road at Cairndow. The approximate overall length of the route corridor is 51km. The fixed link crossing over the Firth of Clyde will present considerable challenges. This area is used by large marine vessels as well as Ministry of Defence (MOD) submarines which are based at Faslane and Coulport. The structure will require to span a deep section of the Firth of Clyde as well as have adequate clearance for large marine vessels.
Rationale for Route Corridor	The Inverclyde – Cowal – Cairndow route corridor was initially identified by the Cowal Fixed Link working group and was subsequently considered as a potential route corridor by Transport Scotland's Strategic Transport Projects Review team. 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 at the Rest and be Thankful to provide access to the central belt via Inverclyde and the A78 Trunk Road and M8 motorway.
Geographic Context	The route corridor lies predominantly within the Argyll & Bute region, which comprises solely of the entirety of the Argyll & Bute local authority area. The southernmost part of the route corridor lies within the Inverclyde local authority area. The route corridor end points are located a straight line distance of approximately 25-37 miles from the city of Glasgow. On the west coast of the Firth of Clyde the town of Dunoon falls within the route corridor extents, the second largest settlement in Argyll and Bute, and connected to the wider area and A83 Trunk Road by the A815. The route corridor heads north along the banks of Loch Eck until it reaches Strachur where it turns north-east along the banks of Loch Fyne. The southern extents of the route corridor is situated on the eastern shore of the Firth of Clyde and the A78 Trunk Road. 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) and there are environmentally designated sites both within and in proximity of the route corridor. With respect to transport links, the route corridor joins the two aforementioned trunk roads and it also crosses the Firth of Clyde in proximity to existing ferry routes between Gourock and Dunoon.
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

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	<p>deprivation levels, both geographic and economic.</p> <p>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.</p> <p>The region's population has been in decline for over a decade, against a backdrop of a population increase at the national level.</p> <p>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.</p> <p>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 provides accessibility to services on the mainland via Kennacraig port, where ferry services depart to Islay with onward connections to Jura and Collonsay.</p>
Economic Context	<p>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.</p> <p>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.</p>

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	<p>The 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.</p> <p>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.</p>
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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.	<p>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.</p> <p>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</p>

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		<p>nature of the area, currently has a single road connection (the A815) linking the area to the wider road network.</p> <p>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.</p>
TPO2	<p>Safety – positively contribute towards the Scottish Government’s Vision Zero road safety target by reducing accidents on the road network and their severity.</p>	<p>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. The relatively low volume of trips re-routing onto the new corridor would indicate that likely accident savings will be low.</p>
TPO3	<p>Economy – reduce geographic and economic inequalities within Argyll & Bute through improved connectivity and resilience.</p>	<p>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.</p> <p>Additionally, as a result of the more direct connections to the central belt provided, enhanced competitive access between Argyll & Bute and key markets could be realised. Through providing enhanced connectivity to Cowal the route corridor is likely to provide enhanced access to a larger geographical area.</p> <p>This 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%).</p>
TPO4	<p>Sustainable travel – encourage sustainable travel to, from and within Argyll & Bute through facilitating bus, active travel and sustainable travel choices.</p>	<p>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.</p>

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		<p>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.</p> <p>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.</p>
TPO5	<p>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.</p> <p>An example of ecosystem service provision is improving water quality regulation.</p>	<p>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.</p>

Existing Route Corridor Conditions		
Engineering	Route Corridor Length	The route corridor is approximately 51km long.
	Existing Roads	<p>The route corridor intersects the A78 Trunk Road at its southern extents and the A83 Trunk Road at its northern extents.</p> <p>The route corridor generally follows the Local Authority operated / maintained 'A' / 'B' / 'C' roads listed below: A770 and A815.</p>

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		<p>The route corridor intersects the following Local Authority operated / maintained 'A' / 'B' / 'C' roads. A770, A815, A885, B836, A880, C09, C57, C56, A886, and B839.</p> <p>The route corridor also includes part of the Ministry of Defence owned and operated road between Garelochhead and Coulport.</p>
	Existing Accesses	<p>A class road: 4 B class road: 3 C class road: 11 Unclassified road/direct Access: 279</p> <p>Relative to the other route corridors, the high number of accesses noted above is attributed to the route corridor passing through the town of Dunoon and other settlements.</p> <p>All local accesses from the A83 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.</p>
	Topography and Land Use	<p>Ground levels along the centre of the route corridor generally rise from the roundabout on the A78 Trunk Road near Inverkip, at a height of approximately 20m above ordnance datum, to approximately 50m above ordnance datum near Low Lunderston. Across the route corridor width in this area the land generally falls towards the Firth of Clyde from an area of high ground elevated at approximately 140m to 160m above ordnance datum. The route corridor then crosses the Firth of Clyde towards the Cowal peninsula landing generally to the south of Dunoon. Ground levels beyond the western shores of the Firth of Clyde rise very steeply to higher ground that extends round the west side of Dunoon. Ground levels to the west of Dunoon within the route corridor extend up to approximately 250m above ordnance datum and this is situated in expansive forests. The town of Dunoon itself is elevated between sea level and approximately 50m above ordnance datum. As the route corridor heads north from Dunoon towards Sandbank and Dalinlongart, the topography is generally similar to the south, with steep slopes extending up from the immediate shoreline. Dalinlongart Hill is elevated at approximately 200m above ordnance datum with the centre of the route corridor following the A815 at the foot of its north east facing slopes and which forms part of an expansive forest round the hill.</p>

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		<p>Land use within this section of the route corridor is primarily residential/commercial/recreational, the majority of which is associated with the town of Dunoon and Kirn, Hunters Key and Sandbank.</p> <p>Outwith these urban areas, from the junction with the A78 Trunk Road to the crossing of the Firth of Clyde there are a small number of residential/commercial/recreational properties, with the majority of the land within this area being used for agriculture. There are also mixed and coniferous plantation woodland across this section and industrial operations in the form of water treatment works and wind turbines near Underheugh. To the west of Dunoon, Bishop's Glen Reservoir offers recreational activities, and there is extensive coniferous plantation woodland for the entire area between Dunoon and Dalinlongart.</p> <p>The route corridor then heads north, generally following the A815, which follows the eastern bank of Loch Eck for approximately 6 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 through expansive forests towards a line of summits which rise up to in excess of 600m above ordnance datum. As the A815 heads south and leaves Loch Eck, the route corridor typically follows the valley floor which includes the River Eachaig as it meanders towards Holy Loch. The route corridor then continues to follow the A815 away from Dalinlongart passing through several small settlements and the head of Holy Loch, all of which are located at sea level or slightly above.</p> <p>Land use within this section of the route corridor includes coniferous plantation woodland on the lower slopes of the surrounding hillsides. There are numerous residential/commercial/recreational properties throughout this section of the route corridor, particularly adjacent to the River Eachaig. These include a botanic garden, an outdoor activity centre and various holiday accommodations. The land adjacent to the river also includes areas used for agriculture. A high voltage electricity transmission line passes through this section from north to south around Dalinlongart.</p> <p>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.</p>
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		<p>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 plantation woodland coverage.</p> <p>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 approximately 20m 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.</p> <p>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</p>
	<p>Geology / Geomorphology</p>	<p>The route corridor crosses the Firth of Clyde and then follows the shoreline north towards Holy Loch across low-lying, slightly undulating ground and then across steeper slopes north of Sandbank along the toe of Finbracken Hill and Dalinlongart Hills. The route corridor then follows the wide U-shaped valley of the River Eachaig to the north, and along the eastern shoreline of Loch Eck. The River Cur flows within the same 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, with numerous channels draining the hillsides above, to the junction of the A815 and A83 at the northern end of the route corridor.</p> <p>Firth of Clyde Fixed Link Crossing</p> <p>On the east bank, superficial cover is generally patchy. In the vicinity of Underheugh Farm, glacial Till – diamicton is mapped extending inland. Raised Marine Deposits (clay, silt, sand and gravel) are mapped, with beach and tidal flat deposits (clay, silt, sand and gravel) along the shoreline at the southern and northern margins of the route corridor. Tidal flat deposits are more extensive to the south of the route corridor, and pockets of peat are mapped on higher ground to the east.</p>

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		<p>On the west bank, Marine Beach and Raised Marine Beach Deposits (sand and gravel) are mapped, with a small area of no superficial deposits mapped in the central area of the route corridor.</p> <p>No mapping is available within the firth, however geophysical reflection surveys have been undertaken. One borehole is available within the route corridor on the west bank, recording 'sand and gravel' to 16.8m. Schist and strong thinly laminated phyllite is recorded from 16.8m to 20m. A dip of 35° is recorded.</p> <p>The bedrock geology underlying the eastern side of the crossing is mapped as belonging to the Strathgryfe Lava Member comprising basalts in the north of the route corridor. Sandstone belonging to the Clyde Sandstone Formation is mapped in the central area of the route corridor with the Clyde Plateau Volcanic Formation comprising tuff and agglomerate mapped in the south of the route corridor.</p> <p>The strata on along the eastern shoreline are heavily faulted in the area. Faults trend northwest-southeast within the fault block and project into the loch. A thrust fault transects the route corridor approximately 600m offshore, trending northeast-southwest. The bedrock geology and faulting in the vicinity of this landfall is complex and should be assessed in more detail in conjunction with the identification of the crossing location should this route corridor be retained.</p> <p>The bedrock geology underlying the western bank side of the crossing is mapped as belonging to the Dunoon Phyllite Formation comprising pelite. Two igneous intrusions, one trending north-south and the other east-west are also mapped.</p> <p>Dunoon to A83 Trunk Road Tie-in</p> <p>The existing route of the A815 from Dunoon, north through Hunter's Quay to the western end of Holy Loch, follows a strip of Raised Marine Deposits – sands and gravels. Inland to the west of Kirn, glacial Till and large isolated areas of peat are mapped. To the immediate north and east, Marine Beach Deposits are mapped along the shoreline of the Firth of Clyde and Holy Loch.</p> <p>Alluvium overlying Raised Marine Deposits is mapped along the course of the Little Eachaig River, and the River Eachaig at the head of Holy Loch, and isolated pockets of glacial till are mapped on the margins of the valley, in places extending up the hillsides where the slope angles are shallower.</p>
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		<p>As the road follows the east shoreline of Lock Eck, there are small areas of Alluvium, glacial Till and the occasional alluvial fan deposit mapped along the route. Glacial Till becomes more prevalent to the north of the loch.</p> <p>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 to the west of Strachur.</p> <p>Further localised deposits of glacial Till remain on the slopes above the A815, within valleys around Strachur, and to the north of Ardnò. The remainder of the existing route from Strachur to 1.5km north of St Catherine's is shown to be located upon Raised Marine Deposits along the shoreline, with superficial deposits largely absent from the hillside slopes. From Ardnò to the tie-in with the A83, the A815 is mainly underlain by glacial Till with Alluvium recorded at Kinglas Water close to the tie-in.</p> <p>Made ground is recorded along the shoreline of to the south of Dunoon in association with the ferry terminal. Additional smaller areas of made ground deposits are mapped in the wider area of Dunoon and to the north of Sandbank. Made ground is also anticipated within the wider route corridor as a result of existing development.</p> <p>At the head of Holy Loch made ground is mapped along the alignment of the existing A815 where the road crosses alluvial deposits, as well as further north to the south of Uig. An area of 'Worked ground (Void)', likely to represent a sand and gravel pit or similar, is mapped southeast of the A815, close to Orchard farm. A further area of made ground is recorded to the south of Dalinlongart in association with a development. An area of worked ground is recorded along the proposed route just south of Ballochyle.</p> <p>The proposed route corridor is predominantly underlain by Dalradian metamorphic rocks, comprising predominantly pelite, semi-pelite and psammite, with some phyllite at Dunoon and north of Strachur. There are several dyke swarms mapped within all the units. In the southern part of the route corridor the intrusions predominantly trend northwest-southeast, north-south and east-west, with northeast-southwest trending features in the northern part of the route.</p> <p>The strata is indicated to be heavily faulted with most faults trending north-northeast, east or northwest. The larger regional faults tend to be orientated northeast-southwest.</p>
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		<p>References:</p> <ul style="list-style-type: none"> 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	<p>The following structures are noted within this route corridor.</p> <ul style="list-style-type: none"> 6 existing watercourse bridges 110 no. existing culverts possibly needing upgraded
Environment Considerations	Biodiversity, Fauna and Flora	<p>17.5ha of Glen Etive and Glen Fyne SPA falls within the route corridor.</p> <p>168.6ha of Beinn an Lochain SSSI falls within the route corridor.</p> <p>All of Ardchylene Wood SSSI (176.8ha) falls within the route corridor.</p> <p>All of Loch Eck SSSI (541.5ha) falls within the route corridor.</p> <p>There are 124 parcels of AWI within the route corridor.</p>

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	<p>Population and Human Health</p>	<p>The noise environment in the vicinity of the route corridor is characterised by the road traffic on existing A and B roads. There are a number of settlements within the route corridor, including Dunoon, Sandbank, Rashfield, Benmore, Invernoaden, Glen Sluain, Strachur, Creggans, Ardnagowan, and St Catherine's.</p> <p>The following core paths are within the route corridor:</p> <ul style="list-style-type: none"> • C220a and b (Strachur village back road); • C221a (Cowal Way - Strachur to Lochgilphead); • C221b (Cowal Way - Strachur to Balliebeg); • C223a (Dunans loop to Inverreck and LLTNP boundary); • C225 (Dunoon to Sandbank (High Road)); • C211c (Ardnadam heritage trail loop); • C2488 (Dunloskin Wood, Dunoon); • C207a, c and d (Sandbank to Toward); • C226 (Bird Garden to Ardnadam); and • C227a, b, c and d (Alexander Street (rear) path network, Dunoon). <p>Cowal Way, a long distance walking path, intersects the route corridor at Strachur.</p> <p>The Dunoon to Portvadie Sustrans route (an on-road route which is not on the National Cycle Network) intercepts the route corridor at Dunoon and continues along the route of the existing A815 (and route corridor) until it reaches Dalinlongart where it continues in a westerly direction outwith the route corridor.</p>
	<p>Water Environment</p>	<p>The route corridor crosses or is in the vicinity of multiple water bodies classified under the Water Framework Directive, including:</p> <ul style="list-style-type: none"> • Five river water bodies, Kinglas Water, River Cur (u/s Glenbranter), River Cur (Glenbranter to Loch Eck), Little Eachaig River/Cruach Neuran Burn, River Eachaig. • One loch water body, Loch Eck. • Three coastal water bodies, Firth of Clyde Inner – Dunoon and Wemyss Bay, Loch Fyne – Upper Basin and Holy Loch. <p>The route corridor also crosses approximately 150-160 minor watercourses.</p>

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		<p>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 and River Cur and from existing fluvial flood risk from River Eachaig, Little Eachaig, Inverchapel Burn, Allt Ruadh, Allt na h-Airigh, Eas Dubh, Allt Coire No, Kinglas Water, Milton Burn in Dunoon and two minor watercourses at Loch Eck during a medium likelihood event (0.5% Annual Exceedance Probability (200-year) event). The route corridor may also be at existing coastal flood risk at Dunoon, Holy Loch and along Loch Fyne during a medium likelihood event (0.5% Annual Exceedance Probability (200-year) event).</p> <p>The Loch Eck SSSI and the Upper Loch Fyne and Loch Goil Marine Protected Area are within the vicinity of the route corridor.</p> <p>Loch Fyne Shellfish Water Protected Area is within the route corridor.</p> <p>There are Active Aquaculture Sites, and Classified Shellfish Harvesting Areas within the vicinity of the route corridor.</p> <p>The route corridor passes through one surface water Drinking Water Protected Area.</p> <p>Lunderston Bay bathing water is out with the route corridor but within the vicinity of the route corridor.</p>
	Soils	<p>Soil type within the route corridor is mixed with peaty podzols, peaty gleys, mineral podzols, brown soils and alluvial soils all present. Mineral soils are predominant in the route corridor. 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) in the Carbon and Peatland 2016 Map. There is no Class 1 or Class 2 peat in the route corridor. Given the combination of soils, climactic conditions and topography the Land Capability for Agriculture (LCA) Class within the is predominantly Class 5 (Class 5.1, 5.2 and 5.3) with Class 4 (Class 4.1 and 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.</p> <p>There are no Geological Conservation Review (GCR) sites in the route corridor.</p> <p>The Land Capability for Forestry (LCF) class is mixed ranging from Class F1 and Class F2 at the Holy Loch in the south at Strachur in the north to Class F6 on the higher steeper slopes in between. There are existing stands of commercial forestry throughout the route corridor. The route corridor includes land identified in the Argyll & Bute Council Woodland Forestry Strategy as Preferred (land that offers the greatest scope to accommodate future expansion of a range of woodland types, and hence, to deliver on a very wide range of objectives, Sensitivities are limited) at Holy Loch and Strachur. Other areas identified include existing woodland, Sensitive (areas where the</p>

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		nature or combination of sensitivities restricts the scope to accommodate further woodland expansion or removal) and Potential (considerable potential to accommodate future expansion of a range of woodland types, but where at least one 'sensitivity' exists).
	Air Quality	<p>The route corridor passes through a predominantly rural environment and there are a number of settlements within the route corridor, including Dunoon, Sandbank, Rashfield, Benmore, Invernoaden, Glen Sluain, Strachur, Creggans, Ardnagowan, and St Catherine's.</p> <p>There are no Air Quality Management Areas (AQMAs) in the route 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).</p> <p>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.</p>
	Climatic Factors	<p>The baseline for climatic factors is not considered to differ greatly between the 11 route corridors.</p> <p>As indicated in the 'Water Environment' section, the route corridor may be at existing fluvial and surface water flood risk on the A815 from Loch Eck and River Cur and from existing fluvial flood risk from River Eachaig, Little Eachaig, Inverchapel Burn, Allt Ruadh, Allt na h-Airigh, Eas Dubh, Allt Coire No, Kinglas Water, Milton Burn in Dunoon and two minor watercourses at Loch Eck during a medium likelihood event. The route corridor may also be at existing coastal flood risk at Dunoon, Holy Loch and along Loch Fyne during a medium likelihood event.</p> <p>As described in the 'Soils' section, there are several areas of peatland in the route corridor with a high carbon sink value. There are also areas of forested land in the route corridor, including Argyll and Bute Forestry Strategy areas. Forested areas also have a carbon sink value.</p>
	Material Assets	The route corridor contains a variety of natural material assets. There are areas of forestry within the route corridor and there are peat soils present.

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		<p>In term of built material assets, the route corridor generally follows existing road infrastructure including a 'A' 'B' and 'C' roads. The route corridor also includes part of the Ministry of Defence owned and operated road between Garelochhead and Coulport. There are waste disposal facilities located in close proximity to the route corridor at Dunoon and Dalinlongart. The route corridor requires a structural crossing of the Firth of Clyde downstream of HMNB Clyde and Clydeport Container Terminal. There is also a pedestrian ferry service operating between Dunoon and Gourock. Consideration for clearance and maritime navigation must be given to facilitate continued passage for naval and commercial shipping on the Firth of Clyde.</p> <p>There are minor renewable energy developments along the route corridor, mostly comprised of micro hydro schemes.</p>
	Cultural Heritage	<p>There are seven Scheduled Monuments, 77 Listed Buildings, two Gardens and Designed Landscapes (GDLs) and Dunoon Conservation Area within the route corridor. The extent of the route corridor occupied by Benmore GDL is relatively large. There are concentrations of Listed Buildings at Strachur, Benmore and Dunoon. Ardgowan GDL is located close to the southern extent of the route corridor.</p>
	Landscape and Visual Amenity	<p>The route corridor is approximately 51km long and runs along existing roads except for the large-scale crossing at the Firth of Clyde between Dunoon and west of Gourock. Approximately 20 km of the southern part of the route corridor until Holy Loch is located within the LLTNP. This section of the route corridor runs through Argyll Forest Park and Benmore (Younger Botanic Garden) Garden and Designed Landscape (GDL). The northern section of the route corridor runs 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 no National Scenic Areas within the route corridor. There are several Open Space Protection Areas within the route corridor around Strachur and Dunoon and a Conservation Area on the coast in Dunoon.</p> <p>The Landscape Character Types (LCTs) within the route corridor comprise Rugged Mountains LCT, Steep Ridges and Mountains LCT, Steep Ridges and Hills LCT, Straths and Glens LCT, Straths and Glens with Lochs LCT, Rocky Coastland – Argyll LCT, Rugged Moorland Hills LCT and Raised Beach - Glasgow & Clyde Valley LCT. There are several Seascape Character Areas (SCAs) within the route corridor, namely Loch Fyne - Inveraray to St Catherines SCA, Loch Fyne - St Catherines to Newton Bay SCA, Upper Firth of Clyde - Toward to Dunoon SCA, Dunoon SCA and Inner Firth of Clyde - Gourock to Cloch Point and Holy Loch SCAs.</p> <p>Land cover within the route corridor for this route option comprises small and scattered settlements, sea and freshwater lochs and coasts, open grassland and moorland, native woodland, coniferous forestry and numerous watercourses as well as the main town on the Cowal peninsula, Dunoon.</p>

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		<p>This route corridor would cross and likely be visible from the Loch Lomond and Cowal Way (Strachur to Lochgoilhead section) and the Argyll Paddle Trail. Parts of the route corridor would also be visible from large sections of Loch Fyne and Firth of Clyde coastline as well as numerous residential and recreational receptor locations.</p>
<p>Traffic</p>		<p>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, on a daily basis. 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.</p> <p>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.</p> <p>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.</p>

Implementability		
<p>Engineering</p>	<p>Topography and Alignment Considerations</p>	<p>The topography is variable within the route corridor extents on the east side of the Firth of Clyde. Steep hills of approximately 100m fall towards the coastline with some flatter areas towards the A78/A770 junction. The carriageway alignment geometry is dictated by the crossing type at the Firth of Clyde. A bridge structure will require a minimum marine navigation clearance of 75m. If a route is positioned within the flatter area of this section, closer to the A78 Trunk Road, the topography should allow for compliant geometry; however, if positioned further north, towards Cloch Point, the terrain levels will likely cause issues.</p>

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		<p>On the west side of the Firth of Clyde, the centreline of the route corridor follows the A815 through Dunoon. If a route is taken through Dunoon, it is expected that the existing road will be utilised. Vertical alignment geometry should be compliant; however, it will likely be sub-standard for horizontal geometry in places with little space for improvement due to the route being heavily constrained on the east by the sea and buildings, properties, etc. on the west. However, this will be an urban trunk road and both context and an appropriate design speed should be considered.</p> <p>The topography to the west of Dunoon is steep hillsides, falling towards the town. Alternatively, a bypass of Dunoon may be possible; however, lifting and falling an alignment to an appropriate elevation would be challenging both due to the topography itself as well as the built up/occupied areas on the periphery of Dunoon which limits the available space for a straightforward solution. Furthermore, Bishop's Glen Reservoir to the west of Dunoon, and Loch Loskin to the north will need to be considered.</p> <p>Between Dunoon and Sandbank the centreline of the route corridor continues to follow the A815. Using this route, the vertical alignment geometry is expected to be compliant, although some sub-standard sections of horizontal alignment geometry have been identified. Similar to above, the built up area on the west, and Firth of Clyde/Holy Loch on the east significantly limit the available space to provide improvements; however, an appropriate design speed and the context of the road through an urban environment should be considered. From the centreline west, there is more open area for an alternative route and while undulating in level could likely accommodate compliant alignment geometry with standard embankment and cutting; however, this area is currently the Cowal Golf Course which would be significantly impacted by a route in this location.</p> <p>From Sandbank to Dalinlongart, the centreline is constrained on the north-east by Holy Loch and steep hills on the south-west, effectively making the existing A815 route the only real possible option. This is bordered by properties along the length; however, it is generally flat and straight, and should allow for compliant vertical and horizontal alignment geometry.</p> <p>South of Loch Eck, the centreline follows the A815 from the B836 at Dalinlongart. The topography should allow compliance with standards for both vertical and horizontal alignment geometry. However, several constraints do need to be considered including River Eachaig and Little Eachaig River, and a number of settlements, although it is unlikely that these will have significant impact on the alignment geometry.</p>
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	<p>Geology / Geomorphology Considerations</p>	<p>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:</p> <ul style="list-style-type: none"> • 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 route 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 junction. The British Geological Survey (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 A815/83 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. • Just outside of the route corridor, to the northwest of Dalinlongart. Mass movement deposits are mapped in association with this record. <p>In addition to the above, further mass movement deposits are recorded on the east-facing slopes of Beinn Mhor to the west of Lock Eck.</p> <p>Furthermore, the local authority provided anecdotal evidence of localised, recurring landslide events at the following locations within this route corridor:</p> <ul style="list-style-type: none"> • Invernoaden; • Close to St Catherine's, north of Strachur; and • On the A815, close to the junction with the A83. <p>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.</p>
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		<p>An assessment of other potential issues including potentially difficult ground conditions is summarised below:</p> <ul style="list-style-type: none"> • Potential presence of peat deposits at western end of the fixed link crossing and at Strachur with associated potential for peat slides or resulting in excessive settlement for earthworks and foundations. • Potential presence of soft or loose deposits (alluvium and raised marine deposits). Approximately 11km of the route corridor is indicated to be underlain by alluvium, and there is potential for further unmapped alluvium and peat deposits within the route corridor. These deposits may require excavation and replacement with fill or suitable improvement treatment. • Potentially highly compressible deposits at the eastern end of the fixed link crossing in association with tidal flat deposits. This may pose a risk for excavations and result in excessive settlement for earthworks and foundations • Variable strength of rock due to the presence of igneous intrusions within the route corridor, likely to cause difficulties for excavations. • The presence of highly fractured rock in association with faulting, resulting in weak/weathered rock with low load bearing capacity, high groundwater flows, jointing and fracturing which may lead to rock slope instability in cuttings.
	Hydrology and Drainage Considerations	This is covered under 'Water Environment' in the 'Environment' part of this table.
	Structures Considerations	<p>The following structures are likely to be needed for a new road within this route corridor.</p> <ul style="list-style-type: none"> • A cable stayed or suspension bridge over the Firth of Clyde approximately 3,900m long (2 x 900m main spans). • 1 no. new 400m long multi-span viaduct near the tie in to the existing A83 Trunk Road. • Approximately 14 no. new culverts. • Approximately 110 no. existing culverts possibly needing upgraded. • Approximately 6 existing watercourse bridges. • Approximately 9 no. new single span Y beam deck bridges on reinforced concrete abutments. <p>Constructability, operation and maintenance in relation to structures is discussed elsewhere within the document.</p> <p>Key issues associated with the likely structures are:</p>

		<p><u>Firth of Clyde Cable Stayed or Suspension Bridge</u></p> <ul style="list-style-type: none"> • The 3,900m long (2 x 900m main spans) bridge crossing length is comparable with the world’s longest. • An approximate comparison for the crossing is made with the Queensferry Crossing although the proposed crossing is considerably longer and in deeper water. The three tower Queensferry Crossing takes advantage of the mid channel island Beamer Rock. The three tower configuration allows for the two 650m cable stayed spans. Whilst there is no central island at the Clyde crossing such was the case for QC at Beamer Rock upon which the central tower can be located, there is a possibility that the relatively shallower mid-channel Warden Bank could, dependent on geology, support a central tower. Nevertheless, the depth at this bank is still 11m deep and therefore a central tower foundation would require a significant caisson for construction. • Flanking towers similarly would be founded in water deeper than the flanking towers at Queensferry Crossing. • The three-tower cable stayed form would be preferable to the suspension form for all of the reasons that Queensferry Crossing was the preferred form in its location – principal among them, durability, the ability of the cable stays to be completely replaced if required. However, for the proposed bridge, it is anticipated that the main spans on a 3 tower structure would be approximately 900m and would put such a bridge in the top 6 longest cable stayed bridges in the world. • Such a cable stayed bridge would approach the limits of technology and therefore costs are anticipated to be higher than an extrapolation from smaller bridges of similar form. • The deck height and, depending on road cross section, suggest that aerodynamic design would be a critical parameter in the design. The bridge would require wind resilience measures similar to the barriers installed on the Queensferry Crossing. The bridge configuration, especially with regard to torsional rigidity would require specific wind analysis and testing which may prolong scheme development and final design duration. • High tower construction on the Clyde Estuary, estimated 250m to 300m (note: the deck carriageway level is at +85m above water level). • Consideration should be given to winter resilience of the bridge, principally deck surface and cable/tower de-icing. • The three main towers and possibly some approach viaduct foundations would be designed for ship collision, most likely with the mass of the underwater foundations providing sufficient energy absorption. <p>The route joins the existing A83 Trunk Road at Cairndow by means of a 400m long composite steel multi-span viaduct. The bridge would be of conventional design but consideration must be given to the possibility of cross-wind effects.</p>
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	<p>Constructability Considerations</p>	<p><u>Major Structures Constructability Considerations – Bridges</u></p> <p><u>Firth of Clyde Cable Stayed or Suspension Bridge</u></p> <p>The following key considerations apply to the construction of the bridge over the Clyde Estuary at Dunoon:</p> <ul style="list-style-type: none"> • A significant approach viaduct would be required on the east shore between the A770 and the east span of the bridge. For navigation clearance, a deck carriageway minimum height of approximately +75m must be attained to ensure a deck navigation clearance is obtained of +75m (+85m deck carriageway level allowing for 5m deck construction depth and 5m deflection) • Similarly, on the west shore an approach viaduct would extend out from the higher land west of Dunoon from which an approach road alignment would run west to form a by-pass of Dunoon. • Preliminary assessment suggests a central tower could be placed on Warden bank at some 11m depth. This would entail prefabricating and sinking a caisson onto the bank and lowering to rock level. Once sealed, underwater concreting would form the spread footing possibly of the order of 30 – 40m deep upon which the base for the central tower could be formed. • Similarly, caissons would be fabricated and placed for the flanking towers whose foundations would also be formed in underwater concreting. • Concrete batching would be from the marine facility (Greenock) and transported to the tower and pier locations by barge. Concrete to the towers would be pumped from the barges to pumps on the tower bases and thereby to the incremental jumps in the towers. • Approach marine piers would be founded pilecaps on driven piles all enclosed in cofferdams. • Access to the east side of the bridge is relatively straightforward with good access to the Central Belt road network. Access to the west shore is more limited so it is anticipated that primary works offices and staging will be on the eastern shore. • The construction of the western abutment will cause significant disruption on the A815 in Dunoon and would require a long-term temporary diversion to maintain connectivity along the coastline, which would potentially be difficult to locate. It would be worth considering moving the abutment out into the water to maintain the existing A815 to avoid needing to construct a new permanent route around the coast for traffic not using the viaduct in the long term as well , although the depth of water would not make this a simple piece of construction. • Similarly, the eastern abutment construction will sever the connection along the A770 coast road. Although this area is somewhat less inhabited the route provides a connection between Inverkip and Castle Levan so
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		<p>the loss of connectivity could present a notable issue for residents and businesses. This abutment would therefore warrant a similar consideration to the western abutment.</p> <ul style="list-style-type: none">• A single carriageway bridge deck will require high twin legged 'A-frame' towers. The deck would be enclosed between the tower legs with torsional restraint provided by bearings. The central tower would provide longitudinal fixity with expansion joints at the east and west deck ends. The reinforced concrete towers would be constructed incrementally by jump forming with concrete being pumped up the towers as their height incrementally increases.• The torsional span lengths are important as the long slender deck combined with wind barriers will be aerodynamically sensitive. The flexibility of the slender deck will also present a deflection challenge.• Steel box deck segments would be fabricated nationally and/or internationally and delivered to a staging area at a nearby facility. It is likely that marine facilities at Greenock would be suitable for the staging area for precasting of the composite deck slab. Weather and tide important factors in and segment erection. Given the military, commercial and private/leisure marine navigation demand in this area of the Clyde Estuary, marine management and control is a construction programme risk.• Segments would be transported by barge to below their location in the span.• Main span segments would be progressively lifted onto the tower and extend incrementally from the towers in an alternating balanced cantilever sequence on each of the three towers until closure at the approach viaducts and then at the midspans of the two main spans.• Lifting would require GPS placement of barges and their station protected by an exclusion zone on the main navigation channels. This will clearly affect marine vessel navigation. The duration of barges on station for the lift is expected to be comparatively lengthy at approximately 8 – 10 hours. This allows for anchoring (2 - 3 hours) and strand jack lifting which, owing to the deck height, could take up to 7 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;<ul style="list-style-type: none">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 Coulpport, Faslane, Holy Loch etc.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.
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		<p><u>Other Constructability Considerations – Road and Small Structures</u></p> <p>Dunoon to Rashfield</p> <p>Road improvement on the existing sections 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. Works along this stretch of road are through a densely populated area so improvement works may have a notable impact on access to properties and connection routes, particularly where minor bridges require replacement.</p> <p>As an alternative to upgrading the A815 through the town, an option exists within the route corridor to bypass the town of Dunoon. Whilst this may remove some of the issues noted above with respect to construction within an urban area there is expected to be constructability challenges with a bypass option similar to other lengths of the route corridor that require new lengths of road to be constructed.</p> <p>Rashfield to Whistlefield</p> <p>This section of the A815 incorporates some areas of improvements to the existing alignment along with construction of a new alignment crossing over the existing road. Construction of this section of the road has the following key areas of consideration:</p> <ul style="list-style-type: none">• Traffic management requirements for these works will likely be severe with single lane running for multiple sections of the road to construct widened areas as well as new alignments, as in most cases these are very close to the existing road. It would be advisable to maintain crossover levels, where new alignments cross the existing road, as close to current levels as possible to minimise the impacts of the reprofiling of the highway on TM requirements.• The loch is landlocked so there is limited opportunity to mobilise large plant for working on the loch and this would be limited to modular barges and vessels to enable transport. This will mean that much of the construction of the viaducts may need to be carried out from land, adding further pressures from traffic management.• Mobilising large cranes and other plant will be challenging given the space constraints on the stretch of road adjacent to the loch.
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		<ul style="list-style-type: none"> To the southern end the available space for working areas is increased substantially once the loch is no longer a factor so many of the above construction issues will be mitigated. In the southern half of the road works the earthworks embankments increase in dimension close to the existing road which may require the new road to be realigned away from the existing road or use of retaining walls to prevent encroachment on the carriageway. If these cannot be achieved, then some temporary diversion of the existing road is likely to be needed. <p>Whistlefield to A83 Trunk Road Tie-in</p> <p>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 multi-span steel composite bridge deck on leaf piers and piled foundations.</p>
<p>Environment Considerations</p>	<p>Biodiversity, Fauna and Flora</p>	<p>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.</p> <p>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.</p> <p>All of Ardchylene 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</p>

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		<p>major negative environmental effect. Moderate negative environmental effects could also occur as a result of nitrogen deposition.</p> <p>Most of Loch Eck SSSI (541.5ha) falls within the route corridor. This could result in the considerable temporary and permanent loss of SSSI habitat, 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.</p> <p>124 parcels of woodland listed on the AWI fall 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.</p> <p>There is potential for negative environmental effects on terrestrial and aquatic species from construction activities, as follows:</p> <ul style="list-style-type: none"> • 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. <p>During operation, there is potential for unavoidable habitat loss and fragmentation for protected species as a result of tree and vegetation clearance and loss of irreplaceable AWI.</p>
	Population and Human Health	<p>There is potential for localised noise and vibration effects on receptors 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 receptors. Construction of the watercourse crossing in particular could result in a longer construction period and could involve activities such as piling with high levels of noise and vibration.</p> <p>During the operation phase, there is potential for receptors close to the route to experience new or increased noise and vibration effects from increased vehicle traffic.</p>

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		<p>As there are a number of settlements within the route corridor, in addition to noise and vibration there is potential for other minor negative 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).</p> <p>During operation, the watercourse crossing to Dunoon would provide significant journey savings around the Firth of Clyde and the route corridor would improve connectivity between the central belt and Argyll and Bute for some traffic. The route corridor would provide greater accessibility to active travel routes including to the Cowal Way and the core path network in and around the route corridor. There is also potential for paths to be severed as a result of the route corridor.</p> <p>Land-take from properties would be required to facilitate the operation of the route corridor.</p> <p>There is also potential for localised effects from air quality on human health; these are discussed further under Air Quality.</p>
	Water Environment	<p>Construction within the route corridor and operational structures and discharges may affect the hydromorphology and surface water quality of approximately five Water Framework Directive (WFD) classified river water bodies, three WFD coastal and one loch WFD water body and approximately 150-160 minor watercourses.</p> <p>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 and River Cur and from fluvial flood risk from River Eachaig, Little Eachaig, Inverchapel Burn, Allt Ruadh, Allt na h-Airigh, Eas Dubh, Allt Coire No, Kinglas Water, Milton Burn in Dunoon and two minor watercourses at Loch Eck during a medium likelihood event (0.5% Annual Exceedance Probability (200-year) event).</p> <p>The route corridor may also be at coastal flood risk at Dunoon, Holy Loch and along Loch Fyne during a medium likelihood event (0.5% Annual Exceedance Probability (200-year) event).</p> <p>Potential for coastal flooding from the new crossing on Firth of Clyde Inner - Dunoon and Wemyss Bay, which could impact flooding on associated road infrastructure.</p> <p>May affect the Loch Eck SSSI and the Upper Loch Fyne and Loch Goil Marine Protected Area.</p> <p>Loch Fyne Shellfish Water Protected Area is within the route corridor and may be affected.</p>

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		<p>There are Active Aquaculture Sites, and Classified Shellfish Harvesting Areas within the vicinity of the route corridor and may be affected.</p> <p>One surface water Drinking Water Protected Area may also be affected.</p> <p>Lunderston Bay bathing water is out with the route corridor but within the vicinity of the route corridor and may be affected.</p> <p>Construction and operation within the route corridor could result in major negative environmental effects on the water environment.</p>
	Soils	<p>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 peatland habitats. 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.</p>
	Air Quality	<p>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 including construction of a large structure over the Firth of Clyde, and pollutant emissions from vehicular movements, which could result in annoyance for local residents.</p> <p>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.</p> <p>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.</p> <p>Potential air quality effects on ecological receptors are assessed under Biodiversity, flora and fauna.</p>
	Climatic Factors	<p>As outlined in the Material Assets section, activities related to the construction of the route corridor would have major negative environmental effects on climate due to the release of carbon emissions associated with the manufacture of raw materials and construction activities.</p> <p>Once operational, forecast traffic levels are relatively low, for this route corridor, assuming the continued operation of the A83 through the Rest and Be Thankful. With the predicted shift towards electric vehicles, this would reduce in the future. Additionally, the route corridor would reduce the driving distance for some journeys due to the</p>

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		<p>introduction of the Firth of Clyde Inner - Dunoon and Wemyss Bay crossing, which over time would likely result in lower vehicle emissions.</p> <p>Effects on the route 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 high 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.</p> <p>Construction would be required on areas identified as peatland, which, if constructed on, would lead to the release of sequestered carbon and a loss of land with a high carbon sink value. Any felling required would also reduce the carbon sink value of forested areas within the route corridor. Woodland and Forestry Strategy areas, including existing planted woodland, potential, preferred and sensitive sites, need to be considered in the route corridor selection process.</p>
	Material Assets	<p>As outlined in the Climatic Factors section, there are several natural material assets including peat soils and forestry that could be affected by the route corridor. As outlined in the Soils section, minor negative or uncertain environmental effects are expected on peatlands. As outlined in the Biodiversity, Flora and Fauna section, there could be major negative environmental effects on forestry.</p> <p>In term of built material assets, as outlined above in the 'Climatic Factors' section, there is likely to be a major negative environmental effects from the construction of the route corridor on climate from embodied carbon from manufacture of materials and construction activities, including:</p> <ul style="list-style-type: none"> • 47km of carriageway upgrade is proposed, requiring significant raw material inputs • Construction of fixed structural crossing of approximately 3,900m long (2 x 900m main spans) crossing over Firth of Clyde Inner - Dunoon and Wemyss Bay would require significant material input • Construction of various smaller structures, including nine 9 Y beam deck bridges and a 400m long multi-span viaduct. Together these represent a significant cumulative material input. <p>The Firth of Clyde is a busy shipping route for naval vessels accessing HMNB Clyde and cargo vessels accessing Clydeport Container Terminal at Greenock as well as ferry services, leisure and fishing vessels. There is potential for effects on shipping during construction of the structural crossing. Appropriate clearance for shipping would be required to avoid effects on navigation during operation.</p>

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	Cultural Heritage	Due to the relatively high numbers of cultural heritage resources within the route corridor (compared to route 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. The most cultural heritage constraints are where Benmore GDL covers a relatively large section of the route corridor and the concentrations of Listed Buildings at Strachur, Benmore and Dunoon.
	Landscape and Visual Amenity	There is potential for major negative effects on the LLTNP, the North Argyll and East Loch Fyne (Coast) APQs, two GDLs and the local landscape and seascape character due to the construction and operation of the carriageway and supporting infrastructure. There is also potential for negative visual effects for residential receptors in proximity to the route corridor, as well as vehicle travellers using the existing roads and other outdoor receptors. The introduction of the new large-scale structure across the Firth of Clyde would affect the landscape character and visual amenity of the area.
Traffic	Traffic Flows	<p>Although this route corridor provides a new direct link from Inverclyde to Cowal, in the context of typical traffic levels on the existing A83 Trunk Road, traffic using this corridor is forecast to be relatively low, with a reduction in traffic on the A83 Trunk Road through the Rest and Be Thankful less than 25% in 2027. This assumes that the Rest and Be Thankful is operating under normal conditions.</p> <p>There will be a degree of re-routing of trips for vehicles accessing the new route corridor, with minor traffic decreases forecast on the A815 between the A83 Trunk Road and Dunoon, along the A82 Trunk Road between Dumbarton and Tarbet, and along the A83 Trunk Road between Tarbet and Inveraray.</p>
	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. The relatively low volume of trips re-routing onto the new corridor would indicate that likely accident savings will be low.
Operational Considerations		From a Trunk Road operation perspective, the main operational considerations within the route corridor are the risk of flooding and/or landslides, based on the steep topography in some areas, particularly adjacent to Loch Eck and Loch Fyne.

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	<p>Bridges within Route Corridor 6</p> <p>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.</p>
Financial Considerations	The estimate cost range of a scheme within this route corridor is approximately £5.79Bn - £7.62Bn
Estimated Time to Completion	It is estimated it would take approximately 16-17 years to achieve a fully operational road 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 there were more statements of opposition to this route corridor than supportive comments.

STAG Criteria		Assessment Summary
Criteria		
Environment		Refer to Implementability Assessment – Environment
Safety		Refer to Implementability Assessment – Accidents
Economy	Transport Economic Efficiency	<p>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 large (>45 minutes) compared with existing road only options, following the construction of the route corridor.</p> <p>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 route 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.</p>

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STAG Criteria		
Criteria		Assessment Summary
	Wider Economic Impacts	<p>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.</p> <p>The route corridor offers more direct connections from Cowal to the more populous areas of Inverclyde, providing substantial improvements in onward journeys to the central belt.</p> <p>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.</p> <p>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 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.</p>
Integration	Transport Integration	<p>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.</p> <p>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.</p>

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STAG Criteria	
Criteria	Assessment Summary
	<p>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 route corridor to Dunoon, Cairndow and beyond.</p> <p>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.</p> <p>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 forced to travel via longer diversion routes.</p> <p>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.</p> <p>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.</p>

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STAG Criteria		Assessment Summary
Criteria		
	Transport and Land Use Integration	<p>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.</p> <p>If selected as the preferred 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.</p> <p>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.</p> <p>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.</p>
	Policy Integration	<p>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.</p>

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STAG Criteria	
Criteria	Assessment Summary
	<p>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.</p> <p>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.</p> <p>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.</p> <p>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:</p> <ul style="list-style-type: none"> - 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.

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STAG Criteria		
Criteria		Assessment Summary
		<ul style="list-style-type: none"> - 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. <p>This route corridor is likely to contribute positively towards the strategic principles set out within the LLTNP 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'.</p> <p>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.</p> <p>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.</p> <p>A further assessment of carbon, and opportunities for carbon reduction in design, would be considered in later stages of the project assessment process.</p>
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

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STAG Criteria	
Criteria	Assessment Summary
	<p>reliance on private cars. This is primarily due to the nature of the route corridor and the areas within which it is located.</p> <p>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.</p> <p>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.</p> <p>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.</p>
Comparative Accessibility	<p>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.</p> <p>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.</p>

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STAG Criteria	
Criteria	Assessment Summary
	<p>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.</p> <p>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.</p> <p>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.</p>

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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.	✓						

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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			
	Climate			
	Material Assets			
	Cultural Heritage			
	Landscape and Visual Amenity			
	Traffic	Traffic Flows		
Accidents				
Operational Considerations				
Financial Considerations				

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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						✓	