

6 BROAD APPRAISAL

This section provides information on all those options taken forward to broad appraisal; and the conclusions made as a result of the Broad Appraisal. The STAG Part 1 Appraisal Summary Tables (ASTs) can be found in Annex E. This also includes appraisal against Do Minimum, as a baseline.

6.1 OPTIONS CONSIDERED FOR BROAD APPRAISAL

At this stage, these options are considered in terms of the capital and revenue costs associated with development, but do not consider any associated infrastructure, such as road improvements.

Option 1 – Reconfigured Ferry Service (Existing Vessel)/ Reconfigured Ferry

This option would include an enhanced ferry service, which could include length of operational day, frequency of sailings, revised fare structures and alternative crewing arrangements. Electric or hydrogen ferries could be considered for replacement vessels in the future. It is assumed this option would retain the existing crossing.

Option 2 – Passenger Ferry/Water Taxi

This option considers a, potentially, smaller vessel, carrying passengers only. It enables exploration of a versatile service, with central accessibility, in combination with other link option(s). Consideration would be made of electric or hydrogen vessels. It is assumed this option would retain a central location.

Option 3 – Public Transport Improvements

This option includes bus, taxis and other vehicles capable of providing a flexible and demand responsive transport system within Bressay, integrated with travel options on Mainland Shetland. This option will be considered alongside other options.

Option 4 – Improved provision for Walkers and Cyclists

This option includes sustainable travel opportunities, including walking and cycling, within Bressay and integrated with travel options on Mainland Shetland.

This option will be considered alongside other options.

Option 5 – Chain Ferry

Chains or cables attached to both shores, are used to guide or propel a ferry across. There are a number of chain ferries in operation in the UK, all located on the South coast of England including Poole Harbour, Dartmouth and Cowes on the Isle of Wight. The advantage of the chain ferry is that the chain helps to keep the ferry in position in strong cross currents. The Poole Harbour ferry operates at the mouth of the harbour in currents exceeding 6 knots.

Vessels less than 50m long have to give way to the ferry when it is crossing. Mariners have to be warned not to pass directly in front of the chain ferry and the draught behind the ferry can also be restricted by the chain.

The Poole Harbour crossing, at approximately 365 metres (m), is similar in length to a crossing of the Bressay Sound at Point of Scatland or Greenhead. The Poole Harbour crossing takes just under 3 minutes. A crossing of Bressay Sound at North Ness or the existing ferry route is considered too great for the operation of a chain ferry.

Modern chain ferries are generally powered by diesel electric motors and they generally operate from slipways rather than Ro-Ro terminals although mooring facilities are also required for berthing the vessel when not in use.

Repair and maintenance of the vessel is generally undertaken *in situ* given the difficulties of dismantling the chains and towing the vessels.

Option 6 – Drill and Blast Tunnel¹⁴

Option covers the construction of a tunnel by drill and blast techniques in the rock beneath the Sound of Bressay on an alignment between Point of Scotland and Heogan. The tunnel would allow bi-directional traffic movement, with a separate cycleway/footpath.

Option 7 – Immersed Tube Tunnel

A tunnel constructed by excavating a trench and placing precast concrete sections in and backfilling. At this stage it is not known which exact location would be most suitable, but it is assumed to be to the north of the current link. This option could include an option which is part causeway and part tunnel. The tunnel would allow bi-directional traffic movement, with a separate cycleway/footpath.

Option 8 – Opening Bridge

An opening bridge with a clear width between supports of at least 200m. It is assumed that the bridge crossing location would be from Point of Scotland to Heogan on Bressay. The bridge would open by two separate halves of the bridge swinging through 90 degrees. When closed the bridge would provide an airdraft above mean high water of between 10m and 15m to enable smaller vessels to pass. The bridge would carry a carriageway for two lanes of traffic and a footpath. The bridge could not carry services other than that required to power and light the bridge. The time for the bridge to fully open from closing the barriers would be between 5 and 15 minutes.

Option 9 – High Level Bridge

A high level fixed bridge having an airdraft above mean high water springs of at least 40m and a clear width between supports of at least 200m. It is assumed the bridge crossing location would be from Point of Scotland to Heogan on Bressay. The bridge would carry carriageway for two lanes of traffic and a footpath. The bridge would incorporate windshielding and could also carry services serving the island. The bridge would be of box girder or cable supported type.

6.2 STAG 1 APPRAISAL SUMMARY TABLES (AST)

The STAG 1 ASTs provide basic information about the option and consider its impact in relation to the planning objectives and the Government's five objectives (accessibility, economy, environment, integration and safety). In doing so, an indicative assessment is made of the scope and scale of the benefits and impacts associated with each option. These tables can be found in Annex F.

¹⁴ The team tunnelling expert has advised that in the Bressay Sound the most suitable option would be drill and blast, and thus a bore tunnel has not be considered further

The appraisal criteria used to assess each option is set out below:

Table 6.1: STAG Part 1 Appraisal Criteria for use against Government Objectives

Major Benefit	+++
Moderate Benefit	++
Minor Benefit	+
No Benefit/Impact	0
Minor Negative	-
Moderate Negative	--
Major Negative	---

6.3 CONCLUSIONS FROM BROAD APPRAISAL

The following options were eliminated as a result of the findings of the Part 1 STAG appraisal:

- **Chain Ferry:**

- This option would require higher levels of capital investment than the existing ferry service (operating the ferry and back up for overhaul/maintenance). Slipways would need to be constructed on either side at a new location and operational costs would not be significantly lower than the existing service (manning levels would be similar to current operation to ensure the ability to safely evacuate a vessel in an emergency situation);
- the Maritime and Coastguard Agency (MCA) code of practice will only consider issue of a certificate allowing a Chain Ferry to operate in Category A-C waters¹⁵; Bressay Sound is categorised as a Category D water;
- the ferry could cause a level of disruption to Lerwick Harbour operations, depending on the frequency of service, because the Master of the ferry generally has to ascertain that the way is clear, before leaving shore, and vessels less than 50m long have to give way to the ferry when it is crossing. Mariners also have to be warned not to pass directly in front of the chain ferry and the draught behind the ferry can also be restricted by the chain;
- the location would have to be from the Point of Scatland or Greenhead, in order to function effectively. The crossing time would be approximately three minutes, but the overall journey time would be slower, as the link would not be so central, and there would be additional time for embarking and disembarking. The Point of Scatland is being developed and land for a slip is now constrained;
- information from Sandbanks, via Tor Point, has highlighted the need to have an appropriate system of chains such that they would not get destroyed on the sea bottom, or interfere with boats using the Sound. This would require substantially more dredging of the navigation channel than for other options, to create a graded edge in order to prevent abrasion of the chain on the edge of the dredge channel. This would increase the costs;

¹⁵ Category A: narrow rivers and canals where the depth of water is generally less than 1.5m; Category B: wider rivers and canals where the depth of water is generally more than 1.5m and where the significant wave height could not be expected to exceed 0.6m at any time; Category C: tidal rivers and estuaries and, large, deep lakes and lochs where the significant wave height could not be expected to exceed 1.2m at any time

- the ferry must travel in a straight line, along the chain, limiting manoeuvrability. The service could also be adversely affected by sea conditions, particularly waves; and
 - there are safety issues, because chain ferries have no means of steering if the chain were to break.
- **Immersed Tube Tunnel:**
 - The capital costs involved in building this option would be high compared to a drill and blast tunnel, because of the depth of dredging the trench required (up to 18m) and the cost of transporting tunnel sections to Shetland or of constructing holding ponds locally to construct the sections in Shetland;
 - there is a potentially greater environmental impact, particularly during construction, because of the activities required to facilitate construction;
 - there is a high degree of risk in floating or craning in sections of tunnel in Shetland's climate and sea conditions; and
 - 160-170,000 cubic metres (cum³) of rock would be removed. It may not be possible to use and/or dispose of this quantity of material easily locally.
 - **Opening Bridge:**
 - Operational costs would be higher than for other fixed link options, due to required maintenance and manpower costs;
 - it would place some constraints on the current activities of Lerwick Harbour, for example, it would have to be opened to enable to allow any pelagic fishing boats to pass through;
 - access would be unpredictable: from when the bridge begins to open it would require up to 30 minutes wait (opening and closing time of 5-15 minutes each way and time for the vessel to pass through). The frequency of opening is not known, but the unpredictability to those using the link could present access issues and could prevent integration with other transport services, including external connections. There would be a deterioration in level of provision of access for emergency services at these times; and
 - under certain extreme weather conditions opening would be prevented.