

Access to Argyll & Bute (A83) Strategic Environmental Assessment & Preliminary Engineering Services
Route Corridor Preliminary Assessment
Route Corridor 5 – A82 – Cowal - Lochgilphead

Route Corridor Details	
Route Corridor Option	Route Corridor 5 – A82 – Cowal – Lochgilphead
Route Corridor Description	This route corridor is a combination of new offline carriageway and online upgrading works which follows the existing road network with new fixed links at Loch Long and Loch Fyne. The route corridor follows the existing A817 and A814 carriageways from the A82 Trunk Road to Whistlefield (near Garelochhead) with new sections of road and a 1.6km fixed link crossing at Loch Long to Barnacabber. The route corridor then generally follows the existing C09 and A815 to Dalinlongart and the existing B836, A886, C11 and B8000 to Otter Ferry, on the eastern shore of Loch Fyne. An approximate 3.0km fixed link crossing ties into the A83 Trunk Road near Port Ann. The length of the route corridor where no road currently exists is approximately 5.5km with the full route corridor approximately 76km in length. Construction is required in the vicinity of the Ministry of Defence (MOD) bases of Faslane and Coulport with a section of the proposed route corridor utilising the MOD owned carriageway.
Rationale for Route Corridor	The A82 – Cowal – Lochgilphead route corridor was initially identified by the Cowal Fixed Link working group and was subsequently considered as a potential route corridor by Transport Scotland's Strategic Transport Projects Review team. This route corridor is considered to offer a potential alternative access route into Argyll and Bute by 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.
Geographic Context	The route corridor lies within the Argyll & Bute region, which comprises solely of the entirety of the Argyll & Bute local authority area. The route corridor end points are located a straight line distance of approximately 20-45 miles from the city of Glasgow. The eastern extents of the route corridor is situated on the west shore of Loch Lomond and the A82 Trunk Road. The route corridor then heads north-west through Glen Fruin towards Garelochhead where it changes direction to a south-westerly heading, across Loch Long and towards Ardentinn. It then travels north-west through Glen Finart, reaching Loch Eck where it turns south along the banks of Loch Eck until it reaches Dalinlongart where it heads west through Glen Lean, around the northern extent of Loch Striven before crossing Glendaruel and approaching Otter Ferry and Port Ann. The western extent 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 corridor joins the two aforementioned trunk roads and it also intersects the West Highland Line railway in proximity to Garelochhead.

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<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 Trunk Road provides accessibility to services on the mainland via Kennacraig port, where ferry services depart to Islay with onward connections to Jura and Collonsay.</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 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</p>

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	<p>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>The route corridor follows for part of its length, the route of the A815 road which is the main road link between Toward at the very south of the Cowal peninsula, the town of Dunoon, many smaller communities along its length including Sandbank and Strachur, and the A83 Trunk Road near Cairndow. This road provides an important link for businesses, residents and visitors in the Cowal peninsula with the wider strategic trunk road network.</p> <p>Due to a large proportion of the region's geographic remoteness from the major economic centres of the central belt, only a few large scale, high skill industries are located within the area. The region's economy tends to be heavily influenced by sectors with lower growth, such as agriculture and public services. Given the focus on economic recovery post-COVID-19, enhanced connectivity for the Argyll & Bute region could contribute towards increasing inward investment and job opportunities for local communities. Reliable access for Bute and Cowal and Mid-Argyll, Kintyre and Islay has the potential to have a transformational effect on local/regional economies.</p>
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Transport Planning Objectives		
Objective	Performance against planning objective	
TPO1	Resilience – reduce the impact of disruption for travel to, from and between key towns within Argyll & Bute, and for communities accessed via the strategic road network.	<p>This route corridor offers 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, are 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</p>

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		<p>minimised through the design of any structures required. It should also be recognised, however, that the provision of fixed link crossings may remove the need for ferries to be used to complete certain trips. Ferry services can be impacted by severe weather and mechanical issues with vessels. This route corridor may, therefore, offer a more resilient means of travel for trips to and from areas of Cowal and Mid-Argyll, Kintyre and the Islands, including the key towns Dunoon and Lochgilphead. 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.	<p>For those trips that utilise the new route corridor, accident reductions would be expected due to the shorter journey times that have attracted them to the new route. This route corridor is one of the options likely to result in the most significant reductions in vehicle kilometres currently using the A83 Trunk Road. As such, it is judged that a corresponding reduction in traffic related casualties could be realised from this corridor. During times when the A83 Rest And Be Thankful is closed, the new route corridor would also provide an alternative route on a standard of road likely to be higher than the current diversion route, which includes a section of the A82 Trunk Road, with a known safety record.</p>
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 corridor would improve resilience of access to key domestic and international markets.</p> <p>Additionally, as a result of the more direct connections to the central belt provided, enhanced competitive access between Argyll & Bute and key markets could be realised. Through providing enhanced connectivity to both Cowal and Kintyre the route corridor is likely to provide enhanced access to a larger geographical area.</p>

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		<p>This route corridor offers the potential to reduce economic and geographic deprivation, particularly within the Bute & Cowal (Dunoon and Rothesay both have data zones within the most deprived 10%) and, to a lesser extent, Mid-Argyll, Kintyre and Islay regions of Argyll & Bute (Campbeltown has data zones within the most deprived 20%).</p>
TPO4	<p>Sustainable travel – encourage sustainable travel to, from and within Argyll & Bute through facilitating bus, active travel and sustainable travel choices.</p>	<p>Through the provision of fixed links to Cowal and Kintyre, improvements in mobility & inclusion and reductions in transport poverty could be facilitated through the enhanced connectivity provided by this route corridor.</p> <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>

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Existing Route Corridor Conditions		
Engineering	Route Corridor Length	The route corridor is approximately 76km long.
	Existing Roads	<p>The route corridor intersects the A82 Trunk Road 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: A817, A814, C09, A815, B836, A886, C11 and B8000.</p> <p>The route corridor intersects the following Local Authority operated / maintained 'A' / 'B' / 'C' roads. A814, B872, A880, B836, A886, A8003, C11 and B8000.</p> <p>The route corridor also includes part of the Ministry of Defence owned and operated road between Garelochhead and Coulpport.</p>
	Existing Accesses	<p>A class road: 4 B class road: 3 C class road: 3 Unclassified road/direct access: 77</p> <p>Relative to the other route corridors, the lower number of accesses noted above is attributed to a limited number of settlements which the route corridor passes through or bypasses and it's rural setting.</p> <p>All local accesses from the A83 Trunk Road in the area around Glen Croe would be retained should this corridor be taken forward; however, the additional work to retain these accesses has not been included in the Preliminary Assessment of this corridor.</p>
	Topography and Land Use	Ground levels in the centre of the route corridor generally rise from the A82 Trunk Road near Shantron, at a height of approximately 17m above ordnance datum, to approximately 180m above ordnance datum north east of Ballymenoch. Thereafter levels generally fall and then undulate between 150m above ordnance datum and 170m above ordnance datum for approximately 5 kilometres. To the north of the route corridor centre, levels typically rise

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		<p>approximately 160m above ordnance datum, with higher ground extending above 200m above ordnance datum located both to the north and south of the C-class road in the route corridor centre. Ground levels in the centre of the route corridor then generally fall quite steeply, towards Whistlefield on the banks of Loch Eck which is elevated at between 25m and 50m above ordnance datum.</p> <p>Land use within this section is primarily coniferous plantation woodland, which covers most of the lower slopes of the surrounding hillsides. Along the base of the Glen Finart there are agricultural and residential/commercial properties generally located at Ardentinnny on the banks of Loch Long and Whistlefield on the banks of Loch Eck. A high voltage electricity transmission line passes through this section from north to south.</p> <p>The route corridor then heads south, generally following the A815, which follows the eastern bank of Loch Eck for approximately 6 kilometres. Ground levels along the A815 in the route corridor centre are typically between 20m and 30m above ordnance datum. Ground levels to the east of the A815 in the route corridor typically rise steeply through expansive forests towards a line of summits which rise up to in excess of 600m above ordnance datum. As the A815 heads south and leaves Loch Eck, the route corridor typically follows the valley floor which includes the River Eachaig as it meanders towards Holy Loch. The route corridor then continues to follow the A815 towards Dalinlongart passing through several small settlements and the head of Holy Loch, all of which are located at sea level or slightly above.</p> <p>Land use within this section of the route corridor includes coniferous plantation woodland on the lower slopes of the surrounding hillsides. There are numerous residential/commercial/recreational properties throughout this section of the route corridor, particularly adjacent to the River Eachaig. These include a botanic garden, an outdoor activity centre and various holiday accommodations. The land adjacent to the river also includes areas used for agriculture. A high voltage electricity transmission line passes through this section from north to south around Dalinlongart.</p> <p>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</p>
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		<p>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> <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</p>
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		<p>electrical substation and associated power lines to the east of Port Ann.</p>
	<p>Geology / Geomorphology</p>	<p>The route corridor heads west from the A82 Trunk Road north of Arden and follows the A817, traversing the south-eastern shoulder of Shantron Hill and then following the relatively wide valley of Glen Fruin along its northern margins, route before passing over the flat upland terrain at the head of the valley and descending to Garelochhead. The terrain becomes more rugged to the west of Garelochhead, with rock exposed in places, particularly on the existing hillsides. Steep slopes are present on both sides of Loch Long, with forest cover on the slopes to the west of the proposed fixed link crossing. West of Loch Long, the route corridor widens, encompassing the steep, rocky terrain of Creachan Mor and the steep sided Glen Finart to the south. The terrain becomes steeper after Sligrachan as the corridor route corridor climbs over the head of the valley and drops down to the A815.</p> <p>Along the east and west shoreline of Loch Eck, the slopes rise sharply towards Beinn Ruadh in the east, and Beinn Mhor in the west. At the southern end of Loch Eck, Benmore sits within a wide and deep U-shaped valley which continues south to the head of Holy Loch. The corridor follows 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 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>Loch Lomond to Glen Finart/A815</p> <p>The superficial deposits beneath the route corridor between A82 and Garelochhead are mapped as comprising primarily glacial Till – Diamicton, with localised granular deposits at the eastern tie in and along the lower parts of Glen Fruin. Parts of the upper slopes have no deposits recorded, indicative of thin or absent superficial deposits. Deposits of peat are located on the top of many of the hills to the northeast of the route corridor. Very limited extents of superficial deposits are recorded to the west of Garelochhead, either side of the proposed fixed link crossing and the approach to Glen Finart. A localised area of Peat is located close to the eastern end of the proposed fixed link, and a thin ribbon of Marine Beach (gravel, silt, sand) and Raised Marine Deposits (clay, silt, sand) are recorded along the western shore of Loch Long. Boundary mapping does not match up between mapped quadrants in the vicinity of Garelochhead. It is likely that superficial cover here is highly variable. More extensive deposits of Marine Beach Deposits, Raised Marine Deposits and Alluvium are recorded in Glen Finart, with localised areas of Hummocky (Moundy) Glacial Deposits (diamicton, sand, gravel) present further up the glen and in places</p>

		<p>on the upper slopes.</p> <p>A815 to Dalinlongart/Holy Loch</p> <p>The A815 follows the Lock Eck shoreline and is mapped as localised deposits of glacial Till on the slopes of Beinn Ruadh, with pockets of Alluvium to the south at the loch side. Deposits at the southern end of the loch are mapped as River Terrace Deposits and Raised Marine Deposits (sand and gravel), with Alluvium following the rivers within the valley.</p> <p>Holy Loch/Dalinlongart to Otter Ferry</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. 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 corridor descends into Otter Ferry, where Raised Marine Deposits and extensive Marine Beach Deposits are mapped along the shoreline of Loch Fyne. The A83 tie in on the western side of the loch has only localised Raised Marine Deposits mapped. Otter Ferry is mapped as predominantly Raised Marine Deposits, with Marine Beach Deposits 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. An area of 'Worked ground (Void)', likely to represent a sand and gravel pit or similar, is mapped southeast of the A815, close to Orchard farm. A further area of made ground is recorded to the south of Dalinlongart in association with a development. An area of worked ground is recorded along the proposed route just south of Ballochyle. Made ground is also recorded in association with the dams to the east and west of Loch Tarsan.</p>
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		<p>Further made ground is anticipated in association with existing developments and infrastructure across the route corridor.</p> <p>The majority of the route is underlain by the Beinn Bheula Schist Formation, comprised of psammites, pelites and metaconglomerates. The route corridor crosses into the Southern Highland Group in the west of the corridor towards Otter Ferry. The Southern Highland Group is mapped as metavolcaniclastic sedimentary rock; thereafter the corridor passes over metabasalt of the Dalradian Supergroup, and metalimestone of the Loch Tay Limestone Formation, and semipelite of the Ben Lui Schist Formation. The western landfall of the Loch Fyne crossing is underlain by the Crinan Grit Formation.</p> <p>Numerous dykes are mapped within the route corridor, generally trending north-south to north east-south west, and north west-south east. Several faults cross the route corridor, generally trending northwest. Four regional scale northeast trending faults cross the route corridor. Two are mapped at the eastern end of the route corridor between Loch Lomond and Loch Long, one between Loch Striven and Loch Tarsan, the final fault is mapped where the route corridor crosses the River Ruel near Glendaruel.</p> <p>Loch Long Fixed Link Crossing</p> <p>In the vicinity of the proposed fixed link crossing across Loch Long, existing information to inform ground conditions is variable. Previous ground investigations have been undertaken around Garelochhead. These generally indicate shallow rockhead in the vicinity of the eastern end of the crossing, although some significant deposits of peat (up to 4m) were also recorded. There is no existing information from previous ground investigation at the western end of the crossing, although the absence of superficial deposits in the published mapping indicates they are anticipated to be thin or absent. Similarly, there is no existing information available along the waterline or within the loch at the proposed location of the crossing. The solid geology at the crossing location is recorded to comprise metamorphic rocks of the Beinn Bheula Schist Formation: pelite, semi-pelite and psammite. Descriptions from available borehole logs describe these rocks as 'well jointed' and moderately strong to strong. Additionally, faults of unknown displacement are indicated within the sections of route approaching the crossing across Loch Long.</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</p>
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		<p>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 corridor. 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 on the west of the crossing. Large metabasalt intrusions are mapped within the psammities 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 Deposits (1:50,000 scale), Superficial Deposits (1:50,000 scale), Bedrock Geology (1:50,000 scale), Linear Features (1:50,000 scale), Borehole Records. • British Geological Survey, The BGS Lexicon of Named Rock Units, https://webapps.bgs.ac.uk/lexicon/home.cfm. Accessed October to December 2020.
	Hydrology and Drainage	This is covered under 'Water Environment' in the 'Environment' part of this table.
	Structures	<p>The following structures are noted within this route corridor.</p> <ul style="list-style-type: none"> • 8 no. Existing watercourse crossings. • 84 no. Existing culverts. • 1 no. Existing rail underbridge on the MOD road to the west of the Portincaple roundabout.

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Environment Considerations	Biodiversity, Fauna and Flora	<p>Corridor crosses Upper Loch Fyne and Loch Goil MPA for approx. 2.8km and is also approx. 0.2km south at another section.</p> <p>131.7ha of Ruel Estuary SSSI falls within the route corridor.</p> <p>360.2ha of Loch Eck SSSI falls within the route corridor.</p> <p>All of Craighoyle Woodland SSSI (77.6ha) falls within the route corridor.</p> <p>4.7ha of Ross Park SSSI falls within the route corridor.</p> <p>160 parcels of woodland listed on the AWI fall within the route corridor. These are mostly ancient or semi-natural origin with some long-established of plantation origin, particularly adjacent to the A815, adjacent to the access track towards Finart Bay from the A815 and north of Finart Bay towards the Loch Long crossing.</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. There are a number of settlements within the route corridor including Achnaba, Otter Ferry, Auchenbreck, Balliemore, Ardtaraig, Clachaig, Dalinlongart, Ardbeg, Uig, Ardentinny, Garelochhead, Shantron and Blairglas.</p> <p>There are several core paths in the route corridor, including:</p> <ul style="list-style-type: none"> • C406 (Otter Ferry Circular, Loch Fyne); • C215 (Glendaruel to Otter Ferry); • C217a (Otter Ferry to Blairs Ferry, Kames); • C214h, i, k, l (Cowal Way Glenbranter to Portvadie); • C212b (Port Lamont to Ardtariag, Loch Strivan); • C223a, b and c (Dunans loop to Inverreck and LLTNP boundary); • C513 (Broxwood bird hide, Sandback); • C466 and C467 (B833 to Dun Diamh part circular Garelochhead); • C280a, b, c and d (Garelochhead to Long Loch Way); • C279f (Helensburgh Pier to Garelochhead via Shanton); and • C275b and c (Three Lochs Way, Helensburgh).

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		<p>Two long distance walking paths (Cowal Way and Three Lochs Way) are also within the route corridor. Cowal Way intersects the corridor to the south of Glendaruel, and Three Lochs Way follows a similar route to the corridor from Garelochhead to the north of Helensburgh.</p> <p>National Cycle Network (NCN) Route 75 passes through the route corridor, following the A886 east of Loch Riddon, and travelling north past Glendaruel. The Dunoon to Portvadie Sustrans route (an on-road route which is not on the National Cycle Network) intercepts the corridor at Dalinlongart and travels in a westerly direction along the route of the existing B836 and A886 (and corridor) until it reaches Glendaruel.</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"> • 10 river water bodies, Kilfinan Burn/Allt Lean Achaidh, River Ruel, Tamhnich Burn, Balliemore Burn/Allt Glen Laorigh, Glentarsan Burn, Little Eachaig River/Cruach Neuran Burn, River Eachaig, River Finart, Fruin Water and Finlas Water; • One loch water body, Loch Eck; and • Five coastal water bodies, Loch Long (south), Holy Loch, Loch Striven, Loch Riddon and Loch Fyne - Middle Basin. <p>The route corridor also crosses approximately 150-160 minor watercourses.</p> <p>SEPA Flood Maps (SEPA, 2020) indicates that the route corridor may be at existing fluvial and surface water flood risk on the A815 from Loch Eck and River Finart, and from existing fluvial flood risk from the River Eachaig, Little Eachaig, Glenkin Burn, Glentarsan Burn, Balliemore Burn, Tamhnich Burn, River Ruel, Bealachandrain Burn and Kilail Burn during a medium likelihood event (0.5% Annual Exceedance Probability (200-year) event). The route corridor may also be at existing fluvial flood risk on and around the A817 from Fruin Water, Finlas Water, Allt a' Bhaile a' Mhuilinn, Auchengaich Burn and at Garelochhead from the McAulay Burn during a medium likelihood event (0.5% Annual Exceedance Probability (200-year) event). The route corridor may be at existing coastal flood risk from Loch Long, Holy Loch, Loch Striven, Loch Riddon and Loch Fyne during a medium likelihood event (0.5% Annual Exceedance Probability (200-year) event).</p>

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		<p>The Loch Eck SSSI, 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 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.</p> <p>The route corridor passes through five surface water Drinking Water Protected Areas.</p> <p>No bathing waters are in the vicinity of the route corridor.</p>
	Soils	<p>Soil type within the route corridor is mixed with peaty podzols, peaty gleys, mineral podzols, brown soils and alluvial soils all present. Peaty Gleys are predominant in the western section of the corridor. The route corridor where peat is present predominantly transects peat identified as Class 5 (no peatland habitat recorded, soils are carbon rich and deep peat) 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) around Garelochhead, Ardentinny and east of Otter Ferry.</p> <p>A small pocket of Class 1 peatland (nationally important carbon rich soils, deep peat and priority peatland habitat, areas likely to be of high conservation value) is present adjacent to the B836 in Glen Lean. Given the combination of soils, climatic conditions and topography the Land Capability for Agriculture (LCA) Class within the study area is predominantly Class 5 (Class 5.1, 5.2 and 5.3) with Class 4 (Class 4.1 and 4.2) on the more productive mineral soils and Class 6 (Class 6.1, 6.2 and 6.3) on the steeper and higher slopes.</p> <p>There are no Geological Conservation Review (GCR) sites in the route corridor.</p> <p>The Land Capability for Forestry (LCF) class is mixed ranging from Class F2 Loch Lomond in the east and at Otter Ferry in the west 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) at Garelochhead, Clachaig and</p>

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		<p>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>
	<p>Air Quality</p>	<p>There are a number of settlements within the route corridor including Achnaba, Otter Ferry, Auchenbreck, Balliemore, Ardtaraig, Clachaig, Dalinlongart, Ardbeg, Uig, Ardentinny, Garelochhead, Shantron and Blairglas.</p> <p>There are no Air Quality Management Areas (AQMAs) in the route corridor or in the Argyll and Bute council area. Current and past annual assessments suggest that it will be very unlikely to be necessary to declare any AQMAs in Argyll and Bute 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>
	<p>Climatic Factors</p>	<p>The baseline for climatic factors is not considered to differ greatly between the 11 route corridors.</p> <p>As described in the 'Water Environment' section, the route corridor may be at existing fluvial and surface water flood risk on the A815 from Loch Eck and River Finart, and from existing fluvial flood risk from the River Eachaig, Little Eachaig, Glenkin Burn, Glentarsan Burn, Balliemore Burn, Tamhnich Burn, River Ruel, Bealachandrain Burn and Kilail Burn during a medium likelihood event. The route corridor may also be at existing fluvial flood risk on and around the A817 from Fruin Water, Finlas Water, Allt a' Bhaile a' Mhuilinn, Auchengaich Burn and at Garelochhead from the McAulay Burn during a medium likelihood event. The route corridor may be at existing coastal flood risk from Loch Long, Holy Loch, Loch Striven, Loch Riddon and Loch Fyne during a medium likelihood event (0.5% Annual Exceedance Probability (200-year) event). The region in which the route corridor is located is expected to experience higher levels of annual rainfall in the future as a result of climate change, therefore increasing the frequency and intensity of flooding events.</p>

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		<p>As described in the 'Soils' section, there are several areas of peatland in the route corridor with high carbon sink value.</p> <p>There are also significant quantities of forested land in the route corridor, including Argyll and Bute Forestry Strategy areas, carrying a carbon sequestration and sink value.</p>
	Material Assets	<p>The route corridor contains a variety of natural material assets. As indicated in the Climatic Factors section, there are areas of forestry within the route corridor and as listed in the Soils section, there are peat soils present.</p> <p>In terms of built material assets, the route corridor generally follows existing road infrastructure including a mixture of 'A' 'B' and 'C' roads. The West Highland Line railway is also within the corridor in proximity to Garelochhead with an existing road crossing. There are waste disposal facilities located in close proximity to the route corridor at Dunoon and Dalinlongart.</p> <p>There are several renewable energy developments in the route corridor including hydroelectric schemes at Otter Ferry, Balagowan, Dalinlongart, Cnon Madaidh, Allt nan Crocan, Glen Striven and Kyles View.</p> <p>HMNB Clyde and Garelochhead Training Camp are in close proximity to the route corridor at Faslane, likely resulting in a high military presence and heightened security level, particularly around the submarine base.</p>
	Cultural Heritage	<p>There are seven Scheduled Monuments, 61 Listed Buildings and three Gardens and Designed Landscapes (GDLs) within the route corridor. The extent of the study area occupied by Benmore GDL and Ballimore GDL is relatively large. Rosdhu GDL abuts (and is partially within) the entire eastern boundary of the route corridor. There are concentrations of Listed Buildings at Benmore and Garelochhead. The Conservation Area at Clachaig is also located within the route corridor.</p>
	Landscape and Visual Amenity	<p>The route corridor is approximately 76km long. Starting with the new crossing between the western and eastern shore of Loch Fyne at Otter Ferry, this route corridor mostly follows existing roads and winds its way between the northern tip of Loch Riddon, Loch Striven and Holy Loch, then along Loch Eck and the western shore of Loch Long, until Whistlefield (near Garelochhead) where a new road and crossing at Loch Long from Barnacabber to Rosneath Peninsula would be introduced. The route corridor then follows existing roads until it joins the A82 Trunk Road on the western shores of Loch Lomond.</p>

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		<p>Approximately 11 km of the eastern part of the route corridor is located within the LLTNP of which approximately 5km is located the Loch Lomond National Scenic Area (NSA). In addition, another 22km or so of the route corridor is located within the LLTNP in Cowal between Loch Long and Loch Eck. This section of the route corridor runs through Argyll Forest Park and Benmore (Younger Botanic Garden) Garden and Designed Landscape (GDL) while the section of the corridor on the eastern shore of Loch Fyne runs through Ballimore GDL. Approximately 20km of the western part of the route corridor is located within the West Loch Fyne (Coast), East Loch Fyne (Coast) and Bute & South Cowal Areas of Panoramic Quality (APOs). The route corridor runs through the Kyles of Bute NSA at the top of Loch Riddon for approximately 3km on the A836. There are several Open Space Protection Areas within the route corridor around Port Ann and Garelochhead. This route corridor also runs through Clachaig Conservation Area. This corridor would cross and likely be visible from two of Scotland's Great Trails, the Loch Lomond and Cowal Way (Glenbranter to Portavadie section) and the Three Lochs Way (Garelochhead to Arrochar / Tarbet section). Parts of the corridor would also be visible from large sections of Loch Long and Loch Fyne coastline as well as nearby hill walking summits and residential receptor locations.</p> <p>The Landscape Character Types (LCTs) from the Loch Fyne crossing to the Loch Long crossing are Rocky Coastland – Argyll LCT, Plateau Moor and Forest – Argyll LCT, Steep Ridges and Mountains LCT, Craggy Upland – Argyll LCT, Straths and Glens LCT, Steep Ridges and Hills LCT and Settled Coastal Fringe LCT. East of the Loch Long crossing the LCTs are Steep Ridges and Mountains LCT, Open Ridges LCT, Steep Ridges and Hills LCT, Straths and Glens LCT, Open Ridgeland - Glasgow & Clyde Valley LCT and Lowland Loch Basin - Loch Lomond & the Trossachs LCT.</p> <p>There is a large number of Seascape Character Areas (SCAs) within the route corridor, namely Loch Fyne - Lachlan Bay to South Ballimore SCA, Loch Fyne - Loch Gilp to Brainport Bay SCA, Loch Striven - Head of Loch Striven SCA, Loch Striven - Head of Loch Striven to The Craig SCA, Loch Striven - Ardbeg Point to Head of Loch Striven SCA, Inner Firth of Clyde - Holy Loch SCA, Gareloch - Head of Gareloch SCA, Loch Long - Shepherd's Point to Coileasan SCA, Loch Long - North of Blairmore to Shepherd's Point SCA and Loch Long Finnart Oil Terminal to Coulpport SCA.</p> <p>Land cover within the route corridor comprises small and scattered settlements, sea and freshwater lochs and coasts, open grassland and moorland, large blocks of woodland and numerous watercourses.</p>
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 Tarbet and 4,400 vpd west of Tarbet, with the HGV percentage between 5%</p>

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	<p>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>AAADT flow levels on the A817 in 2019 were around 2,800 vpd with the HGV percentage around 5%. On the A815, AAADT flow levels in 2019 were in the order of 5,500 vpd (around 6% HGVs) north of Dunoon, reducing to around 2,000 vpd (around 8% HGVs) south of the junction with the A83 Trunk Road. AAADT flow levels, on the A886 between the B836 and A8003, in 2019, were in the order of 800 vpd (around 3% HGVs).</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>Between the A82 Trunk Road at Shantron and Faslane, the centreline of route corridor 5 follows the existing A817. Generally, the topography allows for a compliant horizontal alignment geometry to be achieved throughout most of this length. Sub-standard sections of the existing road have been identified, and should this be utilised in an alignment, then this would require improvement works to be undertaken. While slopes fall towards the centreline from the north, the adjacent ground to the south is generally flatter with minimal properties immediately adjacent to the carriageway which could be used for improvements. Compliant vertical alignment geometry should be achievable; however, depressions in the topography with localised steep contours have been identified near Faslane which will influence the alignment.</p> <p>Continuing to follow the A817 to the junction with the A814, both a horizontally and vertically compliant alignment geometry should be possible with minimal earthworks.</p> <p>The topography which the existing military road follows to Coulport is relatively steep, climbing from 90m above</p>

		<p>ordinance datum to a high point of 200m above ordinance datum over the shoulder of the hill. As the crossing of Loch Long is dictated by the required clearance of minimum 75m, the fixed link structure will have significant influence on the vertical and horizontal alignment on the approaches geometry and could require Departures from Standard depending on location. A balance may need to be reached between the location of the structure and the approach alignment geometry.</p> <p>On the western side of Loch Long the topography is particularly steep and falling towards the Loch. Alignment geometry will be dictated by the structure, but due to the minimum landing height of approximately 85m above the water level (allowing for +75m navigation clearance and bridge deck), providing a compliant alignment geometry design which follows the corridor centreline down towards Ardentinny will be very challenging. Essentially the route will need to turn perpendicularly off the structure and will likely be sub-standard for horizontal and vertical alignment geometry. To avoid this sub-standard section of carriageway, there are various tunnel arrangements which could be considered such as a direct tunnel through to Loch Eck or alternatively into Glen Finart.</p> <p>The centreline of the route corridor travels up Glen Finart from Ardentinny to the junction with A815. Compliant alignment geometry should be achievable for the most part up the wide floor of the valley although Glen Finart Burn, hillside topography and several properties do provide some constraints. Towards the top of the glen, elevation increases from 40m above ordinance datum to a saddle of 150m above ordinance datum over 1.2km and this steep incline will provide a challenge. On the opposite side of the saddle down to the A815 at Whistlefield, there is a similarly steep drop. Again, this may cause issues for the alignment geometry through this section. The topography will limit available alignment options and will likely result in sub-standard geometry. Introducing a tunnel between Glen Finart to Whistlefield will allow compliant geometry to be achieved.</p> <p>From Whistlefield, the centreline of the route corridor follows the A815 south to the bottom of Loch Eck. Over this length, Loch Eck sits to the west with steep slopes to the east heavily constraining the corridor, thus making the existing A815 the most suitable route through this section. The vertical alignment geometry is consistent along the length of the loch and should be compliant with standards. Horizontal geometry is also expected to generally meet requirements; however, some sections are considerably constrained and likely sub-standard. Where improvements are required, building out over the loch or steep cuttings will need to be considered.</p> <p>South of Loch Eck, the centreline follows the A815 to the B836 at Dalinlongart. The topography should allow compliance with standards for both vertical and horizontal alignment. However, several constraints do need to be considered including River Eachaig and Little Eachaig River, and a number of settlements, although it is unlikely that these will have significant impact on the alignment.</p>
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		<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 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 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 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 geometry 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 a compliant horizontal alignment. The ground does descend in level; however, vertical alignments to standard 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 a compliant vertical alignment. On the southern/western side is an open valley floor which should provide sufficient land to achieve a horizontal alignment geometry to standard. 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</p>
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		<p>the C11, the topography begins to flatten but then undulates. Continuing west, it is likely that compliant vertical and horizontal 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 geometry 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 geometry will most likely be dictated by the location of the crossing for Loch Fyne.</p> <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 due to the depth of the loch and the vertical gradients 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"> • To the northeast of Clachaig, between Dalinlongart and Loch Tarsan. The British Geological Survey (BGS) also has mapped mass movement deposits in association with this record. • Above the corridor to the northwest of Dalinlongart at Holy Loch. The BGS also has mapped mass movement deposits in association with this record. • Within the wider route corridor extents between Loch Long and Loch Eck (although this location is at the edge of the route corridor and any future landslide at the same location is considered unlikely to affect any road alignment within the corridor due to the slope aspect and topography). <p>The BGS records mass movement deposits to the west of Ballimore at the north end of Lock Striven. There is no NLD record associated with this deposit.</p>

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		<p>An assessment of other potential issues including potentially difficult ground conditions is summarised below:</p> <ul style="list-style-type: none"> • Further unmapped problematic deposits such as alluvium, peat or mass movement may also be present, particularly where BGS 1:50,000 mapping is of limited resolution in the area of Loch Lomond. • Potential presence of peat deposits on hill sides and directly along the proposed route, resulting in peat slide risk and significant settlement problems for earthworks. • Potential presence of soft or loose deposits (alluvium, river terrace deposits and raised marine deposits) primarily in association with the river mouths of the lochs. At least 13km of corridor between Holy Loch and Loch Striven are mapped as alluvium, likely to be highly compressible. • Faulting can create zones of weak and/or highly fractured rock which is a significant hazard when tunnelling or excavating cuttings. Conversely faulting can create zones of extremely strong 'welded' fault rock, which again would create difficulties for tunnelling or areas of cutting in relation to excavatability. • The presence of faults may provide a preferential pathway for groundwater flow, and groundwater may pose significant issues for excavation in cuttings and for tunnelling if the groundwater table is high. • Faulting in the area of the fixed link crossings, creating zones of highly fractured rock with reduced bearing capacity.
	Hydrology and Drainage Considerations	This is covered under 'Water Environment' in the 'Environment' part of this table.
	Structures Considerations	<p>The following structures are likely to be needed for a new road within this route corridor.</p> <ul style="list-style-type: none"> • A tunnel approximately 380m long. The eastern approach to the Loch Long bridge is in tunnel. Optionally this may be a deep cutting. • A suspension bridge over Loch Long with an approximate 1,600m long (1,200 main span). • A tunnel approximately 4,500m long. The western approach to the Loch Long bridge from Glen Finart. • A tunnel approximately 3,100m long. Under Larach Hill between Glen Finart and the A815 at Whistlefield. • An alternative to the above two tunnels could be a more direct tunnel, approximately 6,700m long between the western approach to the Loch Long bridge and the A815 at Whistlefield • 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 or tunnel approximately 3,000m long across / under Loch Fyne.

- Approximately 88 no. new culverts required depending on the option selected in Barnacaber.
- Approximately 3 no. new river bridges.
- Approximately 1 no. new multispan bridge (River Ruel).

Constructability, operation and maintenance in relation to structures is discussed elsewhere within the document.

Key structures issues are as follows:

Loch Long Suspension Bridge

- Loch Long's central channel extends to a depth of between 72m and 82m.
- The channel is a submarine exercise area.
- Power lines cross to the north of the location of the crossing.
- The route alignment relies on the use of a portion of the existing MOD road to Coulport (and so would require consent of the MOD).
- If the MOD road cannot be utilised, then the approach alignment would have to originate from the Portincaple roundabout and cross the railway line to the west with a new rail underbridge.
- The high and steep topography of the Loch Long shorelines dictates that a crossing is not principally governed by the plan arrangement but by the vertical profiles of the valley and the alignment and gradients of the crossing approaches.
- The elevation of the existing MOD road on the east side is comparatively high in relation to the surface level of Loch Long. Moreover, the MOD road rises as it runs south from the Portincaple roundabout.
- The bridge design aim would be to minimise its length while setting its deck level at a height above Loch Long to enable the passage of commercial and military marine vessels. The Defence Infrastructure Organisation (DIO) have advised that the required minimum clearance is +75m above sea level. For the purposes of initial estimation, an allowance of 5m is made for the maximum deflection of a suspension bridge deck and 5m for its construction depth. Thus, the carriageway height would require to be at least +85m above loch level.
- Topography on east and west shores dictates that the bridge deck level must be set higher to minimise tunnel lengths on the east side from the MOD road. The carriageway level on the proposed crossing has therefore been set higher at a level of 110m above the surface level of Loch Long. The vertical alignment in the eastern approach tunnel therefore falls 20m over its length of 380m, a gradient of approximately 5%.
- The loch's bathymetric profile has consequences for the towers, whether for suspension or cable stayed bridge forms. To minimise tower foundation depth, the towers would preferably be on the shorelines

		<p>resulting in a lengthened single suspended or stayed span. Moreover, the towers would preferably be onshore to avoid interference with the submarine area, obviate ship collision measures and to avoid difficult foundation construction on steeply sloping sub-surfaces. The valley profile dictates that there is limited space for the back-spans and cable foundations.</p> <ul style="list-style-type: none">• It is estimated that the suspension bridge solution would comprise a main span of approximately 1,200m with back spans of up to 150-200m (total length up to 1,600m).• The bridge must remain straight with consequences for the approach alignment on the west shore.• Suspension cables must anchor into rockhead above the tunnel entrance portals.• High tower construction on the Loch Long Bridge. If deck height is above 100m, tower heights are estimated to be 250 to 300m.• The bridge deck must be wind resilient and will require wind barriers similar in form to those provided on the Queensferry Crossing. However, a slender single carriageway long span suspension bridge presents a design challenge to ensure the adequacy of the deck's aerodynamic response.• Consideration should be given to winter resilience of the bridge, principally deck surface and cable/tower de-icing. <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.• 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.
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		<ul style="list-style-type: none">• Consideration should be given to winter resilience of the bridge, principally deck surface and cable/tower de-icing. <p><u>Loch Fyne Bridge</u></p> <ul style="list-style-type: none">• 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.• 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.
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		<p><u>Approach tunnels required for Loch Long Fixed Link Crossing</u></p> <p>This section will firstly consider the short tunnel to the east of the suspension bridge, then subsequently consider the longer tunnel options proposed.</p> <p><u>Eastern Approach Tunnel</u></p> <ul style="list-style-type: none">• A tunnel is considered to be required to satisfy a practical road alignment through hillside to the bridge. The proposed tunnel would be approximately 380m in length with a gradient of 4% descending to the bridge.• It is likely that the tunnel would be constructed as a single bore providing a single carriageway with bi-directional traffic through the tunnel. There are important fire life safety, and associated ventilation and escape provisions, backed up by European and National highways standards that will govern the tunnel configuration, but due to the short length of the tunnel, fire management and escape from an incident are greatly simplified.• Although a tunnel of this length does not specifically fall within the scope of the EU Directive or the Road Tunnel Regulations, and is too short for any significant build-up of pollutants, a semi-transverse ventilation system should be considered, based on traffic flow levels and climatic conditions. In addition, an escape duct should be considered as for the other longer tunnels, but no escape shafts would be necessary.• A twin bore, dual carriageway tunnel may be more appropriate, particularly if the bridge design evolves into a dual carriageway. <p><u>Western Approach Tunnel</u></p> <ul style="list-style-type: none">• A tunnel is considered to be required to satisfy a practical road alignment through the route corridor. The proposed tunnel would be approximately 4.5km in length with a constant gradient of about 2% descending in an elongated "S" from the bridge portal at the NE to the south-west to emerge at a portal in Glen Finart to the SW.• It is initially considered that the tunnel may be constructed by a single bore providing a single carriageway with bi-directional traffic through the tunnel; however, there are important fire life safety, and associated ventilation and escape provisions, backed up by European and National highways standards that will govern the tunnel configuration.• For a single carriageway, bi-directional tunnel, these provisions are quite complex. The ventilation system must be in permanent operation and in the event of a fire, smoke and heat have to be removed from the tunnel using semi-transverse ventilation, which draws the smoke and heat into an overhead duct. In a long
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		<p>tunnel such as this, exhausts are likely to be required through intermediate shafts. Escape from the fire is also more problematic in that an escape duct has to be provided within the tunnel section. People trapped in the tunnel cannot be expected to be able to walk far through such a narrow duct, and so intermediate shafts or a parallel escape bore must be provided to facilitate escape to free air. Given the depth of intermediate shafts of 300m deep or more, lifts and a recovery suite at the shaft head would have to be provided. Alternatively, a parallel rescue bore could be constructed parallel to the main bore with enough space for rescue vehicles.</p> <ul style="list-style-type: none">• Accordingly, a twin bore, dual carriageway tunnel may be more appropriate. In such tunnels, in the event of a severe vehicle fire, longitudinal jet fan ventilation is ramped up to full strength to blow the smoke and heat in the direction of flow of traffic, away from vehicles queued behind the incident, while those ahead of the incident escape by continuing as normal. For those trapped in the tunnel, they can escape into the other non-incident bore through cross-passages, at say 100-300m intervals, and can be evacuated by rescue vehicles. Intermediate shafts would not typically be required other than to vent pollution. <p><u>Other proposals for Western Approach Tunnel</u></p> <p>The other proposals for a 3km tunnel under Larach Hill to Loch Eck is for a 6.7km tunnel from the western bridge portal to Loch Eck are proposed at reasonable gradients and alignments, and the text for Western Approach Tunnel above would apply also.</p> <p><u>Other tunnels</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%. Many of the issues outlined above in relation to the Loch Long fixed link crossing approach tunnels would also apply; however, given the relatively short tunnel length, the requirements for intermediate shafts and escape to free air may not be as onerous.• 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. The issues outlined above in relation to the Loch Long fixed link crossing approach
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		<p>tunnels would also apply including the requirements for intermediate shafts (150m deep or more) and escape to free air.</p> <ul style="list-style-type: none"> 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 tunnel, which is an alternative to the bridge at this crossing location 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. The issues outlined above in relation to the Loch Long fixed link crossing approach tunnels would also apply including the requirements for intermediate shafts (65m deep or more) and escape to free air.
	<p>Constructability Considerations</p>	<p><u>Major Structures Constructability Considerations – Bridges</u></p> <p>Loch Long Bridge</p> <p>The following key considerations apply to the construction of the Loch Long bridge:</p> <ul style="list-style-type: none"> Significant interfaces with the potential tunnel portal on the west bank of the loch which could delay commencement of the bridge construction due to the presence of the anchors near the portal entrance. The design aim would be to locate the towers onshore avoiding interference with surface and submarine vessels and minimising or eliminating ship collision protection. This would also make construction of the towers simpler by removing the need to work in deep water and providing working platforms using barges or jetties. There is minimal existing access to the bridge location on the west shore and no significant access on the east. Temporary access would need to be provided in advance both for the bridge and tunnel entrances. These works will likely involve use of some hill climbing plant and extensive construction of temporary retaining walls or permanent cuttings in the slope. The single carriageway bridge deck will require high twin legged 'A-frame' towers founded on rock. Their proximity to the shoreline suggests that foundation installation may have to be designed for underwater construction or complex temporary works will be necessary to exclude water ingress for construction in the dry. The reinforced concrete towers would be constructed incrementally by jump forming with concrete being pumped up the towers as their height incrementally increases. Concrete volumes would warrant batching plants on site on the east and west shores (for the east shore, ready mixed delivery may also be feasible).

		<ul style="list-style-type: none">• Steel box deck segments would be fabricated nationally and/or internationally and delivered to a staging area at a nearby facility. This could be as far as Greenock or Helensburgh with facilities at the staging area for precasting of the composite deck slab, although with increased distance from staging area to site, weather, tidal and navigation management risks increase.• Segments would be transported by barge to below their location in the span. The cable anchorages would be formed first, and the twin suspension cables formed by aerial spinning. Main span segments would be progressively lifted onto the suspension catenary progressing out from the towers until closure at midspan.• Lifting would require GPS placement of barges and their station protected by an exclusion zone on the main navigation channels in Loch Long. This will clearly affect marine vessel navigation. The duration of barges on station for the lift is expected to be comparatively lengthy at approximately 12 – 16 hours. This allows for anchoring (2- 3 hours) and strand jack lifting which, owing to the deck height, could take up to 12 hours to achieve. For the relatively prolonged operation, wave height and wind conditions may limit the number of available weather windows for lifting unexpected or variable conditions 'on the day' impede the lifting operations.• Climbing tower cranes fixed to the main towers will lift materials and equipment to deck level.• DIO consultation will be required for a number of specific security and operating restrictions such as:<ul style="list-style-type: none">o potential restriction to deck access during the passage of military or large oil transportation vessels.o Construction activities effect on secure channel communications between RNAD Coulport and nearby refuelling and berthing/arming facilities.o The possible effect of a large-scale bridge structure on radar and sonar.o Security exclusion zones.• The suspension bridge construction could have a potential impact on commercial and fishing activities.• Construction of the short section of tunnel on the eastern side of Loch Long may be required to be completed in advance of the bridge construction both to enable improved access to the bridge and so that conflicts between the tunnel and anchor construction can be mitigated. The tunnel construction should be relatively standard for this type of structure with access from the road to Coulport in the east. Temporary diversion of this road may be needed to construct the new junction.• Access for construction traffic from the A815 from Whistlefield is limited by the existing road infrastructure both in the near field; in Glen Finart the approach tunnel(s) and road improvement may need to be significantly advanced to allow access to the west bridge landfall. In the far field, the supply/transport route through A83 at Glen Croe will remain vulnerable to landslide closure throughout the construction period.
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		<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.• 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. <p>Loch Fyne Bridge</p> <p>The following key considerations apply to the construction of the Loch Fyne bridge alternative:</p>
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		<ul style="list-style-type: none">• 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.• 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 very 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
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		<p>number of available weather windows for lifting unexpected or variable conditions 'on the day' impede the lifting operations.</p> <ul style="list-style-type: none"> • 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. <p><u>Major Structures Constructability Considerations – Tunnels within Route Corridor 5</u></p> <ul style="list-style-type: none"> • 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, or even from intermediate shafts. Once the tunnel is completed an in-situ cast secondary lining can be installed to form a durable final structure. • Alternatively, tunnels can be bored using a large Tunnel Boring Machine (TBM), starting at one end and boring consecutively. However, this involves a large capital investment in a TBM and large site set-up at the portal locations, when compared with drill-and-blast. The final circular structural lining of pre-cast segments can be formed as the tunnel advances. <p>Issues specific to various tunnel options are as follows:</p> <ul style="list-style-type: none"> • Loch Long fixed link crossing, eastern approach tunnel – It is considered unlikely that the use of a TBM to construct the tunnel would be economic given its relatively short length. • Loch Long fixed link crossing, western approach tunnel – The construction of a portal at the north-east end of the tunnel adjacent to the bridge over Loch Long is likely to be problematic due to the elevation, slope, and proximity to the bridge abutment. Access may be preferred from the south-west end of the tunnel, via Loch Long and Glen Finart, and associated improvement of the existing road in Glen Finart. • 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.
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- 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.

Other Constructability Considerations – Road and Small Structures

Coulport to Shantron (junction with A817/A82)

Road improvement on this section of the A817 are currently assumed to require widening at existing road level only, so significant earthworks and other heavy civil engineering activities are not anticipated for this part of the scheme. The widening works would require the traffic to be restricted to a single lane on the opposite side of the road from where the work is being carried out with work progressing linearly along the road in small construction sections for each work front. The number of sections under progress may be restricted according to traffic modelling requirements. Some minor bridge replacements on the route may be required and would likely require extensive diversions to allow for road closures during demolition and construction, although it may be possible to utilise temporary bridges to open up the road or divert locally. At Coulport the route comprises a short tunnel and suspension bridge over Loch Long, which have been assessed above.

Whistlefield Inn to Barnacabber

This section is a new route that connects the A815 to the west side of Loch Long. The options for construction involve either a single 6.5km tunnel directly connecting the A815 to the loch west bank NE of Ardentiny, two tunnels in series from the A886 at Whistlefield linking via the Barnacabber valley or a combination of tunnels and new surface roads following the Loch Long shoreline from Barnacabber. The latter of these options would likely result in increased disruption to residents with the increased online works, but could be balanced with the reduced tunnelling and potential reduction in site traffic on the local roads.

		<p>The following are key considerations within this route corridor:</p> <ul style="list-style-type: none">• Access to the working areas is very limited by existing road with only the A815 at the western providing possible access from the west. Other widening works on this stretch of road are likely to impact the capacity of this road also, making its use undesirable for delivering materials and tunnelling spoil removal. As a result it may be desirable to establish a marine loading facility on Loch Long at the bottom of the valley and establish a haul road network from the works area to the facility. This would likely include a haul road up to the interface with the proposed bridge over Loch Long where the eastern tunnel portal is located, which could also be used to support construction of the bridge. If a haul road were created here then it may be easier to combine with a permanent road on the side of the mountain to connect from the bridge to Ardentiny and through the valley, making this option in combination with a smaller tunnel potentially more favourable.• Road construction on the side of the mountain would be relatively complex due to the slope. The work would likely involve use of soil nailing and retaining wall systems on the loch side to enable construction of the road from behind the retainment as it is built up, but in early stages hill climbing plant may be needed to get work started.• At the western end of the tunnel where the route joins the A815, the portal would be ideally relocated further from the road to provide adequate construction space.• Construction of the tunnels is very likely to require vertical shafts which could present a challenge for access, particularly under the mountain peak for the extended single tunnel, requiring extended access routes to accommodate the steep gradients. <p>Whistlefield Inn to Rashfield</p> <p>This section of the A815 incorporates some areas of improvements to the existing alignment along with construction of a new alignment crossing over the existing road. There are also 3 new viaduct structures crossing inlets on Loch Eck. Construction of this section of the road has the following key areas of consideration:</p> <ul style="list-style-type: none">• Traffic management requirements for these works will likely be severe with single lane running for multiple sections of the road to construct widened areas as well as new alignments, as in most cases these are very close to the existing road. It would be advisable to maintain crossover levels, where new alignments cross the existing road, as close to current levels as possible to minimise the impacts of the reprofiling of the highway on TM requirements.• The loch is landlocked so there is limited opportunity to mobilise large plant for working on the loch and this would be limited to modular barges and vessels to enable transport. This will mean that much of the
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		<p>construction of the viaducts may need to be carried out from land, adding further pressures from traffic management.</p> <ul style="list-style-type: none">• Mobilising large cranes and other plant will be challenging given the space constraints on the stretch of road adjacent to the loch.• To the southern end the available space for working areas is increased substantially once the loch is no longer a factor so many of the above construction issues will be mitigated.• In the southern half of the road works the earthworks embankments increase in dimension close to the existing road which may require the new road to be realigned away from the existing road or use of retaining walls to prevent encroachment on the carriageway. If these cannot be achieved, then some temporary diversion of the existing road is likely to be needed. <p>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 multispan cable stay bridge crossing at Loch Striven. The Loch Striven Bridge is set at 95m above loch water level necessitating high towers of up to 250- 300m. 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 advantageous to move as much of the alignment offline as possible to mitigate impacts to the existing road and also provide for a haul route for earthworks vehicles.• 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 are potentially 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.
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		<ul style="list-style-type: none">• Construction of the new link road across the top of Loch Striven presents challenges due to likely depth of water and the height of the piers, requiring extensive marine plant to support the work in the loch.• 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 at Port Ann, 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 a bridge structure or tunnel formed using TBM or possibly an immersed tube. 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 class 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.• 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.
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<p>Environment Considerations</p>	<p>Biodiversity, Fauna and Flora</p>	<p>The route corridor crosses Upper Loch Fyne and Loch Goil MPA for approximately 2.8km and is also approximately 0.2km south at another section. Pollution during construction and operation of crossing could impact the MPA, which could cause a major negative environmental effect.</p> <p>131.7ha of Ruel Estuary SSSI 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>360.2ha of Loch Eck SSSI falls within the route corridor. There could be temporary and permanent habitat loss within the SSSI, including the loss of designated features bryophyte assemblage, flood-plain fen and oligotrophic loch, which could be a major negative environmental effect. Moderate negative environmental effects could also occur as a result of nitrogen deposition.</p> <p>All of Craighoyle Woodland SSSI (77.6ha) falls within the route corridor. This could result in considerable temporary and permanent loss of SSSI habitat, including the loss of designated features bryophyte assemblage and lichen assemblage, which could be a major negative environmental effect. Moderate negative environmental effects could also occur as a result of nitrogen deposition.</p> <p>4.7ha of Ross Park SSSI falls within the route corridor. There could be temporary and permanent habitat loss within the SSSI, including the loss of designated features lichen assemblage and Scottish dock, which would be a major negative environmental effect. Moderate negative environmental effects could also occur as a result of nitrogen deposition.</p> <p>There are 160 parcels of AWI within the route corridor. This could result in the loss of nationally important and irreplaceable habitat, which could require compensation, and would be a major negative environmental effect.</p> <p>There is potential for impacts on terrestrial and aquatic species from construction activities, as follows:</p> <ul style="list-style-type: none"> • Disturbance from noise and vibration and light pollution. • Injury or mortality from vegetation removal, vehicle movements, or becoming trapped in uncovered holes and pipes during construction. • Fragmentation and loss of habitat suitable for shelter, foraging and commuting.
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		<ul style="list-style-type: none"> • 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 watercourse crossings and tunnelling in particular could result in a longer construction period and could involve activities such as piling with high levels of noise and vibration.</p> <p>During the operation phase, there is potential for receptors close to the route to experience new or increased noise and vibration effects from increased vehicle traffic.</p> <p>As there is a number of settlements within the route corridor, in addition to noise and vibration there is potential for other effects on population receptors resulting from construction traffic. Increased traffic volumes and construction activities could result in diversions and affect journey lengths for both vehicle travellers and non-motorised users (NMUs).</p> <p>During operation, the watercourse crossings would provide significant journey savings around Loch Fyne and Loch Long and the route corridor would improve connectivity between the central belt and Argyll and Bute. The route corridor would provide greater accessibility to active travel routes such as the NCN Route 75, Cowal Way and Three Lochs 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, but the extent and significance of such impacts are uncertain at this stage.</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 localised effects from air on human health; these are discussed further under Air Quality.</p>
	Water Environment	<p>Construction within the route corridor and operational structures and discharges may affect the hydromorphology and surface water quality of approximately ten Water Framework Directive (WFD) classified river water bodies, five WFD coastal and one loch WFD water body and approximately 150-160 minor watercourses.</p>

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		<p>SEPA Flood Maps (SEPA, 2020) indicates that the route corridor may be at fluvial and surface water flood risk on the A815 from Loch Eck and River Finart, and from fluvial flood risk from the River Eachaig, Little Eachaig, Glenkin Burn, Glentarsan Burn, Balliemore Burn, Tamhnich Burn, River Ruel, Bealachandrain Burn and Kilail Burn during a medium likelihood event (0.5% Annual Exceedance Probability (200-year) event).</p> <p>The route corridor may also be at fluvial flood risk on and around the A817 from Fruin Water, Finlas Water, Allt a' Bhaile a' Mhuilinn, Auchengaich Burn and at Garelochhead from the McAulay Burn during a medium likelihood event (0.5% Annual Exceedance Probability (200-year) event).</p> <p>The route corridor may be at coastal flood risk from Loch Long, Holy Loch, Loch Striven, Loch Riddon and Loch Fyne during a medium likelihood event (0.5% Annual Exceedance Probability (200-year) event).</p> <p>Potential for coastal flooding from new crossings on Loch Long and Loch Fyne, which could impact flooding on associated road infrastructure.</p> <p>May impact the Loch Eck SSSI and Ruel Estuary SSSI. Upper Loch Fyne and Loch Goil Marine Protected Area may also be affected by crossing structures.</p> <p>Loch Fyne Shellfish Water Protected Area is directly crossed and may be impacted. Loch Striven and Kyles of Bute Shellfish Water Protected Areas are within the route corridor and may also be affected.</p> <p>Five surface water Drinking Water Protected Areas may also be affected.</p> <p>Construction and operation within the route corridor could result in major negative environmental effects on the water environment.</p>
	Soils	<p>The route corridor is assessed as having a minor negative or uncertain environmental effect. This recognises the route corridor is likely to avoid potential effects on Class 2 and Class 1 peatland habitat (nationally important and of potentially high conservation value and restoration potential). Loss of existing commercial forestry and land identified as Preferred and Potential within the Argyll & Bute Woodland Strategy is likely to be unavoidable within the route corridor.</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 Loch Long and at Loch Fyne, and greenhouse gas emissions from vehicular movements, which could result in annoyance for local residents.</p>

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		<p>There is potential for receptors within the route corridor to experience increased pollutant emissions during operation from increased vehicle traffic.</p> <p>Although the existing air quality in the region is good, there are a number of settlements within the route corridor which could potentially experience negative air quality effects; however it is expected that these would be reduced through mitigation measures.</p> <p>Potential air quality effects on ecological receptors are assessed under Biodiversity, flora and fauna.</p>
	Climatic Factors	<p>Once operational, forecast traffic levels (and associated vehicle-derived greenhouse gas emissions) are relatively high, for this route corridor, assuming the continued operation of the A83 through the Rest and Be Thankful. With the predicted shift towards electric vehicles this would reduce in the future. Additionally, the route corridor would reduce the driving distance for some journeys due to the introduction of the watercourse crossings across Loch Long and Loch Fyne, which over time would likely result in carbon savings.</p> <p>Effects on the route corridor as a result of predicted changes to the climate and weather should also be considered. Sections of the corridor are situated within or in close proximity to zones which may be at risk of coastal or fluvial flooding as indicated in the 'Water Environment' section. The anticipated increase in severity and frequency of rainfall events caused by climate change could pose greater risk from flash-flooding.</p> <p>As indicated in the 'Soils' section, the route corridor is likely to have impacts on peatland habitat, degrading the land and releasing its stored carbon. Any felling required would also reduce the carbon sink value of forested areas within the corridor. Woodland and Forestry Strategy areas, including existing planted woodland, potential, preferred and sensitive sites, need to be considered in the route corridor selection process.</p> <p>As outlined in the Material section, there is requirement for significant engineering structures in the route corridor which would carry a high embodied carbon content. Manufacture of materials and construction activities would be expected to have a major negative environmental effect on Climate.</p>
	Material Assets	<p>As outlined in the Climatic Factors section, there are several natural material assets including woodland and peat soils that could be affected by the corridor. Loss of these natural material assets would result in major and minor negative environmental effects for soils and woodland respectively.</p> <p>As outlined in the 'Climatic Factors' section, construction of significant structural crossings and tunnels is required for this route corridor. These structures in addition to the existing carriageway upgrade would require significant raw</p>

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		<p>material inputs and energy usage to construct, resulting in a major negative environmental effect from a built material assets perspective from the following:</p> <ul style="list-style-type: none"> • Construction of new offline carriageway and online upgrading works (total route corridor length of 76km) which follows the existing road network. • Construction of an approximate 1,600m long (1,200m main span) structure over Loch Long. • Construction of tunnels as described in the 'Structures Considerations' section. • Construction of an approximate 8,20m long (500 main span) structure over Loch Striven. • Construction of an approximate 3,000m long (1,100 main span) structure at Loch Fyne. • Approximately 88 new culverts required depending on the local alignment selected in Barnacabber. • Approximately 4,350m² of tree/vegetation clearance to accommodate the new carriageway, releasing stored carbon and reducing sequestration potential.
	Cultural Heritage	<p>Due to the relatively high number of cultural heritage resources within the route corridor (compared to route corridors 1 to 3) and the locations of these, it is considered unlikely that a route within this route corridor could be developed that would avoid significant impacts on these. The most cultural heritage constraints are; where Benmore GDL and Ballimore GDLs cover large sections of the route corridor, where Rossdhu GDL abuts (and is partially within) the entire eastern boundary of the route corridor, the concentrations of Listed Buildings at Benmore and Garelochhead, and the Conservation Area at Clachaig. All of these areas could be considered as pinch points.</p>
	Landscape and Visual Amenity	<p>There is potential for major negative environmental effects on the LLTNP, the special qualities of the Loch Lomond and Kyles of Bute NSAs, the West Loch Fyne (Coast), East Loch Fyne (Coast) and Bute & South Cowal APQs, two GDLs and the local landscape and seascape character due to the construction and operation of the carriageway and supporting infrastructure and the large footprint of the scheme. There is also potential for major negative visual effects for residential receptors in proximity to the route corridor, as well as vehicle travellers using the existing roads and people on long distance walking and cycle routes and Highland summits within the route corridor. The route corridor passes through the Kyles of Bute and Loch Lomond NSAs, which would likely be impacted during construction and potentially operation. Construction of the new structures at Loch Fyne and Loch Long would affect the landscape character and visual amenity of the areas.</p>

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Traffic	Traffic Flows	<p>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 route corridor is forecast to be relatively high, with a corresponding reduction in traffic on the A83 Trunk Road through the Rest and Be Thankful (potentially greater than 75%) in 2027. This assumes that the Rest and Be Thankful is operating under normal conditions.</p> <p>There will be a degree of local re-routing of trips for vehicles accessing the new route corridor, with traffic increases forecast on the A814 between Dumbarton and Arrochar, on the A815 between Dunoon and its junction with the new road and along the length of the A886 connecting the two new roads. Corresponding decreases are expecting on other routes, for example, the A82 Trunk Road between Dumbarton and its junction with the A817 and along the A83 Trunk Road /A815 corridor between Tarbet and Strachur.</p>
	Accidents	<p>For those trips that utilise the new route corridor, accident reductions would be expected due to the shorter journey times that have attracted them to the new route. This route corridor is one of the options likely to result in the most significant reductions in vehicle kilometres currently using the A83 Trunk Road. As such, it is judged that a corresponding reduction in traffic related casualties could be realised from this corridor. During times when the A83 Rest And Be Thankful is closed, the new route corridor would also provide an alternative route on a standard of road likely to be higher than the current diversion route, which includes a section of the A82 Trunk Road, with a known safety record.</p>
Operational Considerations		<p>From a Trunk Roads 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 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 corridor during the winter months, with potential winter resilience operational issues. A further operational consideration in this route corridor is the ongoing MOD operations associated with Faslane and RNAD Coulport. It is possible that these operations could restrict access for periods of time, particularly along the Ministry of Defence controlled section from the A814/ B872 roundabout and the new fixed link over Loch Long.</p> <p>Bridges within Route Corridor 5</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</p>

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	<p>maintaining equipment and collecting telemetry from a Structural Health Monitoring System.</p> <p>Tunnels within Route Corridor 5</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 £6.74Bn - £8.87Bn.
Estimated Time to Completion	It is estimated it would take approximately 16 – 17 years to achieve a fully operational road in this route corridor assuming constructed as a single contract. If construction was phased with contracts in sequence, the time for completion would be greater.
Public Acceptability	Consideration of the feedback received during the public consultation held during September / October 2020 shows that there are a higher number of comments supporting this route corridor than opposing it.

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STAG Criteria		Assessment Summary
Criteria		Assessment Summary
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 a significant proportion of strategic traffic currently using the A83.</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 moderate (in the region of 5-15 minutes) in 2027. Journey time savings between Dunoon and Glasgow are expected to be moderate (in the region of 15-45 minutes) compared with existing road only options.</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	<p>This route corridor offers substantial changes in connectivity and, therefore, is best not solely characterised as a solution to unreliability at the Rest and Be Thankful. Rather, it provides the opportunity to radically improve connectivity to some of the remote communities of Argyll and Bute.</p> <p>The route corridor offers more direct connections from Cowal, 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>

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		<p>It is also worth noting that, while rural depopulation (a significant issue within Argyll & Bute) is linked to wider economic outcomes, indications are that headline economic conditions are not the main driver of this. Transport interventions could likely play a part in arresting population decline, but only if considered alongside an integrated package of economic, cultural and social regeneration measures. A package of measures of this type, coupled with upgraded access to Kintyre, Bute and Cowal, has the potential to arrest population decline and reinvigorate local communities within Argyll & Bute.</p>
Integration	Transport Integration	<p>An integrated transport system aids accessibility by connecting people to opportunities and goods to markets. This route corridor may provide multi-modal opportunities to enhance transport integration.</p> <p>The intervention provides the opportunity to enhance linkages to walking and cycling routes and core paths. As part of the design process, it will be ensured that NMU facilities provided as part of the intervention address the needs of recreational walkers, cyclists and equestrians, as well as commuters, who may be given the opportunity to travel via active modes to transport interchanges.</p> <p>The intervention may help to reduce issues regarding actual and perceived severance, due to the provision of fixed links, with active travel infrastructure benefiting communities in Kintyre and Cowal, with improved linkages across the corridor to Garelohead, 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 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</p>

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	<p>miles. The improved resilience may contribute towards a reduction in the variability of bus journey times and the likelihood of full closures, leading to service cancelations. This may also provide a health and welfare benefit to bus drivers, due to the reduction in instances where bus services are forced to travel via longer diversion routes.</p> <p>This route corridor is not expected to have a major impact on the perception of a seamless public transport journey, as ticketing will not be affected to any great extent. However, there is potential for enhanced interchange between bus services, due to the enhanced connectivity provided.</p> <p>The intervention will improve journey time reliability and resilience, providing more efficient opportunities for freight transport, facilitating more efficient and effective transportation of goods of significant value to the regional and national economies, including high value aquaculture produce and whisky.</p>
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> <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>This route corridor is, however, judged to deliver negative impacts in terms of promoting sustainability and reducing the need to travel. The enhanced connectivity for Cowal and Kintyre provided by this corridor could result in higher levels of traffic as a result of the improved access provided for currently geographically remote communities. While this could result in a short-term negative impact, in terms of delivery against the climate action goals, cognisance of the likely timescales for the delivery of an</p>

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	<p>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> <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>

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STAG Criteria	
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	<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 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>

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		A further assessment of carbon, and opportunities for carbon reduction in design, would be considered in later stages of the project assessment process.
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 Cowal and Kintyre. 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> <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	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.

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	<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 Cowal and Kintyre and the enhancement of business confidence driving an associated increase in inward investment and jobs.</p>

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Assessment Summary

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

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Implementability		RAG Rating		
		RED	AMBER	GREEN
Engineering	Topography and alignment Considerations	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		

Access to Argyll & Bute (A83) Strategic Environmental Assessment & Preliminary Engineering Services
Route Corridor Preliminary Assessment
Route Corridor 5 – A82 – Cowal - Lochgilphead

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						✓	