

Access to Argyll & Bute (A83) Strategic Environmental Assessment & Preliminary Engineering Services
Route Corridor Preliminary Assessment
Route Corridor 11 – Helensburgh – Cowal – Lochgilphead

Route Corridor Details	
Route Corridor Option	Route Corridor 11 – Helensburgh – Cowal – Lochgilphead
Route Corridor Description	This route corridor links the A814 and A818 at Helensburgh to the A83 Trunk Road on Kintyre via Cowal and the provision of fixed link crossings at Gare Loch, Loch Long and Loch Fyne. The route corridor connects the A814 and A818 to Cowal via approximately 1.5km and 3.0km fixed link crossings either side of the Rosneath Peninsula and the route corridor generally follows the B833 whilst on the Rosneath Peninsula. Having crossed Loch Long on the western side of the peninsula the route corridor generally follows the existing A880 to Ardbeg and the A815 to Dalinlongart, before then following the B836, A886, C11 and B8000 to Otter Ferry on the eastern shore of Loch Fyne. A 3.0km fixed link crossing of Loch Fyne ties into the A83 Trunk Road near Port Ann. The approximate overall length of the full route corridor is 49km in length. The fixed link crossing over Gare Loch and Loch Long will present considerable challenges as both lochs are used by large marine vessels as well as Ministry of Defence (MOD) submarines which are based at Faslane and Coulport.
Rationale for Route Corridor	The Helensburgh – Cowal – Lochgilphead route corridor was identified by the Cowal Fixed Link working group and has subsequently been 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 and connecting to the main route to the central belt, the A82 Trunk Road via the A814 or A818 from Helensburgh.
Geographic Context	The route corridor lies within the Argyll & Bute region, which comprises solely of the entirety of the Argyll & Bute local authority area. The route corridor end points are located a straight line distance of approximately 23-45 miles from the city of Glasgow. The eastern extents of the route corridor are situated on the eastern shores of the Gare Loch at Helensburgh. The route corridor then heads west, across the Gare Loch and around the southern tip of the Rosneath Peninsula, passing through Kilcreggan before crossing Loch Long just south of Cove. It then travels along the shores of the Holy Loch, through Strone to Rashfield where it west to Dalinlongart, through Glen Lean, around the northern extent of Loch Striven before crossing Glendaruel and approaching Otter Ferry, where it crosses Loch Fyne to Port Ann. The western extents of the route corridor is situated between Lochgilphead and Port Ann 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

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	<p>route corridor joins the two aforementioned trunk roads and it also intersects the West Highland Line railway in proximity to Garelochhead.</p>
<p>Social Context</p>	<p>Given the geographically remote nature of large areas of Argyll & Bute, reducing the duration of journey times and improving journey time reliability for both strategic and local traffic has the potential to impact positively on deprivation levels, both geographic and economic.</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>
<p>Economic Context</p>	<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</p>

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	<p>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> <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 significantly enhanced resilience, through the provision of a number of alternative routes, 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 and other incidents leading to road closure, such as climate change induced flooding events, accidents and road maintenance activities on the existing A83 Trunk Road, between Lochgilphead 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</p>

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		<p>issues with vessels. This route corridor may, therefore, offer a more resilient means of travel for trips to and from areas of Cowal & Bute, including the key towns Dunoon and Rothesay. Travel from Cowal, in particular, can be subject to disruption as, due to the peninsular nature of the area, a single road connection (the A815) links 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	Safety – positively contribute towards the Scottish Government’s Vision Zero road safety target by reducing accidents on the road network and their severity.	This route corridor is likely to result in significant reductions in vehicle kilometres for strategic traffic currently using the A83 Trunk Road. As such, it is judged that a corresponding reduction in traffic related casualties could be realised from this route corridor.
TPO3	Economy – reduce geographic and economic inequalities within Argyll & Bute through improved connectivity and resilience.	<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. 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 both Cowal and Kintyre 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	Sustainable travel – encourage sustainable travel to, from and within Argyll & Bute through facilitating bus, active travel and sustainable travel choices.	Through the provision of fixed links to Cowal and Kintyre, improvements in mobility & inclusion and reductions in transport poverty could be facilitated through the enhanced connectivity provided by this route corridor.

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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 Corridor Conditions		
Engineering	Corridor Length	The route corridor is approximately 49km long.
	Existing Roads	<p>The route corridor intersects the A814 and A818 at its eastern extents and the A83 Trunk Road at its western extents.</p> <p>The route corridor generally follows the Local Authority operated / maintained 'A' / 'B' / 'C' roads listed below: B833, A880, A815, B836, A886, C11 and B8000.</p> <p>The route corridor intersects the following Local Authority operated / maintained 'A' / 'B' / 'C' roads.</p>

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		B833, C73, A880, A815, B836, A886, A8003, C11 and B8000.
	Existing Accesses	<p>A class road: 4 B class road: 3 C class road: 2 Unclassified road/direct access: 339</p> <p>Relative to the other route corridors, the high number of accesses noted above is attributed to the route corridor passing through Rosneath, Kilcreggan and numerous 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 in the centre of the route corridor at the A814 near Helensburgh are generally at sea level on the eastern shores of the Gare Loch. The route corridor immediately crosses Gare Loch and enters the Rosneath Peninsula near the town of Rosneath. Ground levels in Rosneath slope up from the western shores of Gare Loch to a ridge of higher ground that rises to approximately 200m above ordinance datum at the Clach MacKenny. The route corridor centre then generally follows the B833 road round the southern part of the peninsula and passes between the Clach MacKenny and Gallow Hill. Ground levels along the B833 road rise from sea level at Rosneath to approximately 60m above ordinance datum, before falling again towards the town of Kilcreggan which is generally at sea level.</p> <p>Land use within this section of the route corridor is primarily residential/commercial/recreational, and mainly associated with properties within Helensburgh, Rhu, Shandon, Clynder, Rosneath, Kilcreggan and Cove. There are pockets of coniferous and mixed woodland, both on the Rhu side of the Gare Loch crossing and on the Rosneath Peninsula. There are also numerous areas of agricultural land throughout this section.</p> <p>After crossing Loch Long the route corridor continues west and encompasses an area of land that rises steeply from sea level on the western shores of Loch Long towards a line of summits including Blairbeg Hill at approximately 385m AOD. The centre of the route corridor generally follows the A880 road which is elevated between approximately 5m and 10m AOD and the route corridor passes through the communities of Strone and Kilmun. Ground levels to the north of the route corridor centre generally rise steeply behind the residential areas of Strone</p>

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		<p>and Kilmun towards Blairbeg Hill, Kilmun Hill and Cnoc a' Mhadaidh. The route corridor then generally turns south and follows the A815 road towards the community of Dalinlongart which is located at sea level at the head of Holy Loch.</p> <p>Land use within this section of the route corridor is primarily coniferous plantation woodland, covering the majority of the adjacent slopes. There are numerous commercial/residential properties throughout the section on the banks of the Holy Loch.</p> <p>Dalinlongart marks the point where the route corridor turns west and generally follows the B836 and the Little Eachaig River. As the route corridor heads west away from Dalinlongart ground levels along the corridor centre start to rise as it passes through expansive forests which extend across much of the width of the route corridor. Either side of the road and river, ground levels rise steeply across the route corridor width towards summits to the north and the south. The road reaches an elevation of approximately 110m above ordnance datum within the forests in Glen Lean, again with land either side or the road within the route corridor width rising steeply towards peaks out with the corridor. As the road passes through the forests in Glen Lean, heading north west towards Loch Tarsan which is noted as a reservoir on mapping, ground levels along the route corridor centre continue to rise up to approximately 140m above ordnance datum. The route corridor passes round the southern shores of Loch Tarsan with ground levels towards the south of the corridor rising steeply towards Cruach Neuran at approximately 600m above ordnance datum. To the west of Loch Tarsan the route corridor continues to generally follow the B836, and ground levels start to fall as the corridor approaches Loch Striven which is at sea level. The route corridor includes the generally flat land at the head of Loch Striven before turning south again and following the western shores of Loch Striven. Ground levels along the route corridor centre start to rise again, up to approximately 100m above ordnance datum, before the corridor turns west and continues to rise in elevation to a height of approximately 150m above ordnance datum. Between this point, and the junction between the B836 and A886, ground levels fall again along the centre of the route corridor with the junction elevated at approximately 23m above ordnance datum.</p> <p>Land use within this section of the route corridor is primarily coniferous plantation woodland. There are several residential/commercial properties throughout the corridor. Agricultural land is present through Glen Lean, at Ardtaraig, Balliemore and adjacent to the River Ruel. In terms of utilities and infrastructure there are several features associated with the Striven Power Station between Loch Tarsan and Loch Striven including extensive overland and underground infrastructure, most notably two pipes crossing the existing road.</p>
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		<p>The route corridor centre then generally follows the A886 heading north west. Ground levels along the corridor centre are typically between 10m and 30m above ordnance datum as the road follows the valley floor and the Cuil Uinseann watercourse. The route corridor then turns west and generally follows the single track C11 road, through a large area of forest with ground levels rising steeply along the route corridor centre up to approximately 320m above ordnance datum. As the route corridor continues west generally towards Otter Ferry, ground levels fall again and the route corridor continues to pass through expansive areas of forest.</p> <p>Land use within this section of the route corridor is primarily coniferous plantation woodland. There are a pair of low voltage electricity transmission lines which follow the corridor from east to west.</p> <p>Otter Ferry, which is located at sea level on the eastern shore of Loch Fyne, generally marks the point where the route corridor starts to cross Loch Fyne. On the western shore of Loch Fyne the route corridor ends at the A83 Trunk Road, which generally follows Loch Fyne as it runs down the Kintyre Peninsula. Trunk road levels vary between approximately 10m and 40m above ordnance datum at the end of the route corridor.</p> <p>Land use within this section of the route corridor is primarily coniferous plantation woodland. There are a small number of residential properties located at Achnaba and Port Ann. In terms of utilities and infrastructure, there is an electrical substation and associated power lines to the east of Port Ann.</p>
	<p>Geology / Geomorphology</p>	<p>The eastern end of the route corridor comprises a fixed link from Rhu to Rosneath across Gare Loch. The route corridor then follows the B833 to Kilcreggan before traversing around the southern end of the Rosneath peninsula following the shoreline. The terrain on the peninsula is relatively shallow, with slopes up to around 150mAOD. A second fixed link connects Cove and Blairmore; the route corridor then follows the A880 west to Dalinlongart.</p> <p>The route corridor follows the B836 adjacent to the Little Eachaig River west away from Holy Loch. The river flows from Loch Tarsan and sits within a steep sided U shaped valley with Cruach Neuran to the south and Sgorach Mor to the north. The heads of Loch Striven and Loch Riddon which the route corridor pass to the north of show similar topography, with wide U shaped valleys flanked by steep slopes. Between the two lochs the route corridor follows a wide shallow sided valley. From Loch Riddon to Otter Ferry the route corridor initially follows a narrow valley before reaching wide fairly gentle sloping moorlands.</p> <p>The superficial geology beneath the route corridor at Gare Loch comprises extensive Raised Marine Deposits with Beach and Tidal Flat Deposits mapped along the shorelines and into Gare Loch at Rhu and Rosneath. Inland areas</p>

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		<p>are predominantly mapped as comprising glacial Till with some outcrops of bedrock also mapped. Raised Marine Deposits follow the shoreline to Cove. A large area of peat is mapped in the centre of the route corridor extending across upland areas of the Rosneath peninsula.</p> <p>To the west of the fixed link at Blairmore, a thin strip of Raised Marine Deposits is mapped along the shoreline of Loch Long and Holy Loch, some glacial Till is mapped inland on the lower slopes, however the upland slopes have little to no superficial geology mapped.</p> <p>Significant deposits of Marine Beach Deposits, Raised Marine Deposits and Alluvium are mapped where the Little Eachaig River and the River Eachaig flow into Holy Loch and within their respective valleys, with localised deposits of glacial Till on the margins of the Little Eachaig valley to the west. Alluvium is mapped along almost the full length of the valley between Clachaig and Loch Tarsan, with remnants of River Terrace Deposits recorded on the margins of the valley floor. A large area of peat is mapped in association with tributaries to Tamhnich Burn. Glacial Till is occasionally mapped on the lower slopes. Generally, the upper slopes show no superficial cover.</p> <p>Extensive areas of Marine Deposits and Alluvium are mapped at the mouth of Balliemore Burn at Loch Striven, and at the lower reaches of the River Ruel where it flows into Loch Riddon. One notable area of peat is mapped within the route corridor in the upland areas between Loch Striven and Loch Riddon.</p> <p>Superficial cover is largely absent within the route corridor to the west of the River Ruel until the route corridor descends into Otter Ferry, where Raised Marine Deposits are mapped extensive Marine Beach Deposits are recorded extending along the spit into Loch Fyne. The A83 tie in on the western side of the loch has only localised Raised Marine Deposits mapped.</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. Made ground is also recorded in association with the dams to the east and west of Loch Tarsan. Made ground is anticipated across the route corridor in association with existing development and infrastructure.</p> <p>Bedrock in the east of the route corridor comprises pelites and metalimestones of the Dunoon Phyllite Formation and psammites and pelites of the Bullrock Greywacke Member. To the west side of the Loch Long fixed link,</p>
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		<p>metavolcaniclastics of the Loch Katrine Volcaniclastic Formation are mapped. The remainder of the proposed route corridor is largely underlain by psammites, pelites and metaconglomerates of the Beinn Bheula Schist Formation. Further west near Loch Fyne, metavolcaniclastics of the Southern Highland Group are mapped, followed by psammites, pelites and semipelites of the Ben Lui Schist Formation and the Glen Lui Schist Formation. The western landfall of the Loch Fyne crossing is underlain by the Crinan Grit Formation.</p> <p>Several dyke swarms are mapped within all the units, generally these are orientated northwest-south east and north-south. Regional scale faults are mapped between Rhu and Cove, generally trending north northeast, predominantly across the Rosneath Peninsula. The rest of the route corridor generally has limited faulting mapped, those mapped are generally smaller faults, trending north. Two regional scale faults cross the route corridor, one between Loch Striven and Loch Tarsan trending northeast, the second where the route corridor crosses the River Ruel near Glendaruel, again the fault trends northeast.</p> <p>Gare Loch Fixed Link Crossing</p> <p>Superficial geology is mapped as Beach and Tidal Flat Deposits extending into the loch from both the east and west shores of the loch. Raised Marine Deposits are mapped further inland across Rhu and Rosneath. Glacial Till is mapped up the slopes to the east and the west of the fixed link crossing. A large number of boreholes have been undertaken at Rhu Narrows at the fixed crossing location. Boreholes show superficial cover of soft becoming firm to stiff silts and clays up to 19m deep. The solid geology at the crossing is mapped as pelite and metalimestone of the Dunoon Phyllite Formation to the western end of the crossing, and psammite and pelite of the Bullrock Greywacke Member to the east. The Dunoon Phyllite Formation shows north-south oriented normal faulting across the route corridor.</p> <p>Loch Long Fixed Link Crossing</p> <p>Superficial deposits are recorded to comprise Raised Marine Deposits along the eastern and western shorelines of the fixed crossing. The slopes of Rosneath Peninsula at the eastern end of the fixed link are mapped as glacial Till, with Peat mapped across the plateau on the outskirts of the route corridor. A small area of glacial Till is mapped on the slopes above Blairmore on the western end of the fixed link. No GI information was available for review along the waterline or within the loch at the proposed location of the crossing. Two boreholes have been completed offshore to the west of Kilcreggan, just south of the proposed crossing. One indicated silt deposits to 22m below bed level, overlying moderately weak phyllite. Geophysics surveys in the form of seismic reflection has been undertaken</p>
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		<p>just south of the proposed route corridor. Further assessment of the available information and preliminary GI would be required at an early stage to determine the influence of these conditions on any proposed bridge / tunnel.</p> <p>The solid geology at the eastern end of the crossing location is recorded as comprising metamorphic rocks of the Dunoon Phyllite Formation: pelite, psammite and metallimestone. Solid geology at the western end is recorded as comprising psammites of the Loch Katrine volcanoclastic Formation. To the west of Blairmore two faults trending north are mapped, forming the western boundary to the fault block mapped within the route corridor. Several faults are recorded on the east of the crossing, trending northwest. These are mapped into the loch, it is likely that further faults are present within the loch in this area.</p> <p>Loch Fyne Fixed Link Crossing</p> <p>Raised Marine Deposits are mapped across Otter Ferry at the eastern end of the fixed link crossing, with Marine Beach Deposits mapped along the shoreline and extending into the loch. Small areas of Alluvium are mapped in association with water courses to the north of the route corridor. Isolated deposits of glacial Till are mapped to the east of Otter Ferry. At the western end of the fixed link crossing, isolated areas of Raised Marine Deposits are mapped, with Marine Deposits mapped along the shoreline to the north in the Port Ann area.</p> <p>No GI information is available for review within or near the route corridor of the fixed link crossing. A review of the offshore geoindex indicates that seismic reflection surveys have been undertaken to the south of the route corridor.</p> <p>Bedrock geology at the crossing is mapped as semipelite of the Ben Lui Formation on the eastern shore of the loch, and quartzite and pebbly psammite of the Crinan Grit Formation to the west of the crossing. Large metabasalt intrusions are mapped within the psammites as part of the Dalradian Supergroup.</p> <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
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		<p>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.</p> <ul style="list-style-type: none"> 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"> - 12 no. Existing culverts - 95 no. Existing culverts - 2 no. Existing bridges
Environment Considerations	Biodiversity, Fauna and Flora	<p>This corridor study area crosses Upper Loch Fyne and Loch Goil MPA for approx. 2.8km and is also approximately 200m south at another section.</p> <p>Most of Ruel Estuary SSSI (131.7ha) falls within the route corridor.</p> <p>91 parcels of woodland listed on the AWI fall within the route corridor.</p>
	Population and Human Health	<p>The noise environment in the vicinity of the route corridor is characterised by the road traffic on existing A and B roads. The route corridor passes through predominantly rural areas and there are a number of settlements within the route corridor including Helensburgh, Rhu, Rosneath, Kilcreggan, Cove, Strone, Blairmore, Clachaig, Otter Ferry and Achnaba.</p> <p>Several core paths are also located within/adjacent to the route corridor, including:</p> <ul style="list-style-type: none"> • C406 (Otter Ferry Circular, Loch Fyne); • C215 (Glendaruel to Otter Ferry); • C214h, i and k (Cowal Way Glenbranter to Portvadie); • C212b (Port Lamont to Ardtaraig, Loch Strivan); • C223a, b and c (Dunans loop to Inverreck and the LLTNP boundary);

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		<ul style="list-style-type: none"> • C289a, b and c (Kilcreggan to Auchengower Caravan Park); • C525 (North Ailey Road, Cove); • C319c (Barbour Road, Kilcreggan); • C290a, b and c (School Road to Church Road via Fairfield Gardens); • C291 (School Road to Church Road); • C319d (Barbour Road, Kilcreggan); • C282a, b d, f and g (Kilcreggan to Peaton Hill (Peninsula Path)); • C499 (Portkil Point, Kilcreggan); • C286a, c, d (Roseneath to Kilcreggan); • C288 (Portkill Bay to B833 Kilcreggan/Roseneath); • C285 (Rosneath to Clachan Glen); • C311 (Roseneath to Clynder); • C413 (Tom a'Mhoid, Roseneath); • C415 (Clachan Burn, Roseneath); and • C414 (Silver Hills to Ferry Land, Roseneath). <p>Cowal Way, a long-distance walking path, intersects the route corridor at Glendaruel, where it travels south to the west of the River Ruel and Loch Riddon.</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 Glendaruel where it then travels along the A886 and B836 (and route corridor) in an easterly direction towards Dalinlongart.</p>
	Water Environment	<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"> • Seven river water bodies, Kilfinan Burn/Allt Lean Achaidh, River Ruel, Tamhnic Burn, Balliemore Burn/Allt Gleann Laorigh, Glentarsan Burn, Little Eachaig River/Cruach Neuran Burn and River Eachaig; • Two transitional water bodies, Clyde Estuary – Outer and Gare Loch; and • Six coastal bodies, Firth of Clyde Inner – Dunoon and Wemyss Bay, Loch Fyne – Middle Basin, Loch Striven, Loch Long (South), Holy Loch and Loch Riddon. <p>The route corridor also crosses approximately 130-140 minor watercourses.</p>

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		<p>SEPA Flood Maps (SEPA, 2020) indicates that the route corridor may be at existing coastal flood risk around A814 at Gare Loch, B836 at Loch Striven, A886 at Loch Riddon, A815 at Holy Loch, A880 and B833 at Loch Long South and Loch Fyne Middle Basin during a medium likelihood event (0.5% Annual Exceedance Probability (200-year) event). The route corridor may be at existing fluvial flood risk from Kilcreggan Burn, River Eachaig, around the B836 from Little Eachaig River/Cruach Neuran Burn, Glenkin Burn, Glentarsan Burn, Balliemore Burn, around A886 at River Ruel, and Tamhnich Burn, and from the Kilail Burn during a medium likelihood event (0.5% Annual Exceedance Probability (200-year) event).</p> <p>The Ruel Estuary SSSI and the Upper Loch Fyne and Loch Goil Marine Protected Area are within the vicinity of the route corridor.</p> <p>The Loch Fyne, Loch Striven and Kyles of Bute Shellfish Water Protected Areas are within the vicinity of the route corridor. There are Active Aquaculture Sites, CAR licenced fish farms and Classified Shellfish Harvesting Areas within the vicinity of the route corridor.</p> <p>The route corridor passes in the vicinity of two surface water Drinking Water Protected Areas.</p> <p>No bathing waters are in the vicinity of the route corridor.</p>
	Soils	<p>The route primarily passes through peaty gleys and peaty podzols, in addition to mineral gleys, humus-iron podzols, alluvial soils and brown earths. Land capability for agriculture is generally mid to low value, and ranges from 4.1 – 6.3.</p> <p>Soil type within the route corridor is mixed with peaty podzols, peaty gleys, mineral gleys, mineral podzols, brown soils and alluvial soils all present. Peaty gleys and peaty podzols predominate with mineral soils in sections on the Roseneath Peninsula and at the heads of Loch Striven and Loch Riddon. The route corridor where peat is present predominantly transects peat identified as Class 5 (no peatland habitat recorded, soils are carbon rich and deep peat) and Class 3 (not priority peatland habitat with carbon rich soils and some areas of deep peat) in the Carbon and Peatland 2016 Map. However, the route corridor also transects pockets of peat identified as Class 2 (nationally important carbon-rich soils, deep peat and priority peatland habitat, areas of potentially high conservation value and restoration potential) at Otter Ferry and there are two small areas of Class 1 peatland (nationally important carbon rich soils, deep peat and priority peatland habitat, areas likely to be of high conservation value) on the Roseneath Peninsula and at Glen Lean. Given the combination of soils, climactic conditions and topography the Land Capability</p>

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		<p>for Agriculture (LCA) Class within the study area 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 two Geological Conservation Review (GCR) sites in the route corridor, these being Rhu Point and Cove Bay to Kilcreggan. These sites are shoreline/sea-bed sites.</p> <p>The Land Capability for Forestry (LCF) class is mixed ranging from Class F2 on the Roseneath Peninsula, at Strath Eachaig, Glendaruel and at Otter Ferry to Class F6 on the higher steeper slopes in between. There are existing stands of commercial forestry throughout the route corridor. The study area 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) on the Roseneath Peninsula, Glen Lean and Otter Ferry. Other areas identified include existing woodland, Sensitive (areas where the 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).</p>
	Air Quality	<p>The route corridor passes through predominantly rural areas and there are a number of settlements within the route corridor, including Helensburgh, Rhu, Rosneath, Kilcreggan, Cove, Strone, Blairmore, Clachaig, Otter Ferry and Achnaba.</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>

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		<p>As indicated in the 'Water Environment' section, the route corridor may be at existing coastal flood risk around A814 at Gare Loch, B836 at Loch Striven, A886 at Loch Riddon, A815 at Holy Loch, A880 and B833 at Loch Long South and Loch Fyne Middle Basin during a medium likelihood event. The route corridor may be at existing fluvial flood risk from Kilcreggan Burn, River Eachaig, around the B836 from Little Eachaig River/Cruach Neuran Burn, Glenkin Burn, Glentarsan Burn, Balliemore Burn, around A886 at River Ruel, and Tamhnich Burn, and from the Kilail Burn during a medium likelihood event.</p> <p>As outlined in the 'Soils' section, there are several areas of peatland and woodland in the route corridor with a high carbon sequestration and sink value. As outlined in the Biodiversity, Flora and Fauna section, there are several areas of forestry in the corridor which also has a high carbon sequestration and sink value.</p>
	Material Assets	<p>The route corridor contains a variety of natural material assets. As outlined in the Climatic Factors section, there are areas of forestry within the route corridor and as listed in the Soils section, there are sections of peat soils and a mixture of LCF classes.</p> <p>There is also a variety of built material assets in the corridor. The route corridor generally follows existing road infrastructure including a mixture of 'A' 'B' and 'C' roads. There is one ferry service within the route corridor at Gare Loch, linking Kilcreggan to Gourock.</p> <p>The route corridor requires a structural crossing of Gare Loch, downstream of HMNB Clyde. Consideration for clearance and maritime navigation must be given to facilitate continued passage for naval shipping at Gareloch.</p> <p>There are minor renewable energy developments along the route corridor, mostly comprised of micro hydro schemes. There are waste disposal facilities at located at Dalinlongart to the north of Dunoon and Blackhill at Helensburgh.</p>
	Cultural Heritage	<p>There are seven Scheduled Monuments, 157 Listed Buildings, four Conservation Areas and one Garden and Designed Landscape (Ballimore GDL) within the route corridor. There are concentrations of Listed Buildings at Rosneath, Cove, Kilcreggan, Blairmore, Ardentinny and Strachur. The Cove and Kilcreggan Conservation Area almost completely bisects the route corridor. The Clachaig Conservation Area is centrally located within the study area. The Ballimore GDL occupies a large part of the study area on the eastern shore of Loch Fyne.</p>

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	<p>Landscape and Visual Amenity</p>	<p>The route corridor is approximately 49km long and generally runs along existing roads, but involves three new crossings at Loch Fyne, Loch Long and Gare Loch linking Kintyre with Cowal and Helensburgh. Starting with the new crossing between Port Ann on the western and Otter Ferry on the eastern shore of Loch Fyne, this route corridor runs through Ballimore Garden and Designed Landscape (GDL) and then passes through the Kyles of Bute National Scenic Area (NSA) for approximately 3km, past the northern tip of Loch Riddon and Loch Striven, and then runs past the northern edge of Holy Loch, crossing Loch Long to Kilcreggan on Rosneath Peninsula and then crossing Loch Gare between Rosneath and Rhu to the northwest of Helensburgh</p> <p>Approximately 6km of the route corridor is located within the LLTNP and Argyll Forest Park. Approximately 15km of this route corridor is located within the West Loch Fyne (Coast), East Loch Fyne (Coast) and Bute & South Cowal Areas of Panoramic Quality (APQs). There are several Open Space Protection Areas around Kilcreggan and Rhu and Conservation Areas in Cove and Kilcreggan, Rosneath and Rhu.</p> <p>The Landscape Character Types (LCTs) within the route corridor comprise Rocky Coastland – Argyll LCT, Plateau Moor and Forest – Argyll LCT, Steep Ridges and Mountains LCT, Rocky Coastland – Argyll LCT, Steep Ridges and Hills LCT, Straths and Glens LCT, Settled Coastal Fringe LCT, Open Ridges LCT and Rolling Farmland with Estates – Argyll LCT. There are several Seascape Character Areas (SCAs) within the study area, namely Loch Fyne - Lachlan Bay to South Ballimore SCA, Loch Fyne - Loch Gilp to Brainport Bay SCA, Loch Striven - Ardbeg Point to Head of Loch Striven, Head of Loch Striven and Head of Loch Striven to The Craig SCAs, Loch Long - Strone Point to North of Blairmore, North of Blairmore to Shepherd's Point and Coulport to Barons Point SCAs, Inner Firth of Clyde - Holy Loch and Kilcreggan to Rosneath Point SCAs and Gareloch - Rosneath Bay to Clynder, Rosneath Point to Rosneath Bay and Rhu 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.</p> <p>This route corridor would cross and likely be visible from the Loch Lomond and Cowal Way (Glenbranter to Portavadie section) and the Argyll Paddle Trail. Parts of the route corridor would also be visible from large sections of Loch Fyne, Loch Long, Gare Loch and Firth of Clyde coastline as well as numerous residential and recreational receptor locations.</p>
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Traffic	<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>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>
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Implementability		
Engineering	Topography and Alignment Considerations	<p>The route corridor starts on the east side of Gare Loch where it is significantly constrained. Steep, high (361m high point) hills run the width of the route corridor to the west with the towns and villages of Helensburgh, Rhu and Shandon also spread across the east of Gare Loch. Additionally, the West Highland Line railway extends the width of the route corridor, and Faslane Military Base sits just outside the extents. The alignment will entirely be dictated by the location of the Gare Loch crossing point, and due to the built-up area and topography will likely prove difficult to achieve a compliant design without significant engineering challenges.</p> <p>On the west side of Gare Loch sits the Rosneath Peninsula, which again is significantly constrained. A ridge line effectively runs down the middle in a north-south direction with steep slopes falling east and west towards Gare Loch and Loch Long where the toe is very close to the respective coast lines. Additionally, the settlements of Rosneath and Cove spread around the coastline. Alignments will be dictated not only by the crossing location from the Gare Loch but also Loch Long. Due to the high elevation and steep topography north of Rosneath, it is unlikely that compliant geometry will be achievable without significant engineering intervention such as a tunnel or very high structure. South of Rosneath there is a flatter area which would likely allow for compliant geometry to be achieved, although it is anticipated that there would still be engineering challenges depending on the location of the Loch</p>

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		<p>Long crossing. The centreline follows the B833 from Roseneath to Cove which would result in stretches of sub-standard horizontal alignment geometry, particularly through the two settlements.</p> <p>The western side of Loch Long is again significantly constrained by topography where steep slopes and localised gullies in the hillside fall towards the coastline with properties across the width adjacent to the shore. Crossing type will dictate the alignment; however, a structure will require minimum clearance of 75m which will result in the landing being located on the slope. Achieving compliant vertical alignment geometry may be possible by descending longitudinal along the contours; however, the sharp changes and steep slope will make it difficult to achieve horizontal alignment geometry compliance without significant cutting or structural intervention.</p> <p>From Blairmore the route corridor heads west to Ardbeg/A815 junction with the centreline following the A880. Steep slopes and properties constrain the centreline on west and then north as it rounds Strone Point headland with the Holy Loch and Loch Long on the opposite side. Similar to Route corridor 10, the Loch Long crossing location will dictate the alignment. The topography will make it challenging to achieve a compliant alignment following an elevated landing from a structure. It is likely that a route would need to slowly descend across the contours as switch back would most likely be sub-standards to minimise the impact on the slope. A tunnel from the Loch Long side of the headland to the Holy Loch side would circumvent this issue but introduce additional engineering challenges. If the route of the existing A880 could be followed, then compliant vertical alignment geometry should be achievable. Generally, horizontal alignment geometry should be to standard, although localised sections may not be compliant and would require improvements which could be limited by the adjacent properties. A lengthy route behind the properties is unlikely to be feasible due to the challenges required in managing the steep topography.</p> <p>The centreline of the route corridor follows the B836 west to Glenlean/Loch Tarsan. The valley floor is relatively flat and should allow for compliant vertical alignment geometry to be achieved. Steep side slopes, Little Eachaig River and tributary watercourses do constrain the route and will influence the horizontal alignment geometry; however, alignments should generally comply with standards.</p> <p>Heading west between Glenlean and Ardtaraig, the route corridor is constrained by Loch Tarsan, supplying the Striven Hydro Scheme, on the north and steep slopes on the south. A route will likely follow the contours and should allow for a compliant vertical and horizontal alignment geometry to a point at west of the loch; however, levels rapidly fall from 100m to sea level at Loch Striven. The centreline of the corridor follows the B836 round the head of Loch Striven. The topography does not lend itself well to achieving compliant vertical alignment geometry in order to descend to sea level and then ascend to 150m. It will also require doubling back around the head of the loch. In order to achieve this, it will likely require a sub-standard radius to roughly follow the extents of the loch around this</p>
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		<p>section. It is unlikely that a practical solution could be implemented to allow a compliant radius. Furthermore, there is potential for this area to flood due to its low lying, flat nature and proximity to the loch with a substantial river. This could be avoided through the use of a structure over Loch Striven; however, a climb of around 50m on the west side of the loch over a short distance would still be required making it difficult to provide a suitable alignment for an open road and may require a tunnel to pass the saddle in the topography.</p> <p>Continuing west to the top of Loch Ruel, the route corridor opens up and is less constrained which should allow for compliant horizontal alignment geometry. The ground does descend in level; however, vertical alignment geometry to road design standards should be achievable with little difficulty, although cuttings will likely be required.</p> <p>Between the top of Loch Ruel and Otter Hill Road/C11, the topography steepens on the north side, but following the contours should allow for compliant vertical alignment geometry. On the southern/western side is an open valley floor which should provide sufficient land to achieve horizontal alignment geometry to road design standards. A number of settlements as well as the River Ruel and its tributaries are spread across the area which will need to be considered, particularly from the perspective of potential flooding.</p> <p>The centreline of the route corridor follows the C11 west to Otter Ferry. From the start of the C11, the topography steeply rises up a gully from 50m up to 300m over a distance of 2km. The increase in level combined with the steep slopes make this a very challenging area to achieve a compliant alignment. Several switchbacks would be required in order to reasonably elevate the road; however, these would likely need to be sub-standard to minimise the impact on the hillside, otherwise significant retaining walls may be required. If the road could successfully be raised to follow the C11, the topography begins to flatten but then undulates. Continuing west, it is likely that compliant vertical and horizontal alignment geometry could be achieved through the use of fairly standard embankments and cuttings. The only real alternative to circumvent the steep rise would be to use a tunnel, emerging at an appropriate level near Otter Ferry.</p> <p>On approach to Loch Fyne the topography begins to fall. The steepness varies and it will be possible to optimise the route to minimise gradients; however, it is unlikely that a straightforward alignment to standard will be achievable. Again, switchbacks will likely be necessary to provide the change in elevation, although at this location the topography is less severe than detailed before. The level of descent and alignment will most likely be dictated by the location of the crossing for Loch Fyne.</p>
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		<p>The A83 Trunk Road on the western side of Loch Fyne is situated close to the shoreline at points and relatively low lying, 10 to 40m. Topography is unlikely to cause significant issues for tying into the trunk road assuming a structure is used for the crossing as this will allow for the new carriageway coming from the west to be of a similar elevation. Consideration for an appropriate junction will be required. Alternatively, a tunnel could be considered for this location; however, this will come with its own challenges for connecting back into the existing A83 Trunk Road due to the depth of the loch and the vertical gradient of the approach roads required</p>
	<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"> • Above the route corridor to the northwest of Dalinlongart at Holy Loch. The British Geological Survey (BGS) also has mapped mass movement deposits in association with this record. • To the northeast of Clachaig, between Dalinlongart and Loch Tarsan. The BGS also has mapped mass movement deposits in association with this record. • Mass movement deposits are mapped west of Balliemore, at the head of Loch Striven, however no record is shown by the NLD. <p>An assessment of other potential issues including potentially difficult ground conditions is summarised below:</p> <ul style="list-style-type: none"> • Potential for compressible ground associated with deposits of peat, alluvium and raised marine deposits with possible implications for road alignment. These deposits may require excavation and replacement with fill or suitable improvement treatment. • Potential for peat slides to occur in cuttings due to presence of peat deposits on hillsides and in upland areas of the route corridors, particularly in the Rosneath area. • Potential presence of soft or loose deposits (Alluvium and Raised Marine Deposits) primarily in association with Glen Lean and the areas at the heads of Gare Loch, Loch Striven and Loch Riddon. • Presence of compressible Tidal Flat Deposits at the eastern end of the Gare Loch fixed crossing, south of Rhu, extending into the loch.

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		<ul style="list-style-type: none"> • Faulting can create zones of weak and/or highly fractured rock which is a significant hazard when tunnelling. Conversely faulting can create zones of extremely strong 'welded' fault rock, which would pose a significant hazard for tunnelling or areas of cutting in relation to excavatability. • Faulting in the area of the fixed link sections may result in zones of highly fractured rock with reduced bearing capacity. • The presence of faults may provide a preferential pathway for groundwater flow, and groundwater may pose significant issues for excavation in cuttings and for tunnelling if the groundwater table is high. • Areas of artificial ground including worked ground and voids may include disturbed and/or loose deposits or voids, and may have been infilled with potentially contaminated material.
	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"> • 1 no. New 1,500m long (900m main span) cable stayed or suspension bridge across Gare Loch. • 1 no. New 2,980m long (1,980m main span) suspension bridge across Loch Long. • 1 no. New cable stayed bridge 820m long (500m main span) across Loch Striven. • 1 no. New tunnel approximately 1,450m under high ground west of Loch Striven. • 1 no. New tunnel approximately 4,400m under high ground west of Ballochandrain. • 1 no. New bridge approximately 3,000m long (1,100m main span) or tunnel across / under Loch Fyne. • 4 no. New multi-span steel composite single carriageway bridges on piled reinforced concrete abutments and piled intermediate piers • Approximately 9 no. New single span composite concrete Y beam deck single carriageway bridges on piled or spread footing abutments • Approximately 95 no. New piped or box culverts <p>Constructability, operation and maintenance in relation to structures is discussed elsewhere within the document.</p> <p>Key structures issues are as follows;</p>

		<p><u>Gare Loch Cable Stayed or Suspension Bridge</u></p> <ul style="list-style-type: none">• The length of bridge suggests a cable stayed bridge may be an option and would offer the benefit of enhanced long term durability. However, for the location at the mouth of Gare Loch and navigation by large military surface and submarine vessels, there may be an advantage in locating the towers as close to shore as possible. This increases the main span favouring a suspension span form. The precise requirements of ship/submarine navigation would need due examination and liaison with MOD. For the present, a suspension form is assumed.• On the east side of Gare Loch at Helensburgh, there are a number of properties in close proximity of the crossing point. This could result in a complex arrangement/ design being required to limit the impact on these properties or the consideration to move the crossing further north. Moving the crossing of Gare Loch would also result in the Loch Long crossing being required to moved further north, to a location closer to the route within route corridor 4.• The bridge design aim would be to minimise its length, locate the towers as close to shore as possible and set the deck level at a height above Gare Loch to enable the passage of commercial and military marine vessels. The Defence Infrastructure Organisation (DIO) have advised that the required minimum clearance is +75m above sea level. For the purposes of initial estimation, an allowance of 5m is made for the maximum deflection of a suspension bridge deck and 5m for its construction depth. Thus, the carriageway height would require to be at least +85m above loch level.• The east approach commences at the A818 Luss Road north of Helensburgh and descends on the landform to a point between the built-up areas of Helensburgh and Rhu. An approach viaduct would be required.• The western landfall is at Castle Point where an approach viaduct would descend to the road network.• It is estimated that the suspension bridge solution would comprise a main span of approximately 900m with back spans of up to 300m (total length up to 1,500m).• The bridge must remain straight with consequences for the approach alignment on both the east west shores.• High tower construction on the Gare Loch bridge; if deck height is +85m, tower heights are estimated to be 200 – 250m.• The bridge deck must be wind resilient and will require wind barriers similar in form to those provided on the Queensferry Crossing. However, a slender single carriageway long span suspension bridge presents a design challenge to ensure the adequacy of the deck's aerodynamic response.• Consideration should be given to winter resilience, principally deck surface and cable/tower de-icing.
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		<p><u>Loch Long Suspension Bridge</u></p> <ul style="list-style-type: none">• A suspension bridge crossing is required 2,980m long (main span 1,980m)• The bathymetry indicates water depths of approximately 60m on mud and sands.• The bridge crosses the main navigation channel entrance to Loch Long.• Given the need for navigation minimum clearance of +75m and allowing for deck construction depth and deflection, the carriageway would have to be placed at approximately +85m above sea level.• The towers would extend to heights of approx. 200 -250m or upwards of 300m from sea-bed level. Unlike the northern Loch Long crossing (Route Corridors 4 and 5), locating the towers onshore would result in too long a main span, therefore for this crossing, towers must be located in relatively deep water.• Ship collision protection to the towers would be a major factor; navigation requirements include military surface and submarine vessels and very/ultra large crude oil carriers (VLCC/ULCC). Navigation transit velocities through the channel depends on the Piloting arrangements and transit speed for vessel steering may increase to allow for tidal currents. Particularly for the VLCC and ULCC, their masses combined with transit speed is expected to result in considerable potential impact energies that must be able to be absorbed by the bridge footings/ship collision protection measures.• The bridge decks must be wind resilient and will require wind barriers similar in form to those provided on the Queensferry Crossing. However, a slender single carriageway long span suspension bridge presents a design challenge to ensure the adequacy of the deck's aerodynamic response. This is particularly important for these long span suspension bridges. Research and wind tunnel testing would be required to determine if a slender single carriageway suspended road deck of that length is feasible. Conceivably, additional lateral and vertical restraint/damping would be required.• The west approach to the bridge is considerably constrained by topography and requires a tunnel to descend through the hillside at Strone. <p><u>Loch Striven Bridge</u></p> <ul style="list-style-type: none">• The Loch Striven Bridge crosses the comparatively shallow head of the loch at approximately 20m depth. The bridge's main span would be approximately 500m between two A -frame towers with a total length of approximately 820m.• Deck level is at a relatively high level of 95m to suit the east and west land profiles, particularly where, on the west side, a tunnel is required. To reduce the level of the deck would increase the length of the tunnel significantly.• The bridge would be a cable stayed single carriageway with pedestrian/cyclist provision.
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- The cable stayed form obviates cable ground anchors as would be the case for a suspension form and greatly improves durability – the ability for cable maintenance and replacement.
- The two towers would be reinforced concrete founded on spread footings onto rock. Sands overlie rock so a mass concrete filled caisson would transfer load below the water line
- The bridge must remain straight thereby dictating the approach alignments.
- With the relatively high deck level, the towers would be correspondingly high estimated at 200 – 250m.
- The bridge deck must be wind resilient and will require wind barriers similar in form to those provided on the Queensferry Crossing. However, a slender single carriageway long span cable stayed bridge presents a design challenge to ensure the adequacy of the deck’s aerodynamic response.
- Consideration should be given to winter resilience of the bridge, principally deck surface and cable/tower de-icing.

Loch Fyne Bridge

- The Loch Fyne Bridge is an alternative to a tunnel at this crossing location and crosses the loch at the sand spit at Otter Ferry.
- The overall length of the crossing is approximately 3,000m comprising a shallow area to the east at Otter Ferry with deeper channel of up to 20 – 30m in the narrows at the west side of the loch.
- A mixed bridge form would be appropriate comprising an eastern reinforced concrete spine box form or composite steel box girder approach viaduct over the shallower area to the east and a cable stayed bridge section over the deeper narrows to the west.
- The cable supported length is 1,600m of the overall length of 3,000m and would comprise a steel composite box girder and reinforced concrete slab. The bridge’s main span would be approximately 1,100m between two A -frame towers.
- Unlike the other crossings which must cater for the passage of large commercial and military vessels, the navigation clearance to the Loch Fyne Bridge need be only the minimum clearance required for commercial navigation, +45m.
- The bridge would be single carriageway with pedestrian/cyclist provision.
- The cable stayed form obviates cable ground anchors as would be the case for a suspension form and greatly improves durability – the ability for cable maintenance and replacement.
- The two towers would be reinforced concrete founded on spread footings onto rock. Sands overlie rock so a mass concrete filled caisson would transfer load below the water line
- The cable stayed length of the bridge must remain straight although the eastern approach viaduct could be curved to suit the approach road alignment and if advantageous in terms of geology.

		<ul style="list-style-type: none"> • The towers would be approximately 200m high. • The bridge deck must be wind resilient and will require wind barriers similar in form to those provided on the Queensferry Crossing. However, the cable supported length is significant and a slender single carriageway long span cable stayed bridge presents a design challenge to ensure the adequacy of the deck's aerodynamic response. • Consideration should be given to winter resilience of the bridge, principally deck surface and cable/tower de-icing. <p><u>Tunnels within Route Corridor 11</u></p> <ul style="list-style-type: none"> • Loch Striven West Tunnel – A tunnel is considered to be required to satisfy a practical road alignment through the route corridor. The proposed tunnel would be approximately 1.45km in length and would be routed around the side of the hill following a similar route to the B836 at a slight downwards grade of 0.5%. • Ballochandrain Tunnel – A tunnel is considered to be required to satisfy a practical road alignment through the route corridor. The proposed tunnel would be approximately 4.4km in length and on a generally straight alignment east to west. From Ballochandrain the tunnel would climb at a gradient of approximately 4%. After reaching a high point of 170m the road heads downwards at approximately 3% to the west portal approaching Otter Ferry. • Loch Fyne Tunnel – A tunnel is considered to be required to satisfy a practical road alignment under Loch Fyne at Otter Ferry, where the Loch is thought to be 50m at its deepest on the route considered. The proposed tunnel would be approximately 3-4km in length depending on alignment and would run on a curve from an eastern portal at Otter Ferry to the western side of the Loch south of Carrick. From Otter Ferry the road would descend at 4-5% to a low point of approximately -65m AOD and then would climb at a similar gradient to emerge on the west. <p>It is initially considered that tunnels would be constructed by a single bore providing a single carriageway with bi-directional traffic through the tunnel; however, there are important fire life safety, and associated ventilation and escape provisions, backed up by European and National highways standards that will govern tunnel configuration.</p> <p>For a single carriageway, bi-directional tunnel, these provisions are quite complex. The ventilation system must be in permanent operation and in the event of a fire, smoke and heat have to be removed from the tunnel using semi-transverse ventilation, which draws the smoke and heat into an overhead duct and exhausts are likely to be required</p>
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		<p>at intermediate shafts or via shafts near the tunnel portals for the shorter Loch Striven West Tunnel. Escape to free air from fire is facilitated by either an escape duct provided within the tunnel section or for longer tunnels via intermediate shafts with lifts and recovery suites given significant depth below ground surface and remote locations.</p> <p>Accordingly, twin bore, dual carriageway tunnels may be more appropriate. In such tunnels, in the event of a severe vehicle fire, longitudinal jet fan ventilation is ramped up to full strength to blow the smoke and heat in the direction of flow of traffic, away from vehicles queued behind the incident, while those ahead of the incident escape by continuing as normal. For those trapped in the tunnel, they can escape into the other non-incident bore through cross-passages, at say 100-300m intervals, and can be evacuated by rescue vehicles. Intermediate shafts would not typically be required other than to vent pollution.</p>
	<p>Constructability Considerations</p>	<p><u>Major Structures Constructability Considerations – Bridges</u></p> <p>Gare Loch Cable Stayed or Suspension Bridge</p> <ul style="list-style-type: none"> • The channel depth reaches 60m. Navigation includes military surface vessels, submarines and commercial and private/leisure craft. Marine management and control are crucial factors governing the construction process. • The eastern approach between Helensburgh and Rhu is a curved elevated highway viaduct while the west may also have to be curved to follow the shoreline at Castle Point for the descent to the road network. Both east and west viaducts would be concrete box or steel composite decks on leaf piers on piled foundations. The approach viaducts' curvatures would appear to preclude incremental launching as these would be built conventionally span by span. • The bridge towers would be high H- or A-frames enclosing the single carriageway road deck. The location of the towers would require large diameter caissons fabricated nationally or internationally. Single or twin caissons would be required for each tower footing, floated by semi-submersible into location and sunk to seabed possibly in up to 50m depths. These would then be sunk by their own mass and by perimeter jetting to penetrate and sink through to rockhead where jet grouting would form a seal prior to excavation and underwater concreting. • An alternative foundation method would be the construction of large diameter pilecaps within the caissons and large diameter piles to rock. • The mass of the caisson and internal concreting mass would be designed to provide the energy absorption required and may govern the overall diameter of the caissons. It is estimated caissons of approx. 30m

		<p>diameter would be needed. Large fendering installation would be necessary to prevent hull over-sail impacting the towers. The potential for submarine collision is also an unusual factor.</p> <ul style="list-style-type: none"> • Road access to east and west ends of the bridge is reasonably good. • Marine transfer of personnel, materials and equipment would be a major challenge where the tower construction would require to be serviced by east-west marine transport across the loch. • Cable installation would be by aerial spinning. Cable anchorages would occupy additional land and require careful alignment interaction with the approach road/viaduct alignments. • Importantly for the bridge is the time deck segment delivery barges must stay on station to allow segment lifting onto the suspension cable catenaries. The deck height of +85m lengthens the time taken to jack the segments to deck level. On station times of up to 12 hours could be expected (2 hrs GPS locating and anchoring, 10 hrs jacking). During this time exclusion zones will limit or divert marine traffic. In this respect, the crossing location on Gare Loch is particularly constrained and military vessel movements would have to be carefully managed – consultation would be required at an early stage to determine specific requirements and constraints as there are no alternative marine routes to Faslane. • The towers would be constructed by jump-forming. For a deck carriageway height of +85m, tower heights are estimated to be 250 to 300m above sea level. In the western channel particularly, overall height from foundation may approach 350m. <p>Loch Long Suspension Bridge</p> <ul style="list-style-type: none"> • Navigation at the entrance to Loch Long includes military surface and submarine vessels, very/ultra large crude oil carriers (VLCC/ULCC), commercial and private/leisure craft. Marine management and control are crucial factors governing the construction process. • The eastern approach from the Rosneath Peninsula is from elevated land east of Cove and will require a curved approach viaduct. The western landfall is more difficult in that the approach has to descend in a constrained shoreline space towards Kilmun on the A880. The viaduct form would be a post-tensioned concrete box or a steel composite box girder deck on discrete or leaf piers on piled foundations and would enter a tunnel for the descent to the A880. • The towers would be high H- or A-frames enclosing the single carriageway road deck. The location of the towers would require large diameter caissons fabricated nationally or internationally. Single or twin caissons would be required for each tower footing, floated by semi-submersible into location and sunk to seabed possibly in up to 60m depths. These would then be sunk by their own mass and by perimeter jetting to
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		<p>penetrate and sink through to rockhead where jet grouting would form a seal prior to excavation and underwater concreting.</p> <ul style="list-style-type: none">• An alternative foundation method would be the construction of large diameter pilecaps within the caissons and large diameter piles to rock.• The mass of the caisson and internal concreting mass would be designed to provide the energy absorption required and may govern the overall diameter of the caissons. It is estimated caissons of approx. 30m diameter would be required. Large fendering installation would be necessary to prevent hull over-sail impacting the towers. The potential for submarine collision is also an unusual factor.• The west end of the bridge is isolated and would require a haul road at Strone. Alternatively, considerable marine transfer operations would be required across the loch.• Marine transfer of personnel, materials and equipment to the towers would be a major challenge where east-west construction marine transport would cross the north-south navigation route.• Cable installation would be by aerial spinning. This will occupy additional land and require careful alignment interaction with the approach road/viaduct alignments especially at the west approach.• Importantly for the deck construction interface with marine traffic is the time deck segment delivery barges must stay on station to allow segment lifting onto the suspension catenaries. The channel depths lengthen the time taken to anchor the barges on station – anchor line length is 60m depths. The deck height of +85m lengthens the time taken to jack the segments to deck level. On station times of up to 10 hours could be expected (2 hrs GPS locating and anchoring, 8hrs jacking). During this time exclusion zones will limit or divert marine traffic. Military vessel movements would have to be carefully managed – consultation would be required at an early stage to determine specific requirements and constraints.• The road network delivery route to west approach is long and vulnerable to the ongoing closure risk of the A83 at Rest and Be Thankful.• The towers would be constructed by jump-forming. For a deck carriageway height of +85m, tower heights are estimated to be 250 to 300m above sea level. <p>Loch Striven Bridge</p> <p>The following key considerations apply to the construction of the Loch Striven bridge:</p> <ul style="list-style-type: none">• There is access to both east and west ends of the bridge although the existing carriageway is single lane with passing places so construction access would require improvement prior to bridge construction. Marine access also appears relatively straightforward with access from the south of the loch.
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- The single carriageway bridge deck will require high twin legged 'A-frame' towers founded on rock. The tower foundations will be in water. However, there appears to be little if any navigation demand at this location at the head of Loch Striven so construction could progress from causeways constructed out from the shores. However, these would impede later segment erection from marine barge so would most likely need removal. Access to tower construction from land would eliminate the need for marine concrete transport.
- The foundation installation would be designed for underwater construction. The reinforced concrete towers would be constructed incrementally by jump forming with concrete being pumped up the towers as their height incrementally increases. Concrete volumes, especially given the nearby tunnel construction would warrant batching plants on site.
- Steel box deck segments would be fabricated nationally and/or internationally and delivered to a staging area at a nearby facility constructed onshore in the south of the loch.
- Segments would be transported by barge to below their location in the span. Main span segments would be progressively lifted onto the towers by alternating balanced cantilever progression out from the towers until closure at the bridge abutments and then at midspan.
- Lifting would require GPS placement of barges and their stations would be protected by an exclusion zone although there is very little marine traffic in this locale. Given the height of the deck, 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.
- The bridge construction on Loch Striven could have a potential impact on commercial and fishing activities.

Loch Fyne Bridge

The following key considerations apply to the construction of the Loch Fyne bridge alternative:

- There is access to both east and west ends of the bridge although the existing carriageway on the east shore at and to Otter Ferry is single lane with passing places so construction access would require improvement prior to bridge construction. Marine access also appears relatively straightforward with access from the south.

		<ul style="list-style-type: none">• The eastern approach viaduct would be constructed by the temporary formation of an access causeway or jetty extending from the shore at Otter Ferry and placement of a series of cofferdams at the pier locations onto the Otter spit.• The piers for the approach viaduct would be founded on steel piles driven to rock or into sand/gravel dependent on the geotechnical design. Pile caps would be formed in reinforced concrete in the cofferdams with leaf or discrete piers erected to deck level.• The viaduct would be a post-tensioned concrete spine box girder or composite steel box section launched from the eastern shore. This would require a construction bay formed at Otter Ferry with delivery of concrete and/or fabricated steel components. Box assembly would take place in the assembly bay.• The cable supported length of the single carriageway bridge deck will require high twin legged 'A-frame' towers founded on rock. The tower foundations will be in water. There appears to be limited navigation demand at this location so construction could progress from causeways/jetties constructed out from the shores. However, these would impede later segment erection from marine barge so would most likely need removal. Access to tower construction from land would eliminate the need for marine concrete transport. Access to the east tower would most likely require an extended causeway across the Otter spit.• The foundation installation would be designed for underwater construction. The reinforced concrete towers would be constructed incrementally by jump forming with concrete being pumped up the towers as their height incrementally increases. Concrete volumes, especially given the nearby tunnel construction would warrant batching plants on site.• Steel box deck segments would be fabricated nationally and/or internationally and delivered to a staging area at a nearby facility constructed onshore in a location within approx. 3km of the bridge.• Segments would be transported by barge to below their location in the span. Main span segments would be progressively lifted onto the towers by alternating balanced cantilever progression out from the towers until closure at the bridge abutment on the west, the approach viaduct end on the east and then at midspan.• Lifting would require GPS placement of barges and their stations would be protected by an exclusion zone although there is little marine traffic in this locale. Given the moderate height of the deck, the duration of barges on station for the lift is expected to approximately 5 hours. This allows for anchoring (1 hours) and strand jack lifting which could take up to 4 hours to achieve. 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.• The bridge construction on Loch Fyne could have a potential impact on commercial and fishing activities.
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Major Structures Constructability Considerations – Tunnels within Route Corridor 11

- Tunnels could be advanced by drill and blast techniques or by using a large Tunnel Boring Machine (TBM).
- Whichever technique is used, short sections of cut and cover tunnel would be required at each portal location to form a vertical portal face in reasonably competent rock from which the tunnel can be advanced. At each drill-and-blast advance the flat-bottomed “horseshoe”-shaped excavation of newly cut rock would be evaluated by a geologist and strengthened using a combination of rock bolts and sprayed concrete (SCL), to form a stable primary lining before the next advance is drilled and charged with explosive. Although this may seem a slow and laborious process it can be an economic method to construct tunnels in rock. The tunnel can be completed more quickly if the drill-and-blast sequence can be repeated at the opposite portal. Once the tunnel is completed an in-situ cast secondary lining can be installed to form a durable final structure.
- Alternatively, tunnels can be bored using a large Tunnel Boring Machine (TBM), starting at one end and boring consecutively. Although this involves a large capital investment in a TBM and large site set-up at the portal locations when compared with drill-and-blast. The final circular structural lining of pre-cast segments can be formed as the tunnel advances.

Issues specific to various tunnel options are as follows:

- Loch Striven West Tunnel – The construction of a portal at the north-east end of the tunnel adjacent to Loch Striven is likely to be problematic due to the elevation and slope. Access may be preferred from the south-west end of the tunnel, via Loch Riddon, the A886 and B836. Due to the length of this tunnel, drill-and-blast is considered to be more suitable.
- Ballochandrain Tunnel – A TBM drive site from the western end of the proposed tunnel seems the optimum solution as the TBM could be delivered via Loch Fyne, and spoil and other materials could be transported via the Loch, rather than on sub-standard local roads. However, this would mean that the road from Otter Ferry to the western portal location would need to be constructed first as the existing track would not be suitable. Access via Loch Riddon and the A886 to the eastern portal would be possible too with an improvement of the existing track, and there may be better land availability at this site.
- Loch Fyne Tunnel – The tunnel could be advanced using a large Tunnel Boring Machine (TBM), or possibly an immersed tube tunnel, which is floated into place and sunk into a dredged trench on the loch bed. Regardless of technique, short sections of cut and cover tunnel would be required at each portal location. Both techniques present a considerable tunnelling challenge as the Loch bed is variable, and consists of both soft ground deposits and rock, the extents of which are unknown at this stage.

		<p><u>Other Constructability Considerations – Road and Small Structures</u></p> <p>Rhu to Blairmore</p> <p>This section of road comprises 2 large marine crossings described above, connected by a new surface road crossing the peninsula between Rosneath and Cove. The construction of the new surface road in the central section indicates a large amount of earthworks likely to impact the B833 through extensive vehicle usage. Depending on the cut and fill balance it may be necessary to establish a borrow pit in the nearby vicinity to avoid importing fill, as the area is remote with limited access.</p> <p>Blairmore to Rashfield</p> <p>This section comprises a new offline road constructed on the side of the hill approximately 4.4km in length. There is an indication that a 125m long bridge is required approximately 1.5km east of the A815 at Rashfield which could potentially be replaced with an MSE wall solution as it appears that the structure would be required to reduce earthworks quantities. Extensive earthworks are required on the slope of the mountainside which would need to incorporate a haul road likely progressing with the earthworks. If roads are to be used for disposal of materials it is likely that the main route would be via the A815 at Rashfield, however there could be consideration for using a loch facility to load barges from the Blairmore end which could be combined with the works from Blairmore viaduct or new route to the north.</p> <p>Rashfield to Ballochandrain</p> <p>This alignment is a new offline road approximately 7.5km long that criss-crosses the existing alignment of the B836 at numerous locations before moving fully to an online widening of the existing road south of Loch Parsan and back offline to a new crossing at Loch Striven. The road then moves into a tunnel and new surface road to finish at Ballochandrain. The following are key construction considerations for the route:</p> <ul style="list-style-type: none">• The area where the route is passing through is relatively isolated from any roads of notable size which presents a challenge for logistics• The existing B836 is a bi-directional single carriageway with intermittent passing places, so would therefore be impacted notably by the construction of a new road crisscrossing the alignment making traffic management difficult without closing the road. A closure could have significant impacts for connectivity between local communities so would require careful planning.• If possible, it would be advised to move as much of the alignment offline as possible to mitigate impacts to
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		<p>the existing road and also provide for a haul route for earthworks vehicles.</p> <ul style="list-style-type: none">• Where the new alignment crosses over the existing road levels should be kept close to existing if possible and the existing pavement construction reused to alleviate TM issues.• Earthworks quantities appear relatively significant in the eastern section of the works but are a mix of cut and fill areas. If possible, the alignment should be designed to achieve a cut and fill balance to reduce the amount of material arriving at or leaving from site. Given the minor roads in this area this would be a particular advantage.• Given the access issues in this area it would be advisable to primarily support construction of the bridge from the loch to bring in materials. If a marine facility or temporary jetty could be established here it could also support earthworks activities and tunnel construction to reduce spoil being removed from site on the local road network.• To the west end of the new tunnel, construction of the new surface road and an adjacent haul road would be advised to enable work to begin on the tunnel from the western portal whilst the bridge is construction over the loch. Construction from the east end if the tunnel would be challenging without the bridge in place due to the steep slope and height of the portal above the existing road.• During tunnelling a significant challenge will be removal of the excavated spoil using the local road network. Opportunities to reuse the material on site or possibly transport to a marine loading area at Loch Striven may be explored that would alleviate the amount of traffic on the road. <p>Ballochandrain to Port Ann</p> <p>This section of road connects between the A886 in Ballochandrain in the east and the A83 on the west side of Loch Fyne, incorporating a short section of new surface road at the eastern end before entering a 4.3km tunnel through the mountain which exits approximately 2km from the eastern shore of Loch Fyne requiring a new surface road to reach the crossing. The link road crossing Loch Fyne would either need to be an extended 3.5km viaduct or a tunnel under the river. The route has the following key construction considerations:</p> <ul style="list-style-type: none">• Access roads on the east side via the A886 are single carriageway A roads providing limited access to site via road. Resulting from the tunnel excavation and the construction of the new surface roads it may be more feasible to establish a site compound and adjacent marine facility on the eastern loch shore to provide deliveries and remove spoil from site rather than using the surface roads. The capacity of the existing road network could also be additionally strained through ongoing online improvements to other nearby roads as part of the scheme.
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		<ul style="list-style-type: none"> On the west side of the mountain current surface access is very poor with only narrow access tracks to the area. This means that logistics routes via the loch or road network would need to be created to allow the works to commence.
Environment Considerations	Biodiversity, Fauna and Flora	<p>Route corridor crosses Upper Loch Fyne and Loch Goil MPA for approximately 2.8km and is also approximately 200m south at another section. Pollution during construction and operation of crossing could adversely impact the MPA, which could be a major negative environmental effect.</p> <p>Most of Ruel Estuary SSSI (131.7ha) falls within the route corridor. This could result in the loss of SSSI habitat, including the loss of designated features fen meadow, flood-plain fen, saltmarsh and upland oak woodland, which could be a major negative environmental effect. Moderate negative environmental effects could also occur as a result of nitrogen deposition.</p> <p>91 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 effects on marine and terrestrial 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. Changes in water flow conditions from runoff, or alterations to watercourses and groundwater. <p>During operation, there is potential for 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</p>

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		<p>watercourse crossings 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 impacts from increased vehicle traffic.</p> <p>As there are a number of settlements within the route corridor, in addition to noise and vibration there is potential for 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 crossings would provide significant journey savings around Gare Loch, Loch Long and Loch Fyne. The route corridor generally would improve connectivity between the central belt and Argyll and Bute.</p> <p>It is expected that the route corridor would provide greater accessibility 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 and the tunnelling options would require additional land take and potentially demolitions.</p> <p>There is also potential for air quality effects which could affect 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 approximately seven Water Framework Directive (WFD) classified river water bodies, six WFD coastal and two transitional WFD water bodies and approximately 130-140 minor watercourses.</p> <p>SEPA Flood Maps (SEPA, 2020) indicates that the route corridor may be at coastal flood risk around A814 at Gare Loch, B836 at Loch Striven, A886 at Loch Riddon, A815 at Holy Loch, A880 and B833 at Loch Long South and the crossing at Loch Fyne Middle Basin during a medium likelihood event (0.5% Annual Exceedance Probability (200-year) event). The route may be at fluvial flood rise from Kilcreggan Burn, River Eachaig, around the B836 from Little Eachaig River/Cruach Neuran Burn, Glenkin Burn, Glentarsan Burn, Balliemore Burn, around A886 at River Ruel, and Tamhnich Burn, and from the Kilail Burn during a medium likelihood event (0.5% Annual Exceedance Probability</p>

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		<p>(200-year) event). Potential for coastal flooding from new crossings on Loch Long, Gare Loch and Loch Fyne which could impact flooding on the immediate road infrastructure.</p> <p>May affect the Ruel Estuary SSSI and the Upper Loch Fyne and Loch Goil Marine Protected Area.</p> <p>Loch Fyne Shellfish Water Protected Area is directly crossed and may be affected. Loch Striven and Kyles of Bute Shellfish Water Protected Areas are within the study area and may be impacted by the route corridor.</p> <p>There are Active Aquaculture Sites, CAR licenced fish farms and Classified Shellfish Harvesting Areas within the vicinity of the route corridor, which may be affected.</p> <p>The route corridor passes in the vicinity of two surface water Drinking Water Protected Areas, which may be affected.</p> <p>Construction and operation within the route corridor could result in a major negative effect 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 Class 1 and Class 2 peatland habitat (nationally important and of potentially high conservation value and restoration potential) and the GCR sites. 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, but mitigation is likely to be achievable to reduce the potential for major negative environmental effects.</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 large structures over Gare Loch, Loch Long, and at Loch Fyne, 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 experience increased pollutant emissions during operation from increased vehicle traffic.</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>

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		<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 impacts on ecological receptors are assessed under Biodiversity, flora and fauna.</p>
	Climatic Factors	<p>Construction of the route corridor would have major negative effects on climate due to the release of carbon emissions associated with the construction materials and installation process. This includes the widening of 66.5km of existing A class road and upgrading of 9.5km of other roads, requiring significant raw material inputs. There is also a significant quantity of embodied carbon associated with constructing the elements as listed in the Material Assets section.</p> <p>Once operational, forecast traffic levels (and associated vehicle-derived greenhouse gas emissions) are relatively low, for all route corridors, 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 would reduce the driving distance for some journeys due to the introduction of the watercourse crossings over Gare Loch, Loch Long and Loch Fyne, which over time would likely result in carbon savings.</p> <p>Effects on the route as a result of predicted changes to the climate and weather should also be considered. Sections of the route are situated within or in close proximity to zones deemed to 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>As indicated in the 'Soils' section, the route corridor is located on areas identified as peatland which would lead release of sequestered carbon and a loss of high value carbon sink land which could lead to minor negative or uncertain environmental effects.</p> <p>Felling would be required which would also reduce the carbon sink value of forested areas within the route corridor and could result in major negative environmental effects. Woodland and Forestry Strategy areas, including existing planted woodland, potential, preferred and sensitive sites, need to be considered in the route corridor selection process.</p>
	Material Assets	<p>As outlined in the Climatic Factors section, there are several natural material assets including woodland, peat soils and farmland that could be affected by the route corridor.</p>

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		<p>As indicated in the 'Soils' section, the route corridor is located on areas identified as peatland which would lead release of sequestered carbon and a loss of high value carbon sink land which could lead to minor negative or uncertain environmental effects.</p> <p>Felling would be required which would also reduce the carbon sink value of forested areas within the route corridor and could result in major negative environmental effects. Woodland and Forestry Strategy areas, including existing planted woodland, potential, preferred and sensitive sites, need to be considered in the route corridor selection process.</p> <p>In terms of built material assets, construction of the route corridor would have major negative effects a result of raw material requirements for the following elements:</p> <ul style="list-style-type: none"> • 1 no. new 1,500m long (900m main span) long cable stayed or suspension bridge over Gare Loch. • 1 no. new 2980m long (1980m main span) suspension bridge over Loch Long. • A cable stayed bridge approximately 820m long (500m main span) across Loch Striven. • A tunnel approximately 1,450m under high ground west of Loch Striven. • A tunnel approximately 4,400m under high ground west of Ballochandrain. • A bridge approximately 3,000m long (1,100 main span) or tunnel across / under Loch Fyne. • Approximately 4 no. new multi-span steel composite single carriageway bridges on piled reinforced concrete abutments and piled intermediate piers. • Approximately 9 no. new single span composite concrete Y beam deck single carriageway bridges on piled or spread footing abutments. • Approximately 95 no. new piped or box culverts. <p>The Firth of Clyde and Loch Fyne are busy shipping route for naval vessels accessing HMNB Clyde and cargo vessels accessing Clydeport Container Terminal at Greenock as well as ferry services. There is potential for impacts on shipping during construction of the watercourse crossing structures. Appropriate clearance for navigation would be required to avoid impacts on shipping that use the Firth of Clyde and Loch Fyne to maintain navigation for naval, commercial, fishing and leisure traffic.</p>
	Cultural Heritage	<p>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 could be developed that would avoid major negative effects on these.</p>

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		The most cultural heritage constraints are likely to be where there are concentrations of Listed Buildings at Rosneath, Cove, Kilcreggan, Blairmore, Ardentinny and Strachur, the Cove and Kilcreggan and Clachaig Conservation Areas and the Ballimore GDL. This GDL occupies a large part of the study area on the eastern shore of Loch Fyne. There are also large Conservation Areas and concentrations of Listed Buildings at Rhu and Helensburgh.
	Landscape and Visual Amenity	There is potential for effects on the LLTNP, the special qualities of the Kyles of Bute NSA, the West Loch Fyne (Coast), East Loch Fyne (Coast) and Bute & South Cowal APOs, Ballimore GDL and the local landscape and seascape character due to the construction and operation of the carriageway and supporting infrastructure. There is also potential for 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 three new crossings at Loch Fyne, Loch Long and Gare Loch would affect the landscape character and visual amenity of the area.
Traffic	Traffic Flows	Due to the improved road links to Cowal and Kintyre, associated with this route corridor, within the context of typical traffic levels on the existing A83 Trunk Road, traffic using this corridor is forecast to be relatively high, with a corresponding reduction in traffic on the A83 through the Rest and Be Thankful (potentially greater than 75%) in 2027. This assumes that the Rest and Be Thankful is operating under normal conditions. There will be a degree of local re-routing of trips for vehicles accessing the new route corridor, with traffic increases forecast on the A814. Corresponding decreases are expecting on other routes, for example, the A82 Trunk Road between Tarbet and Dumbarton, the A83 Trunk Road from Tarbet to its junction with the new route and the A815 north of its junction with the new route. Reductions are also expected on the A817 and A818.
	Accidents	This route corridor is likely to result in significant reductions in vehicle kilometres for strategic traffic currently using the A83 Trunk Road. As a result, it is judged that a corresponding reduction in traffic related casualties could be realised.
Operational considerations		From a Trunk Road operation perspective, the main operational considerations within the route corridor are the risk of flooding and/or landslides where it passes through valleys or adjacent to waterbodies, based on the steep topography in these areas. In some areas, the centreline of the route corridor has a maximum elevation of approximately 320m AOD, with significant adjacent peaks providing shelter. This means it is likely that in these areas, snow accumulates within the route corridor during the winter months, with potential winter resilience operational issues.

	<p><u>Bridges within Route Corridor 11</u></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> <p><u>Tunnels within Route Corridor 11</u></p> <ul style="list-style-type: none"> • There is a need for regular inspection and maintenance of such tunnels. A tunnel manager, tunnel safety officer and a tunnel design & safety consultative group (TDSCG) must be set up early in the design process and continue through operation. The location and type of tunnel operations centre would need to be reviewed and investigated further, depending on the final location and length of tunnel provided. A sufficient power supply will be required to allow operation of the tunnel ventilation system and any other systems, particularly those required in the event of an emergency incident. • The use of the tunnel by vehicles carrying potentially hazardous materials or dangerous goods (such as fuel tankers) is largely dependent on fire safety and ventilation, and may require a tunnel ventilation system that allows for a larger design fire size. Dependent on the evaluation of risks, dangerous goods vehicles may need to be escorted through the tunnel in a convoy. It should be noted that a twin bore dual carriageway tunnel configuration is considered likely to result in fewer road traffic accidents (due to no bi-directional traffic flow), theoretically attracting a lower risk of emergency incidents. • For a twin bore dual carriageway configuration, vehicle cross-overs may need to be provided at intervals if practicable, as per recommendation from the European Directive EUD 2004/54 EC. In addition, lay-bys should be provided at intervals. • The development of any tunnel design should be informed by consultation with emergency services and other relevant stakeholders and guided by European and National Standards to ensure that appropriately robust measures in the event of an emergency incident are put in place.
Financial considerations	The estimate cost range of a scheme within this route corridor is approximately £7.36Bn - £9.68Bn.

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Estimated Time to Completion	It is estimated it would take approximately 15 – 16 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 the balance of positive and negative sentiment for this route corridor is more evenly balanced, or at least less clearly positive or negative overall.

STAG Criteria		Assessment Summary
Criteria		
Environment		Refer to Implementability Assessment – Environment
Safety		Refer to Implementability Assessment – Accidents
Economy	Transport Economic Efficiency	<p>This route corridor is likely to result in significant journey time savings for strategic traffic currently using the A83 Trunk Road.</p> <p>Based on traffic forecasting for 2027 using Transport Model for Scotland (TMfS14), journey time savings between Tarbert and Glasgow are forecast to be large (>45 minutes) in 2027, compared with other options. Journey time savings between Dunoon and Glasgow are also 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>
	Wider Economic Impacts	This route corridor offers substantial changes in connectivity and, therefore, is best not solely characterised as a solution to unreliability at the Rest and Be Thankful. Rather, it provides the opportunity to radically improve connectivity to some of the remote communities of Argyll and Bute.

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		<p>The route corridor offers more direct connections from Cowal, Kintyre and the islands (including Islay and Gigha) to the more populous areas of Garelochhead and Helensburgh, 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. 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 Kintyre and Cowal, with improved linkages across the route corridor to Helensburgh, Rosneath, Lochgilphead 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</p>

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Criteria	Assessment Summary
	<p>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 force 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>
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 route corridor, a strategic assessment of the impact of the route corridor on the environment would be carried out in the Strategic Environmental Assessment (SEA). More detailed Environmental Impact Assessment would be carried out as part of the DMRB Assessment Process.</p>

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STAG Criteria	
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	<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 negative impacts in terms of promoting sustainability and reducing the need to travel.</p> <p>The enhanced connectivity for Cowal and Kintyre provided by this route 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 Moderate 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> <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>

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STAG Criteria	
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	<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. - 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 Local Development Plan. An intervention within this route corridor will contribute to the National Park by aiding the delivery of 'a successful, sustainable place', 'a low carbon place', 'a natural, resilient place' and 'a more connected place'.</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</p>

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Criteria		Assessment Summary
		<p>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	<p>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 Kintyre, Cowal and Rosneath. It is considered unlikely, however, that this route corridor would have any significant impact on reducing transport poverty or reducing reliance on private cars. This is primarily due to the nature of the route corridor and the areas within which it is located.</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 links which, in and of themselves, may be an attractor for visitors and tourists, wishing to park and proceed via active modes.</p>

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STAG Criteria	
Criteria	Assessment Summary
	<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> <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 Kintyre, Cowal and Rosneath and the enhancement of business confidence driving an associated increase in inward investment and jobs.</p>

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

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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						✓	