

Stromeferry Bypass

Welcome to the Exhibition

The purpose of this exhibition is to present an update of recent progress on the Stage 2 route options appraisal for the Stromeferry bypass. Information displayed is draft at this stage and will be updated in light of comments received today.

The first set of boards (2 - 5) provides some background information on the scheme, the process and stages of assessment, and outlines the route options that emerged from the Stage 1 work.

The second set of boards (6 - 11) displays the identified key environmental, engineering, traffic and economic constraints, and solutions developed.

The third set of boards (12 - 13) provides a brief summary of the emerging results of the appraisal, scoring the route options against considered criteria.

The next set of boards (14 - 17) shows more details of the identified best route options for each of the three corridors (North Shore, Online and Southern) emerging from preliminary appraisal.

The final set of boards (18-21) provides further information and preliminary appraisal results, including indicative costings and potential phasing. Details of the next steps for the project are also provided.

We welcome your feedback on the current route options and invite you to fill in a comments sheet, provided at the end of the exhibition.



Background

The existing Stromeferry Bypass is an approximately 12km long section of public road alongside the southern shore of Loch Carron. Since opening in 1970, a 4.5km section between Ardnarff and Cuddies' Point has been subject to a number of landslide and rock fall events causing temporary closures, requiring a 130 mile diversion.

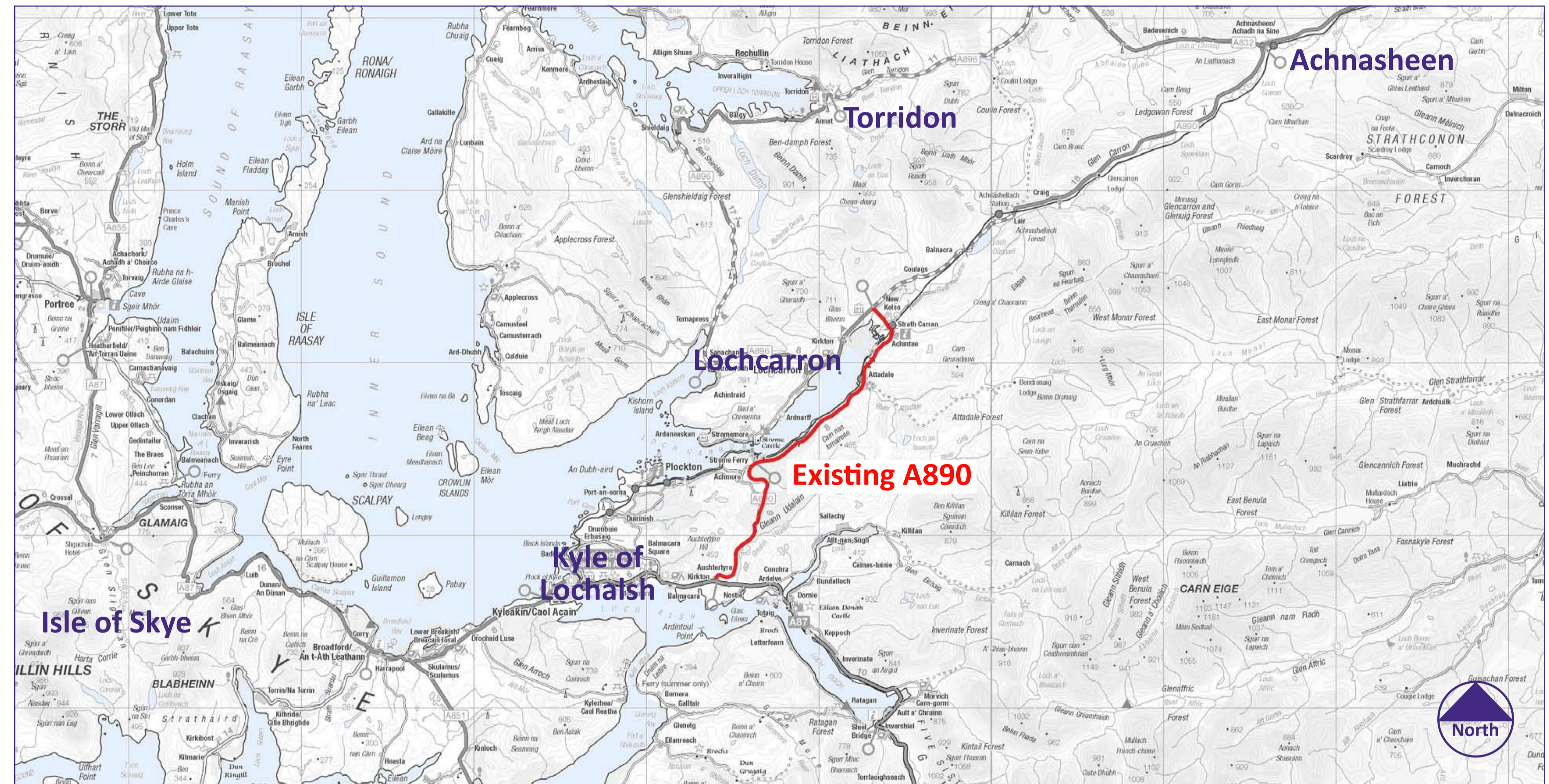
During the 1990s, several feasibility studies were undertaken to identify potential solutions, however, no final decision was reached. In response to a more recent rock fall event which closed the road for several months, a further options appraisal was commissioned. The initial stage of this appraisal included public and statutory consultation and input from technical experts to identify a number of options for further study.

A Stage 2 route options appraisal of the nine route options, emerging from the Stage 1 appraisal in May 2013, is currently underway in order to identify one preferred option.

Need for Scheme

- Landslides and rock falls causing hazards to road users and road closures
- Existing sub-standard road geometry
- Transport reliability and dependability
- Economic impact

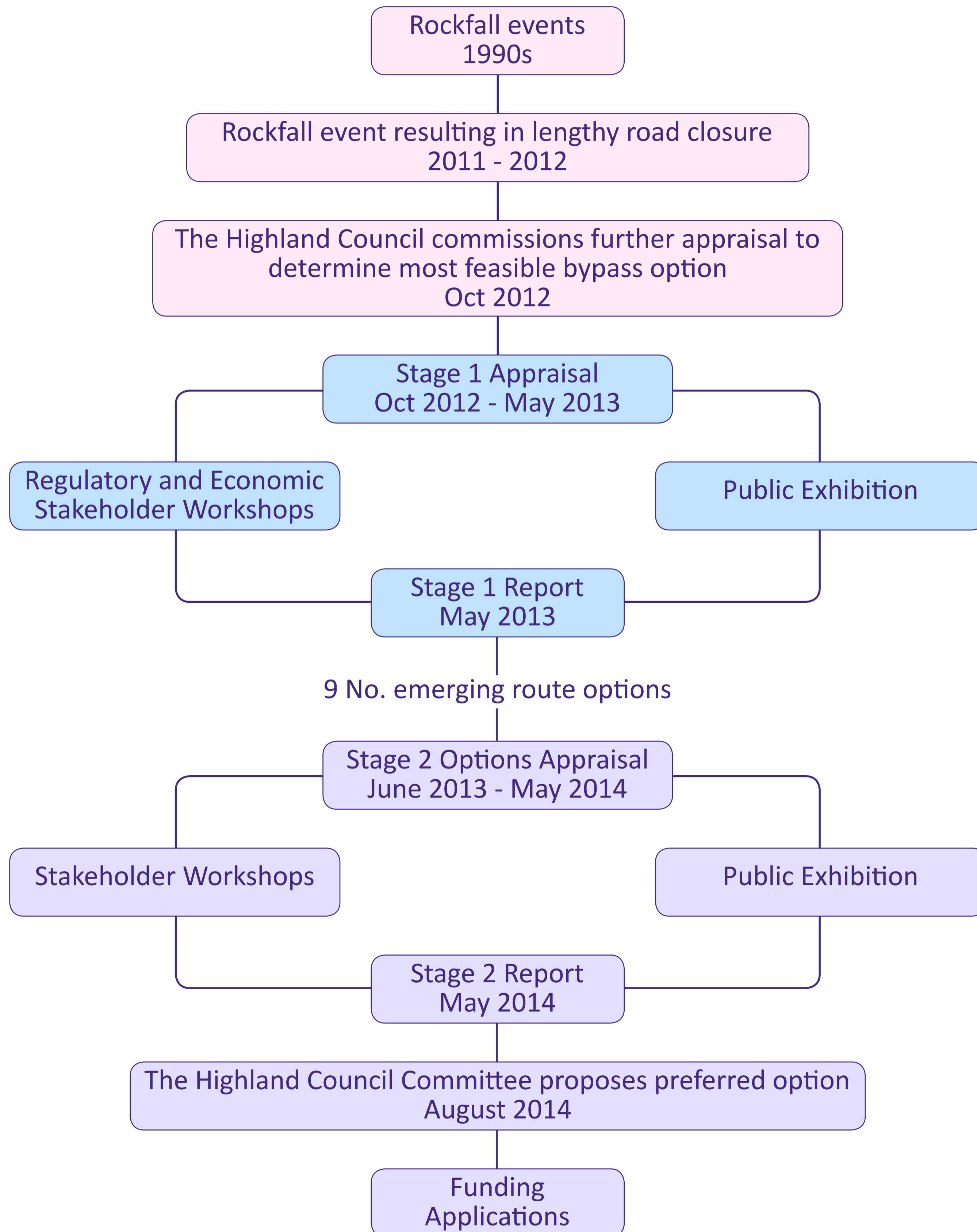
Location Plan



Scheme Objectives



- Safeguard and enhance access to the natural and built environment during construction, maintenance and operation of the scheme
- Minimise all risks during design, construction, operation and maintenance
- Ensure deliverability of scheme and 'Value for Money'
- Deliver a safe and reliable, two lane carriageway
- Ensure no increase in risk to and liability of the railway, maintaining access over the life of the scheme
- Keep the A890 and peripheral road network open during construction
- Maintain and improve social cohesion for the local population, making use of leisure, health and educational facilities and by improving accessibility for emergency services
- Maintain and improve choice of transport mode and integration of public transport links
- Take account of relevant local, regional and national planning policies during the design stage
- Maximise / improve network efficiency, sustainable connectivity and social cohesion in terms of journey times and journey reliability in the Wester Ross area
- Deliver a scheme that assists local businesses to maximise opportunities for sustainable development and economic growth

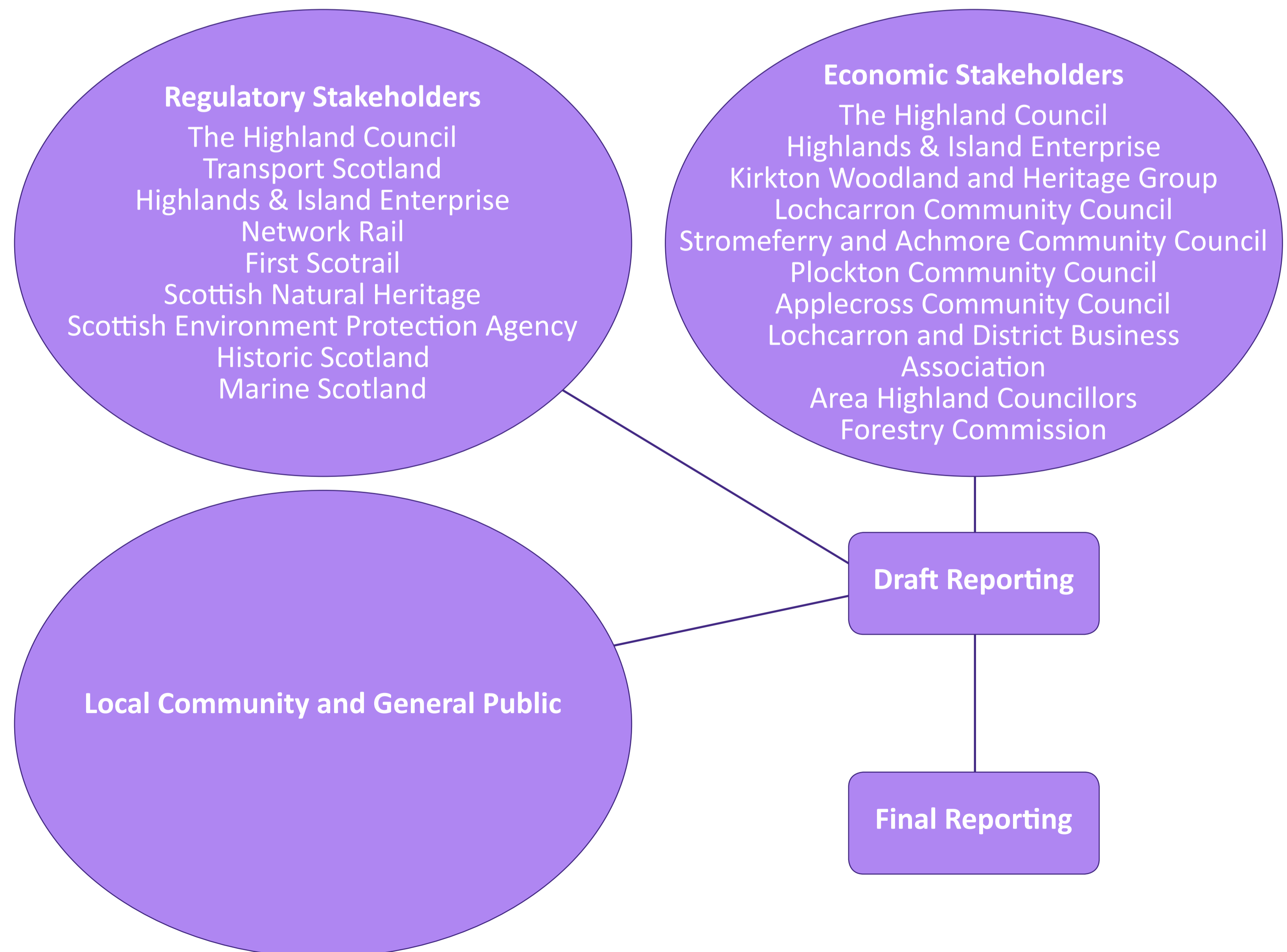


Consultation

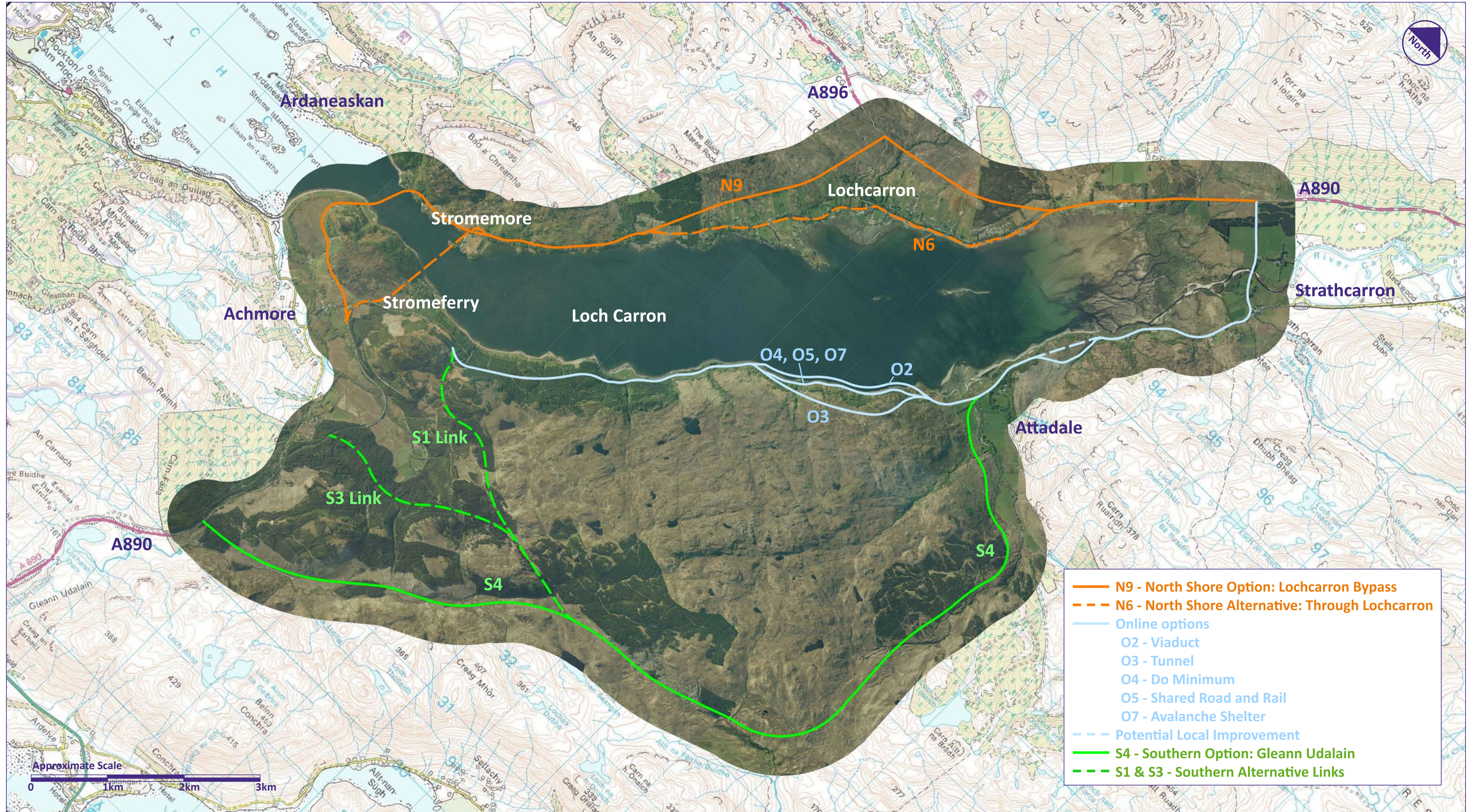
Consultation and active engagement with Stakeholders has featured throughout the project and continues to inform the options assessment. As part of Stage 1 and Stage 2 a number of workshops with Regulatory and Economic Stakeholders and the local community have been undertaken.

Future Works

Further discussions with Key Stakeholders, including the local community, will be held at Stage 3 of the process and will include a public exhibition.



Emerging Route Options from Stage 1



European designations

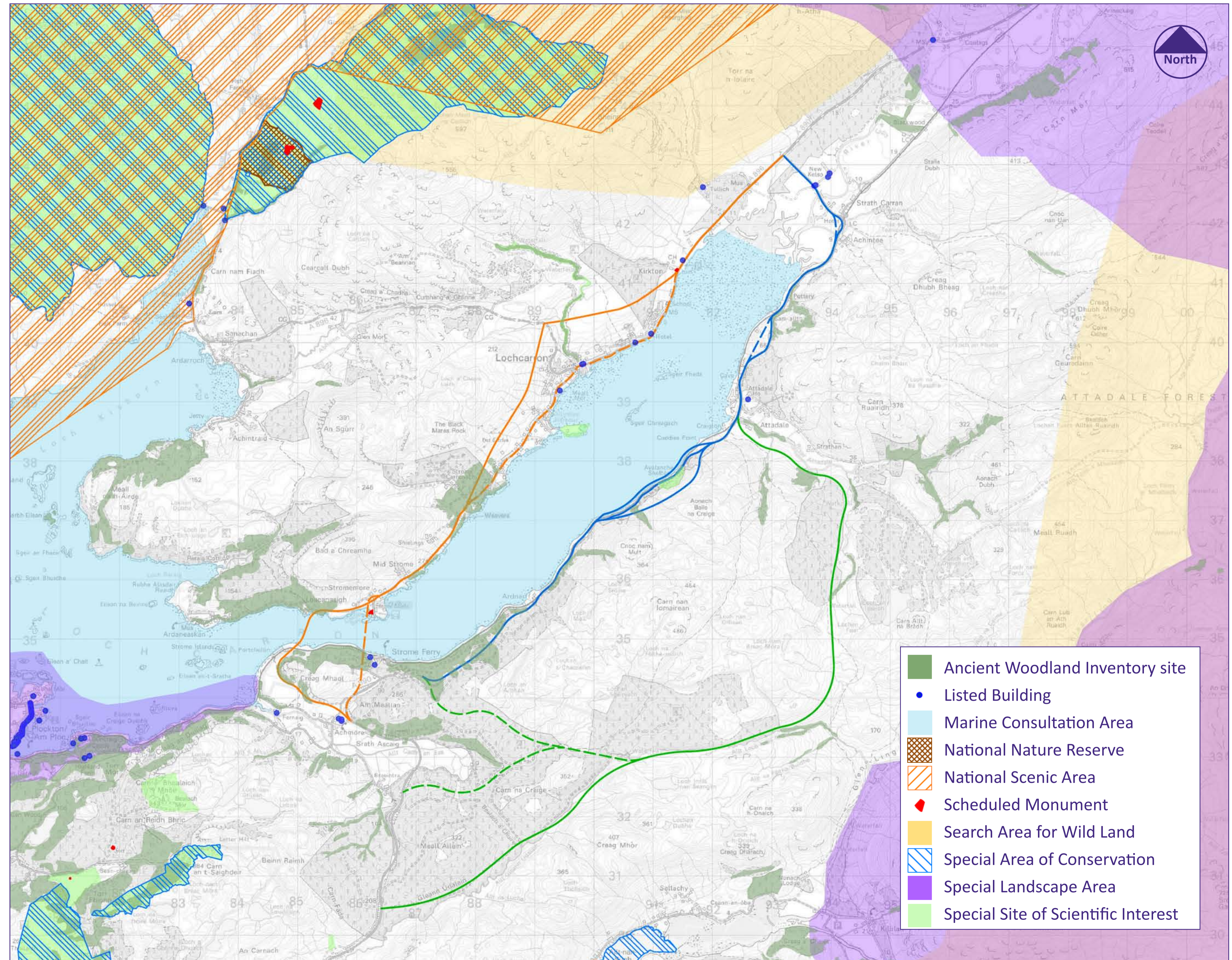
- Special Areas of Conservation
- A number of European Protected Species, including: Otter, Wild Cat, Cetaceans, and Bat species

National designations

- National Nature Reserve
- National Scenic Area
- Scheduled Monuments and Listed Buildings, including: Strome Castle and Lochcarron Old Parish Church
- Sites of Special Scientific Interest

Other designations or key constraints

- Ancient Woodland Inventory Sites
- Marine Consultation Area
- Search Areas for Wild Land
- Special Landscape Areas
- Views Over Open Water
- Diverse ground conditions and hydrology



Key Engineering Constraints

Alignments

- Topography
- Railway
- Level Crossings
- Existing settlements, properties and frontage activity
- Geometry of existing roads
- Existing structures
- Existing land use and ownership

Strome Narrows Crossing

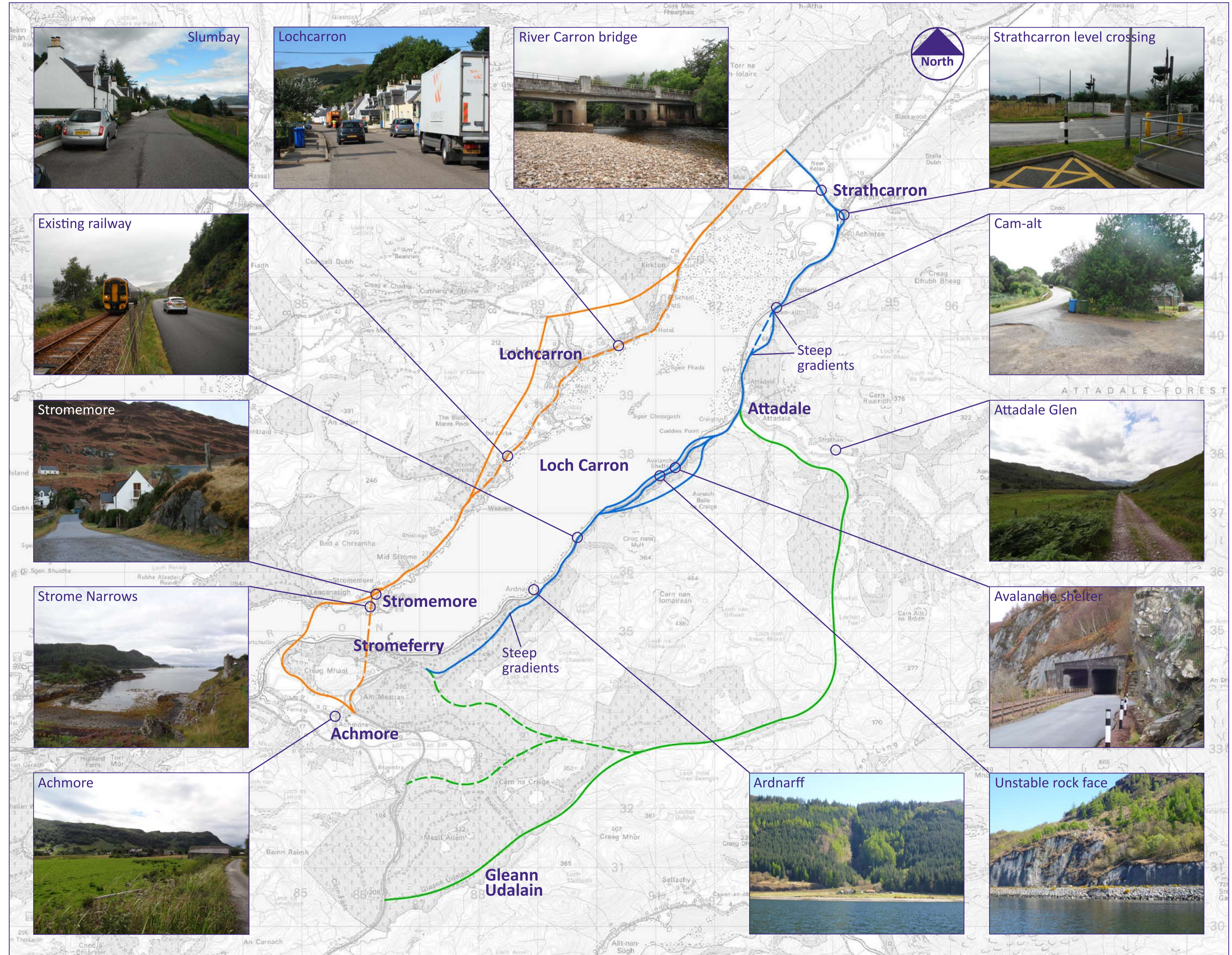
- Tidal range and currents
- Topography and make-up of seabed
- Length of structure required
- Navigational clearance requirements

Structures

- Requirements for major bridge or tunnel at the Narrows
- Retaining existing structures, if possible
- Existing avalanche shelter
- On-line viaduct/ shelter/ tunnel

Buildability

- Restricted road corridors
- Ground conditions
- Construction risks
- Unstable rock faces
- Potential requirement for road and rail closures
- Securing suitable scheme funding

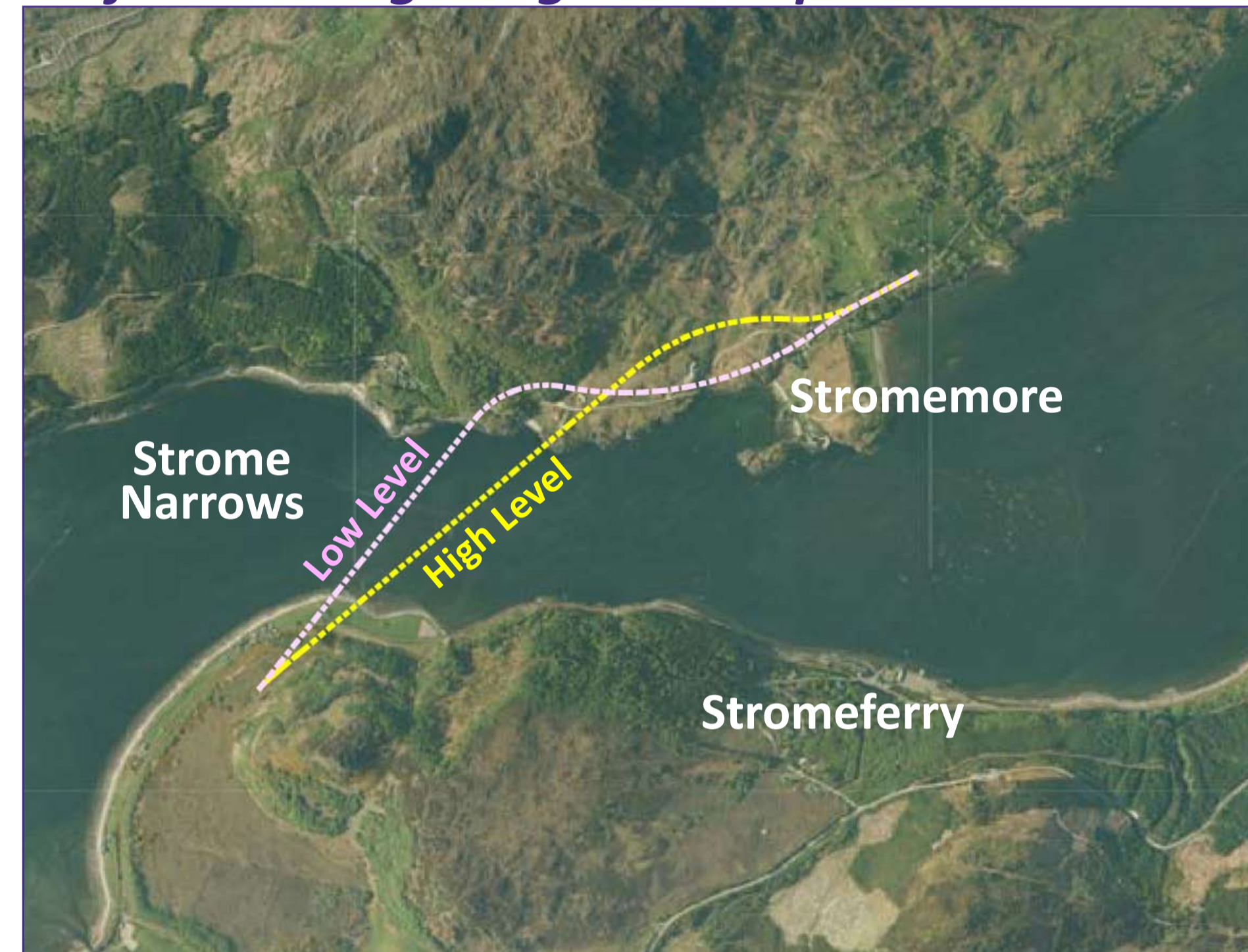


Bridge Crossing

Five potential options for crossing the Strome Narrows, including a barrage, have been considered. The drawing to the right shows two indicative alignments that have emerged from the initial engineering assessment.

The options include a range of lengths and heights of bridge crossings, two of which are shown below. The high level bridge would have the highest structure and longest span of the options, while the low level bridge would have multiple and shorter spans. The engineering assessment has identified the low level bridge as the most feasible option.

Preferred Bridge Alignment Options

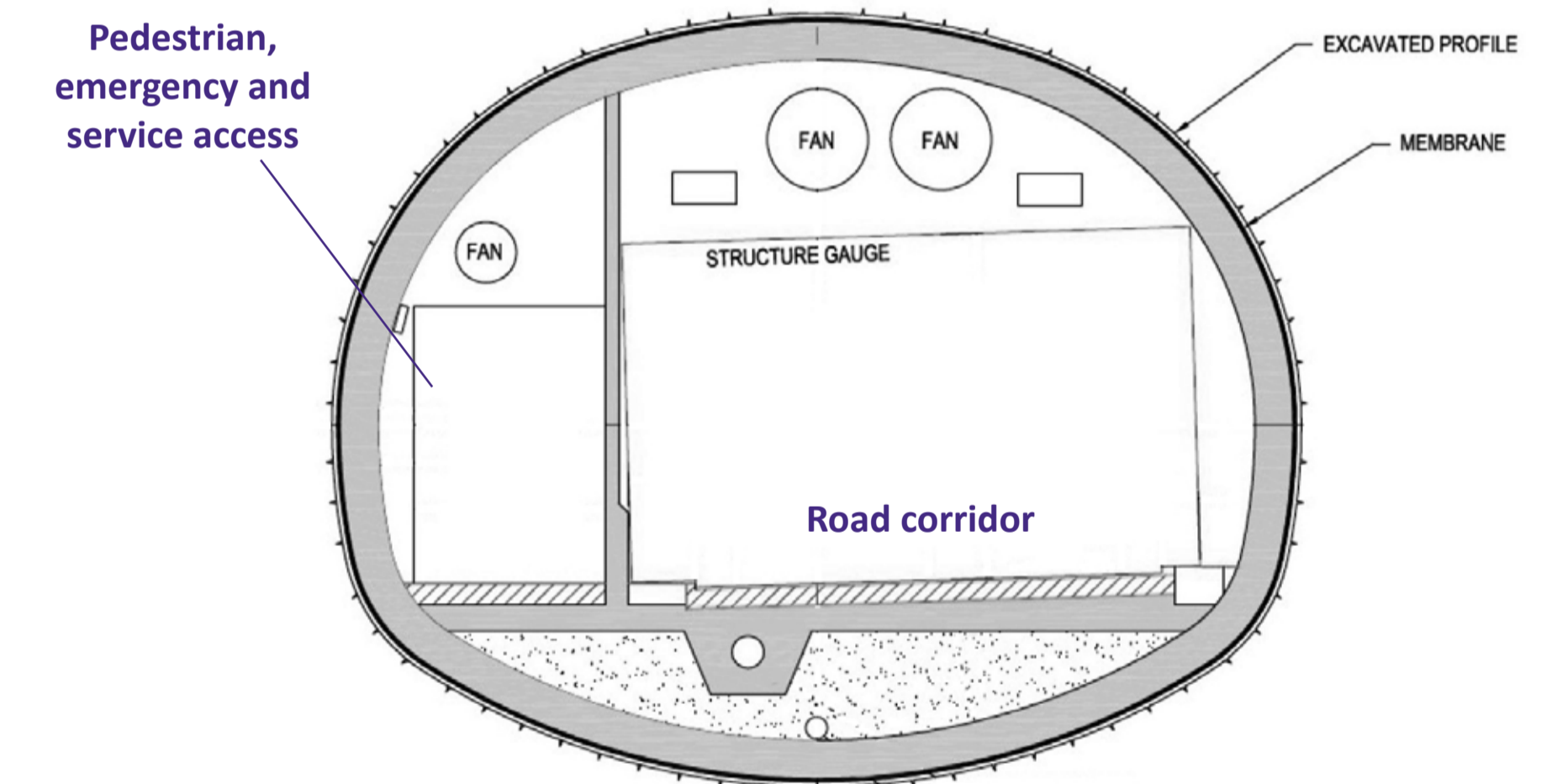


Tunnel

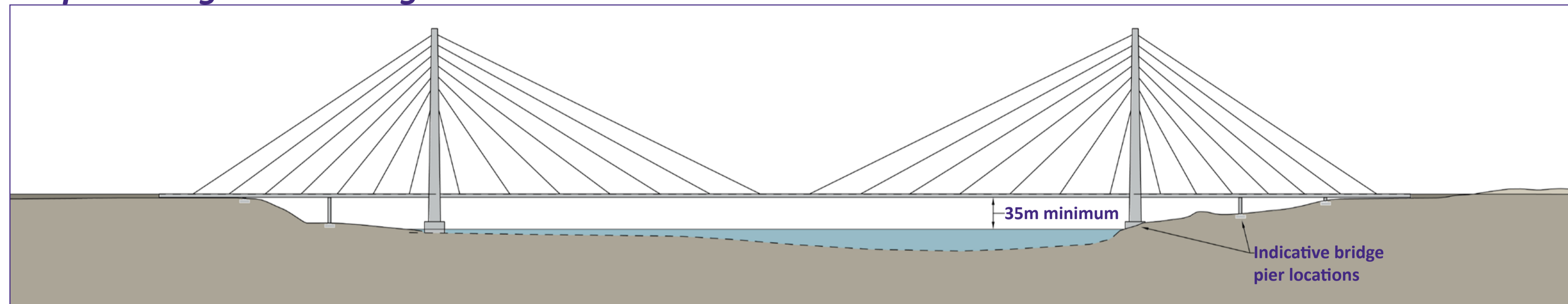
In addition to the identified bridge crossing options, a tunnel crossing under the Narrows has also been considered. The below drawings show a typical tunnel profile and a potential tunnel alignment.

The tunnel is likely to better satisfy environmental criteria but would be more costly and carry greater risks than a bridge crossing.

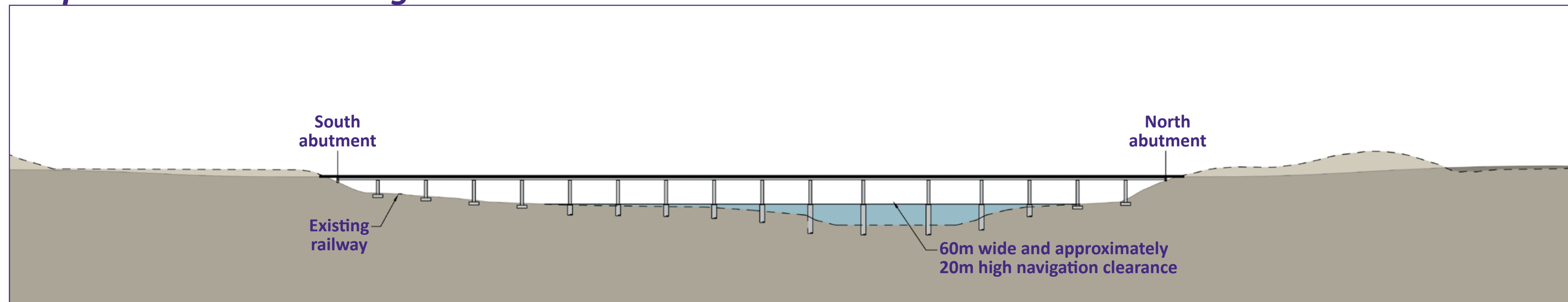
Typical Tunnel Profile



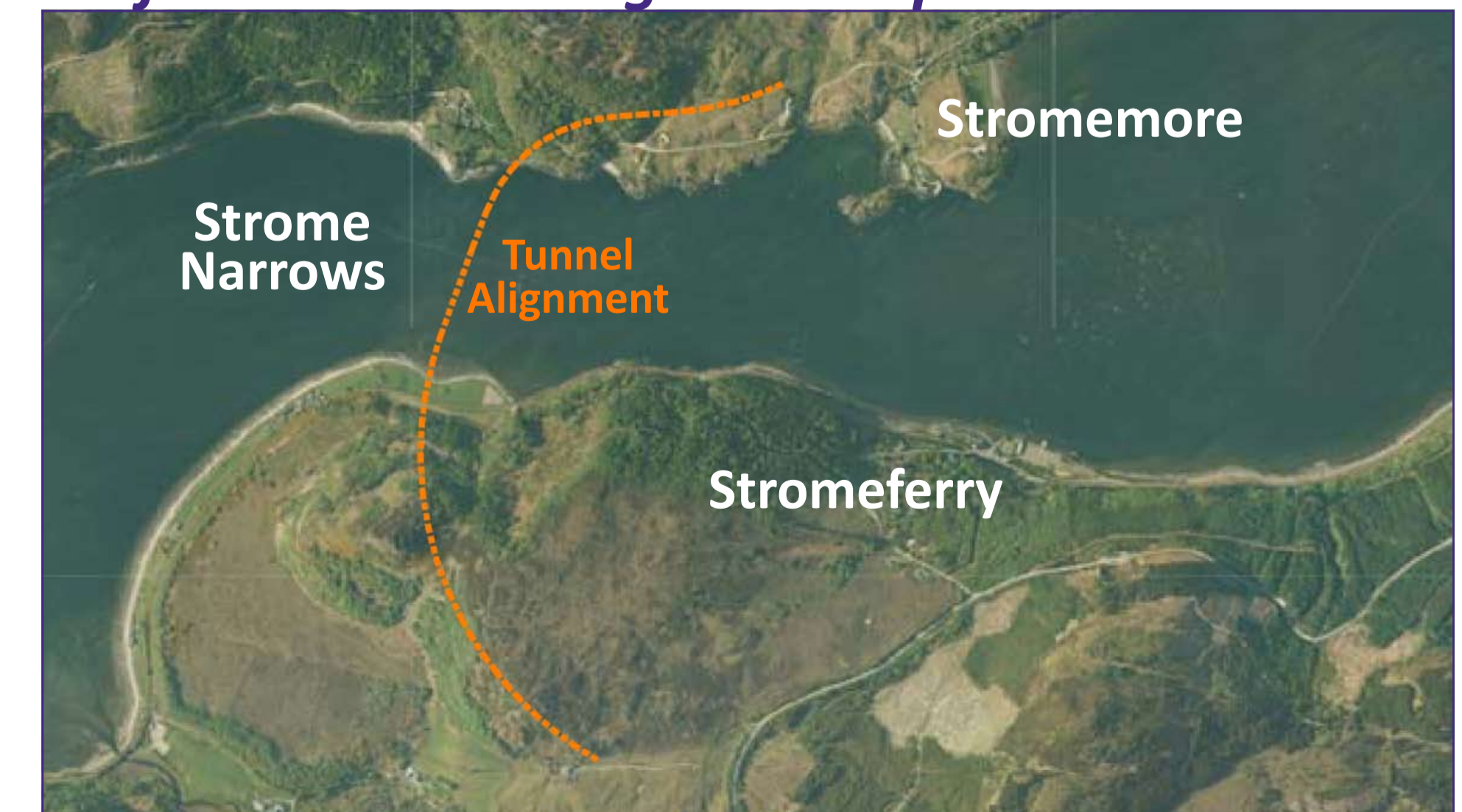
Proposed High Level Bridge



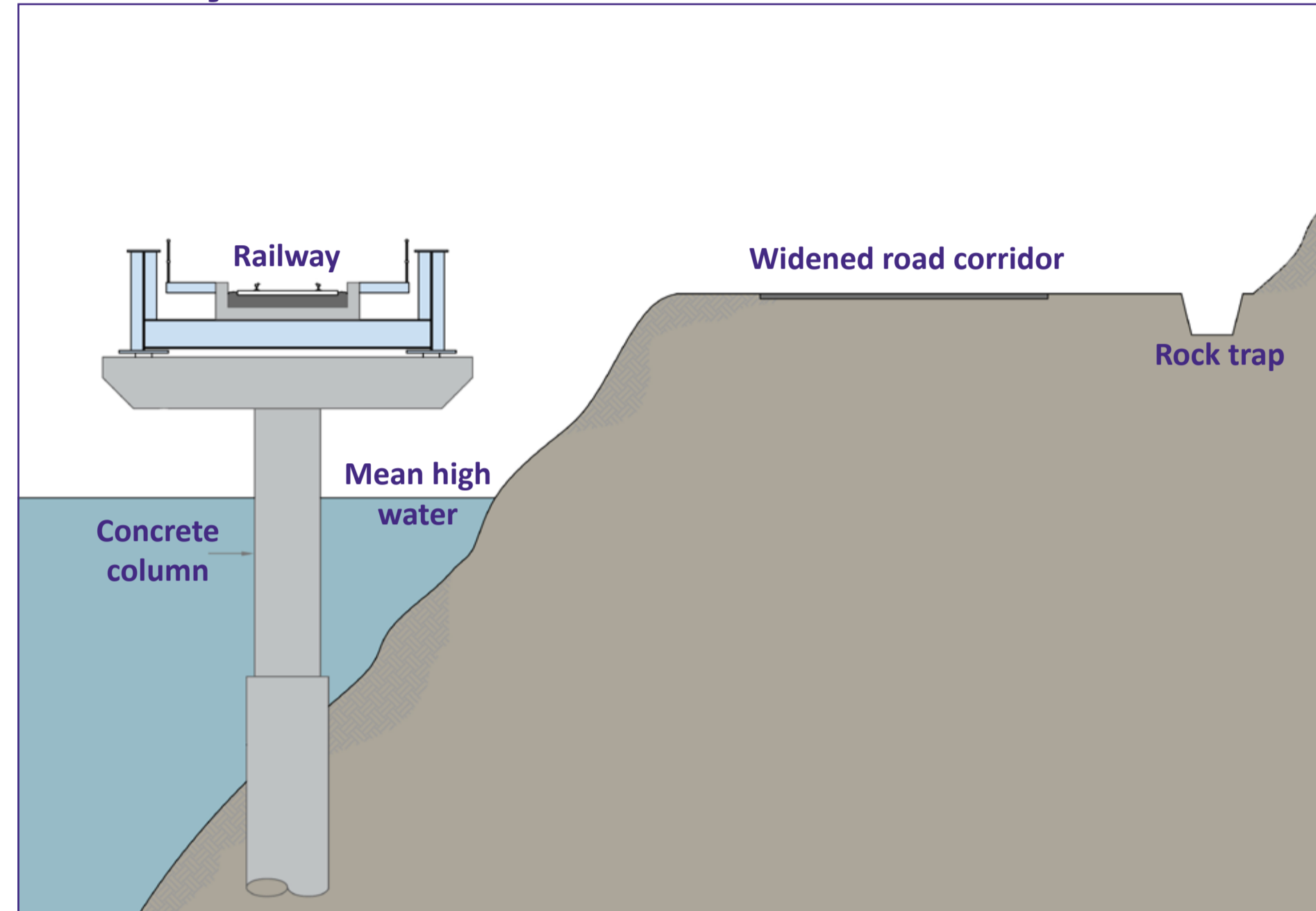
Proposed Low Level Bridge



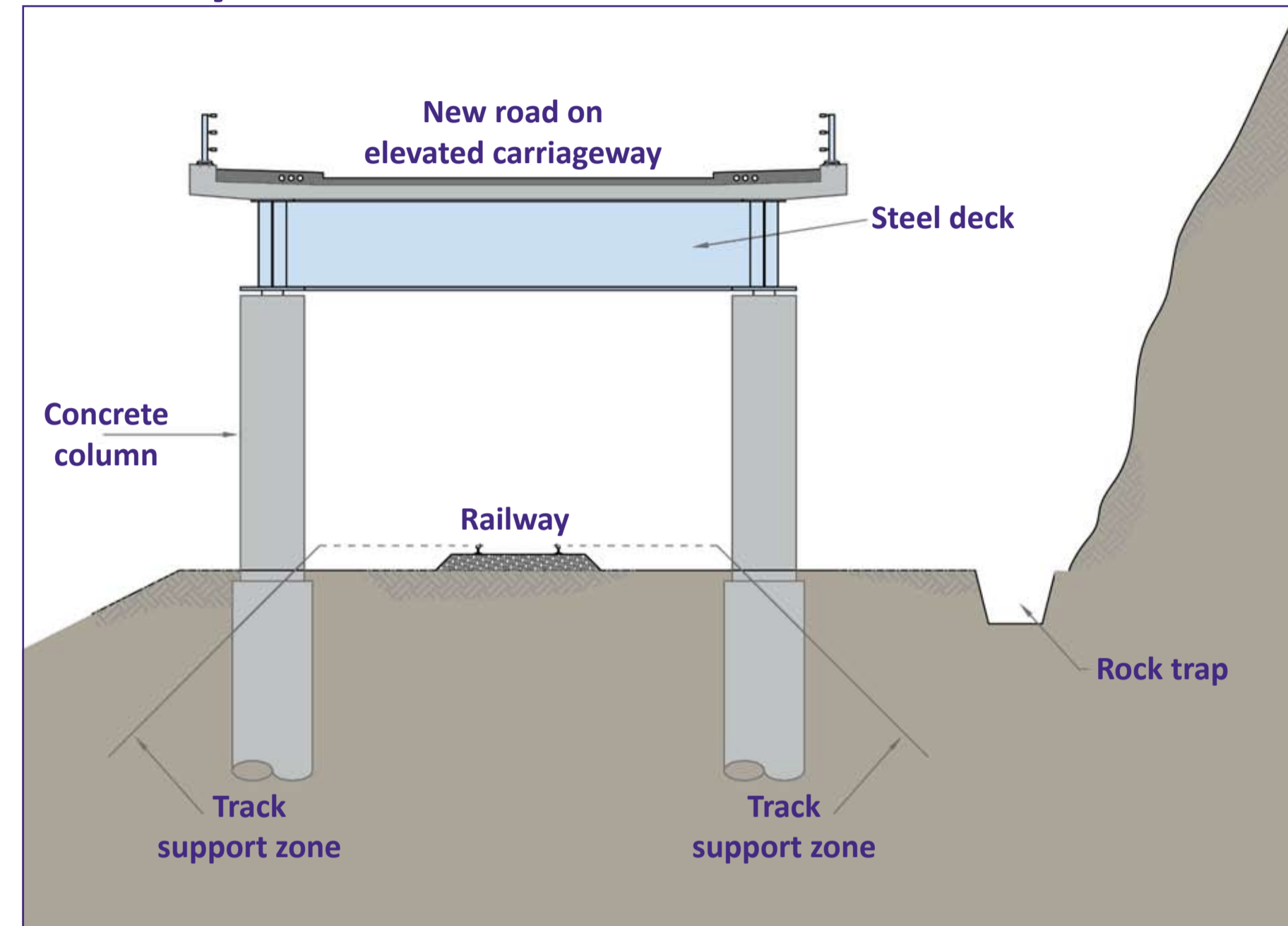
Preferred Tunnel Alignment Option



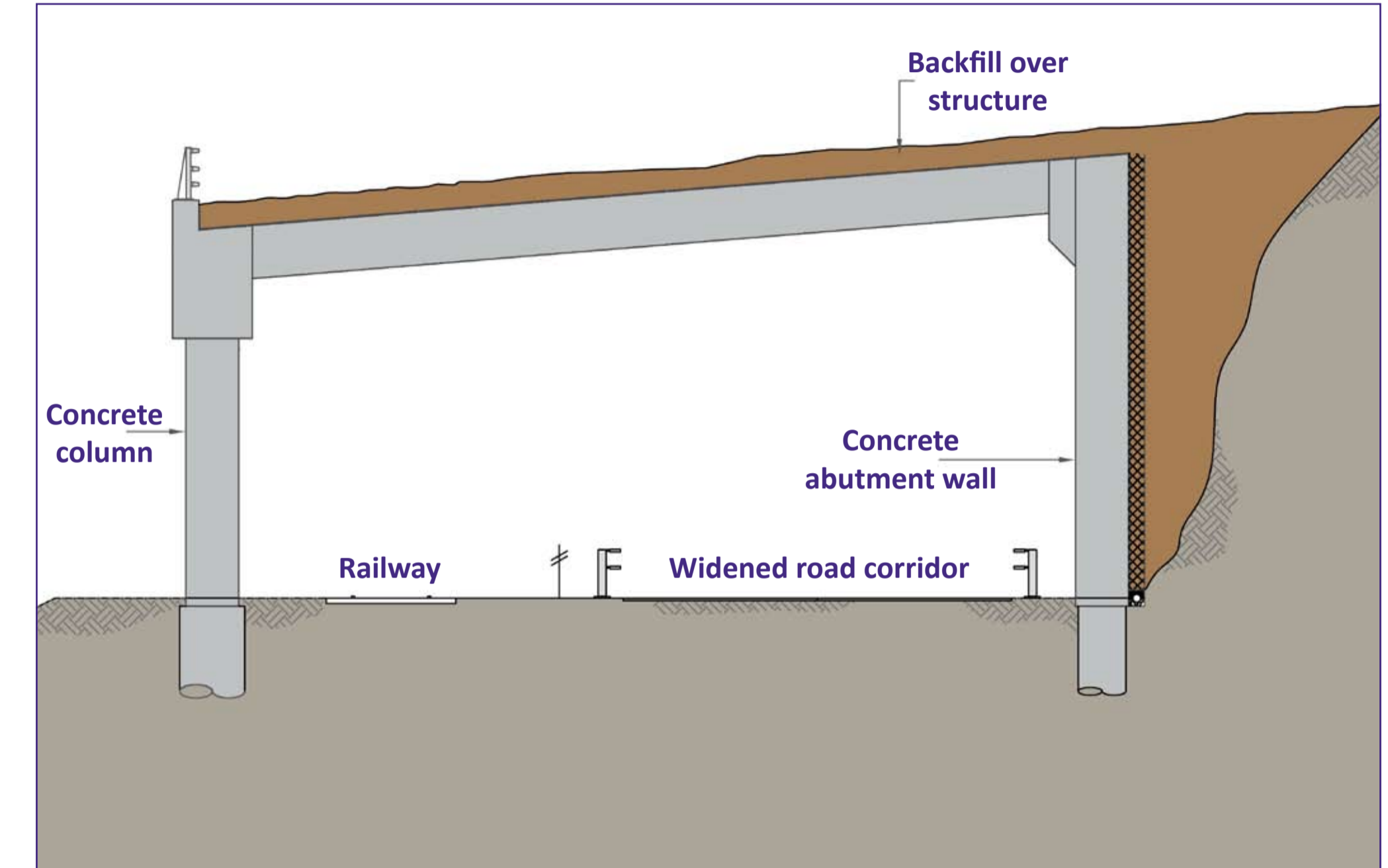
Railway Viaduct



Developed Avalanche Shelter



Extended Avalanche Shelter



Shared Road and Rail

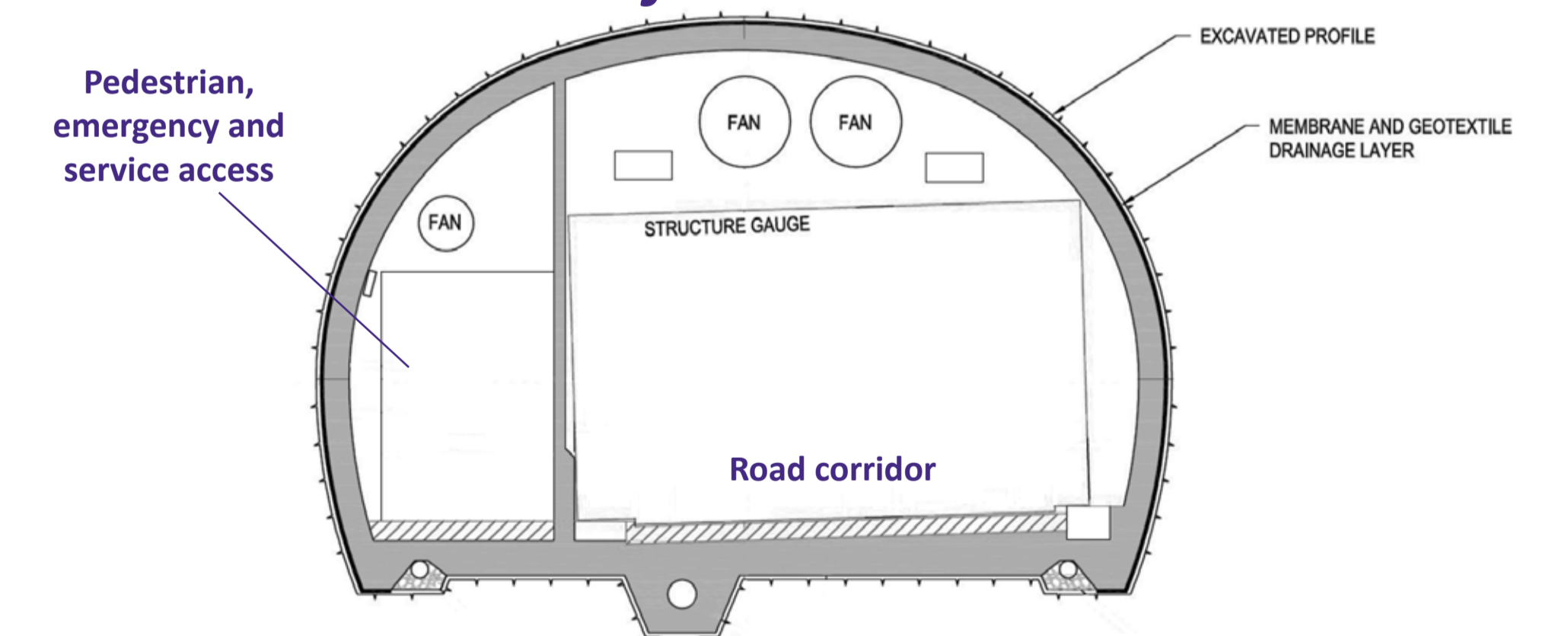


A number of different solutions have been considered for the online options to bypass the most problematic online section, between Cuddies Point and Ardnarff.

Potential options include:

- a **Railway Viaduct** along the edge of the loch, enabling a wider road corridor;
- a **Developed Avalanche Shelter**, providing an elevated carriageway above the existing railway;
- an **Extended Avalanche Shelter**;
- **Tunnel** options; and
- a **Shared Road and Rail** option.

Indicative Tunnel Profile



Example of a Tunnel Portal



A high level traffic and economic assessment is underway for each of the identified 9 routes. This has involved a review of historical and collected data, including:

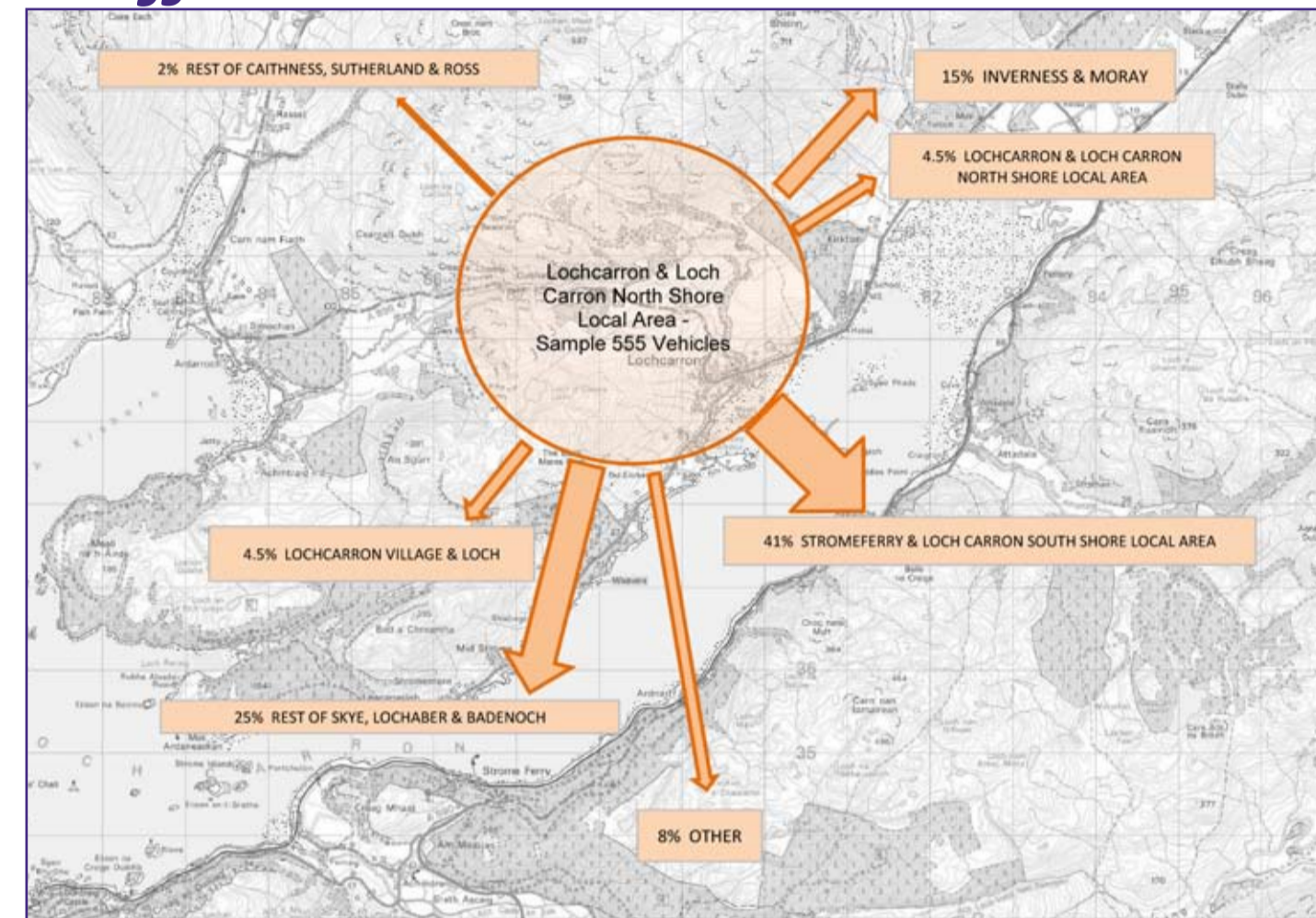
- Journey times
- Accident rates
- Traffic, volumes and mix
- Turning movements
- Roadside interviews
- Origin & Destination assessments
- Public Transport review

A cost benefit appraisal is currently being completed using an assessment of scheme benefits against up to date total scheme costs.

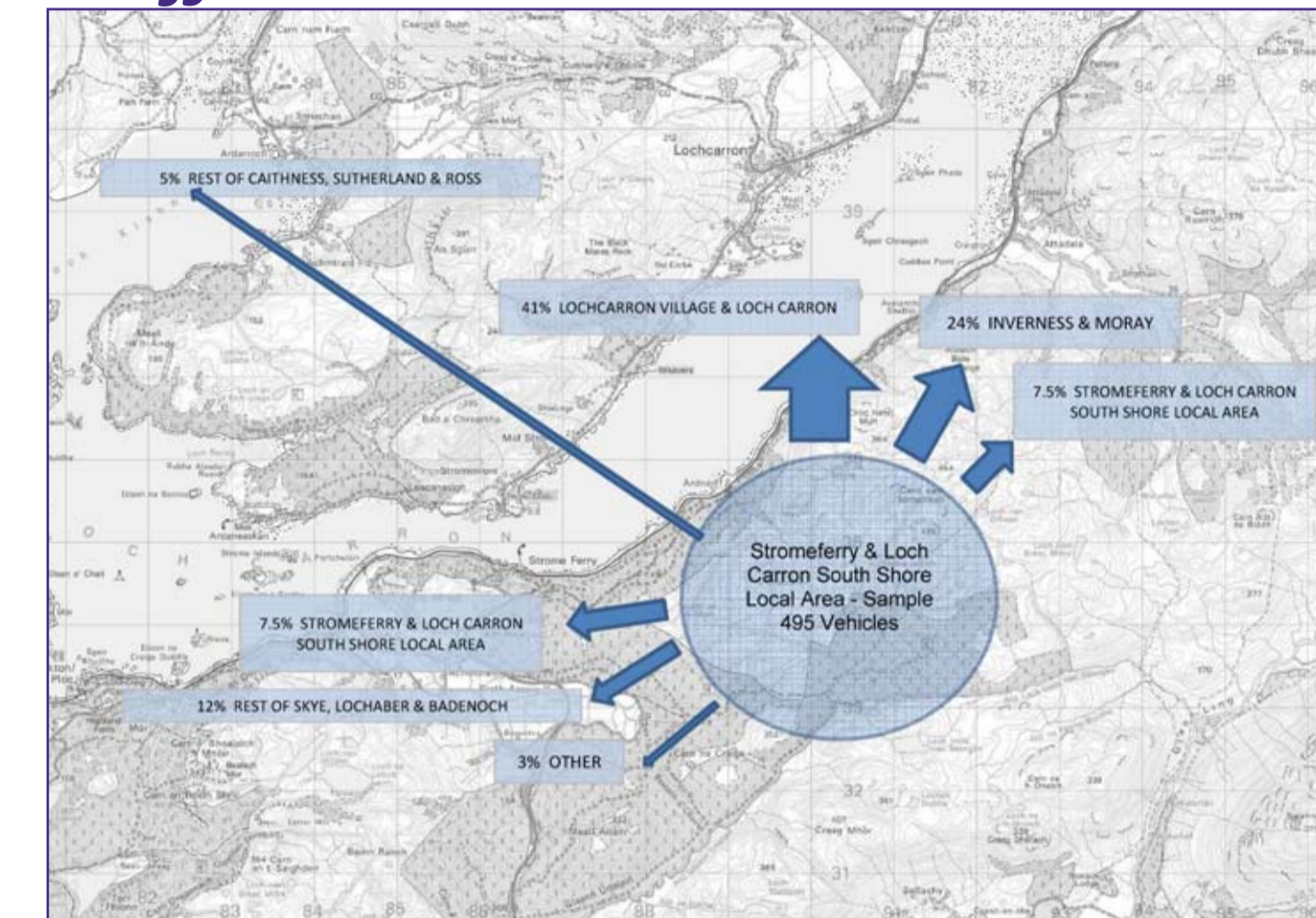
A review of the Economic Activity and Location Impacts is also being completed and includes a detailed Business Survey.

The assessment has also taken account of traffic that is likely to be generated should the Kishorn development go into full production.

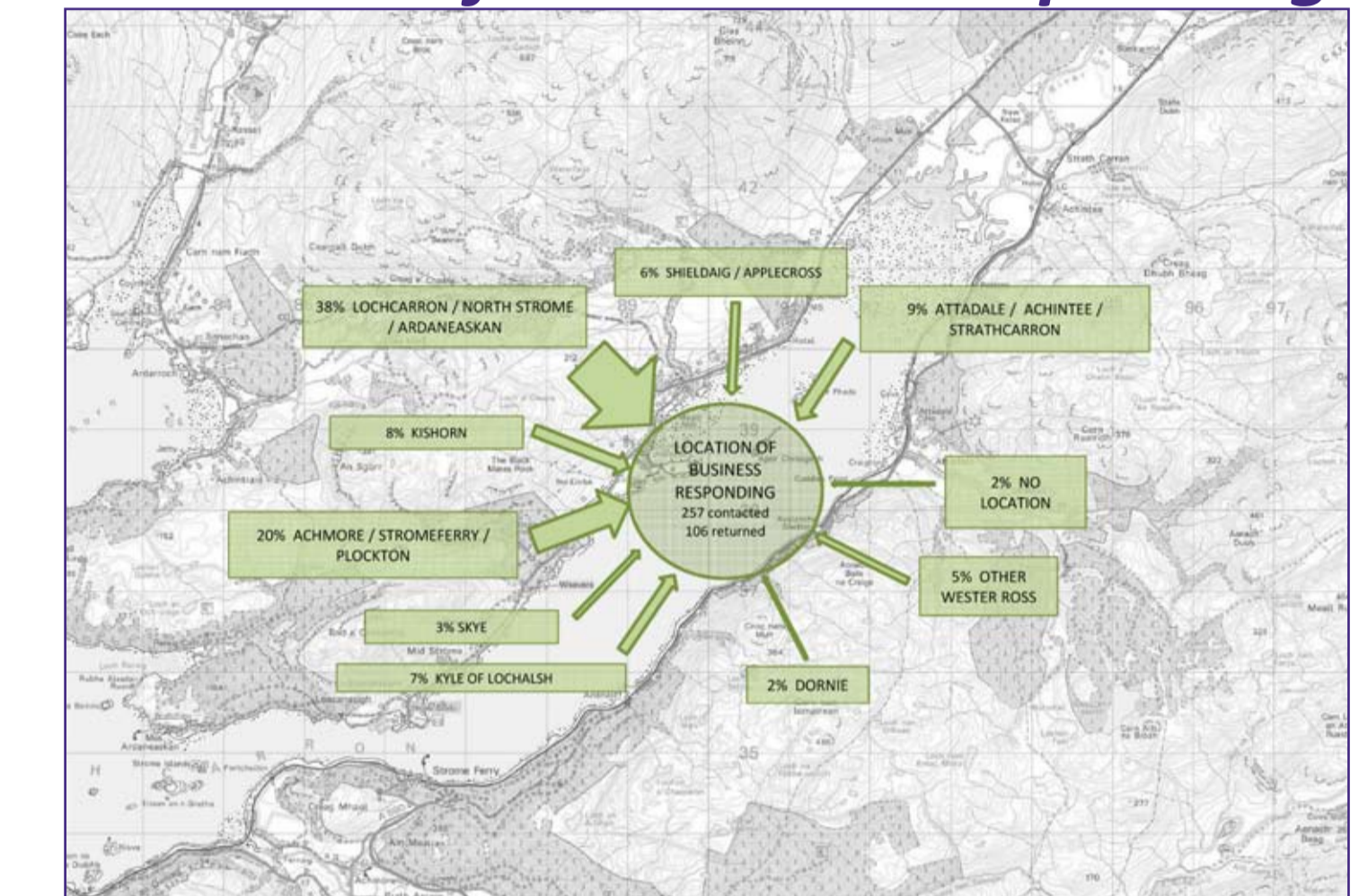
Traffic Destination - North Shore



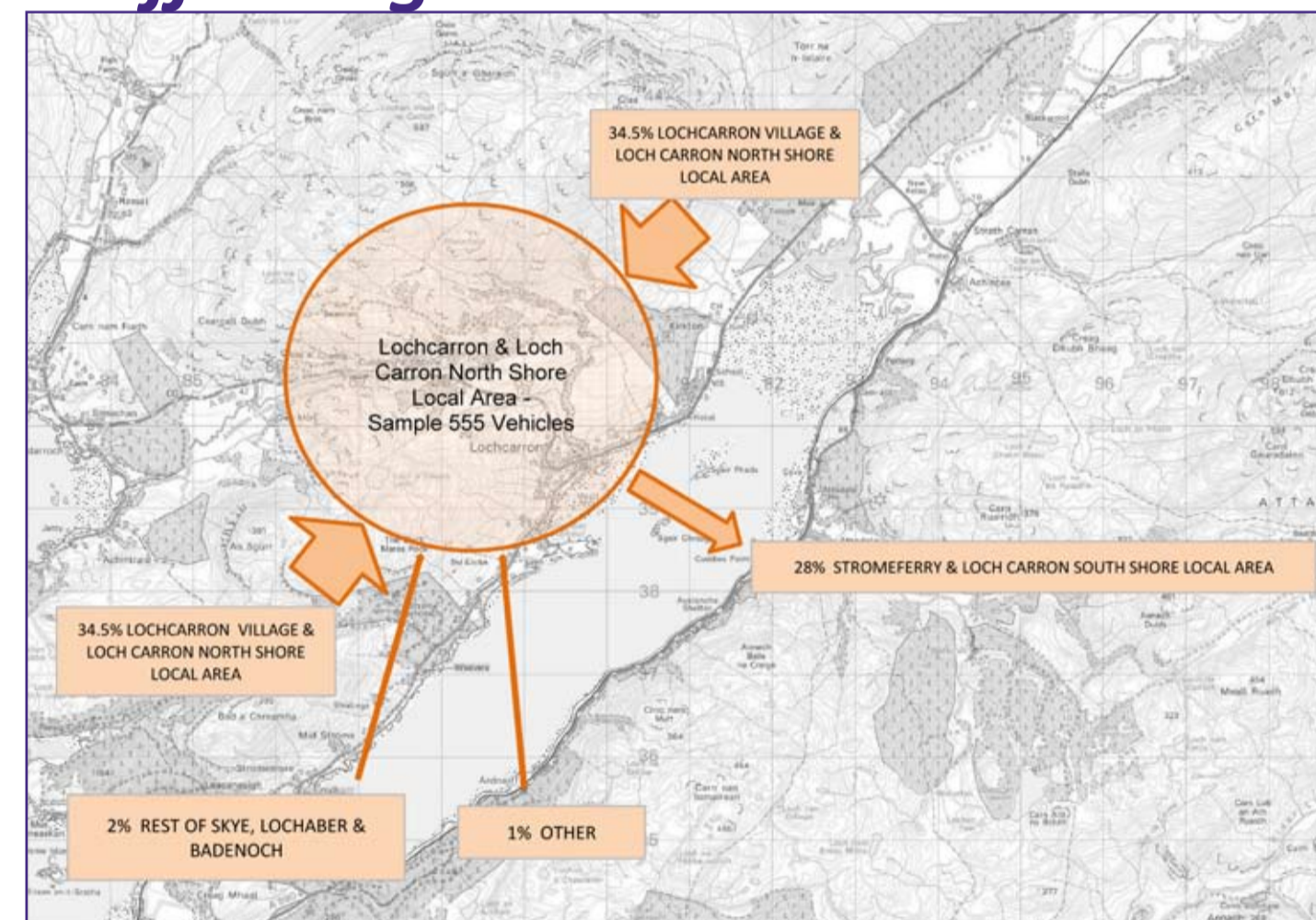
Traffic Destination - South Shore



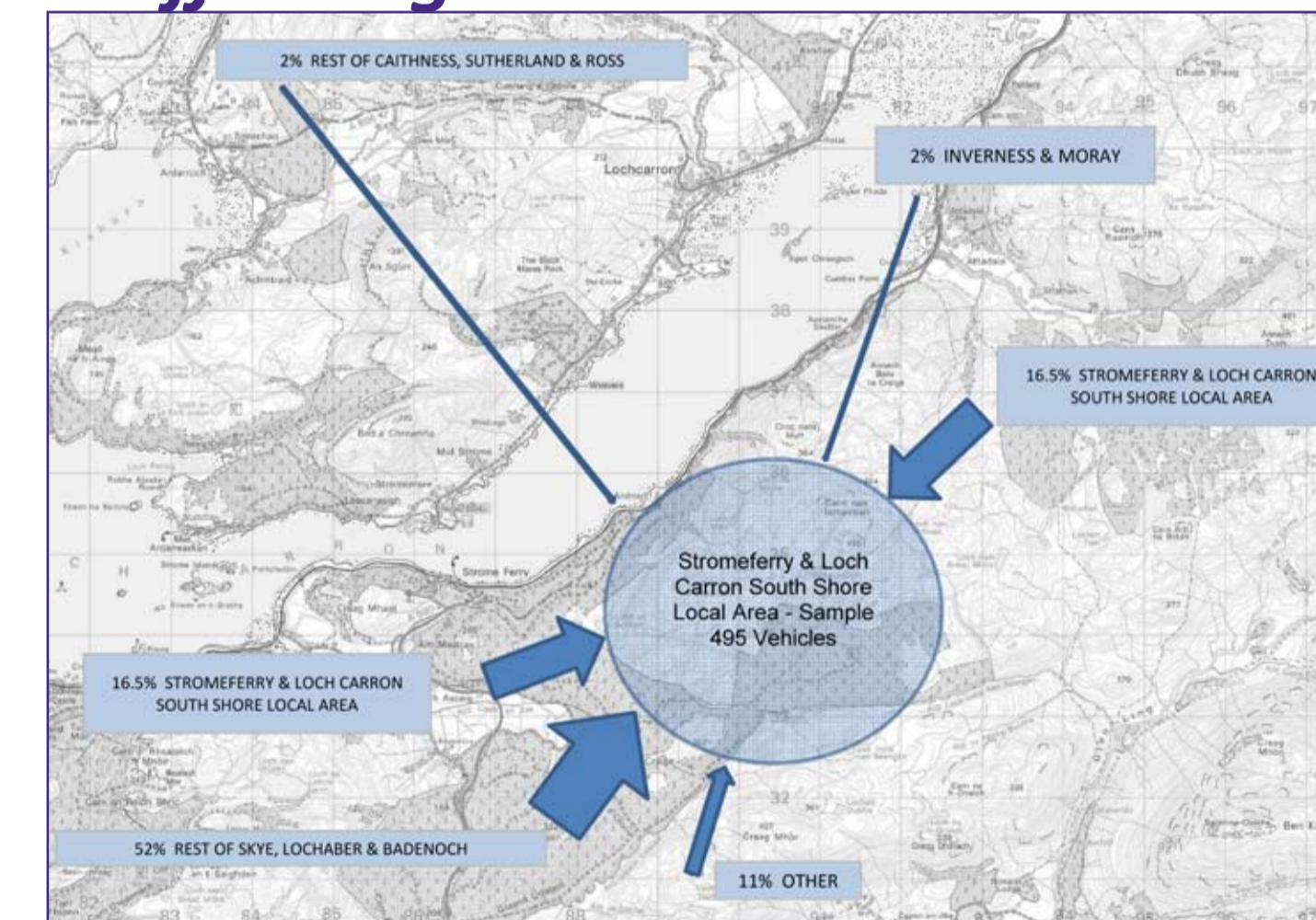
Locations of Businesses Responding



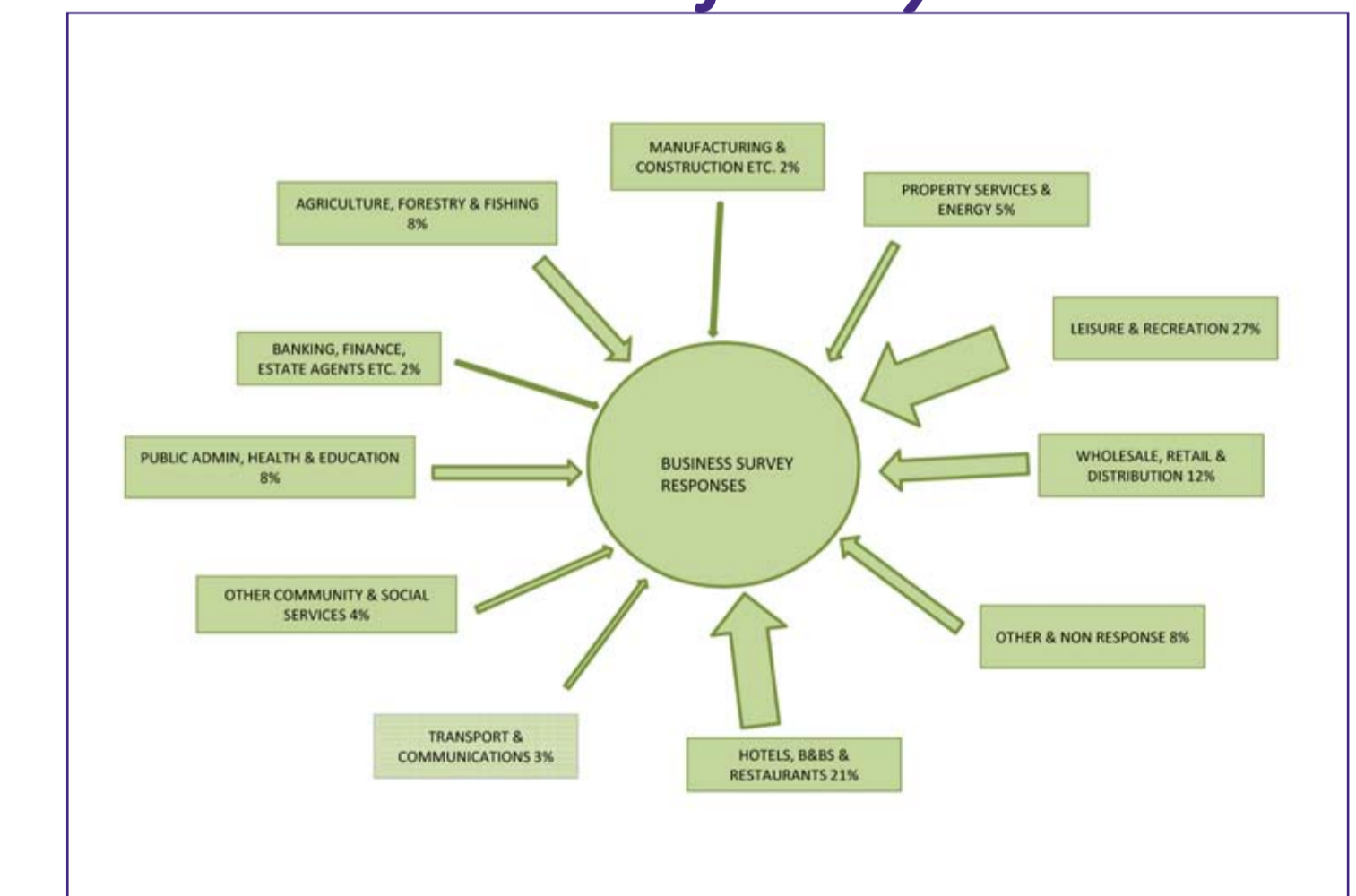
Traffic Origin - North Shore



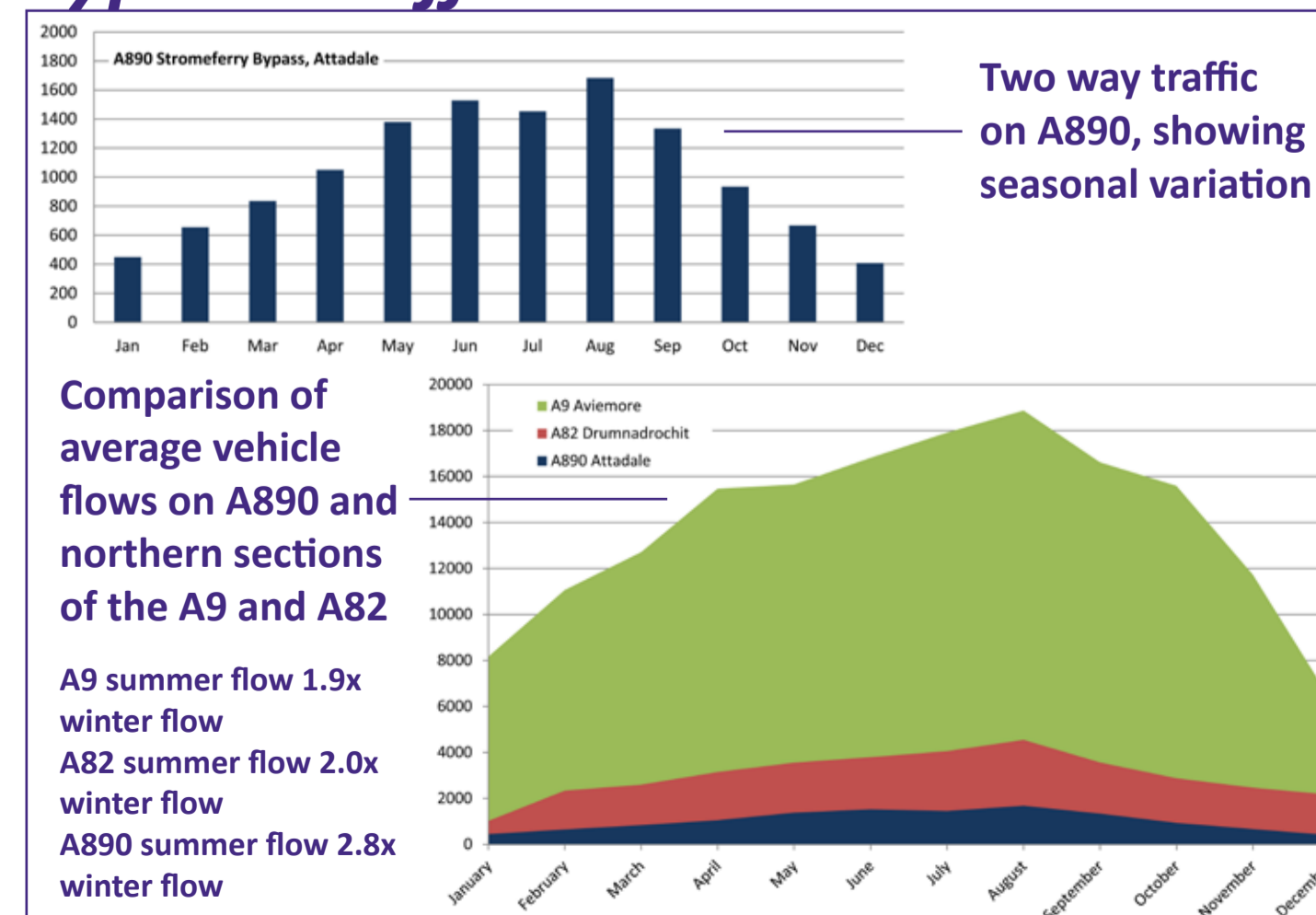
Traffic Origin - South Shore



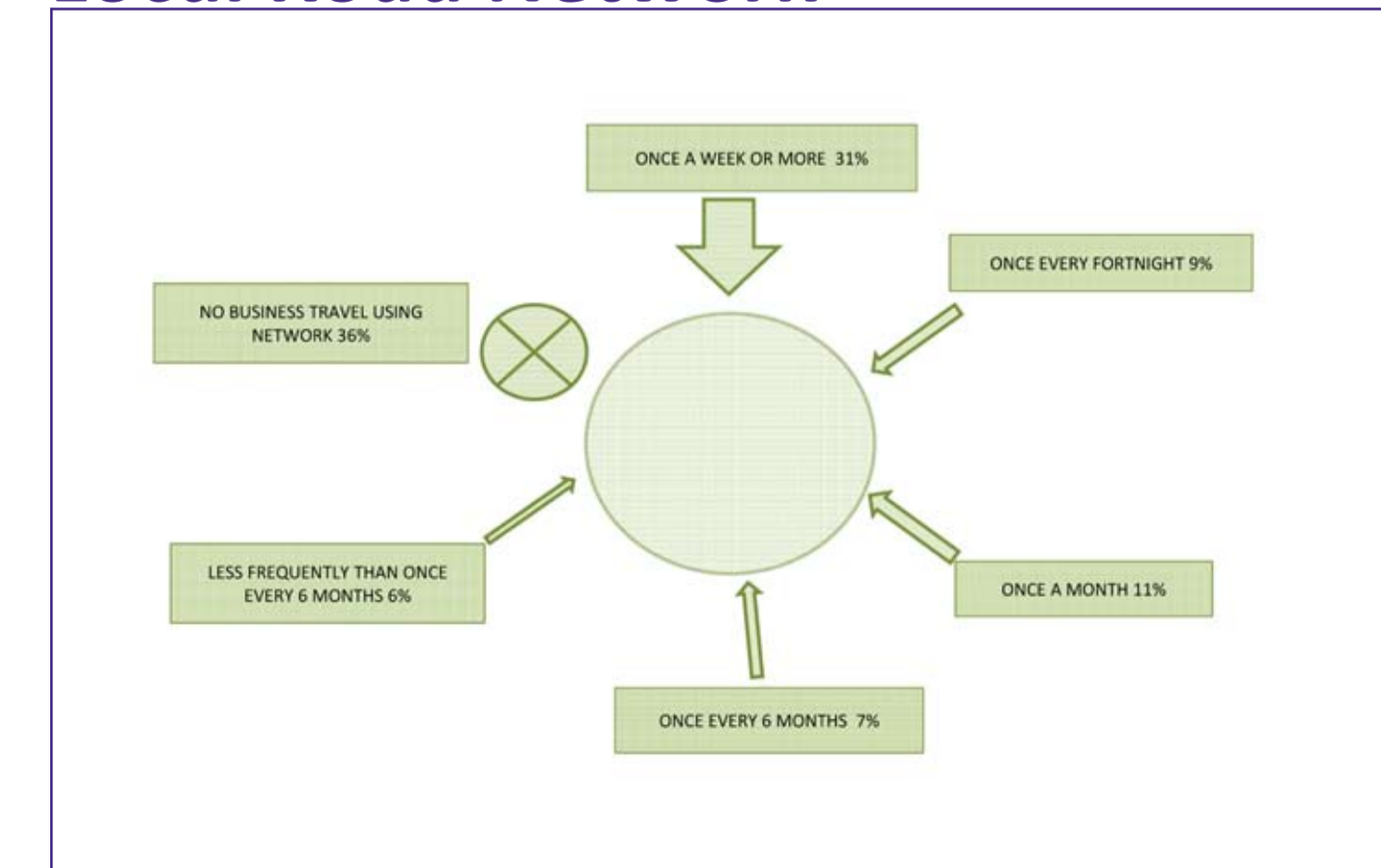
Businesses Classified by Sector



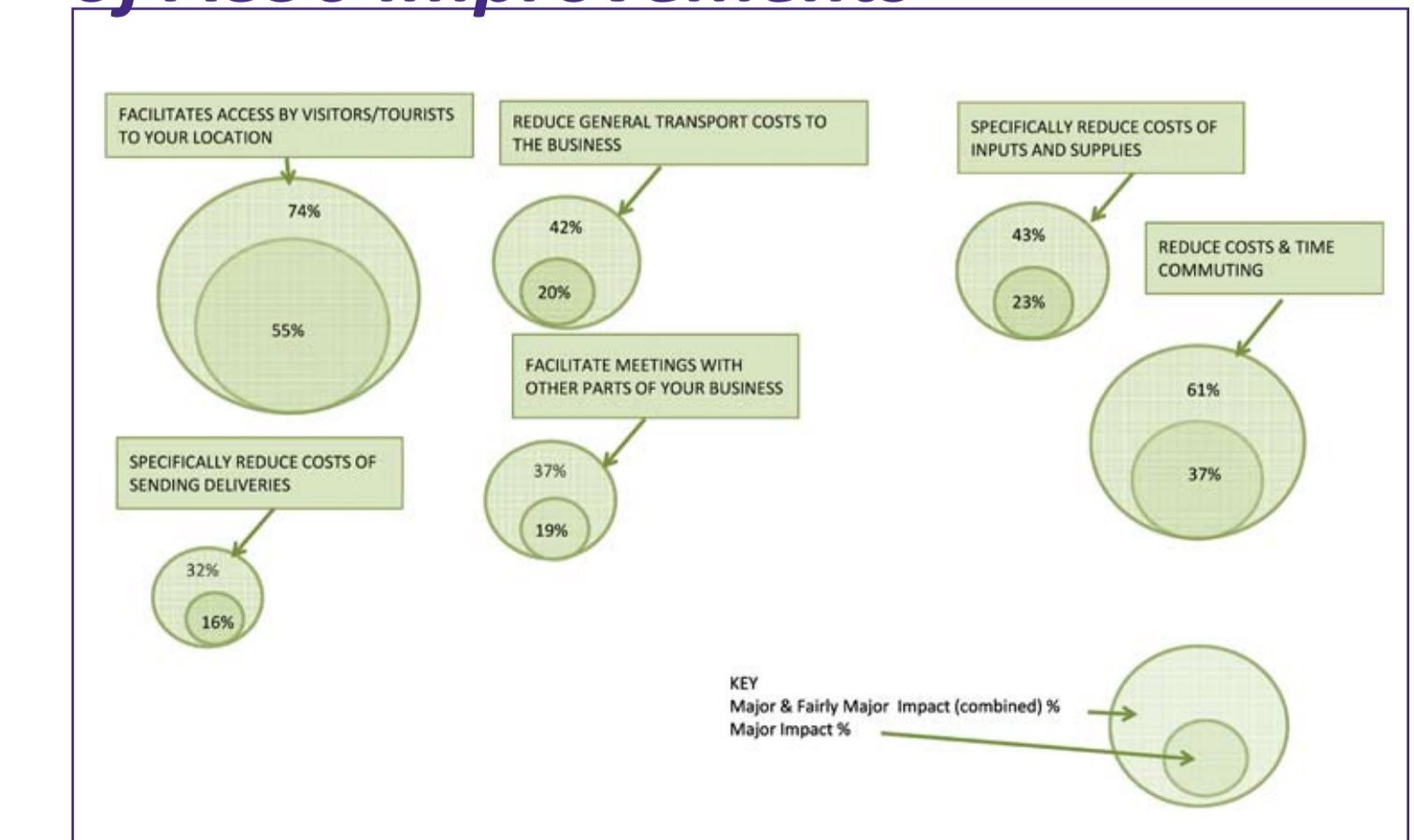
Typical Traffic Flows



Frequency of Business Travel using Local Road Network



Responses on Likely Business Impact of A890 Improvements



The Strome Narrows is considered to have a significant tidal resource and as such Renewable Energy was investigated as a means to offset some of the construction costs. The following three tidal technologies have been considered in some detail as part of the Stage 2 study:

- **Tidal Barrage**, a dam across the Narrows, catching the tides and there after working like a hydro scheme.
- **Tidal Stream Device**, stand alone turbines fixed to the sea bed.
- **Tidal Bridge**, an array of smaller turbines across the Narrows, fixed to a bridge structure.

In conclusion, a tidal bridge is the preferred option. However as the technology is not well developed it is suggested further work on renewable energy as a mechanism for off-setting construction cost is deferred and revisited closer to the construction start date when technologies, revenue generation, incentives and funding models will be more mature.

Summary of Potential Output and Costs

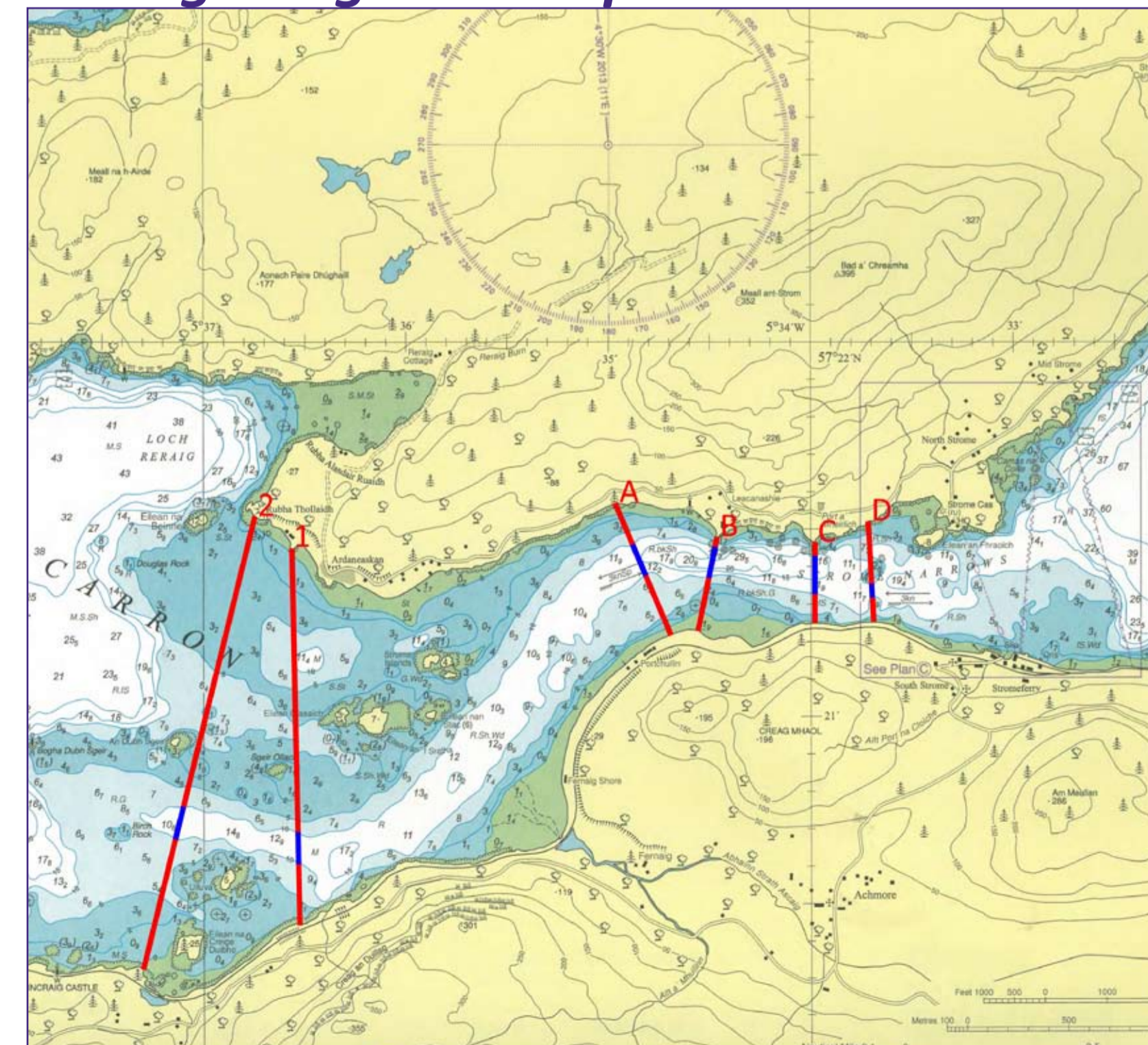
Criteria	Tidal Barrage	Tidal Stream Devices	Tidal Bridge
Capital Cost (£m)	113	13.8	29.9
Yearly Generation (MWh)	35,474	245	6,100
Net Annual Revenue (£k)	3,908: yr 1-50 822: yr 50-120	65	1,628
Operating and Management Cost (£k/per annum)	987	30	15
Payback Period (Years)	30	20	19
Operating Life (Years)	120	20	20
Breakeven Price (£MWh)	56	2,490	247

Evaluation of Technologies

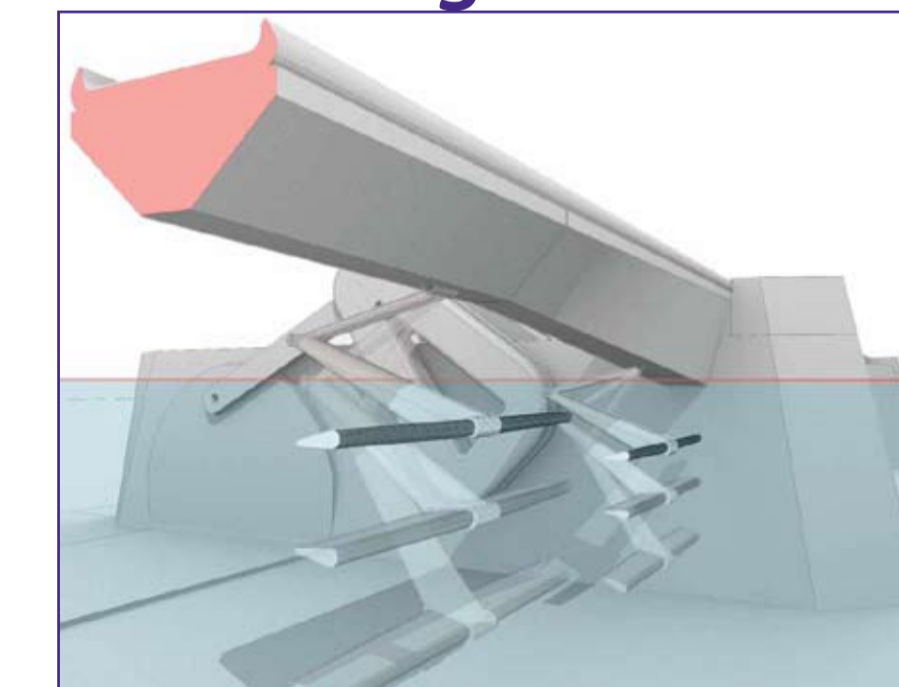
Criteria	Tidal Barrage	Tidal Stream Devices	Tidal Bridge
Environmental Risk	Considered unfeasible	Considered feasible	Considered feasible
Construction Risk	Considered unfeasible	Considered feasible	Considered feasible
Technology Maturity Risk	Considered feasible	Considered feasible	Considered unfeasible
Planning Risk	Considered unfeasible	Considered feasible	Considered feasible
Generation Output	Considered feasible	Considered unfeasible	Considered feasible
Cost	Considered feasible	Considered unfeasible	Considered feasible

Considered feasible Considered unfeasible

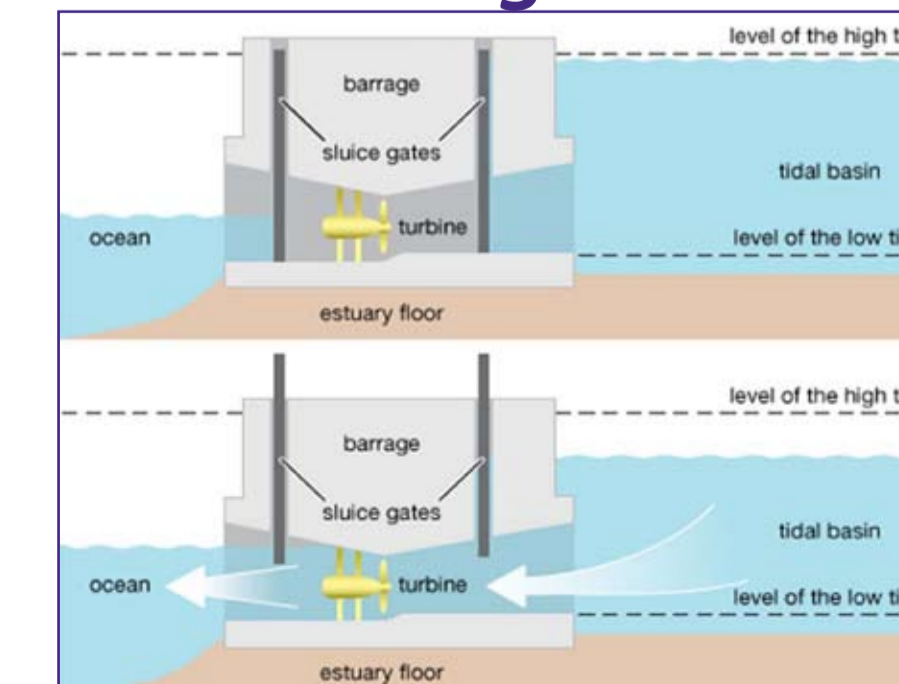
Barrage Alignment Options



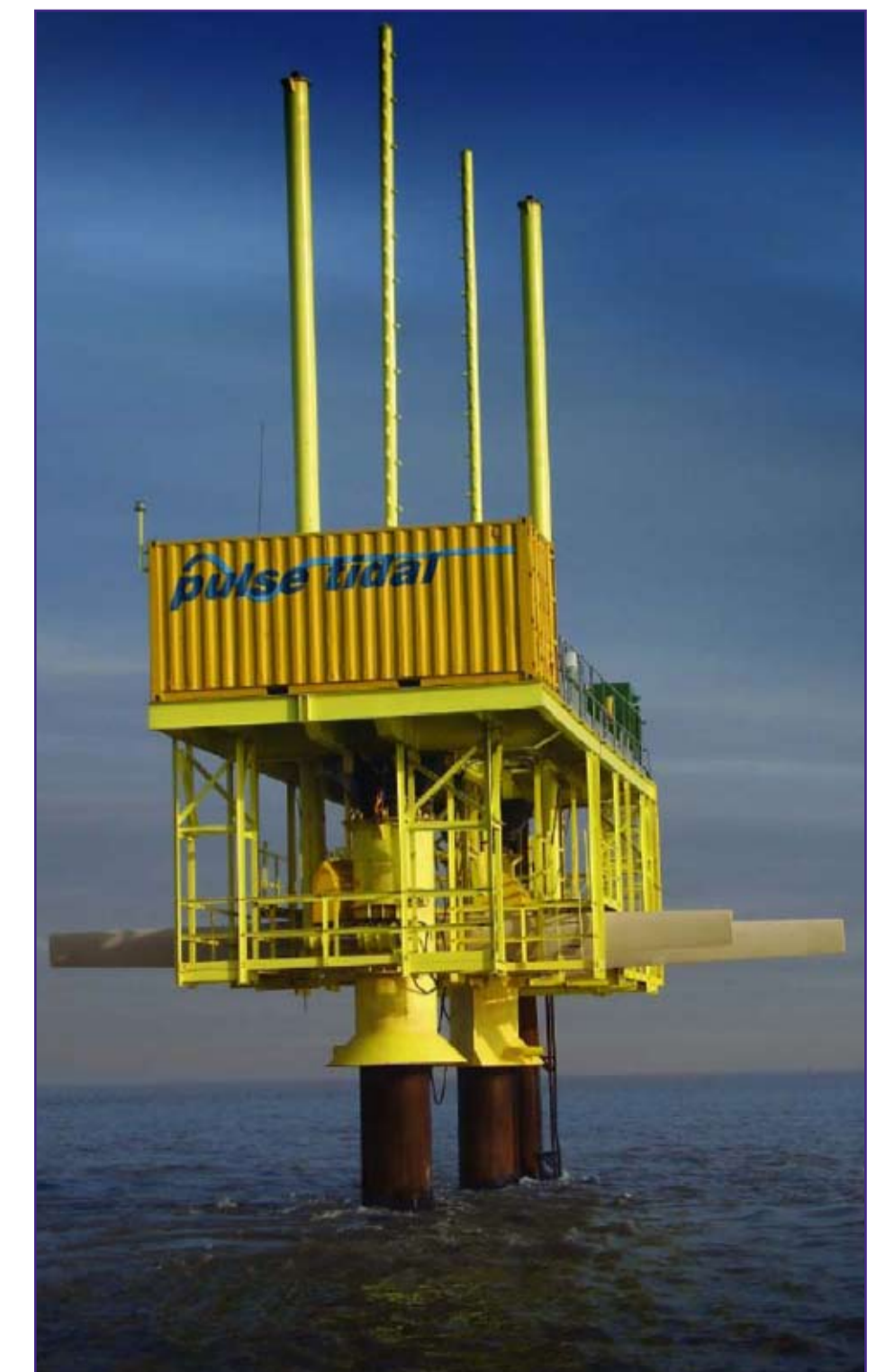
Tidal Bridge



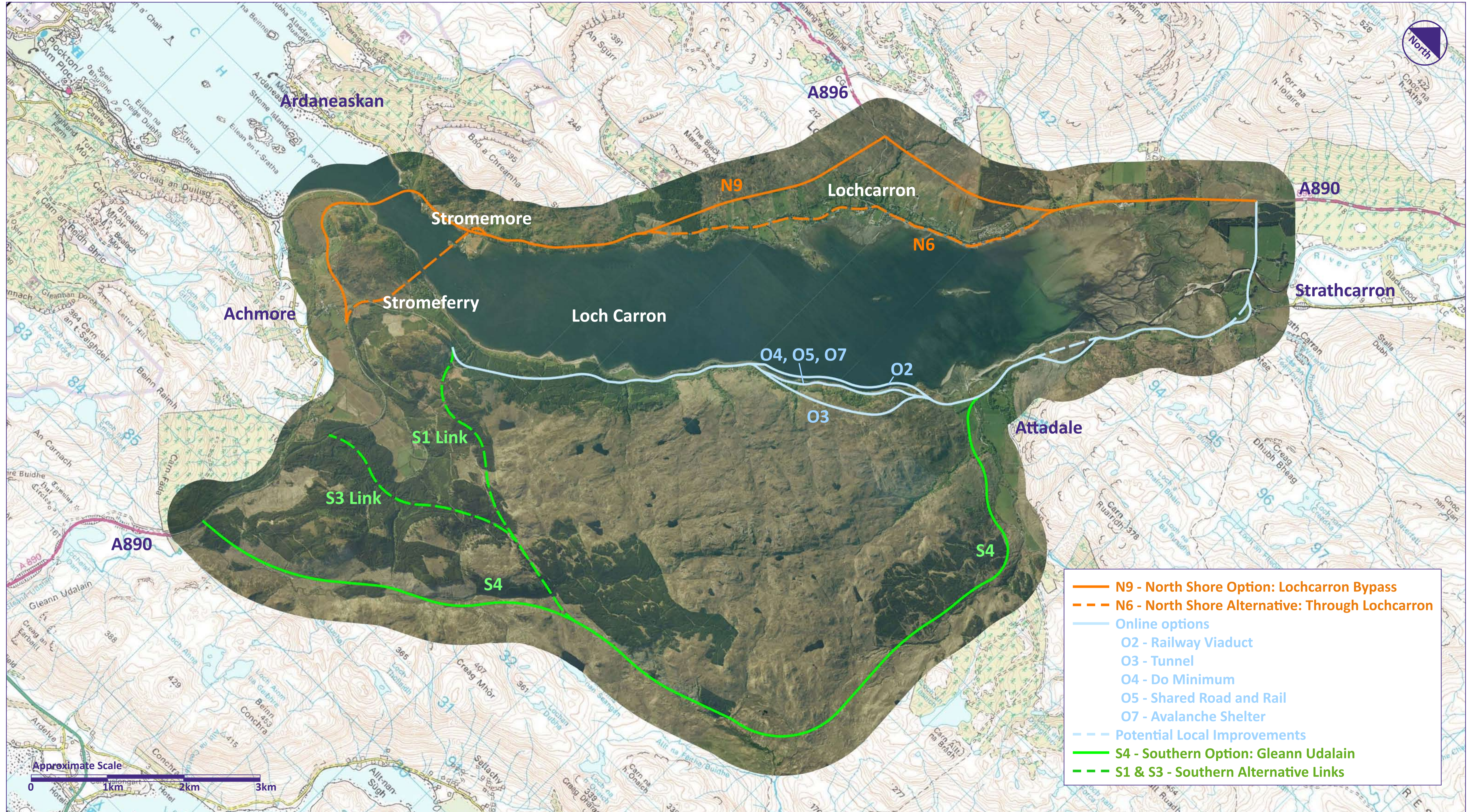
Tidal Barrage



Tidal Stream Device



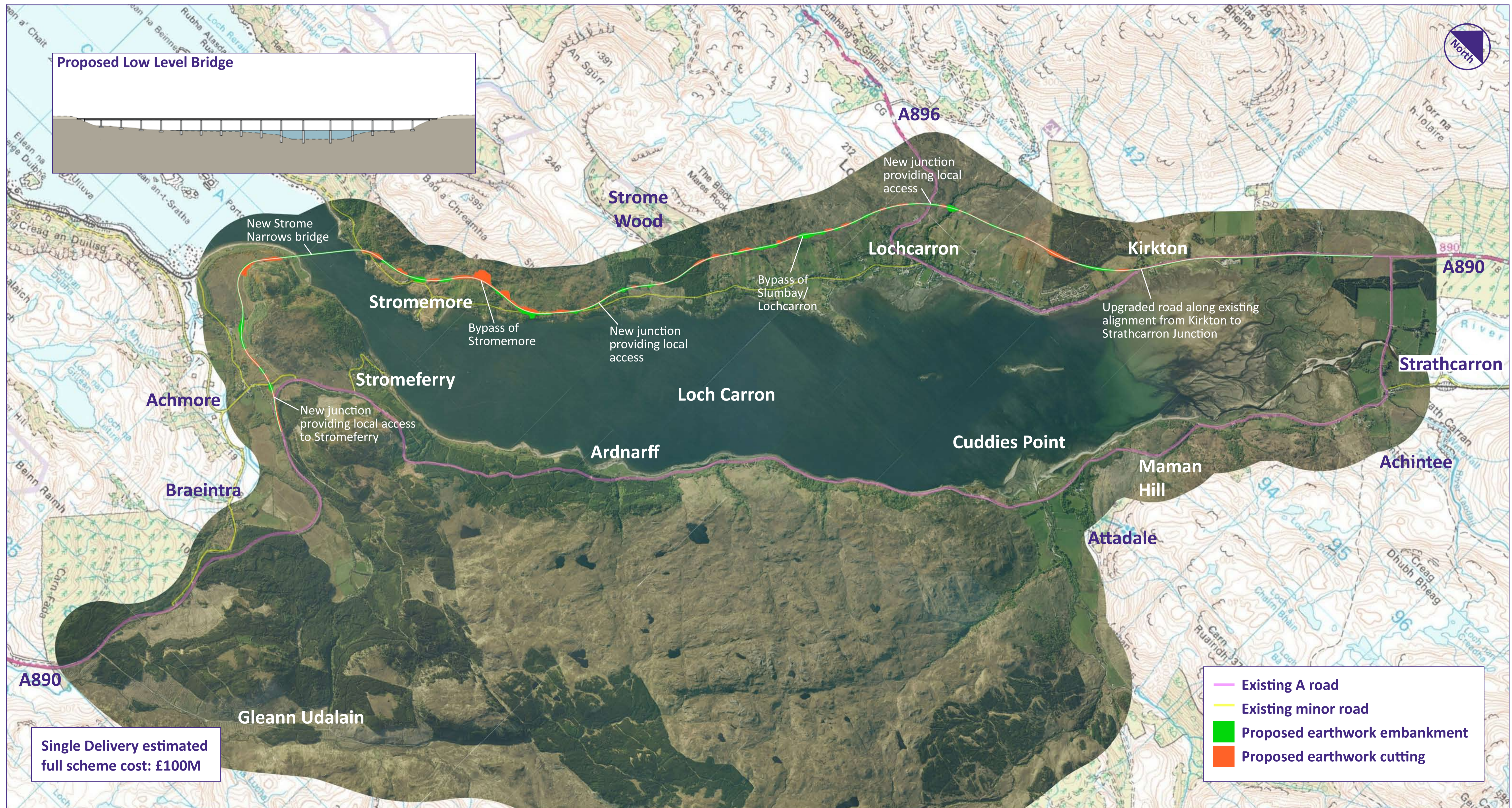
Selected Route Options from Stage 1



Scottish Transport Appraisal Guidance Criteria	North Shore		Online					Southern
	N6 Through Lochcarron (low level bridge)	N9 Lochcarron Bypass (low level bridge)	O2 Railway Viaduct	O3 Tunnel	O4 Do-minimum	O5 Shared Road and rail	O7 Developed Avalanche Shelter	S4 Gleann Udalain
Scheme Objectives	Good linkage, but online through Lochcarron	Delivers on scheme objectives	Some buildability and environmental issues, limited road closures	Some buildability issues, road/ rail closures required	Does not satisfy objectives	Issues with safety and not delivering required road standard	Significant buildability issues for road and railway, closures inevitable	Environmental intrusion and lengthened journey, but safe and deliverable
Environment	Potential marine, ecology, landscape and visual, cultural heritage, air quality and noise impacts	Potential ecology, landscape and visual, cultural heritage, air quality and noise impacts	Potential marine environment, ecology and landscape and visual impacts	Considerable waste material, but reduced hydrology, ecology and landscape and visual impacts	No change	Reduced impacts on landscape and visual	Potential Landscape and visual impacts	Potential landscape, ecology, peat and hydrology impacts
Safety	Increased traffic flow through Lochcarron village and conflicts due to frontage activity	Safe and secure route	Railway realigned on viaduct and road on existing embankment, protected by rock trap measures	Existing route made safe but tunnels not as safe as other structures	Potential for further rock falls	Road/ rail conflicts	Existing route made safe	Safe route but more remote
Economy (generally a benefit to cost ratio greater than 1 indicates a scheme resulting in economic benefit)	Benefit to cost ratio: 0.73	Benefit to cost ratio: 0.71	Benefit to cost ratio: 0.63	Benefit to cost ratio: 0.43	Benefit to cost ratio: n/a	Benefit to cost ratio: 1.1	Benefit to cost ratio: 0.66	Benefit to cost ratio: 0.76 (community link S1/ S3: 0.60)
Integration	Opens up north/ south corridor and enhanced linkage to Kishorn	Opens up north/ south corridor and enhanced linkage to Kishorn	Safeguards existing connections	Safeguards existing connections	Safeguards existing connections, but potential for delays associated with road closures	Requires traffic control which results in potential delays	Safeguards existing connections	Longer route, but of high quality
Accessibility/ Social Inclusion	Traffic through Lochcarron, but disbenefits Strathcarron area	Benefits Lochcarron, but disbenefits Strathcarron area	Improved existing route	Improved existing route	Reluctance to use route due to threat of road closures	Improved existing route	Improved existing route	Route lengthened for strategic and local traffic
Cost to Government (construction, land preparation, supervision and 20% optimism bias)	£97 Million	£100 Million	£115 Million	£171 Million	£43 Million	£61 Million	£110 Million	£88 Million With community link S1/ S3: £111 Million
Risk and Uncertainty	Ground conditions for bridge and marine environment	Ground conditions for bridge and marine environment and Lochcarron bypass	Ground conditions for structure, marine environment and working from barges	Rock quality for tunnel and portals, buildability: portals adits, compound, spoil	Potential further rockfall events can be managed	Road/ rail conflicts, not acceptable to Network Rail	Significant buildability issues and potential closures	Peat identified but otherwise little engineering/ construction risk
Best Route Options		Best north shore route option	Best online route option					Best southern route option

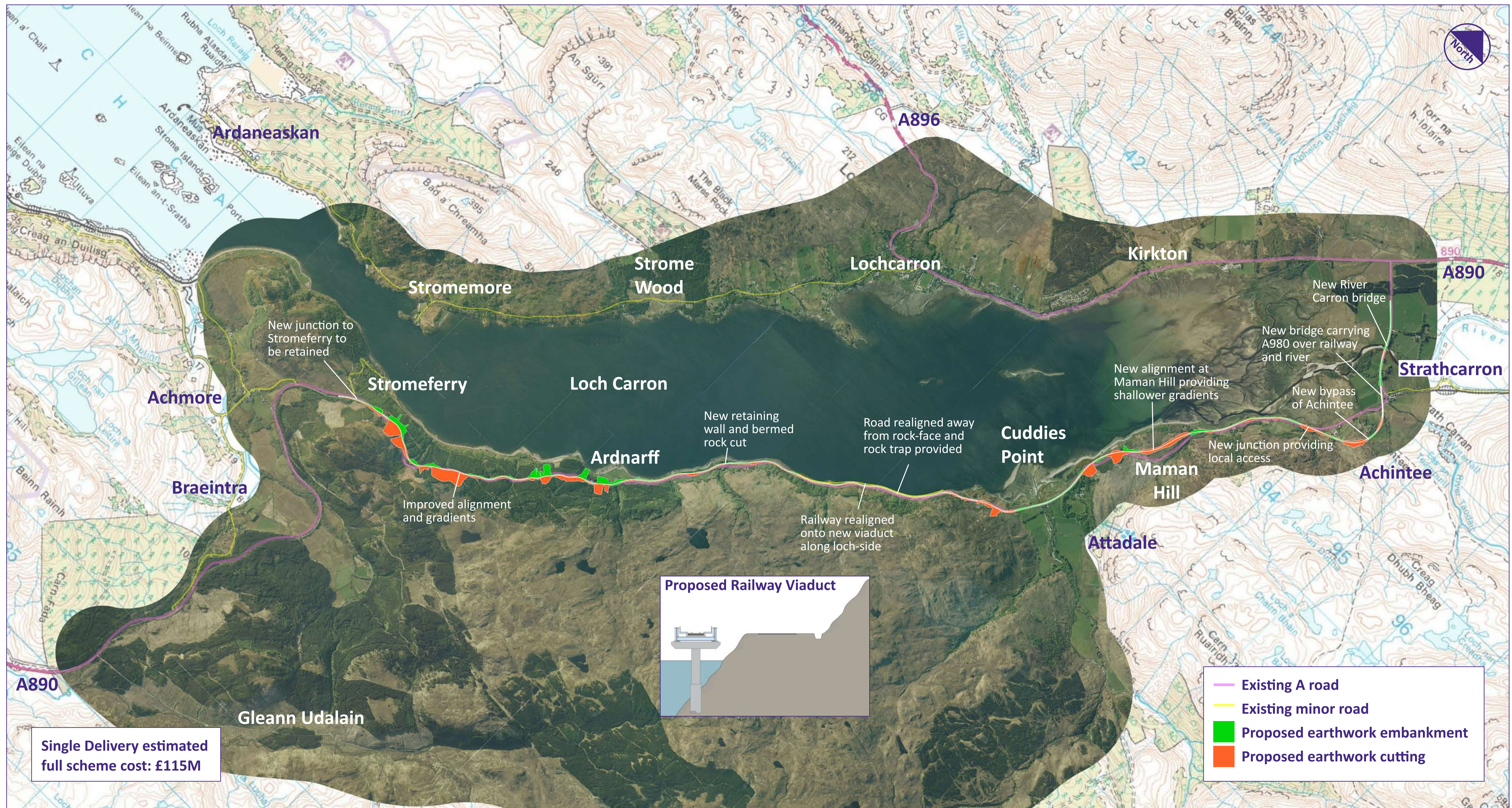
Significant Benefit
 Minor Benefit
 Negligible Effect on key characteristics, features or elements
 Minor Adverse
 Significant Adverse

Lochcarron Bypass

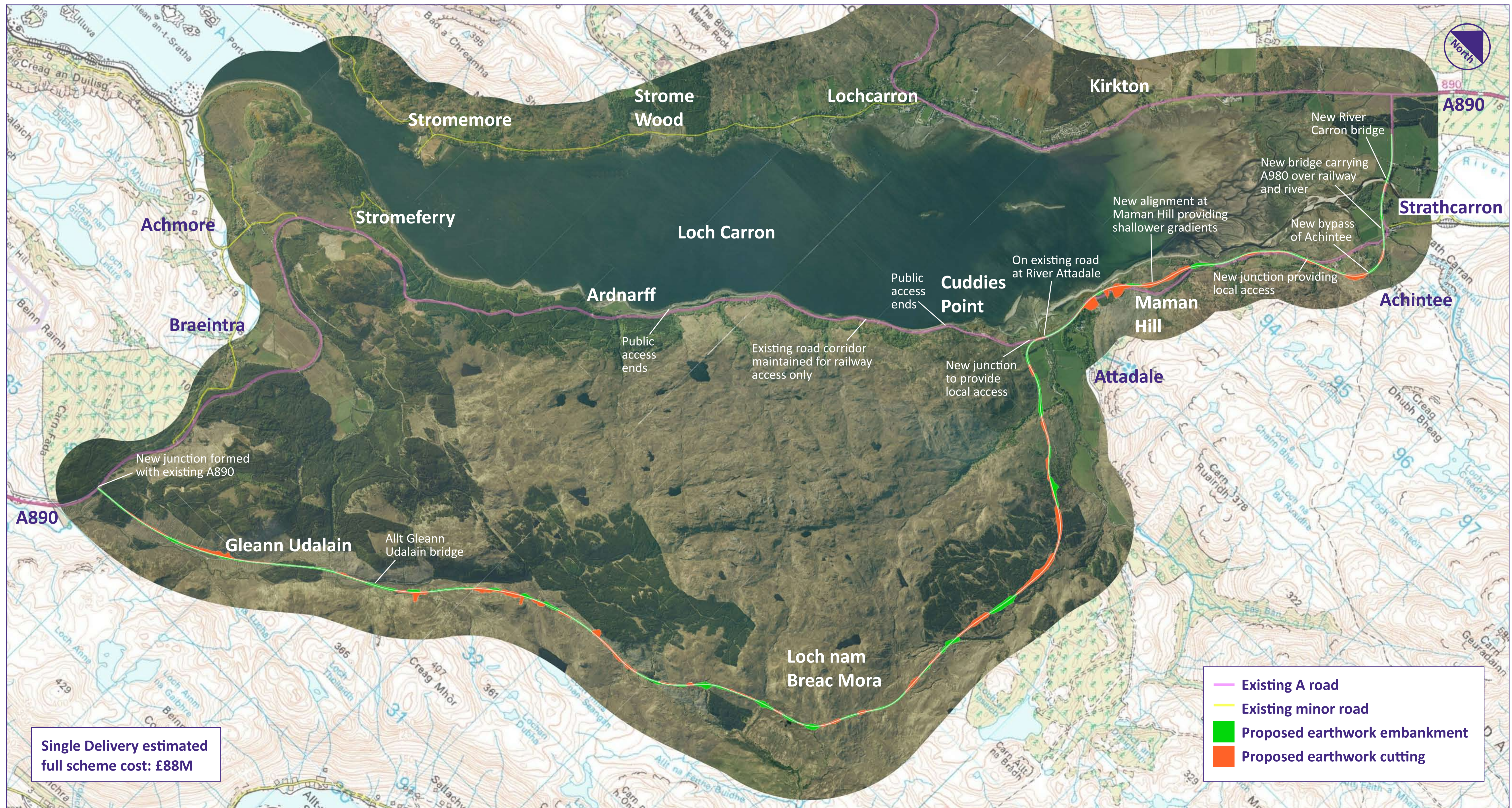


Single Delivery estimated full scheme cost: £100M

Railway Viaduct



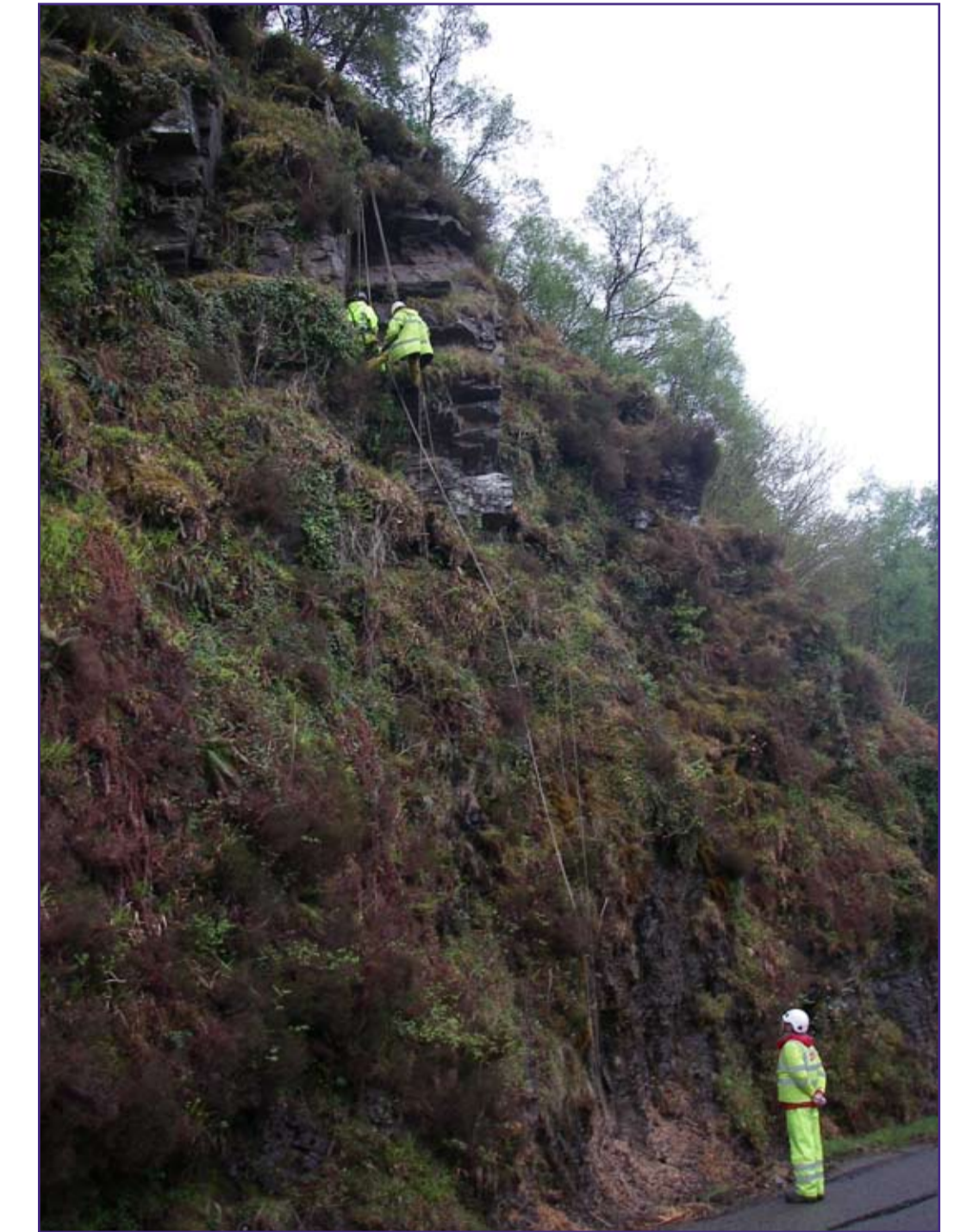
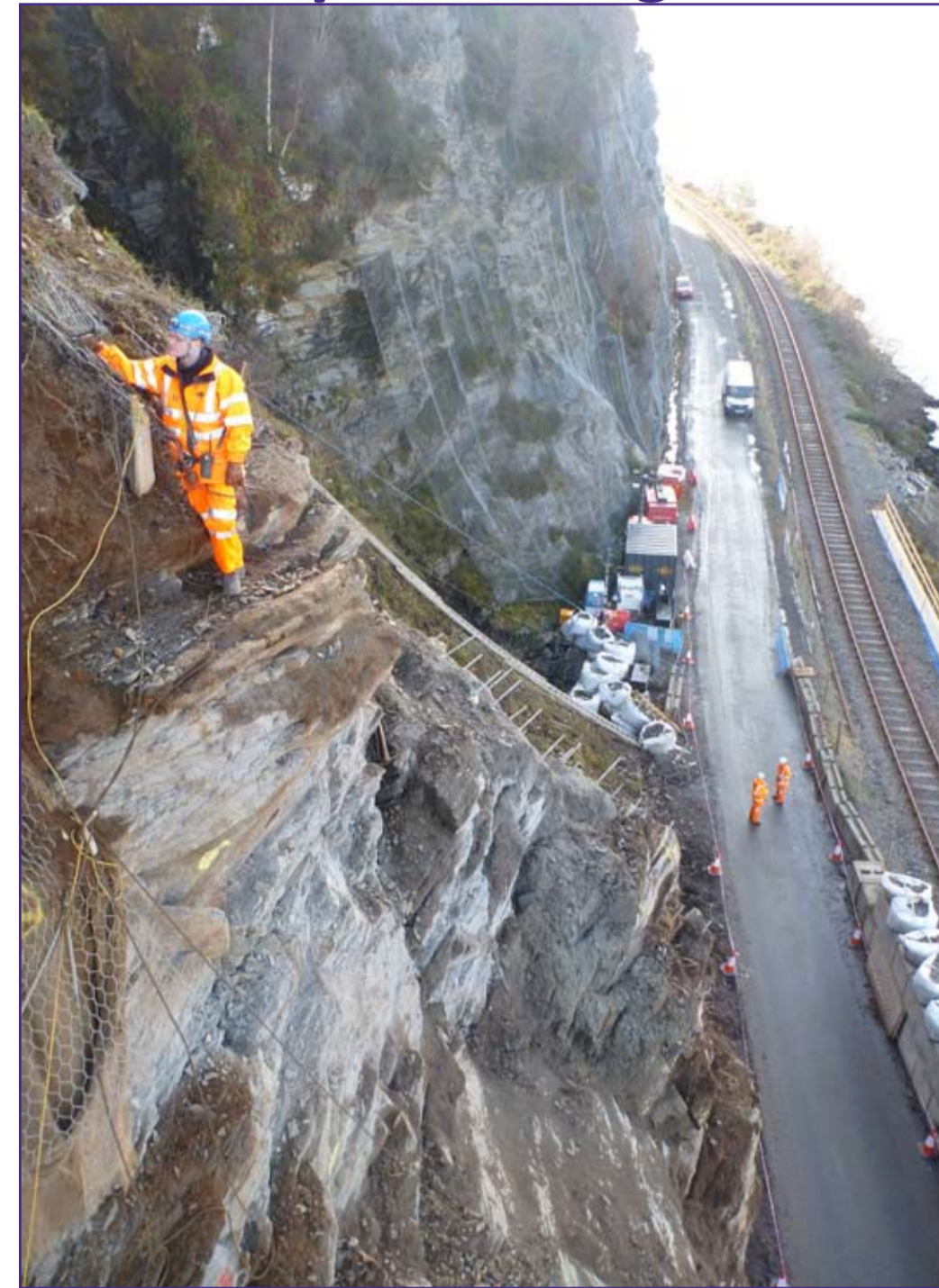
Gleann Udalain



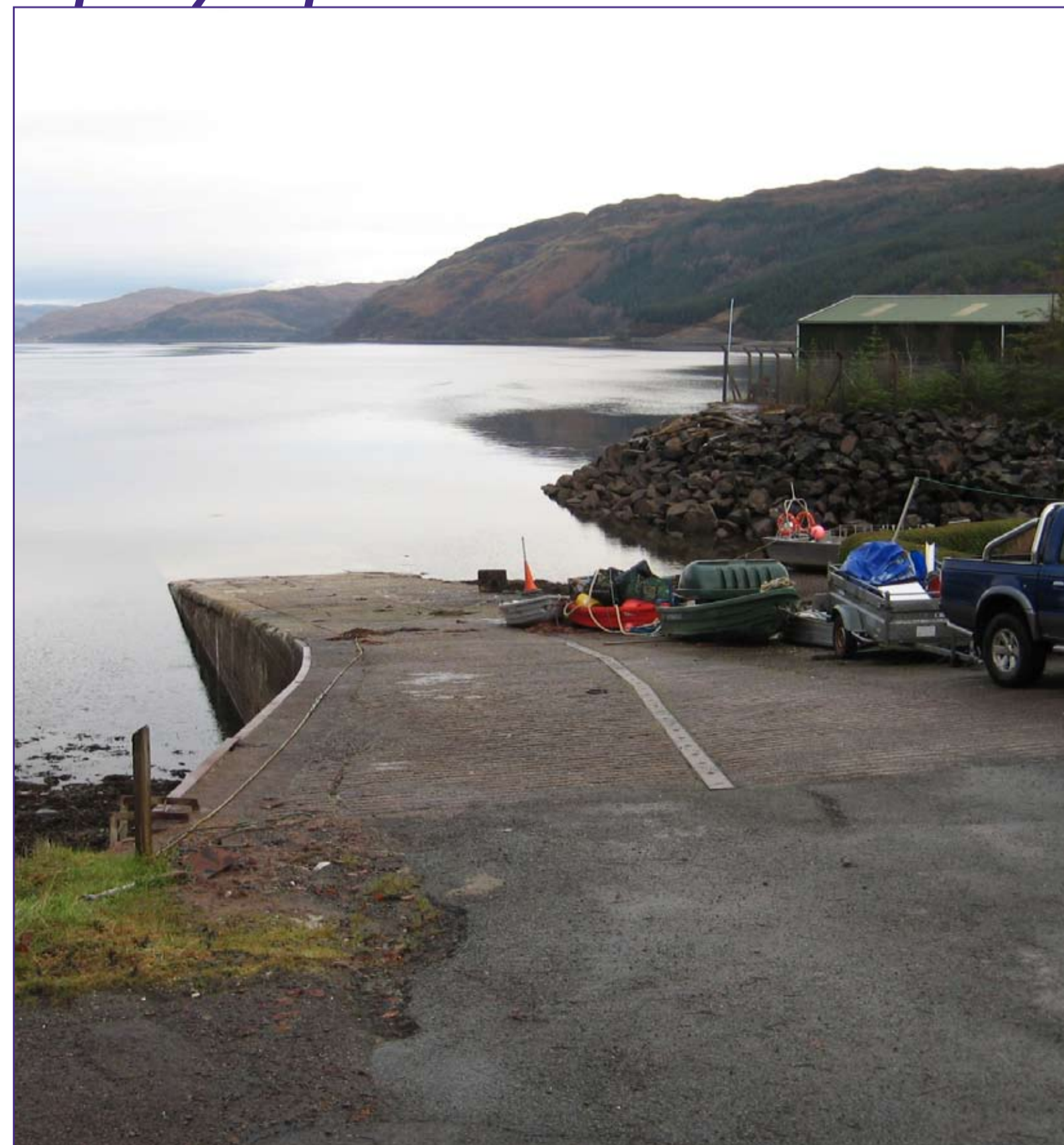
The 'Do-minimum' Option provides the baseline on which all other route proposals are measured. This retains the existing A890, without any improvements, and as such would involve the following considerations:

- Rock slope management and maintenance to help prevent future uncontrolled rockslope failures;
- Slipway and marshalling improvements for ferry operations during road closures, as and when required;
- Shared use of railway corridor, if lengthy road closures required;
- Contingency planning to coordinate works in the event of a rock fall which closes the road; and
- Reactive repairs to reopen the road in the event of a rock fall.

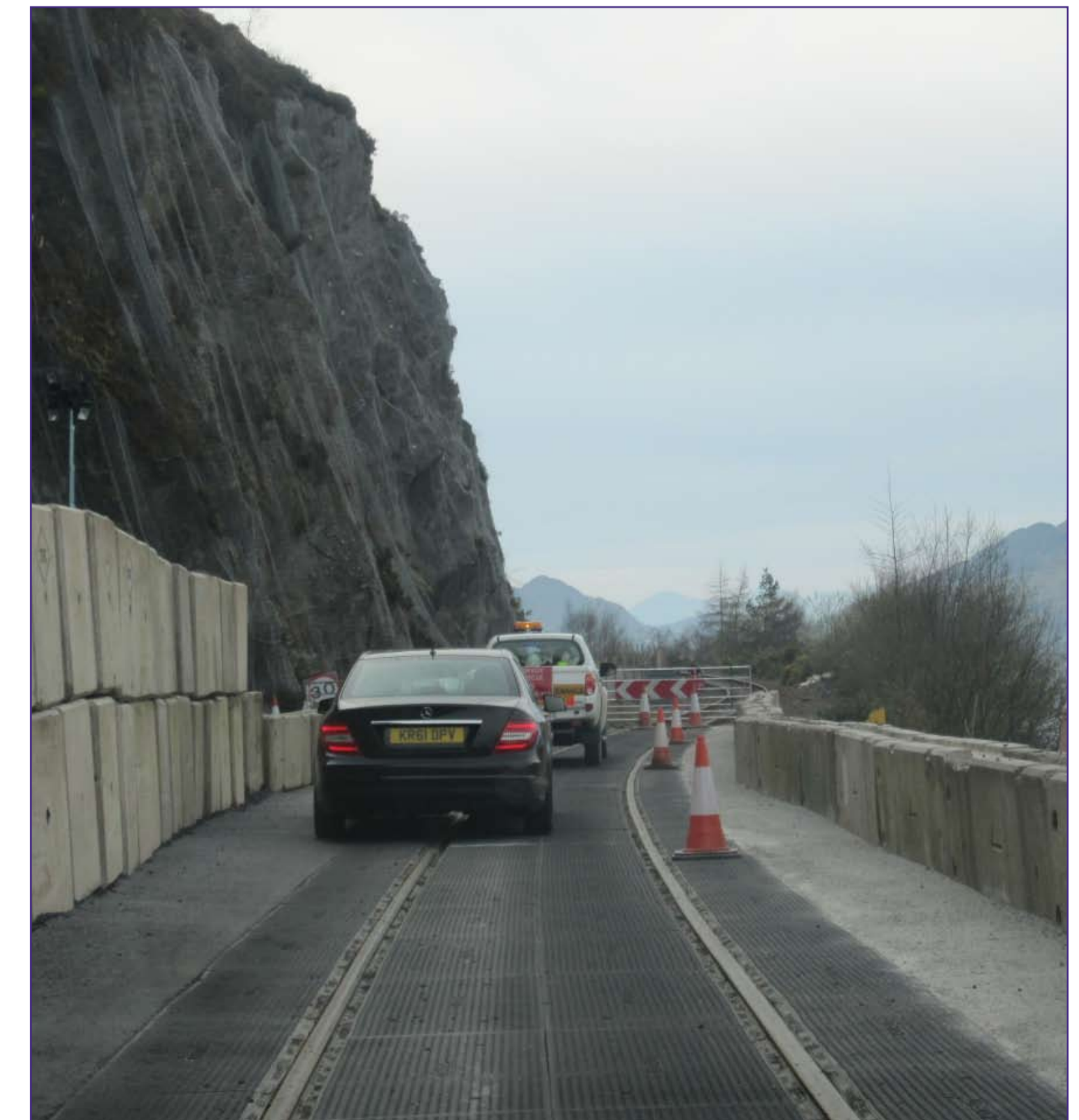
Rock Slope Management



Slipway Improvements



Temporary Shared Use of Railway



Scheme Objectives	North Shore	Online	Southern	Baseline
	N9 Lochcarron Bypass	O2 Railway Viaduct	S4 Gleann Udalain	O4 Do-minimum
Safeguard and enhance access to the natural and built environment during construction, maintenance and operation of the scheme	Yellow	Green	Yellow	Yellow
Minimise all risks during design, construction, operation and maintenance	Yellow	Yellow	Green	Red
Ensure deliverability of scheme and 'Value for Money'	Yellow	Yellow	Green	Red
Deliver a safe and reliable, two lane carriageway	Green	Green	Green	Red
Ensure no increase in risk to and liability of the railway, maintaining access over the life of the scheme	Yellow	Yellow	Green	Yellow
Keep the A890 and peripheral road network open during construction	Green	Yellow	Green	Yellow
Maintain and improve social cohesion for the local population, making use of leisure, health and educational facilities and by improving accessibility for emergency services	Green	Yellow	Red	Yellow
Maintain and improve choice of transport mode and integration of public transport links	Green	Green	Red	Yellow
Take account of relevant local, regional and national planning policies during the design stage	Green	Green	Green	Yellow
Maximise / improve network efficiency, sustainable connectivity and social cohesion in terms of journey times and journey reliability in the Wester Ross area	Green	Green	Yellow	Red
Deliver a scheme that assists local businesses to maximise opportunities for sustainable development and economic growth	Green	Yellow	Yellow	Red

■ Successfully meets objective
 ■ Partially meets objective
 ■ Does not meet objective

Summary of Best Options Appraisal

Scottish Transport Appraisal Guidance Criteria	North Shore	Online	Southern	Baseline
	N9 Lochcarron Bypass (low level bridge)	O2 Railway Viaduct	S4 Gleann Udalain	O4 Do-minimum
Scheme Objectives	Significant Benefit	Minor Benefit	Minor Benefit	Significant Adverse
Environment	Minor Adverse	Minor Adverse	Negligible Effect	Negligible Effect
Safety	Significant Benefit	Significant Benefit	Minor Benefit	Significant Adverse
Economy	Minor Adverse	Minor Adverse	Minor Adverse	Minor Adverse
Integration	Minor Benefit	Minor Benefit	Minor Benefit	Minor Benefit
Accessibility/ Social Inclusion	Minor Benefit	Minor Benefit	Negligible Effect	Minor Adverse
Cost to Government	Significant Adverse	Significant Adverse	Significant Adverse	Minor Adverse
Risk and Uncertainty	Minor Adverse	Minor Adverse	Negligible Effect	Negligible Effect

■ Significant Benefit
 ■ Minor Benefit
 ■ Negligible Effect
 ■ Minor Adverse
 ■ Significant Adverse

The best options have been abstracted from Board No. 13 and are summarised here by means of a simple ‘traffic light’ system.

- The best north shore option is a Lochcarron bypass, crossing Strome Narrows on a low level bridge.
- The best online option is bypassing the rockfall area by means of transferring the railway to a viaduct.
- The best southern option is via Gleann Udalain.

The following provides a brief commentary of the initial findings of the options appraisal:

- North Shore option performs better than Online option;
- Southern option performs better than Online option;
- Online option is not likely to be taken forward;
- North Shore option has slightly more benefits than Southern option;
- Southern option has less adverse impacts than North Shore option; and
- The Southern option and North Shore option are evenly matched however overall the northern option performs marginally better.

We are keen to get your feedback and we invite you to fill in a comments sheet.

Stromeferry Bypass

Phasing and Costs

- A section of the A890, east of Strathcarron Junction, is currently in The Highland Council’s programme of works and funding for the development of the Stromeferry Bypass Project is within the 10-year Strategy
- The aim of this project is to deliver a full scheme between Strathcarron junction and the A890 south of Achmore
- Phasing of the scheme has been considered to help meet required affordability criteria for delivery
- The First phase would involve scheme development to bypass the rockfall area as a minimum

Conclusion – considering cost only

For Phased Delivery, costs for the Online and Southern options are similar (£64M - £65M). The Southern option gives better value for money in cost and benefits

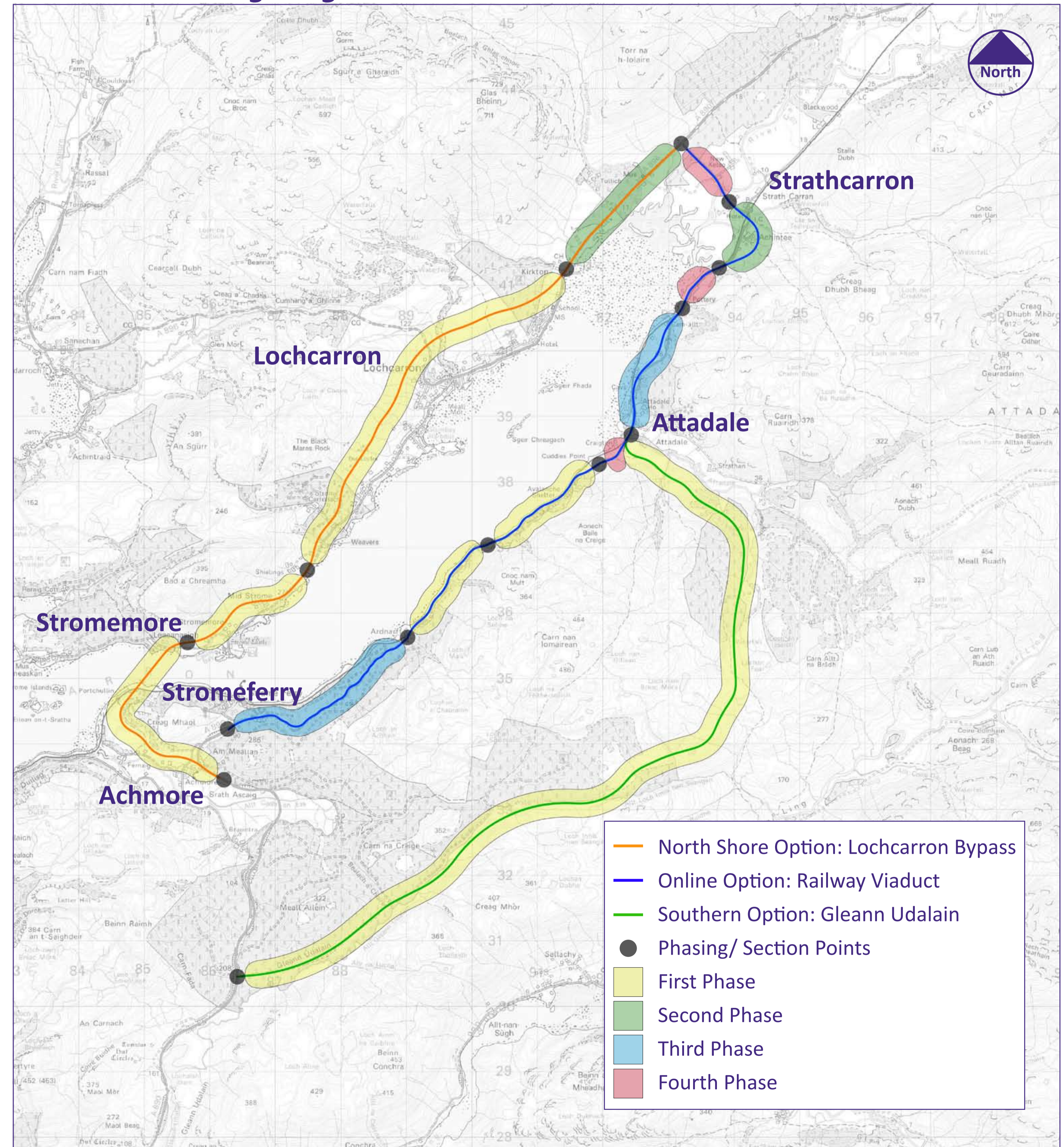
For Single Delivery or Total Phased Delivery the Southern option, at £94M, gives better value for money in cost and benefits. The North Shore option does not match value for money, but performs better than the Online option.

Indicative Construction Cost Summary

Delivery	Single Delivery			Phased Delivery		
	North Shore	Online	South	North Shore	Online	South
Single Delivery (2017)	100	115	88			
Phase 1 (2017)				97	65	64
Phase 2 (2022)				4	17	17
Phase 3 (2027)				n/a	41	11
Phase 4 (2032)				n/a	5	2
Total Scheme Cost	100	115	88	101	128	94

All above costs are indicative and all values are in £Millions.

Indicative Phasing Diagram



Your Comments

If you have any particular questions please come and talk to the exhibition staff before you leave.

Feel free to take a copy of the exhibition leaflet which provides a summary of the scheme to date. We welcome your feedback and invite you to complete a comment sheet which can be left in the box provided or returned by post. If returning by post please do so no later than 11 April 2014.



Next Steps

The Highland Council will consider all the views expressed during this exhibition as they finalise the route option selection.

Further design and environmental work will continue to be undertaken, incorporating your comments, and will feed into the Stage 2 report, leading to the selection of a preferred option. It is anticipated that the Stage 2 report will be delivered in May/ June 2014, with The Highland Council selecting their preferred route in August 2014.

Future Work

