Shetland Inter-Island Transport Connectivity Programme

Draft Network Strategy OBC

On behalf of Shetland Islands Council

SHETLAND ISLANDS COUNCIL

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Glossary

Term	Definition
Annual Average Daily Traffic (AADT)	The average number of vehicles passing a point on a road each day, calculated over a full year.
Appraisal Summary Table (AST)	A standardised table used in STAG appraisal to present a structured summary of how each option performs against each appraisal criterion. ASTs provide a consistent format for comparing options side by side.
Bank seat	A reinforced concrete structure built into the shoreline or embankment to support one end of a linkspan. The bank seat provides a fixed anchor point from which the linkspan can rise and fall with the tide.
Bathymetry	The measurement and mapping of water depths in seas, harbours and channels. Bathymetric surveys are used to determine whether there is sufficient depth for vessels to navigate and berth safely.
Beam	The width of a vessel at its widest point. A vessel with a greater beam is wider, which affects its stability, cargo capacity and the width of berth it requires.
Benefit-Cost Ratio (BCR)	A measure of value for money used in economic appraisal. It is calculated by dividing the Present Value of Benefits by the Present Value of Costs. A BCR greater than 1.0 indicates that a project's benefits exceed its costs. The higher the BCR, the better the value for money.
Berth roundhead	The curved or rounded end of a pier or jetty, designed to guide vessels safely into the berth and to withstand wave and current forces from multiple directions.
Berthing dolphin	A freestanding structure in the water, separate from the main pier, used to help secure a vessel when berthed. Dolphins are typically formed from a cluster of piles driven into the seabed and connected at the top.
Bollard	A short, sturdy post fixed to a pier or quayside to which mooring ropes are attached to hold a vessel securely in position.
Breakwater	A structure (typically of rock or concrete) built to shelter a harbour from the force of waves, providing calmer water for vessels to berth and manoeuvre safely.
Chart Datum (CD)	The standard reference water level used on nautical charts, typically set at or near the lowest astronomical tide. All water depths on charts are measured downward from this level, meaning that the actual water depth will almost always be greater than charted.
Cost-Benefit Analysis (CBA)	A systematic method for comparing the total costs and benefits of a project, expressed in monetary terms, to determine whether it represents good value for money. It is a core requirement of UK Government appraisal guidance (the Green Book).
Davits	Mechanical lifting devices, typically crane-like arms, used to raise and lower vessels or equipment. In a harbour context, davits may be used to lift a ferry out of the water when not in service.
Deadweight	The total weight a vessel can safely carry, including passengers, cargo, fuel, water and stores. It is the difference between the vessel's empty weight and its maximum loaded weight.
Dependency ratio	The ratio of the non-working-age population (typically children under 16 and persons of state pension age or above) to the working-age population. A higher ratio indicates that fewer working-age people are supporting a larger number of dependants.
Discounting	A technique used in economic appraisal to convert future costs and benefits into present-day terms. It reflects the widely accepted principle that people value a pound today more than a pound in the future. The UK Government sets standard discount rates for use in public sector appraisal.

Term	Definition
Double-ended ferry	A ferry designed to operate in both directions without needing to turn around. It has a wheelhouse, propulsion and a loading ramp at each end, allowing vehicles to drive on at one end and drive off at the other.
Drill and blast	A tunnelling method in which holes are drilled into rock, packed with explosives and detonated to break up the rock face. The broken rock is then removed and the tunnel is lined. It is a common method for constructing tunnels through rock.
Early Contractor Involvement (ECI)	A procurement approach in which a contractor is appointed at an early stage of a project to contribute practical construction experience to the design and planning process, before the main construction contract is let. This can help to reduce risk and improve buildability.
Embodied carbon	The total greenhouse gas emissions associated with the manufacture, transport and construction of materials and infrastructure.
Environmental Impact Assessment (EIA)	A formal process, required by law for certain types of development, that identifies, predicts and evaluates the likely significant environmental effects of a proposed project. The findings are reported in an Environmental Impact Assessment Report, which informs decision-makers and the public before consent is granted.
Factor prices	Costs expressed excluding indirect taxes (such as VAT) and subsidies. Factor prices reflect the underlying resource cost of goods and services. They are used alongside market prices in economic appraisal, and the two can be converted between one another using a standard adjustment factor.
Fender	A cushioning device attached to a pier, quay wall or vessel to absorb the impact of berthing and prevent damage to both the vessel and the harbour infrastructure.
FIDIC Emerald Book	A standard form of construction contract published by the International Federation of Consulting Engineers (FIDIC), designed specifically for underground and tunnelling works. It provides an internationally recognised framework for allocating risk between the client and the contractor on complex civil engineering projects.
Geotechnical Baseline Report (GBR)	A report that sets out the ground conditions expected to be encountered during a construction project, based on available survey data. In tunnelling, the GBR is a key contractual document that defines the baseline conditions against which risk is allocated between the client and the contractor.
Gilt	A bond issued by the UK Government — in effect, a loan to the Government that pays a fixed rate of interest. Gilt yields are commonly used as a benchmark for the cost of public sector borrowing and are referenced in economic appraisals.
Grandfather rights	Exemptions that allow older vessels to continue operating under the safety and design standards that were in force when they were originally built, rather than being required to comply with current regulations. These rights can be lost if a vessel undergoes major structural modifications, which may then trigger a requirement to meet modern standards at significant cost.
Habitats Regulations Assessment (HRA)	A legal requirement to assess whether a plan or project could have a significant effect on a European designated nature conservation site, such as a Special Protection Area or Special Area of Conservation. If significant effects cannot be ruled out, a more detailed assessment known as an Appropriate Assessment must be carried out before consent can be granted.
Job density	The ratio of the number of jobs located in an area to the number of working-age residents in that area, as reported by the Office for National Statistics (NOMIS). A job density below 1.0 indicates there are fewer jobs than working-age residents, suggesting that many residents commute elsewhere for work.
Just transition	The principle that the shift to a net zero economy should be managed in a way that is fair and does not widen existing inequalities. In the context of island communities, it recognises that reducing emissions from transport must be balanced against the need to maintain essential connectivity.
Length overall (LOA)	The total length of a vessel measured from the foremost point of the bow to the aftermost point of the stern. It is the standard measure of a vessel's size and determines the minimum length of berth required.

Term	Definition
Linkspan	A moveable bridge or ramp at a ferry terminal that connects the quayside to the vehicle deck of a ferry. The linkspan adjusts with the tide to maintain a level surface for vehicles driving on and off the vessel.
Lo-Lo (Lift-on/Lift-off)	A method of loading and unloading cargo using cranes or other lifting equipment, rather than vehicles driving on and off under their own power. Lo-Lo operations are typically used where roll-on/roll-off infrastructure is not available.
Marine Licence	A licence required under the Marine (Scotland) Act 2010 for activities in the Scottish marine environment, such as construction works, dredging or the deposit of substances on the seabed. Marine Licences are administered by Marine Scotland on behalf of the Scottish Ministers.
Marine Protected Area (MPA)	An area of the sea designated under legislation to protect important marine habitats, species or geological features. Activities within an MPA may be restricted or require consent to prevent damage to the protected features.
Market prices	Costs expressed inclusive of indirect taxes and subsidies. Market prices represent what is actually paid for goods and services in the economy. In UK Government economic appraisal, costs are typically presented in market prices, with a standard conversion factor used to derive factor prices.
Net Present Value (NPV)	The total value of a project's benefits minus its total costs, with both expressed in present-day terms after discounting. A positive NPV indicates that the project's benefits exceed its costs and that it would deliver a net gain to society.
Net zero emissions	Achieving a balance between the greenhouse gas emissions produced and the emissions removed from the atmosphere, such that there is no net increase in atmospheric greenhouse gas concentrations.
Open piled pier	A pier constructed on vertical piles driven into the seabed, with a deck spanning between them. Unlike a solid quay wall, an open piled pier allows water to flow beneath it, reducing wave reflection and sediment build-up.
Operational carbon	The greenhouse gas emissions generated during the day-to-day operation of an asset over its lifetime. For a ferry service, this includes emissions from vessel fuel consumption.
Optimism Bias	The well-documented tendency for project promoters to underestimate costs and delivery timescales and to overestimate the benefits of a project. UK Government appraisal guidance (the Green Book) requires a percentage uplift to be applied to cost estimates to account for this tendency, with the level of uplift varying by project type and stage of development.
Passenger Car Unit (PCU)	A standard unit of measurement used to express the vehicle-carrying capacity of a ferry deck. One PCU is equivalent to the space occupied by a standard car. Larger vehicles such as vans, lorries or agricultural vehicles occupy more than one PCU.
Present Value of Benefits (PVB)	The total benefits of a project expressed in present-day terms after discounting. It represents the value today of all benefits expected to arise over the appraisal period.
Present Value of Costs (PVC)	The total costs of a project expressed in present-day terms after discounting. It represents the value today of all costs expected to be incurred over the appraisal period, including capital expenditure, operating costs and maintenance.
Protected characteristics	The nine characteristics defined by the Equality Act 2010 on the basis of which it is unlawful to discriminate. These are: age; disability; gender reassignment; marriage and civil partnership; pregnancy and maternity; race; religion or belief; sex; and sexual orientation.
Quantitative Risk Assessment (QRA)	A structured process for identifying the risks associated with a project, estimating the likelihood of each risk occurring and its potential cost or time impact, and combining these into an overall risk allowance. QRA is used to inform cost estimates and contingency provisions and is a standard requirement in public sector business cases.

Term	Definition
Ro-Ro (Roll-on/Roll-off)	A type of vessel or method of loading where vehicles and wheeled cargo drive on and off the ferry under their own power, typically via ramps or linkspans.
Scheduled Monument	A nationally important archaeological site or historic structure that is legally protected under the Ancient Monuments and Archaeological Areas Act 1979. Consent from Historic Environment Scotland is required before any works that might affect a Scheduled Monument can be carried out.
Seakeeping	The ability of a vessel to operate safely and comfortably in rough sea conditions. A vessel with good seakeeping characteristics is better able to maintain its course and speed in heavy weather, reducing the risk of service cancellations.
Short-shipped	A term used to describe goods or cargo that have been presented for transport but could not be carried on the intended sailing, typically due to insufficient deck capacity.
Single-ended ferry	A ferry with a wheelhouse and main propulsion at one end only. Unlike a double-ended ferry, it must turn around at each terminal before vehicles can load or unload.
Site of Special Scientific Interest (SSSI)	An area designated under the Nature Conservation (Scotland) Act 2004 for its special biological or geological features. SSSIs are afforded legal protection, and consent from NatureScot is required for any operations likely to damage the notified features.
Social Time Preference Rate	The discount rate used by governments to convert future public costs and benefits into present-day values. It reflects society's preference for receiving benefits sooner rather than later and is set by HM Treasury for use in public sector appraisal.
Special Area of Conservation (SAC)	An area designated to protect habitats and species (other than birds) that are considered rare, vulnerable or of particular importance. SACs are classified under retained EU law (originally the Habitats Directive) and are afforded strict legal protection.
Special Protection Area (SPA)	An area designated to protect rare, vulnerable or regularly occurring migratory bird species and their habitats. SPAs are classified under retained EU law (originally the Birds Directive) and are afforded strict legal protection, including the requirement for Habitats Regulations Assessment of plans and projects that may affect them.
Scottish Transport Appraisal Guidance (STAG)	The Scottish Government's guidance framework for appraising transport projects and interventions. It sets out the process for identifying transport problems, developing options and assessing them against a range of criteria including environment, economy, safety, equality and accessibility.
Strategic Environmental Assessment (SEA)	A legal requirement under the Environmental Assessment (Scotland) Act 2005 to assess the likely significant environmental effects of certain plans, programmes and strategies before they are adopted. SEA applies at the plan level, as distinct from EIA, which applies to individual projects.
TAG Data Book	A reference document published by the Department for Transport (DfT) containing the standard economic parameters used in transport appraisal across the UK. These include values of travel time, vehicle operating costs, accident rates, greenhouse gas values and discount rates.
Tie rod	A steel rod used in marine infrastructure to anchor a retaining wall (such as a sheet pile wall) to a fixed point in the ground behind it, preventing the wall from being pushed forward by earth or water pressure.
Transport Economic Efficiency (TEE)	The component of a transport appraisal that compares the monetised costs and benefits of an option in economic terms. It is the primary quantitative measure of value for money in transport appraisal.
Transport Planning Objective (TPO)	A specific, measurable objective set at the outset of a transport appraisal that defines what the investment is seeking to achieve. Options are appraised against the TPOs to determine how well they address the identified transport problems.

Term	Definition
Waling beam	A horizontal steel or timber beam fixed along the face of a sheet pile wall to distribute the load from tie rods evenly across the piles. Waling beams help to maintain the structural integrity of quay walls and other marine retaining structures.
Watertight subdivision	The division of a vessel's hull into separate compartments using watertight bulkheads. This is a safety feature that limits flooding in the event of hull damage, helping the vessel to remain stable and afloat. Older vessels may not comply with modern subdivision standards.
Wave screen	A vertical barrier fixed to the top of a pier or breakwater to reduce wave overtopping and spray, providing greater shelter for vessels berthed alongside and for personnel working on the pier.
Whole Life Carbon (WLC)	The total greenhouse gas emissions associated with a project over its entire lifespan, including both embodied carbon (from construction and materials) and operational carbon (from day-to-day use). WLC is used to compare the climate change impact of different options on a consistent basis.

List of Acronyms

Acronym	Definition
AADT	Annualised Average Daily Traffic
BaU	Business-as-Usual
BCR	Benefit-Cost Ratio
CAPEX	Capital expenditure
CBA	Cost-Benefit Ratio
CD	Chart Datum
CHFS	Clyde and Hebridean Ferry Services
CMAL	Caledonian Maritime Assets Ltd
CPI	Consumer Price Index
CPP	Community Planning Partnership
DMRB	Design Manual for Roads and Bridges
EIA	Environmental Impact Assessment
FBC	Full Business Case
FLM	Fixed Link Model
FY	Financial Year
GBR	Geotechnical Baseline Report
GI	Ground investigations
HRA	Habitats Regulations Assessment
IITCP	Inter-Island Transport Connectivity Programme
IRM	Implementation Route Map
KPI	Key Performance Indicator
LDP	Local Development Plan
LOA	Length Overall
LPA	Lerwick Port Authority
MEP	Mechanical, Electrical and Plumbing
MHWS	Mean High Water Springs
MLWS	Mean Low Water Springs
MPA	Marine Protected Area
NIP	National Islands Plan
NPF4	National Planning Framework 4
NPV	Net Present Value
NTS2	National Transport Strategy 2
O&M	Operating and maintenance
OB	Optimism Bias
OBC	Outline Business Case
OPEX	Operational expenditure
PCU	Passenger Car Unit

Acronym	Definition
PVB	Present Value of Benefits
PVC	Present Value of Costs
QCRA	Quantitative Cost Risk Assessment
RTS	Regional Transport Strategy
SEA	Strategic Environmental Assessment
SIITS	Shetland Inter-Island Transport Study
SMART	Specific, Measurable, Attainable, Relevant and Time-Bound
SME	Small to Medium Enterprise
SOC	Strategic Outline Case
SPA	Special Protection Area
SRO	Senior Responsible Officer
SSSI	Site of Special Scientific Interest
STAG	Scottish Transport Appraisal Guidance
STCW	Standards of Training, Certification and Watchkeeping
STPR2	Strategic Transport Projects Review 2
SVRP	Small Vessels Replacement Plan
TAG	Transport Analysis Guidance
TOM	Target Operating Model
TPO	Transport Planning Objectives
VfM	Value for money

Executive Summary

What is the Shetland Inter-Island Transport Connectivity Programme?

The **Shetland Inter-Island Transport Connectivity Programme (IITCP)** is being developed to define a long-term, costed and prioritised network strategy for inter-island transport serving eight island communities in the Shetland archipelago, as shown in the figure below:

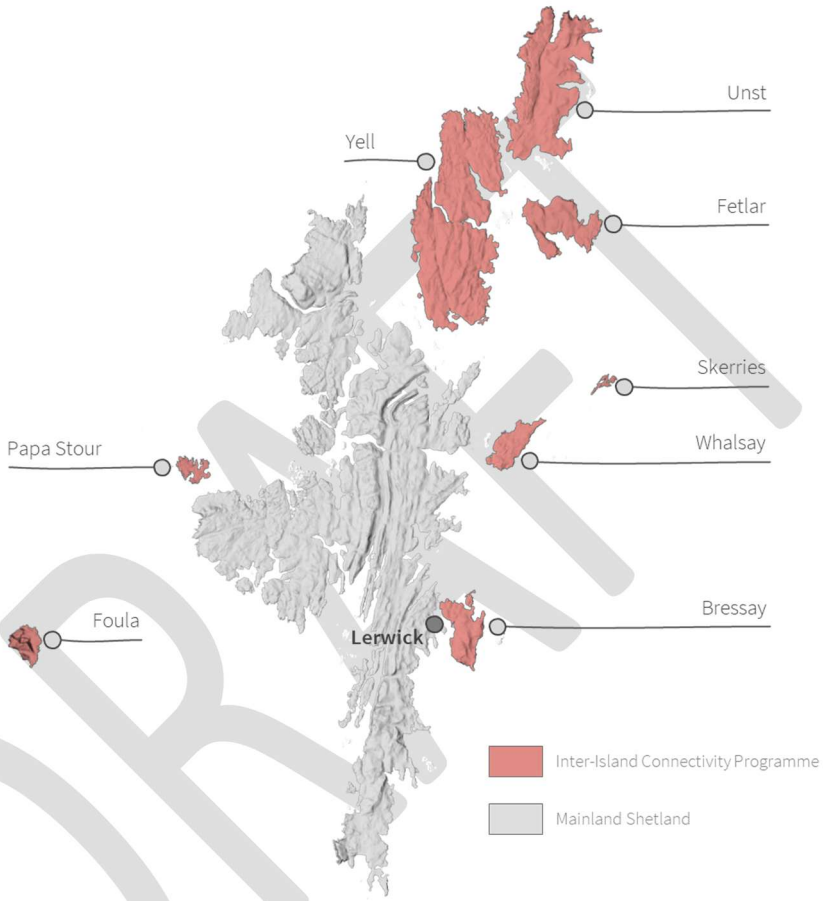

Figure ES1: Geographic scope of the Shetland Inter-Island Transport Connectivity Programme

The programme focuses on **future ferry service provision and the case for potential fixed links for four islands (Bressay, Unst, Whalsay and Yell)**, with the objective of identifying a preferred set of interventions and sequencing these through an **Implementation Route Map (IRM)**.

This document is the **Draft Network Strategy Outline Business Case (OBC)**, which is intended to provide Shetland Islands Council Members with the evidence required to select a preferred option for each island community. Following agreement on this decision at a meeting of Shetland Islands Council on 30th June 2026, the preferred options will be recorded in this report and progressed to the **IRM**, a phased, prioritised and costed plan for delivering the preferred options over time, subject to funding.

The study is being undertaken in accordance with Scottish Transport Appraisal Guidance (STAG) and H.M. Treasury Five Dimension Model, ensuring that strategic need, economic

performance, affordability, deliverability and management arrangements are considered in a consistent and robust manner.

What is meant by a Programme in this context?

This Network Strategy OBC has been explicitly developed as a **programme-level business case**, rather than a discrete project appraisal. It supports the identification of preferred options at an island level and establishes a strategic framework for investment, recognising the need to consider network-wide interactions, funding constraints and long-term phasing.

The **OBC does not however develop options to a delivery-ready level**; instead, it provides the basis for subsequent project-level business cases, which will refine design, costs, funding procurement and delivery arrangements for individual interventions over time.

Why is the IITCP required?

The IITCP replaces the **2016 Shetland Inter-Island Transport Study (SIITS)**. The requirement for this programme was identified through the **ZetTrans Regional Transport Strategy**, which defines the strategic policy framework for inter-island connectivity, including a clear commitment to **improving ferry services and exploring the case for fixed links (Policy 29)**. The IITCP effectively operationalises the ZetTrans RTS by turning its strategic policies around ferry services, fixed links and connecting public transport for island communities into a prioritised, evidence-based network investment programme.

The IITCP is being developed within the context of a significantly strengthened strategic and policy framework, including:

- Transport Scotland's **National Transport Strategy 2**, with its commitments to reducing inequalities, taking climate action, delivering inclusive economic growth and improving health and wellbeing.
- The **Climate Change (Emissions Reduction Targets) (Scotland) Act 2019 and 2024**, which sets a legally binding commitment to deliver net zero emissions by 2045.
- The **National Islands Plan 2026**, with its strong focus on population retention and connectivity.
- **Shetland Islands Council's Corporate Plan**, which seeks to ensure financially and environmentally sustainable internal ferry services, whilst making the case for fixed links, where they may be a viable alternative.
- **UK Government** 'missions' to drive economic growth, support the transition to clean energy and reduce regional inequalities / improve opportunity.

What is the Case for Change?

Any appraisal or business case is founded on developing a **case for change – i.e., what is the rationale for investment**. In the context of STAG, the case for change is primarily focused on defining the transport problems that have been identified and evidenced. There are two broad components to the Case for Change:

- **Network / operational problems**, which in this context are the problems that the Council experiences in delivering ferry services – i.e., the **supply-side**.
- Problems experienced by a **user or potential user of the transport network** – i.e., the **demand side**.

What are the network and operational problems (supply-side)?

The existing ferry system faces several structural challenges including, but not limited to:

- **An ageing fleet** – the fleet has an average vessel age of 32.5 years, with most vessels beyond the nominal replacement age of 30-years
- **Poor** resilience, with increasing frequency of breakdowns and longer refits, with associated service reductions
- **Crew shortages**, which will be exacerbated by demographic change over time
- **Capacity constraints**, particularly for vehicles at peak times
- **Rising operating costs**, placing significant pressures on public sector funding

These challenges mean that significant capital investment is unavoidable, even simply to maintain current service levels.

What problems are experienced by users and potential users of the ferry service?

Desk-based research, survey evidence and consultation found that the most significant problems experienced by users are:

- Poor **reliability** (cancellations and disruption)
- Limited **vehicle capacity** (difficulty booking or accessing sailings)
- **Limited, fixed times of travel, within the operating day**
- **Cost of travel**, particularly for island residents

What are the implications for communities?

Shetland's island communities are highly dependent on **frequent, reliable, car-based travel**, with travel rates significantly higher than comparable island regions, including neighbouring Orkney. Maintaining and improving connectivity is therefore **fundamental to long-term social and economic sustainability**. However, across the archipelago, island communities are suffering from a range of socio-economic challenges, including:

- **Population decline** (circa 24% reduction over four decades)
- **Ageing populations** and **high dependency ratios**
- **Labour market challenges**, including difficulty filling vacancies
- Constraints on **housing and development**
- A **cost premium** for doing business in the islands

Transport connectivity, and in particular the challenges and costs posed by the ferry service, is routinely identified as one of the main threats to island sustainability. The IITCP is focused on addressing these transport problems and facilitating the sustainability and growth of Shetland's island communities.

What are the implications of not changing?

Without intervention, the ageing fleet and infrastructure will lead to a **progressive degradation of service**. This will include **reduced reliability**, with more cancellations and single vessel operation due to extended refits

This would have significant consequences, including but not limited to:

- Continued and potentially **accelerated population decline**
- Reduced **economic productivity and labour mobility**
- Increased **cost of living and business costs**
- **Constraints on key sectors** such as aquaculture and tourism

At worst, this could **threaten the long-term viability of some island communities**.

What are the Transport Planning Objectives?

The Transport Planning Objectives (TPOs) were developed thematically based on evidence from the resident survey, which obtained circa 1,000 responses. In keeping with the guidance, the TPOs are not SMART[1] at this programme business case stage but will be made SMART in the individual project business cases which emerge from the IITCP.

Table ES1: Survey ferry service factors, barriers to travel and prospective TPO themes

TPO Theme	TPO
Resilience	Reduce or remove **variances from the regular published timetable**
Capacity	Reduce or remove the ferry **capacity** barrier associated with ferry travel
Limited, fixed times of travel, within operating day	Improve the **flexibility of travel** within the operating day
Cost	Reduce or remove the **cost** barrier associated with ferry travel
Accessibility	Make inter-island travel fully **accessible** to all
Operating day restriction	Improve travel options beyond the current **operating day**
Poor non-car travel options	Improve provision for those **not travelling by car** / who would **prefer not to travel to by car**

These TPOs are deliberately framed at a high level and are intended to capture the principal transport problems identified, rather than define specific solutions. Whilst these TPOs have been used universally in the appraisal, it is recognised that their relevance differs between islands.

What options have been considered?

To ensure a manageable and distinguishable set of options for appraisal purposes, individual options were combined into packages for each route and island. These packages reflect the Case for Change and are intended to incrementally address the transport problems identified. This structured approach ensures that the appraisal compares a manageable and meaningful set of distinct investment pathways, consistent with STAG guidance for programme-level business cases.

There are therefore two strands to this option generation process:

- **Candidate fixed link islands[2] (Bressay, Unst (plus Fetlar, as an integral element of Bluemull Sound), Whalsay and Yell):** For these five islands, the options increment up from the present-day position to a 'Ferry Do Max' option, which is effectively a ferry comparator to a fixed link. The responses to the resident survey for these islands were of a sufficient number to highlight the key areas of dissatisfaction with the service. When

[1] **S**pecific, **M**easurable, **A**ttainable, **R**elevant and **T**ime-bound

[2] It should be noted that a fixed link to Fetlar was considered and discounted from further consideration in the Strategic Outline Case.

combined with other secondary data, it was possible to develop detailed option packages for consideration that incrementally address the problems expressed by communities.

- **Foula, Papa Stour and Skerries:** For these smaller and more geographically remote islands, the option generation was focused on asset replacement and increments to the current ferry service. The option packages were defined through in depth interviews with each community, supplemented by other secondary data.

How were options packaged?

Reflecting the preceding narrative, a set of option packages was developed, summarised in the table below. These option packages were structured as incremental improvements, with each successive option building on the previous one.

Table ES2: Option packages

Option	In-Scope Islands	Description
Business-as-usual	All	The BaU option is focused on operating services as per the published timetable, addressing recent resilience issues and the disruption caused by refit periods. From an asset replacement perspective, it assumes replacement of vessels at the point of life expiry with vessels of a broadly like-for-like vehicle carrying capacity (although such vessels will likely be physically larger, reflecting modern design requirements).
Ferry 'Do Something'	All	This option package involves addressing current route priorities using the current assets, supplemented by revenue measures. It does however include asset replacement ahead of life expiry where there is a clear justification for this, capacity problems for example.
Ferry 'Do Maximum' (Do Max)	Bressay, Fetlar Unst, Whalsay and Yell	The 'Do Max' is intended to demonstrate a broadly realistic maximum level of connectivity that can be achieved by significantly scaling-up revenue and capital funding. The 'Do Max' expands the Ferry Do Something to provide a service level broadly equivalent to that offered by Western Ferries in the Firth of Clyde and would reduce other barriers to travel (e.g., provision for 24-hour sailings, reduced fares etc). The 'Do Max' is only considered for a subset of islands, both as a comparator to a fixed link and, where it can be demonstrated as practical, as a potential option in its own right.
Fixed link	Bressay, Unst, Whalsay and Yell	Fixed link options have been developed for the four listed islands. Within these options, there are potential variants around tolling and public transport provision through the fixed link. It is important to note here that public transport provision must be integral to all fixed link options, if those without access to a car or who would prefer not to drive, including cyclists, are not to experience inequality of opportunity.

Which option packages are considered in the Network Strategy OBC?

The table below summarises the options progressed from the SOC into the Network Strategy OBC (this report) following a decision of Shetland Islands Council Members in June 2025.

Table ES3: Option packages progressed to Network Strategy OBC

Island	Business-as-Usual	Ferry Do Something	Ferry Do Max	Fixed Link
Bressay	✓	✓	✓	✓
Fetlar (Bluemull Sound)	×	✓	✓	×
Foula	✓	✓	Not applicable	
Papa Stour	✓	✓	Not applicable	
Skerries	✓	✓	Not applicable	
Unst (Bluemull Sound)	×	✓	✓	✓
Whalsay	✓	✓	✓	✓
Yell	✓	✓	✓	✓

What are the outcomes of the economic appraisal?

The Economic Dimension comprises a multi-criteria analysis (based in this case on Scottish Transport Appraisal Guidance (STAG)) incorporating qualitative and quantitative approaches to assess the options from a value for money to society perspective, where value for money is interpreted in its broadest sense, rather than in a strict monetary way.

The approach taken differed between the **candidate fixed link islands (Bressay, Unst (plus Fetlar, as integral component of Bluemull Sound), Whalsay and Yell)** and the smaller communities that will continue to be served by ferries (Foula, Papa Stour and Skerries).

Candidate fixed link islands

In accordance with H.M. Treasury guidance, all costs and benefits in the appraisal are estimated on an annual basis over a 60-year appraisal period and expressed in 'Present Values' where future costs and benefits are progressively 'discounted' over time. This reflects the Social Time Preference Rate which is the percentage used by governments to discount future public policy costs and benefits, reflecting society's preference for receiving goods and services now rather than later.

Here, estimates of all capital and revenue costs have been made covering construction, cyclical ferry and infrastructure asset replacement and operating and maintenance costs.

The key monetary metrics in the appraisal are:

- **Present Value of Costs (PVC):** the full cost of the option (including optimism bias), from the present day until 60 years after the planned opening year, discounted to 2023 prices and values.
- **Present Value of Benefits (PVB):** the monetised benefits of the option (primarily travel time savings) for 60 years from the planned opening year, discounted to 2023 prices and values.
- **Net Present Value (NPV):** PVB - PVC, where a positive indicates a net monetised benefit.
- **Benefit Cost Ratio (BCR):** PVB / PVC, where a value >1 indicates that the monetised benefits outweigh the monetised costs.

In Transport Scotland terms, this analysis is known as Transport Economic Efficiency (TEE) and the key results are reported below.

Transport Economic Efficiency

TEE analysis has been undertaken on the four candidate fixed link islands, Bluemull Sound (Unst)[3], Bressay, Whalsay and Yell. The figure below shows the PVC for each option for each island, including the BaU:

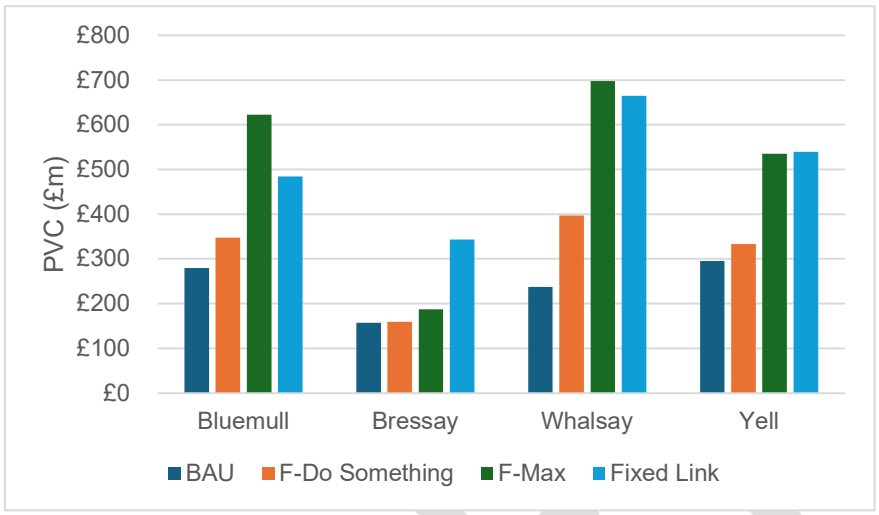

Figure ES2: Option Costs (PVC)

The key points of note from the above figure are:

- Any of these options implies significant spend over the appraisal period, even BaU.
- The BAU PVC for Bluemull Sound, Whalsay and Yell are broadly similar.
- The Fixed Links PVC varies widely between the four islands.
- In three of the four cases, the PVC for the Ferry Max option is around the same or more than the fixed link.

In appraisal, it is the increment of cost from the BAU to the option which is appraised against the benefits associated with that option. The resulting **PVC together with the PVB and NPV** for each fixed link option is shown in the figure below.

[3] Note that any Bluemull fixed link assumes a continuing Fetlar ferry service to one or both of Yell and Unst, the cost of which is not included in the figures which follow.

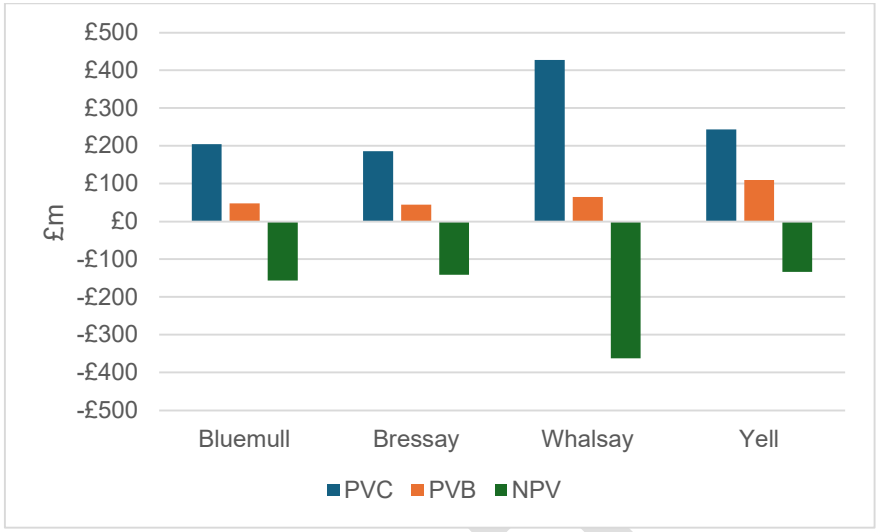

Figure ES3: Appraisal Costs (PVC), Benefits (PVB) and Net Present Value (NPV)

The key points of note from the above figure are:

- All of the NPVs are negative, implying that the quantified benefits do not outweigh the quantified costs.
  - It should be noted though that current appraisal techniques are not particularly well suited for assessing island connectivity and there are key aspects of ferry travel (e.g., cancellations, being unable to book certain ferries etc) which are not monetised as benefits at present.
- The quantum of the PVB reflects usage, including by commercial vehicles.
- Yell has the best NPV, Bluemull and Bressay are similar and Whalsay is the lowest of the four.

The final measure is the **BCR**. In addition to the core tests, a number of **sensitivity tests** were undertaken including three with potential 'upside' effects for fixed links: applying a lower optimism bias to tunnel construction, applying optimism bias to new ferries and extending the appraisal period to 100 years. The results are shown in the figure below, where a BCR of greater than one implies the quantifiable benefits outweigh the costs. BCRs for ferry options are not shown here for brevity as they are generally lower than the fixed link BCRs.

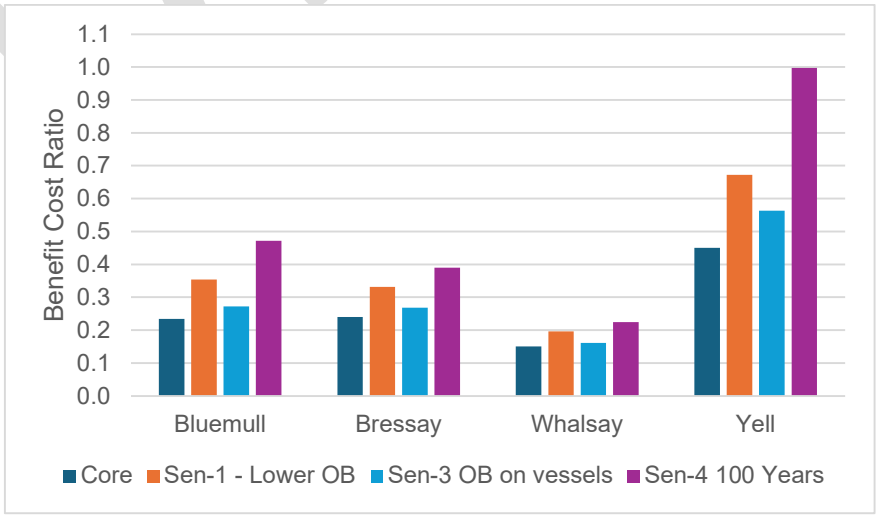

Figure ES4: Benefit Cost Ratios for core test and sensitivities

It can therefore be seen that the **range of BCRs for Yell is greater than for the other islands**. If two of these sensitivity tests were combined and / or additional benefits were quantified in appraisal, the BCR could easily exceed one. The pattern of results for **Bressay** and **Bluemull** are very similar, with a BCR of less than 0.5 even in the best case. The BCRs for **Whalsay** are the lowest of the four islands.

What is the supporting strategic case?

In addition to the above quantitative appraisal, a wider assessment has been undertaken of how the islands could benefit from improved connectivity and this has been defined as the wider 'strategic case' for investment.

There are a range of wider economic benefits which would be common to all islands including **positive labour market impacts, reduced costs of doing business, potential for savings in the delivery of public services, positive housing market impacts and increased footfall through tourism on the islands**.

Key **island-specific** factors are highlighted below:

- **Bluemull (Unst):** The SaxaVord Spaceport is an emerging nationally significant development in Unst and has the potential to be transformative for the island. As well as the direct economic activity associated with the Spaceport, it provides scope for spin-off benefits in e.g., aerospace connected industrial development, tourism etc. Unst also has a significant aquaculture industry which could be upscaled.
- **Bressay:** The geography and topography of Lerwick means that developable land is at a premium and improved connectivity could produce opportunities for Lerwick to grow. A fixed link could open the east side of Lerwick Harbour (Bressay) to development, potentially facilitating the expansion of the settlement, with benefits for Shetland overall.
- **Whalsay:** Whalsay's highly skilled economy is based in large part around the pelagic fishing industry, which accounts for over a quarter of all resident jobs. However, no product is landed in or processed in Whalsay, which means it does not generate significant freight volumes. The key market for ferry travel is therefore off-island commuting and indeed levels of car ownership and car-based travel-to-work in Whalsay are far higher than the Shetland and national averages.
- **Yell:** In addition to improving connectivity to the opportunities in Unst, Yell's export driven economy is based on the aquaculture / fisheries sector, which taken together with Unst means that that the North Isles collectively make an outsized economic contribution. Stakeholders indicated that a fixed link could generate £30m-£60m in additional output per annum by lifting production constraints (with much of this figure attributable to the fisheries / aquaculture / shellfish sector).

How do the options perform against the Transport Planning Objectives?

Table ES4: Performance of options against the TPOs

TPO	Option Commentary
1 – Resilience: Reduce or remove **variances from the regular published timetable**	• For most of the TPOs, the magnitude of positive impact against the TPO increases from BaU to Ferry Do Something to Ferry Max to Fixed Link. Additional capacity, increased frequency, improved reliability of service delivery, longer operating days and lower fares all go some way towards removing the barriers to travel to / from the islands. • In terms of the contribution of the options in addressing the dissatisfaction with ferry services found in the resident survey, **Ferry Do Something**
2 – Capacity: Reduce or remove the ferry **capacity** barrier associated with ferry travel	
3 – Limited, fixed times of travel: Improve the **flexibility of travel** within the operating day	

TPO	Option Commentary
4 – Cost: Reduce or remove the **cost** barrier associated with ferry travel	• removes around **25%** of the dissatisfaction, **Ferry Do Max** removes around **60%** and **Fixed Link** removes nearer **90%** for Bluemull, Yell and Whalsay, but only **67%** for Bressay where cost is a greater source of dissatisfaction. • **Fixed Links** would clearly remove all barriers associated with TPOs 1, 2, 3, 5 and 6. Remaining barriers would be associated with (i) cost (as it has been assumed that tunnel tolls and ferry fares would be equivalent) and (ii) non car travel options. In the latter case it has been assumed that bus options would be provided for current foot passengers / cyclists to provide a broadly equivalent level of service to the current ferries.
5 – Physical accessibility: Make inter-island travel fully **accessible** to all	
6 – Length of operating day: Improve travel options beyond the current **operating day**	
7 – Non car travel options: Improve provision for those **not travelling by car** / who would **prefer not to travel to by car**	

Summary

The **Ferry Do Max** is at least as expensive than the **Fixed Link** in three cases, whilst delivering lower, and a narrower range of benefits. On this basis, and given significant deliverability challenges, **the Ferry Do Max options can be discounted**. **This illustrates that the provision of ferry services does have an upper bound, beyond which a fixed link indisputably provides a better value for money solution.**

In terms of the **fixed link options**:

- **Yell** demonstrated the best TEE results, and the BCR could easily exceed 1 under a combination of sensitivity tests and the inclusion of other benefits. The Yell fixed link also has the strongest strategic case in terms of its potential impact on key industries and labour markets and the fact that three island communities would benefit.
- **Bressay** and **Unst** fixed links produced similar TEE results, and both would have a lot of ground to make up to achieve a BCR of greater than one. Both have differing but meaningful strategic cases however in relation to effective Lerwick expansion and the SaxaVord Spaceport respectively. In the case of Bressay though, very high levels of connectivity straight into Lerwick could be provided with a more frequent ferry service and lower or zero ferry fares.
- **Whalsay** has the weakest economic results due to the tunnel's longer length and therefore higher cost, and the low freight volumes reduce the quantified benefits. Whalsay has less in the way of exporting economic activity on the island and therefore perhaps has a weaker strategic case.

Foula, Papa Stour and Skerries

The non-fixed link islands of Foula, Papa Stour and Skerries are considered no less important in the context of the IITCP, but the approach to appraising options for these islands and their associated strategic narrative is different. The focus here is much more on essential / 'lifeline' connectivity, ensuring residents can travel when required and are provided with a resilient supply-chain.

The core requirement on these routes is asset replacement – both vessels and infrastructure – and, in the context of Papa Stour and Skerries, incremental service improvements, subject to funding.

Financial Dimension

The Financial Dimension demonstrates that there is currently no funding in place for anything other than day-to-day operating deficit funding of the current services. **This is a fundamental**

point – the programme is not affordable within existing Council resources and will require substantial and sustained external funding to deliver even baseline ferry replacement, with fixed links having a significantly larger funding requirement.

As an illustration of the scale of the problem, a 10-year BaU capital spend profile from 2026/27 has been estimated at **£581m** (nominal prices, including real cost inflation and general inflation) across the eight islands served. This is simply to maintain the current level of service, replacing aging ferries and refurbishing / replacing life expired infrastructure.

The nature of the current funding regime is set out and the risks associated with this are noted.

For fixed links, the capital costs (including contingency) are: **£257m** for **Bressay**, **£346m** for **Unst**, **£488m** for **Whalsay** and **£401m** for **Yell**, all at 2025 Q4 prices. A number of potential funding strategies are explored including capital grant funding, Shetland Islands Council borrowing and private finance, noting that these options are not mutually exclusive, and any funding package is likely to involve more than one of these.

As the IITCP is at the programme stage in the process, a number of illustrative scenarios are developed to close the funding gap, i.e., the difference between the capital that current ferry funding could secure and the construction cost of a tunnel. All of these scenarios require external government funding.

Commercial Dimension

The Commercial Dimension seeks to demonstrate that the programme and its inherent projects are commercially viable, deliverable and attractive to the market, and that a robust approach has been put in place to procure and manage them effectively. At this stage, it is only possible to set out the Commercial Dimension in outline given the uncertainty around the availability of funding and the timescale in which that could be provided.

The procurement strategy for any option will be linked to how it is funded and financed. For example, the procurement strategy for a tunnel would be very different if it was procured using project finance rather than grant funding or borrowing. It is also important to note that vessels, harbour infrastructure and fixed links all have very different considerations with regards to procurement.

The Commercial Dimension therefore highlights the main considerations for each investment type separately covering harbour infrastructure, vessels and fixed links. Legal and regulatory issues pertinent to each are also considered.

Management Dimension

The Management Dimension seeks to demonstrate that robust arrangements are in place for the delivery, monitoring and evaluation of the IITCP. Demonstrating that the preferred investment programme can be successfully delivered requires evidencing that the programme is being managed in accordance with best practice, subjected to independent assurance and that the necessary arrangements are in place for change and contract management, benefits realisation and risk management.

As with the Financial and Commercial Dimensions, the Management Dimension is provided in outline at this stage given uncertainty over funding and programme. It will also be updated once Council Members have made a decision on the preferred option for each island and will be coordinated with the Implementation Route Map.

The Management Dimension considers evidence from similar projects elsewhere and develops a programme plan, proposals for project governance, key dependencies and

assurance procedures. An approach to the management of risk, opportunities and issues is developed and finally an initial benefits realisation plan is considered.

What are the next steps?

Recognising the need for external funding, the next step following the Council meeting on 30th June 2026 will be to develop a prioritised and phased programme of investment, defining the order in which the eight island preferred options should be delivered. The **Implementation Route Map** will be presented to Shetland Islands Council Members in autumn 2026.

The IRM will serve two purposes – it will allow the Council to:

- **Determine and progress its short-term project priorities** within the context of a longer-term programme.
- **Provide the Scottish and UK Governments and other potential funders with a timed and costed programme** setting out the Council's investment priorities and funding requirements. Whilst this programme will inevitably evolve over time, it will allow funding discussions to progress within a structured long-term plan, providing funders with confidence in the overall strategic approach being adopted by the Council.

The IRM is the next major governance control point for the IITCP.

Following the completion of the IRM and the prioritisation of options, the next step will be move to individual project business cases for the highest priority options.

1 Introduction

1.1 Overview

1.1.1 The purpose of the **Shetland Inter-Island Transport Connectivity Programme (IITCP)** is to develop a high-level, timed and costed sequence of island connectivity investments which, taken together, will form an agreed **network strategy** to meet the needs of Shetland's island communities.

1.1.2 The study is being delivered by **Stantec UK Ltd** in partnership with **Mott MacDonald**, **COWI** and **ProVersa Ltd**.

What is the background to the study?

1.1.3 Shetland Islands Council operates or contracts essential transport connections to nine islands across the archipelago – Bressay, Fair Isle, Fetlar, Foula, Papa Stour, Skerries, Unst, Whalsay and Yell. These connections are delivered through a combination of air and ferry services, which have been supported over many years in both capital and revenue terms by the Council and, more recently with respect to ferry service revenue funding, the Scottish Government.

1.1.4 The majority of ferry services are operated directly by the Council, with the exception of the Foula ferry route which is delivered through a contract with a private operator. Air services are provided under contract by ZetTrans, the Regional Transport Partnership for the Shetland Islands, and the costs are met by the Council, under its duty to meet the net costs of ZetTrans.

Shetland Inter-Island Transport Study, 2016

1.1.5 In 2014, Shetland Islands Council, through the *Our Islands, Our Future*, initiative, began a dialogue with the Scottish Government on establishing some principles for 'fair funding' of Shetland's inter-island transport services and infrastructure. The basis of these discussions was that the financial burden placed on the Council in providing inter-island transport was both disproportionate and unsustainable

1.1.6 To inform the Council's ask of the Scottish Government, it commissioned **the Shetland Inter-Island Transport Study (SIITS)**. SIITS was a programme-level Strategic Outline Case (SOC) which established the case for investment in the inter-island transport network and identified a set of timed capital and revenue options which, if delivered, would in-part or in full address the identified transport problems.

1.1.7 Elements of the Programme SOC were progressed through a subsequent series of project-level Outline Business Cases (OBC)[4] focused on the priority recommendations from SIITS. The SIITS project delivered several important successes for the Council, including:

- Securing partial and thereafter full Scottish Government **revenue funding to cover the annual operating deficit of the Council's ferry service**
- Securing circa **£27 million** of UK Government *Levelling-Up* funding for the **Fair Isle Ferry Replacement Project**, now under construction
- Reorganisation of **air services** to provide improved connectivity for Fair Isle and Foula
- **Timetable improvements** on several ferry routes including **Papa Stour, Skerries and Whalsay**

[4] These were the Fair Isle, Whalsay, Air Services and Ferry Revenue OBCs.

- Further development of **potential future ferry options for Whalsay**

Why is the IITCP required?

1.1.8 Whilst SIITS delivered a number of successes, it is being replaced by the IITCP. There are two reasons for this:

- Several island communities, including Bressay, Fetlar, Unst, Whalsay and Yell, have long expressed **a desire to consider a fixed link** rather than a ferry as their means of connectivity. At the time SIITS was undertaken, the prevailing political, economic and financial position meant that fixed links were not considered in detail and were instead placed in the context of Transport Scotland's Strategic Transport Projects Review 2 (STPR2) for consideration. The macroeconomic and policy context has however changed, and the time is now right to consider fixed links in detail.
- SIITS was also published almost a decade ago and, as with any strategic planning document / programme business case, it is appropriate to **periodically review and refresh the outcomes** to reflect the passage of time and the evolving context within which transport investments are made.

1.2 Shetland Inter-Island Transport Connectivity Programme

1.2.1 The Shetland Inter-Island Transport Connectivity Programme will set-out a **long-term network strategy for eight island communities served by Shetland Islands Council's ferry service** (with Fair Isle being addressed separately through the ongoing Fair Isle Ferry Replacement Project), as shown in the map below:

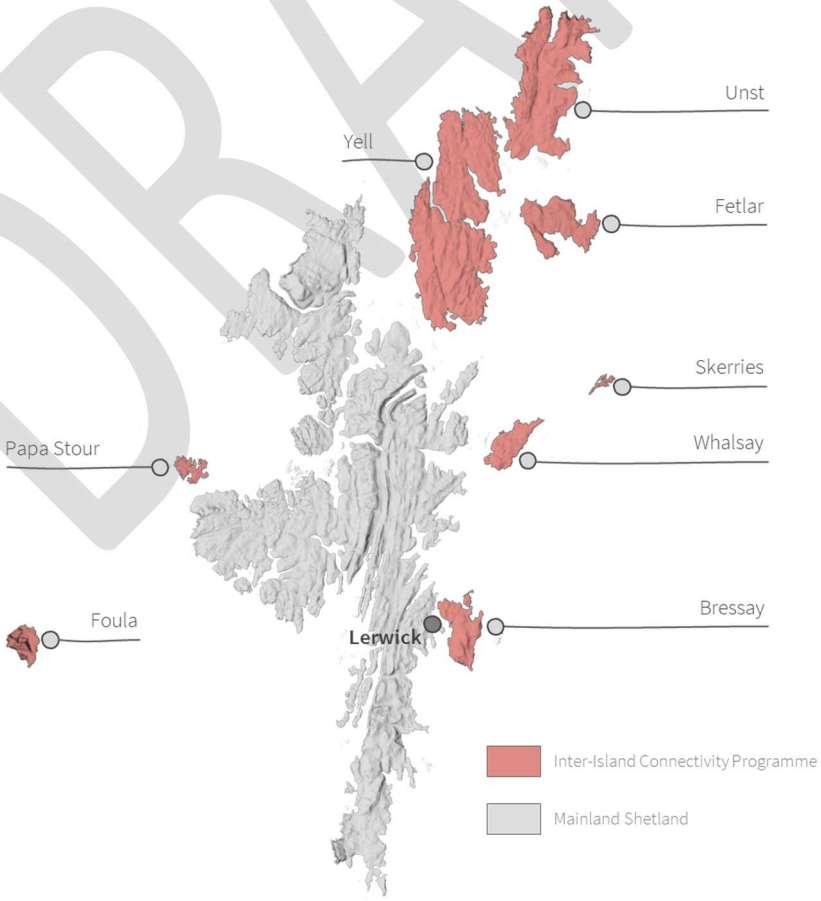

Figure 1.1: Geographic scope of the Shetland Inter-Island Transport Connectivity Programme

What is the purpose of the IITCP?

1.2.2 As alluded to above, the purpose of this study is to determine, for Shetland overall:

- The 'case' (in its widest sense) for **fixed links**
- The **shape of the ferry service and network in the short, medium and long-term**

1.2.3 These two elements will be combined to create a long-term 'Network Strategy', i.e., a sequential and costed investment plan for the inter-island transport network known as the **Implementation Route Map (IRM)**.

Does this study cover air services?

1.2.4 The IITCP **does not consider air services** – it has been commissioned specifically to consider future ferry services, fixed links and the potential interaction between the two.

1.2.5 However, the information obtained through the IITCP will be used to support ZetTrans in developing the specification for the next inter-island air services contract in 2028.

1.3 How is the IITCP being developed?

1.3.1 The Shetland Inter-Island Transport Connectivity Programme (IITCP) is being developed in accordance with both Scottish Transport Appraisal Guidance and UK business case best practice, ensuring that the evidence presented is robust, consistent, and capable of supporting decision-making by Shetland Islands Council and external funding bodies.

Scottish Transport Appraisal Guidance (STAG)

1.3.2 Appraisal of publicly funded transport projects in Scotland must be undertaken in line with the principles of the **Scottish Transport Appraisal Guidance (STAG)**. The IITCP therefore closely follows the refreshed *STAG Managers' Guide*, published in January 2022, to ensure compliance with Scottish Government requirements. STAG comprises three stages:

- Initial Appraisal: Case for Change
- Preliminary Options Appraisal (largely qualitative)
- Detailed Options Appraisal (more quantitative)

1.3.3 Within the IITCP, the STAG framework has been used to:

- Define transport problems and objectives
- Develop and refine options
- Provide a consistent and objective basis for comparing those options

Business Case Framework

1.3.4 The end product here though is a **programme business case**, which goes beyond a typical STAG-based study into consideration of how the programme can be delivered. To this end, Transport Scotland has published *Guidance on the Development of Business Cases*, very broadly reflecting H.M. Treasury *Green Book* approaches, although with some subtle differences. This guidance outlines the following stages:

- Stage 1 - Scoping: Strategic Business Case (SBC)
- Stage 2 - Planning: Outline Business Case (OBC)
- Stage 3 - Procurement: Final Business Case (FBC)

1.3.5 Given the range of potential funders for any options emerging from the IITCP, it is also important to reflect UK business case guidance, which is far more detailed than the Transport Scotland guidance. In UK guidance, the equivalent steps are:

- Stage 1: Strategic Outline Case (SOC) - identifies a 'preferred way forward'
- Stage 2: Outline Business Case (OBC) - identifies a 'preferred option'
- Stage 3: Full Business Case (FBC) - confirms the preferred option and sets out the means by which it will be delivered

1.3.6 In both sets of guidance, each business case stage comprises five 'Dimensions'. These are summarised in the table below:

Table 1.1: Business case dimensions and their purpose

Dimension	Purpose
Strategic	Defines the case for change (i.e., why something needs to happen); the transport planning or spending objectives; assesses alignment with organisational objectives policies and strategic priorities; and defines a long-list of options
(Socio) Economic[5]	Assesses value for money by appraisal options, providing evidence on which option delivers the greatest net benefit to society
Financial	Confirms the affordability of the programme and how it will be funded over its lifetime
Commercial	Sets out procurement and commercial arrangements for the programme, ensuring that it is viable and attractive to the market
Management	Defines how the programme will be delivered, governed and managed to ensure successful implementation

Relationship between STAG and the Business Case Process

1.3.7 As noted above, the requirement for this commission is to deliver a **'preferred option'** Network Strategy (i.e., sequence of investments and actions expressed through the Implementation Route Map). In order to reach this preferred option stage (and align with both Scottish and UK Guidance), it was necessary to complete the SOC and the OBC.

1.3.8 For context, the primary relationships between STAG and the business case process are therefore:

- **Stage 1 – Strategic Outline Case (SOC):** broadly incorporates the STAG 'Initial Appraisal – Case for Change' and 'Preliminary Options Appraisal' stages (qualitative).
- **Stage 2 – Outline Business Case (OBC):** broadly incorporates the STAG Detailed Options Appraisal, which itself draws heavily on the Department for Transport's Transport Analysis Guidance.
- **Stage 3 – Full Business Case (FBC):** extends beyond STAG and the scope of this commission.

[5] This is referred to as the Socio-Economic Dimension in the Transport Scotland guidance and the Economic Dimension in H.M. Treasury guidance.

1.3.9 The reporting structure across this study therefore: (i) follows the UK business case guidance as referred to by the Scottish guidance; and (ii) uses the main components of STAG for the qualitative and quantitative appraisal of options.

Programme Level Approach

1.3.10 UK business case guidance uses the term 'programme', defined as a series of planned measures, related events and co-ordinated activities in pursuit of an organisation's long-term goals. This definition applies well to this work, and we have therefore adopted this terminology. The outputs will hereafter be referred to as the Network Strategy Programme SOC / OBC, and these documents provide the framework for all subsequent project-level business case work.

1.3.11 As a programme business case, rather than a single project appraisal, the IITCP will define a long-term strategy for inter-island connectivity, rather than to develop individual schemes to a deliverable level of detail.

1.3.12 It is important to note that a **programme business case** entails the development of options to a level of detail that allows for comparison, but not to a level that would allow them to be immediately tendered or implemented. Therefore, for each of the options defined in the Network Strategy Programme OBC, **project-level business cases** will be required, which will progress that option to an implementable and market-ready position.

1.3.13 Future project-level business cases would draw on the 'umbrella' Network Strategy Programme SOC and OBC but update and expand on the analysis, and complete the Financial, Commercial and Management Dimensions for these individual projects in much greater detail. The project-level business cases will be developed over a long timeframe (circa two to three decades, with the phasing defined in the Implementation Route Map).

1.3.14 A **'Project FBC'** would follow the Project OBC at the point of procurement - for clarity, this overall structure is shown in the figure below:

Figure 1.2: Development of the Network Strategy Programme Business Case

1.4 What is the current status of the IITCP?

Strategic Outline Case

1.4.1 The IITCP Strategic Outline Case was approved by Shetland Islands Council Members on 25th June 2025 and is available on the project page on the Council website - Inter-Island Transport Connectivity Programme – Shetland Islands Council

1.4.2 The SOC established the case for change, the transport planning objectives and programme-level option packages for each island, to be appraised in the Network Strategy OBC.

Network Strategy OBC

1.4.3 **This report is the Network Strategy OBC** – whilst it restates the Strategic Dimension and further develops the deliverability discussion in the Financial, Commercial and Management Dimensions, its primary purpose is to present evidence which will allow Shetland Islands Council Members to select a **preferred option for each island**.

1.4.4 The Network Strategy OBC will be presented at a meeting of Shetland Islands Council on 30th June 2026, at which Members will be invited to select a preferred option for each island.

Implementation Route Map

1.4.5 The final element of the IITCP is to develop an **Implementation Route Map (IRM)**. The IRM will prioritise and phase the preferred options emerging from the Network Strategy OBC into a long-term network investment plan.

1.4.6 The IRM will be presented to Shetland Islands Council Members in autumn 2026 and will be the means by which individual project level business cases are prioritised. This sequence ensures that strategic justification (SOC), option selection (OBC) and delivery planning (IRM) are undertaken in a clear and structured manner.

1.5 Network Strategy – Outline Business Case Report

1.5.1 This Network Strategy OBC Report is structured around the Five Dimension Model and is intended to provide the evidence required for Shetland Islands Council Members to select a preferred option for each island. It consists of thirteen further chapters, as follows:

- **Chapter 2** restates and updates the Strategic Dimension, first set out in the SOC.
- **Chapter 3** sets out the approach to the development of the Economic Dimension, providing the context for the eight individual island chapters which follow.
- **Chapters 4-10** provide the Economic Dimension for each island / island-group individually. Whilst integrated into the Network Strategy OBC, these chapters are intended to be read on a broadly standalone basis.
- **Chapters 11-14** outline how the preferred island options and the IRM which ultimately emerges from the IITCP could be funded, procured and delivered.
    - It is important to note however that, in the absence of committed funding for any options at present, these dimensions are presented largely in the generality. Significant further development of these dimensions will be required in any project-level OBC.

Impact Assessments and Strategic Environmental Assessment

1.5.2 The IITCP is a wide-ranging programme which could have significant implications for the eight islands which it encompasses and for Shetland overall. Recognising this, the Council has commissioned the following reports in support of the IITCP:

- Equality Impact Assessment (EqIA)
- Fairer Scotland Duty Impact Assessment
- Island Communities Impact Assessment
- Children's Rights and Wellbeing Impact Assessment
- Climate Change Impact Assessment
- Health Impact Assessment (non-statutory)
- Strategic Environmental Assessment (SEA)

1.5.3 These supporting reports / impact assessments will accompany the Network Strategy OBC.

1.5.4 With regards to the SEA, the Environmental Report will accompany the IRM in autumn 2026, as it will assess the likely environmental effects of the programme overall.

Fixed Link Model

1.5.5 A key consideration of the IITCP is whether there is a case for replacing ferry services with fixed links on certain routes.

1.5.6 There has been a long-term campaign for fixed links in several islands and strong political support for their delivery. However, a perennial issue from an objective appraisal perspective is that there is a paucity of information on what it would take to deliver one or more tunnels in Shetland, particularly when compared with ferry and harbour improvements, which are well-understood.

1.5.7 Recognising this issue, the Council committed to undertake the Fixed Link Model (FLM) at the same time as approving the SOC in June 2025. The objective of the FLM was to develop the knowledge base around fixed links and ensure a like-for-like comparison with ferry service options in the IITCP appraisal. The FLM was undertaken by Stantec and COWI for a Yell Sound test case tunnel – it should be noted this does not imply that a tunnel to Yell should be the preferred option, nor does it confirm that it should be the first priority if multiple tunnel options are selected by Council Members.

1.5.8 The FLM sought to answer the following questions:

- What could the **design for a subsea tunnel** look like?
- Are there **contractors who would be interested** in building a tunnel in Shetland? If yes,
  - What models could the Council adopt to **deliver** this?
  - What is the **price** and **risk** level?
  - Is it **affordable** and, if so, **how could it be paid for**?

1.5.9 Elements of the FLM Report have been used to inform this Network Strategy OBC. This has included cost estimation for fixed links and inputs to the Financial, Commercial and Management Dimensions.

2 Strategic Dimension

2.1 Overview

2.1.1 This section summarises the Strategic Dimension, setting out the case for change, Transport Planning / Spending Objectives and options long-list. As the SOC was only approved by Council Members in June 2025, the Strategic Dimension remains largely unchanged but has been updated to reflect the passage of time, where appropriate.

2.1.2 In the interests of brevity and in accordance with the guidance, the Case for Change is only reported in summary here. The full Case for Change Report, as of June 2025, can be found on the Council website.

2.2 Strategic and Policy Context

2.2.1 The strategic context for the IITCP is set out in some detail in Chapters 3 and 4 of the Case for Change Report but is summarised below for the purposes of this SOC.

2.2.2 As explained in the introductory chapter, the IITCP is intended to update and ultimately supersede the Shetland Inter-Island Transport Study, which was published in 2016. A key part of the rationale for undertaking this refreshed study was a requirement to reflect significant changes in both the strategic and policy context over the last decade. The narrative which follows therefore provides the foundations of the IITCP, setting out why it is being undertaken and what outcomes it must seek to deliver at the local and national levels.

Strategic Context

How has the macroeconomic context changed?

2.2.3 Since the completion of SIITS in autumn 2016, there have been several changes in both the macroeconomic and institutional landscape, some of which are directly material to this study whilst others define the context in which it has been undertaken. These changes can be summarised as follows:

- When the SIITS study was being undertaken, **the Council ferry service operated with a significant Council funded annual deficit**. The award of top-up funding from the Scottish Government from financial year (FY) 2018-19 onwards addressed this, with funding ramped-up over time to cover the full annual deficit.
    - There was a **change to the basis of this funding for this financial year (2026/27)**. The funding has evolved from a specific ring-fenced grant into the wider **Local Government General Revenue Grant**. This has repurposed the grant from being purely about funding the operating deficit to providing the Council with a more flexible allocation which can be used more holistically to deliver inter-island transport policy.
- The **United Kingdom's withdrawal from the European Union (Brexit)** has had, and will continue to have, a multiplicity of effects on Shetland. Identifying and understanding these impacts is clearly beyond the scope of this study but it is nonetheless important to recognise both the change in the wider economic context and in procurement law since the SIITS study was published in 2016.
- At the time of the initial SIITS study, the focus was almost entirely on making an investment case to the Scottish Government. However, the **recent involvement of the UK Government in Scottish local authority transport matters** (of which the Fair Isle Ferry Replacement Project and Islands Growth Deal are the most pertinent examples in Shetland) provides a potential second outlet for this business case.

- In August 2023, the Scottish Government and Shetland Islands Council formed a **'Ferry Replacement Task Force'** to work jointly on proposals to support the Council's consideration of options for the long-term renewal of its internal ferry fleet. This Task Force provides a forum into which the outcomes of the IITCP can be input for discussion. It has already delivered **short-term funding commitments** across the 2025/26 and 2026/27 Scottish Budgets to support improvements to the inter-island transport network. An early outcome of this has been the ordering of a new relief ferry as part of the *Ferries Resilience Review*.

2.2.4 In short, much has changed since SIITS was published in 2016, but the key point here is that island transport issues have assumed a much higher profile in recent years and there is a recognition that the asset, financial, operational and customer problems facing the Shetland inter-island ferry network need to be resolved.

What is the strategic context in which the study is set?

2.2.5 Shetland has some of Scotland's most successful and vibrant island communities, but they are also facing many of the challenges that other islands, island groups and indeed Scotland overall are encountering. These macro level challenges frame the strategic context for the study and are summarised below:

- **Population retention** is the major challenge facing Shetland's island communities - the collective population of the in-scope islands has **reduced by almost a quarter** over the last four decades, which compares to a **5%** increase in mainland Shetland and broad stability for Shetland overall. Absolute reductions were particularly significant in the North Isles (Fetlar, Unst and Yell).
- Long-term population decline has been compounded by **population ageing** across the islands. They have an older than average population and a demographic position which has worsened over the last decade or so. This has increased the dependency ratio[6] and placed additional pressures on the remaining working age population. The dependency ratio of the islands is higher (**0.79** relative to **0.65** for mainland Shetland), highlighting that their demographics are less favourable.
- **House prices in Shetland's island communities lag those of mainland Shetland**, whilst the **cost of building is also higher**. This makes the provision of modern and affordable housing problematic and thus compounds the challenges associated with population retention and growth. Whilst this is a Shetland-wide issue outside of Lerwick, evidence from the engagement, including with the main local construction firm, highlighted that it is a particularly prominent issue in the islands, where a shortage of suitable housing is frequently cited as a major constraint on growth.
- From a **transport perspective**, the inter-island ferry network emerged in its current form in the 1970s and 1980s, designed around the short-sea crossings principle (on volume routes), with a high frequency Ro-Ro service operating across a long day with comparatively low fares for most islands. Residents of Shetland's island communities therefore have **a higher propensity to travel** for work, personal business and leisure, whilst **public service design** in many cases reflects the comparative ease of travel to and from the islands.
- For the above reason, the type and nature of travel on the **internal Shetland routes materially differs from most other island communities in Scotland**. There is significant regular travel, with strong commuting flows and high volumes of essential travel but generally lower tourism demand (although the tourism industry in Shetland is growing). Frequent non-discretionary travel on the Shetland network meant that **carryings on all routes quickly recovered from the COVID-19 pandemic**. The change

[6] The dependency ratio is the number of people aged under-16 and over-64 divided by the number of people of 'working age' (16-64).

in volumes and the composition of demand seen elsewhere in Scotland as a result of the pandemic has been much less prevalent in Shetland.

2.2.6 In summary, Shetland's island communities are facing several short and medium-term demographic and economic pressures. These communities (with some exceptions) have evolved around the ability to make frequent and comparatively low-cost car-based ferry journeys to access employment, business, personal services and leisure opportunities in Lerwick and elsewhere on mainland Shetland (and there is strong evidence from the resident survey to support this). This particular feature means that high quality, reliable, resilient and frequent connectivity offered over a long operating day (or 24-hours) is essential in promoting the continued development of the islands and addressing the aforementioned challenges.

Policy Context

2.2.7 When the original SIITS study was undertaken in 2015/16, much of the policy which informed it had been set in the 2000s (e.g., the National Transport Strategy (2006) and ZetTrans Regional Transport Strategy (2008)) or early 2010s (e.g., the *Scottish Ferries Plan 2013-2022*). These and other documents provided a clear but dated strategic direction for the work.

2.2.8 It was however recognised when preparing the reporting in 2016 that the Scottish Government planned to embark on a fundamental review of policy, commencing with the National Transport Strategy 2. Since the completion of the SIITS study, there has been a wholesale change in the policy environment through which a much more coherent position has emerged on several issues of relevance to Shetland's island communities. This section summarises the main policy developments and their implications for the IITCP. Full detail is provided in Chapter 4 of the Case for Change Report which, as previously noted, is available on the Council website.

2.2.9 It should also be noted that, **whilst not strictly a matter for a business case, there has been a growth in political interest in the connectivity of Shetland's island communities**, particularly with regards to fixed links. Indeed, several of the political party manifestos for the 2026 Scottish Parliament elections recognised the potential 'transformative role' of fixed links and pledged differing degrees of support to advance the work on this topic.

National Policy – Scotland

2.2.10 The enacting of the Climate Change (Emissions Reduction Targets) (Scotland) Act 2019 and its subsequent update in 2024 combined with the publication of the National Transport Strategy 2 (February 2020) has fundamentally changed the approach to transport infrastructure and service planning in Scotland.

2.2.11 *It should be noted that the National Planning Framework 4 (NPF4) is considered in the 'Local Policy' section due to its relationship with the Shetland Local Development Plan.*

Climate Change (Emissions Reduction Targets) (Scotland) Act 2019 and 2024

2.2.12 The Climate Change (Emissions Reduction Targets) (Scotland) Act 2019 was an Act of the Scottish Parliament committing the Scottish Government to deliver net-zero emissions[7] by 2045.[8] It embedded the principles of a 'just transition', which means reducing emissions in a way that reduces inequalities or at least does not widen them.

[7] Net zero means that the amount of greenhouse gas emissions released into the atmosphere and the amount that is extracted through offsetting measures will add up to zero - https://www.netzeronation.scot/the-importance-of-net-zero

[8] https://www.legislation.gov.uk/asp/2019/15/contents/enacted

2.2.13 The 'just transition' principle recognises that, in theory at least, islands have unique characteristics which have to be accommodated within the overall transition to net zero. This is particularly pertinent in Shetland where there is a concentration of employment and other essential services in Lerwick, making routine travel essential for many island residents.

2.2.14 It should be noted that this Act was significantly reformed in 2024, moving from a system of strict annual and interim emissions targets (set by the 2019 Act) to a system based on legally binding multi-year carbon budgets (introduced in 2024). However, whilst this represents a change in the way that progress is measured and accounted for, the 2045 net zero target has been retained and is central to this study.

What are the implications for the IITCP? The IITCP establishes a long-term network strategy for the eight in-scope islands, with a planning horizon which extends beyond the Scottish (and wider UK) net zero commitment. The option generation, development and appraisal therefore incorporate a focus on the absolute and relative embodied and operational carbon of each option, ensuring that the preferred strategy can be aligned with long-term decarbonisation objectives.

National Transport Strategy 2

2.2.15 In February 2020, Transport Scotland published its *National Transport Strategy 2* (NTS2) which set out a 20-year vision for Scotland's transport system to 2040, including a statement of transport's contribution to achieving net zero. Its **'Vision'** is:

- *"We will have a sustainable, inclusive, safe and accessible transport system, helping deliver a healthier, fairer and more prosperous Scotland for communities, businesses and visitors".*[9]

2.2.16 The Vision is underpinned by **four 'Priorities'** and **12 'Outcomes'** with which any prospective investment must seek to align, as is shown in the figure below:

[9] National Transport Strategy 2 (Transport Scotland, 2020), p. 5.

Figure 2.1: NTS2 Priorities and Outcomes (Source: NTS2)

2.2.17 Crucially for this study, the NTS2 established two 'hierarchies' which define the principles upon which future transport investment decision making and services should be planned – these are the:

- ***Sustainable Travel Hierarchy***, which defines the priority which will be given to each mode of transport in future investment planning, with walking and wheeling the highest priority and the private car the lowest.
- ***Sustainable Investment Hierarchy***, which establishes a structured set of steps to be followed when planning investment in transport infrastructure. The provision of targeted infrastructure improvements is the final step once it has been demonstrated that the scope for reducing the need to travel unsustainably and making better use of existing assets has been exhausted.

What are the implications for the IITCP? NTS2 and its embedded hierarchies provide a clear statement of the transport priorities of national government.

An inherent challenge here however is that the Shetland internal ferry network, and hence the island communities which it serves, has largely evolved around a car-based model of travel. There is therefore a balance to be struck in terms of reducing unsustainable travel without widening inequalities in island communities (i.e., a 'just transition'), where residents are frequently making essential car-based journeys to employment and / or off-island services.

The *Sustainable Investment Hierarchy* also very clearly identifies that 'targeted infrastructure improvements' should only be introduced once options under each of the preceding steps have been exhausted. For example, where ferry vehicle deck capacity is a problem, this hierarchy would advocate options to better manage demand prior to building more or larger ferries or a fixed link in the first instance. This point is particularly pertinent to fixed links, where the investment case will need to provide evidence that there are an insurmountable problem or problems that cannot be addressed through better use of existing assets.

Islands (Scotland) Act 2018 and the National Plan for Scotland's Islands (2024)

2.2.18 The Islands (Scotland) Act 2018 requires the preparation of a National Islands Plan (NIP), with the first Plan published in 2019. Following a statutory review, **a second NIP was published in February 2026**, setting out a refreshed programme of actions to address challenges and opportunities facing Scotland's island communities.

2.2.19 The current Plan places a strong emphasis on **population retention and attraction**, supported by priorities relating to sustainable economic development and improved connectivity. Transport is recognised as a critical enabler of these outcomes, with a continued focus on **reliable, resilient and accessible transport links**, alongside consideration of longer-term infrastructure solutions where appropriate.

2.2.20 Transport has a critical role to play in delivering these objectives for island communities. This is particularly the case for Shetland's island communities, where the concentration of economic activity in Lerwick and at Sullom Voe, combined with the export-oriented nature of the Shetland economy, heightens the importance of efficient and reliable transport links.

2.2.21 In this context, improving transport connectivity - encompassing both the resilience and capacity of inter-island connections - remains fundamental to supporting population sustainability, enabling economic activity, and enhancing access to services across Shetland's island communities.

What are the implications for the IITCP? The NIP is one of the few documents that adopts an island-specific policy perspective. It recognises the unique features and challenges of Scotland's island communities and places a strong emphasis on population retention and attraction as its overarching objective, supported by sustainable economic development and improved connectivity. The Plan continues to highlight the role of transport connectivity as a critical enabler of these outcomes, reinforcing the need for the IITCP to improve the reliability, resilience, capacity and accessibility of inter-island connectivity.

Summary

2.2.22 Since the completion of the Shetland Inter-Island Transport Study in 2016, there has been a significant and pronounced change in national policy direction. The Climate Change (Emissions Reduction Targets) (Scotland) Act 2024 and the NTS2 (and National Planning Framework 4) put decarbonisation at the heart of the policy agenda. There is now a distinct focus on travelling less frequently and, when a journey is required, that it is made by sustainable modes where possible.

2.2.23 The last decade or so has also seen a wider consciousness emerge of the issues faced by Scotland's island communities, culminating in the Islands (Scotland) Act 2018, the publication of the first and second National Islands Plan (2019, updated in 2024) and the conclusion of the Islands Growth Deal[10].

2.2.24 This evolution in the policy context provides a strong rationale for revisiting and updating the business case for improvements in inter-island connectivity.

National Policy – United Kingdom

2.2.25 Transport is a devolved matter in Scotland, with Shetland effectively operating a form of 'double devolution' in respect of its internal ferry services (notwithstanding that revenue funding is supported by the Scottish Government).

2.2.26 In recent years, however, the UK Government has taken an increasingly active role in supporting transport and wider infrastructure investment in Scotland. This has been delivered through partnership-based programmes such as the Islands Growth Deal, alongside national funding streams and successor regional investment programmes aimed at supporting economic development, infrastructure and connectivity across the UK.

2.2.27 The UK Government has adopted a missions-based approach to policy, with a focus on driving economic growth, improving connectivity, supporting the transition to net zero and reducing regional inequalities. Transport investment is recognised as a key enabler in delivering these overarching priorities

2.2.28 The outcomes of the IITCP are aligned with key UK Government transport and infrastructure priorities, including:

- **Transforming infrastructure to support inclusive growth and reduce inequalities:** Improvements to inter-island connectivity will reduce the peripherality of Shetland's island communities, supporting social mobility and improving access to employment, services and opportunities. These changes will also support nationally significant sectors such as aquaculture and renewable energy.
- **Delivering greener transport:** The Shetland internal ferry network currently relies on hydrocarbon-based fuels. Regardless of whether the preferred long-term solution

[10] https://www.islandsdeal.co.uk/

comprises renewed ferry services or fixed links, reducing operational and embodied emissions will be a central consideration of this study.

- **Improving integration of transport networks:** Limited modal alternatives contribute to car dependency for inter-island travel. While bus and active travel are outwith the immediate scope of this study, improving integration across transport modes will remain an important consideration.

2.2.29 By supporting these priorities, the outcomes of the IITCP contribute to wider UK Government missions, including:

- **Driving economic growth:** Through improving the efficiency and productivity of Shetland's economy, including key sectors such as aquaculture, renewable energy and the emerging space sector.
- **Delivering the transition to clean energy:** By enabling renewable energy development and reducing emissions associated with inter-island connectivity.
- **Reducing regional inequalities and improving opportunity:** By improving access to services, employment and economic opportunities for Shetland's island communities.

What are the implications for the IITCP? The project remains closely aligned with UK Government priorities. Investment in inter-island connectivity will support nationally significant industries, contribute to the transition to a net zero economy and help address the structural disadvantages faced by island communities.

Regional Policy

2.2.30 The change in the national transport and land-use planning policy landscape in-turn created the requirement to refresh regional policy, which is the responsibility of the ZetTrans Regional Transport Partnership (RTP) in Shetland. ZetTrans defines its policy positions for transport in Shetland by means of a Regional Transport Strategy (RTS) – the second ZetTrans RTS was developed over the period 2021-23 and was adopted in March 2025. This section sets out:

- The **alignment** of the IITCP with the RTS Vision, Objectives and Policies
- From a **governance perspective**, the alignment between the IITCP Network Strategy OBC and the ZetTrans RTS

IITCP and RTS alignment

2.2.31 The second ZetTrans RTS (RTS2) was based around an overarching 'Vision', under which sat six RTS Strategy Objectives and eight RTS Themes, within which individual policies were grouped.

2.2.32 The **RTS Vision** is:

- *"Our transport networks in Shetland and our connections to the rest of Scotland support our social and inclusive economic prosperity, provide equitable access to opportunities, enable people to live healthy and active lives, facilitate the development of sustainable and inclusive communities, and contribute to our net zero emission targets"*[11]

2.2.33 Whilst all of the RTS Strategy Objectives are relevant to Shetland's island communities, RTS Strategy Objective 2 was specifically set with these communities in mind:

[11] ZetTrans Regional Transport Strategy (ZetTrans, 2023), p. 7

- **RTS Strategy Objective 2:** To address the barriers which constrain access to and / or impose unreasonable costs on travel and freight transport for all groups within Shetland.

2.2.34 Through this objective, the RTS recognised that Shetland's island communities experience a specific set of transport problems which limit access and or increase the costs of travel for passengers and freight alike. This island-specific focus at the strategic level gave rise to an RTS Theme and associated policies specifically related to these island communities, as follows:

- **RTS Theme 4:** Improving internal ferry and air connections and exploring the case for fixed links so as to better connect Shetland's island communities.
  - **RTS Policy 25:** Our internal ferry network should be developed in a more coherent, recognisable, and integrated way for regular, occasional and new users of the network, including visitors.
  - **RTS Policy 26:** We are committed to contributing to the sustainability of our island communities by reducing or removing the cost, capacity and connectivity barriers to personal and business travel, the delivery of public services and the movement of goods between our islands.
  - **RTS Policy 27:** We commit to ensuring the maintenance of the ferry fleet and associated infrastructure and to invest in these assets and crews to a level which ensures a continuing reliable and resilient service.
  - **RTS Policy 28:** We commit to maintaining the inter-island air service to at least its current level and to explore opportunities to improve the service where necessary and deliverable. As part of developing and implementing this policy, we will take cognisance of the activities being undertaken by the Sustainable Aviation Test Environment located in Orkney.
  - **RTS Policy 29:** We will progress the feasibility and case for fixed links and act on the conclusions as part of our future wider inter-island connectivity planning across all modes of travel. Any fixed link should be implemented in conjunction with a high-quality public transport offer, which incorporates provision for cyclists.
  - **RTS Policy 30:** We will support island-based vessels and crews where safe, deliverable and practicable.
  - **RTS Policy 31:** We will ensure that all future ferry and aircraft replacement programmes will contribute towards the delivery of the Council's Climate Change Strategy.
  - **RTS Policy 32:** Inter-island services will move towards being fully accessible taking account of the needs of all users.[12]

What are the implications for the IITCP? The ZetTrans RTS provides the strategic transport rationale for this study (RTS Policy 29) and highlights a range of issues that it must cover including fixed links, island-based vessels and reducing the cost and connectivity barriers facing Shetland's island communities. The IITCP must therefore demonstrate how the preferred options respond directly to these issues and deliver a coherent long-term approach to inter-island connectivity.

Governance alignment

2.2.35 From a governance perspective, the IITCP is being led by Shetland Islands Council and the Network Strategy OBC will be presented to the Council for consideration and decision-making. ZetTrans, as Shetland's statutory Regional Transport Partnership, has a distinct role in relation to the Regional Transport Strategy and the strategic coherence of transport planning

[12] ZetTrans Regional Transport Strategy (ZetTrans, 2023), p. 10

across Shetland. The OBC is therefore being considered by ZetTrans from the perspective of its alignment with the RTS and as a strategic transport basis to inform Council decision-making, but ZetTrans is not being asked to approve the OBC, select preferred options, commit funding or make delivery decisions.

2.2.36 This alignment is summarised in the figure overleaf, which demonstrates how the preferred programme level options derived through the IITCP have their origins in the RTS:

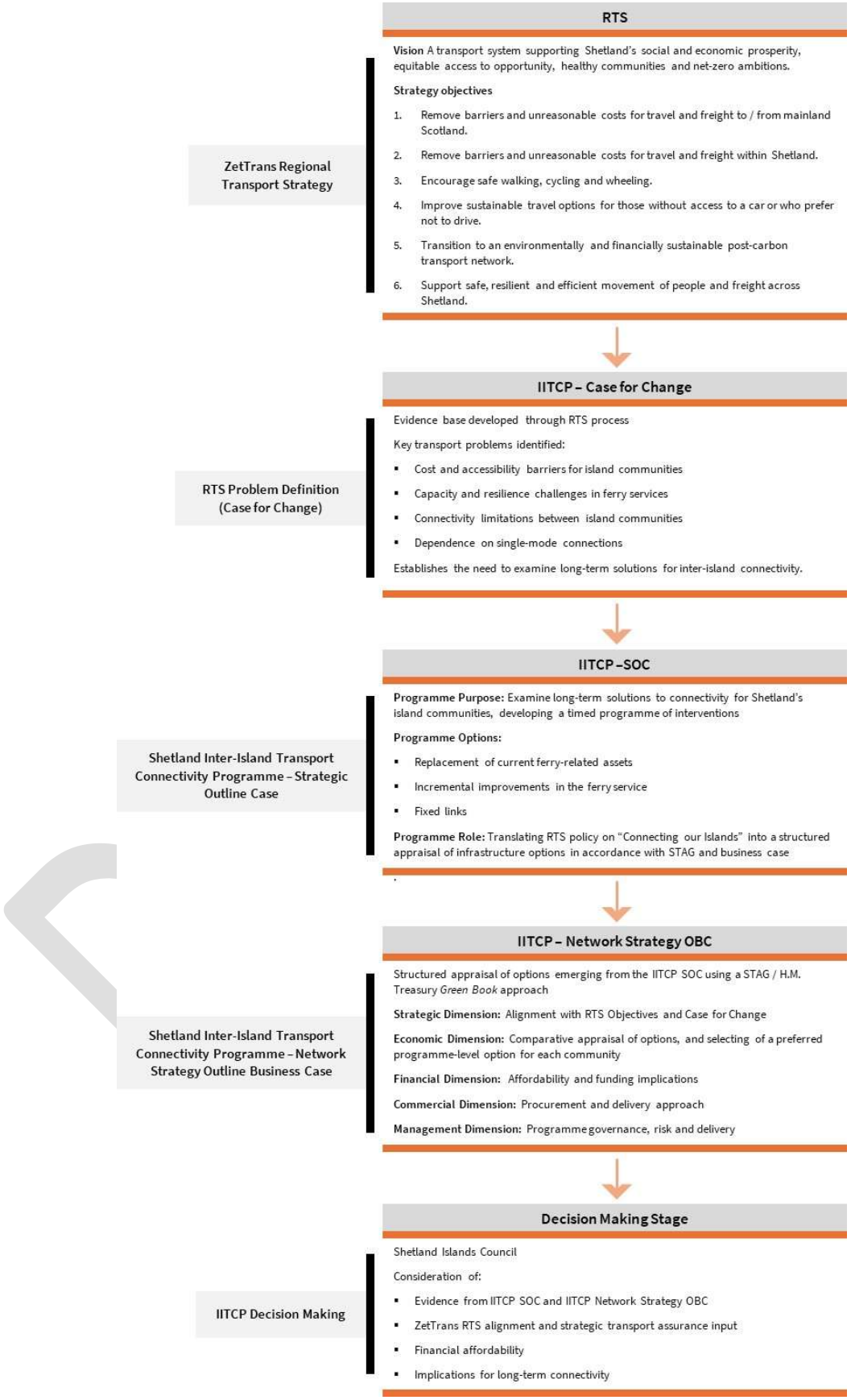

Figure 2.2: Governance alignment between the ZetTrans RTS and the IITCP

Local policy – Shetland Islands Council

Shetland Islands Council Corporate Plan 2021-2026 – Our Ambition

2.2.37 The Corporate Plan provides the strategic political direction for the Council across all policy areas. Much of the Plan is relevant to this study, for example its aspirations to achieve an improved demographic balance, equitably grow the economy and support new development. However, it is the transport theme which is most relevant.

2.2.38 The Plan references the challenges facing the inter-island transport network, including ageing assets and affordability. It also provides the specific political context for this study noting that:

- *"We will **continue to secure support from the Scottish Government to ensure financially and environmentally sustainable internal ferry services**, so we can continue to provide links between the islands that are reliable and support economic and social wellbeing, and will **continue to pursue fixed links where they can be proven to be a viable alternative**."*[13]

What are the implications for the IITCP? The Shetland Islands Council Corporate Plan 2021-26 provides the strategic political direction for this study.

Shetland Local Development Plan

2.2.39 The Local Development Plan (LDP) defines planning policy and the spatial approach to development in Shetland. Shetland's current LDP was adopted in 2014. Policy H2 of the LDP identifies eight areas of 'Best Fit' throughout Shetland in order to promote sustainable locations for residential or residentially compatible development. There are three island locations identified – Baltasound (Unst), Symbister (Whalsay) and Mid Yell.[14]

2.2.40 The Council is currently preparing its LDP2 which will reflect the policies and principles set out in National Planning Framework 4 (NPF4), the national spatial strategy for Scotland. Shetland's LDP2 is expected to be adopted in 2028.

2.2.41 In the intervening period, NPF4 will be the primary planning policy document that applies to Shetland, which takes precedence over the extant Shetland LDP. Of particular relevance to this study are the six spatial principles that will guide how development will be planned across Scotland and, by extension, Shetland:

- **Compact growth**, which is focused on development in locations that reduce the need to travel.
- **Local living**, which will enable people to meet most of their daily needs within a 20-minute walk, cycle or public transport trip (i.e., 20-minute neighbourhoods).
- **Balanced development**, which will ensure that development benefits all parts of Scotland, including rural and island communities. The focus is on avoiding over concentration and promoting a fair distribution of growth.
- **Conserving and recycling assets**, prioritising the re-use of existing buildings, infrastructure and land to reduce the environmental impacts of development.
- **Just Transition**, to support a fair and inclusive transformation to a net zero economy, ensuring that no community is left behind.

[13] Shetland Islands Council Corporate Plan 2021-26 (Shetland Islands Council, 2021), pp. 29-30.

[14] Shetland Islands Council Local Development Plan (Shetland Islands Council, 2014), p. 39.

- **Climate resilience**, with respect to directing development to places that are less vulnerable to climate risks.

2.2.42 The application of these principles will evidently take a different form in Shetland from more urbanised areas of Scotland, reflecting its dispersed geography and reliance on inter-island connectivity. However, with respect to the IITCP, they highlight the important consideration of balanced development, reflecting the need to ensure that development benefits Shetland's island communities.

What are the implications for the IITCP? The extant LDP and NPF4 provide the local spatial planning context for the IITCP. These documents recognise the importance of ensuring balanced development, which will include reflecting the needs of Shetland's island communities. The IITCP must therefore consider how the preferred options support sustainable development across the islands and avoid exacerbating existing spatial inequalities.

Shetland Islands Council Climate Change Strategy 2023-2027

2.2.43 Shetland Islands Council acknowledged a 'Climate Emergency' in January 2020, prompting the creation of the Climate Change Programme, with the purpose of minimising the risks of climate change to the Shetland community as far as possible, and to make the transition to net zero as beneficial as possible. The Council has a statutory duty to reduce greenhouse gas emissions in line with Scotland's national target of 2045, and to demonstrate that it is working towards this. The Shetland Islands Council Climate Change Strategy and associated Action Plan were prepared in response to these developments.[15] The Strategy is formed of six themes, of which **transport** is one.

2.2.44 The Strategy sets out six outcomes that the Council is seeking to achieve with respect to transport:

- Fully **decarbonise the Council fleet by 2045**, including heavy-duty vehicles, vessels and aircraft.
- Reduce emissions from business and commuter travel by **30%** by 2030 from the 2019 baseline.
- **Increase active travel infrastructure and encourage uptake of active travel** for Council employees and the Shetland community.
- Work towards **developing a public transport system that is affordable and attractive to residents**, which will increase use and efficiency.
- Support the **transition to zero-emissions vehicle use and transport infrastructure**.
- Prepare our transport networks and infrastructure for the **effects of climate change**.[16]

2.2.45 The Climate Change Strategy directly references the IITCP, highlighting that it will consider the emissions implications of fixed links and consider both the growing zero-emissions fleet of vehicles and the possibility of zero-emissions ferries. It is important to note that 'vessels' (the majority of which will be Council ferries) are by some distance the third biggest source of greenhouse gas emissions in Shetland, behind only 'waste and waste infrastructure' and 'Council homes', demonstrating the importance of the solutions that will emerge from this study.[17]

[15] Climate Change Strategy 2023-27 (Shetland Islands Council, 2022), p. 4

[16] Climate Change Strategy 2023-27 (Shetland Islands Council, 2022), p. 52

[17] Climate Change Strategy 2023-27 (Shetland Islands Council, 2022), p. 22

What are the implications for the IITCP? The Climate Change Strategy 2023-27 is the local expression of how the Council will contribute to the delivery of national net zero legislative commitments and is inclusive of a specific transport theme. The key consideration for this study is assessing through the appraisal the emissions associated with each option, both in terms of embodied and operational carbon. It will also be important to develop realistic assumptions on the timescales for the transition of the vehicle fleet and future options for low or zero emissions ferries to ensure that the preferred strategy is consistent with these commitments.

As with several other policy documents, there is also a presumption towards reduced business and commuter travel which the IITCP must consider alongside the need to maintain essential connectivity.

Shetland's Partnership Plan 2018-2028

2.2.46 The Shetland Partnership is the Community Planning Partnership (CPP) for Shetland, which combines a range of agencies and bodies that work together and with local communities to design and deliver better services. The Plan incorporates a shared vision, as follows:

- *"Shetland is a place where everyone is able to thrive; living well in strong, resilient communities; and where people and communities are able to help plan and deliver solutions for future challenges."*[18]

2.2.47 Under the 'Place' priority, public transport is noted as being of the highest priority for improvement according to Shetland communities.[19] It highlights that distance should not be a barrier to opportunity.[20]

2.2.48 The Partnership has published its *Second Locality Plan for Shetland's Islands with Small Populations*, which covers Fair Isle, Fetlar, Foula, Papa Stour and Skerries. The purpose of this Plan is to support these five island communities to find innovative solutions to their main local problems.[21]

What are the implications for the IITCP? The key point of note for this study is that the solutions for the four 'small population islands' in-scope are developed in the context of each locality, recognising that bespoke solutions may be required for each island (as per Fair Isle for example). The IITCP must therefore ensure that the development of options reflects these differing local circumstances and supports the long-term sustainability of each community.

Summary

2.2.49 The evolution of policy at the national (Scottish and UK) level has established the macro context for this study. At the strategic level, the Council must work towards delivering the national carbon reduction target but in a way that ensures a 'just transition' and recognises the unique characteristics of the eight in-scope islands.

2.2.50 This has been reflected in the formulation of Shetland-level policy, with the Council's Corporate Plan providing the political rationale for the study and the ZetTrans RTS the strategic policy direction. It is also recognised that inter-island transport is a cross-cutting

[18] Shetland's Partnership Plan 2018-2028 (Shetland Partnership, 2018), p. 2
[19] Shetland's Partnership Plan 2018-2028 (Shetland Partnership, 2018), p. 8
[20] Shetland's Partnership Plan 2018-2028 (Shetland Partnership, 2018), p. 9
[21] Shetland's Islands with Small Populations: Second Locality Plan (Shetland Partnership, 2023), p. 1

policy issue and the need for reliable and resilient connections is detailed in the Shetland Partnership Plan, the Council's Climate Change Strategy and the emerging LDP2.

2.3 Case for Change summary – what is the need?

2.3.1 Any appraisal or business case is founded on developing a **case for change – i.e., what is the rationale for investment**. In the context of STAG, the case for change is primarily focused on defining the transport problems that have been identified and evidenced. The Case for Change Report, which is available on the Council website, provides the extensive detail underpinning this summary section.

2.3.2 The case for change underpinning this business case is complex and nuanced – each of the eight in-scope islands have commonalities but they also have significant differences, reflecting their geography, economies, history and distinct cultures. Moreover, for several of the smaller islands, data availability is limited and that which does exist is often aggregated with other islands or mainland Shetland, out-of-date or not reported because it would risk the identity of individuals being revealed. However, there are two broad components to consider:

- **Network / operational problems**, which in this context are the problems that the Council experiences in delivering ferry services – i.e., the **supply-side**
- Problems experienced by a **user or potential user of the transport network** – i.e., the **demand side**

2.3.3 In the context of this programme, both supply-side and demand-side problems are important. However, the scale of the supply-side problems means that significant capital investment will be required irrespective of future demand growth.

Network / operational problems

2.3.4 As noted, the network problems are an expression of the supply-side difficulties faced by the Council in operating and maintaining its inter-island fleet – these can be summarised as follows:

- **Fleet resilience:** Resilience is a major challenge facing the inter-island ferry network. A combination of an ageing fleet, only having one spare vessel (and even that only outside of drydock periods) and harbour and vessel certification limitations on certain routes means that there are several potential points of failure. Recognising the criticality of this issue, the Council commissioned an internal **Ferries Resilience Review** in 2024 to consider short-term measures which could be adopted to put the service on a more sustainable footing. An early output from this process has been the ordering of one new vessel (due to be delivered in late 2028 or early 2029) to enhance fleet resilience.
- **Fleet age:** The Shetland internal ferry fleet is ageing, with an average age of 32.5 years and seven of the eleven vessels are over 30-years old. As a consequence of their age, a number of the vessels in the fleet do not comply with modern legislation and fall below passenger expectations. Significant fleet renewal will be required over the next 10-15 years, for which there is at present not committed funding.
- **Crewing:** The availability of qualified ferry crew, and in particular engineers, is placing a significant resilience challenge on the Council's Ferry Service. There is a global shortage of qualified seafarers (and engineers in particular), but this issue is being compounded by several Shetland-specific factors. Agency crew members are playing a crucial role in maintaining the current level of service (by and large), but this is not a sustainable long-term solution. The **Ferries Resilience Review** introduced some changes to shift patterns to support improved resilience, but this does not mitigate the ongoing challenge of crewing the fleet, particularly where vessels are based in islands of small population.

- **Succession planning:** The demographics of the current ferry crew are skewed towards the older age groups (**50%** are aged 46+ and only **9%** aged 16-25) and there is a clear challenge around long-term succession planning given the ageing population of the islands and Shetland overall.
- **Vehicle deck capacity:** Providing and managing vehicle deck capacity is a daily challenge faced by the Council on some routes. There are evident capacity problems on certain routes and at particular times of the day or week, exacerbated by the recent growth in average vehicle size. The approach to accommodating the future demand for travel is an important strategic choice for the IITCP.
- **Cost:** The operational challenges facing Shetland's internal ferry network have been compounded by sharp increases in cost and the associated annual operating deficit. Whilst the additional funding provided by the Scottish Government has offset this, the widening differential between cost and revenue remains a cost to the public sector overall.

2.3.5 In summary, there is an increasingly **urgent need for capital investment and additional crew to first put the service on a more sustainable footing**, before potentially **expanding** it to address problems experienced by users or potential users of the service.

User and potential user problems

Island-by-island problems

2.3.6 'Transport problems' from the perspective of users and potential users of the internal ferry network have been developed within a systematic 'Transport Problems Framework'. This is summarised in the figure below:

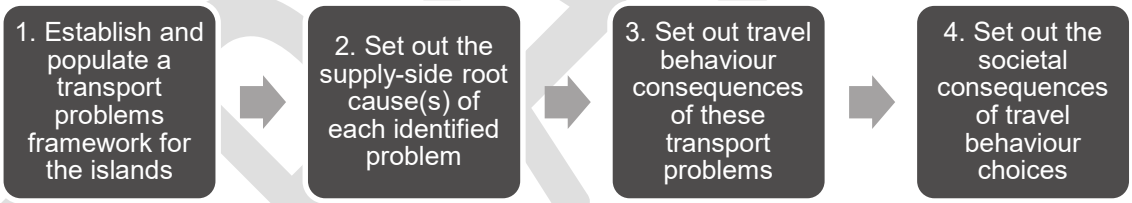

Figure 2.3: Transport Problems Framework process

2.3.7 **What is a transport problem?** Here, we primarily focus on the definition of a transport problem as being **a problem experienced by a user, or potential user of the transport network** in or travelling to / from one of the in-scope island communities. These transport problems can be thought of as one or more of:

- Something that **negatively affects a journey which is still made** (people and freight) by that mode of travel – *in the main this makes a trip less efficient, more expensive, less comfortable or more stressful in terms of safety and / or wellbeing*.
- Something that **stops people or goods travelling by (generally) more sustainable and policy friendly modes** – *this primarily leads to more car use and associated negative impacts across a range of policy areas including the environment, climate change and safety*.
- Something that **stops people making the trips they would like to make, or goods being moved** – with potential *impacts on peoples' life chances, wellbeing, and business opportunities*.

2.3.8 These transport problems are defined as problems faced by users of transport networks and services either now or potentially in the future and are the basic building blocks from which the investment case is developed.

2.3.9 Transport problems, when defined as described above, are typically associated with a relatively narrow range of parameters which define any trip, defined here as **'problem components'** - these problem components are set out in the table below:

Table 2.1: Transport problem 'components'

All modes of travel	Public transport specific
Concern over environmental impact of travel	Booking and journey planning (e.g., making connections between services)
Cost of travel and affordability[22]	Capacity
Fuel / power issues	Comfort, safety and security
Integration of travel between modes	Connectivity and network coverage (availability of services)
Journey information, including for protected groups who may find accessing information particularly difficult	Ease of use / convenience
Journey quality	Integration between services (within mode, e.g., bus-to-bus and between modes, e.g., bus-to-ferry, including for people with disabilities or other protected characteristics which affect accessibility
Journey times	Service reliability (cancellations and punctuality)
Journey time reliability (including public transport service punctuality)	Timetables (first and last / frequency / days of the week etc.) and their accessibility for all groups
Lack of awareness of travel options	
Personal accessibility – being able to access transport networks and public transport services specifically including people with disabilities or other protected characteristics which affect accessibility	
Personal security (fear of crime)	
Travel safety (collisions, personal injury)	

2.3.10 The above list was used as a 'checklist' to develop a set of transport problems for each island, which are detailed in **Chapters 7 to 13** of the Case for Change Report. The transport problems identified were presented, discussed and validated with the communities through the public drop-in sessions / community depth interviews. We can therefore be confident that we have a firm and agreed understanding of the principal problems affecting travel to and from island communities.

Aggregating the island transport problems

2.3.11 Whilst problems have been identified at the island level, this is a **network (programme) business case** and thus it is important to aggregate these problems, providing a focus for the setting of Transport Planning / Spending Objectives in Section 2.5.

2.3.12 This was primarily done through using the **resident survey**, supported by **wider community inputs** and **secondary data**. The resident surveys generated around **1,000** responses, with

[22] **Framing cost of travel as a barrier to opportunity:** In the Shetland context, the cost of travel is best understood as a structural barrier to access, not simply a per-journey or distance-based cost. Residents of island communities frequently rely on off-island travel for employment, education, healthcare and daily activities. As a result, the cumulative travel costs borne by households are disproportionately high, even when individual fares appear modest in isolation. Recognising this framing will be essential in ensuring fair funding models and infrastructure investment decisions that reflect the lived realities of Shetland's island communities.

around **600** from island residents and **400** from mainland residents, a very high response rate to a survey of this nature. These surveys asked respondents about their level of **satisfaction / dissatisfaction with 38 aspects of their ferry services**. Those who stated that aspects of the ferry services **prevented them making all the journeys they'd like to make** (around **1/3** of island respondents and **39%** of mainland respondents) were asked how significant **20 key aspects of the ferry services were in not travelling as much as they would like**. These 'dissatisfaction' and 'barriers to travel' metrics ultimately form the basis of the TPO setting process.

2.3.13 The quantitative analysis of the surveys focussed on responses from the four most populous islands (Bressay, Unst, Whalsay and Yell, where response rates were highest) plus Fetlar, and mainland Shetland. Survey responses from the lower population islands (where the absolute number of responses is low by definition) have been used in a more qualitative sense and supplemented by community depth interviews. A low number of business surveys were also returned, and these are reported in brief here and more broadly used in a more qualitative sense. These business surveys were however supplemented by an extensive programme of business and service provider interviews, which have been used to support the analysis.

2.3.14 In order to make the analysis more manageable, the **38 ferry dissatisfaction factors** and **20 barriers to travel factors** were allocated into one of nine prospective 'TPO themes' as set out in the table below.

Table 2.2: Survey ferry service factors and prospective TPO themes

TPO theme	Survey dissatisfaction factors	Survey barriers to travel factors
Accessibility – physical accessibility	- Facilities for those with a disability - Availability of suitable seating onboard	- Facilities for those with a disability
Capacity – ability to take a car on the ferry	- Ability to get on first sailing with a vehicle if not booked - Ability to book vehicle on my preferred sailings - The frequency with which I have to book for travel	- Ability to get on first sailing with a vehicle if not booked - Ability to book vehicle on my preferred sailings - The frequency with which I have to book for travel
Cost – fares	- Level of standard fares: vehicle - Level of 10-journey fares: vehicle - Level of standard fares: - commercial vehicle - Level of 10-journey fares: passenger - Level of standard fares: passenger	- Level of standard fares: vehicle - Level of standard fares: passenger
Journey times	- Check in times - Crossing time	N/A
Limited, fixed times of travel, within operating day – current timetables	- Service frequency - Sunday - Service frequency – Saturday - Monday timetables (Yell Sound, Bluemull Sound, Whalsay only) - Integration with other SIC ferry services - Timetable complexity and regularity - Convenience of 'booking only' sailings - Service frequency - weekday evening	- Service frequency - Sunday - Service frequency - Saturday - Service frequency - weekday evening - Service frequency - weekday

TPO theme	Survey dissatisfaction factors	Survey barriers to travel factors
	- Service frequency - weekday - Connections with NorthLink Ferry arrivals and departures (island residents only)	
Operating day restriction – service start and end times	- Ability to catch first flight (island residents only) - Ability to return home from last flight (island residents only) - Time of first sailing of the day - Time of final sailing of the day - Number of days per week that service operates	- Ability to catch first flight (island residents only) - Ability to return home from last flight (island residents only) - Time of first sailing of the day - Time of final sailing of the day
Other	- Ticketing and payment arrangements - Vehicle marshalling arrangements - The ease and convenience of the booking process - Comfort onboard	NA
Poor non-car travel options – public transport and foot passenger provision	- Public transport connections to island / mainland ferry terminal - Onward public transport connections from mainland / island ferry terminal - Parking at island / mainland ferry terminal - Quality of ferry terminal facilities	- Public transport connections to island / mainland ferry terminal - Onward public transport connections from mainland / island ferry terminal
Resilience – service consistency, reliability and punctuality	- Service during vessel re-fit periods - The number of service cancellations (short notice) - The number of service cancellations (notified in advance) - The punctuality of the services (i.e., sailings running to timetable)	- Service during vessel re-fit periods - The number of service cancellations (short notice) - The punctuality of the services (i.e., sailings running to timetable)

2.3.15 In order to get a sense of the relative importance of the prospective TPO Themes to Shetland residents:

- The dissatisfaction factors and barriers to travel factors were **ranked in terms of their frequency of being cited** – where being ranked **'1'** represents the highest level of dissatisfaction / biggest barrier to travel.
- An **average TPO Theme dissatisfaction rank** was then calculated (the average ranking of all the factors allocated to each theme) for island and mainland residents with respect to both dissatisfaction and barriers to travel.
- These **averages were then ranked**.

2.3.16 The results of this analysis are shown in the table below, where a **high ranking (low number) indicates greater significance** – the **top three** areas of dissatisfaction and barriers to travel are shown in **bold** and **orange** shading in each case

Table 2.3: Survey ferry service factors, barriers to travel and prospective TPO themes

TPO Theme	Dissatisfaction rank		Barrier to travel rank	
	Rank (island residents)	Rank (mainland residents)	Rank (island residents)	Rank (mainland residents)
Accessibility	7	7	6	4
Capacity	**3**	**3**	**1=**	**2**
Cost	**2**	5	5	4
Journey times	9	9	NA	NA
Limited, fixed times of travel, within operating day	6	**2**	**3**	**3**
Operating day restriction	5	8	4	7
Other	8	6	8	8
Poor non-car travel options	4	4	7	6
Resilience	**1**	**1**	**1=**	**1**

2.3.17 The **highest levels of dissatisfaction** are therefore associated with:

- Resilience
- Cost
- Limited, fixed times of travel, within operating day
- Capacity

2.3.18 **Cost** is a greater source of dissatisfaction with **island residents**.

2.3.19 The **key barriers to travel** therefore surround:

- Resilience
- Capacity
- Limited, fixed times of travel, within operating day

2.3.20 The results are very similar for island and mainland Shetland residents.

2.3.21 It is notable for **island residents** that, whilst **cost** is a major source of dissatisfaction, it is not considered a significant barrier to travel, reflecting the fact that most journeys made by island residents are non-discretionary.

2.3.22 This aggregated set of transport problems has been used to set the Transport Planning Objectives in Section 2.5. Ahead of this however, it is important in a business case to detail the **impact of not changing** so that there is a clear statement of the implications of a no investment position.

2.4 Impact of not changing

2.4.1 Failure to address the problems identified in the Case for Change will have negative impacts on Shetland's island communities and indeed the archipelago overall. For some islands which are already facing significant economic and demographic pressures, the perpetuation and worsening of the transport problems identified could threaten the viability of maintaining a sustainable community in the long-term. For others, it may undermine critical industries (e.g.,

aquaculture in Yell) and / or prevent or limit the scale and benefits of new investment (e.g., SaxaVord Spaceport in Unst).

2.4.2 For clarity, this report distinguishes between a 'Do Nothing' scenario (no further investment) and a 'Business-as-Usual' (BaU) scenario, which assumes continued investment to maintain current service levels. The latter is used as the appraisal baseline.

Do Nothing

2.4.3 The Do Nothing provides the baseline against which value for money is conventionally measured. In most business case settings, this implies a comparison against a broadly 'steady state' position – e.g., in the context of a new road, the basis of comparison would be the current road (hence the usual nomenclature of BaU). Whilst this approach could be adopted for the IITCP, it fails to recognise that the Do Nothing is not a static position – without investment in ferries or fixed links as current assets expire, the economies and societies of Shetland's island communities would be severely threatened. In short, the **Do Nothing represents a declining position over time, as ageing vessels and infrastructure would progressively reduce service reliability, capacity and operating hours in the absence of replacement**.

It should be noted that we discussed the basis of comparison in the appraisal with Transport Scotland, and they agreed with our view that the BaU (i.e., maintaining current service levels over time) is the more appropriate point of comparison than the Do Nothing in this context.

So, what does the Do Nothing look like?

2.4.4 The 'rule of thumb' for the replacement of a passenger ferry operating in Scottish waters was defined in the *Scottish Ferries Plan 2013-2022* as 30-years[23]. This is not a hard and fast rule as ferries can operate for many years beyond this date so long as their steelwork is in good condition – indeed one of the world's most luxurious small cruise ships, MV *Hebridean Princess*, was launched in 1964 as the Mull Ro-Ro ferry MV *Columba*. That said, as vessels get older:

- Breakdowns become more common
- Refits take longer either because more work is required or parts become harder to source
- Systems become obsolete
- Compliance with modern legislation and regulations becomes harder to maintain, with a dependence on 'grandfather rights' often required

2.4.5 These types of issues have very much come to the fore in Scotland in recent years. The most high-profile cases have been on the Clyde and Hebridean Ferry Services (CHFS) network and for the Corran Ferry, but Shetland Islands Council has also begun to experience these problems in more recent years.

2.4.6 The table below summarises the age of the Shetland ferry fleet in chronological order (note the Fair Isle vessel MV *Good Shepherd IV* is excluded as she is in the process of being replaced and is out of scope for this study):

Table 2.4: Shetland Islands Council internal ferry fleet – vessel age as of May 2026

Vessel	Primary Route	Entered Service	Age in 2026
MV *Hendra*	Symbister – Laxo / Vidlin	1982	44
MV *Snolda*	West Burrafirth – Papa Stour	1983	43

[23] *Scottish Ferries Plan 2013-2022* (Transport Scotland, 2012), p. 9.

Vessel	Primary Route	Entered Service	Age in 2026
MV *Fivla*	Spare	1985	41
MV *Geira*	Bluemull Sound	1988	38
MV *Bigga*	Bluemull Sound	1991	35
MV *Leirna*	Lerwick – Bressay	1992	34
MV *New Advance*	Foula – Walls	1996	30
MV *Linga*	Symbister – Laxo / Vidlin	2001	25
MV *Filla*	Skerries – Laxo / Lerwick / Vidlin	2003	23
MV *Dagalien*	Toft – Ulsta	2004	22
MV *Daggri*	Toft – Ulsta	2004	22

2.4.7 The key points of note from the above table are as follows:

- The **average age of the fleet** as of May 2026 is **32.5 years**.
- **Seven of the eleven vessels in the Shetland fleet are 30-years old or over**, with three of these vessels having now entered their fifth decade of service.
- There have been **no new vessels introduced into the Shetland fleet for over 20-years**.

2.4.8 This indicates that a significant proportion of the fleet is already beyond the commonly assumed replacement threshold, increasing the risk of reliability issues and unplanned service disruption.

2.4.9 In addition to the age of the vessels, there are several ships in the fleet which do not comply with modern legislation – for example:

- MV *Hendra*, MV *Fivla*, MV *Geira* and MV *Bigga* all have passenger accommodation below the waterline, accessed by steep steps.
- MV *Snolda* is limited to carrying 12 passengers due to her insufficient watertight sub-division.

2.4.10 Ultimately, even with investment in maintenance and life extension, vessels and landside infrastructure will reach a stage at which asset replacement is required. This may be preceded by the imposition of operational restrictions in terms of e.g., carrying capacity (passengers, vehicles, tonnage etc), length of operating day etc. Whilst complete loss of island connectivity is unlikely, a more credible outcome is a progressively degraded level of service - characterised by reduced reliability, capacity constraints and shorter operating days - which would materially affect island communities and the wider economy. Indeed, this situation has become manifest in the Clyde and Hebrides network in the first half of 2026. There is therefore evidently a requirement for a significant fleet renewal over the next 10-15 years and / or potential replacement of some ferry services with fixed links.

What are the implications of not changing / doing nothing?

2.4.11 The ‘Shetland model’ of inter-island connectivity was developed in the 1970s and 1980s, focused on enabling frequent travel by car on short ferry crossings operating regularly over a long day. The societies and economies of the islands have evolved around this high-level of connectivity. By way of comparison, the table below shows the comparable trip rates on the Orkney and Shetland internal ferry services in 2022:

Table 2.5: Orkney and Shetland internal ferry networks – comparable trip rates (2022)

	Passenger trips	Council population	Annual Trip rate	Mainland population	Annual Trip rate	Island population	Annual Trip rate
Orkney	320,800	21,958	15	17,162	19	4,796	67
Shetland	656,510	22,900	29	18,765	35	4,135	159

2.4.12 The key points of note from the above table are as follows:

- For the islands overall, the average Orcadian only makes around half **(15)** the number of trips of the average Shetland resident **(29)**.
- Specifically with regards to those who live in an island, the average Shetland resident makes around **two and half times** the number of journeys **(159)** that the average Orcadian **(67)** resident makes each year.
- It is likely that the figures in the above table slightly underestimate the relative difference in annual trip rates, as there is a higher volume of tourism to Orkney's island communities relative to those in Shetland.

2.4.13 High frequency of travel is therefore embedded in Shetland and maintaining the economic and social viability and sustainability of island communities is dependent on minimising the inconvenience associated with having to cross a body of water. As outlined in the previous section, there is an increasingly urgent need to replace the Shetland fleet, and failure to do so may have a range of consequences for island communities, including:

- **Continued long-term population decline** – the total population of the eight in-scope islands reduced by **24%** between 1981 and 2022. The trend in population varies by island but it is worth noting that **all islands except Bressay** have experienced population decline over the last four decades, with the population of the **North Isles (Fetlar, Unst and Yell)** having reduced by **one third** over the 1981-2022 period.
    - At the most extreme end of the scale, the sobering experiences of several abandoned Scottish islands, including the world-famous St Kilda, Stroma and Mingulay, highlight the ultimate end point when declining conditions on island allied with poor connectivity to larger centres of population combine to make a community unsustainable. Engagement with communities suggests that this is not an immediate threat for any of the in-scope islands, but **maintaining a viable and stable population is evidently a long-term challenge for several of them**.
- Allied to the above point, **the populations of the respective islands are ageing**. Most of the in-scope islands have a higher number of people of retirement age and a lower proportion of children than Shetland and Scotland overall. For example, over one third of Fetlar residents are above state retirement age and there are now no residents under 23-years of age on the island (as of March 2025). This translates into low rates of economic activity and difficulties and / or high costs of delivering services. Transport has an essential role to play in rebalancing the demographics of the islands in terms of providing access to education, employment and leisure opportunities for young people and families living in the islands, or for those that are minded to move to an island.
- Negative **labour market impacts**, particularly in terms of matching skills to jobs and filling vacancies. At **1.11** in 2023, Shetland has a much higher jobs density[24] than Scotland **(0.83)** and Great Britain **(0.86)**.[25] In short, there are more jobs than prospective employees, making recruitment difficult, and demographic change is exacerbating this problem. The transport connectivity of Shetland's island communities is important in

[24] Jobs density is the total number of filled jobs in an area divided by the resident population of working age in that area. A jobs density of >1 implies that there are more jobs than prospective workers

[25] NOMIS labour market statistics

providing access to mainland jobs for island residents. Perhaps more significantly however, there are high-value established industries on several islands and emerging new developments such as onshore wind and SaxaVord Spaceport in Unst. Maximising the labour market catchment of these industries is essential to their success and providing reliable and efficient inter-island transport connectivity plays a key role in this. Indeed, consultation with island businesses clearly identified access to labour as perhaps the most pernicious effect of connectivity limitations.

- Reduced **business productivity**, particularly in sectors such as aquaculture and agriculture where there is a requirement to physically move products. Several of the products produced in Shetland's island communities are very time sensitive and at the end of long supply-chains, making reliable inter-island connections of paramount importance. Moreover, the start and end time of the inter-island ferry service, combined with the departure time and capacity of the NorthLink ferry, define the production day for many businesses. Industries such as aquaculture, fish processing etc also have a degree of mobility and there is a risk of businesses relocating if e.g., moving products, recruiting labour etc becomes more difficult.
- **Tourism** in Shetland's island communities has grown strongly in recent years, particularly in Unst. Stakeholder engagement however suggested that issues of ferry service reliability (and also capacity to some degree) are constraining visitor demand (with accommodation also being an issue). A modern and reliable inter-island ferry service with adequate capacity or a fixed link is therefore important if this industry is to continue growing.
- Finally, **island residents and businesses already pay a cost premium for many goods and services**, reflecting their comparative geographic remoteness, thin supply-chains etc. The inter-island transport network compounds these cost pressures, both directly in terms of the need to pay fares, but also indirectly in terms of e.g., unproductive time for tradespeople, premiums charged to account for reliability risks, the cost of having some goods shipped etc. Any worsening of provision or reliability over time would further increase this cost premium.

2.5 Transport Planning Objectives

2.5.1 With regards to TPOs, the STAG Managers Guide (2022) states that: *The objective must express the change sought in the study area without indicating potential solutions*. With this in mind, when considering and developing TPOs it is helpful to place them in the context of the following simplified transport intervention logic map:

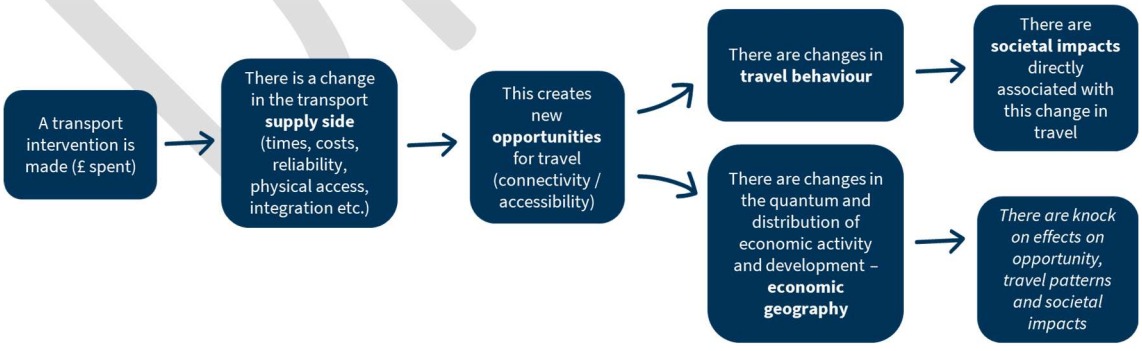

Figure 2.4: Simplified transport intervention logic map

2.5.2 Whilst there is no guidance from Transport Scotland regarding at which 'stage' in the logic map TPOs should be directed, measures of *supply-side* and *opportunity* are generally the most readily measurable in any appraisal, and changes in *travel behaviour* (and environmental *societal impacts*) are typically the most readily quantifiable / forecastable.

2.5.3 In the Shetland case, it is clear that significantly improved inter-island transport connectivity would have implications across the full extent of the logic map, and the graphic below illustrates how improved island connectivity can lead to changes in economic geography and greater dependency on this connectivity. This in turn drives the need for further improved connectivity, with the ultimate end point over time potentially including a fixed link (and in some cases a fixed link with no toll) subject to the outcomes of subsequent appraisal.

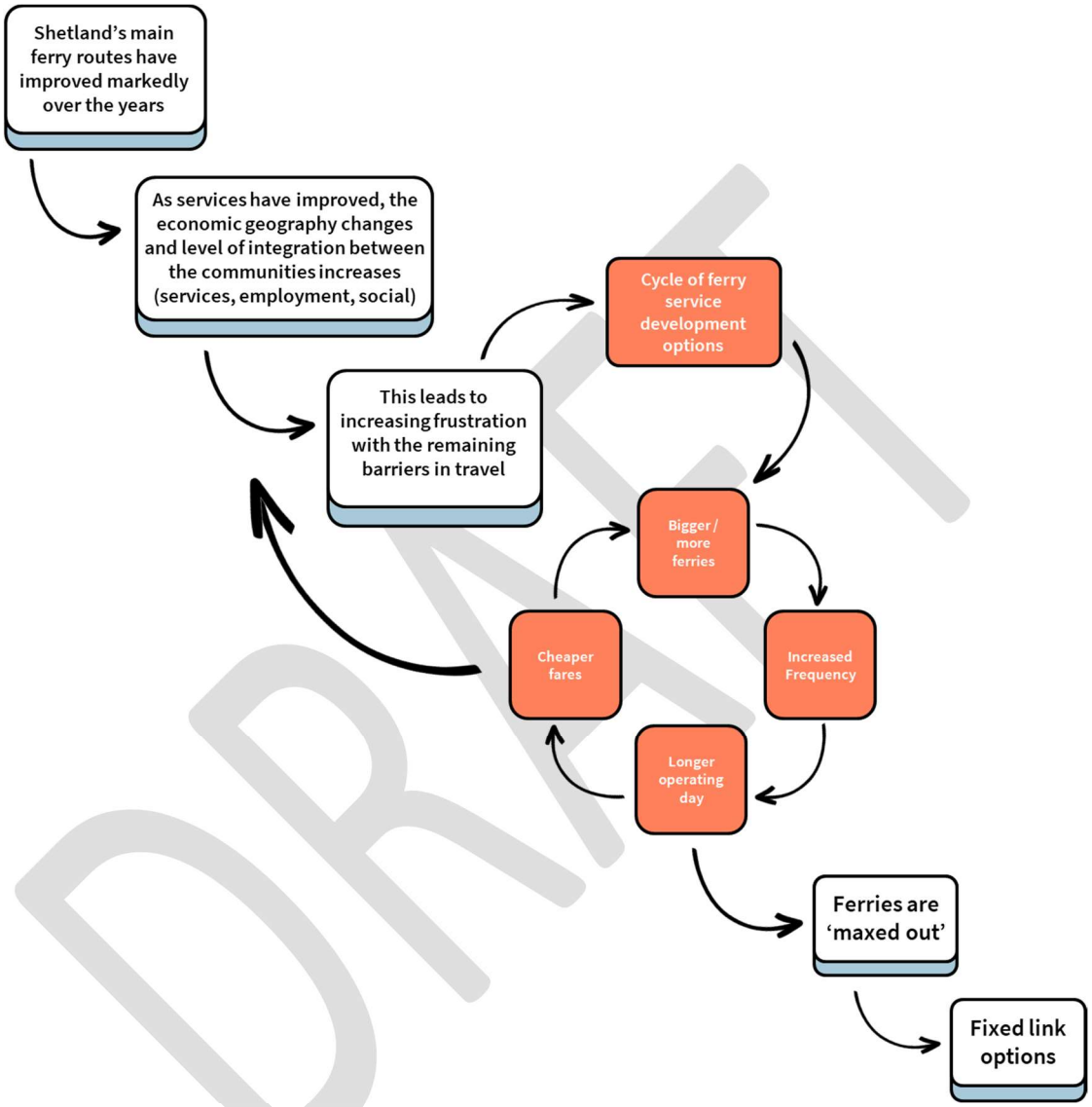

Figure 2.5: Inter-island transport connectivity through time

2.5.4 In the light of the case for change and the evidence of transport problems outlined in Section 2.3, the following TPOs have been set in response to the TPO themes of most significance The **TPO themes below are ordered in terms of their significance as barriers to travel**. In keeping with the guidance, the TPOs are not SMART[26] at this programme business case stage but will be made SMART in the individual project business cases which emerge from the IITCP.

[26] **S**pecific, **M**easurable, **A**ttainable, **R**elevant and **T**ime-bound

Table 2.6: Survey ferry service factors, barriers to travel and prospective TPO themes

TPO Theme	TPO
Resilience	Reduce or remove **variances from the regular published timetable**
Capacity	Reduce or remove the ferry **capacity** barrier associated with ferry travel
Limited, fixed times of travel, within operating day	Improve the **flexibility of travel** within the operating day
Cost	Reduce or remove the **cost** barrier associated with ferry travel
Accessibility	Make inter-island travel fully **accessible** to all
Operating day restriction	Improve travel options beyond the current **operating day**
Poor non-car travel options	Improve provision for those **not travelling by car** / who would **prefer not to travel to by car**
Other	No TPO set as not identified as a significant problem
Journey times	No TPO set as not identified as a significant problem

2.5.5 These TPOs are deliberately framed at a high level and are intended to capture the principal transport problems identified, rather than define specific solutions.

2.5.6 In terms of the logic map set out previously (Figure 2.4), these **TPOs are aimed at the transport supply-side**. The resident survey did also explore the degree to which people would make more trips to take up activities and opportunities so there is evidence to suggest that resolving these supply-side problems could lead to the travel behaviours and societal impacts set out in the logic map.

2.5.7 Whilst these TPOs will be used universally in the appraisal, it is recognised that their relevance will differ between islands.

2.5.8 As will be explained in Section 2.8, the options have been developed based on an incremental approach to addressing the TPOs, i.e., different levels of ferry service improvement will address these TPOs to different extents whilst a fixed link package could deliver all or almost all of these TPOs in their entirety.

2.6 Scope

2.6.1 The overall scope of the IITCP is to facilitate the delivery of **a reliable, resilient and decarbonised inter-island transport network that supports the growth and development of Shetland's island communities**. The transport outcomes desired are expressed through the Transport Planning Objectives.

2.6.2 However, there are a number of quite different ways in which this scope could be delivered, and the role of this programme-level business case is to identify the most appropriate approach to addressing the transport problems and meeting the needs of island communities in a way that maximises value for money.

2.6.3 Individual project level business cases will be developed for the interventions emerging from the IITCP programme. These will be phased over a number of years, with priorities defined through the subsequent Implementation Route Map.

2.7 Strategic Benefits, Risks, Constraints and Dependencies

2.7.1 This section focuses on the potential benefits, risks, constraints and dependencies associated with the generality of improving inter-island transport connectivity in Shetland, recognising that

there are different options with respect to potential solutions and the timeframes over which they will be delivered.

Benefits

2.7.2 The scale, timing and incidence of benefits which will be realised will be dependent on the solutions which ultimately emerge from the IITCP and the order in which they are implemented. At a strategic level, the benefits that can be expected to emerge from delivering the IITCP can be considered in three steps:

- **Improved transport network outcomes:** These are the direct outcomes of investment emerging from the IITCP, such as no / fewer capacity constrained sailings, the ability to travel more frequently etc.
- **Improved travel and supply-chain outcomes:** These are the changes in personal and supply-chain travel enabled by the 'transport network outcomes', e.g., more journeys made, greater ferry use by those with mobility impairments etc.
- **Societal impacts:** The corresponding societal impacts generated by the travel and supply-chain outcomes, for example, population retention, reduced social exclusion etc.

2.7.3 The component parts of each of these steps are set out below.

Transport network outcomes

2.7.4 The transport network outcomes represent the change in the service offered (or the supply-side change) delivered by the investment. These are:

- Improved **resilience** in terms of fewer or no **deviations from the published timetable**.
- Improved **reliability** in terms of fewer cancelled or delayed sailings.
- No or fewer **capacity** constrained sailings in terms passengers, vehicles and freight tonnage.
- Increased ability to travel more frequently **within the current operating day** and **beyond the current operating day**.
- Increased **flexibility of travel** within the operating day, particularly in terms of being able to secure a ferry booking or the removal of this requirement altogether (either through a ferry or fixed link solution).
- A reduction or removal in the **cost** barrier associated with ferry travel.
- An expansion of options for **non-car-based travel** on the ferry or through a fixed link.
- Removal of the current **physical accessibility** issues associated with certain vessels and a **reduction in inequalities** faced by those with certain protected characteristics on vessels and at ferry terminals.

Travel and supply-chain outcomes

2.7.5 The travel and supply-chain outcomes are those which could emerge from the improvement in connectivity. These will vary in type and scale depending on the solution ultimately adopted. However, it is anticipated that the ultimate preferred option could deliver the following outcomes:

- Increased **passenger carryings (including visitors)**, and potentially **vehicle carryings** depending on the quality of non-car-based alternatives.
    - These journeys would be for a range of purposes including employment, business, leisure etc.

- **New journeys** made as a result of the expansion of travel options.
- Greater certainty of goods being delivered **on time**.
- Greater ferry use by those with **mobility impairments**.
- Greater ferry use by those with **protected characteristics**.
- Improved passenger **wellbeing** and **journey quality**.
- Increased **bus travel** and **active journeys** to and from islands and / or ferry terminals.

Societal impacts

2.7.6 Societal impacts are the intended benefits that the investment is seeking to deliver for Shetland's island communities, supporting local, national and regional policy. These societal impacts / benefits are summarised in the table below and are split by **benefit category** (i.e., type), **beneficiary** (i.e., to whom it will be of value) and **class** (i.e., how the benefit will be measured):

Table 2.7: Strategic benefits to island communities

Benefit	Category	Beneficiary	Class
Community			
Increased community confidence	Wider societal benefit	Island communities and Shetland overall	Qualitative
Reduction in transport inequalities	Wider societal benefit	Island communities	Qualitative
Reduction in the cost premium faced by island residents	Wider societal benefit	Island communities	Qualitative
For some communities, provision of career path / development / progression opportunities for future island residents associated with the ferry service	Wider societal benefit	Island communities, particularly where vessels are based in the island overnight	Qualitative
Demographic			
Population retention and growth	Wider societal benefit	Island communities and Shetland overall	Quantifiable, but not readily monetisable
Improved demographic balance	Wider societal benefit	Island communities and Shetland overall	Quantifiable, but not readily monetisable
Employment and training			
Increased employment through better connecting labour and jobs – allows: (i) unemployed to enter workforce; (ii) uptake of higher-paid jobs; and (iii) working more hours	Wider societal benefit	Island communities and Shetland overall	Monetisable in line with TAG[27] Unit 2.1 (Wider Economic Impacts Appraisal), although absolute impacts would be small
Improved educational attainment through better connecting island-based students and educational establishments	Wider societal benefit	Island communities and Shetland overall	Qualitative
Productivity			

[27] Transport Analysis Guidance (TAG) is the Department for Transport's appraisal guidance and toolkit.

Benefit	Category	Beneficiary	Class
Improved productivity through increasing the effective size of the labour force and improved matching of skills to jobs	Direct benefit to businesses and wider societal benefit	Individual business, island communities and Shetland overall	Monetisable in line with TAG Unit 2.1 (Wider Economic Impacts Appraisal), although absolute impacts would be small
Improved business certainty and confidence associated with: (i) improved resilience; (ii) improved reliability; (iii) reduced cost of travel; and (iv) reduced stock loss	Direct benefit to businesses and wider societal benefit	Individual business, island communities and Shetland overall	Quantifiable, and potentially monetisable with appropriate data
Access to a larger customer base, particularly for leisure and tourism-focused businesses	Wider societal benefit	Island communities and Shetland overall	Quantifiable (connectivity analysis), but not readily monetisable
Efficiencies in public service delivery on-island, leading to savings for public bodies	Indirect public sector	Public sector bodies including the Council, NHS Shetland etc	Qualitative
Development			
Realisation / improved performance of new developments (e.g., SaxaVord Spaceport)	Wider societal benefit	Island communities and Shetland overall (and potentially beyond for Scotland and the UK)	Quantifiable but not readily monetisable
Increased housing development / refurbishment	Wider societal benefit	Island communities and Shetland overall as well as the Council and other housing developers	Given the small scale of impacts, this would only be reported qualitatively in this context
Environmental			
Reduced greenhouse gas emissions	Wider societal benefit	Scottish / UK society	Monetisable in line with TAG unit A3 Environmental Impact Assessment at the project level business case

Risks

Risk represents the possibility of an event occurring, which could adversely impact the IITCP. The table below outlines the most critical risks to the development of the programme.

Table 2.8: Major IITCP programme risks

Risk Theme	Cause	Risk Description
Affordability	The capital investment required for the delivery of future individual projects under the IITCP – including maintaining the service at its present-day level - is well beyond the Council's funding capacity. Delivery of the IITCP will be dependent on external funding, and this risk is explored in more detail in the Financial Dimension.	There is a risk that the Council may not be able to develop a robust investment case. At this stage, this is undoubtedly the most critical risk and source of uncertainty to the IITCP, particularly when it comes to the delivery of subsea tunnels.

Risk Theme	Cause	Risk Description
SIC organisational capability	If identified as the preferred option for a given island, subsea tunnelling projects are outwith the Council's typical knowledge and experience as a client organisation. Additionally, the Council would need to review its resources to manage such a project through its lifecycle.	There is a risk that future decision-making may underestimate the degree of uncertainty and complexity – technical, financial, commercial and organisational – associated with delivering a subsea tunnelling project, particularly given the limited experience of such projects in the UK. This could lead to the failure of elements of the IITCP and cause a reputational impact for the Council. It should be noted that the Council has made an early investment in risk mitigation through commissioning the Fixed Link Model, which sets out the Target Operating Model for the Council with respect to delivering a fixed link.
Ageing infrastructure	Ferry terminal infrastructure in Shetland is ageing and will need to be modernised and ultimately replaced to accommodate any ferry service development options. Outline costs have been developed for the IITCP, but there is still a degree of cost uncertainty until a project level business case and associated design and consenting work is undertaken.	Harbour infrastructure weighs heavily in the total capital expenditure requirements of the IITCP, even to maintain the present-day arrangements. Therefore, any uncertainty around the cost assumptions could lead to significant cost variability across the programme, putting additional pressure on the Council's financial position. Robust project level business cases informed by outline and detailed design, early contractor involvement and a clear consenting strategy will be key to mitigating this risk.
Consents	The delivery of any future ferry service development or fixed link options will be subject to successfully gaining the necessary consents.	There is a risk that the consenting processes could be challenging, attracting significant attention from interest groups and statutory consultees. This could result in significant delay, increasing the risk of added inflationary costs not accounted for and potentially limiting future financing opportunities. As an early mitigation measure, the Council has commissioned a Strategic Environmental Assessment (SEA) of the IITCP.
Crewing issues	The Council's Ferry Service is facing significant challenges around retaining and attracting crew. Although current issues with crewing may be cyclical, this does present a clear threat to future ferry service sustainability, particularly where vessels overnight in islands of small population.	There is a risk that the assumptions included in the Network Strategy OBC may need to be revisited in future project business cases, as they could affect the standing of any ferry service development options progressed.
Ferries operating costs	The Scottish Government currently funds the revenue gap required to run Shetland's inter-island ferry services. However, the requirement may be higher in the future as a result of ferry development options. Moreover, this funding is provided through annual Scottish Government Budget settlements and is no longer ring-fenced,	There is a risk that additional costs of operating future ferry service development options create an even larger revenue gap (i.e., operating deficit), which may not be covered by the Scottish Government, shifting the financial burden to the Council. This could require reworking the programme-level assumptions and result in delays to individual projects. An up-to-

Risk Theme	Cause	Risk Description
	so there is some uncertainty over the long-term profile of this support.	date funding position will be required for each project level business case.

Constraints

2.7.7 Constraints are the internal / external conditions and agreed parameters within which the programme and individual projects therein must be delivered and over which the programme has little or no control. The table below identifies high-level constraints with the potential to affect the programme:

Table 2.9: High-level project constraints

High-level constraint	Type	Potential project considerations / implications
Environmental designations	External – physical	Individual projects emerging from the programme will need to be delivered within the context of defined environmental constraints. Some projects may require an Environmental Impact Assessment. It should be noted that a key environmental consideration with tunnel options will be the disposal of tunnel spoil. Options and the preferred solution for this can only be defined in project level business cases, where the characteristics of the rock and opportunities for its reuse become clear.
Compliance with planning legislation	External - regulations	Several of the projects that may emerge from this programme will require infrastructure works, be they harbour upgrades or fixed links. Any such works would need to be delivered in accordance with Shetland Islands Council's planning policy, as well as those of the Marine Directorate for works below the mean high water spring tide level.
Compliance with industry design standards	External - regulations	Several of the vessels in the Council fleet are operating under 'grandfather rights', providing specific exemptions to regulations which were not in force when the vessels were built. Any new vessels and indeed harbour infrastructure will need to be built to modern standards, which will include compliance with the Equality Act 2010. This may impact the size of vessels and associated infrastructure works. Any fixed links would likely need to be designed in accordance with the Design Manual for Roads and Bridges (DMRB), with any departures from standards agreed within the Council (as the Roads Authority) and potentially with Transport Scotland.
Funding	External - funding	There is at present no in-principle or committed funding for any of the projects which will emerge from the IITCP, including for e.g., further business case work, design etc.
Procurement regulations which apply to local authority project delivery.	External / internal - procurement	Shetland Islands Council must adhere to the Public Contracts (Scotland) Regulations 2015 and the Reform Act (Scotland) 2014. Whilst the procurement strategy for any individual element of the IITCP will be developed in project level business cases, it will be necessary to work within this constraint.

High-level constraint	Type	Potential project considerations / implications
Subsidy control	External / internal - legislative	Any individual project emerging from the IITCP must be delivered in accordance with the Subsidy Control Act 2022.
Crewing	Internal - resourcing	It is important to recognise that any short-term measures to operate the service more intensively or add additional vessels will be constrained to some degree by the availability of suitably qualified crew. Scaling-up the ferry service would therefore require a period of time between taking the decision to do so and actually delivering it.

Dependencies

2.7.8 Successful delivery of the programme and its inherent projects will depend on several factors which are outside of the immediate control of the programme and project environment. These dependencies are summarised in the table below and, whilst outwith the control of the project team, they are reflected in programme planning so as to minimise risk.

Table 2.10: High-level project dependencies

Dependency	Type	Comment	Project Delivery Interactions
Ferries Resilience Review	Internal	The IITCP and all subsequent business case work must complement the recent Ferries Resilience Review undertaken by the Council. The options (see Section 2.8) have been developed to reflect this requirement.	Approval of the IITCP Network Strategy OBC.
Business case sign-off and political approval	Internal	Shetland Islands Council Members will be required to approve the Network Strategy OBC and thereafter individual project business cases prior to any intervention being delivered.	Conclusion of the programme and then individual project business cases up to the commencement of construction.
Consents	Internal / external	Any harbour infrastructure or fixed link (including ground investigations) will require consents. This is likely to include terrestrial planning consent and a marine licence as a minimum. Site specific consents may also be required.	Commencement of construction.
Securing funding	Internal / external	There is a requirement to secure in-principle and thereafter committed funding. Each funding source will have its own governance and assurance requirements which will have to be met.	Release of funding and commencement of construction.
Design approval	Internal / external	Design approval will be required for any vessels, harbour infrastructure or fixed links, particularly where these entail a departure from agreed standards	Release of funding, political approval and commencement of construction.
Subsidy control	External	The procurement and funding strategy for any project developed through this study must satisfy the Council's Governance and Law Service that it is compliant with the Subsidy Control Act 2022.	Permission to proceed with any project and release of associated funding.

Dependency	Type	Comment	Project Delivery Interactions
		If Scottish and / or UK Government funding is involved, additional assurance may be required from the Scottish Government Legal Directorate and / or Department for Transport.	
Successful procurement of contractors	Internal / external	Market interest in delivering any individual project emerging from the IITCP will need to be established at the point of procurement. Thereafter, the procurement process and outcomes would need to be agreed within the overall project / programme governance structure.	Decision to tender, appointment of a contractor(s), release of funding and commencement of construction.
Crewing	Internal	Any short-term measures to operate the service more intensively or add additional vessels may require: (i) an agreed change in current crewing arrangements; or, more likely (ii) the deployment of additional crew.	Decision to implement any short-term measures to operate the service more intensively or introduce new vessels.

2.8 Options Long-List

2.8.1 This section summarises the development of the long-list of options, including key assumptions, design principles and constraints applied. These options form the basis of the option packages which are considered in the Economic Dimension.

Ferries Resilience Review

2.8.2 It is important to reiterate that the Council is facing immediate resilience problems associated with its ageing fleet, including longer refit periods, more frequent breakdowns and a shortage of crew. In order to address this problem, the Council commissioned an internal Ferries Resilience Review in 2024 to consider short-term measures which could be adopted to put the service on a more sustainable footing.

2.8.3 This review, which reported in September 2024, identified a number of recommendations / actions including changes to crew shifts and pay (now implemented) and the requirement for the procurement of an additional vessel for the fleet, which is out to tender at the time of writing.

2.8.4 Reflecting the spirit of the review, the **business-as-usual** option package outlined later in this chapter incorporates measures to address current resilience issues (including fleet availability and crewing), such that it represents a realistic baseline rather than a continuation of current service disruption. The *Ferries Resilience Review* is therefore explicitly recognised by and incorporated within the definition of the baseline and the option generation process.

Vessel typologies

2.8.5 As a programme level business case, the IITCP only considers vessel design at a high-level. That said, the Council operates a network, and it is essential that, in network planning, there is a clear strategy with respect to vessel replacement.

2.8.6 As detailed in the Case for Change Report, a constraint on the Shetland network at present is that there is limited interchangeability within the fleet – this causes management problems and is limiting in operational terms, with some vessels such as MV *Leirna* limited to plying their current routes only. Ideally, and where economically and financially practical, vessels should

meet the same class rules of construction instead of the present regime which has differences of classification for different routes, times of year etc.

2.8.7 The IITCP therefore supports **greater standardisation of the fleet**, with a limited number of vessel designs to improve and optimise flexibility in vessel and crew deployment. It is though important to recognise that certain islands, Foula for example, will likely always require bespoke solutions that meet their specific needs. A typology consisting of **five vessel types** has been defined and applied in the IITCP – this is detailed in the table below:

Table 2.11: IITCP vessel typologies

Typology	Class	Indicative Length Overall	Indicative PCU Capacity	Single[28] or Double-Ended[29]
Bespoke	Workboat	Max. 24m	1	Not roll through
Fair Isle Class	Workboat	Max. 24m	4	Not roll through
Type 1	Euro B	33m	14-15	Single
Type 2	Euro B	45m	22-24	Double
Type 3	Euro B	65m	31	Double

2.8.8 This typology provides a consistent set of assumptions for fleet replacement across all options, ensuring that differences between options reflect service levels and infrastructure provision rather than underlying vessel specification.

2.8.9 The key points of note from the above table are as follows:

- Both Fair Isle and Foula have a very different model of operation to the other islands in Shetland. On both islands, the vessel is coded as a **workboat** and limited to a maximum of 12 passengers. This very much fits the needs of both islands, allowing the vessel to be island-based and crewed. A new vessel has recently been ordered for Fair Isle (the **'Fair Isle Class'** cited in the table above) and this may provide a usable design for Foula (or a variant therein). This is explored in the Economic Dimension and has been discussed with the community. It may however remain the case that Foula requires a genuinely bespoke vessel to fit with its infrastructure and meet community needs.
- It is assumed that vessels of Type 1, 2 and 3 will be classified as **Euro B**, thus maximising the scope for short-term redeployment and long-term cascade within Shetland.
- The indicative **Passenger Car Unit (PCU) capacities are intended to replicate or slightly increase** those provided by the existing tonnage.
- On review of the infrastructure, the project team has determined that **vessel length overall should be capped at 65 metres, effectively providing a 'Shetland Max' vessel which defines the upper bound for vessel size across all options considered**. The Type 3 vessel is therefore equivalent in size to the Yell Sound ferries, MV *Dagalien* and MV *Daggri*. Building vessels larger than this would have significant infrastructure implications, would lead to periods of very low-capacity utilisation and would also increase the number of vessel types, negatively impacting on the flexibility of deployment of vessels and crew (and thereby reinforcing current resilience issues). The principle adopted therefore is to **achieve capacity through frequency rather than**

[28] A single-ended ferry has a designated forward end which will always face the direction of travel. Whilst such a vessel is drive through, it will always need to turn to either access or egress the berth. An example of such a vessel in Shetland is MV *Linga*.

[29] A double-ended ferry is a type of ferry with identical bow and stern sections, allowing it to travel in either direction without needing to turn around. An example of this in Shetland is MV *Dagalien*.

vessel size, in order to maximise operational flexibility and minimise infrastructure requirements.

- To reduce journey times and simplify operations, it is assumed that **the majority of the fleet will migrate to being double ended over time**. The Type 1 vessel will however remain single-ended to ensure it delivers the required seakeeping standards and thus reliability.

2.8.10 The table below identifies the candidate vessels by route which will be incorporated in the option generation and further developed - it does not represent a preferred allocation under any specific option:

Table 2.12: Vessel typology and candidate routes

	Vessel Typology				
Route	**Bespoke**	**Fair Isle Class**	**Type 1**	**Type 2**	**Type 3**
Bluemull Sound	✗	✗	✓[30]	✓	✓
Bressay	✗	✗	✗	✓	✗
Foula	✓	✓	✗	✗	✗
Papa Stour	✗	✗	✓	✗	✗
Skerries	✗	✗	✓	✗	✗
Whalsay	✗	✗	✓	✓	✓
Yell Sound	✗	✗	✗	✗	✓

2.8.11 It should be noted that, whilst there is a commitment to standardisation in principle, a **slightly modified design of the Type 1 vessel may be required for Papa Stour and Skerries**, given seakeeping conditions on those routes. Any such variant would nonetheless be designed to remain within the same broad dimensions so as to facilitate use at different ferry terminals across Shetland.

Type 1 Vessel

2.8.12 The Ferries Resilience Review highlighted the need for an expansion of the fleet size to ensure adequate cover for breakdowns and the annual refit period. Reflecting this requirement, the Council worked with its framework naval architects Macduff Ship Design to design a new small ferry capable of operating across the network. This design is out to tender at the time of writing. This vessel forms the basis for the IITCP Type 1 and is thus the first investment action emerging from the IITCP.

2.8.13 An important consideration with this vessel class is ensuring that it can operate across as many routes as possible, either as the primary vessel or as a relief. Additionally, a key constraint on option development is the need to avoid vessel specifications which would trigger more onerous crewing requirements.

2.8.14 To this end, she has been **designed to remain within a threshold of 500 gross tonnes (GT) and 750kw installed power**. The rationale for this is that any vessel with a higher GT or power requirement would impose more onerous qualifications on the crew, known as the Standards of Training, Certification and Watchkeeping for Seafarers (STCW). A significant proportion of the Council ferry crew are not certified to this level as it has not been required for the vessels and routes which they operate. Obtaining STCW qualifications would require

[30] A Type 1 would only be deployed on Bluemull Sound in the event of either: (i) a three-vessel solution, where it would be dedicated to Fetlar; or (ii) if a fixed link was progressed between Yell and Unst, thus providing Fetlar with a dedicated vessel.

extended periods of sea time on a qualifying vessel, which could entail crew leaving the Council ferry service and possibly Shetland altogether to obtain this experience.

2.8.15 The vessel currently under being tendered fits within these parameters and would therefore offer a broadly like-for-like replacement in terms of both size and vehicle capacity for several of the smaller vessels in the Council fleet, including MV *Bigga*, MV *Fivla*, MV *Geira* and MV *Hendra*.

Option generation

2.8.16 This section sets out the approach to the initial generation and development of the options.

2.8.17 There are several challenges with respect to option generation in this study – these include:

- For each route, there are **multiple potential capital and revenue options**, each of which merits consideration in detail, and some of which could be the subject of studies in their own right, changes to fares for example.
- There is a **temporal issue**, whereby some revenue options could be implemented immediately with the current vessels, but capital investment could be some years away depending on asset condition and route need.
- Even where there are few problems on a route, **asset replacement** will be required over the lifespan of this programme, and thus capital investment will be necessary on all routes (and with ferry options, there will be several rounds of asset replacement over the lifespan / appraisal period of a fixed link).

2.8.18 Without structuring, this would result in an unmanageable number of permutations and difficulties in undertaking an appraisal which meaningfully distinguishes between options. It is therefore essential to reiterate that the IITCP is a programme business case, rather than a project business case. That is, it is a strategic document focused on justifying a group of related projects (i.e., developing a long-term plan for investment) and their outcomes and long-term benefits rather than justifying a single project.

2.8.19 To ensure a manageable and distinguishable set of options for appraisal purposes, individual options were combined into packages for each route and island. These packages reflect the Case for Change and are intended to incrementally address the transport problems identified. As explained in Chapter 1, at the conclusion of this Network Strategy OBC, short-term priorities for project level OBCs will be identified through the Implementation Route Map - it is subsequent to this stage that more detailed consideration of the intricacies of options for each island will be considered (i.e., in project-level business cases). This structured approach ensures that the appraisal compares a manageable and meaningful set of distinct investment pathways, consistent with STAG guidance for programme-level business cases.

2.8.20 There are therefore two strands to this option generation process:

- **Candidate fixed link islands[31] (Bressay, Unst (plus Fetlar, as an integral element of Bluemull Sound), Whalsay and Yell):** For these five islands, the options increment up from the present-day position to a 'Ferry Do Max' option, which is effectively a ferry comparator to a fixed link. The responses to the resident survey for these islands were of a sufficient number to highlight the key areas of dissatisfaction with the service. When combined with other secondary data, it was possible to develop detailed option packages for consideration that incrementally address the problems expressed by communities.
- **Foula, Papa Stour and Skerries:** For these smaller and more geographically remote islands, the option generation was focused on asset replacement and increments to the

[31] It should be noted that a fixed link to Fetlar was considered and discounted from further consideration in the Strategic Outline Case.

current ferry service. The option packages were defined through in depth interviews with each community, supplemented by other secondary data.

Option Packaging

2.8.21 Reflecting the preceding narrative, a set of option packages were developed which are intended to reflect and address the transport problems identified in the Case for Change Report. The option packages are structured as incremental improvements, with each successive option building on the previous one.

2.8.22 The table below summarises the options taken forward for appraisal in this Network Strategy OBC:

Table 2.13: Option packages

Option	In-Scope Islands	Description
Business-as-usual	All	Reflecting the Ferries Resilience Review, the BaU option is focused on operating services as per the published timetable, addressing recent resilience issues and the disruption caused by refit periods. From an asset replacement perspective, it assumes replacement of vessels at the point of life expiry with vessels of a broadly like-for-like vehicle carrying capacity (although such vessels will likely be physically larger, reflecting modern design requirements).
Ferry 'Do Something'	All	This option package involves addressing current route priorities using the current assets, supplemented by revenue measures. It does however include asset replacement ahead of life expiry where there is a clear justification for this, capacity problems for example.
Ferry 'Do Maximum' (Do Max)	Bressay, Fetlar Unst, Whalsay and Yell	The 'Do Max' is intended to demonstrate a realistic maximum level of connectivity that can be achieved by significantly scaling-up revenue and capital funding. The 'Do Max' expands the Ferry Do Something to provide a service level broadly equivalent to that offered by Western Ferries in the Firth of Clyde and would reduce other barriers to travel (e.g., provision for 24-hour sailings, reduced fares etc). This will only be considered for a subset of islands, both as a comparator to a fixed link and, where it can be demonstrated as practical, as a potential option in its own right
Fixed link	Bressay, Unst, Whalsay and Yell	Fixed link options have been developed for the four listed islands. Within these options, there are potential variants around tolling and public transport provision through the fixed link. It is important to note here that public transport provision must be integral to all fixed link options, if those without access to a car or who would prefer not to drive, including cyclists, are not to experience inequality of opportunity.

Island-level options

2.8.23 Section 3.8 of the SOC provided a detailed breakdown of the option packages for all eight in-scope islands. In the interests of brevity, this is not repeated here, partly because the options

are restated and further developed in the Economic Dimension chapters which follow for each of the islands. Further detail can be found in the SOC if required.

Options progressed to the Network Strategy OBC

2.8.24 The table below summarises the options progressed from the SOC into the Network Strategy OBC (this report) following a decision of Shetland Islands Council Members in June 2025. Further detail on the rationale for the selection and rejection of individual option packages can be found in the SOC.

Table 2.14: Option packages progressed to Network Strategy OBC

Island	Business-as-Usual	Ferry Do Something	Ferry Do Max	Fixed Link
Bressay	✓	✓	✓	✓
Fetlar (Bluemull Sound)	×	✓	✓	×
Foula	✓	✓	Not applicable	
Papa Stour	✓	✓	Not applicable	
Skerries	✓	✓	Not applicable	
Unst (Bluemull Sound)	×	✓	✓	✓
Whalsay	✓	✓	✓	✓
Yell	✓	✓	✓	✓

2.9 Next Steps

2.9.1 The Strategic Dimension has set out the case for investment, developed the TPOs and generated a set of option packages for appraisal. It provides the foundation on which all other elements of the business case are built.

2.9.2 The next step in this Network Strategy OBC is therefore to further develop the particulars of these option packages and subject them to appraisal against the TPOs and STAG criteria. This appraisal has been undertaken to assist Council Members in their selection of a preferred option for each route.

2.9.3 It is important to note though that this study is somewhat unusual as it is comparing two very different solutions for four islands (i.e., continue with ferries or replace them with tunnels) with respect to both outcomes and the cost profile over time. This is uncommon as most transport business cases compare broadly similar interventions where the spend is typically up-front, and thus the IITCP does 'stretch' many aspects of the guidance. by assessing fundamentally different intervention types with distinct cost and benefit profiles over time. To this end, the next chapter details the approach adopted in the preparation of the Economic Dimension.

3 Economic Dimension - Approach

3.1 Overview

3.1.1 The Economic Dimension of the Network Strategy OBC provides the evidence on the comparative merits of different options, providing the basis for a preferred option to be selected by Council Members. It assesses which option package delivers the greatest net benefits to society and represents the best value for money when all costs and benefits are considered. This chapter summarises how the Economic Dimension is presented and the approach to the option development and appraisal.

3.2 Reporting Approach

Strategic approach

3.2.1 The Network Strategy OBC covers eight islands, 15 ferry terminals, multiple vessels and four prospective fixed links and is therefore inherently complex. The work which has informed this report is both voluminous and detailed. However, it is important to recognise that this is a **programme business case** and thus it has a broader and higher-level focus than a **project business case**. That is, it is a broad and evolving strategy intended to identify a series of outputs and outcomes to be delivered over time.

3.2.2 There is therefore a risk that excessive detail and / or focus on very specific issues obscures the strategic programme outcomes being presented. To address this risk, the Network Strategy OBC has been written in a proportionate manner focused on supporting decision making by Shetland Islands Council Members rather than producing an excessively lengthy document for its own sake – in effect, the principle is that the business case is as short as possible, but as long as it needs to be.

3.2.3 This aligns with the STAG Guidance, which stresses the **role of an appraisal and business case as a decision-aid and not a technical record**, with a preference for a **concise narrative**.

Structure

3.2.4 To support clear decision making, the Economic Dimension is therefore developed around individual chapters for each island, which set out the options considered and their appraisal.

3.2.5 At the conclusion of the SOC:

- A fixed link was retained as an option for four islands – **Bressay, Unst, Whalsay and Yell.**
- For **Foula, Papa Stour and Skerries**, only ferry-based options are in-scope.
- Whilst a fixed link to **Fetlar** was ruled out in the SOC, the nature of the ferry connection will depend on the solution adopted for neighbouring **Unst**, and thus the two islands are considered together as part of an **overall Bluemull Sound solution**.

3.2.6 The Economic Dimension chapters for the candidate fixed link islands are presented first (in alphabetical order), followed by the ferry-only islands. This ordering is for consistency and readability and does not imply any prioritisation.

3.2.7 The island-based Economic Dimension chapters have been written so that they can be used as largely standalone documents. To this end, there is some repetition across the chapters,

but this is considered on-balance to be worthwhile as it allows each island to be considered independently.

3.3 Options Generation and Development

Options generation

3.3.1 As explained in Section 2.8, the SOC defined a set of option packages to be further developed and appraised in the Economic Dimension of the OBC. To recap, these were:

- **Business-as-Usual (all routes):** This is effectively the minimum required to maintain the current service – it is assumed as the baseline comparison for each option increment thereafter.
- **Ferry Do Something (all routes):** An option package which involves addressing current route priorities using the current assets (with asset replacement ahead of life expiry where there is a case for this), supplemented by revenue measures.
- **Ferry Do Max (candidate fixed link routes only):** An identification of the realistic maximum level of connectivity that can be achieved by significantly scaling-up revenue and capital spending.
- **Fixed link**.

3.3.2 These option packages were designed as a **programme-level response** to the transport problems identified for each island in the Case for Change structured to enable consistent comparison across different types of intervention.

Options development

3.3.3 In the period since the SOC was approved, the option packages have been progressed to a level commensurate with a programme business case. They have been developed in a manner that allows them to be meaningfully compared, with a view to arriving at a preferred programme-level option.

3.3.4 Further work will be required in project level business cases to refine the options to such a stage that they are fully deliverable. The option packages also pose policy and operational questions (e.g., around fares) which are treated in-principle in this study, but which merit specific consideration in a separate workstream.

3.3.5 The table below summarises how the option themes emerging from the SOC have been treated in the OBC:

Table 3.1: Option themes and Network Strategy OBC Approach

Option Theme	Network Strategy OBC Approach
Vessels	The Council ferry service has worked with a naval architect to obtain estimated construction costs for the vessel typologies. It is assumed in the OBC that vessel replacement occurs every 30-years and this has been profiled over the appraisal horizon.
Harbour infrastructure	Harbour infrastructure options have been developed and costed for the BaU, Ferry Do Something and Ferry Do Max. Maintenance and asset replacement has been estimated and profiled over the appraisal horizon.
Fixed links	The approach to fixed link option development is summarised in section 3.5 below – this approach is common across all four fixed link routes, with the individual alignments presented in the relevant route chapters.

Option Theme	Network Strategy OBC Approach
Ferry revenue options	Ferry revenue options associated with higher frequency sailings, longer operating days etc have been developed in partnership with the Council. These are presented in terms of the change in the number of sailings relative to the BaU. Whilst they provide broad proof of concept, there are deliverability challenges around e.g., crew recruitment, pressure on the assets etc that would need to be worked through in some detail in a project-level business case.
Fares	The Ferry Do Something and Ferry Do Max include options to, respectively, reduce fares for island residents and make them free for island residents. Fares are, however, a complex network-wide issue for which any significant change would merit a study in its own right covering: the basis of the tariff; the level at which it is set; discounts; surcharges; and any implications for capacity based on the demand response. The reduction in fares is therefore treated as an in-principle option only and is not explicitly costed or modelled.
Booking and cancellation arrangements	The arrangements for booking sailings, including request sailings, as well as arrangements when services are cancelled was identified as a barrier to travel by some in the resident survey. Whilst there was value in highlighting this, it is a network-wide operational matter and thus has not been considered in detail in this OBC.
Bus services	The Ferry Do Something, Ferry Do Max and Fixed Link options all include proposed improvements to bus services. These options are described in narrative only at this stage. There are however a range of cost and deliverability considerations (e.g., vehicle and driver availability) which would need to be worked through in any project level business case.

Options deliverability

3.3.6 As a programme-level business case, the options have been developed to a level that provides confidence about their broad feasibility and makes them suitable for comparison. It is again however prudent to note here that further exploration of deliverability would be required in a project-level business case before any scheme could be progressed to delivery. There are several key points worth noting:

- The **broad vessel typologies** would need to be refined in the context of the requirements of each route. Whilst standardisation is the working principle, some modifications to the broad design may be required to accommodate route specifics. For example, whilst a Type 1 is identified as the new vessel for Skerries, the Type 1 design currently being procured by the Council for the fleet relief vessel may require some refinement for the sea conditions on this crossing. The harbour infrastructure designs have however been prepared to envelope different designs within an overall set of vessel dimensions.
- The **harbour infrastructure options** would be subject to outline and detailed design work, informed by a programme of surveys, wave modelling and further crew feedback.
- The **ferry revenue options** generally entail an uplift in the number of sailings and crew to operate them – these options would need to be further developed to establish:
  - The realistic prospect of recruiting the required **crew**, given low island populations and recent challenges in his respect.
  - The viability of the indicative levels of service with respect to **navigation and vessel infrastructure wear and tear.**
  - The required scale-up of **overhead support** to maintain an expanded service, e.g., the recruitment of additional marine superintendents.
  - The **availability of contractors** when e.g., moving drills and maintenance to a Sunday.

- The alignment, design and cost of a **fixed link** would require a programme of ground investigations, detailed design etc.
- All major physical interventions, e.g., a **fixed link** or **major ferry terminal expansions** would be subject to a **comprehensive planning and consenting process, including undertaking an Environmental Impact Assessment (EIA)**.

3.4 Options Appraisal

3.4.1 This section summarises how the options in the Network Strategy OBC have been appraised and how that appraisal is presented in each of the subsequent island chapters.

STAG or TAG?

3.4.2 Whilst the IITCP Network Strategy OBC is being developed in the Scottish context, it is possible that it could be submitted to UK Government as part of a funding ask. This posed the question as to whether it should be developed in line with:

- Scottish Transport Appraisal Guidance (STAG)
- DfT Transport Appraisal Guidance (TAG)

3.4.3 Whilst the broad philosophy of the two guidance documents is the same, they are materially different in certain aspects:

- STAG has obviously been developed for application in Scotland and is a format that is familiar to Transport Scotland and Scottish Government officials. However, whilst the headline guidance was recently refreshed, the STAG Technical Database (which provides the parameters for appraisal) is significantly out-of-date and no longer aligns with the current guidance.
- TAG on the other hand is regularly updated, and its technical database (the TAG Data Book) is considerably more advanced than STAG. However, its appraisal criteria are quite different to STAG.

3.4.4 The **appraisal of options in the Economic Dimension will be undertaken in accordance with STAG**. However, we discussed the weaknesses in the STAG Technical Database with Transport Scotland economists and were **advised to use the TAG Data Book as the basis of any quantitative appraisal undertaken**. In practice, this means that STAG provides the appraisal framework and reporting structure, while the TAG Data Book is used to inform quantitative inputs where more up-to-date parameters are required.

Methodological limitations

3.4.5 The **application of the STAG Technical Database / TAG Data Book is mandatory in appraisal**, as it incorporates a range of parameters that have been exhaustively researched and peer reviewed, ensuring that business cases submitted to government are robust and comparable.

3.4.6 It is important to note here though that the **guidance was not developed with a study of this nature in mind**, and thus the outputs from its application do need to be qualified. The following points should be noted:

- Most applications of the guidance are generally about comparing broadly similar options. However, for the candidate fixed link islands, **the IITCP is comparing two distinctly different approaches** of continuing with / improving ferry services or connecting islands with fixed links. These two options have very different cost, benefit and temporal profiles, and this should be borne in mind when comparing them. As a result, direct comparison of

quantitative metrics (including BCRs) should be treated with caution and must be considered alongside the wider strategic case.

- Benefits in the TAG context are the societal gains from a transport intervention, primarily measured through changes in travel times, costs, safety and wider economic impacts compared to a baseline scenario. In the context of the candidate fixed link islands, most of the benefits are associated with the travel time savings offered by a fixed link over a ferry service. Whilst this is an appropriate application of the guidance, it is important to recognise that the **key consideration in islands is generally connectivity rather than journey times *per se***. Whilst travel time savings are a useful metric, they should be considered in that wider context.
- As previously noted, there is **no realistic 'Do Nothing'** in an island context as there is a requirement to invest in a ferry service to maintain it. Unusually, the baseline for comparison – the business-as-usual - therefore often has a significant cost attached to it. For the economic appraisal, all options are compared to the BaU and the BaU costs are therefore subtracted from option costs, as this is spend which would be required regardless.
- **TAG does not include bespoke optimism bias figures for harbour infrastructure or vessels**, primarily due to a lack of research on this topic. The closest matching optimism bias categories have been used, with sensitivity tests undertaken to show the sensitivity of the option economics to this.
- The **benefit-cost ratio (BCR) for Scottish island projects of any scale is expected to be low (i.e., costs exceed monetised benefits)**. This is because benefits in appraisal are heavily volume driven and there is simply not the volume in these islands to generate high levels of benefit. Whilst the **BCR is a useful metric, it is only part of a wider judgement on whether an option represents value for money** – in this context, the Strategic Dimension plays a key role in defining why an investment is needed and the full range of benefits that could emerge from it beyond that quantified and monetised in conventional option economics.

3.4.7 More widely, in light of the above, there would be value in bespoke guidance in relation to the appraisal of ferry and fixed link options being developed by Transport Scotland / DfT. This would seek to better reflect the monetary value that people attach to 'negative' aspects of ferry travel (cancellations, inconvenience of having to book, inability to book onto preferred sailing, only being able to travel at given times, absence of 24 hour connectivity etc.), and therefore better reflect the benefits that improvement can bring relative to scheme costs.

OBC reporting and Appraisal Summary Tables

3.4.8 In keeping with the 'Strategic Approach' to the reporting outlined in **Section 3.2**, the island-based Economic Dimension chapters are reported proportionately in a summary format. The objective is to draw out the key differentiators between options based on the TPOs and headline STAG criteria rather than provide a blow-by-blow account of the performance of every option against every STAG sub-criterion – **the focus is on clarity over length**.

3.4.9 However, to ensure that all of the appropriate detail is recorded, an **Appraisal Summary Table (AST)** has been prepared for each option, which includes assessment against each individual TPO and STAG sub-criterion. The STAG AST template is based on the old guidance and is therefore outdated, so we have developed a bespoke version of this for the Network Strategy OBC. The ASTs will be published on the Council website after 30th June 2026.

Transport Planning Objectives

3.4.10 The TPOs were developed to address the transport problems identified in the Case for Change and are set out in Section 2.5.

3.4.11 TPOs are conventionally made SMART[32] at the STAG Detailed Appraisal / OBC stage. However, this is a programme-level OBC covering eight islands, where the incidence and magnitude of the problems differ from one island to the next. This makes it difficult to meaningfully smarten the TPOs and thus they are retained in their current form for this business case – smartening should follow in any subsequent project-level business case, where the TPOs can be aligned to the specific transport problems of a single island.

3.4.12 The above said, to provide a degree of quantification, the island resident survey has been used to **assess how the various options address the quantum of dissatisfaction reported by residents of Bressay, Fetlar / Unst, Whalsay and Yell** (i.e., the most populous islands with a usable sample size). The survey asked people to rate 38 factors relating to their ferry service on the following five-point scale:

- Very Satisfied
- Satisfied
- Neither Satisfied nor Dissatisfied
- Dissatisfied
- Very Dissatisfied

3.4.13 The number of **'Dissatisfied'** and **'Very Dissatisfied'** responses with the 38 factors was then attributed to the relevant TPOs. In this way, a baseline level of dissatisfaction could be quantified for each TPO. To account for severity of dissatisfaction, each 'Very Dissatisfied' was factored up by three in this 'dissatisfaction score'. The weighting applied to 'Very Dissatisfied' responses is a simplifying assumption to reflect relative severity and is not derived from an established appraisal parameter.

3.4.14 A judgement was then made as to the extent to which each option package would resolve each of the 38 potential problem areas leading to this dissatisfaction as follows:

- **In-part:** Would reduce dissatisfaction by **33%**
- **Significantly:** Would reduce dissatisfaction by **66%**
- **Resolved:** Would remove the issues leading to the dissatisfaction

3.4.15 The percentage reductions applied ('In-part', 'Significantly', 'Resolved') are indicative assumptions used to differentiate options at a programme level and are based on professional judgement.

3.4.16 The resulting remaining levels of dissatisfaction were then aggregated back to the TPO level which means we can say e.g., dissatisfaction with TPOX would be reduced by y% under option z. These outputs are therefore indicative and should be interpreted as supporting evidence rather than precise forecasts.

3.4.17 Note that, in this analysis, some impact on 'Resilience' was assumed in the BaU, reflecting the outcomes of the Ferries Resilience Review.

STAG criteria

3.4.18 The table below sets out the five STAG criteria and their associated sub-criteria – as noted above, this OBC document will focus on the overall assessment against the headline criteria, with the detail around the sub-criteria captured in the ASTs where appropriate.

[32] **S**pecific, **M**easurable, **A**ttainable, **R**elevant and **T**ime-bound

Table 3.2: STAG appraisal criteria and sub-criteria

STAG Criteria	Sub-criteria
(Physical) Environment	• Biodiversity and habitats • Geology and soils • Land-use (including agriculture and forestry) • Water, drainage and flooding • Air quality • Historic environment • Landscape • Noise and vibration
Climate Change	• Greenhouse gas emissions • Vulnerability to the effects of climate change • Potential to adapt to the effects of climate change
Health, Safety and Wellbeing	• Accidents • Security • Health outcomes • Access to health and wellbeing infrastructure • Visual amenity
Economy	• Transport Economic Efficiency (TEE), which covers the benefits ordinarily captured by standard cost-benefit analysis – including traffic volumes, journey times, driver frustration or travel time reliability • Wider Economic Impacts (WEIs), which refer to any economic impacts which are additional to transport user benefits.
Equality and Accessibility	• Public transport network coverage • Active travel network coverage • Comparative access by people group • Comparative access by geographic location • Affordability

3.4.19 STAG also considers the 'Feasibility', 'Affordability' and 'Public Acceptability' criteria as follows.

Table 3.3: Feasibility, Affordability and Public Acceptability Criteria

Criterion	Description
Feasibility	The feasibility of construction or implementation and operation (if relevant) of an option and the status of its technology (e.g., proven, prototype, in development, etc.) as well as any cost, timescale or deliverability risks associated with the construction or operation of the option, including consideration of the need for any departure from design standards that may be required.
Affordability	The scale of the financing burden on the promoting authority and other possible funding organisations and the risks associated with these. The level of risk associated with an option's ongoing operating or maintenance costs and its likely operating revenues (if applicable).
Public Acceptability	An assessment of the likely public response to an option. The public engagement process is described in more detail below

Public acceptability

3.4.20 To inform the public acceptability criterion in STAG, the Council and consultant team undertook a programme of public engagement in May and June 2026 to seek views on the emerging Network Strategy OBC and its inherent options. There were two elements to this:

- In-person public drop in-sessions in the candidate fixed link islands (**Bressay, Unst, Whalsay and Yell, as well as Fetlar**, which is integral to the overall Bluemull Sound solution).
- MS Teams discussions with the communities in **Foula, Papa Stour and Skerries**. It should be noted that, at the time of writing, arrangements for these meetings are in progress, and so they have not yet been held.

3.4.21 The objective of these sessions was to update the public on progress since the March 2025 drop-ins, specifically to present the:

- Transport Planning Objectives
- Approach to developing the options, including the Ferry Do Max and fixed link options where appropriate
- Headline outcomes from the appraisal
- Next steps

3.4.22 The drop-in sessions provided an opportunity for the public to ask any questions and complete a short feedback form on the options.

3.4.23 It is important to note that this engagement programme was not intended to provide a representative sample of public opinion, rather the objective was to keep communities informed on progress and seek views on the options through the discussions. The individual island chapters which follow provide a broad summary of the views provided by island residents through the engagement. However, further and more detailed and specific engagement on options will be required as part of any project level business case.

Established policy directives

3.4.24 There is a requirement within STAG to assess the options against established Scottish Government policy objectives, using the Policy Assessment Framework (PAF) tool. However, the policy context described in Section 2.2 identified the overall policy fit of the IITCP in terms of improving connectivity, although highlighting some of the tensions with respect to the environment, climate change and equalities. These specific issues can however be drawn out through reference to the relevant STAG criteria. Policy in its widest sense is not therefore considered further unless there is a specific point of note, although a summary of key points is provided in the ASTs.

Hierarchies

3.4.25 The *STAG Managers' Guide* requires options to be appraised against both the **Sustainable Investment Hierarchy** and **Sustainable Travel Hierarchy** as defined in the National Transport Strategy 2. This is not however particularly meaningful or appropriate in the context of this appraisal because:

- **Sustainable Travel Hierarchy:** The options being considered in this study are effectively a combination of improved ferry services and fixed links. Neither can be easily categorised with respect to the hierarchy, and each will have a range of impacts across modes. These impacts will therefore be brought out separately in the narrative of the appraisal, particularly with respect to the STAG Equality and Accessibility criterion, rather than independently.
- **Sustainable Investment Hierarchy:** The case for change is largely predicated on the need to replace capital assets at the point of life expiry, so most options will involve 'targeted infrastructure improvements' as standard. Where this is not the case, it will be described in the appraisal narrative.

Risk and Uncertainty

3.4.26 Risk and uncertainty are being considered at the programme level (see Section 2.7) and will not be detailed for individual option packages at this stage. The appraisal narrative will though highlight key risks where these exist.

Scoring

3.4.27 The STAG seven-point scoring scale, as illustrated in the table below, has been used to assess the relevant scale of the option packages against the TPOs and STAG criteria.

Table 3.4: STAG Seven-point scoring scale

Impact	Description	Score
Major Positive	These are benefits or positive impacts which, depending on the scale of benefit or severity of impact, the practitioner feels should be a principal consideration when assessing an option's eligibility for funding.	✓✓✓
Moderate Positive	The option is anticipated to have only a moderate benefit or positive impact. Moderate benefits and impacts are those which taken in isolation may not determine an option's eligibility for funding but taken together do so.	✓✓
Minor Positive	The option is anticipated to have only a small benefit or positive impact. Small benefits or impacts are those which are worth noting, but the practitioner believes are not likely to contribute materially to determining whether an option is funded or otherwise.	✓
No benefit or impact	The option is anticipated to have no or negligible benefit or negative impact.	○
Minor Negative	The option is anticipated to have only a small cost or negative impact. Small costs/negative impacts are those which are worth noting, but the practitioner believes are not likely to contribute materially to determining whether an option is funded or otherwise.	x
Moderate Negative	The option is anticipated to have only a moderate cost or negative impact. Moderate costs / negative impacts are those which taken in isolation may not determine an option's eligibility for funding but taken together could do so.	xx
Major Negative	These are costs or negative impacts which, depending on the scale of cost or severity of impact, the practitioner should take into consideration when assessing an option's eligibility for funding.	xxx

3.4.28 When interpreting the scoring of the options, it is essential to bear in mind the following points:

- STAG is a **multi-criteria appraisal framework** – in simple terms, it **assesses an option from a range of different perspectives** to provide objective evidence for the decision maker. It combines qualitative and quantitative approaches.
- The use of a **seven-point scale does not always allow the subtle differences between options to be drawn out**. For example, the BaU, Ferry Do Something, Ferry Do Max and a fixed link on a route could all potentially contribute to e.g., improving capacity. However, with four options and only three positive 'ratings' it can be difficult to draw out some of the differences in the scoring. Where this is the case, these differences are described in the subsequent narrative.
- It should be applied proportionately, focusing on the main areas of differentiation between options. Related to this, **no one criterion is more important than another and scores should not be arithmetically summed (i.e., Option A has 10 ticks overall, but Option B has 12, so ergo Option B is better), weighted or used to derive a composite ranking**. However, it is recognised that some criteria may be more important than others in certain cases – for example, safety, was a core focus of the appraisal of options for the A9 Dualling – this is expressed in the narrative where appropriate.
- Crucially, **STAG is not intended to formulaically define the 'answer'**, rather its purpose is to objectively define the advantages and disadvantages of different options
- Related to the above point, **STAG does not define a preferred option**, rather it is intended to ultimately provide Council Members (in this instance) with the evidence to make that decision – i.e., it is democratic rather than technocratic.

Option economics methodology

3.4.29 An integral part of almost all business cases is **economic appraisal**, the results of which are typically informed by **cost-benefit analysis (CBA)**, from which a **BCR** is determined. In STAG, this is reported under the **'Transport Economic Efficiency (TEE)'** sub-criterion of the overarching **'Economy'** criterion.

3.4.30 For the Network Strategy OBC, CBA has been undertaken for the candidate fixed link islands (Bluemull Sound, Bressay, Whalsay and Yell) as a means of comparing the relative value for money of the Ferry Do Something, Ferry Do Max and Fixed Link options relative to the BaU position. CBA is a complex technical activity informed by the TAG Data Book and shaped by the assumptions used in the appraisal. **Appendix A** sets out the economic appraisal methodology and assumptions adopted. The island chapters which follow only report the outcomes of this analysis – i.e., they do not include commentary on the underlying methodology and assumptions.

3.4.31 To reiterate, the purpose of a **BCR** in transport appraisal is to capture, in a **single metric**, whether a scheme **delivers net economic benefits** and to support the transparent **comparison and prioritisation** of competing investments where public funding is constrained (i.e., where a choice has to be made). The CBA process is a **tool and a construct designed to support good decision making** – it is an important factor in decision making but it does not provide the **'answer'** in and of itself and should be considered as part of a **balanced judgement** as to whether a scheme represents good value for money.

Presentation of costs in the Economic Dimension - arithmetic versus Present Value Costs

3.4.32 Transport infrastructure schemes are long-term and often inter-generational investments. The benefits and costs of schemes accrue over different periods. For example:

- The capital cost of a **tunnel** would be up-front and, once spent, would not be required again.
- **Ferries** on the other hand would need to be replaced circa every 30-years and **harbour infrastructure** circa every 60-years.

3.4.33 This often gives rise to the question:

- *"Would it not be cheaper in the long-term to pay the upfront cost of a tunnel rather than the ongoing costs of ferry operations, including the replacement of vessels and infrastructure?"*

3.4.34 The logic underpinning this question is generally predicated on a purely **arithmetical approach** of summing costs over time, without adjusting for **when** those costs occur. For example, if three cycles of vessel replacement are required over the life of a tunnel and a vessel is £10m, the arithmetical cost is £30m. This approach however reflects **cash spend** and not **economic value** – i.e., it assumes that £10m spent today is the same as £10m spent in 30, 60 and 90 years' time and this is not appropriate.

3.4.35 Appraisal addresses this temporal issue through converting all future costs and benefits into **today's value (known as present value)** so that they can be compared. In short, the principle here is that **the further into the future a benefit or cost occurs, the less meaningful it is and this the less weight it carries today (i.e., the lower its present value)**. This is known as **discounting** and recognises that £10m spent in the future is not the equivalent to £10m spent today in present value terms)

3.4.36 The figure below provides an illustration of the difference between **arithmetic (undiscounted) costs** and **present value (discounted) costs** over a 60-year appraisal period. The example is based on a spend of £10m per annum over a 60-year period, with the standard H.M. Treasury *Green Book* long-term discount rate of 3.5% applied:

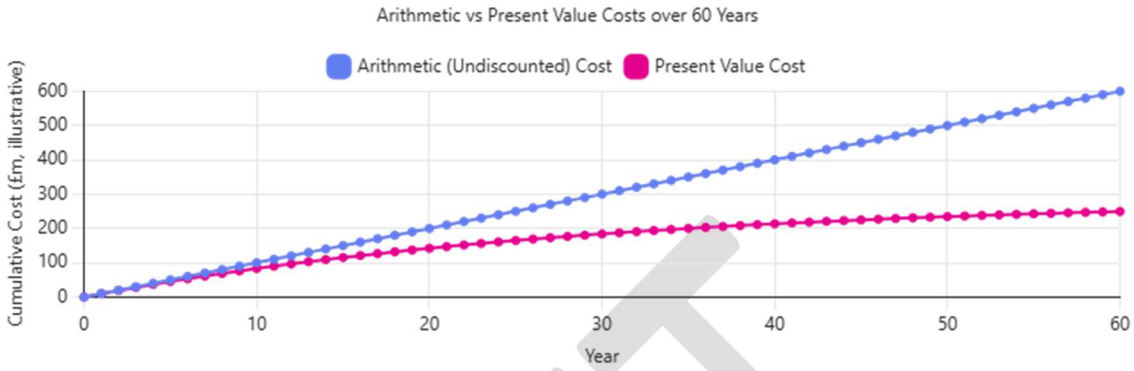

Figure 3.1: Illustrative example of arithmetic v present value costs over 60-years

3.4.37 The key points from the above figure are as follows:

- In **arithmetic (undiscounted) costs**, the **blue** line shows the total cost accumulation over 60-years being **£600m** (i.e., £10m * 60 years)
- In the **present value cost (discounted)**, the **pink** line shows that costs further into the future are worth less than in today's terms – over 60-years, the present value of costs is only **£250m**

Why does this matter?

3.4.38 In the Economic Dimension of a business case, all costs (and benefits) are shown as **present values**. Therefore, costs and benefits that occur further into the future are valued less than costs and benefits experienced today. Calculating present values involves profiling all estimated capital and revenue costs over the appraisal period (2026 to an assumed 2035 opening year for fixed links, then 60-years in this business case).

3.4.39 When comparing a ferries option to a fixed link option, the capital and revenue spend for both options (accounting for assets, operational costs, cyclical maintenance etc) is profiled over 60-years and then all costs discounted to a present value. By way of an example, a £10m ferry in year 60 of this appraisal would have a present value cost of only £1.47m.

3.4.40 **Arithmetical values are not reported here as they are not meaningful and have no status in appraisal.**

Sensitivity tests

3.4.41 For the four candidate fixed link islands, four sensitivity tests have been undertaken as follows:

- **ST1:** Reduced tunnel optimism bias – reflecting the level of work undertaken on tunnel cost estimates, this reduces the level of optimism bias from Stage 1 (55%) to Stage 2 (32%).
- **ST2:** Waiting time assumed to have same value as in-car time – in TAG, time second waiting is weighted by two to reflect the fact that people generally prefer to be moving rather than waiting and the waiting environment is often poor. In the case of ferries

though, most people are in the relative comfort of their vehicles, so this test removes this weighting.

- **ST3:** Optimism bias applied to vessel costs – guidance does not require optimism bias to be applied to new vessels, but this test applies Stage 2 rail rolling stock optimism bias (38%) to vessel costs.
- **ST4:** 100-year appraisal period – this test recognises that the asset life of a tunnel will be longer than most transport investments and extends the appraisal horizon into three cycles of ferry replacement in some instances.

3.5 Fixed Links – Option Development

3.5.1 The approach to developing the fixed link options was common across the four candidate islands of Bressay, Unst, Whalsay and Yell. This section sets out the assumptions and methodology used to determine the design, alignment and costs of the four proposed tunnels.

Design standards

3.5.2 The reference design for the Yell Sound tunnel was developed in the FLM using a combination of UK, European and international tunnel design standards. The selection of applicable standards reflects both the geographical context of the scheme and the technical characteristics associated with long subsea rock tunnels. The approach adopted for Yell in the FLM was applied to all four fixed links in the Network Strategy OBC.

Application of UK standards

3.5.3 The UK Design Manual for Roads and Bridges (DMRB) standards have been applied where appropriate, particularly for elements relating to road geometry, drainage and general highway safety. *DMRB CD109 Highway Link Design* has informed the selection of a minimum horizontal radius of 720 metres, ensuring adequate forward visibility.

3.5.4 Tunnel specific guidance has been referenced through *DMRB CD 352 Design of Road Tunnels* (Version 0.0.1, 2024; formerly BD 78/99), which provides requirements for structural configuration, operational safety provisions, fire life safety considerations and equipment performance standards for UK road tunnels. This standard has been used to benchmark key elements of tunnel design, whilst recognising that adaptations may be required for a long, low traffic subsea tunnel environment.

3.5.5 The DMRB provides a comprehensive framework for UK roads and tunnels but its applicability to long, low traffic, rural subsea tunnels is somewhat limited. Certain geometric criteria, operational assumptions and safety system requirements in DMRB are not directly transferable to a project of this nature, particularly where the tunnel environment differs significantly from conventional UK Motorway or A-Road conditions, hence, international standards have also been applied in this study.

European Tunnel Safety Directive

3.5.6 The *European Directive 2004/54/EC* on minimum safety requirements for tunnels in the Trans European Road Network has been incorporated to establish baseline safety measures. This includes provisions for escape routes, fire life safety systems, ventilation strategy and structural fire protection. The Directive provides essential minimum requirements but, again, it does not fully address the specific conditions associated with long rock tunnels in low traffic remote environments.

Adoption of Norwegian Standard N500

3.5.7 To address the limitations of UK and European guidance for this type of tunnel, the *Norwegian Standard N500 Road Tunnels* has been adopted for key elements of the design. Norway has extensive experience in delivering long subsea hard rock tunnels in rural and island contexts, making N500 highly suited to the conditions present in Shetland.

3.5.8 N500 offers detailed guidance on geometric design, safety philosophy, drainage, cross section requirements and construction approaches for drill and blast rock tunnels. Its safety provisions are based on large datasets from comparable environments with similar geology, traffic volumes and operational characteristics.

3.5.9 In summary, UK guidance provides the overarching design framework, supplemented by European requirements for minimum safety compliance and Norwegian standards for detailed design of subsea tunnel elements.

3.5.10 Departures from DMRB in the design have been necessary where UK standards do not adequately address project requirements here. These departures relate to:

- **Vertical alignment:** adopting a 5% gradient in line with N500 rather than UK guidance.
- **Tunnel safety philosophy:** adopting international best practice for subsea rock tunnels where DMRB guidance is not directly applicable.
- **Cross section and layout:** using N500 recommendations for two lane hard rock tunnels rather than UK tunnel typologies, which are typically based on high traffic, urban or motorway conditions.

3.5.11 All departures are considered appropriate by COWI based on the specific characteristics of long, low-traffic subsea tunnels and are supported by established international practice, particularly in Norway. Any departures from DMRB would require formal agreement through the relevant departures from standard process at the project development stage.

Traffic and transport assumptions

3.5.12 For design purposes, the tunnels are assumed to carry an Average Annual Daily Traffic (AADT) of fewer than 4,000 vehicles. This level of traffic aligns with the standards for an N500 Class B Road and reflects the anticipated traffic volume 20 years after the tunnel opens. The forecast assumes traffic comprising private and commercial vehicles with periods of increased use by heavy goods vehicles (HGVs), reflecting the needs of local infrastructure and industry.

3.5.13 The largest regular vehicle accounted for in the design is a walking floor trailer HGV, measuring approximately 4.80m in height, 2.55m in width and 16.50m in length. Larger vehicles, such as double decker HGVs up to 4.95m tall, could still use the tunnels but would require an escort and temporary traffic management to ensure safe passage. Similarly, dangerous goods are assumed to require traffic management. These assumptions are indicative and would require confirmation through detailed design, operational planning and consultation with relevant regulatory bodies.

3.5.14 The tunnels have been designed as a single tube and two-lane bi-directional, supporting safe travel at a design speed of 40mph in both directions. Emergency lay-bys and turning niches are provided throughout the tunnel design to enhance safety and maintenance operations. This configuration represents a concept design suitable for programme-level appraisal and would be subject to refinement at the project business case stage.

3.5.15 For safety reasons, the **tunnels would be restricted to motorised vehicles only**. Pedestrians, cyclists and horse drawn vehicles would not be permitted. This restriction is based on tunnel length, two-way operation and the need to manage fire and life safety risks

within an enclosed environment. The implications of this restriction for non-car users are considered within the Equality Impact Assessment, and mitigation (e.g., public transport provision) would be required at the project level.

Tunnel cross-sections

3.5.16 A typical tunnel cross-section is shown in the figure below and includes the following key components:

- **Carriageway:** A 7.50m wide two-lane carriageway (two 3.25m lanes) designed in accordance with *CD127, TSRGD* and *N100*. A 300mm double white line separates opposing traffic.
- **Drainage system:** Surface water is managed through a 2.5% crossfall directing runoff toward kerbed drainage channels located at the verge. These channels collect roadway water and prevent ponding within the tunnel.
- **Safe escape route:** Behind the raised verge and concrete barrier on each side, a protected evacuation route is incorporated. This provides a continuous safe walkway for tunnel users in the event of an incident and supports access for the emergency services.
- **Road edge protection:** Reinforced concrete barriers (150mm wide, 1,000mm tall) are installed at the verge to prevent vehicles from striking the tunnel lining or entering safety and service areas.
- **Headroom:** A minimum vertical clearance of 4.80m is provided, with an additional 250mm space allowance for ventilation, lighting and service equipment.
- **Fan:** Expanded verge and ceiling space accommodate jet fans and associated cabling. This section ensures adequate air quality and smoke control without reducing vehicle clearance.

3.5.17 The cross-section overall reflects a synthesis of relevant UK and international standards appropriate to the expected operating conditions.

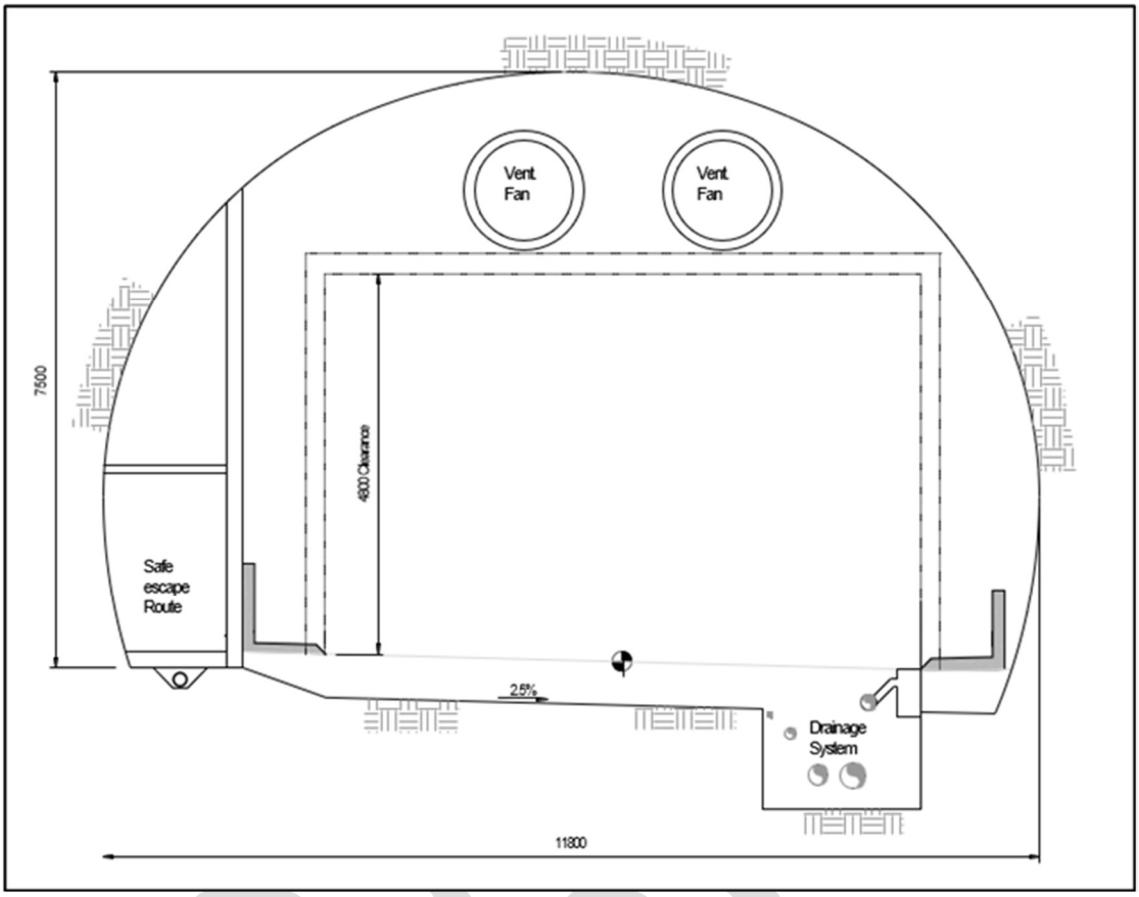

Figure 3.2: Typical tunnel cross-section with roadway, drainage, safety barrier and protected escape route

3.5.18 The emergency escape route shown in the typical cross section has been designed to meet the relevant tunnel safety standards and to ensure that all users have access to a protected evacuation path in the event of a fire. The current solution, positioned behind the concrete verge wall, provides an indicative compliant approach at this stage of the design and aligns with the fire and life safety principles.

3.5.19 As the design progresses and more detailed risk assessments are undertaken, alternative escape strategies may be explored. These could include other forms of protected walkways, pressurised passages or integrated refuge areas, provided they deliver an equivalent or improved level of safety in accordance with regulatory requirements.

Other cross-section types

3.5.20 In addition to the typical running section, several specialised cross-section configurations are used in the tunnel design. These are required to support safety, operations and maintenance needs:

- **Emergency lay-by sections:** Provided every 500m, with the first within 250m of each portal. These would allow vehicles to stop safely during breakdowns or emergencies. The width is increased locally to allow a vehicle to pull out of the traffic stream.
- **Turning niche sections:** Spaced at approximately 1km intervals, these widened areas would allow maintenance vehicles to turn around within the tunnel. They would also contain integrated plant rooms for mechanical and electrical equipment.
- **Portal approach sections:** On approach roads outside the tunnels, the carriageway would be widened to 9.3m, including 1m hardstrips on both sides. This would support

safer merging, turning and drainage transitions into the tunnel. Verges would accommodate safety barriers and additional drainage infrastructure.

Tunnel construction

Hard rock drill and blast methodology

3.5.21 Drill and blast tunnelling involves drilling a pattern of holes into the rock at the tunnel face, charging the holes with explosives and blasting the rock. The blast removes a predetermined quantity of rock within the tunnel profile. Support is installed as required as the tunnel advances - its nature depends on the rock mass conditions encountered.

3.5.22 Subsea tunnels, such as those considered in this study, are regularly constructed in Scandinavian countries - the technique has been successfully used in the Faroe Islands and Norway to construct subsea tunnels. Experience in these countries is based around highly mechanised drilling, blasting, spoil removal and support installation. This technique has been used in Scotland, most recently in the construction of advanced work tunnels for the Coire Glas Pumped Hydro Scheme north-east of Fort William. Sufficient experience of the design and construction of such tunnels exists within the UK, and Scotland in particular, although further investigation of site-specific conditions, supply-chain capacity and construction risks would be required at the project level.

3.5.23 Hard rock drill and blast techniques give the flexibility to deal with the anticipated variations in rock mass conditions along the route and the optimisation of the tunnel profile for rock support and end usage, albeit with associated risks relating to geology, groundwater and construction environment which would require detailed investigation.

Drill and blast cycle sequence

3.5.24 The approach to any tunnelling project is to excavate as quickly and efficiently as possible. The tunnels would be excavated from both ends simultaneously. Both crews would operate continuously, working toward a central breakthrough point beneath the seabed.

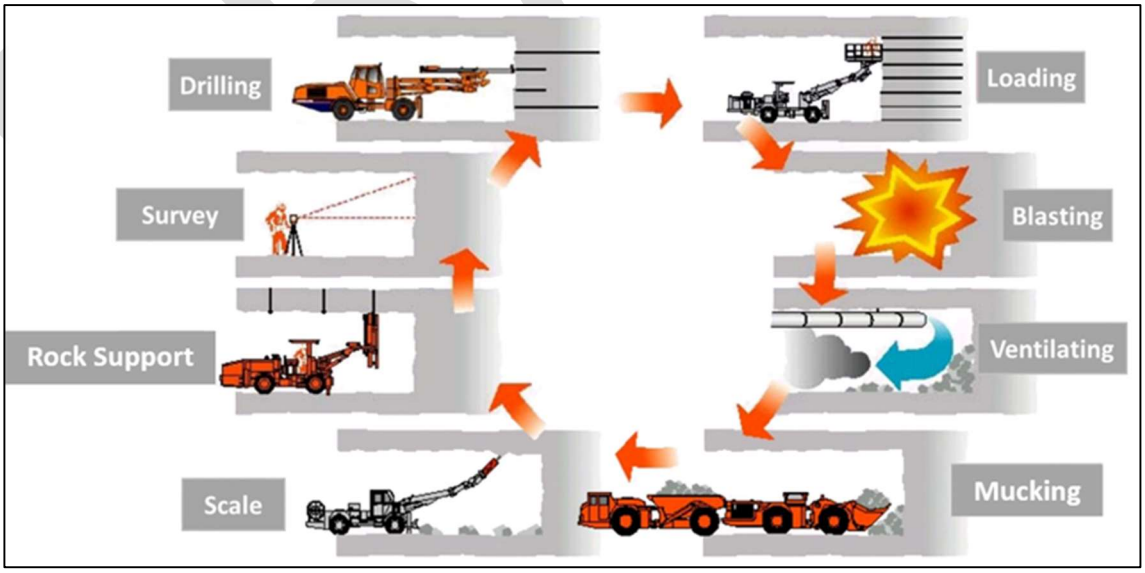

Figure 3.3: Typical drill and blast cycle for tunnelling works

3.5.25 Each blast cycle proceeds through these ten steps as outlined below:

- Forward probing

- Drilling the blasting pattern
- Charging holes with explosives
- Controlled blasting
- Ventilation and clearing gas
- Mucking (removal of blasted rock)
- Scaling (removal of loose rock)
- Face mapping and geotechnical assessment
- Survey and excavation control
- Rock support installation.

3.5.26 This structured and systematic approach ensures safety, efficiency and quality in excavation. Highly mechanised three-arm boomer drill jumbos would be deployed for full-face excavation and support installation work.

Site logistics and land-use

3.5.27 Excavation is proposed to be carried out simultaneously from both portals, allowing tunnelling to progress from each end at the same time. This dual-heading approach significantly reduces the overall construction duration and enables more efficient use of plant, labour and tunnelling equipment.

3.5.28 Each portal would be supported by a dedicated construction compound, providing the operational infrastructure required to carry out tunnelling activities safely and continuously. Although the exact layout would vary by location, all sites generally require a similar suite of facilities. These typically include:

- Portal work areas for plant operation, spoil handling and safe vehicle movement.
- Internal access roads designed for heavy construction traffic.
- Plant and material storage zones for excavated rock, aggregates, consumables and large equipment.
- Office and workshop facilities, located within the construction compound, for day-to-day site management, supervision, equipment servicing and maintenance.
- Mechanical and electrical support areas, including temporary power distribution, ventilation equipment, water management systems and utility connections.
- Onsite concrete batching, where required, to provide reliable supply for tunnel lining and structural works.
- Explosives magazines, positioned in accordance with regulatory separation distance requirements, to safely store blasting materials needed for drill and blast excavation and to enable controlled delivery to each portal.

3.5.29 In addition to these construction compounds, separate accommodation and welfare sites are typically established to support the workforce. These facilities are not located within the active construction area and generally include accommodation blocks, canteens, sanitary units, rest areas, parking and other essential services needed for short to medium-term occupancy. The location and scale of construction compounds would require careful consideration of environmental, land-use and community impacts at the project stage.

Cost assumptions and methodology

Capital expenditure (CAPEX)

3.5.30 The CAPEX estimates for the four candidate fixed links were developed using the detailed cost outputs from the FLM and contractor engagement undertaken specifically for the Yell Sound tunnel as part of that commission. This provided a bottom-up estimate of construction costs including:

- Tunnelling portals
- Approach roads
- Mechanical, electrical and plumbing (MEP) systems
- Spoil management
- Testing and commissioning
- Preliminaries
- Management
- Contingency
- Per-construction activities

3.5.31 Cost estimates were derived from contractor engagement and reflect prices as at Q4 2025. These are assumed to reflect factor prices.

3.5.32 Based on the fully costed Yell reference scheme, a replicable cost model was created to allow consistent assessment of the proposed Bressay, Unst and Whalsay tunnels. The model was then scaled and interpolated for each additional candidate fixed link by adjusting key cost drivers such as tunnel length, approach road length, construction duration and site establishment requirements.

3.5.33 This approach ensures each scheme is costed proportionately to its physical characteristics while maintaining consistency across all options, enabling transparent comparison and programme-level budgeting. This scaling approach is appropriate for programme-level comparison but introduces uncertainty which would need to be reduced latterly through detailed design and costing.

Operational expenditure (OPEX)

3.5.34 The OPEX assessment covers the long-term operational and maintenance requirements of the fixed-link tunnels, including routine maintenance, renewals, energy consumption, monitoring systems and operational staffing.

3.5.35 These costs form part of the overall lifecycle cost analysis and are assessed separately from CAPEX. Operational and maintenance (O&M) costs were developed using a benchmarking approach drawing primarily on operational data from Norwegian and Danish road tunnels, where long-established national tunnel networks provide reliable reference points for factors such as tunnel length, traffic volumes, technical system complexity and safety-critical installations.

3.5.36 For the FLM, these benchmarks were adjusted to reflect UK-specific conditions, the increased technical complexity of the proposed tunnels and the absence of comparable domestic assets. This estimate includes key operational activities such as minor repairs, inspections, cleaning, consumables, energy demands for ventilation and lighting, and personnel and administrative costs, while **excluding** major renewals or system replacements.

3.5.37 These O&M costs have been interpolated for each proposed fixed link tunnel option based on the tunnel length parameter to ensure consistent and proportionate estimation across all schemes.

3.5.38 Given the limited UK precedent, these estimates should be treated as indicative and subject to refinement through further benchmarking and project-specific analysis.

3.6 Next Steps

3.6.1 Having defined the approach to the appraisal and reporting in the Economic Dimension, the eight chapters which follow set out the appraisal of the options for each island (island group in the context of Bluemull Sound).

3.6.2 Each chapter sets out:

- The option packages considered
- Their appraisal against the Transport Planning Objectives
- Their performance against the STAG criteria
- The supporting economic, environmental and social evidence

3.6.3 These chapters are structured to support comparison between options and to provide a clear and proportionate evidence base to inform the selection of a preferred option for each island.

4 Economic Dimension – Bluemull Sound

4.1 Overview

4.1.1 This section provides the Economic Dimension for Bluemull Sound, commencing with a brief summary of the option packages followed by their appraisal against the TPOs and STAG criteria. ASTs for each option detail the appraisal against each individual criterion, with the narrative below drawing out the key issues and supporting interpretation.

4.2 Option Packages

4.2.1 This section summarises the option packages progressed from the SOC – for reference, Table 3.1 sets out how each element of the option packages has been treated in the Network Strategy OBC.

4.2.2 It is important to note that:

- The BaU for Bluemull Sound was ruled out as a viable option in the SOC. This option entailed the replacement of MV *Bigga* and MV *Geira* on a broadly like-for-like basis in terms of capacity. However, the evidence highlighted existing capacity problems on the route which will only worsen with the emergence of SaxaVord Spaceport and other developments in Unst (e.g., in aquaculture). Larger capacity vessels than the incumbents will therefore be required (so, Type 2 vessels).
- Whilst the BaU will not be considered as an option in its own right, it forms the basis of comparison for the other options and thus the component parts of it are presented in this section. It is not however included in the subsequent appraisal.
- The Ferry Do Something therefore represents the minimum viable option for this route.
    - There is a subtlety in this however in that the Ferry Do Something includes capital investment to address the asset issues on the route and revenue measures to intensify and extend the operating day. This packaging is appropriate for this programme level business case and is retained, but it should be recognised that there would be an option to deliver just the capital element as a reasonable 'do minimum' in a project-level business case.

Option Bluemull Sound 1: Business-as-Usual

4.2.3 The BaU broadly maintains the present-day operation whilst addressing some of the more recent resilience issues on the route, such as a reduction in sailings during refit periods. This option was ruled out at SOC stage and the presentation of the BaU which follows is therefore for **context and comparative purposes only**.

4.2.4 This Bluemull Sound BaU is summarised in the table below:

Table 4.1: Bluemull Sound Business-as-Usual option components

Approach / Principles	Component Options
Capital measures	
Like-for-like asset replacement at life expiry	- 2 * Type 1 vessels in the immediate-term - Replace and extend existing berth structures (Gutcher and Belmont) - Provide increased shelter (Gutcher and Belmont) - Better designated vessel manoeuvring areas, particularly Gutcher
Ferry revenue measures	

Approach / Principles	Component Options
Operate the service to timetable year-round (weather events excepted)	- Solution to current crewing challenges (e.g., additional crew, different shift patterns etc)
Address refit impacts – additional vessels to remove / mitigate refit timetable impacts	- 2-vessel service year-round, delivered through a fleet reserve vessel

Capital measures

Vessels

4.2.5 The BaU assumes the immediate replacement of MV *Bigga* and MV *Geira* with Type 1 vessels, maintaining existing vehicle capacity on the route and addressing reliability and resilience risks associated with two ageing vessels.

Harbour infrastructure

4.2.6 Whilst the infrastructure at Hamars Ness is in fair condition, elements of the infrastructure at Belmont and Gutcher are in poor condition. The timber berthing structure at Belmont is in urgent need of replacement. There is therefore a **short-term requirement for investment on this route.**

4.2.7 At Gutcher, the manoeuvring area within the bay is also constrained for the current vessels and should be increased to aid navigation. Bathymetric information is required to inform the extent of the dredging works. Marks should also be provided to improve the definition of the safe vessel manoeuvring area.

4.2.8 Berths at both Gutcher and Belmont are exposed and would benefit from additional shelter. Whilst the Type 1 vessel is the same length as MV *Bigga*, there would be merit in extending the breakwater to provide greater shelter to the berths, providing a degree of futureproofing given the 60-year investment. Wave modelling would be required to inform the extent to which the breakwaters are extended at Gutcher and Belmont.

4.2.9 It is important that the service is maintained during the construction of any new berthing structures. To avoid prolonged closures associated with relocating linkspans, new berthing structures would need to be constructed behind the existing berthing structures. Details of the existing rock armour slopes would be required to locate the toe of these slopes and inform the available seabed area that the new berthing structures could be constructed upon, and the extent of works required to install support piles.

4.2.10 A general arrangement drawing and description of the works required at each port is provided below:

Belmont

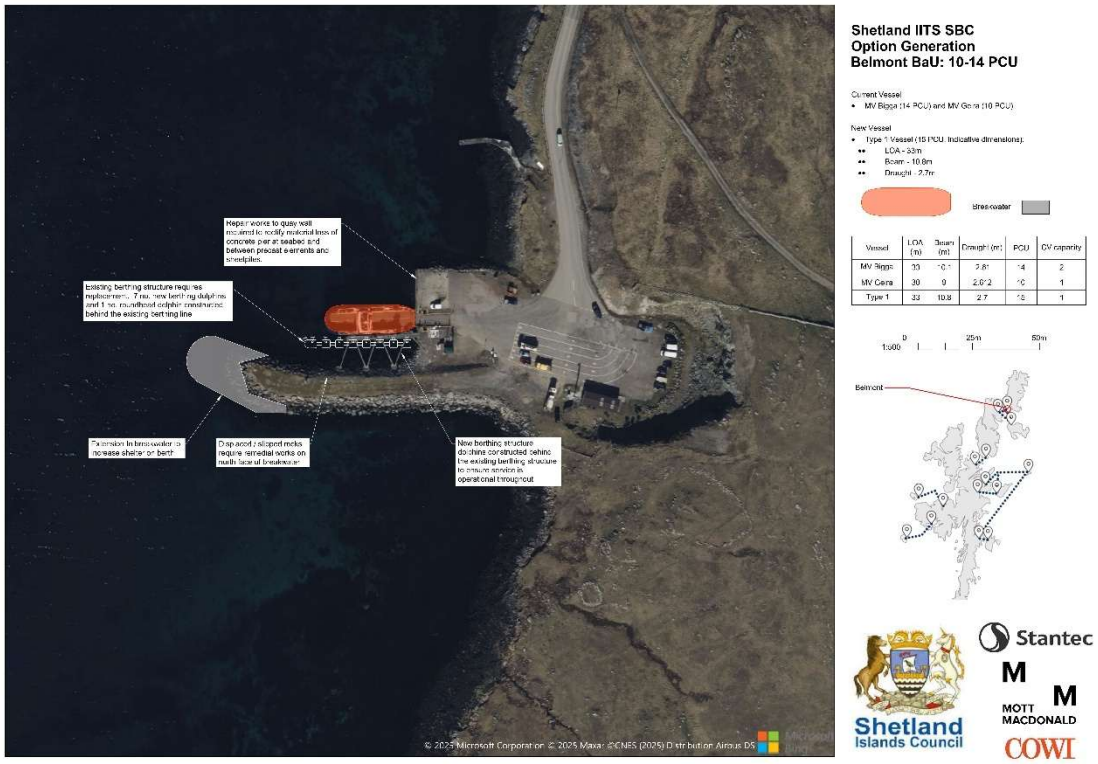

Figure 4.1: Bluemull Sound – Belmont – business-as-usual

4.2.11 The following works would be required at Belmont:

- Replacement of the entire timber berthing structure with a new structure consisting of seven berthing dolphins and one roundhead dolphin to provide a berth length of 40 metres, including bollards, fenders, ladders etc.
- The new berthing structure would be constructed behind the existing to generally allow the ferry service to remain live through the works with potential minor outages. The existing structure would be demolished in a phased approach as the new berthing dolphins are constructed. The new berthing dolphins would be reinforced concrete supported on tubular piles with a walkway between each dolphin to allow access to bollards etc.
- Extension of the breakwater by approximately 20 metres in a north-west direction to provide shelter for the new vessels.
- Repairs to the existing rock armour to rectify displaced / slipped stones on the north face of the breakwater.
- Repairs to the quay wall to rectify material loss of concrete pier at seabed and between precast elements and sheet piles.

Gutcher

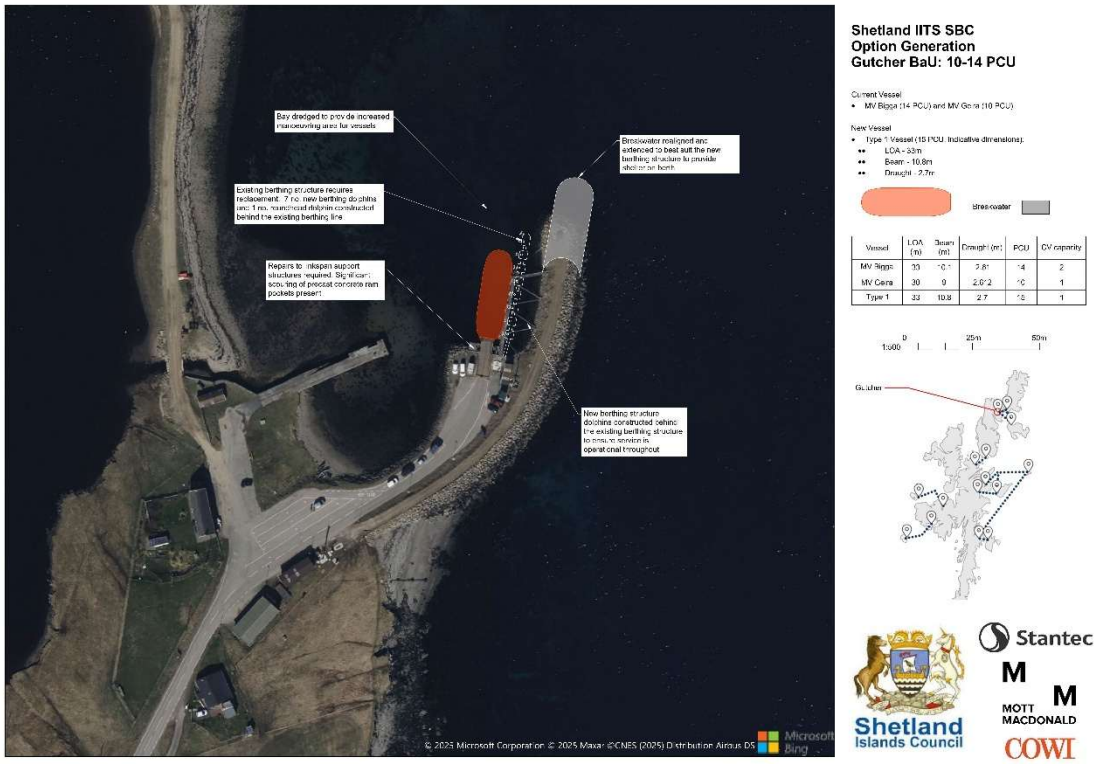

Figure 4.2: Bluemull Sound – Gutcher – business-as-usual

4.2.12 The following works would be required at Gutcher:

- Replacement of the entire timber berthing structure with a new structure consisting of seven berthing dolphins and one roundhead dolphin to provide a berth length of 40 metres, including bollards, fenders, ladders etc.
- The new berthing structure would be constructed behind the existing to generally allow the ferry service to remain live through the works with potential minor outages. The existing structure would be demolished in a phased approach as the new berthing dolphins are constructed. The new berthing dolphins would be reinforced concrete supported on tubular piles with a walkway between each dolphin to allow access to bollards etc.
- Realignment of the end of the existing breakwater and extension of the breakwater by approximately 20 metres in a north, north-east direction to provide shelter for the new vessels.
- Dredging of the bay to provide adequate manoeuvring area for the new vessels, whilst also providing marks to designate the dredged area.
- Repairs to the linkspan support structures to rectify scouring issues.

Hamars Ness

4.2.13 The berth at Hamars Ness is in relatively good condition and little would be required in the BaU except minor modifications to linkspan hydraulics to provide an appropriate load share with the new vessel.

Option Bluemull Sound 2: Ferry Do Something

4.2.14 As noted in the introductory section, the Ferry Do Something for Bluemull Sound effectively represents the minimum required from an assets perspective to avoid a declining service on the route.

4.2.15 This option comprises larger double-ended Type 2 vessels, major upgrades at Belmont and Gutcher and a more intensive timetable, as summarised in the table below

Table 4.2: Bluemull Sound Ferry Do Something option components

Approach / Principles	Component Options
Capital measures	
Larger vessels to increase vehicle capacity	- 2 * Type 2 45m length overall double-ended vessels - Berth modifications as required, and as indicated for BaU but on a larger scale - Consideration of increased marshalling provision particularly at Belmont
Fully accessible vessels	
Foot passenger waiting facilities	- Improved facilities in waiting rooms
Ferry revenue measures	
Common Monday to Friday timetable	- Standardise Monday to Friday timetable, either through additional vessels to cover drills and maintenance and / or move drills and maintenance to a two-vessel Sunday
Timetable intensification – increase frequency with existing assets	- Intensification of the timetable to fill gaps in the evening - Extend the operating day of the day vessel (currently MV *Geira*)
Improved Saturday service	- Operate the day vessel on a shift basis on a Saturday
Improved Sunday service	- Operate the shift vessel on the same basis as a Monday to Friday - Operate the day vessel on a Sunday
Earlier first sailings to enable shift work / airport access	- Earlier start (circa 05:00 and 05:35 departures from Gutcher to Belmont and return, operated on a request basis)
Public transport integration measures	
Improved bus connections	- Additional No.24Y bus services to connect with Yell Sound Ferries at Ulsta
Fares	
Lower fares for residents	- Reduced fares for residents

Capital measures

Vessels

4.2.16 The Ferry Do Something for Bluemull Sound entails the deployment of two Type 2 vessels, replacing MV *Bigga* and MV *Geira* at the earliest possible juncture. As well as broadly doubling vehicle deck capacity, the deployment of double ended vessels would reduce manoeuvring time at the berth.

Harbour infrastructure

4.2.17 This option would entail significant harbour works at Belmont and Gutcher and modest works at Hamars Ness.

4.2.18 The Ferry Do Something options at Belmont and Gutcher would be similar in nature to the BaU, but larger in scale to accommodate the Type 2 ferries, specifically including longer berthing structures and breakwater extensions.

4.2.19 Increased marshalling area capacity would be required at Belmont, and this would result in the excavation and levelling of an area of land to facilitate this. Ownership and / or purchase of this land would need to be resolved to inform the shape and extent of the proposed expansion.

4.2.20 A general arrangement drawing and description of the works required at each port is provided below:

Belmont

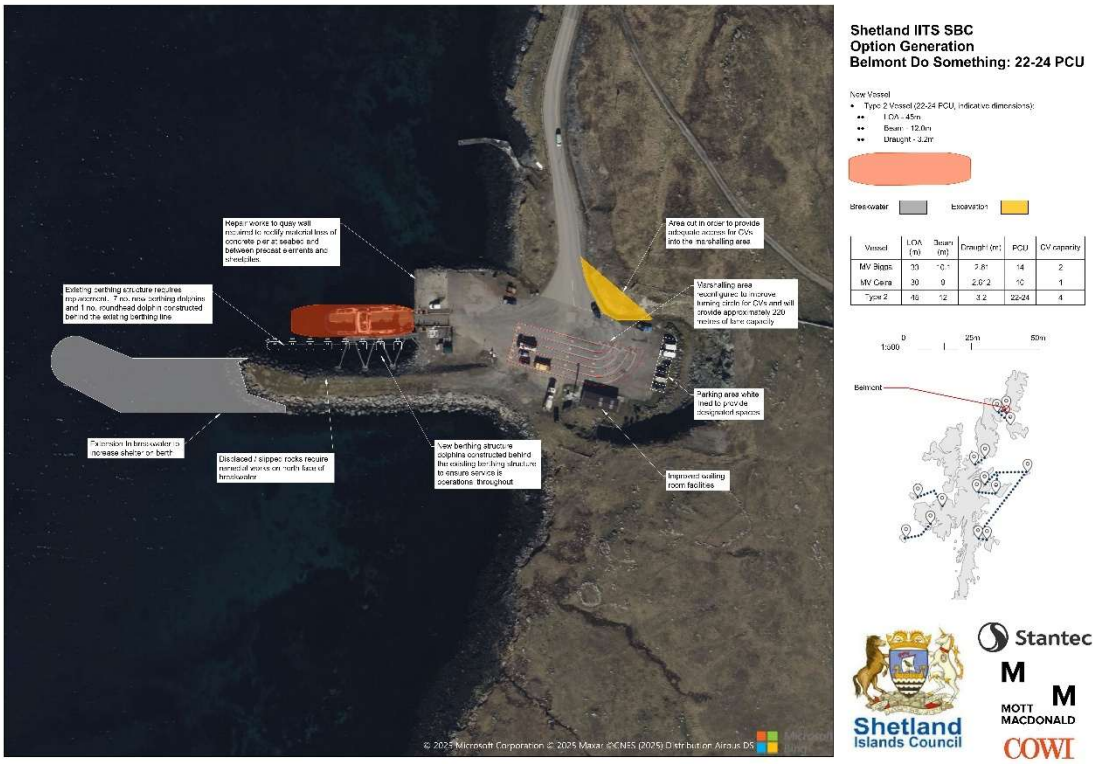

Figure 4.3: Bluemull Sound – Belmont – Ferry Do Something

4.2.21 The following works would be required at Belmont:

- Replacement of the entire timber berthing structure with a new structure consisting of seven berthing dolphins and one roundhead dolphin to provide a berth length of 55 metres for a Type 2 vessel, including bollards, fenders, ladders etc.
- The new berthing structure would be constructed behind the existing to generally allow the ferry service to remain live through the works with potential minor outages. The existing structure would be demolished in a phased approach as the new berthing dolphins are constructed. The new berthing dolphins would be reinforced concrete

supported on tubular piles with a walkway between each dolphin to allow access to bollards etc.

- Extension of the breakwater by approximately 75 metres to the west with a new dog leg end to accommodate a Type 2 vessel and provide adequate shelter on the berth.
- Repairs to the existing rock armour to rectify displaced / slipped stones on the north face of the breakwater.
- Repairs to the quay wall to rectify material loss of the concrete pier at seabed level and between precast elements and sheet piles.
- Reconfiguration of the marshalling area and car parking, including widening of the ferry terminal entrance to provide additional space and to ease commercial vehicles turning to access the marshalling lanes.

Gutcher

Figure 4.4: Bluemull Sound – Gutcher – Ferry Do Something

4.2.22 The following works would be required at Gutcher:

- Replacement of the entire timber berthing structure with a new structure consisting of seven berthing dolphins and one roundhead dolphin to provide a berth length of 55 metres for a Type 2 vessel, including bollards, fenders, ladders etc.
- The new berthing structure would be constructed behind the existing to generally allow the ferry service to remain live through the works with potential minor outages. The existing structure would be demolished in a phased approach as the new berthing dolphins are constructed. The new berthing dolphins would be reinforced concrete supported on tubular piles with a walkway between each dolphin to allow access to bollards etc.

- Extension of the breakwater by approximately 30 metres in a north-north-east direction to accommodate a Type 2 vessel and provide adequate shelter on the berth.
- Dredging of the bay to provide adequate manoeuvring area for a Type 2 vessel, whilst also providing marks to designate the dredged area.
- Repairs to the linkspan support structures to rectify scouring issues.

Hamars Ness

4.2.23 As per the BaU, minimal works would be required at Hamars Ness. These would be limited to minor modifications to the linkspan hydraulics to provide an appropriate load share with the new Type 2 vessel.

Cullivoe

4.2.24 In both this option **(BISo2)** and the Ferry Do Max **(BISo3)**, works will also be required at Cullivoe. As Cullivoe is occasionally used as an overnight berth for the Bluemull Sound ferries during periods of adverse weather, the pier structure must be considered to ensure that this overnight berth is available for the duration of the appraisal period.

4.2.25 The following works would be required at the end of the structure's design life in 2052:

- Partial demolition of the existing pier to bring the top level of the existing structure below the level of new tie rods.
- Construction of an approximately 150 metre steel sheet piled wall around the existing pier structure to encapsulate the pier with tie rods spanning across to the partially demolished existing structure.
- Construction of a new pier deck and installation of new pier furniture, bollards, fenders and services.
- At project business case stage, there would also be merit in raising the level of the pier to account for rising sea levels. In preparing the cost estimates, we have assumed a 700mm to 1,000mm increase.

4.2.26 The required works for Cullivoe have been included in the costing of the Ferry Do Something **(BISo2)** and Ferry Do Max **(BISo3)**.

Ferry revenue measures

4.2.27 The proposed ferry revenue measures entail:

- The provision of a two-vessel service between 06:55 and 22:05 Monday to Saturday, with a one vessel service operating the current timetable thereafter.
- The provision of a two-vessel service between 06:15 and 17:50 on a Sunday, with a one vessel service thereafter.
- Early request sailings for Gutcher and Belmont, Monday to Saturday (departing Gutcher at 05:00 and 05:35).
- Drills and maintenance would be moved to the two vessel Sunday, subject to contractor availability.

4.2.28 As noted previously, whilst this option is deliverable in principle, its implementability would need to be worked through in detail with respect to e.g., crew availability, maintenance implications, stress on the assets, contractor availability etc. Crewing is a particular challenge on Bluemull Sound, where the Council has recently faced significant challenges in even maintaining the current level of service, let alone expanding it.

4.2.29 The table below summarises the indicative number of sailings in the Ferry Do Something relative to the BaU.

Table 4.3: Bluemull Sound – number of sailings in Ferry BaU and Ferry Do Something

	Monday	Tues-Sat	Sunday	Monday	Tues-Sat	Sunday
	Gutcher - Belmont			***Hamars Ness – Gutcher / Belmont***		
BaU	26	28	15	8	11	5
Do Something	32	32	26	14	14	8
Do Something v BaU	***+6***	***+4***	***+11***	***+6***	***+3***	***+3***

Option Bluemull Sound 3: Ferry Do Max

4.2.30 The Ferry Do Max would represent a major scaling-up of the Bluemull Sound service, moving to a dedicated two vessel service between Gutcher and Belmont using Type 3 vessels and providing Fetlar with a dedicated Type 1 vessel. The service frequency would consequently be expanded, whilst a 24-hour operating day would be introduced, with on-request overnight sailings. The component elements of the Ferry Do Max are set out in the table below:

Table 4.4: Bluemull Sound Ferry Do Max option components

Approach / Principles	Component Options
Capital measures	
Additional vessels and harbour infrastructure required to deliver an increased service intensity	- 2 * Type 3 65m length overall double-ended vessels - 1 * Type 1 vessel dedicated to Fetlar - Additional linkspans at Gutcher and Belmont - Increased sheltered berth lengths to accommodate longer vessels (Gutcher and Belmont) - Increased vessel manoeuvring areas for longer vessels (Gutcher and Belmont) - Increased marshalling capacity - Additional overnight / layby berth, likely at Gutcher
Ferry revenue measures	
Provide 'turn-up-and-go' service, no bookings required between 06:00-00:00	- Increase service frequency to half-hourly on Gutcher – Belmont - Hourly Fetlar service (balance of Yell and Unst calls decided through discussion with the community)
Provision for 24-hour travel with request sailings 00:00-06:00	- Hourly on-request service 00:00-06:00
Public transport integration measures	
Through bus services (i.e., which travel on the ferry to the end destination)	- Three through bus services (No.24 Gutcher to Lerwick) to deliver working-day and part-day connectivity to Lerwick, seven days per week
Fares	
Free fares for residents (or toll equivalent for fixed link comparison)	- Free fares for residents

Capital measures

Vessels

4.2.31 The Bluemull Sound Ferry Do Max assumes the introduction of two Type 3 vessels to operate the trunk route between Gutcher and Belmont. This would more than double the existing vehicle capacity on every sailing and would also allow a more intensive service to be operated, as Fetlar would be served by its own vessel.

4.2.32 A dedicated Type 1 vessel would be provided for Fetlar. The infrastructure at Hamars Ness is already sized to accommodate the Type 3 vessels, with MV *Dagalien* and MV *Daggri* both having berthed there in the past.

Harbour infrastructure

4.2.33 Unlike the BaU and Ferry Do Something, which are incremental in nature, the Ferry Do Max would require the complete development of Belmont and Gutcher. The preliminary design for the redevelopment of these ferry terminals has been developed to facilitate continuity of service throughout the works. This would be achieved by allowing the existing berths to remain operational and by phasing of the works so that the ferry service could move to a newly constructed berth ahead of completion of the entire redevelopment.

4.2.34 General arrangement drawings and summaries of the works required at each port are provided below.

Belmont

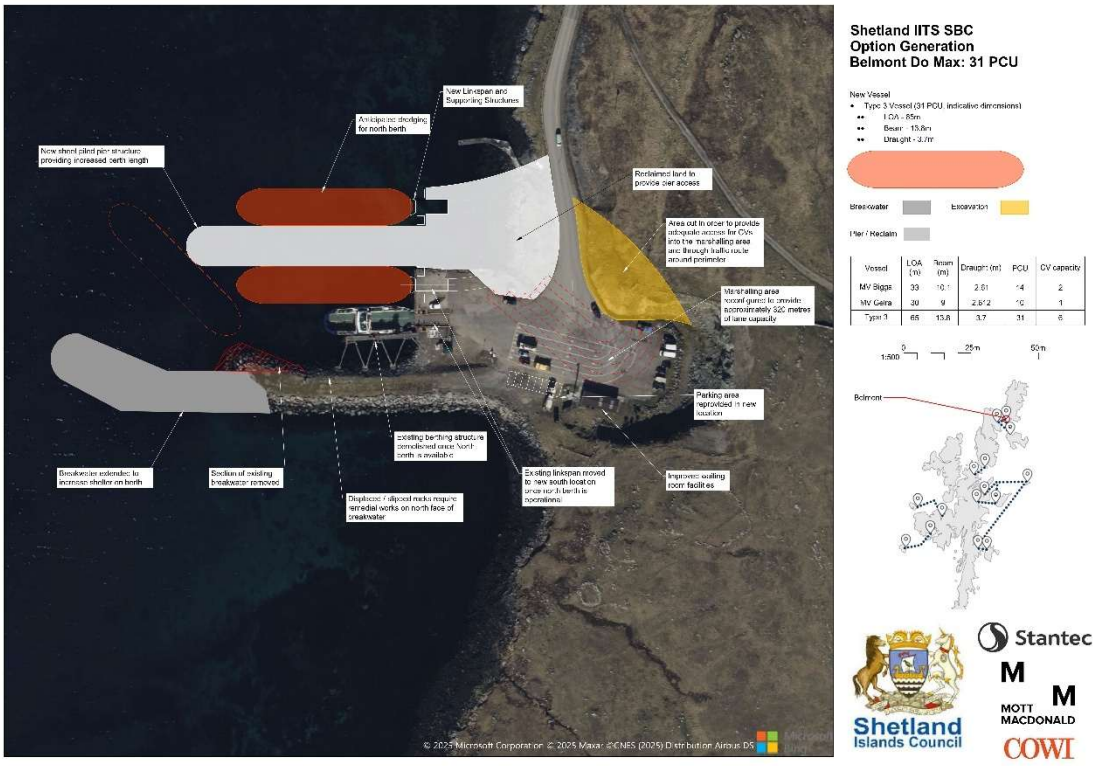

Figure 4.5: Bluemull Sound – Belmont – Ferry Do Max

4.2.35 The following works would be required at Belmont:

- Extension of the breakwater by approximately 75 metres in a westerly direction to provide additional shelter in the bay.
- Dredging of the new north berth area to provide adequate manoeuvring area for a Type 3 vessel.
- Excavation of land to the east of the ferry terminal entrance to widen the approach to the marshalling area.
- Reclamation of land to the north of the existing linkspan to provide an approach to the new pier and linkspan, building end-over from the land to remove the need for marine plant. Excavated material from the widening of the approach to the marshalling area could be used for this reclaim (subject to its suitability).
- Construction of a new 90 metre solid sheet piled pier (assumed) to the north of the existing berth, building end-over from the newly reclaimed area.
- Construction of linkspan support structures and installation of a new linkspan on the north berth of the new pier. This would allow this berth to enter service, with the ferry service switching over at this point.
- Reconfiguration of the existing marshalling area for the new berths.
- Demolition of the existing berthing structure and the north side of the existing dog-leg section of the breakwater.
- Construction of new linkspan support structures and relocation if of the existing linkspan to the south berth of the new pier.

Gutcher

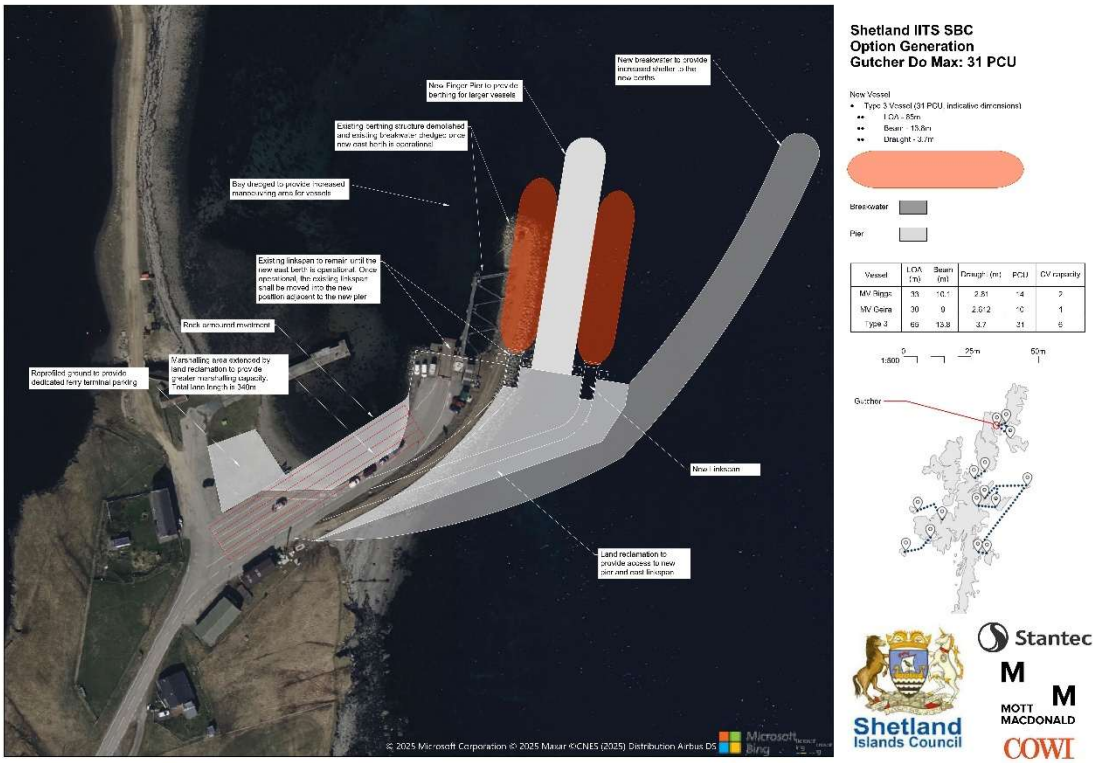

Figure 4.6: Bluemull Sound – Gutcher – Ferry Do Max

4.2.36 The following works would be required at Gutcher:

- Construction of a new approximately 225 metre breakwater that branches from the root of the existing breakwater in a north-easterly direction to provide additional shelter.
- Reclamation of land between the existing and new breakwaters to provide an approach to the new pier and linkspan, building end-over from the existing breakwater to remove the need for marine plant.
- Construction of a new 90 metre solid sheet piled pier (assumed) on the east side of the existing breakwater, building end-over from the newly reclaimed area.
- Reclamation of land to the north of the existing marshalling area to provide additional marshalling area capacity.
- Construction of new linkspan support structures and installation of a new linkspan on the east berth of the new pier. This would allow this berth to enter service, with the ferry service switching over at this point.
- Demolition of the existing berthing structure and breakwater.
- Dredging of the bay to provide adequate manoeuvring area for a Type 3 vessel, providing marks to designate the dredged area.
- Construction of new linkspan support structures and installation of new a linkspan on the west berth of the new pier.

Hamars Ness

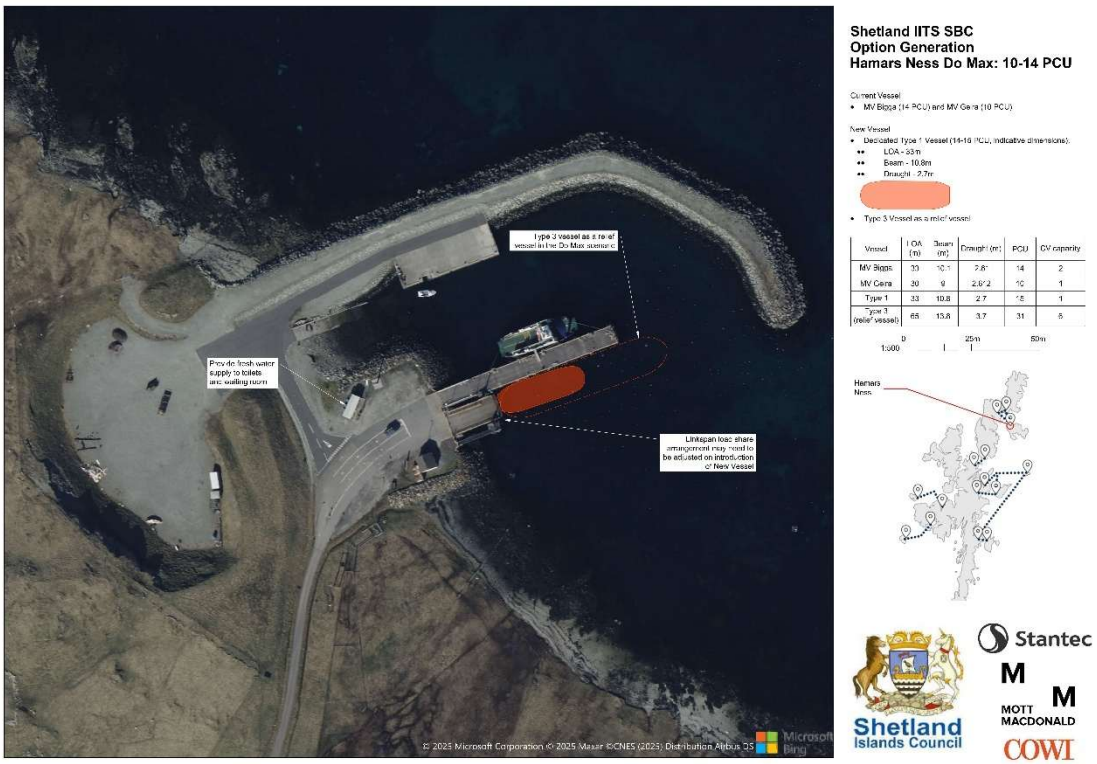

Figure 4.7: Bluemull Sound – Hamars Ness – Ferry Do Max

4.2.37 The following works would be required at Hamars Ness:

- Minor modifications to linkspan hydraulics to give an appropriate load share with the new vessel.
- Provision of a new fresh water supply to the existing waiting room / toilets.

Ferry revenue measures

4.2.38 The Bluemull Sound Do Max would entail a major scaling-up of the current service with a:

- **Monday to Saturday**
  - Half hourly direct Gutcher – Belmont service from 06:00-23:30.
  - Hourly scheduled (i.e., not request) overnight service between Gutcher and Belmont, operating from midnight onwards.
  - Hourly Hamars Ness departures from 06:40-23:35, except during breaks.
    - The balance of Belmont and Gutcher calls could be discussed and agreed with the community, as the vessel would be dedicated to Fetlar.
- An equivalent timetable would be operated on a Sunday, except there would be no overnight vessels and the frequency would be reduced across the day to allow for drills and maintenance.

4.2.39 This is again a conceptually deliverable solution, but it would clearly require significant work around deliverability in any project business case – this is particularly the case on this route where crew availability has been a major challenge recently. Moreover, expanding the service to this sort of level on this and other routes would require a scaling-up of overhead support, e.g., an increase in the number of marine superintendents.

4.2.40 The table below summarises the number of sailings in the Ferry Do Max relative to the BaU.

Table 4.5: Bluemull Sound – number of sailings in Ferry BaU and Ferry Do Max

	Monday	Tues-Sat	Sunday	Monday	Tues-Sat	Sunday
	Gutcher - Belmont			***Hamars Ness – Gutcher / Belmont***		
BaU	26	28	15	8	11	5
Do Max	40	40	32	16	16	13
Do Max v BaU	***+14***	***+12***	***+17***	***+8***	***+5***	***+8***

Option Bluemull Sound 4: Unst to Yell Fixed Link

4.2.41 It should be noted that the retention of a ferry service for Fetlar using a dedicated Type 1 vessel would be required with this option. The working assumption in this programme level business case is that both Belmont and Gutcher would be maintained for the Fetlar service, but this would need to be revisited in a project business case. It should be noted that the Fetlar vessel element has not been included in the costs of this option at this stage.

Alignment

4.2.42 The proposed alignment between Unst and Yell connects the northern end of Yell to a landfall point on Unst located south-west of the existing main road network.

4.2.43 From Yell, the route would curve north-east towards the Bluemull Sound crossing, before passing beneath the channel and rising to meet the existing road on Unst. The subsea tunnel would have a total length of 5.3 km, forming part of a 6.0 km overall road corridor including the tunnel and its approach junctions.

4.2.44 The link has been designed as a single-bore, two-lane tunnel supporting bi-directional vehicle travel at a design speed of 40 mph. Pedestrian and bicycle access would not be permitted, reflecting the safety requirements associated with long subsea tunnels, bi-directional traffic, emergency management constraints, and fire and life-safety principles.

4.2.45 Safety would be supported through the inclusion of a full-length emergency walkway, alongside regularly spaced laybys and turning niches to facilitate emergency access, breakdown recovery and inspection activities.

4.2.46 The figures below illustrate the indicative horizontal and vertical alignment developed for this crossing, showing the tunnel trajectory between Unst and Yell and its position relative to local topography and seabed conditions:

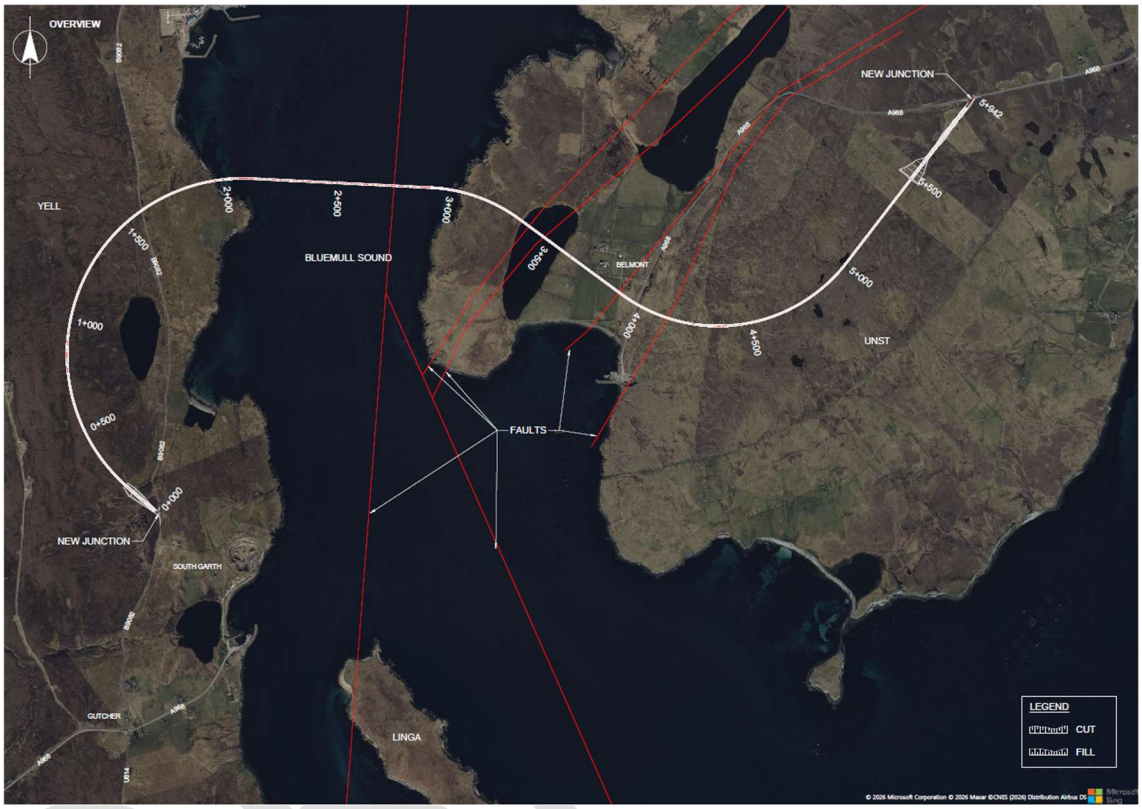

Figure 4.8: Horizontal tunnel alignment form mainland Unst to Yell

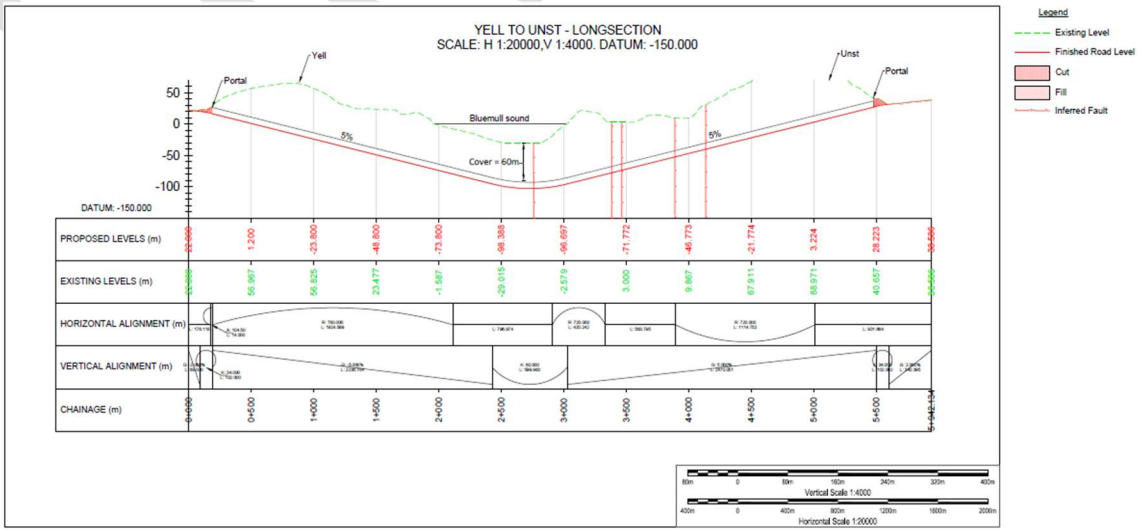

Figure 4.9: Vertical tunnel alignment from mainland Unst to Yell

Option costs

4.2.47 As explained in Chapter 3, all costs in the Economic Dimension are presented on a present value basis. In the economic appraisal, capital (initial and lifecycle) and operating and maintenance costs are profiled over 60 years and discounted to a present value.

4.2.48 These include:

- Vessel and harbour infrastructure replacement for all ferry options from 2026 to 2095, including cyclical renewals and refurbishment.
- Pre-construction and construction costs for a fixed link. It should be noted that major refurbishment and renewal of tunnel infrastructure is **not** included.
- Operating and day-to-day maintenance costs over the same period for all options.
- For ferry options, the **PVC** includes all capital expenditure, operating and maintenance costs and fares revenue, and is presented in 2023 market prices.[33]
- For the fixed link option, the **PVC** includes capital expenditure, operating, day-to-day maintenance costs and toll revenue, but excludes major refurbishment and renewal of tunnel infrastructure. Costs are again presented in 2023 market prices.
- Subsidies, fares and tolls are treated as public / private sector transfers and are typically reflected through the Public Accounts framework. In this appraisal, fare / toll revenues have been included within the PVC for each option. However, changes in ferry operating subsidy requirements have not been quantified and will be developed alongside the Public Accounts position at the next stage of appraisal.
- For clarity, the 'Appraisal PVC' is the 'Absolute PVC' of each intervention less the 'Absolute PVC' of the BaU. This is because the appraisal is focused on incremental costs and benefits relative to the BaU.

Table 4.6: Bluemull Sound - Option costs, PVC

	Absolute PVC (2023 market prices, 60-years)	Appraisal PVC (2023 market prices, 60-years)
BISo1: BaU	£279.9m	-
BISo2: Ferry Do Something	£347.6m	£67.7m
BISo3: Ferry Do Max	£622.4m	£342.5m
BISo4: Fixed Link	£484.5m	£204.6m

4.3 Options Appraisal

Transport Planning Objectives

4.3.1 The table below summarises the performance of the Bluemull Sound option packages against the TPOs:

[33] PVCs are presented in market prices in line with TAG convention (i.e. costs in factor prices are uplifted to market prices), ensuring costs and benefits are compared on a consistent basis. These should not be interpreted as the Council's cash outlay or funding requirement though, which is addressed separately in the Financial Dimension.

Table 4.7: Bluemull Sound – appraisal against TPOs

	BISo2: Do Something	BISo3: Do Max	BISo4: Fixed Link
TPO1: Resilience	✓	✓✓	✓✓✓
TPO2: Capacity	✓	✓✓	✓✓✓
TPO3: Limited, fixed times of travel in operating day	✓	✓✓	✓✓✓
TPO4: Cost	✓	✓✓✓	O
TPO5: Physical accessibility	✓✓	✓✓	✓✓
TPO6: Length of operating day	✓	✓✓	✓✓✓
TPO7: Non-car travel options	✓	✓✓	✓

4.3.2 The nature of the option packages for Bluemull Sound means that each increment will deliver progressively larger benefits with respect to the TPOs. This ultimately culminates in a fixed link, which would remove many of the identified barriers to travel.

- **Resilience (TPO1)**:
  - Resilience is the critical issue on Bluemull Sound at present. The Case for Change highlighted several problems around vessel and infrastructure age, crewing challenges and reductions in service / single vessel operation during refit. The Council introduced a new timetable in late 2025 which has stabilised the position, but the situation with regards to the assets remains precarious and there is a need for short-term investment on this route. Indeed, the Bluemull Sound route has recently seen a sustained period of single vessel operation, with MV *Geira* undergoing an extended refit and with no spare vessel available.
  - The Ferry Do Something **(BISo2)** would address the immediate problems of ageing vessels and harbours through introducing two Type 2 vessels and modernising both Gutcher and Belmont. The **Ferry Do Max (BISo3)** would have a similar short-term impact but records a moderate benefit because it adds a third vessel, ensuring a minimum two vessel service during refit or when there is a breakdown (albeit Fetlar's vessel would become shared rather than dedicated during refit). Moreover, the deployment of Type 3 vessels on Gutcher – Belmont would ensure that demand could be more readily accommodated in the event of e.g., a short-term breakdown – one Type 3 vessel could accommodate more PCUs than MV *Bigga* and MV *Geira* combined.
  - A fixed link **(BISo4)** would evidently deliver a major resilience benefit by removing the reliance on sea-based travel altogether for Unst. It would also provide Fetlar with a dedicated vessel, providing greater flexibility and removing the need for a compromise timetable across two islands.
- **Capacity (TPO2):**
  - Vehicle deck capacity was identified in the Case for Change as a problem, with **42%** of island resident survey respondents noting that that they are unable to book on their preferred sailing 2-3 times per month, and **15%** noting that this happens more than five times per month. Indeed, the data show that around a quarter of all sailings on the Gutcher – Belmont route were full or near to full in 2024. There are several reasons for this including the use of relatively small vessels and triangular sailings, where capacity is shared between Fetlar and Unst.
  - Existing capacity problems on the Bluemull Sound route will be amplified, potentially significantly, by the emergence of SaxaVord Spaceport. Consultation suggests that this will drive business travel, the movement of materials and equipment (including abnormal loads) and a nascent tourism industry around the Spaceport.

- **BISo2**, the Ferry Do Something, would offer a significant uplift in capacity on the current tonnage. It would also provide a small number of additional sailings across the week (albeit at times when demand is lower) and a near doubling of the service frequency on a Sunday.
- **BISo3**, the Ferry Do Max, would offer a much larger benefit, introducing Type 3 vessels on Gutcher – Belmont and providing a three-vessel service overall.
- A fixed link **(BISo4)** would remove all capacity related constraints for Unst. Whilst Fetlar would continue to be served by a ferry, a Type 1 vessel dedicated to that island would offer sufficient capacity to meet its needs.

- **Limited, fixed times of travel in the operating day (TPO3)**
  - This TPO is about frequency and each ferry option therefore offers an increment on the last through expanding the number of sailings. A fixed link would provide unfettered vehicular access between Unst and Yell (and mainland Shetland if there was a tunnel on Yell Sound), thereby recording a major benefit with respect to this TPO.
  - Whilst Fetlar would continue to have a ferry-based connection, the provision of a dedicated vessel would significantly enhance frequency and reduce journey times through removing the need for indirect connections.
- **Cost (TPO4)**
  - The impact on **TPO4** (cost to the user) remains to be established and would depend on the balance between ferry fares and tunnel tolls. It is assumed for this appraisal that a tunnel would be tolled and thus would be higher cost than the Ferry Do Something **(BISo2)** and Ferry Do Max **(BISo3)** which assume a discount and free fares respectively.
  - However, there is also a scenario where a tunnel could be operated without tolls and thus would be cost equivalent to the Ferry Do Max **(BISo4)** in this respect.
  - For clarity, the economic appraisal assumes consistent fare and toll treatment across options. The assessment of user costs within the TPO framework is indicative and reflects potential policy choices rather than modelled outputs.
  - The future of ferry fares is a network-wide issue for the Council to consider, whilst the approach to tolling and the basis on which the tariff is set would be a matter for a project level business case.
  - A Fixed Link **(BISo4)** would also increase the distance driven and increase vehicle operating costs. With the Bluemull Sound crossing being quite short, this impact is much smaller than for other candidate links.
- **Physical accessibility (TPO5)**
  - Physical accessibility is a problem on this route at present, as the passenger accommodation on both MV *Bigga* and MV *Geira* is located below the waterline and only accessible via very steep stairs. The short-term replacement of the current tonnage across both ferry options would therefore deliver an immediate benefit.
  - A fixed link **(BISo4)** would evidently provide a major step change in accessibility, as passengers could remain in their cars for any journey. However, there could be issues for those without access to a car or who would prefer not to drive one.
- **Length of operating day (TPO6)**
  - The Ferry Do Something **(BISo2)** would offer a minor benefit with respect to this TPO, as it would provide two early morning request sailings between Gutcher and Belmont Monday to Saturday. The Ferry Do Max **(BISo3)** would have a more material impact, offering an hourly on-request overnight service.

- A fixed link **(BISo4)** would again remove all barriers with respect to travel time for Unst, providing 24-hour vehicular access to Yell (and mainland Shetland if there was a tunnel on Yell Sound).
- None of the options benefit Fetlar. Whilst a higher ferry frequency would be offered in each of the options, no early morning request or overnight sailings are assumed given the small population.

- **Non-car travel options (TPO7)**
  - **BISo2** and **BISo3** both score positively with respect to this TPO, as they include an in-principle commitment to expand the bus service.
  - With a fixed link, it is assumed that the bus service is scaled up to a level that approaches the frequency of the current ferry service. Without this, there would be a reduction in accessibility for those without a car or who would prefer not to drive, as pedestrians and cyclists would not be able to use the tunnel between Unst and Yell.
  - Fetlar would benefit from any scaling-up of the bus service to Unst through connections at Gutcher.

4.3.3 The estimated quantitative impact on the level of disstisfaction (as described in Section 3.4) is shown in the figure below.

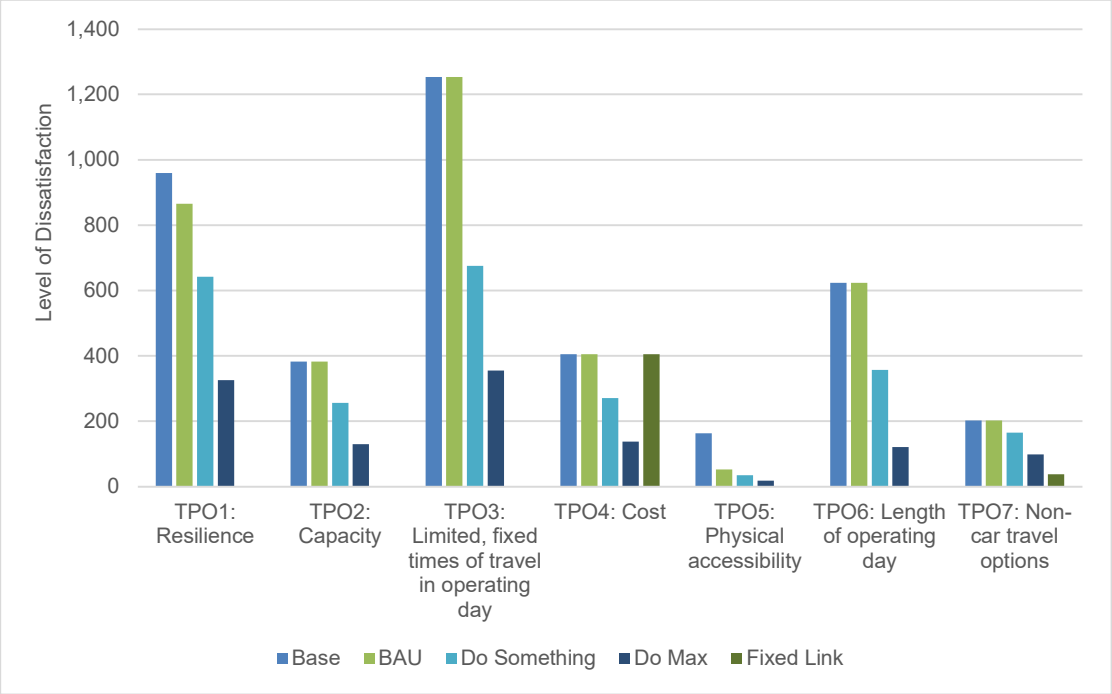

Figure 4.10: Bluemull Sound, estimated level of dissatisfaction with each TPO by option

4.3.4 In the present day ('base') it can be seen that the highest levels of dissatisfaction are with TPO3 – Limited, fixed times of travel in operating day, TPO1 – Resilience and TPO6 – Length of operating day.

4.3.5 Overall, the options would reduce the level of dissatisfaction from the present day by:

- **5%** in the BaU
- **37%** in the Ferry Do Something
- **65%** in the Ferry Do Max
- **90%** with the Fixed Link

Key Point: The nature of the option packages for Bluemull Sound means that each increment will deliver progressively larger benefits with respect to the TPOs. This ultimately culminates in a fixed link, which would remove many of the identified barriers to travel, except from the cost of travel where tolls are levied.

STAG criteria

Environment

4.3.6 The figures below map the main environmental constraints pertaining to the Bluemull Sound route. Figure 4.10 shows Gutcher – Belmont and Figure 4.11 shows Hamars Ness

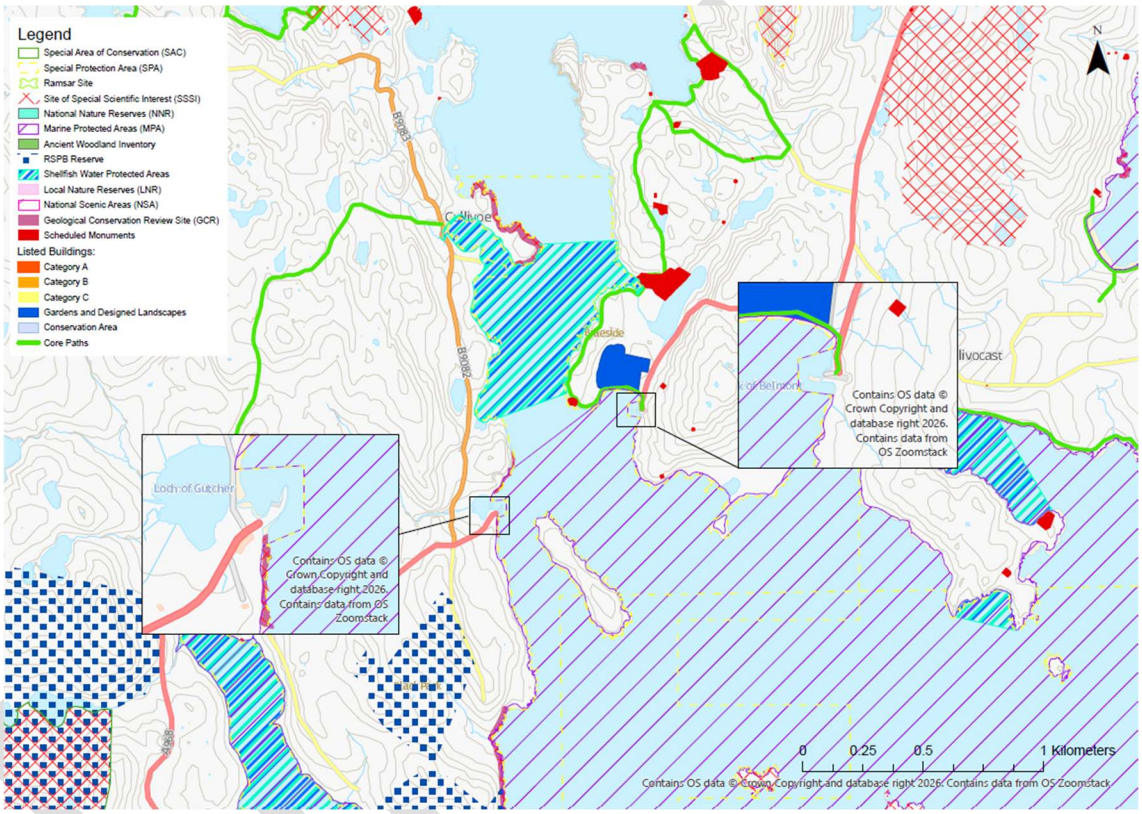

Figure 4.11: Bluemull Sound, Belmont and Gutcher – environmental constraints map

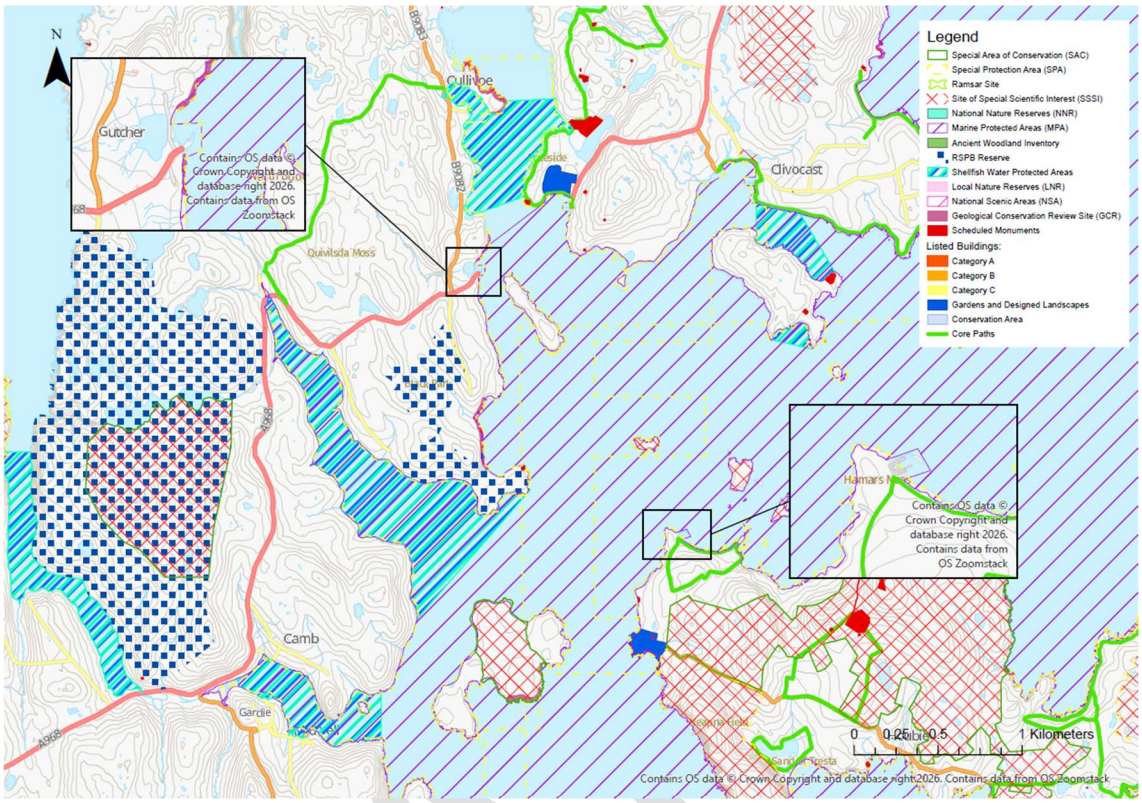

Figure 4.12: Bluemull Sound, Hamars Ness – environmental constraints map

4.3.7 The key points of note from the above figure are as follows:

- Belmont, Gutcher and Hamars Ness are working harbours / ferry terminals and are not directly covered by any specific environmental designations.
- However, they are in very close proximity to the Fetlar Special Protection Area (SPA). This is an important constraint which would be a key consideration in a project level business case and would undoubtedly be within the scope of an EIA. It would also likely trigger a Habitat Regulations Assessment (HRA).
- It is also important to note that all three ferry terminals are on the very edge of the Fetlar to Haroldswick Marine Protected Area (MPA), a significant ecological site designated to conserve its biodiversity and geodiversity features. The proposed expansions to Belmont and Gutcher would need to be considered in the context of the MPA, which comes within circa 50 metres of each ferry terminal. This again would be a key consideration in a project level business case and EIA.
- At **Belmont**:
  - There are residential properties in close proximity to the harbour (within circa 200 metres).
  - The Core Path from Belmont to Lund commences at the ferry terminal.
  - The Shellfish Water Protected Areas of Southwick Cullivoe and Bastavoe are within six kilometres and half a kilometre respectively of Belmont.
- At **Gutcher**:
  - There are residential properties in close proximity to the harbour (within circa 50 metres).
  - The Shellfish Water Protected Areas of Southwick Cullivoe and Bastavoe are within one kilometre and four kilometres respectively of Gutcher.

- There are geological SSSIs to the north and south of the ferry terminal.
- There is a Category B listed building within 100 metres of the ferry terminal.

- At **Hamars Ness**:
  - The Fetlar Special Protection Area (SPA) is adjacent to the ferry terminal, which is again a material consideration for the SEA and any subsequent EIA. Any significant works at Hamars Ness would also likely trigger HRA.
  - There is a Core Path that passes immediately opposite the ferry terminal.
  - Brough House Garden and Designed Landscape is about two kilometres to the south of Hamars Ness ferry terminal.

4.3.8 The table below summarises the performance of the Bluemull Sound options against the STAG Environment criterion:

Table 4.8: Bluemull Sound – appraisal against STAG Environment criterion

	BISo2: Do Something	BISo3: Do Max	BISo4: Fixed link
Environment	-	--	---

- The environmental impacts of the options increase with each increment in scale, with a fixed link **(BISo4)** clearly being the most significant in this respect. However, it is important to recognise that **most impacts will be short-term and associated with construction only**.
- It is important to reiterate here that all three ferry terminals are located on the edge of an environmentally sensitive area. The scale of works associated with **BISo2** and **BISo3** would need to be considered in detail through the EIA process.
- **BISo2 and BISo3** would entail significant infrastructure works at Belmont and Gutcher, including dredging at Gutcher. This would have a range of short-term environmental impacts, albeit these would be largely contained within the existing harbour area. There would therefore be negative environmental impacts in terms of e.g., **noise and vibration** for surrounding properties and marine ecology, reduced **water quality** and impacts **on air quality** associated with construction dust. The impact of **BISo3** would be larger given the greater scale of the works.
- A fixed link **(BISo4)** would have a range of environmental considerations, for example the impacts on geology and soils, noise and vibration etc. This would particularly be the case during construction, as this would be a major project in this geographic context.
- Disposal of tunnel spoil would be a significant environmental consideration, even if a purpose could be found for it. A fixed link would undoubtedly be subject to full EIA through which environmental protections, mitigations and enhancements would be developed.
- It is also important to note that the harbour works associated with the BaU **(BISo1)** would be required with a Unst to Yell fixed link **(BISo4)** to maintain a service to Fetlar. Whilst the works associated with **BISo1** are more modest than **BISo2** and **BISo3**, they do still entail a rebuild of the berthing structure and an extension of the breakwater, so there will still be some environmental impacts.

4.3.9 Whilst a fixed link **(BISo4)** would evidently have a significant environmental impact (at least during construction), one key point of note here is that, as the fixed link would take the form of a tunnel, its physical environmental impacts would be more spatially concentrated, for example on the landscape, historic environment and water quality, drainage and flooding. Indeed, this type of solution has been successfully delivered at scale in the Faroe Islands and Norway, where the environmental impacts have been carefully managed. Moreover, the

Faroese have created positive landscape features around the tunnel portals, adding to rather than subtracting from local visual amenity.

Key Point: The environmental impacts of the Bluemull Sound options increment relative to the scale of those options. All three ferry terminals sit on the edge of an environmentally sensitive area – this is important as all options, including a fixed link **(BISo4)** will require harbour works, with **BISo2** and **BISo3** entailing significant works. A fixed link **(BISo4)** would evidently have the most significant impacts given its scale, and a key consideration here would be the approach to the disposal of spoil.

Key Point: Whilst each of the options would have an environmental impact to a lesser or greater degree, there is precedent for the delivery of similar solutions across Scotland and beyond. The undertaking of a full EIA for the ultimate preferred option emerging from a subsequent project business case would allow for environmental impacts to be scoped, fully assessed and mitigated where possible.

Climate Change

Table 4.9: Bluemull Sound - appraisal against STAG Climate Change criterion

	BISo2: Do Something	BISo3: Do Max	BISo4: Fixed link
Climate change	xx	xxx	x

Greenhouse gas emissions

4.3.10 A programme level comparison of whole life carbon (WLC) has been developed – this incorporates an estimate of:

- Embodied and operational carbon associated with the fixed link provided by COWI.
- Embodied carbon associated with harbour infrastructure improvements based on estimated quantities provided by Mott MacDonald.
- Operational carbon associated with the continued operation of ferry services.
- Road operational carbon associated with additional vehicle kilometres relative to the BaU.

4.3.11 The methodological approach to developing this comparison is detailed in **Appendix A**, but it should be noted that the WLC comparison is highly sensitive to the underpinning assumptions, particularly in relation to when the ferry fleet is decarbonised.

4.3.12 The table below shows the estimated WLC for the Bluemull Sound options in tonnes of carbon dioxide equivalent (tCO_2e):

Table 4.10: Bluemull Sound WLC comparison (tCO_2e), round to nearest thousand

Option	Whole Life Carbon - tCO_2e
BISo1: BaU	42,000
BISo2: Ferry Do Something	89,000
BISo3: Ferry Do Max	163,00
BISo4: Fixed Link	63,000

4.3.13 The following points should be noted in relation to the above table:

- A fixed link **(BISo4)** has a lower WLC than **BISo2** and **BISo3** due to operational (ferry) emissions associated with these two options.

- Given that MV *Bigga* and MV *Geira* are 35 and 38 years old respectively, it is a working assumption with all of the ferry options that they would be replaced in the immediate term with a conventionally fuelled vessel.
- New vessels are assumed to generate 20% less CO_2 than existing vessels of that type due to efficiencies in hull form, propulsion systems etc. Additionally, after 15 years of operation, these vessels are assumed to undergo a decarbonisation refit to reduce CO_2 emissions by a further 10%.
- Under **BLSo1**, this is assumed to be a like-for-like Type 1 vessel replacement, whereas under **BISo2** and **BISo3**, this is assumed to be larger Type 2 and Type 3 vessels respectively (plus a Type 1 for Fetlar in **BISo3**), so there will be a balance between the power requirement of these vessels, and the fuel efficiency benefits which they offer.
- **BISo2** and **BISo3**, especially the latter, would increase the route capacity and the number of sailings. This would generate additional vessel emissions and vehicle kilometres, with the longevity of this impact depending on when the vehicle fleet and the ferry fleet is decarbonised.
- These findings underpin the scoring presented in Table 4.9, with lower whole life carbon resulting in a more favourable assessment for the fixed link option **(BISo4)**.

Adaptation to climate change

4.3.14 Island communities dependent on ferry services are uniquely exposed to climate change. Continued dependence on ferry services will retain and amplify this risk as the climate continues to change, whereas a fixed link **(BISo4)** would almost entirely remove this vulnerability for Unst (although the position for Fetlar would remain unchanged).

Key Point: The Ferry Do Something **(BLSo2)** and Ferry Do Max **(BLSo3)** are dominated by maritime operational emissions; these accumulate every year and increase where service and / or vessel requirements increase. The fixed link **(BLSo4)** has a large upfront construction carbon cost, but the ongoing carbon (road + tunnel operation / maintenance) is lower on an annual basis, meaning that the fixed link option generates the lowest whole life carbon emissions. These figures are however highly sensitive to the underpinning assumptions.

Health, Safety and Wellbeing

Table 4.11: Bluemull Sound – appraisal against STAG Health, Safety and Wellbeing criterion

	BISo2: Do Something	BISo3: Do Max	BISo4: Fixed link
Health, safety and wellbeing	✓	✓✓	✓✓✓

4.3.15 The three material considerations in this study with regards to this criterion are:

- Accidents
- Health outcomes
- Access to health and wellbeing infrastructure

4.3.16 It should be noted that, in this context, **access to health and wellbeing infrastructure** and **health outcomes** are intrinsically linked and are therefore addressed together

Accidents

*It should be noted that the monetary valuation of **accidents** of differing severity is standard practice in cost-benefit analysis and is thus captured under the **Economy** criterion. It is though*

important to recognise that such impacts will be very small given the low traffic volumes and the inferred number of accidents.

4.3.17 With the two ferry increments, the Do Something **(BISo2)** and the Do Max **(BISo3)**, there are several 'competing' factors at play with respect to accidents:

- Each increment in service level will generate **additional vehicular demand and thus vehicle kilometres** - there is therefore an increased risk of accidents in terms of vehicle collisions driven by this increase in traffic volumes (as quantified and monetised under the Economy criterion).
- Moreover, **BISo2** and **BISo3** include **increments in the number of sailings relative to the BaU**. This again increases the risk of an incident, particularly where more sailings are introduced in the hours of darkness. However, the Council's ferry service has a long-term reputation for high safety standards and thus any such risk is minimal.
- On the other side of the equation, a higher frequency ferry service would **reduce the wait time between sailings and therefore the temptation to rush to catch a specific connection**. This would be more of an issue on Yell than in Fetlar or Unst, as people are often travelling from the Yell Sound ferry to connect with a sailing to Fetlar or Unst.
- The **expansion and formalisation of the marshalling areas at Belmont and Gutcher** to a size commensurate with the Type 2 vessel in **BISo2** and a Type 3 vessel in **BISo3** would reduce the risk to motorists and pedestrians.

4.3.18 Whilst not strictly speaking 'accidents', a further key consideration here would be the implications of the options with respect to **navigational safety**. The new harbour developments in **BISo2** and **BISo3** would address the ageing infrastructure at Belmont and Gutcher and deepen the berth at the latter port through dredging.

4.3.19 A fixed link **(BISo4)** between Unst and Yell would create the scope for a notable expansion of vehicle movements between the two islands and also between Unst and mainland Shetland (which would be amplified if a Yell Sound fixed link was also delivered). However, there would be two specific 'accidents' benefits with respect to **BISo4**:

- SaxaVord Spaceport is expected to generate significant commercial vehicle / equipment movements (in relative terms). There are challenges associated with moving larger pieces of kit on ferries – whilst these can be worked around, the inconvenience and risk associated with this would be removed with a fixed link.
- A fixed link would also remove all risks associated with ferry-borne travel between Unst and Yell, including vehicle marshalling, vehicle and foot passenger interaction, rushing for a ferry and incidents at sea. It is important to note though that there would be a continued ferry service to Fetlar.

Key Point: The impact of the options with respect to the Accidents criterion is finely balanced. In terms of a fixed link **(BISo4)**, there would be scope for a notable increase in vehicle kilometres increasing the risk of accidents but, at the same time, this would remove all risks associated with seaborne travel and facilitate the movement of larger vehicles to and from SaxaVord Spaceport. Overall, it is important to recognise that the low traffic volumes associated with the options, even in the context of a fixed link, means that accident impacts will be minimal overall.

Access to health and wellbeing infrastructure and health outcomes

4.3.20 Unst has a GP practice, dental surgery and care home on island, meaning that most of the day-to-day needs of island residents can be met locally. This is not, however, the case in Fetlar, where residents need to travel off-island for medical purposes. Moreover, Shetland's

only hospital – Gilbert Bain – is located in Lerwick, whilst off-island travel to Aberdeen can be necessary for more specialist care.

4.3.21 The ferry service therefore plays an essential role in meeting community health needs. In the 2024 resident survey:

- **8% (n=12)** of **Unst** residents selected 'Health Visit' as their main reasons for travel off island in a given month. It should be noted that **33% (n=46)** of respondents also noted a 'combination of reasons' as their main reason for off-island travel, which will likely include an element of health-related travel.
- **15% (n=70)** of **Unst** residents also selected 'health visit' as one of the other reasons for travel off island in a typical month.
- **17% (n=13)** of **Fetlar** residents selected 'health visit' as one of the other reasons for travel off island in a typical month. No Fetlar resident cited 'health visit' as their main reason for travel, however, given the journey time to Lerwick, any trip for a health appointment will likely combine multiple activities.

4.3.22 Moreover, in an emergency, casualties from both Fetlar and Unst need to be moved by ambulance using the Bluemull Sound ferry service. Whilst the frequency on this route is relatively high and there is out of hours cover, the long journey can create both anxiety and potential risk / discomfort for the patient. This effect is amplified for Unst as the vessel lies overnight in Yell, which means it must travel to Unst first to pick-up any casualties – this contrasts with Bressay, Fetlar, Whalsay and Yell, where the vessel lies in the island overnight. Note however, in life threatening situations, the air ambulance is summoned.

4.3.23 Each option increment therefore improves access to health and wellbeing infrastructure. A fixed link **(BISo4)** would however evidently be transformative for Unst, as it would provide unfettered vehicular 24-hour access to Gilbert Bain Hospital, including for Accident and Emergency. It would also significantly reduce ambulance response times and transit time back to the hospital. Moreover, from a risk perspective, a fixed link **(BISo4)** would mitigate the twin risks of the ferry being unable to sail due to weather or technical problems and the air ambulance being unavailable due to another call out. It should be noted that, in **BISo4**, there would be no impact on Fetlar as this route would still be served by an island-based ferry.

4.3.24 The impact assessment process specifically considered the impact of the different options on access to health and wellbeing infrastructure and health outcomes. The following key points emerged:

- Each increment in the ferry service **(BISo2 and BISo3)** would support improved access to health and wellbeing infrastructure and associated health outcomes – for example:
  - Improved service frequency and reliability may support better access to routine healthcare, reducing missed or delayed appointments.
  - Improved service reliability and resilience may improve health equity by reducing e.g., weather related cancellations, single vessel working during refit etc, increasing predictability of travel for treatment.
  - On the Gutcher - Belmont route leg, vehicle capacity constraints at certain times can make it difficult to secure a ferry booking. The expansion of capacity in **BISo2** and **BISo3** would reduce the risk of not getting a booking, and the anxiety associated with this. It would also support health service workforce mobility, including visiting clinicians and social care staff.
  - An overall reduction in travel stress and fatigue may positively influence mental wellbeing, particularly for frequent travellers. This is particularly the case on Bluemull Sound, where reliability and resilience have been key issues of late.

- The impact assessment work noted that a fixed link **(BISo4)** would offer significant benefits for Unst, although would be broadly neutral for Fetlar – it would:
  - Provide a step-change in access to emergency and unscheduled healthcare for Unst residents, including reduced response times and greater flexibility for time critical journeys.
  - Offer potential long-term public health benefits associated with reduced isolation and improved access to health promoting activities and services.
  - However, it did also recognise the point that increased traffic volumes may introduce new road safety risks (although this risk as minimal as previously described).

Key Point: Whilst Unst does have on-island health provision, there is still a dependence on travel to Lerwick and sometimes mainland Scotland for health purposes, including in emergencies. Fetlar residents need to travel off-island for all health provision, either to Yell or Lerwick. Each option increment would make an improvement to access to health and wellbeing infrastructure and thus health outcomes. A fixed link **(BISo4)** would however be genuinely transformative for Unst in this respect, improving access to Gilbert Bain Hospital, reducing response and transit times in the event of an emergency and addressing the risks associated with on-island emergencies. It would also offer potential long-term public health benefits associated with reduced isolation and improved access to health promoting activities. For Fetlar, the key benefit would be a more frequent ferry service across the day, improving access to health infrastructure.

Economy

Table 4.12: Bluemull Sound – appraisal against STAG Economy criterion

	BISo2: Do Something	BISo3: Do Max	BISo4: Fixed link
Economy	✓	✓✓	✓✓✓

4.3.25 Whilst Transport Economic Efficiency is negative for all options due to low demand volumes, the relative scoring reflects the scale of wider economic benefits identified in the qualitative assessment, which are not captured within the CBA.

Transport Economic Efficiency

4.3.26 The table below summarises the CBA for the Bluemull Sound options, including the core scenario and sensitivity tests. It should be noted that the BaU is not included as it is the baseline against which other options are compared. As previously described, a note on the methodological approach to the option economics can be found in **Appendix A**.

Table 4.13: Bluemull Sound options cost-benefit summary (£m, 2023 values and prices)

Scenario	Option	PVB (£000)	PVC (£000)	NPV (£000)	BCR
Core	**Do Something**	**3,016**	**67,695**	***-64,679***	**0.0**
	Do Max	**9,960**	**342,520**	***-332,560***	**0.0**
	Fixed Link	**47,842**	**204,586**	***-156,744***	**0.2**
ST1: Reduced tunnel optimism bias	Do Something	Not applicable			
	Do Max				
	Fixed Link	47,842	135,313	-87,471	0.4
	Do Something	2,377	67,695	-65,318	0.0

Scenario	Option	PVB (£000)	PVC (£000)	NPV (£000)	BCR
ST2: Waiting time assumed to have same value as in-car	Do Max	8,213	342,520	-334,307	0.0
	Fixed Link	34,273	204,592	-170,319	0.2
ST3: Optimism bias applied to vessel costs	Do Something	3,016	79,100	-76,084	0.0
	Do Max	9,960	379,498	-369,538	0.0
	Fixed Link	47,842	175,810	-127,968	0.3
ST4: 100-year appraisal period	Do Something	4,122	73,658	-69,536	0.1
	Do Max	13,609	402,735	-389,126	0.0
	Fixed Link	65,502	138,840	-73,338	0.5

4.3.27 The key points of note from the above table are as follows:

- As would be expected given the nature of appraisal, which is predicated on volume, the BCR of all of the options in all scenarios is less than one.
  - ST1 reduces the PVC of the fixed link and hence increases the BCR from 0.2 to 0.4.
  - ST2 reduces the PVB of all three options.
  - ST3 increases the PVC of the ferry options, including BaU, increasing the fixed link BCR slightly (not seen in rounding).
  - ST4 increases BCRs for all options. The PVC for the fixed link reduces (since ferry costs rise faster than fixed link costs in years 61-100), doubling the BCR from the core scenario.
- A fixed link **(BISo4)** offers the highest BCR in all scenarios, although still only a maximum of 0.5, even in the 100-year appraisal scenario test.
- The Ferry Do Something and Ferry Do Max perform poorly in terms of value for money. This is because of the scale of the incremental investment in vessels, Belmont and Gutcher compared to the BaU and relative to the travel time savings generated. Both options would bring other benefits though which cannot be quantified using current methodologies.

4.3.28 These results should be interpreted alongside the wider strategic, social and economic case for investment set out in this report, recognising that conventional appraisal metrics do not fully capture the benefits of improved connectivity for island communities.

Key Point: All the Bluemull Sound options return a BCR of less than one. Of these options, a fixed link has the highest BCR, albeit it still returns a negative NPV. Ferry options perform poorly in conventional Transport Economic Efficiency terms, reflecting the scale of capital investment relative to monetised benefits. However, this limitation applies across all options due to the low volume nature of the corridor.

Wider Economic Impacts (Economic Narrative)

4.3.29 This section sets out the economic narrative pertaining to the options for Fetlar and Unst, considering how investment in improved transport connectivity could support the economy and society of each island. The economic narrative has been informed by the analysis undertaken as part of the Case for Change (e.g., the resident survey, community and business engagement, socio-economic analysis, case studies etc).

4.3.30 Several points should be noted with regards to the economic narrative:

- It has been **developed in the context of improved connectivity generally**. However, it is important to recognise that a **fixed link would by some distance be the most economically transformative of the options for Unst**, and indeed **several of the benefits would only emerge with the provision of a fixed connection.**
- In absolute terms, the **economic benefits will be most significant for Unst** given that it has a population circa 10 times that of Fetlar and a far higher level of on-island economic activity.
- The benefits of a fixed link for Unst would be amplified by a fixed link across Yell Sound. Whilst this Network Strategy OBC is defining a preferred option for each island, the Implementation Route Map will consider these complementarities in more detail.

4.3.31 The key economic benefits of improved connectivity across Bluemull Sound can be defined as follows:

- **SaxaVord Spaceport** is an emerging nationally significant development in Unst and has the potential to be transformative for the island. As well as the direct economic activity associated with the Spaceport, it provides scope for spin-off benefits in e.g., aerospace connected industrial development, tourism etc. Whilst Spaceport is being developed in the context of the current transport provision, consultation has highlighted that improved connectivity would improve its competitiveness, efficiency and scope for growth. It is unusual for an island of a relatively small population to benefit from such a major and potentially nationally significant development, and thus there is considerable economic development opportunity for Unst at present.
- Unst also has a significant **aquaculture industry** – whilst smaller than that of neighbouring Yell, 14% of the island's population work in 'Agriculture, Forestry and Fishing'. The supply-chain of this industry is highly integrated with that of neighbouring Yell, and thus improved connectivity between the two islands would be economically beneficial and support an uplift in production.
- As noted in the Case for Change Report, current connectivity imposes substantial economic costs across multiple sectors in the North Isles generally – the geographic peripherality of Unst makes it particularly impacted by this. The reality of being dependent on a ferry service and the perception of what this means for an island can damage competitive positioning and investment confidence. Improved connectivity would enhance business confidence and productivity, and support the formation of new businesses (e.g., the tourism offer around SaxaVord Spaceport). This was a unanimous point made by stakeholders in the consultation.
- Perhaps the key challenge faced by Unst (and Yell) businesses is **access to labour**. Every North Isles business consulted highlighted labour recruitment and retention as a critical business constraint, with ferry dependency cited as the primary barrier to attracting workers from mainland Shetland. This was a particularly strong theme in Unst. The psychological impact of breaking a commute journey with a ferry crossing from Yell and two from mainland Shetland emerged consistently. Reliability and resilience risks are, of course, layered on top of this given the recent issues on Bluemull Sound. A fixed link would clearly address this issue in its entirety for Unst (tolls aside), although not Fetlar. The Ferry Do Something and Ferry Do Max could also contribute positively to labour mobility, but they could not address the fundamental break in a journey, and two breaks in the journey for those travelling from mainland Shetland.
- Businesses in the North Isles – and in particular Unst - noted that ferry dependency imposes **three distinct categories of cost premium across all sectors: (i) direct ferry charges, i.e., fares; (ii) extended journeys; and (iii) uncertainty risk premiums**. Whilst fares are perhaps the most visible element, the **latter two categories were deemed by businesses to be the most impactful**, particularly in Unst where two ferry crossings are required. Uncertainty costs prove particularly problematic, manifesting as inflated quotations, declined work and strategic business decisions. Construction contractors apply supplemental charges or minimum day rates to account for stranding

risks and weather delays. Service providers from Lerwick add travel charges reflecting unproductive time and disruption risk, which again is a major issue for Fetlar and Unst given the requirement for two ferry crossings. In extreme cases, businesses simply refuse to quote for work in Fetlar and Unst, or customers cannot proceed with necessary maintenance and repairs due to prohibitive costs. **In short, doing business on Fetlar and Unst costs significantly more than on mainland Shetland and even than on Yell**. Once again, improved ferry services would be advantageous here, but it is a fixed link that would be economically transformative, removing the second and third factors cited above.

- By extension, there is very little **house building** activity in the North Isles – indeed, it is understood from consultation with one stakeholder that no new social housing has been built in Yell, Unst or Fetlar for over three decades. The limited and ageing housing stock is a barrier to maintaining sustainable communities. Improved connectivity, most notably a fixed link would have material benefits in this respect, supporting construction viability but also the demand to live in the North Isles. This is one example of where the benefits of improved Bluemull Sound connectivity would be amplified by a fixed link across Yell Sound.
- The higher cost of doing business in the North Isles also impacts the **public sector**, both in terms of service provision (e.g., health, education etc.) and the maintenance of assets (e.g., buildings utilities etc.). Whilst any improvements to connectivity may not be cash releasing overall, it would allow for more efficient and lower cost service delivery.
- For both Fetlar and Unst, increasing access for local visitors creates opportunities for business growth through transport, services, retail and accommodation.
- Fetlar would continue to be served by a ferry if a fixed link is delivered for Unst. This, combined with a low population and limited on-island activity, means that improved connectivity would not necessarily be economically transformative for Fetlar. However, an enhanced ferry service under any of the options would be socially advantageous to Fetlar, supporting the economic, social and demographic sustainability of the island.

4.3.32 It should be noted that the economic benefits identified for Unst assume continued onward connectivity across Yell Sound. In the absence of a fixed link on that route, some benefits - including labour market integration and travel reliability - would be of a much lesser scale.

Key Point: Overall, stakeholder consultations reveal consistent, compelling evidence that ferry-dependent connectivity imposes substantial economic costs on Fetlar and Unst. Improved transport connectivity, and in particular a fixed link, provides scope for significant economic benefits for Unst, particularly with respect to maximising the economic opportunity associated with SaxaVord Spaceport.

Key Point: The economic (and social) benefits of improved transport connectivity across Bluemull Sound would be amplified by improved connectivity across Yell Sound, particularly if a fixed link was delivered on this route.

Equality and Accessibility

Table 4.14: Bluemull Sound – appraisal against STAG Equality and Accessibility criterion

	BISo2: Do Something	BISo3: Do Max	BISo4: Fixed link
Equality and Accessibility	✓	✓✓	✓✓

4.3.33 The material considerations in this study with regards to this criterion are:

- Comparative access by geographic location

- Comparative access by people group
- Affordability

Comparative access by geographic location

4.3.34 Shetland's island communities are, with some limited exceptions, less well-connected to the key destinations in the archipelago (e.g., Lerwick, Sumburgh etc) than mainland communities. In the resident survey:

- **45% (n=13)** of Fetlar residents responded that they travel off-island less than they would like to, which has a negative impact on the things they would like to do.
- The equivalent figure for Unst was **38% (n=56)**.

4.3.35 This subset of the sample for both islands was asked what opportunities they are missing out on as consequence of not travelling off-island as much as they would like to, the responses to which are summarised below:

Table 4.15: Fetlar – in travelling to mainland Shetland less often than you would like, what activities / opportunities are you missing out on (n=13, multiple response question)

Activity / opportunity missed out on	No. of responses	% of sub-sample	% of total Fetlar sample
Attending health appointments	12	92%	41%
Shopping	10	77%	34%
Other social activities	9	69%	31%
Personal business	8	62%	28%
Business opportunities	7	54%	24%
Sports, leisure and cultural activities - participating	7	54%	24%
Education opportunities	6	46%	21%
Visiting friends and relatives less often	6	46%	21%
Sports, leisure and cultural activities – spectating / attending	5	38%	17%
Employment opportunities	4	31%	14%
Training opportunities	4	31%	14%

Table 4.16: Unst – in travelling to mainland Shetland less often than you would like, what activities / opportunities are you missing out on (n=56, multiple response question)

Activity / opportunity missed out on	No. of responses	% of sub-sample	% of total Unst sample
Visiting friends and relatives less often	42	75%	29%
Attending health appointments	40	71%	27%
Other social activities	40	71%	27%
Shopping	35	63%	24%
Sports, leisure and cultural activities – spectating / attending	27	48%	18%
Sports, leisure and cultural activities - participating	26	46%	18%
Personal business	24	43%	16%

Activity / opportunity missed out on	No. of responses	% of sub-sample	% of total Unst sample
Employment opportunities	20	36%	14%
Education opportunities	18	32%	12%
Training opportunities	15	27%	10%
Business opportunities	14	25%	10%

4.3.36 The above tables highlight that Fetlar and Unst residents noted that they are missing out on a range of essential day-to-day activities and life opportunities such as health appointments, shopping and personal business and employment and education opportunities. These are essential social functions which can impact on community sustainability.

4.3.37 Each option increment would therefore improve comparative access by geographic location for both Fetlar and Unst. For Unst, a fixed link to Yell would clearly deliver the most significant improvement in this respect, subject to affordability (see below). The picture is more nuanced for Fetlar, where the Ferry Do Max would be at least as advantageous as a dedicated ferry under the fixed link. Indeed, the EqIA noted that there is a risk that islands not connected by a fixed link could experience a widening of inequalities relative to those that do have a fixed link. Fixed links are options for both Unst and Yell, so there is a risk of the widening inequalities for Fetlar in the scenario where is delivered.

Comparative access by people group

4.3.38 The EqIA workstream found that the incidence of connectivity related inequality did not fall evenly across different people groups. It noted that:

- There is persistent inequality of access for disabled people, older people, families with young children, and those requiring accompanied travel.
- Young people and working age adults face constrained access to education, training and employment opportunities, reinforcing demographic imbalance.

4.3.39 Each option increment for Bluemull Sound would progressively improve comparative access for a range of different people groups, including those with protected characteristics:

- Overall, a fixed link would deliver the most significant improvement in comparative access by people group for Unst, particularly for spontaneous travel and out of hours journeys to Yell (and mainland Shetland if there was a fixed link across Yell Sound). There are four key caveats here however:
  - The cost of tolls relative to ferry fares (which is discussed in more detail in the next section).
  - Accessibility for those who either do not have access to a car or do not wish to drive one. For there to be no loss of accessibility with a fixed link, bus services through the tunnel would need to at least approach the frequency of the current ferry services, on which island residents can travel as a foot passenger (albeit only a small number of services connect with bus services at either end currently).
  - The tunnel design does not allow use by cyclists. Again, for there to be no loss of accessibility with a fixed link, the bus services provided in lieu of a ferry would need to be capable of accommodating bicycles.
  - There is a risk of increased geographic inequality overall, with islands getting a fixed link becoming comparable to mainland locations, potentially widening disparities with non-linked islands. This is a particularly key issue here as Fetlar could be the only one of the North Isles which does not have a fixed connection.

- With regards to the ferry options:
  - The immediate replacement of MV *Bigga* and MV *Geira* in the two ferry options would record an immediate benefit in terms of disabled access, addressing the issue of passenger accommodation being below the waterline.
  - Incremental improvements such as **BISo2** may benefit regular users but may not fully address structural accessibility barriers such as the need to book or certain peak capacity constraints on this route. This is an inequality which could widen in the years ahead if capacity pressures are accentuated by the emergence of the SaxaVord Spaceport.
  - In contrast, a step change in the ferry service under **BISo3** would significantly reduce competition for space on this route, benefiting carers, families and those travelling for health or education purposes.
- There is an equality and accessibility risk associated with potential public service reform in the context of the Ferry Do Max or a fixed link, if fewer services were based on island. This could have particularly negative implications for certain protected characteristic groups.

Affordability

4.3.40 The EqIA highlighted affordability as a major source of inequality for island communities. Households on lower incomes experience disproportionate affordability pressures linked to fares and occasional off island overnight accommodation and lost income. There are two specific considerations here for the Bluemull Sound communities:

- Whilst Fetlar and Unst residents travelling to mainland Shetland only pay for one crossing, the overall journey is longer and thus more expensive.
- For Fetlar, almost all services are located off island and thus residents typically have to travel more frequently, imposing an inequality on this island. There is evidence of this higher propensity to travel relative to Unst in the resident survey (although it is not entirely clear cut, possibly because Fetlar has an older population with a lower commuter demand).

4.3.41 The resident survey responses found that:

- **Fetlar**
  - Of those who **use the ferry service less often than they would like to (45%, n=13)** the level of car fares (**46%** major / **23%** minor) and passenger fares (**31%** major, **46%** minor) were identified as factors contributing to this.
  - Of those who **travel as often as they would like to but for whom the ferry service negatively impacts their day-to-day activities (27%, n=8)**, the level of car fares (**38%** major / **25%** minor) and passenger fares (**25%** major, **25%** minor) were identified as factors contributing to this.
- **Unst**
  - Of those who **use the ferry service less often than they would like to (38%, n=56)** the level of car fares (**38%** major / **36%** minor) and passenger fares (**23%** major, **41%** minor) were identified as factors contributing to this.
  - Of those who **travel as often as they would like but for whom the ferry service negatively impacts their day-to-day activities (42%, n=62)**, the level of car fares (**21%** major / **42%** minor) and passenger fares (**13%** major, **42%** minor) were identified as factors contributing to this.

4.3.42 Affordability is therefore a key issue impacting on travel from both Fetlar and Unst. The impact of the options with respect to affordability is largely dependent on the balance of ferry fares

versus tolls. It is assumed in the economic appraisal that tunnel tolls are set at a level equivalent to current ferry fares revenue raised, and thus there would be little difference between the options for Unst if this was the case.

4.3.43 The Ferry Do Something and Ferry Do Max assume an in-principle commitment to reduced and free island resident fares respectively. On this basis, these options would score most positively with regards to affordability. However, the detail around ferry fares and tunnel tolls would need to be worked through in a project-level business case (and potentially at a network level with respect to fares) and thus there is uncertainty over the impacts at this programme stage.

4.3.44 Another point of consideration is the increased driving distance that comes with use of a fixed link, rather than a ferry, with associated impacts on vehicle operating costs.

Key Point: A fixed link **(BISo4)** offers a potentially transformative change in accessibility for Unst residents and those visiting the island. This in-turn would assist in tackling some of the inequalities faced as a consequence of geographic remoteness and low population density, with specific benefits for some protected characteristic groups. However, the scale of the benefit / impact would be dependent on the relative balance of tunnel tolls to ferry fares (i.e., affordability) and ensuring that bus services were provided to a frequency at least approaching that of the current ferry service, without which new inequalities could arise. These would be most keenly felt by those without access to a car or who do not wish to drive one.

Key Point: Regardless of the solution for Unst, Fetlar will continue to be served by a ferry. Each ferry increment **(BISo2 and BISo3)** would therefore offer progressively larger benefits for Fetlar, improving connectivity and reducing costs. There is a risk that a fixed link for Unst **(BISo4)** could have comparative equalities impacts for Fetlar, but this is uncertain.

Feasibility, Affordability and Public Acceptability

Feasibility

- The physical infrastructure options (vessels, ferry terminals and fixed links) are all technically feasible.
- Outline and detailed design work would be required for ferry terminals and fixed links, inclusive of e.g., surveys, ground investigations, environmental consenting etc.
- The detailed design of **BISo2** and **BISo3** would be required to minimise disruption to ferry and wider harbour operations during the construction phase as there is no alternative route for these communities, as per e.g., Whalsay.
- The options would also be developed close to or across an environmentally sensitive area and thus an EIA would be required regardless of which option is progressed.
- The ferry revenue options, and in particular the Ferry Do Max, would have significant deliverability considerations, particularly with respect to the recruitment of crew given recent human resource challenges on this route. This would need to be considered in detail in the context of a project business case.
- This is also true of any scaling-up of bus services in **BISo2, BISo3 and BISo4** – securing sufficient vehicles and drivers to operate these services is a deliverability challenge that would need to be considered in detail at the project level.

Affordability

- As will be explained in the Financial Dimension, affordability is the key challenge across all options. Outwith the ongoing procurement of one new Type 1 vessel, the Council does not have committed funding for any capital works.
- External funding will be required for any of the options progressed through this business case. Naturally, the larger the scale of the option, the higher its cost and thus the more significant the affordability gap. It is essential to note on the Bluemull Sound route that all options will entail a major capital outlay (it should also be noted that a ferry and at least one berth at Belmont or Gutcher would be required for Fetlar if a fixed link is delivered for Unst).
- The options will have different spend profiles and their affordability will be shaped by the financing mechanism adopted.
- It is important to recognise that any scaling-up of ferry or bus services will impose an ongoing financial commitment on the Council for which funding is not presently in place.
- As all Shetland Islands Council ferry services operate at a deficit, any reduction in or removal of fares would have a direct revenue impact. At present, the annual operating deficit is funded by the Scottish Government, but it is possible / probable that any increase in this deficit as a consequence of a deliberate policy choice would be a matter for the Council.

Public acceptability

Fetlar

4.3.45 The Fetlar public drop-in session was held on 27th May, with **ten** island residents attending. The key points of note were as follows:

- Fetlar residents reiterated their concern about recent disruptions to the service and the implications for the island. With the BaU **(BISo1)** has not been progressed as an option for Bluemull Sound, it was recognised that the Ferry Do Something **(BISo2)** would be a material improvement, even if just larger vessels without the revenue measures.
- There was a recognition that the solution of Fetlar is intrinsically linked to that of Unst, given the current shared service. Residents recognised the potential advantages associated with the Ferry Do Max **(BISo3)** and fixed link for Unst with a dedicated vessel for Fetlar **(BISo4)**, as both options would increase flexibility if Fetlar had a dedicated vessel.
- Whilst beyond the scope of this study, the community noted that, in the event that Fetlar has its own vessel **(BISo3 and BISo4)**, consideration should be given to a service To Mid Yell. This would provide direct access to a range of services (e.g., the leisure centre) that are not available at Gutcher.

Unst

4.3.46 The Unst public drop-in session was held on 27th May, with **55** island residents attending. The key points of note were as follows:

- There was strong and indeed near universal support for a fixed link **(BISo4)** between Unst and Yell.
- The feedback forms highlighted concerns and dissatisfaction with the ferry service related to resilience, reliability and capacity, all themes which featured strongly in the Case for Change. A view expressed by several respondents is that the ferry service is constraining the island economy and in the long-term may dampen the positive impacts of SaxaVord Spaceport. A fixed link **(BISo4)** is considered by many as the only means of

fully addressing current problems and realising the benefits of SaxaVord Spaceport and other recent developments on Unst.

- The above said, there was a strong view expressed by drop-in attendees that short-term investment in the ferry service is required to provide a sustainable service in the medium-term. Crewing resilience issues and the age of the assets were cited as immediate threats. The above said, there was a strong view that any investment should be proportionate, minimising sunk costs in the event of a fixed link (or, as many attendees stated, delaying a fixed link because of spend on the ferry service).
- Pressed on whether a fixed link represented a risk to the unique island character of Unst, several residents noted that the most immediate threat to the island way of life is continued population decline and ageing, which it is argued a fixed link would help to stem and reverse.
- There was a strong view amongst Unst residents that the benefits of a fixed link **(BISo4)** would be considerably amplified by an equivalent tunnel across Yell Sound.

4.4 Preferred Option

4.4.1 The preferred option selected by Shetland Islands Council Members on 30th June 2026 will be recorded in this report post-decision.

5 Economic Dimension – Bressay

5.1 Overview

5.1.1 This section provides the Economic Dimension for Bressay, commencing with a brief summary of the option packages followed by their appraisal against the TPOs and STAG criteria. ASTs for each option detail the appraisal against each individual criterion, with the narrative below drawing out the key issues and supporting interpretation.

5.2 Option Packages

5.2.1 This section briefly recaps the option packages progressed from the SOC - for reference, Table 3.1 sets out how each element of the option packages has been treated in the Network Strategy OBC.

Option Bressay 1: Business-as-Usual

5.2.2 The BaU broadly maintains the present-day operation and represents the appraisal baseline, and is summarised in the table below:

Table 5.1: Bressay Business-as-Usual option components

Approach / Principles	Component Options
Capital measures	
Like-for-like asset replacement at life expiry	- 1 * Type 2 vessel at life expiry of MV *Leirna* - Replace the berthing structure at Bressay - Extend the pier at Lerwick and reconfigure the marshalling area
Ferry revenue measures	
Address refit impacts – additional vessels to remove / mitigate refit timetable impacts	- Fleet reserve vessel to ensure no reduction in service during refit

Capital measures

Vessels

5.2.3 The BaU assumes the replacement of MV *Leirna* with a Type 2 vessel at life expiry. This would maintain existing capacity on the route whilst also increasing overall network resilience by deploying a Euro B vessel that could be deployed elsewhere on the network (MV *Leirna's* classification means that she can only operate Lerwick – Bressay).

Harbour infrastructure

5.2.4 The majority of the existing berthing structure at **Bressay** is approximately 50-years old, with the most recent extension being undertaken in 1993. The berthing structure is therefore approaching / is at the end of its operational life and requires replacement.

5.2.5 The new berthing structure would need to be constructed whilst maintaining the ferry service. Therefore, to maintain the existing linkspan location (thus avoiding lengthy closures to construct new linkspan substructures and relocate the linkspan deck), the new berthing structure would need to be constructed behind the existing berthing line. Details of the existing rock armour slopes would be required to locate their toe and inform the available seabed area that the new berthing structures could be constructed upon and the extent of works required to install support piles.

5.2.6 Bathymetric information would be required to inform the extent of any dredging works at Bressay in order to provide adequate manoeuvring area for the larger Type 2 vessel.

5.2.7 At **Lerwick**, the current pier would need to be extended, and the marshalling area reconfigured to be able to accommodate the Type 2 vessel. The ferry terminal in Lerwick is owned by Lerwick Port Authority (LPA) and agreement would be required to undertake any works (this applies across all ferry options).

5.2.8 A general arrangement drawing and description of the works required at each port is provided below:

Bressay

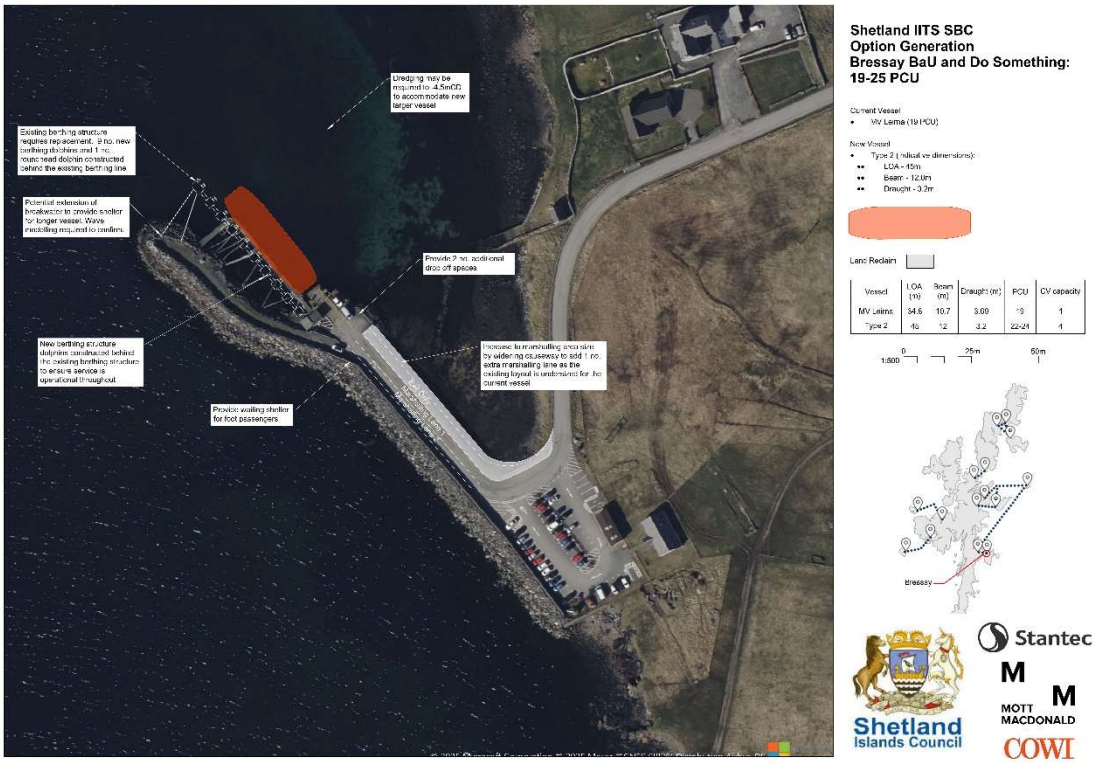

Figure 5.1: Bressay – Lerwick, Bressay BaU

5.2.9 The following works would be required at Bressay:

- Replacement of the entire timber berthing structure with a new structure consisting of seven berthing dolphins and one roundhead dolphin to provide a berth length of 55 metres, including bollards, fenders, ladders etc.
- This new structure would be constructed behind the existing berthing structure to allow the ferry service to remain live throughout the works period, albeit with potential minor outages. The existing structure would be demolished in a phased approach as the new berthing dolphins were constructed.
- The new berthing dolphins would be reinforced concrete supported on tubular piles with a walkway between each dolphin to allow access to bollards etc.
- Dredging of the bay could be required to provide adequate manoeuvring area for a Type 2 vessel.

- Widening of the approach causeway by approximately six metres would be required to provide adequate marshalling capacity for a Type 2 vessel.

Lerwick

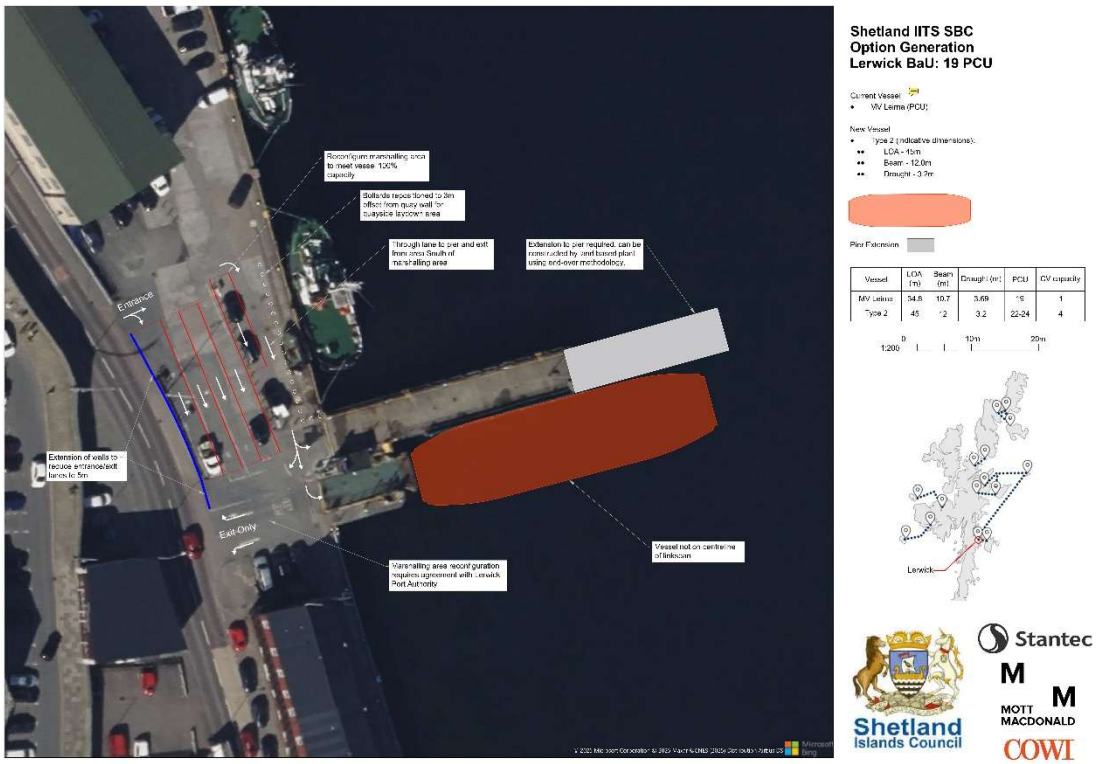

Figure 5.2: Bressay – Lerwick, Lerwick BaU

5.2.10 The following works would be required at Lerwick:

- Extension of the pier by approximately 24 metres, with a solid sheet piled structure to accommodate a Type 2 vessel.
- Reconfiguration of the marshalling area to provide capacity for a Type 2 vessel, including extension of the wall adjacent to the A969 road to reduce entrance and exit widths to 5 metres, introducing a one-way system around the marshalling area, and repositioning of traffic bollards along the fishing berth.

Option Bressay 2: Ferry Do Something

5.2.11 The Ferry Do Something for Bressay represents the minimum viable upgrade to maintain a sustainable and reliable service. It is primarily focused on revenue measures to extend and intensify the current operating day, plus an in-principle commitment to reduce fares. This is summarised in the table below:

Table 5.2: Bressay Ferry Do Something option components

Approach / Principles	Component Options
Capital measures	

Approach / Principles	Component Options
Larger vessel to increase vehicle capacity	- 1 * Type 2 vessel - Harbour works as per the BaU
Fully accessible vessels	
Foot passenger waiting facilities	- New waiting room at Lerwick
Ferry revenue measures	
Timetable intensification – increase frequency with existing assets	- Weekdays and Saturdays: 20-minute frequency in peak, 30-minute frequency over the rest of the day - Sunday: 30-minute frequency
Improved Saturday service	- As above
Improved Sunday service	- As above
Public transport integration measures	
Improved bus connections	- No changes required with respect to mainland bus services, although scope for improved bus services on Bressay
Fares	
Lower fares for residents	- Reduced fares for residents

Capital measures

Vessels

5.2.12 The Ferry Do Something for Bressay would entail the deployment of a Type 2 vessel, as per the BaU.

Harbour infrastructure

5.2.13 The Ferry Do Something options for **Bressay and Lerwick are the same as the BaU option**, as the in-scope vessel remains the same for both.

5.2.14 The only additional item in this option package is the construction of a new secure waiting room at Lerwick. A location for the waiting room has not been confirmed and it should be noted that there is limited space around the ferry terminal in close proximity to the berth. Liaison with Lerwick Port Authority would be required to identify a suitable location.

Ferry revenue measures

5.2.15 The proposed ferry revenue measures entail:

- The provision of a 20-minute frequency in peak and a 30-minute frequency over the rest of the day.
- The provision of a 30-minute frequency on a Sunday, with time allocated for drills and maintenance.
- *It should be noted that the SOC included an option for an 06:00 departure from Bressay to provide a connection with the first flights from Sumburgh. This has since been delivered through the regular timetable setting process and is thus not considered further in the Network Strategy OBC.*

5.2.16 The table below summarises the indicative number of sailings in the Ferry Do Something relative to the BaU – as with all revenue options, the deliverability of this schedule would need to be worked through in detail in a project level business case.

Table 5.3: Bressay - Lerwick - number of sailings in Ferry BaU and Ferry Do Something

	Mon-Thu	Fri	Sat	Sun
BaU	25	27	24	20
Do Something	44	44	44	34
Do Something v BaU	***+19***	***+17***	***+20***	***+14***

Option Bressay 3: Ferry Do Max

5.2.17 The Ferry Do Max represents a significant scaling-up of ferry provision to address capacity and service constraints. The Bressay service would continue to be operated by a single vessel but on an intensive and continuous basis throughout the day, with on-request overnight sailings. The component elements of the Ferry Do Max are set out in the table below:

Table 5.4: Bressay Ferry Do Max option components

Approach / Principles	Component Options
Capital measures	
Larger vessel to increase vehicle capacity	- 1 * Type 2 vessel - As a 'Do Maximum' option, a second berth orientation has been developed for Bressay that would be less disruptive to the ferry services than constructing new berthing dolphins behind the existing structures, as per the Ferry Do Something (Bressay Option 2) - The Ferry Do Max would be the same as the Ferry Do Something at Lerwick in terms of harbour works
Ferry revenue measures	
Provide turn-up-and-go service between 06:00-00:00	- 20-minute frequency, 7-days per week
Provision for 24-hour travel with request sailings 00:00-06:00	- Hourly on-request service 00:00-06:000
Public transport integration measures	
Improved bus connections	- No changes required with respect to mainland bus services, although scope for improved bus services on Bressay
Fares	
Free fares for residents (or toll equivalent for fixed link comparison)	- Free fares for residents

Capital measures

Vessels

5.2.18 The Ferry Do Max for Bressay would entail the deployment of a Type 2 vessel, as per the BaU.

Harbour infrastructure

Bressay

5.2.19 The harbour infrastructure option for Bressay presented as part of the Ferry Do Something could equally apply to the Ferry Do Max. However, as a theoretical 'Do Maximum' option, an

alternative option has been developed at Bressay which would be less disruptive to the ferry service during construction than building new berthing dolphins behind the existing structures. This 'alternative Ferry Do Max' has been used as the basis of the appraisal:

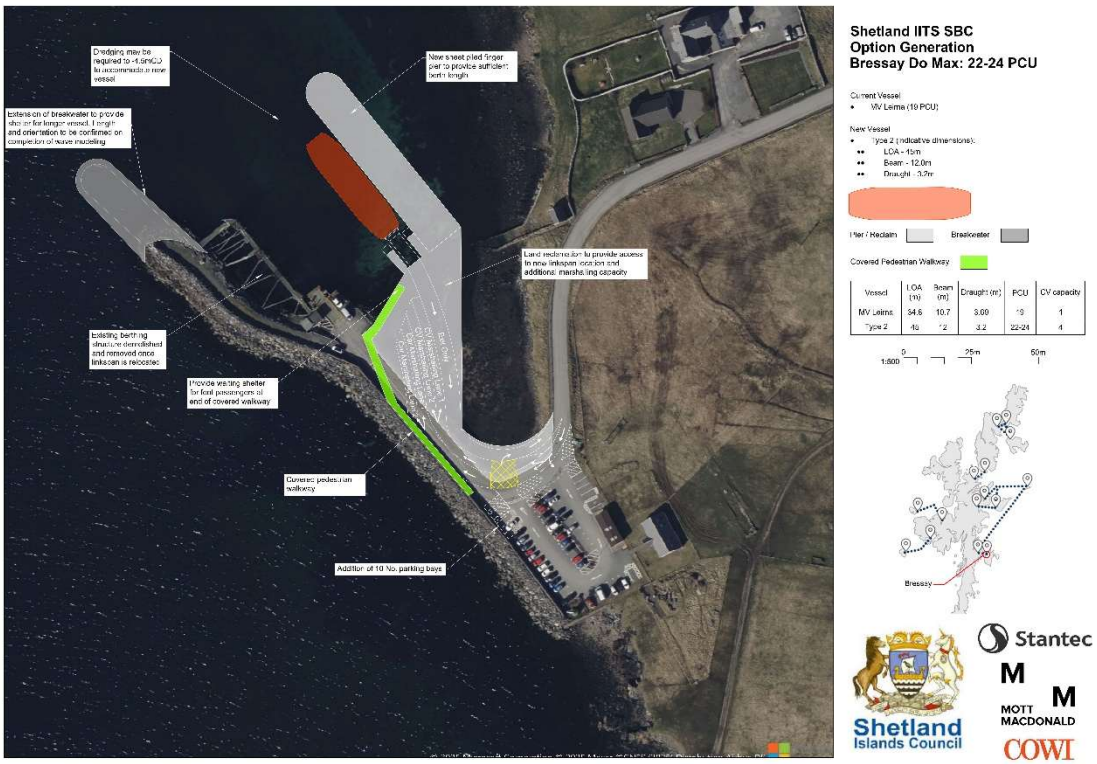

Figure 5.3: Bressay – Ferry Do Max

5.2.20 The following works would be required as part of this **alternative Ferry Do Max** at Bressay:

- Additional reclamation (compared to the Ferry Do Something) at the root of the causeway in order to provide ten additional car parking spaces. A covered walkway would be provided along the length of the causeway to provide shelter for pedestrians using the ferry service.
- Extension of the existing breakwater by approximately 40 metres to provide additional shelter to the berth, allowing for the deployment of the larger vessel.
- Reclamation of land to the east of the existing causeway, building out from the land in order to minimise the need for marine plant.
- Construction of a new 80 metre solid sheet piled finger pier (assumed) to the east of the existing linkspan berth, building end over from the new reclaim area.
- Construction of new linkspan support structures to enable the existing linkspan to be lifted out of the existing position and into the new location with minimum disruption to the ferry service. This would make the new berth operational.
- Demolition of the existing berthing structures and linkspan ancillaries, which would no longer be required.

Lerwick

5.2.21 The Ferry Do Max option for the infrastructure at Lerwick remains the same as the Do Something option as there is no scope to increase the marshalling capacity further, given the

proximity to existing structures and that the surrounding areas are owned by Lerwick Port Authority.

Ferry revenue measures

5.2.22 The Bressay Ferry Do Max would entail operating the current service as a shuttle operation, with bookable on-request overnight sailings. This would specifically include:

- A 20-minute service frequency between 06:00 and midnight, seven days a week.
- An hourly on-request service between midnight and 05:00 (with the current Friday and Saturday services post-midnight operating as scheduled sailings as per the current timetable).

5.2.23 This is a conceptually deliverable solution, but it would require significant work around deliverability in any project business case. As well as crewing and time for drills and maintenance, a key consideration here would be whether the service could be reliably maintained at a 20-minute frequency for 18-hours a day, or whether a relaxation of the timetable would be required in some hours to e.g., allow for recovery from delay.

5.2.24 The table below summarises the number of sailings in the Ferry Do Max relative to the BaU.

Table 5.5: Bressay – number of sailings in Ferry BaU and Ferry Do Max

	Mon-Thu	Fri	Sat	Sun
BaU	25	27	24	20
Do Maximum	60	60	60	60
Do Maximum v BaU	***+35***	***+33***	***+36***	***+40***

Option Bressay 4: Fixed Link

Alignment

5.2.25 The proposed fixed link alignment between Lerwick and Bressay provides a direct tunnel connection, tying into the existing road network on both sides.

5.2.26 On the Lerwick side, the route would begin near the harbour industrial area and would follow a curved shoreline alignment before descending beneath Bressay Sound. From there, the tunnel would rise toward its landfall point on Bressay, connecting to the island's local road system on the western side. The subsea tunnel would extend for 3.3 km, forming part of a 5km overall road corridor including the tunnel and its surface junctions.

5.2.27 The crossing has been designed as a single-bore, two-lane tunnel enabling safe bi-directional travel at a design speed of 40 mph. Due to tunnel length, operational conditions, and fire and life-safety requirements, pedestrian and cyclist access would not be permitted within the tunnel. Safety provisions include a full-length emergency walkway, as well as regularly spaced vehicle laybys and turning niches that support emergency response, maintenance access and safe operation.

5.2.28 The figures below illustrate the indicative alignment developed for this crossing, showing its route between Lerwick and Bressay, and its integration with existing topography, coastal infrastructure and approach road geometry.

Figure 5.4: Horizontal tunnel alignment form mainland Shetland to Bressay

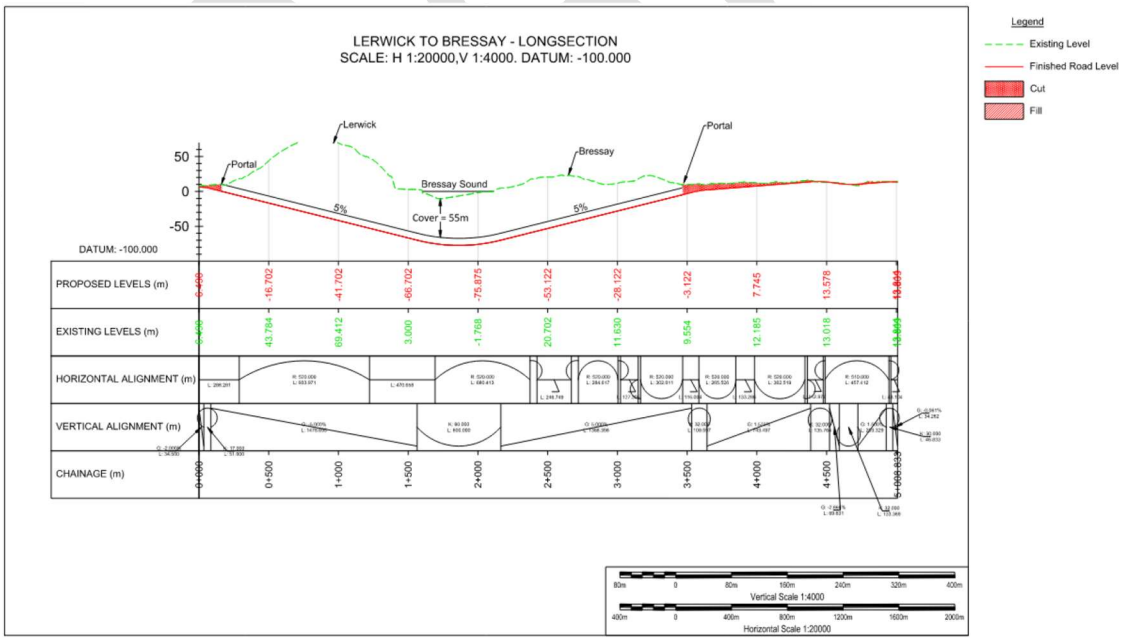

Figure 5.5: Vertical tunnel alignment from mainland Shetland to Bressay

5.2.29 It should be noted that the required tunnel alignment significantly increases driven access distance relative to the ferry service.

Option costs

5.2.30 As explained in Chapter 3, all costs in the Economic Dimension are presented on a present value basis. In the economic appraisal, capital (initial and lifecycle) and operating and maintenance costs are profiled over 60 years and discounted to a present value.

5.2.31 These include:

- Vessel and harbour infrastructure replacement for all ferry options from 2026 to 2095, including cyclical renewals and refurbishment.
- Pre-construction and construction costs for a fixed link. It should be noted that major refurbishment and renewal of tunnel infrastructure is **not** included.
- Operating and day-to-day maintenance costs over the same period for all options.
- For ferry options, the **PVC** includes all capital expenditure, operating and maintenance costs and fares revenue, and is presented in 2023 market prices.[34]
- For the fixed link option, the **PVC** includes capital expenditure, operating, day-to-day maintenance costs and toll revenue, but excludes major refurbishment and renewal of tunnel infrastructure. Costs are again presented in 2023 market prices.
- Subsidies, fares and tolls are treated as public / private sector transfers and are typically reflected through the Public Accounts framework. In this appraisal, fare / toll revenues have been included within the PVC for each option. However, changes in ferry operating subsidy requirements have not been quantified and will be developed alongside the Public Accounts position at the next stage of appraisal.
- For clarity, the 'Appraisal PVC' is the 'Absolute PVC' of each intervention less the 'Absolute PVC' of the BaU. This is because the appraisal is focused on incremental costs and benefits relative to the BaU.

Table 5.6: Bressay - option costs, PVC

	Absolute PVC (2023 market prices 60-years)	Appraisal PVC (2023 market prices, 60-years)
Bre1: BaU	£157.1m	-
Bre2: Ferry Do Something	£159.3m	£2.2m
Bre3: Ferry Do Max	£186.9m	£29.8m
Bre4: Fixed Link	£343.0m	£185.9m

5.3 Options Appraisal

Transport Planning Objectives

5.3.1 The table below summarises the performance of the Bressay option packages against the TPOs:

[34] PVCs are presented in market prices in line with TAG convention (i.e., costs in factor prices are uplifted to market prices), ensuring costs and benefits are compared on a consistent basis. These should not be interpreted as the Council's cash outlay or funding requirement though, which is addressed separately in the Financial Dimension.

Table 5.7: Bressay – appraisal against TPOs

	Bre1: BaU	Bre2: Do Something	Bre3: Do Max	Bre4: Fixed Link
TPO1: Resilience	O	O	✓	✓✓✓
TPO2: Capacity	O	✓	✓✓	✓✓✓
TPO3: Limited, fixed times of travel in operating day	O	✓	✓✓	✓✓✓
TPO4: Cost	O	✓	✓✓✓	O
TPO5: Physical accessibility	O	O	O	✓
TPO6: Length of operating day	O	✓	✓✓	✓✓✓
TPO7: Non-car travel options	O	✓✓	✓✓✓	O

5.3.2 The nature of the option packages for Bressay means that each option increment will generally deliver progressively larger benefits with respect to the TPOs. This ultimately culminates in a fixed link, which would remove almost all of the identified barriers to travel.

- **Resilience (TPO1)**:
  - The Bressay – Lerwick route operates in categorised waters with a dedicated vessel. There are therefore comparatively few resilience problems on the route at present outwith a fleet-wide shortage of vessels caused by breakdowns and extended refits, as is currently being experienced in the Clyde and Hebrides. The introduction of a new Type 2 vessel in each of **Bre1**, **Bre2** and **Bre3** would alleviate the risks posed by the ageing MV *Leirna*, but it is not a major consideration on this route at present.
  - The Ferry Do Max would generate a very minor and short-term resilience benefit associated with building an entirely new berth in Bressay. This would reduce the resilience and reliability risks of operating from the current berth when a new berth is being built behind it.
  - A fixed link would deliver a major resilience benefit by removing the reliance on sea-based travel altogether.
- **Capacity (TPO2):**
  - Capacity is not a major issue on the Bressay route outwith a handful of sailings which generally operate full or close to full (these are the 08:30, 10:30 and 11:30 sailings from Bressay and the 15:30 and 17:15 from Lerwick). The introduction of a Type 2 vessel in the BaU would increase PCU capacity from 19 to 22-24 offering a very minor increase in capacity (~20%), but this option is scored neutral overall.
  - **Bre2** and **Bre3** would each record incremental improvements on the BaU. As well as introducing a slightly larger Type 2 vessel, they would deliver additional capacity through enhanced frequency. **Bre3** would almost certainly resolve all capacity issues on the route.
  - A fixed link would remove all capacity related constraints for Bressay.
- **Limited, fixed times of travel in the operating day (TPO3)**
  - Limited, fixed times of travel in the operating day (i.e., frequency) is the most significant travel barrier for Bressay outwith cost. Whilst there is a 20-minute frequency during peak periods, this reduces to a 30-minute or hourly frequency over the rest of the day. For a crossing time of seven minutes, an hourly frequency can act as a barrier (less so half-hourly).
  - **Bre2** would contribute to addressing this, through delivering a half-hourly service across the day. **Bre3** would make a more significant contribution, providing a turn-up-

and-go twenty-minute frequency across the day and into the evening, akin to an urban bus or rail service.

- A fixed link would provide unfettered vehicular access between Bressay and Lerwick (and Shetland more widely), thereby recording a major benefit with respect to this TPO.
- However, a substantial proportion of people who use the Bressay ferry do so as foot passengers. While there is a new bus service proposed, which would operate a timetable similar to the existing ferry service, these non-car users would continue to be bound by a timetable, as per the BaU. Given the less direct nature of the Bressay fixed link, it is anticipated that journey times may also increase for non-car users.

- **Cost (TPO4)**
  - Cost of travel is the major area of dissatisfaction for Bressay residents, and this came through strongly in both the resident survey and public drop-in sessions. With common fares across all Ro-Ro routes, Bressay residents pay a far higher fare per mile than residents of e.g., Whalsay, Yell etc. Moreover, Bressay has very few on-island services and a strong daily commuter flow to Lerwick, meaning that residents pay a higher cost (per mile) and do so more frequently.
  - The impact on **TPO4** (cost to the user) remains to be established and would depend on the balance between ferry fares and tunnel tolls. It is assumed for this appraisal that a tunnel would be tolled and thus would be higher cost than the Ferry Do Max, where free fares are assumed in principle for residents. However, there is also a scenario where a tunnel could be operated without tolls and thus would be cost equivalent to the Ferry Do Max in this respect.
  - For clarity, the economic appraisal assumes consistent fare and toll treatment across options. The assessment of user costs within the TPO framework is indicative and reflects potential policy choices rather than modelled outputs.
  - The future of ferry fares is a network-wide issue for the Council to consider, whilst the approach to tolling and the basis on which the tariff is set would be a matter for a project level business case.
  - A reduction or removal in resident fares for the Bressay route would record a major benefit for residents, reducing the most significant barrier to accessing employment and services in Lerwick.
  - Additionally, those without access to a car, or who do not drive, would be subject to bus fares rather than tunnel tolls.
  - A fixed link option would necessitate longer driving distances, which in turn increase vehicle operating costs. In the current situation, only a short trip is anticipated to / from the ferry terminals, given proximity to Lerwick town centre and the population centre of Bressay. However, under a fixed link scenario it is estimated that driven travel distance would increase by approximately 15km per return trip as a result of the indirect tunnel routing.

- **Physical accessibility (TPO5)**
  - Physical accessibility is not a major problem on this route as MV *Leirna* has passenger accommodation on the same level as the vehicle deck, whilst the short crossing allows those travelling with a car to stay in their vehicles. The ultimate replacement of MV *Leirna* with a Type 2 vessel would apply to **Bre1-3** and bring with it modern accessibility standards, meaning that the net benefits of Bre2 and Bre3 are neutral.
  - The impacts of a fixed link with regards to physical accessibility are perhaps more modest on this route than on the other candidate fixed link routes. As noted, the existing problem is not as significant and, whilst a fixed link would mean that passengers could remain in their cars for any journey, those without access to a car

would need an accessible bus or taxi to make the journey (as the option of travelling as a ferry foot passenger on a Type 2 vessel meeting all modern legislation would be lost).

- **Length of operating day (TPO6)**
  - Bressay already has a very long operating day, particularly on a Friday and Saturday – indeed, the ferry service operates over a longer day than many Central Belt bus and train services. Nonetheless, the close proximity of the island to Lerwick and the significant interactions with Shetland's main settlement mean that a longer operating day would be valuable for e.g., irregular hours jobs, late night leisure etc.
  - **Bre2** would offer a very minor benefit through starting the service slightly earlier in the morning (05:30 compared to 06:00). The value of this would though be limited as an 06:00 service allows those travelling by car to access the first flights from Sumburgh, so the main benefit would be for accessing shift-based jobs starting at 06:00.
  - **Bre3** would offer a moderate benefit by providing 24-hour connectivity, albeit through the night services would be on-request, so there would be fewer opportunities for unplanned travel.
  - A fixed link would again remove all barriers with respect to travel time, providing 24-hour vehicular access between Bressay and Lerwick.
- **Non-car travel options (TPO7)**
  - Whilst a tunnel from Bressay would permit unconstrained vehicular access, non-car available residents would need a bus service that at least approaches the frequency of the current ferry service to avoid a reduction in connectivity (and so contribute to **TPO7**). Whilst this is true of all candidate fixed link islands, it is particularly important in Bressay, where travelling as a foot passenger is common given the ferry berths in the heart of Lerwick.
  - Moreover, the alignment of the fixed link, which connects the north of Bressay with Gremista would mean that journeys by bus through a fixed link would not be materially quicker (and could be slower) than travelling on a Ferry Do Max ferry timetable, where wait times would be minimal.

5.3.3 The estimated quantitative impact on the level of disstisfaction (as described in Section 3.4) is shown in the figure below

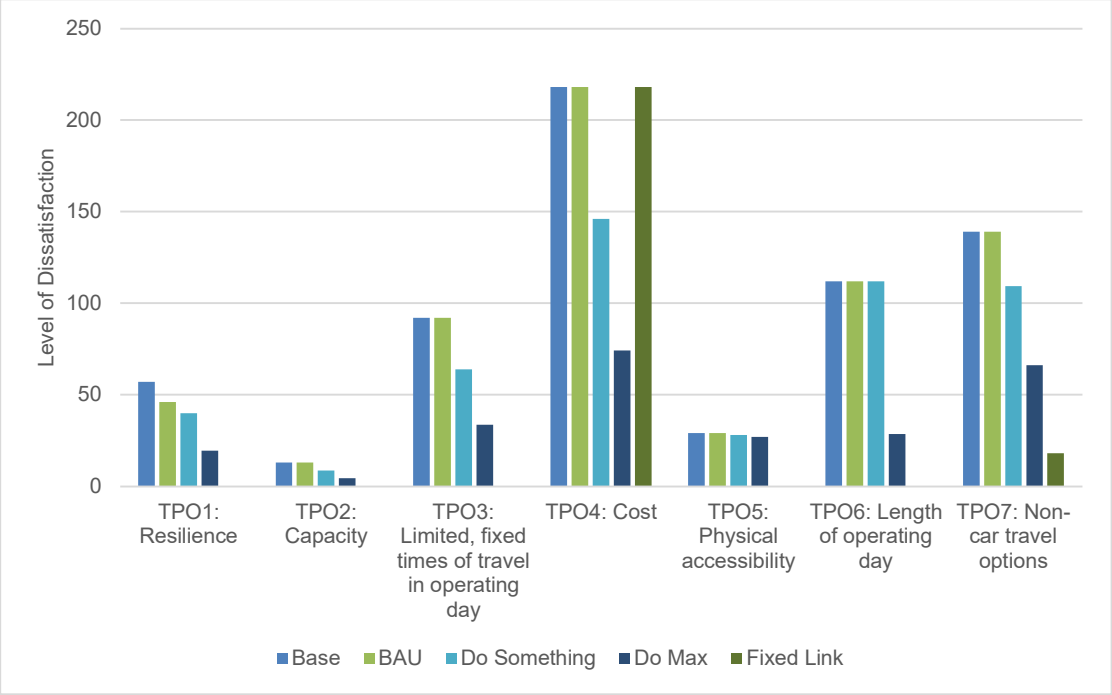

Figure 5.6: Bressay, Estimated level of dissatisfaction with each TPO by option

5.3.4 In the present day ('base')m it can be seen that the highest levels of dissatisfaction are with TPO4 – Cost, TPO7 – Non-car travel options and TPO6 – Length of operating day.

5.3.5 Overall, the options would reduce the level of dissatisfaction from the present day by:

- **2%** in the BaU
- **21%** in the Ferry Do Something
- **57%** in the Ferry Do Max
- **67%** with the Fixed Link

Key Point: The nature of the option packages for Bressay means that each increment will deliver progressively larger benefits with respect to the TPOs. That said, this is perhaps a less linear relationship than for the other candidate fixed link islands as the Ferry Do Something and Ferry Do Max could go some way towards delivering a number of the benefits that would be realised with a fixed link.

STAG criteria

Environment

5.3.6 The figure below maps the main environmental constraints pertaining to the Bressay - Lerwick route:

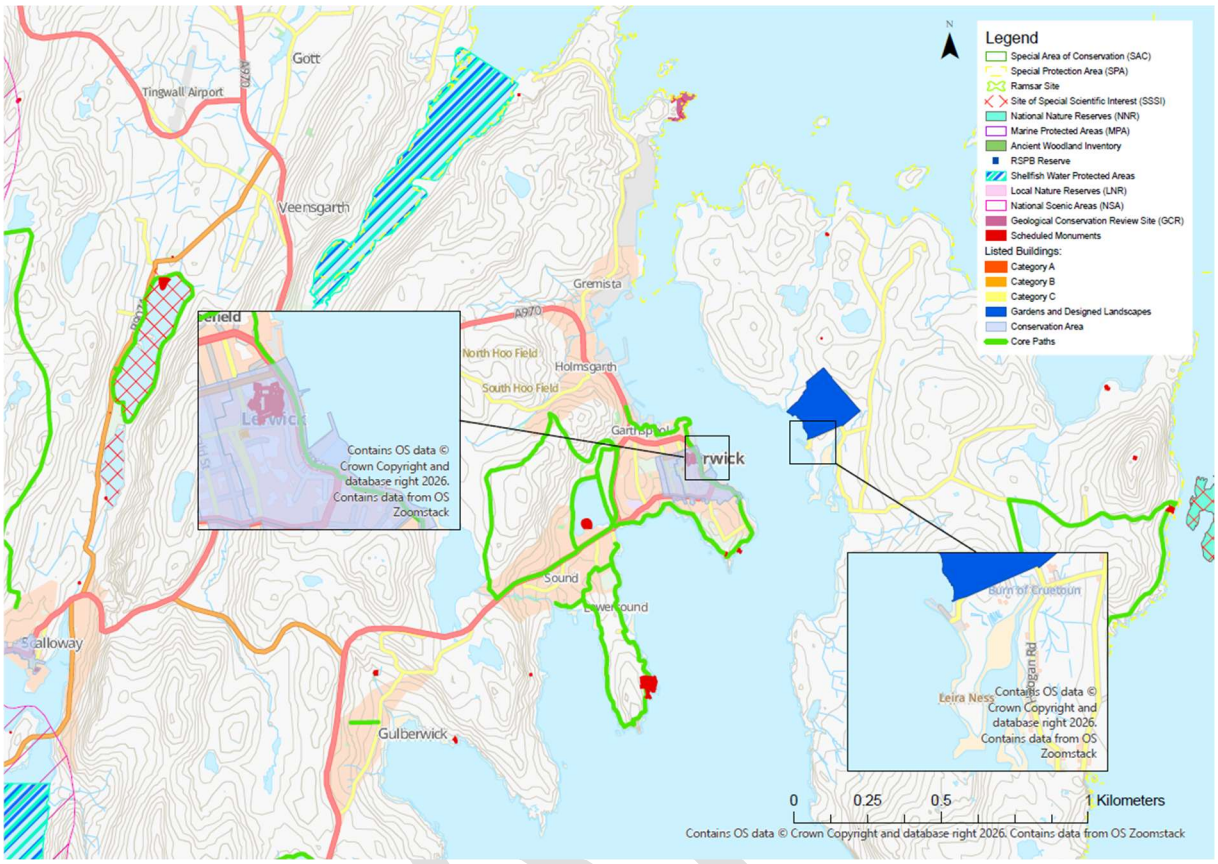

Figure 5.7: Bressay – Lerwick, environmental constraints map

5.3.7 The key points of note from the above figure are as follows:

- Bressay and Lerwick ferry terminals are both located in the Lerwick Port Authority area and are thus part of a much larger working harbour. The scale of proposed improvements at both ports, even in the Ferry Do Max is comparatively modest and contained broadly within the existing ferry terminal boundaries.
- At **Bressay**:
  - There are residential properties within 150 metres of the harbour, whilst Maryfield House Hotel is only circa 200 metres from the ferry terminal.
  - Gardie House Garden and Designated Landscape is around 100 metres to the north of the ferry terminal.
  - There are listed buildings within 100 metres of the ferry terminal, including Maryfield House (Category C) and Maryfield Boat Store and Slipway (Category B).
- At **Lerwick**:
  - The ferry terminal is located in the centre of town and therefore falls within the designated Lerwick Conservation Area.
  - There are residential properties within 50 metres of the harbour and numerous listed buildings in close proximity.
  - Core Path CPPL04 crosses the ferry terminal entrance.

5.3.8 The table below summarises the performance of the Bressay options against the STAG Environment criterion:

Table 5.8: Bressay – appraisal against STAG Environment criterion

	Bre1: BaU	Bre2: Do Something	Bre3: Do Max	Bre4: Fixed Link
Environment	O	O	x	xxx

- The harbour works for the BaU, and Ferry Do Something would be minimal on both sides of the crossing. There would be some short-term environmental impacts during construction, but these would be very limited and are thus scored 'neutral'.
- The Ferry Do Max is somewhat more significant from an environmental perspective if the new terminal is built offline rather on the existing berthing line. This would have several impacts:
  - There would be a range of short-term environmental impacts, albeit these would be largely contained within the existing ferry terminal area. There would therefore be minor negative environmental impacts in terms of e.g., **noise and vibration** for surrounding properties, reduced **water quality** and impacts **on air quality** associated with construction dust.
  - Perhaps more significantly, the new terminal would be built immediately adjacent to the Category B listed Maryfield Boat Store and Slipway and Gardie House Garden and Designated Landscape. Impacts on these designated sites and potential mitigations would need to be considered in more detail in a project level business case and EIA.
- A fixed link would have a range of environmental considerations, for example the impacts on geology and soils, noise and vibration etc. This would particularly be the case during construction, as this would be a major project in this geographic context.
- Disposal of tunnel spoil would be a significant environmental consideration, even if a purpose could be found for it. A fixed link would be subject to full EIA through which environmental protections, mitigations and enhancements would be developed.
- The tunnel portal on the mainland side would be in the industrialised Gremista area and would thus not impact on the Lerwick Conservation Area.

5.3.9 Whilst a fixed link **(Bre4)** would evidently have significant environmental impacts (at least during construction), one key point of note here is that, as the fixed link would take the form of a tunnel, its physical environmental impacts would be spatially concentrated, for example on the landscape, historic environment and water quality, drainage and flooding. Indeed, this type of solution has been successfully delivered at scale in the Faroe Islands and Norway, where the environmental impacts have been carefully managed. Moreover, the Faroese have created positive landscape features around the tunnel portals, adding to rather than subtracting from local visual amenity.

Key Point: The BaU and Ferry Do Something would be largely neutral from a physical environmental perspective. Whilst **Bre3** would be built within the existing ferry terminal bay, it would have a range of short-term environmental impacts. More materially, **Bre3** would potentially impact on designated sites immediately adjacent to Bressay ferry terminal. A fixed link would evidently have the most significant impacts given its scale, and a key consideration here would be the approach to the disposal of spoil.

Key Point: Whilst each of the options would have an environmental impact to a greater or lesser degree, there is precedent for the delivery of similar solutions across Scotland and beyond. The undertaking of a full EIA for the ultimate preferred option emerging from a subsequent project business case would allow for environmental impacts to scoped, fully assessed and mitigated where possible.

Climate Change

Table 5.9: Bressay - appraisal against STAG Climate Change criterion

	Bre1: BaU	Bre2: Do Something	Bre3: Do Max	Bre4: Fixed Link
Climate change	O	×	×	×

Greenhouse gas emissions

5.3.10 A programme level comparison of whole life carbon (WLC) has been developed – this incorporates an estimate of:

- Embodied and operational carbon associated with the fixed link provided by COWI.
- Embodied carbon associated with harbour infrastructure improvements based on estimated quantities provided by Mott MacDonald.
- Operational carbon associated with the continued operation of ferry services.
- Road operational carbon associated with additional vehicle kilometres relative to the BaU.

5.3.11 The methodological approach to developing this comparison is detailed in **Appendix A**, but it should be noted that the WLC comparison is highly sensitive to the underpinning assumptions, particularly in relation to when the ferry fleet is decarbonised.

5.3.12 The table below shows the estimated WLC for the Bressay options in tonnes of carbon dioxide equivalent (tCO_2e):

Table 5.10: Bressay WLC comparison (tCO_2e), round to nearest thousand

Option	Whole Life Carbon - tCO_2e
Bre1: BaU	47,000
Bre2: Ferry Do Something	51,000
Bre3: Ferry Do Max	64,000
Bre4: Fixed Link	48,000

5.3.13 The following points should be noted in relation to the above table:

- A fixed link **(Bre4)** has a broadly equivalent WLC to the BaU **(Bre1)** and the Ferry Do Something **(Bre2)**. It has a materially lower WLC than the Ferry Do Max **(Bre3).**

- Given that MV *Leirna* is 34 years old, it is a working assumption with all of the ferry options **(Bre1-Bre3)** that she would be replaced in the short to medium term with a conventionally fuelled vessel.
- New vessels are assumed to generate 20% less CO_2 than MV *Leirna* due to efficiencies in hull form, propulsion systems etc. After 15 years of operation, it is assumed that the vessel would undergo a decarbonisation refit which would reduce CO_2 emissions by a further 10%. After 30 years of operation, it is assumed that the vessel would be replaced by a fully zero-emission vessel.
- It should be noted that **Bre2** and **Bre3**, especially the latter, would increase the intensity of the service by scaling-up the number of sailings. This would generate additional vessel emissions (and potentially vehicle kilometres, although this is perhaps less of an issue on this route), with the longevity of this impact depending on when the ferry fleet is decarbonised.
- Under **Bre4**, a new bus service is proposed which would align with the existing Bressay-Lerwick ferry timetable, ensuring continuation of the connection for those without access to a car. Carbon estimates do not yet allow for the emissions associated with this service.

Adaptation to climate change

5.3.14 Island communities dependent on ferry services are uniquely exposed to climate change. Continued dependence on ferry services would retain and amplify this risk as the climate continues to change, whereas as fixed link **(Bre4)** would almost entirely remove this vulnerability.

Key Point: The WLC difference between the options is relatively small, although the significant increase in the intensity of the service under the Ferry Do Max **(Bre3)** means it is the most carbon intensive option. These figures are however highly sensitive to the underpinning assumptions.

Health, Safety and Wellbeing

Table 5.11: Bressay – appraisal against STAG Health, Safety and Wellbeing criterion

	Bre1: BaU	Bre2: Do Something	Bre3: Do Max	Bre4: Fixed Link
Health, safety and wellbeing	**O**	✓	✓	✓✓

5.3.15 The four material considerations for Bressay with regards to this criterion are:

- Accidents
- Security
- Health outcomes
- Access to health and wellbeing infrastructure

5.3.16 It should be noted that, in this context, **access to health and wellbeing infrastructure** and **health outcomes** are intrinsically linked and are addressed together

Accidents

*It should be noted that the monetary valuation of **accidents** of differing severity is standard practice in cost-benefit analysis and is thus captured under the **Economy** criterion. It is though important to recognise that such impacts will be very small given the low traffic volumes and the inferred number of accidents.*

5.3.17 It has been noted for the other candidate fixed link islands that, for the two ferry increments (Ferry Do Something and Ferry Do Max), there are competing factors at play with regards to accidents – i.e., primarily additional vehicle kilometres generated versus improved vessels and ferry terminal facilities. This is perhaps a less significant consideration in Bressay, where it unlikely that improvements to ferry service frequency would materially impact carryings to the extent that there would be a notable accidents impact. There may, at the margins, be additional vehicular demand associated with a higher frequency and lower fares in **Bre2** and **Bre3,** but any impact is likely to be negligible.

5.3.18 The following benefits with regards to accidents should though be noted:

- **Bre1** and **Bre2** both expand and formalise the marshalling area in Bressay and reconfigure it in Lerwick, providing safer traffic management and reduced vehicle and pedestrian interaction.
- **Bre3** would provide a further incremental benefits in Bressay through expanding parking provision and the size of the marshalling area. It would also include a covered walkway for pedestrians from the marshalling area to the linkspan, entirely segregating pedestrian and vehicular traffic.

5.3.19 A fixed link **(Bre4)** would create the scope for an expansion of vehicle movements and would increase the driven distance between mainland Shetland and Bressay and thus would record a minor disbenefit against this criterion (albeit Annualised Average Daily Traffic (AADT) would remain very low by national standards, most movements would be short i.e., Bressay to Lerwick and there would be very few heavy goods movements to and from Bressay). Any such impact though would be exceptionally minor and the scale of the uplift in demand would depend on the comparative balance between tunnel tolls and current ferry costs.

5.3.20 On the other hand, a fixed connection would remove all risks associated with ferry-borne travel including vehicle marshalling, vehicle and foot passenger interaction, rushing for a ferry (less common on the Bressay route) and the scope for incidents in the busy Lerwick Harbour. Any such impacts would though be marginal.

Key Point: The impact of the Bressay options on accidents is likely to be more muted than for the other candidate fixed link islands. Whilst there would likely be an increase in vehicle kilometres across options **Bre2-Bre4**, particularly **Bre4**, volumes would be very small.

Security

5.3.21 Security is not generally a major concern across the Shetland network, but the more urbanised nature of the Lerwick – Bressay route does make it a consideration here. The following points should be noted:

- The construction of a new and secure waiting room in Lerwick in **Bre2** and **Bre3** would be advantageous. It is understood from the public drop-in sessions that anti-social behaviour in and around the current waiting room in Lerwick can be a problem, which this option would help to address (if monitored and controlled properly).
- Option **Bre3** includes a covered walkway between the marshalling area and the linkspan. This would provide a more secure waiting environment for foot passengers, including protection from inclement weather, which does not exist at present.
- It is important to recognise that a fixed link would provide 24-hour access to Bressay, thus potentially increasing the risk of crime or anti-social behaviour on the island given its proximity to Lerwick. Again, however, any such impact would likely be minor (particularly given the need to pay a toll), if it existed at all.

Key Point: The Ferry Do Something and Ferry Do Max would provide incremental security benefits associated with a new waiting room at Lerwick (both options) and a covered walkway to the linkspan in Bressay. There is a small risk of an increase in anti-social behaviour associated with a fixed link, as it would provide 24-hour access to the island from nearby Lerwick.

Access to health and wellbeing infrastructure and health outcomes

5.3.22 There is no formal health provision on Bressay and thus there is a dependence on travel to Lerwick for routine appointments (e.g., GP, dentist etc) and for hospital treatment. The ferry service therefore plays a critical role in meeting community health needs. In the 2024 resident survey, **15% (n=37)** of Bressay residents selected 'Health Visit' as one of the 'other reasons' for which they travel off-island in a given month.

5.3.23 Moreover, in an emergency, casualties from Bressay need to be moved by ambulance using the Bressay - Lerwick ferry service. Whilst the frequency on this route is relatively high, unscheduled runs can generally be undertaken and there is out of hours cover, the requirement to cross a body of water can still create both anxiety and potential risk / discomfort for the patient (particularly when there is no on-island care).

5.3.24 Given that MV *Leirna* is manned 24-hours and can be pressed into service at short notice, all three ferry options **(Bre1-Bre3)** would have a largely neutral impact. A fixed link would provide unfettered 24-hour access to Gilbert Bain Hospital, including for Accident and Emergency. It would also reduce ambulance response times and transit time back to the hospital. Moreover, from a risk perspective, a fixed link would mitigate the twin risks of the ferry being unable to sail due to weather (uncommon on this route) or technical problems and the air ambulance being unavailable due to another call out.

5.3.25 The impact assessment process specifically considered the impact of the different options on access to health and wellbeing infrastructure and health outcomes. The following key points emerged:

- It noted that, in general, the BaU across the islands (**Bre1** in this instance), leads to continued reliance on existing ferry timetables, which may constrain timely access to preventative health appointments, allied health services, acute and specialist healthcare and mental health support, all of which is located on mainland Shetland in the case of Bressay. However, as described above, this is perhaps a less prominent issue for Bressay overall. That said, issues around frequency (e.g., reducing to an hourly service for parts of the day), reliability and the deployment of a smaller vessel during refit may exacerbate stress, anxiety and social exclusion, particularly for older people, carers and those with long-term health conditions.
- Each increment in the ferry service **(Bre2 and Bre3)** would marginally support improved access to health and wellbeing infrastructure and associated health outcomes through increasing frequency.
- The impact assessment work noted that a fixed link **(Bre4)**:
  - Would provide a step-change in access to emergency and unscheduled healthcare, including reduced response times and complete flexibility for time critical journeys. Again however, this impact would likely be smaller in Bressay than for other candidate fixed link islands.
  - Offer potential long-term public health benefits associated with reduced isolation and improved access to health promoting activities and services.
  - However, it did also recognise the point that increased traffic volumes may introduce new road safety risks (although again, this would be marginal in Bressay).

Key Point: Bressay has no formal on-island health provision and thus each option increment would be positive in terms of improving access to health and wellbeing infrastructure and in delivering improved health outcomes. However, given the design of the current ferry service and its in-built flexibility, any improvements would likely be quite marginal across all options. A fixed link would have the most significant positive impact.

Economy

Table 5.12: Bressay – appraisal against STAG Economy criterion

	Bre1: BaU	Bre2: Do Something	Bre3: Do Max	Bre4: Fixed Link
Economy	O	✓✓	✓	✓✓

Transport Economic Efficiency

5.3.26 The table below summarises the CBA for the Ferry Do Something **(Bre2)**, Ferry Do Max **(Bre3)** and the Fixed Link **(Bre4)** options. It includes the core scenario and sensitivity tests. It should be noted that the BaU is not included as it is the baseline against which other options are compared and, as previously described, a note on method can be founded in **Appendix A**.

Table 5.13: Bressay options cost-benefit summary (£m, 2023 values and prices)

Scenario	Option	PVB (£000)	PVC (£000)	NPV (£000)	BCR
Core	**Bre2: FDS**	**15,274**	**2,182**	***13,092***	**7.0**
	Bre3: FDM	**24,487**	**29,853**	***-5,366***	**0.8**
	Bre4: FL	**44,553**	**185,880**	***-141,327***	**0.2**
ST1: Reduced tunnel optimism bias	Bre2: FDS	-			
	Bre3: FDM				
	Bre4: FL	44,553	134,338	*-89,785*	0.3
ST2: Waiting time assumed to have same value as in-car	Bre2: FDS	8,652	2,232	*6,420*	3.9
	Bre3: FDM	16,431	29,890	*-13,459*	0.5
	Bre4: FL	26,599	186,027	*-159,428*	0.1
ST3: Optimism bias applied to vessel costs	Bre2: FDS	15,274	2,182	*13,092*	7.0
	Bre3: FDM	24,487	29,853	*-5,366*	0.8
	Bre4: FL	44,553	166,120	*-121,567*	0.3
ST4: 100-year appraisal period	Bre2: FDS	20,880	2,468	*18,412*	8.5
	Bre3: FDM	33,482	31,490	1,992	1.1
	Bre4: FL	61,300	157,010	-95,710	0.4

5.3.27 The key points of note from the above table are as follows:

- ST1 reduces the PVC of the fixed link and hence increases the BCR from 0.2 to 0.3.
- ST2 reduces the PVB of all three options.
- ST3 increases the PVC of the ferry options, including BaU, increasing the fixed link **(Bre4)** BCR to 0.3.

- ST4 increases BCRs for all options. The PVC for the fixed link reduces (since ferry costs rise faster than fixed link costs in years 61-100), doubling the BCR from the core scenario.
- The Ferry Do Something **(Bre2)** is a very modest increase on the current day service, effectively intensifying the frequency during peak periods. It therefore has a very low PVC and, despite also having a relatively low PVB, it generates a very high BCR across all scenarios.
- Unlike the other fixed link islands, the Ferry Do Max **(Bre4)** is competitive in value for money terms, even if the BCR is less than one in all but ST4 (100-year appraisal horizon). Again, the benefits are relatively small in absolute terms, but the cost increase is also modest as there is no major scaling up of the infrastructure or the number of vessels in the Ferry Do Max.
- The fixed link **(Bre4)** delivers relatively poor value for money, with a BCR of less than 0.5 in all tests. This is again a consequence of a fixed link being a high-cost solution for low volumes, particularly relative to the ferry options.
- These results should be interpreted alongside the wider strategic, social and economic case for investment set out in this report, recognising that conventional appraisal metrics do not fully capture the benefits of improved connectivity for island communities.

Wider Economic Impacts (Economic Narrative)

5.3.28 This section sets out the economic narrative pertaining to the options for Bressay, considering how investment in improved transport connectivity could support the economy and society of the island. The economic narrative has been informed by the analysis undertaken as part of the Case for Change (e.g., the resident survey, community and business engagement, socio-economic analysis, case studies etc).

5.3.29 The economic narrative has been developed in the context of improved connectivity generally, unless otherwise stated. However, it is important to recognise that a fixed link would by some distance be the most economically transformative of the options, and indeed several of the benefits would only emerge with the provision of a fixed connection.

5.3.30 The key economic benefits of improved connectivity for Bressay can be defined as follows:

- In **population** terms, **Bressay** is by some distance the **smallest of the candidate fixed link islands**. However, it is also the **closest and most connected of these islands to Lerwick** – its economy and services are highly integrated with the island capital and thus the economic narrative assumes a somewhat different form here. Indeed, Bressay's transport connectivity needs must be viewed in the wider context of its economic connectedness with Lerwick.
- Bressay's proximity to Lerwick means that a large proportion of island residents work in the town. Moreover, with the exception of Pelagia Bressay, there are no volume sources of inbound or outbound freight from the island. **The key market for ferry travel is therefore off-island commuting and travel for personal business**.
- However, the resident survey found that:
  - **29% (n=20)** of Bressay residents travel off-island less than they would like to, and this has a negative impact on the things they would like to do.
  - **19% (n=13)** of Bressary residents travel off-island as much as they need to, but their day-to-day activities are negatively impacted by the current ferry service.
  - **Cost**, rather than connectivity, is however seen as the major barrier to travel – of those making fewer trips than they wish to, **100% (95% major factor, 5% minor**

factor) cited the **level of vehicle fares** as a barrier, whilst **80% (25% major, 55% minor)** cited the **level of passenge**r fares as a barrier.[35]

- Improvements to the ferry service, and in particular a reduction in fares, could therefore support the **improved functioning of the labour market**. This could support Bressay residents: (i) not in the labour market to enter employment; (ii) take-up a more productive job; and (iii) work more hours. These impacts, if realised, would be beneficial for Bressay and Shetland overall. It is worth noting that the benefits of a fixed link would be heavily shaped by the level of the toll in this specific context.
- A fixed link would make Bressay a *de facto* part of mainland Shetland. It would fully integrate the economies of the island and town, removing all barriers to travel (except cost, where there is toll):
  - This would provide scope for undertaking a range of leisure activities in Lerwick, albeit the economic benefits of this would be minimal.
  - It would also remove any perceived barrier to tourism (e.g., cost, unfamiliarity with the timetable) caused by having to use a ferry to visit Bressay.
  - These benefits would again be contingent on having access to a car or the provision of a bus service that at least matches the current ferry schedule.
- The other key economic opportunity in Bressay is land-use development, but this is specifically associated with a fixed link. Shetland has an under-supply of housing which in turn contributes to difficulties in attracting people to move to Shetland and the tight labour market of the archipelago. The geography and topography of Lerwick however means that developable land is at a premium, with the new Staney Hill and Knab developments the only significant expansions committed at present. A fixed link could open the east side of Lerwick Harbour (Bressay) to development, potentially facilitating the expansion of the settlement, with benefits for Shetland overall. The extent of this opportunity would need to be tested with property agents, but there would likely be some benefits. The level of the toll would again be key here, as any cost barrier would make the island a less attractive place to live.
- There is a **considerable degree of community-led activity in Bressay**, including the proposed redevelopment of the Speldiburn facility (previously the Bressay Primary School) into an accessible community hub, which will incorporate studio and business start-up units, a café and second-hand shop, public facilities and gallery / exhibition space. It would also support community efforts around improving provision for visitors and supporting community events – this project has been supported by a £997k grant from the Scottish Government Regeneration Capital Grant Fund, as well as support from the Council and Highlands and Islands Enterprise. Improvements to connectivity could support these aspirations to grow sustainable activity in Bressay and maintain a viable and vital community on the island.

[35] Note that the ability to catch the first flight was also identified as a major barrier in the survey but that has been addressed by the addition of an 06:00 departure from Bressay.

Key Point: The economic impacts of a fixed link to Bressay could potentially stem from opening the island up for development, effectively making it a *de* facto part of mainland Shetland. Improved connectivity more generally could provide opportunities associated with e.g., improved employment opportunities, tourism etc, but much of this would depend on the current cost barrier associated with ferry services being reduced or removed. In the specific context of a fixed link, benefits for existing ferry passengers, whether island residents or visitors, would be contingent on either having access to a car or the provision of a bus service that at least matches the current ferry frequency.

Equality and Accessibility

Table 5.14: Bressay – appraisal against STAG Equality and Accessibility criterion

	Bre1: BaU	Bre2: Do Something	Bre3: Do Max	Bre4: Fixed Link
Equality and Accessibility	O	✓	✓✓	✓✓

5.3.31 The material considerations in this study with regards to this criterion are:

- Comparative access by geographic location
- Comparative access by people group
- Affordability

Comparative access by geographic location

5.3.32 Unlike the other candidate fixed link islands, Bressay is geographically close to Lerwick and well-connected in terms of the number of ferry services. However, as noted previously **29% (n=20)** of Bressay resident survey respondents noted that they travel off-island less than they would like to, which has a negative impact on the things they would like to do. This subset of the sample was asked what opportunities they are missing out on as consequence of not travelling off-island as much as they would like to, the responses to which are summarised in the table below:

Table 5.15: Bressay – in travelling to mainland Shetland less often than you would like, what activities / opportunities are you missing out on (n=20, multiple response question)

Activity / opportunity missed out on	No. of responses	% of sub-sample	% of total Bressay sample
Visiting friends and relatives less often	18	90%	26%
Other social activities	16	80%	23%
Sports, leisure and cultural activities - participating	15	75%	22%
Shopping	11	55%	16%
Sports, leisure and cultural activities – spectating / attending	8	40%	12%
Personal business	6	30%	9%
Attending health appointments	5	25%	7%
Employment opportunities	5	25%	7%
Business opportunities	13	65%	19%
Training opportunities	13	65%	19%

5.3.33 The above table highlights that Bressay residents who are travelling less often than they would like to are primarily missing out on social opportunities. It is notable from the survey that cost is the most significant barrier to travel – this aligns with the above table given that social trips are more discretionary in nature and thus cost will be a more significant factor in the decision as to whether to make the trip.

5.3.34 Each option increment would improve comparative access by geographic location or put another way, would reduce the barrier to accessing opportunities imposed by living on an island. The singular most important issue for Bressay residents, at least based on the survey and public drop-in sessions, is cost. Options which reduce the cost of travel would arguably be more advantageous than options which improve connectivity *per se*.

5.3.35 As the Bressay ferry berths in the centre of Lerwick, this route has a much higher proportion of foot passengers than any other in Shetland. A fixed link would therefore only contribute to a comparative improvement in access by geographic location if it offers a bus service that at least approaches the current ferry timetable and costs no more than a ferry foot passenger fare.

Comparative access by people group

5.3.36 The EqIA workstream found that the incidence of connectivity related inequality did not fall evenly across different people groups. It noted that:

- There is persistent inequality of access for disabled people, older people, families with young children, and those requiring accompanied travel. This is likely to be particularly prominent in Bressay given the significance of cost as a barrier to travel with a car.
- Young people and working age adults face constrained access to education, training and employment opportunities, reinforcing demographic imbalance. The evidence from Bressay is that residents have built their lives around services being on mainland, but there is still a cost in accessing these services.

5.3.37 Each option increment for Bressay would progressively improve comparative access for a range of different people groups, including those with 'protected characteristics'

- Overall, a fixed link ***could*** deliver the most significant improvement in comparative access by people group, particularly for spontaneous travel and out of hours journeys. There are four key caveats here however:
  - The cost of tolls and bus fares relative to ferry fares (which is discussed in more detail in the next section) but is of particular relevance in Bressay.
  - Accessibility for those who either do not have access to a car or do not wish to drive one. For there to be no loss of accessibility with a fixed link, bus services through the tunnel would need to at least approach the frequency of the current ferry services, on which island residents can travel as a foot passenger. As noted, this is essential on this route given the relatively high volume of foot passengers.
  - The tunnel design does not allow use by cyclists. Again, for there to be no loss of accessibility with a fixed link, the bus services provided in lieu of a ferry would need to be capable of accommodating bicycles.
  - There is risk of increased geographic inequality overall across Shetland, with islands getting a fixed link becoming comparable to mainland locations, potentially widening disparities with non-linked islands. This is particularly the case with Bressay, which would become a *de facto* part of the mainland.
- With regards to the ferry increments **(Bre2 and Bre3)**, improvements in connectivity would support comparative access by people group, but it is the reduction in the barrier posed by cost which would be the most fundamental benefit for this island.

- There is an equality and accessibility risk associated with potential public service reform in the context of the Ferry Do Max or a fixed link, if fewer services were based on island. This could have particularly negative implications for certain protected characteristic groups. However, Bressay is again somewhat different from the other islands in this respect, as most of its services are already located in Lerwick, so any improvement in connectivity should be advantageous in this respect.

Affordability

5.3.38 The EqIA highlighted affordability as a major source of inequality for island communities. Households on lower incomes experience disproportionate affordability pressures linked to fares and occasional off-island overnight accommodation and lost income. As noted above, this is perhaps the key equalities issue for Bressay, with residents facing the double impact of the highest fare per mile of Shetland Ro-Ro routes and a higher frequency of travel.

5.3.39 The impact of the options with respect to affordability is largely dependent on the balance of ferry fares versus tolls. It is assumed in the appraisal that tunnel tolls are set at a level equivalent to current ferry fares revenue raised and thus there would be little difference between the options for if this was the case. Note however that even setting tunnel tolls at a level reflective of the current ferry fares would just perpetuate current inequalities in Bressay.

5.3.40 The Ferry Do Something and Ferry Do Max assume an in-principle commitment to reduced and free resident fares respectively. On this basis, these options would score most positively with regards to affordability. However, the detail around ferry fares and tunnel tolls would need to be worked through in a project-level business case (and potentially at a network level with respect to fares) and thus there is uncertainty over the impacts at this programme stage.

5.3.41 Under a fixed link scenario **(Bre4)**, those without access to a car, or who do not drive, would be subject to bus fares rather than tunnel tolls.

5.3.42 A fixed link option would also necessitate longer driving distances, which in turn increase vehicle operating costs.

5.3.43 The Bressay crossing is very direct and drops passengers into the heart of Lerwick, enabling a significant proportion of foot-passenger trips. Under a fixed link **(Bre4)** scenario, these travellers will have to switch to bus or car travel with Associated cost implications.

Key Point: The key equalities issue facing Bressay residents is cost – they pay the highest ferry fare per mile on Shetland Ro-Ro routes and also travel the most frequently. Whilst improved connectivity overall would be valuable in tackling inequalities, it is a reduction in the cost burden of travel that would be most meaningful to this particular community.

Feasibility, Affordability and Public Acceptability

Feasibility

- The physical infrastructure options (vessels, ferry terminals and fixed links) are all technically feasible. Three issues should be noted here however:
  - Any works at Lerwick would require the agreement of Lerwick Port Authority.
  - There is no immediately obvious location for the siting of a new waiting room **(Bre2 and Bre3)** in Lerwick, so this would need to be worked through in the design and in partnership with LPA.
  - Given the absence of alternative Ro-Ro ferry facilities in Lerwick Harbour, any harbour works undertaken would need to be delivered in such a way that the ferry can continue to operate.

- Outline and detailed design work would be required for ferry terminals and fixed links, inclusive of e.g., surveys, ground investigations, environmental consenting etc.
- The ferry revenue options, and in particular the Ferry Do Max **(Bre3)**, would have significant deliverability considerations, particularly with respect to the sustainability of an all-day 20-minute frequency in **Bre3**. These would need to be considered in the context of a project business case.
- This is also true of any scaling-up of bus services in **Bre4** to provide a level of service through the tunnel approaching that offered by the ferry – securing sufficient vehicles and drivers to operate these services is a deliverability challenge that would need to be considered in detail at the project level.

Affordability

- As will be explained in the Financial Dimension, affordability is the primary challenge across all options. Outwith the ongoing procurement of one new Type 1 vessel, the Council does not have committed funding for any capital works. The works on the Bressay route, even in the Ferry Do Max, are however generally more modest than elsewhere on the network.
- The options will have different spend profiles and their affordability will also be shaped by the financing mechanism adopted. The BaU is the lowest cost option on this route, but the increment to the Ferry Do Something and Ferry Do Max is less than on other routes.
- It is important to recognise that any scaling-up of ferry or bus services will impose an ongoing financial commitment on the Council for which funding is not presently in place.
- As all Shetland Islands Council ferry services operate at a deficit, any reduction in or removal of fares would have a direct revenue impact. At present, the annual operating deficit is funded by the Scottish Government, but it is possible / probable that any increase in this deficit as a consequence of a deliberate policy choice would be a matter for the Council.

Public acceptability

5.3.44 The Bressay public drop-in session was held on 25th May, with **46** island residents attending. The key points of note were as follows:

- There were mixed views on a preferred option in Bressay – some residents were in favour of a fixed link **(Bre4)** as a means of providing unfettered access to Lerwick, but others foresaw a range of potential disadvantages including access for those without access to a car, the indirect alignment, a loss of island character and the potential cost of tunnel tolls relative to ferry fares.
- Of the potential downsides to a fixed link **(Bre4)**, the key issue raised was access for those who do not own a car or who would prefer not to drive one. The Bressay route is uncommon in Shetland, with a comparatively high level of foot passenger traffic. Whilst it was acknowledged that this impact could be mitigated by the provision of a bus service matching the current ferry timetable, the realism of this was questioned, particularly with regards to its long-term sustainability.
- In terms of island character, there was, as noted, some residents who felt that a fixed link **(Bre4)** would weaken island identity, effectively making Bressay part of mainland Shetland. However, other residents noted that the island is almost wholly integrated with Lerwick with regards to its supply-chain, service delivery, education and employment, and thus the risk of a loss of island identify was considered less likely / important.
- The key issue for Bressay residents is however cost. Several residents noted that they bear a disproportionate cost burden amongst Shetland's island communities, with the highest cost per mile and a greater propensity to travel given the lack of on-island services. The relative cost of options would therefore be of fundamental importance in

selecting a preferred option in any future project business case. The proposal for reduced fares in the Ferry Do Something **(Bre2)** and Ferry Do Max **(Bre3)** were received positively by the community.

5.4 Preferred Option

5.4.1 The preferred option selected by Shetland Islands Council Members on 30th June 2026 will be recorded in this report post-decision.

6 Economic Dimension – Whalsay

6.1 Overview

6.1.1 This section provides the Economic Dimension for Whalsay, commencing with a brief summary of the option packages followed by their appraisal against the TPOs and STAG criteria. ASTs for each option detail the appraisal against each individual criterion, with the narrative below drawing out the key issues and supporting interpretation.

6.2 Option Packages

6.2.1 This section briefly recaps the option packages progressed from the SOC - for reference, Table 3.1 sets out how each element of the option packages has been treated in the Network Strategy OBC.

6.2.2 It is important to note that any ferry-based increment on the BaU in Whalsay, would require major harbour works and would represent a significant capital investment.

Option Whalsay 1: Business-as-Usual

6.2.3 The BaU broadly maintains the present-day operation whilst addressing some of the more recent resilience issues on routes, such as a reduction in sailings during refit periods.

6.2.4 On the Whalsay route, the key short-term intervention to maintain the current service is a replacement for the 1982-built MV *Hendra*. She is now well past her nominal service life – the need for her replacement was identified in the previous Shetland Inter-Island Transport Study (2016) and the Whalsay OBC (2019, updated in 2022).

6.2.5 The Whalsay BaU represents the appraisal baseline and is summarised in the table below:

Table 6.1: Whalsay Business-as-Usual option components

Approach / Principles	Component Options
Capital measures	
Like-for-like asset replacement at life expiry	- 1 * Type 1 vessel in the immediate-term to replace MV *Hendra* - MV *Linga* continues in operation until she is at the point of life expiry
Ferry revenue measures	
Operate service to timetable year-round (weather events excepted)	- Not applicable
Address refit impacts – additional vessels to remove / mitigate refit timetable impacts	- Fleet reserve vessel to ensure no reduction in service during refit

Capital measures

Vessels

6.2.6 The BaU assumes the immediate replacement of MV *Hendra* with a Type 1 vessel. This would maintain existing capacity on the route and would address the reliability and resilience risks associated with a vessel that is now in its fifth decade. Recognising that her capacity exceeds that of a Type 1, MV *Linga* would be replaced by a version of a Type 1 at life expiry.

Harbour infrastructure

6.2.7 The existing berthing structure at **Vidlin** is in poor condition and requires replacement. The current vessels have caused damage to the structure, so introducing a heavier Type 1 vessel would likely result in its further degradation.

6.2.8 Previous repairs have been carried out on the existing berthing structure at Vidlin. Details of these repairs are required to assess whether a new berthing structure could be built behind the current one, allowing the ferry service to continue operating during construction. At this stage, it is assumed that the BaU is constructed with terminal remaining live.

6.2.9 The figure below shows and describes the works required at Vidlin in the BaU:

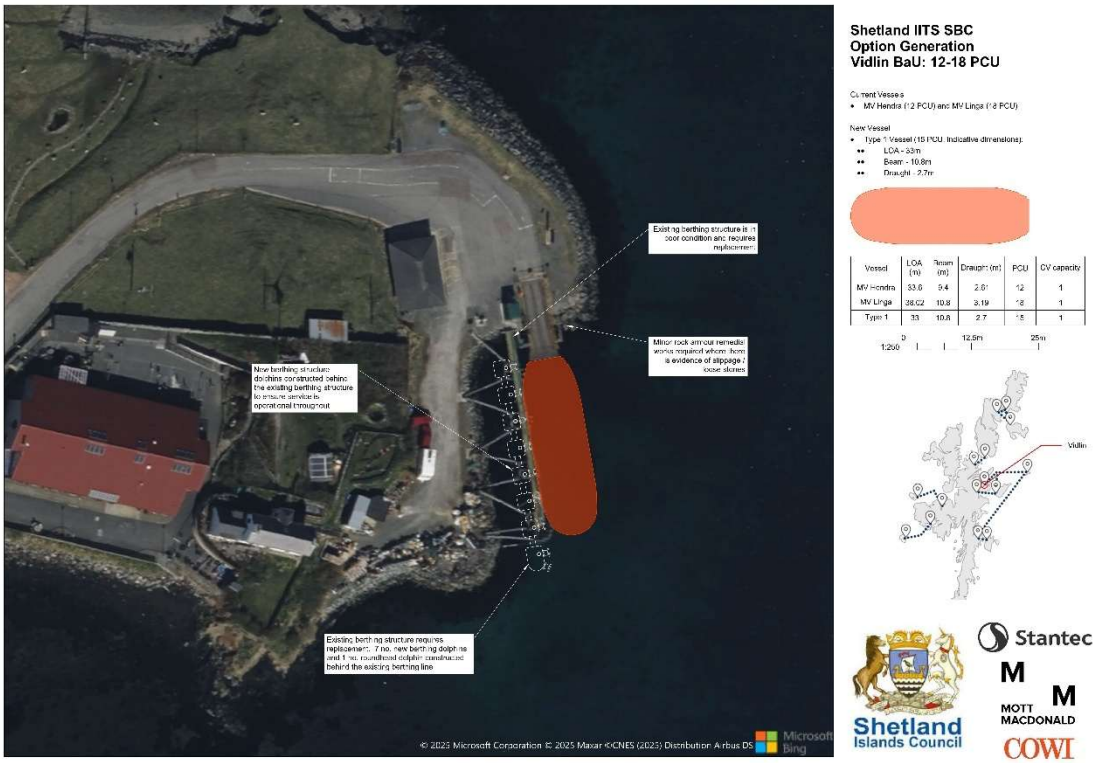

Figure 6.1: Whalsay – Vidlin - BaU

6.2.10 In order to facilitate use by the existing vessels and new Type 1 vessels, immediate maintenance works are proposed to the Laxo berthing structure to extend its lifespan, as it is currently reported to be in fair-to-good condition.

6.2.11 It is estimated that the berthing structure at Laxo will require replacement by 2033 given the current condition of the structure. The works consist of the replacement of the entire berthing structure with a new structure consisting of: (i) seven. berthing dolphins; and (ii) one. roundhead dolphin to provide a berth length of 55 metres, including bollards, fenders, ladders etc.

6.2.12 This would likely be constructed behind the existing berthing structure to allow the ferry service to remain live through the works, with potential minor outages. The existing structure would be demolished in a phased approach as the new berthing dolphins are constructed. All existing dolphins and supporting structures would then be demolished. New berthing dolphins would be reinforced concrete supported on tubular piles with a walkway between each dolphin to allow access to bollards etc.

6.2.13 Repairs to the existing rock armour to rectify slippage / loose stones would also be required.

6.2.14 Outwith the berthing structures at **Laxo** and **Symbister** (and also the waling beams at Symbister), no significant works would be required in the BaU.

Option Whalsay 2: Ferry Do Something

6.2.15 As noted in the introductory section, the Ferry Do Something for Whalsay would entail significant harbour works, with the redevelopment of the current Pelagic Basin in Symbister. This option would also include an expansion of the service, with a two-vessel timetable from early morning to late evening Monday to Saturday and for much of the day on a Sunday. This is summarised in the table below

Table 6.2: Whalsay Ferry Do Something option components

Approach / Principles	Component Options
Capital measures	
Larger vessels to increase vehicle capacity	- 2 * Type 2 45m length overall double-ended vessels - Redevelop the Pelagic Basin in Symbister Harbour as per the 2022 Whalsay OBC - Redevelop Laxo and Vidlin as per the 2022 Whalsay OBC to accommodate new 45m vessels - Potential cascade of MV *Linga* depending on when this option is introduced
Fully accessible vessels	
Foot passenger waiting facilities	- Symbister: Upgraded waiting facilities - Laxo: Improved heating, Wi-Fi, toilets, baby change, functioning vending machines etc
Ferry revenue measures	
Common Monday to Friday timetable	- Standardise Monday to Friday timetable, either through or moving drills and maintenance to a two-vessel Sunday - As part of this option, it is assumed that MV *Filla* would be released from her Whalsay commitments on a Monday and her time reallocated to Skerries
Timetable intensification – increase frequency with existing assets	- Extend the operating day of the 'day vessel' (currently MV *Hendra*)
Improved Saturday service	- Operate the route on the basis of the Monday to Friday timetable, as set out above
Improved Sunday service	- Operate the 'day vessel' on a Sunday
Public transport integration measures	
Improved bus connections	- Additional bus connections at Laxo for Whalsay services - Other measures to improve connectivity, such as a car club at Laxo
Fares	
Lower fares for residents	- Reduced fares for residents

Capital measures

Vessels

6.2.16 The SOC, and indeed the previous work on Whalsay, highlighted peak / commuter vehicle capacity as one of the most significant transport problems facing the community. To this end,

the Ferry Do Something entails moving to Type 2 vessels, which have a higher vehicle lane meterage than MV *Hendra* and MV *Linga*.

6.2.17 If this option was progressed in the short-term, there would be benefit in considering replacing MV *Linga* before her nominal life expiry and cascading her to another route, given, the benefits of operating two of the same vessel class on the route.

Harbour infrastructure

6.2.18 This option would entail major harbour works to accommodate the Type 2 vessels:

- At **Symbister**, the tight manoeuvre onto the berth combined with strong cross-currents at the narrow harbour mouth, would require a new ferry berth to be developed for the larger double-ended Type 2 vessels. This issue was considered in detail in the 2022 Whalsay OBC and the option progressed was the redevelopment of the existing Pelagic Basin (suggested by the pelagic vessel owners).
- The berths at both **Laxo** and **Vidlin** would also need to be redeveloped to accommodate the larger and heavier Type 2 vessels.
- This would all have to be done whilst maintaining the service, although Vidlin and Laxo could each be closed in turn with the other port used for the duration of the works. The absence of a diversionary port could though give rise to some short-term reliability issues.

6.2.19 A general arrangement drawing and description of the works required at each port is provided below:

Symbister

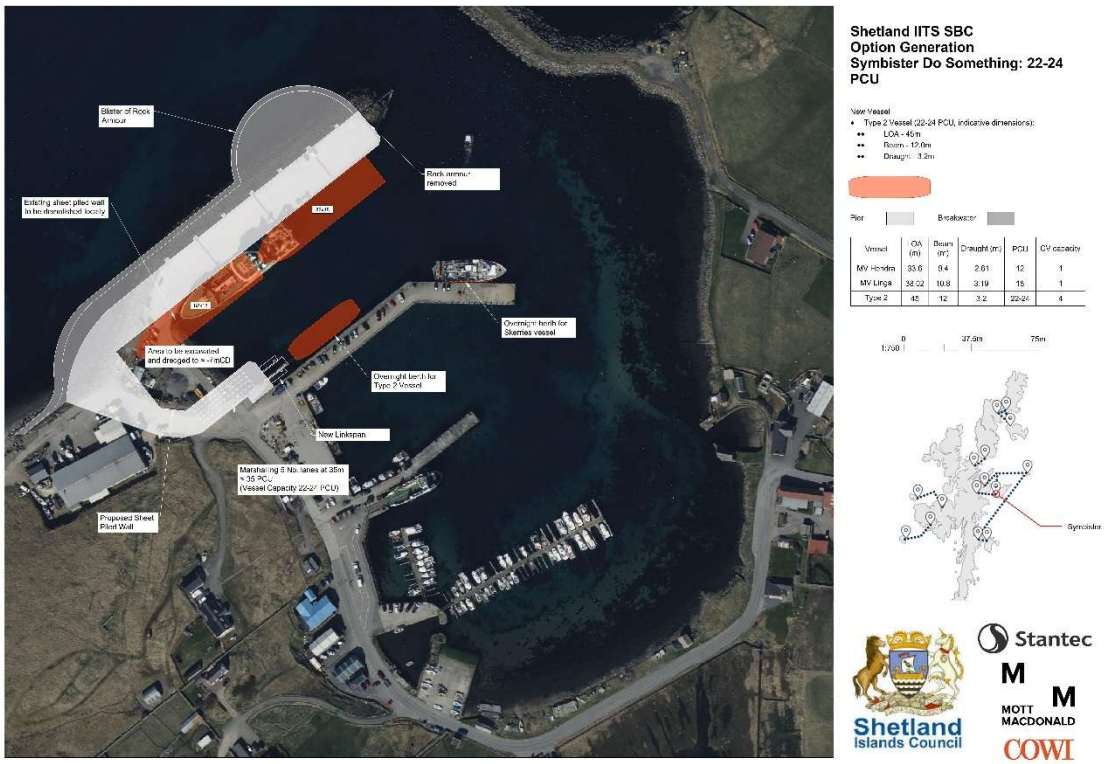

Figure 6.2: Whalsay – Symbister – Ferry Do Something

6.2.20 The following works would be required at Symbister:

- This option would involve redeveloping the port in line with the 2022 Whalsay OBC layout – a significant body of work was undertaken to inform this, including simulations, and it is thus appropriate to include it here.
- Demolition and removal of approximately 75 metres length of sheet pile wall within the pelagic basin to provide additional berthing area.
- Reclamation of land over the existing slipway to the north of the existing middle pier to provide access to the new linkspan location and space for a new marshalling area.
- Construction of a new linkspan and support structures on the north side of the middle pier.
- Reclamation of land to the north-west to provide access to the newly extended pelagic berth.
- Removal of rock armour at the end of the existing berth and reprofiling of the existing rock armour on the Pelagic Berth.
- Bathymetric information would be required to determine the scope of any dredging works at Symbister.

Laxo

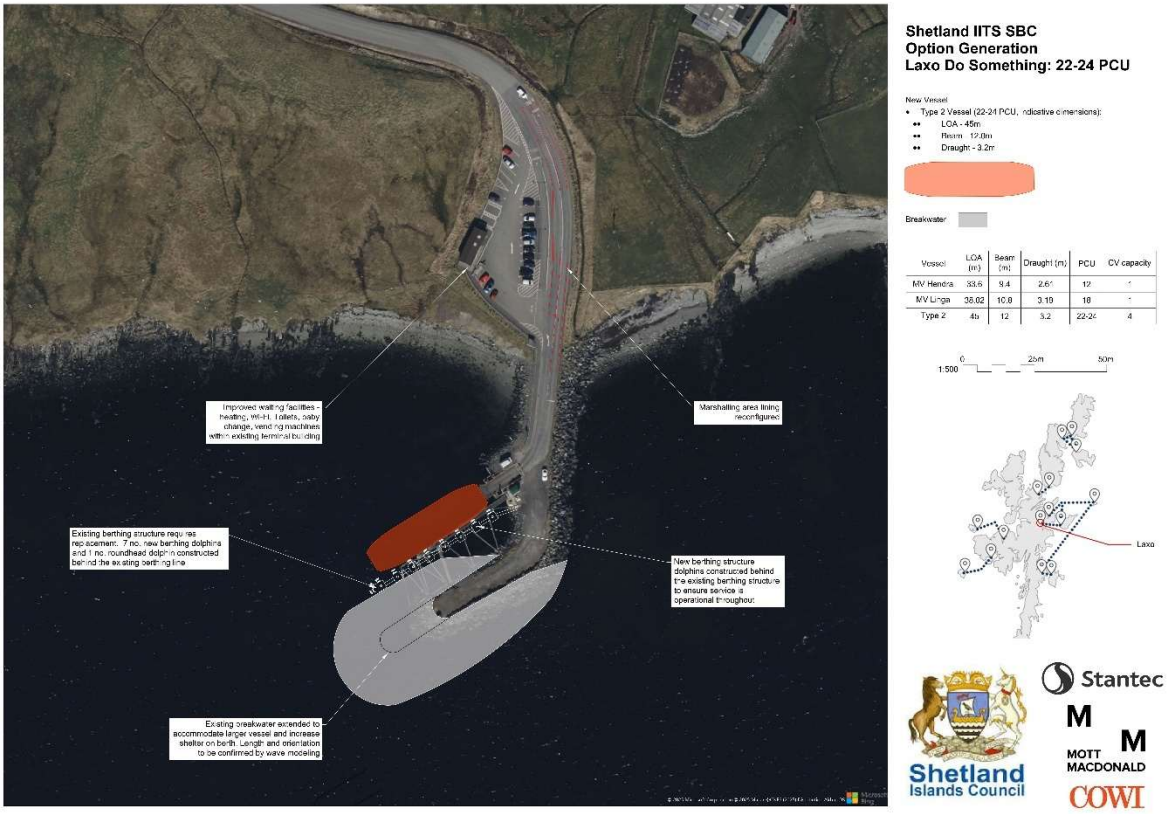

Figure 6.3: Whalsay – Laxo – Ferry Do Something

6.2.21 Any new berthing structures must be constructed whilst maintaining the ferry service. Therefore, to maintain the existing linkspan location at Laxo, the new berthing structure must be constructed behind the existing berthing structure.

6.2.22 The following works would be required at Laxo:

- Extension of the breakwater by circa 20 metres to provide shelter for the new larger vessels. This extension would require wave modelling in order to accurately inform the length and crest height of the extension. The breakwater works could require diversion of the service to Vidlin for their duration.
- Replacement of the entire berthing structure with a new structure consisting of seven berthing dolphins and one roundhead dolphin to provide a berth length of 55 metres, including bollards, fenders, ladders etc. This would be constructed behind the existing berthing structure to generally allow the ferry service to remain live throughout the works, with potential minor outages.
- The existing structure would be demolished in a phased approach as the new berthing dolphins are constructed. The new berthing dolphins would be reinforced concrete supported on tubular piles with a walkway between each dolphin to allow access to bollards etc. All existing dolphins and supporting structures would be demolished.
- Improved waiting facilities.
- Reconfiguration of the marshalling area lining to provide additional capacity.

Vidlin

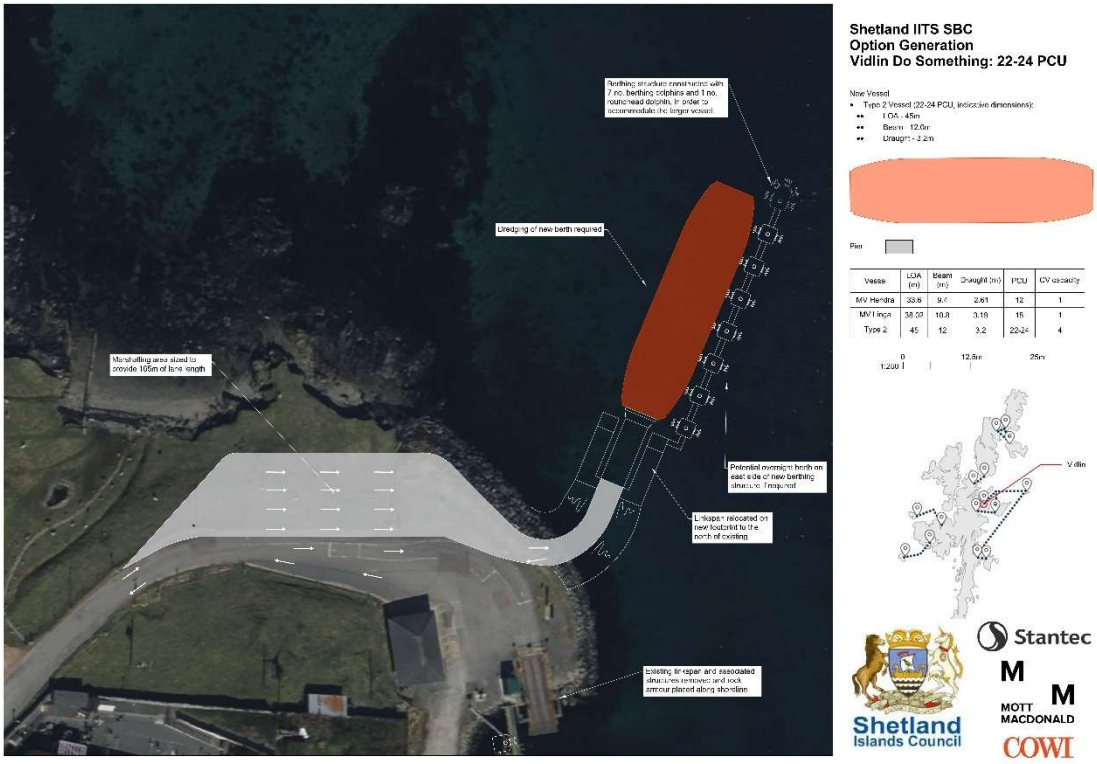

Figure 6.4: Whalsay – Vidlin – Ferry Do Something

6.2.23 The following works would be required at Vidlin:

- This option would involve redeveloping Vidlin in line with the 2022 Whalsay OBC layout – a significant body of work was undertaken to inform this, and it is thus appropriate to include it here.
- Construction of a new berthing structure to the north, consisting of seven berthing dolphins and one roundhead dolphin to provide a berth length of 55 metres.

- Construction of new linkspan support structures and mechanical equipment to the north, relocating the existing linkspan to the new location.
- Construction of a 20 metre causeway approach to the new linkspan location.
- Redevelopment of the land to the north of the existing marshalling area to provide adequate marshalling area capacity.
- Bathymetric information would be required for Vidlin to determine whether dredging would be required for this new berth.

Ferry revenue measures

6.2.24 The proposed ferry revenue measures entail:

- The provision of a two-vessel service between 05:00 and 01:00 Monday to Saturday.
- The provision of a two-vessel service between 05:00 and 18:25 on a Sunday, with a one vessel service thereafter.
- Drills and maintenance would be moved to the two vessel Sunday subject to contractor availability.

6.2.25 Whilst this option is deliverable in principle, its implementability would need to be worked through in detail with respect to e.g., crew availability, maintenance implications, stress on the assets, contractor availability etc.

6.2.26 The table below summarises the indicative number of sailings in the Ferry Do Something relative to the BaU.

Table 6.3: Whalsay – number of sailings in Ferry BaU and Ferry Do Something

	Monday	Tues-Thurs	Friday	Saturday	Sunday
BaU	19	19	20	18	12
Do Something	24	24	24	24	18
Do Something v BaU	***+5***	***+5***	***+4***	***+6***	***+6***

Option Whalsay 3: Ferry Do Max

6.2.27 The Ferry Do Max would represent a major scaling-up of the Whalsay ferry service to address capacity and service constraints. It involves moving to a three vessel, 24-hour operation and would require the development of a new harbour in Whalsay at North Voe. The component elements of the Ferry Do Max are set out in the table below:

Table 6.4: Whalsay Ferry Do Max option components

Approach / Principles	Component Options
Capital measures	
Additional vessels and harbour infrastructure required to deliver an increased service intensity	- 3 * Type 2 45m length overall double-ended vessels (this could potentially be increased to Type 3 vessels to provide resilience for Yell Sound) - Develop North Voe to accommodate the new vessels and also the Skerries ferry, MV *Filla*. Two linkspans would be required - Redevelop Laxo and Vidlin to accommodate new larger vessels and a higher intensity timetable. This would be a major redevelopment as significantly greater sheltered manoeuvring area

Approach / Principles	Component Options
	and berth lengths would be required to accommodate the larger vessels and two linkspans may be required at each terminal to accommodate the increased frequency and provide resilience
Ferry revenue measures	
Provide 'turn-up-and-go' service, no bookings required between 06:00-00:00	- Increase service frequency to half-hourly, with two vessels operating on a shift basis and one on a day basis (reducing to two shift vessels on a Sunday) - Increase service frequency to hourly on a Sunday
Provision for 24-hour travel with request sailings 00:00-06:00	- Hourly on-request service 00:00-05:00
Public transport integration measures	
Through bus services (i.e., which travel on the ferry to the end destination)	- BaU plus three through bus services from Whalsay to deliver working-day and part-day connectivity to Lerwick, seven days per week
Fares	
Free fares for residents (or toll equivalent for fixed link comparison)	- Free fares for residents

Capital measures

Vessels

6.2.28 The Whalsay Ferry Do Max assumes the introduction of three Type 2 vessels to the route. As a 'Ferry Max' solution, the case for three Type 3 vessels was considered, but this was deemed to be disproportionate, even as a theoretical maximum.

Harbour infrastructure

6.2.29 The Ferry Do Max options for Laxo, Vidlin and Symbister would require extensive construction works. Whilst Type 3 vessels were considered disproportionate for this route, to future proof the infrastructure at these locations, they have been designed to accommodate either Type 2 or Type 3 vessels. This approach ensures flexibility and, should Type 3 vessels be deployed in the fullness of time, would provide resilience for Yell Sound.

6.2.30 General arrangement drawings and summaries of the works required at each port are provided below.

Symbister / North Voe

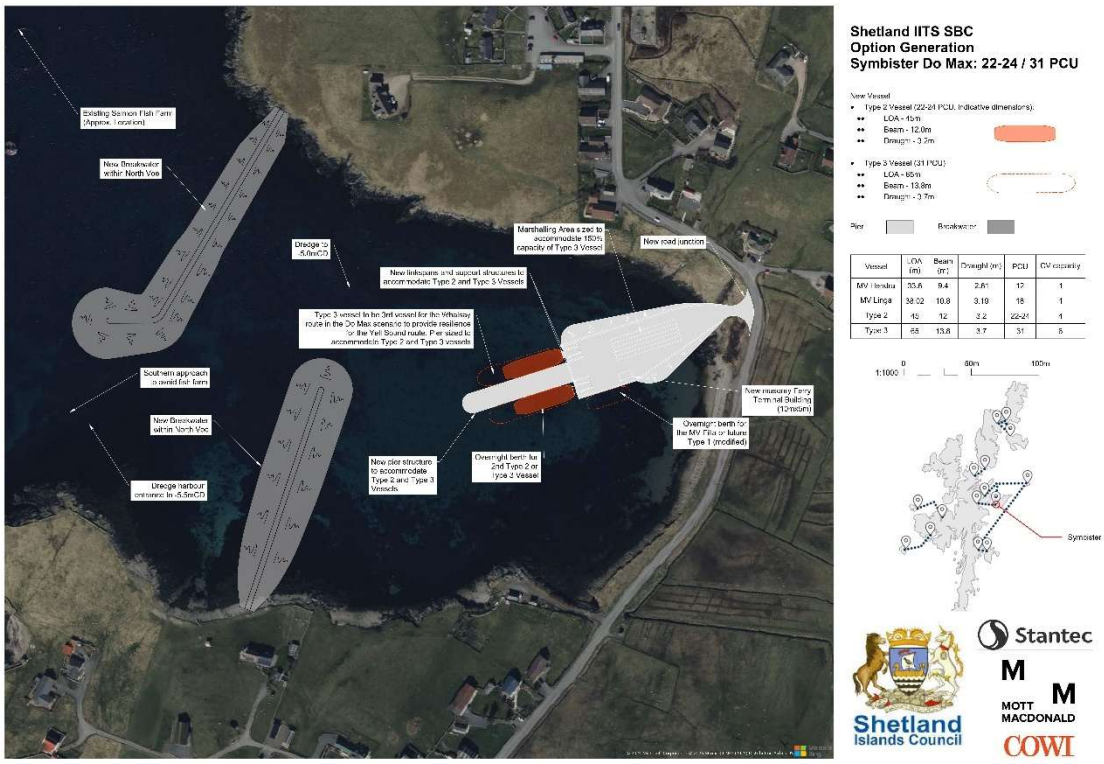

Figure 6.5: Whalsay – Symbister / North Voe – Ferry Do Max

6.2.31 The following works would be required at Symbister:

- Development of a new ferry terminal at North Voe.
- Construction of two new breakwaters:
  - One 210 metre long breakwater with a dog-leg end from the north.
  - One 170 metre long breakwater from the south to provide overlapping shelter for the new berth locations.
- Reclamation of land from the north-east corner of North Voe Bay, building out by approximately 120 metres to provide a new area for marshalling, the terminal building and an overnight berth for the Skerries vessel MV *Filla* (or future replacement vessel) on the southern extent.
- Construction of a new 85 metre solid sheet piled (assumed) finger pier, building end-over from the new reclaim area, to provide a new linkspan berth to the north and overnight berth to the south.
- Construction of new linkspan supporting structures and installation of a new linkspan on the north side of the new finger pier.
- Construction of new linkspan supporting structures and installation of a new linkspan on the south side of the new finger pier.
- Dredging of bay to -5.0m Chart Datum to ensure adequate water depth for all in-scope vessels.

Laxo

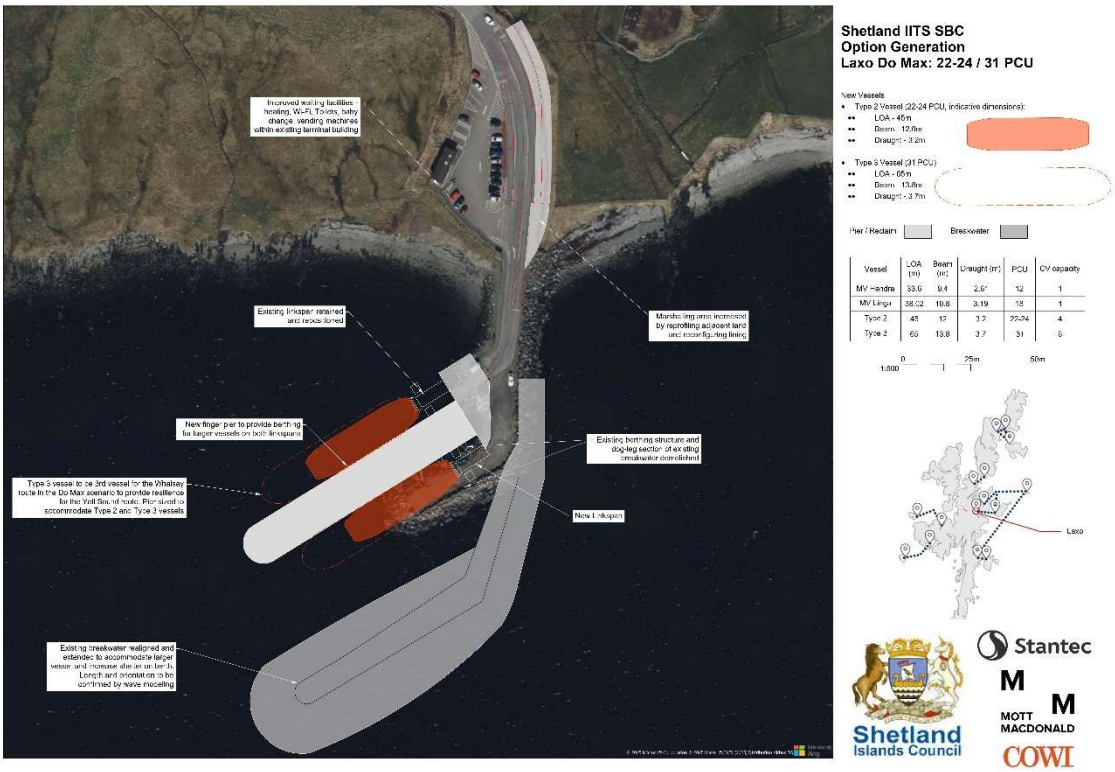

Figure 6.6: Whalsay – Laxo – Ferry Do Max

6.2.32 The following works would be required at Laxo:

- In order to undertake the extensive works at Laxo, the port would need to close until one of the new berths was available. This is only possible due to Vidlin being available as an alternative port. It is recommended that Vidlin is redeveloped first.
- Extension of the existing breakwater by moving the dog-leg bend further south by approximately 35 metres, and extension of the dog-leg by 45 metres to provide greater shelter to the berth.
- Demolition of the existing berthing structure, linkspan and supporting structures (linkspan deck retained), and section of breakwater that would no longer be required.
- Reclamation of land over the existing linkspan location, building out from the existing reclaim area.
- Construction of a new 95 metre solid sheet piled (assumed) finger pier, building end-over from the new reclaim area.
- Construction of new linkspan support structures to the new north berth and installation of the existing linkspan in the new location.
- Construction of new linkspan support structures to the new south berth and installation of a new linkspan.
- Increase the size of the marshalling area by re-profiling and surfacing adjacent land.
- Upgrade to facilities within the existing terminal building.

Vidlin

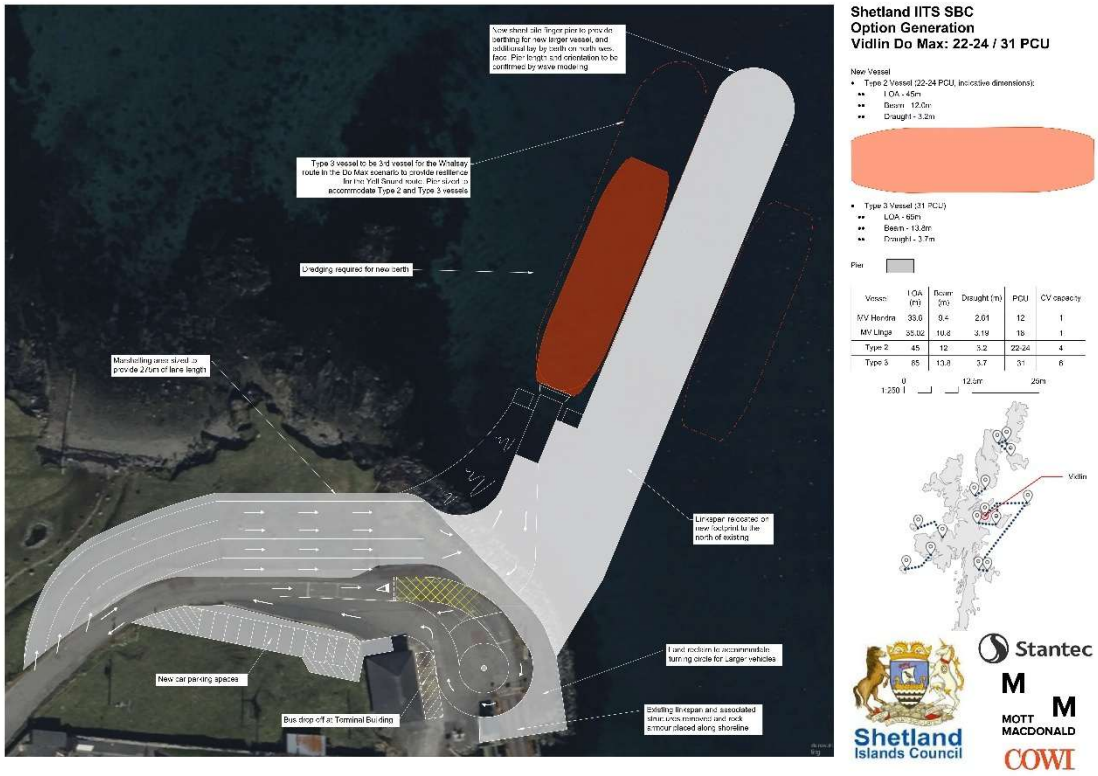

Figure 6.7: Whalsay – Vidlin – Ferry Do Max

6.2.33 The following works would be required at Vidlin:

- Reclamation of an area to the north-east, building out from the land to construct the linkspan and pier approach area.
- Construction of a new 95 metre solid sheet piled (assumed) finger pier, building end-over from the new reclaim area.
- Land reclamation / reprofiling land to the north of the existing marshalling area to provide sufficient space for a new marshalling area to meet the capacity needs of the new larger vessels.
- Reprofiling of the land to provide new parking spaces.
- Construction of new linkspan support structures for the new north berth and relocation of the existing linkspan to a new location (modified as necessary to suit any future Type 3 vessel deployment).
- Dredging to the west side of the new finger pier to provide sufficient water depth for an overnight berth.
- Demolition of the existing berthing structure.
- Demolition of the existing linkspan support structures and reclamation of this area to provide sufficient space for a vehicle turning area / roundabout.
- Reconfiguration of an area to provide increased marshalling capacity and safe traffic flows.

Ferry revenue measures

6.2.34 The Whalsay Ferry Do Max would entail a major scaling-up of the current service with a:

- **Monday to Saturday**
  - Hourly overnight request service.
  - Three vessel service from circa 06:00-17:00 operating a broadly 30-minute frequency.
  - Two vessel service from 17:00 to the end of the operating day.
- A two vessel **Sunday** service from 05:00 to the end of the operating day, with drills and maintenance on a Sunday, subject to contractor availability. This would provide a circa 45-minute service in the middle of the day when two vessels are operating.

6.2.35 This is again a conceptually deliverable solution, but it would clearly require significant work around deliverability in any project business case. Moreover, expanding the service on this and other routes to this sort of level would require a scaling-up of overhead support, e.g., an increase in the number of marine superintendents

6.2.36 The table below summarises the number of sailings in the Ferry Do Max relative to the BaU.

Table 6.5: Whalsay – number of sailings in Ferry BaU and Ferry Do Max

	Monday	Tues-Thurs	Friday	Saturday	Sunday
BaU	**19**	**19**	**20**	**18**	**12**
Ferry Do Max	35	35	35	35	19
Ferry Do Max v BaU	***+16***	***+16***	***+15***	***+17***	***+7***

Option Whalsay 4: Fixed Link

Alignment

6.2.37 The proposed fixed-link alignment between mainland Shetland and Whalsay would provide a direct subsea crossing beneath Linga Sound. On the mainland side, the route would connect to the road network via the B9071, the road that serves Laxo. From here, the alignment would curve eastward before descending beneath the Sound. The tunnel would then follow a generally east / south-east trajectory before rising to meet the approach road on the western side of Whalsay.

6.2.38 The subsea tunnel would have a total length of 8.2 km, forming part of a 9.8 km overall road corridor that would include the tunnel and its surface junctions. The link is designed as a single-bore, two-lane tunnel, allowing safe bi-directional travel at a design speed of 40 mph. Due to length, operational conditions and fire and life-safety requirements, pedestrian and cyclist access would not be permitted.

6.2.39 Safety would be supported by a full-length emergency walkway and regularly spaced vehicle laybys and turning niches, ensuring effective emergency response, breakdown management and maintenance access.

6.2.40 The figures below show the indicative horizontal and vertical alignment, illustrating how the tunnel would connect the mainland road network to Whalsay and how the route would integrate with local coastal and seabed conditions.

Figure 6.8: Horizontal tunnel alignment form mainland Shetland to Whalsay

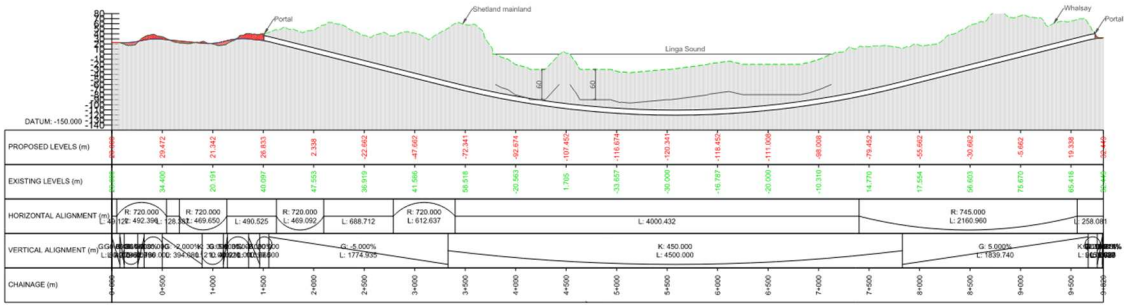

Figure 6.9: Vertical tunnel alignment from mainland Shetland to Whalsay

Option costs

6.2.41 As explained in Chapter 3, all costs in the Economic Dimension are presented on a present value basis. In the economic appraisal, capital (initial and lifecycle) and operating and maintenance costs are profiled over 60 years and discounted to a present value.

6.2.42 These include:

- Vessel and harbour infrastructure replacement for all ferry options from 2026 to 2095, including cyclical renewals and refurbishment.
- Pre-construction and construction costs for a fixed link. It should be noted that major refurbishment and renewal of tunnel infrastructure is **not** included.
- Operating and day-to-day maintenance costs over the same period for all options (i.e., excluding fare / toll revenue, which would reduce the net cash cost).

- For ferry options, the **PVC** includes all capital expenditure, operating and maintenance costs and fares revenue, and is presented in 2023 market prices.[36]
- For the fixed link option, the **PVC** includes capital expenditure, operating, day-to-day maintenance costs and toll revenue, but excludes major refurbishment and renewal of tunnel infrastructure. Costs are again presented in 2023 market prices.
- Subsidies, fares and tolls are treated as public / private sector transfers and are typically reflected through the Public Accounts framework. In this appraisal, fare / toll revenues have been included within the PVC for each option. However, changes in ferry operating subsidy requirements have not been quantified and will be developed alongside the Public Accounts position at the next stage of appraisal.
- For clarity, the 'Appraisal PVC' is the 'Absolute PVC' of each intervention less the 'Absolute PVC' of the BaU. This is because the appraisal is focused on incremental costs and benefits relative to the BaU.

Table 6.6: Whalsay - Option costs, PVC

	Absolute PVC (2023 market prices, 60-years)	Appraisal PVC (2023 market prices, 60-years)
Wha1: BaU	£237.5m	-
Wha2: Ferry Do Something	£396.6m	£159.1m
Wha3: Ferry Do Max	£697.5m	£460.0m
Wha4: Fixed Link	£664.5m	£427.0m

6.3 Options Appraisal

Transport Planning Objectives

6.3.1 The table below summarises the performance of the Whalsay option packages against the TPOs:

Table 6.7: Whalsay – appraisal against TPOs

	Wha1: BaU	Wha2: Do Something	Wha3: Do Max	Wha4: Fixed Link
TPO1: Resilience	O	O	✓✓	✓✓✓
TPO2: Capacity	O	✓	✓✓	✓✓✓
TPO3: Limited, fixed times of travel in operating day	O	✓	✓✓	✓✓✓
TPO4: Cost	O	✓	✓✓✓	O
TPO5: Physical accessibility	O	✓✓	✓✓	✓✓
TPO6: Length of operating day	O	O	✓✓	✓✓✓
TPO7: Non-car travel options	O	✓	✓✓	✓

[36] PVCs are presented in market prices in line with TAG convention (i.e. costs in factor prices are uplifted to market prices), ensuring costs and benefits are compared on a consistent basis. These should not be interpreted as the Council's cash outlay or funding requirement though, which is addressed separately in the Financial Dimension.

6.3.2 The nature of the option packages for Whalsay means that each increment will deliver progressively larger benefits with respect to the TPOs. This ultimately culminates in a fixed link, which would remove almost all of the identified barriers to travel

- **Resilience (TPO1)**:
  - Under both BaU and **Wha2** existing vessels are proposed to be replaced with modern tonnage. The service would though still be built around a two-vessel service. As this is true of both BaU and Wha2, the net impact of Wha2 in this respect is neutral.
  - **Wha3** represents a major increment in this respect, through introducing a third vessel to the route, ensuring that an at least two vessel service could be maintained if there is a breakdown and during refit. With the infrastructure being sized for Type 3 vessels, there would be the added resilience of interchangeability with Yell Sound.
  - A fixed link would deliver a major resilience benefit by removing the reliance on sea-based travel altogether.
- **Capacity (TPO2):**
  - Peak vehicle deck capacity was one of the major challenges identified on the Whalsay route. **Wha1** would deliver a very minor capacity benefit, as the Type 1 vessel has a slightly larger vehicle carrying capacity than MV *Hendra* (note the capacity element (TPO2) has been scored as 'neutral' to create a differentiation with the other options, which entail progressively larger increases in capacity).
  - Progressing to two Type 2 vessels in **Wha2** would deliver a reasonable uplift in capacity, with these vessels holding 22-24 PCUs compared to 16 on MV *Linga* and 11 on MV *Hendra*[37]. **Wha3** would amplify this benefit by adding a third Type 2 vessel, with scope to operate Type 3 vessels in future. Both options would also offer increased capacity at the weekend and in the evenings (where it is less needed) through increased sailings.
  - A fixed link would remove all capacity related constraints for Whalsay.
- **Limited, fixed times of travel in the operating day (TPO3)**
  - This TPO is about frequency, and each ferry option therefore offers an increment on the last through expanding the number of sailings. A fixed link would provide unfettered vehicular access between Whalsay and mainland Shetland, thereby recording a major benefit with respect to this TPO.
- **Cost (TPO4)**
  - The impact on **TPO4** (cost to the user) remains to be established and would depend on the balance between ferry fares and tunnel tolls. It is assumed for this appraisal that a tunnel would be tolled and thus would be higher cost than the Ferry Do Max, where free fares are assumed in principle for residents.
  - However, there is also a scenario where a tunnel could be operated without tolls and thus would be cost equivalent to the Ferry Do Max in this respect.
  - For clarity, the economic appraisal assumes consistent fare and toll treatment across options. The assessment of user costs within the TPO framework is indicative and reflects potential policy choices rather than modelled outputs.
  - The future of ferry fares is a network-wide issue for the Council to consider, whilst the approach to tolling and the basis on which the tariff is set would be a matter for a project level business case.
  - A fixed link **(Wha4)** will also necessitate longer driving distances than under the BaU, and associated increases in vehicle operating costs.

[37] The vehicle capacity figures for MV *Hendra* and MV *Linga* are based on 'true' values calculated in the Whalsay OBC – i.e., the number of modern cars that these vessels can carry rather than their originally stated capacity.

- **Physical accessibility (TPO5)**
  - Physical accessibility is a problem on this route at preset, as the passenger accommodation on MV Hendra is located below the waterline and only accessible via steep stairs. Under both BaU and Wha2 existing vessels are proposed to be replaced with modern tonnage.
  - **Wha2** and **Wha3** would deliver an equivalent benefit but would also include new custom built ferry terminals, which would be designed to meet all modern accessibility requirements.
  - A fixed link would provide a major step change in accessibility, as passengers could remain in their cars for any journey. However, there could be issues for those without access to a car or who would prefer not to drive one.
- **Length of operating day (TPO6)**
  - **Wha1** and **Wha2** retain the current operating day and thus are neutral with respect to this TPO. However, the Ferry Do Max would progress the Whalsay service to a 24-hour operation, with an hourly on-request overnight service yielding a moderate benefit.
  - A fixed link would again remove all barriers with respect to travel time, providing 24-hour vehicular access to Whalsay and mainland Shetland.
- **Non-car travel options (TPO7)**
  - **Wha2** and **Wha3** both score positively with respect to this TPO, as they include an in-principle commitment to expand the bus service.
  - With a fixed link, it is assumed that the bus service is scaled up to a level that approaches the frequency of the current ferry service. Without this, there would be a reduction in accessibility for those without a car or who would prefer not to drive one, as pedestrians and cyclists would not be able to use the tunnel. The identified benefit comes from the assumption that the new bus service would be quicker than the corresponding journey under BaU.

6.3.3 The estimated quantitative impact on the level of disstisfaction (as described in Section 3.4) is shown in the figure below.

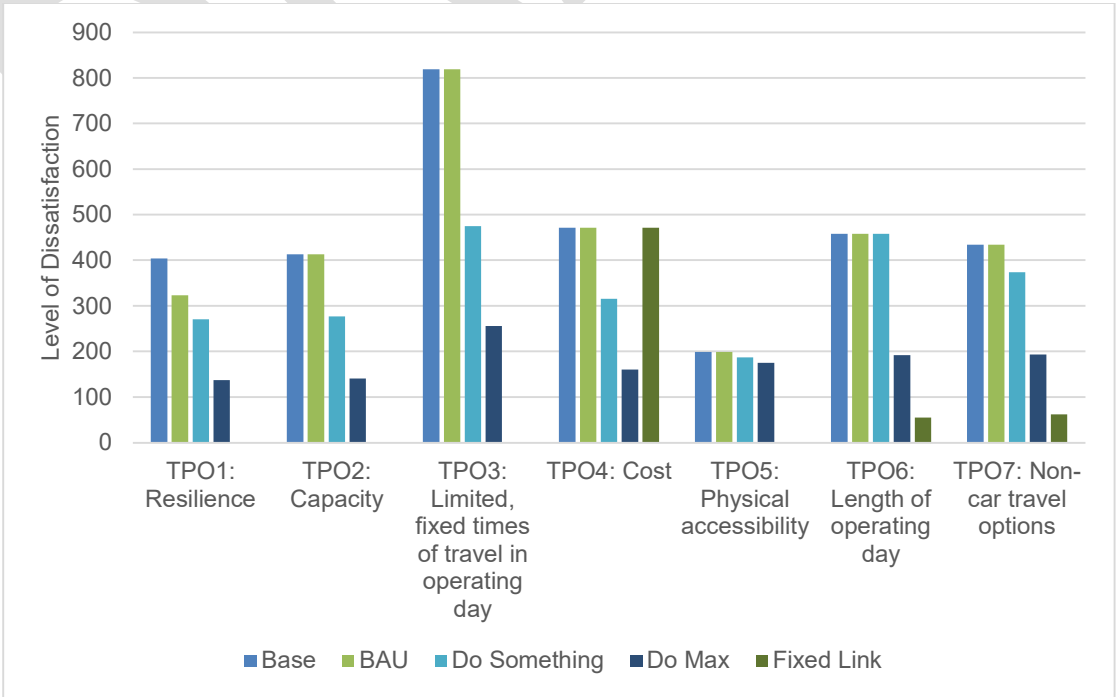

Figure 6.10: Whalsay, estimated level of dissatisfaction with each TPO by option

6.3.4 In the present day ('base') it can be seen that the highest levels of dissatisfaction are with TPO3 – Limited, fixed times of travel in operating day, TPO4 – Cost and TPO6 – Length of operating day.

6.3.5 Overall, the options would reduce the level of dissatisfaction from the present day by:

- **2%** in the BaU
- **24%** in the Ferry Do Something
- **56%** in the Ferry Do Max
- **83%** with the Fixed Link

Key Point: The nature of the option packages for Whalsay means that each increment would deliver progressively larger benefits with respect to the TPOs. This ultimately culminates in a fixed link, which would remove almost all of the identified barriers to travel, except from the cost of travel where tolls are levied.

Key Point: It is important to recognise that, in comparison with some other routes, the Ferry Do Something and Ferry Do Max entail very substantial infrastructure investments. Whilst they both deliver benefits with respect to the TPOs, they will also be high-cost solutions to deliver.

STAG criteria

Environment

6.3.6 The figure below maps the main environmental constraints pertaining to the Whalsay route:

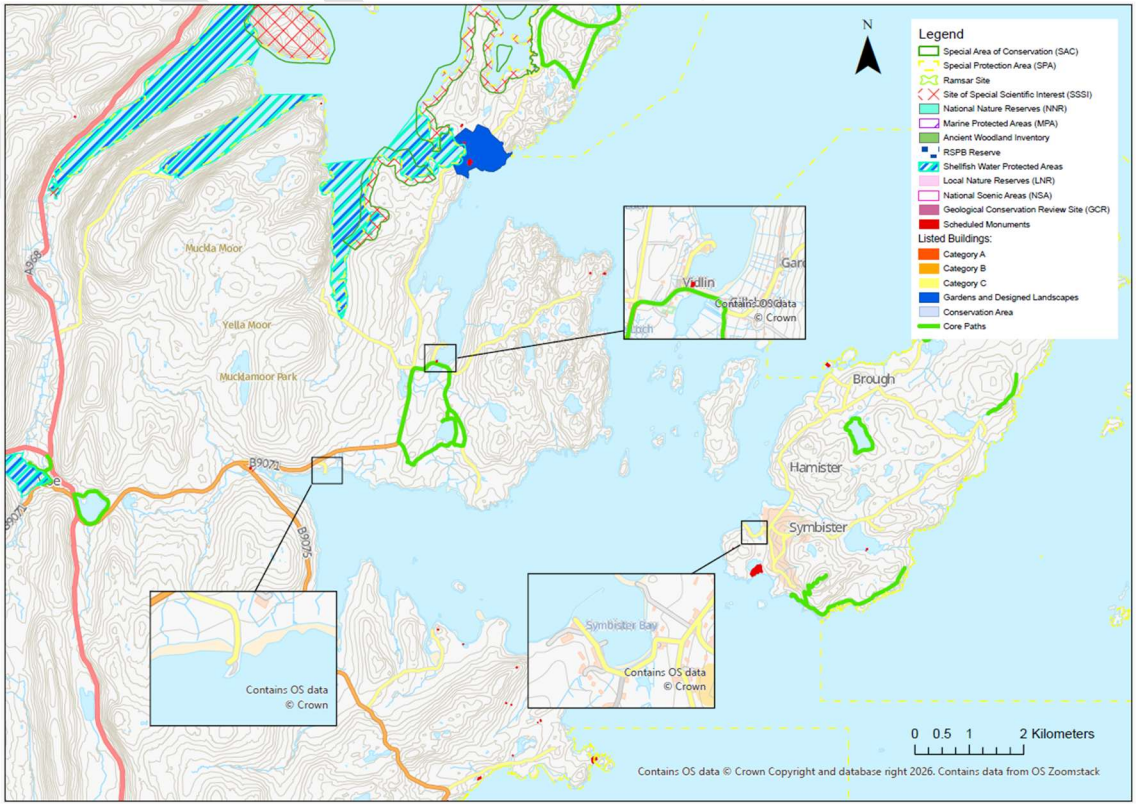

Figure 6.11: Whalsay, Laxo and Vidlin – environmental constraints maps

6.3.7 The key points of note from the above figure are as follows:

- Symbister, Laxo and Vidlin are working harbours / ferry terminals and are not directly covered by any specific environmental designations.
- At **Symbister**:
  - There are residential properties in close proximity to the harbour.
  - There are also Category B listed buildings in close proximity to the harbour.
- At **Laxo**:
  - There are residential properties within circa 150 metres of the harbour.
  - Laxo Burn SSSI is within 1km of the ferry terminal.
- At **Vidlin**:
  - Lunnasting Primary School and residential properties are immediately adjacent to the ferry terminal.
  - There is core path, which passes immediately opposite the ferry terminal.
  - Vidlin Broch, a scheduled monument, is on the edge of the harbour area.

6.3.8 The table below summarises the performance of the Whalsay options against the STAG Environment criterion:

Table 6.8: Whalsay – appraisal against STAG Environment criterion

	Wha1: BaU	Wha2: Do Something	Wha3: Do Max	Wha4: Fixed link
Environment	O	x	xx	xxx

- The environmental impacts of the options increase with each increment in scale, with a fixed link being the most significant in this respect. However, it is important to recognise that **most impacts will be short-term and associated with construction only**.
- The harbour works in **Wha1** would be minimal overall, with the exception of the replacement of the berth at Vidlin. It can be considered broadly neutral from an environmental perspective.
- **Wha2** would entail significant infrastructure works and thus would have a range of short-term environmental impacts, albeit these would be largely contained within the existing Symbister Harbour. There would therefore be minor negative environmental impacts in terms of e.g., **noise and vibration** for surrounding properties, reduced **water quality** and impacts **on air quality** associated with construction dust.
- The redevelopment of Laxo and Vidlin in **Wha2** would also be more significant than the BaU, with a significant increase in the scale of the breakwater at Laxo, and a complete reorientation of the ferry terminal at Vidlin. The effects would be relatively short-term in nature, although there would be a longer-term change to the landscape and visual amenity at Vidlin associated with the reorientated ferry terminal.
- In contrast, the environmental impacts associated with developing a new ferry terminal at North Voe **(Wha3)** are much more significant, recording an overall moderate negative. In addition to the short-term construction impacts, there would be major negative landscape and visual amenity impacts associated with the development of a new harbour at a currently undeveloped site, and one which is adjacent to residential frontages. Obtaining the necessary environmental and planning consents for this site could be challenging.

- The scale of works at Laxo and Vidlin in **Wha3** to provide passive provision for a Type 3 vessel would also be significant. This would have particular implications for Vidlin as it would create a more industrialised appearance adjacent to the school and village, significantly altering the visual character and landscape of the village (or at least the north end of it).
- A fixed link would evidently have a range of environmental considerations, for example the impacts on geology and soils, noise and vibration etc. This would particularly be the case during construction, as this would be a major project in this geographic context. Disposal of tunnel spoil would be a significant environmental consideration, even if a purpose could be found for it. A fixed link would undoubtedly be subject to full EIA through which environmental protections, mitigations and enhancements would be developed.

6.3.9 Whilst a fixed link would have significant environmental impacts (at least during construction), one key point here is that, as the fixed link would take the form of a tunnel, its physical environmental impacts would be spatially concentrated, for example on the landscape, historic environment and water quality, drainage and flooding. Indeed, this type of solution has been successfully delivered at scale in the Faroe Islands and Norway, where the environmental impacts have been carefully managed. Moreover, the Faroese have created positive landscape features around the tunnel portals, adding to rather than subtracting from local visual amenity.

Key Point: The environmental impacts of the Whalsay options increment relative to the scale of the options. It is important to recognise in Whalsay however that the Ferry Do Something and the Ferry Do Max entail major harbour works, which would have at least short-term environmental impacts. **Wha3** would also have longer-term implications for landscape and visual amenity, creating an entirely new harbour in Whalsay (North Voe), an expanded harbour at Laxo and an expanded and reorientated harbour at Vidlin. A fixed link would evidently have the most significant impacts given its scale, and a key consideration here would be the approach to the disposal of spoil.

Key Point: Whilst each of the options would have an environmental impact to a lesser or greater degree, there is precedent for the delivery of similar solutions across Scotland and beyond. The undertaking of a full EIA for the ultimate preferred option emerging from a subsequent project business case would allow for environmental impacts to scoped, fully assessed and mitigated where possible.

Climate Change

Table 6.9: Whalsay - appraisal against STAG Climate Change criterion

	Wha1: BaU	Wha2: Do Something	Wha3: Do Max	Wha4: Fixed link
Climate change	O	O	--	O

Greenhouse gas emissions

6.3.10 A programme level comparison of whole life carbon (WLC) has been developed – this incorporates an estimate of:

- Embodied and operational carbon associated with the fixed link provided by COWI.
- Embodied carbon associated with harbour infrastructure improvements based on estimated quantities provided by Mott MacDonald.
- Operational carbon associated with the continued operation of ferry services.

- Road operational carbon associated with additional vehicle kilometres relative to the BaU.

6.3.11 The methodological approach to developing this comparison is detailed in **Appendix A**, but it should be noted that the WLC comparison is highly sensitive to the underpinning assumptions, particularly in relation to when the ferry fleet is decarbonised.

6.3.12 The table below shows the estimated WLC for the Whalsay options in tonnes of carbon dioxide equivalent (tCO_2e):

Table 6.10: Whalsay WLC comparison (tCO_2e), round to nearest thousand

Option	Whole Life Carbon - tCO_2e
Wha1: BaU	99.000
Wha2: Ferry Do Something	101,000
Wha3: Ferry Do Max	148,000
Wha4: Fixed Link	99,000

6.3.13 The following points should be noted in relation to the above table:

- A fixed link **(Wha4)** has a broadly equivalent WLC to the BaU and the Ferry Do Something. It has a materially lower WLC than the Ferry Do Max. These figures are driven by vessel emissions and are thus sensitive to the decarbonisation profile of the fleet.
- Given that MV *Hendra* is already 44 years old, it is a working assumption with all of the ferry options **(Wha1-Wha3)** that she would be replaced in the immediate term. MV *Linga* is a newer vessel and is scheduled for replacement in 2032, although this could be brought forward if there a choice to standardise the vessels on the route.
- New vessels are assumed to generate 20% less CO_2 than existing vessels of that type due to efficiencies in hull form, propulsion systems etc. After fifteen years of operation, these vessels are assumed to undergo decarbonisation refit to reduce CO_2 emissions by a further 10%.
- Under **Wha1**, this is assumed to be a like-for-like Type 1 vessel replacement, whereas under **Wha2** and **Wha3**, this is assumed to be larger Type 2 vessels, so there will be a balance between the power requirement of these vessels, and the fuel efficiency benefits which they offer.
- It should be noted that **Wha2** and **Wha3**, especially the latter, would increase the route capacity and the number of sailings. This would generate additional vessel emissions and vehicle kilometres, with the longevity of this impact depending on when the vehicle fleet and the ferry fleet is decarbonised.

6.3.14 These findings underpin the scoring presented in Table 6.9, with lower whole life carbon resulting in a more favourable assessment for the fixed link option **(Wha4)**.

Adaptation to climate change

6.3.15 Island communities dependent on ferry services are uniquely exposed to climate change. Continued dependence on ferry services will retain and amplify this risk as the climate continues to change, whereas a fixed link would almost entirely remove this vulnerability for Whalsay.

Key Point: The Whalsay fixed link is the longest of those proposed and so embodied carbon is substantial and tunnel construction dominates early-life emissions. The BaU and Ferry Do Something accumulate significant operational emissions over the appraisal period, with the two options being of a broadly similar magnitude from a WLC perspective. The Ferry Do Max adds a third vessel to the service and requires the development of North Voe, increasing WLC by approximately 50% relative to the other options. These figures are however highly sensitive to the underpinning assumptions.

Health, Safety and Wellbeing

Table 6.11: Whalsay – appraisal against STAG Health, Safety and Wellbeing criterion

	Wha1: BaU	Wha2: Do Something	Wha3: Do Max	Wha4: Fixed link
Health, safety and wellbeing	**O**	✓	✓✓	✓✓✓

6.3.16 The three material considerations in this study with regards to this criterion are:

- Accidents
- Health outcomes
- Access to health and wellbeing infrastructure

6.3.17 It should be noted that, in this context, **access to health and wellbeing infrastructure** and **health outcomes** are intrinsically linked and are addressed together.

Accidents

*It should be noted that the monetary valuation of **accidents** of differing severity is standard practice in cost-benefit analysis and is thus captured under the **Economy** criterion. It is though important to recognise that such impacts will be very small given the low traffic volumes and the inferred number of accidents.*

6.3.18 With the two ferry increments, the Do Something **(Wha2)** and the Do Max **(Wha3)**, there are several 'competing' factors at play with respect to accidents:

- Each increment in service level will generate **additional demand and thus vehicle kilometres** - there is therefore an increased risk of accidents in terms of vehicle collisions driven purely by this increase in traffic volumes (and it is this that is quantified and monetised under the Economy criterion).
  - A particular consideration in this respect would be when the ferry is diverted to Vidlin. Whilst **Wha2** and **Wha3** would modernise traffic management at Vidlin, it would nonetheless increase the number of vehicle movements through the village and past Lunnasting Primary School.
- Moreover, **Wha2** and **Wha3** include **increments in the number of sailings relative to the BaU**. This again increases the risk of an incident, particularly where more sailings are introduced in the hours of darkness. However, the Council's ferry service has a long-term reputation for high safety standards and thus any such risk is minimal.
- On the other side of the equation, a higher frequency ferry service would **reduce the wait time between sailings and therefore the temptation to rush to catch a specific connection**. This would be more of an issue on mainland Shetland than in Whalsay, where much of the population lives in and around Symbister. This could be a particular benefit when the service is **diverted to Vidlin**, as the drive time is longer and the road becomes single track with passing places west of Laxo.

- The **expansion and formalisation of the marshalling areas at all three ports** to a size commensurate with the Type 2 vessel (and Type 3 at North Voe) in **Wha2 and Wha3** would also reduce the risk to motorists and pedestrians. **Wha3** would be particularly advantageous in this respect as it would provide a purpose-built ferry terminal segregated from other harbour users in Symbister.

6.3.19 Whilst not strictly speaking 'accidents', a further key consideration here would be the implications of the options with respect to **navigational safety**:

- **Wha1** would perpetuate the current day berthing arrangements at Symbister. Whilst it is likely that any new vessels would be more powerful and manoeuvrable than the current vessels, particularly MV *Hendra*, any change would be marginal.
- Redeveloping the pelagic basin **(Wha2)** would record a minor benefit. It would remove the long-narrow approach channel within the harbour and the challenging turn onto the current berth, whilst the deployment of a double-ended Type 2 vessel would improve manoeuvrability.
- The development of a ferry terminal at North Voe **(Wha3)** would address all of the current issues with the current berth in Symbister. However, whilst this would segregate the ferries from all other harbour users, the requirement to navigate past the adjacent fish farm and through the overlapping breakwaters could make navigation onto the berth challenging.

6.3.20 A fixed link **(Wha4)** would evidently create the scope for a significant expansion of vehicle movements and would increase the distance driven (+26km per return trip) between mainland Shetland and Whalsay. New trips and longer driving distances increases accident exposure and so the fixed link option would record a minor disbenefit against this criterion (albeit Annualised Average Daily Traffic (AADT) would remain very low by national standards, whilst there would be few heavy goods movements to and from Whalsay). On the other hand, a fixed connection would remove all risks associated with ferry-borne travel including vehicle marshalling, vehicle and foot passenger interaction, rushing for a ferry, incidents at sea and the navigational risks associated with Symbister Harbour.

Key Point: The impact of the options with respect to the Accidents criterion is finely balanced. In terms of a fixed link **(Wha4)**, there would be scope for a significant increase in vehicle kilometres statistically increasing the risk of accidents but, at the same time, this would remove all risks associated with seaborne travel, particularly the navigational risks associated with the current Symbister Harbour. Overall, it is important to recognise that the low traffic volumes associated with the options, even in the context of a fixed link, means that accident impacts will be fairly minimal overall.

Access to health and wellbeing infrastructure and health outcomes

6.3.21 Whalsay has a GP practice, dental surgery and care home on island, meaning that most of the day-to-day needs of island residents can be met locally. However, Shetland's only hospital – Gilbert Bain – is located in Lerwick, whilst off-island travel to Aberdeen can be necessary for more specialist care. The ferry service therefore plays an important role in meeting community health needs. In the 2024 resident survey, **10% (n=51)** of Whalsay residents selected 'Health Visit' as one of the 'other reasons' for which they travel off-island in a given month.

6.3.22 Moreover, in an emergency, casualties from Whalsay need to be moved by ambulance using the Symbister – Laxo / Vidlin ferry service. Whilst the frequency on this route is relatively high and there is out of hours cover, the long journey can create both anxiety and potential risk / discomfort for the patient. Note however, in life threatening situations, the air ambulance is summoned.

6.3.23 Each option increment therefore improves access to health and wellbeing infrastructure. A fixed link **(Wha4)** would however be transformative in this respect as it would provide

unfettered 24-hour access to Gilbert Bain Hospital, including for attendance at Accident and Emergency. It would also significantly reduce ambulance response times and transit time back to the hospital. Moreover, from a risk perspective, a fixed link **(Wha4)** would mitigate the twin risks of the ferry being unable to sail due to weather or technical problems and the air ambulance being unavailable due to another call out.

6.3.24 The impact assessment process specifically considered the impact of the different options on access to health and wellbeing infrastructure and health outcomes. The following key points emerged:

- In the BaU **(Wha1)**, continued reliance on existing ferry timetables may constrain timely access to preventative health appointments, allied health services acute and specialist healthcare and mental health support, much of which is located on mainland Shetland. Issues around frequency, reliability and reduced service in refit may exacerbate stress, anxiety and social exclusion, particularly for older people, carers and those with long-term health conditions.
- Each increment in the ferry service **(Wha2 and Wha3)** would support improved access to health and wellbeing infrastructure and associated health outcomes – for example:
  - Improved service frequency and reliability may support better access to routine healthcare, reducing missed or delayed appointments.
  - Improved service reliability and resilience may improve health equity by reducing e.g., weather related cancellations, single vessel working during refit etc, increasing predictability of travel for treatment.
  - On the Whalsay route, peak capacity constraints can make it difficult to secure a ferry booking. The expansion of capacity in **Wha2** and **Wha3** would reduce the risk of not getting a booking, and the anxiety associated with this. It would also support health service workforce mobility, including visiting clinicians and social care staff.
  - An overall reduction in travel stress and fatigue may positively influence mental wellbeing, particularly for frequent travellers.
- The impact assessment work noted that a fixed link **(Wha4)**:
  - Would provide a step-change in access to emergency and unscheduled healthcare, including reduced response times and great flexibility for time critical journeys.
  - Offer potential long-term public health benefits associated with reduced isolation and improved access to health promoting activities and services.
  - However, it did also recognise the point that increased traffic volumes may introduce new road safety risks.

Key Point: Whilst Whalsay does have on-island health provision, there is still a dependence on travel to Lerwick and sometimes mainland Scotland for health purposes, including in emergencies. Each option increment would therefore improve access to health and wellbeing infrastructure. A fixed link **(Wha4)** would however be genuinely transformative in this respect, improving access to Gilbert Bain Hospital, reducing response and transit times in the event of an emergency and addressing the risks associated with on-island emergencies. It would also offer potential long-term public health benefits associated with reduced isolation and improved access to health promoting activities.

Economy

Table 6.12: Whalsay – appraisal against STAG Economy criterion

	Wha1: BaU	Wha2: Do Something	Wha3: Do Max	Wha4: Fixed link
Economy	O	O	✓	✓✓

Transport Economic Efficiency

6.3.25 The table below summarises the CBA for the Ferry Do Something **(Wha2)**, Ferry Do Max **(Wha3)** and the Fixed Link **(Wha4)** options. It includes the core scenario and sensitivity tests. It should be noted that the BaU is not included as it is the baseline against which other options are compared and, as previously described, a note on method can be founded in **Appendix A**.

Table 6.13: Whalsay options cost-benefit summary (£m, 2023 values and prices)

Scenario	Option	PVB (£000)	PVC (£000)	NPV (£000)	BCR
Core	**Do Something**	**3,963**	**159,090**	***-155,127***	**0.0**
	Do Max	**12,518**	**459,987**	***-447,469***	**0.0**
	Fixed Link	**64,478**	**426,970**	***-362,492***	**0.2**
ST1: Reduced tunnel optimism bias	Do Something	Not applicable			
	Do Max				
	Fixed Link	64,478	329,239	*-264,761*	0.2
ST2: Waiting time assumed to have same value as in-car	Do Something	2,432	159,106	*-156,674*	0.0
	Do Max	8,809	460,021	*-451,212*	0.0
	Fixed Link	46,279	427,146	*-380,867*	0.1
ST3: Optimism bias applied to vessel costs	Do Something	3,963	170,070	*-166,107*	0.0
	Do Max	12,518	496,466	*-483,948*	0.0
	Fixed Link	64,478	398,648	*-334,170*	0.2
ST4: 100-year appraisal period	Do Something	5,416	167,170	*-161,754*	0.0
	Do Max	17,109	500,629	*-483,520*	0.0
	Fixed Link	88,786	395,866	*-307,080*	0.2

6.3.26 The key points of note from the above table are as follows:

- All of the Whalsay options beyond the BaU require significant short-term infrastructure investment, driving a very high PVC. The comparatively low volumes on the Symbister –

Laxo / Vidlin route, particularly with respect to commercial vehicles, means that the PVB is also very low. Therefore **the BCR for all options across all scenarios is very low.**

- ST1 reduces the PVC of the fixed link and hence increases the BCR, although the impact is too small to see in the rounded figures.
- ST2 reduces the PVB of all three options, reducing the fixed link BCR to 0.1.
- ST3 increases the PVC of the ferry options, including BaU, increasing the fixed link BCR slightly, although the impact is too small to see in the rounded figures.
- ST4 increases BCRs for all options. The PVC for the fixed link reduces (since ferry costs rise faster than fixed link costs in years 61-100), improving the BCR from the core scenario, although the impact is too small to see in the rounded figures.

- Of the options, a fixed link performs the best relative the BaU as it generates a much higher level of benefit relative to the other options. Its value for money in strict appraisal terms is however very poor, even under Sensitivity Test 4, where a 100-year appraisal horizon is considered.
- The Ferry Do Max has a higher PVC **and** lower PVB than a fixed link and thus should not be considered further in this appraisal.
- In summary, **any case for investment beyond the BaU (Wha1) in Whalsay will be wholly dependent on the wider strategic / economic narrative given the very low conventional value for money of the options.**

Wider Economic Impacts (Economic Narrative)

6.3.27 This section sets out the economic narrative pertaining to the options for Whalsay, considering how investment in improved transport connectivity could support the economy and society of the island. The economic narrative has been informed by the analysis undertaken as part of the case for change (e.g., the resident survey, community and business engagement, socio-economic analysis, case studies etc).

6.3.28 The economic narrative has been developed in the context of improved connectivity generally, unless otherwise stated. However, it is important to recognise that a fixed link would by some distance be the most economically transformative of the options, and indeed several of the benefits would only emerge with the provision of a fixed connection.

6.3.29 The key economic benefits of improved connectivity for Whalsay can be defined as follows:

- Whalsay has a very different economic structure to Unst and Yell, the other two more populous islands within the scope IITCP. It is a highly skilled economy based in large part around the **pelagic fishing industry**, which accounts for over a quarter of all resident jobs (i.e., jobs held by Whalsay residents whether they work on the island or otherwise). However, unlike e.g., Yell, **no product is landed in or processed in Whalsay**, which means it does not generate significant freight volumes. The key market for ferry travel is therefore off-island commuting and indeed levels of car ownership and car-based travel-to-work in Whalsay are far higher than the Shetland and national averages.
- The key benefit of improved transport connectivity for Whalsay would therefore be an **improvement to the functioning of the labour market**. At present, a combination of peak vehicle-deck capacity, frequency and cost act as barriers to Whalsay residents taking up employment on mainland Shetland. **31% (n=49)** of Whalsay residents responding to the resident survey noted that they travel off-island less than they would like. Of these, **15** (~1/3) noted that they are missing out on employment opportunities as a consequence of this. Improved connectivity, in its widest sense, could therefore support Whalsay residents: (i) not in the labour market to enter employment; (ii) take-up a more productive job; and (iii) work more hours. These impacts, if realised, would be beneficial for Whalsay and Shetland overall.

- It is important to note with specific respect to a fixed link that the Council ferry service is a major employer in Whalsay, with the island providing the crews of MV *Hendra*, MV *Linga* and the Skerries vessel MV *Filla*. The discontinuation of the ferry service would lead to the loss or redeployment of a number of these jobs, with the potential for localised impacts on Whalsay.

- The higher cost of doing business on an island means that there is very little **house building** activity in Whalsay. Maintaining, refurbishing and developing the housing stock is essential to ensuring a sufficient supply of high quality and suitably sized homes to meet population needs, and is therefore integral to population retention. Improved connectivity, most notably a fixed link would have material benefits in this respect, supporting construction viability but also potentially the demand to live in Whalsay, by effectively making it part of mainland Shetland.
- The higher cost of doing business in Whalsay also impacts the **public sector**, both in terms of service provision (e.g., health, education etc) and the maintenance of assets (e.g., buildings utilities etc). Whilst any improvements to connectivity may not be cash releasing overall, it would allow for more efficient and lower cost service delivery.
- Improved connectivity would also support the **delivery of locally significant projects over time**, the Whalsay Kirk project for example.
- With respect to the ferry options, it is important to note that:
  - **Wha2** would offer an ancillary economic benefit associated with developing additional space for the pelagic fleet, whilst also allowing the current ferry berth to be developed for different purposes, marine leisure for example.
  - **Wha3** would offer a minor benefit by freeing-up the current ferry berth for other purposes.

Key Point: The wider economic benefits of improving Whalsay's connectivity would primarily emerge from improving the functioning of its labour market. There is evidence from the resident survey that Whalsay residents are making fewer trips to the mainland than they would like to and some are missing out on employment opportunities as a consequence. Improved connectivity, with a fixed link offering a step change in this respect, would support Whalsay residents out of work to take-up employment, support a move to more productive jobs and facilitate the working of longer hours. It is though important to recognise that the Council ferry service is a major employer on the island. The discontinuation of the ferry service under **Wha4** would therefore lead to the loss or redeployment of these jobs, with potential for significant localised impacts in Whalsay.

Equality and Accessibility

Table 6.14: Whalsay – appraisal against STAG Equality and Accessibility criterion

	Wha1: BaU	Wha2: Do Something	Wha3: Do Max	Wha4: Fixed link
Equality and Accessibility	O	✓	✓✓	✓✓

6.3.30 The material considerations in this study with regards to this criterion are:

- Comparative access by geographic location
- Comparative access by people group
- Affordability

Comparative access by geographic location

6.3.31 Shetland's island communities are, with some limited exceptions, less well-connected to the key destinations in the archipelago (e.g., Lerwick, Sumburgh etc) than mainland communities. In the resident survey, **31% (n=49)** of Whalsay responded that they travel off-island less than they would like to, which has a negative impact on the things they would like to do. This subset of the sample was asked what opportunities they are missing out on as a consequence of not travelling off-island as much as they would like to, the responses to which are summarised in the table below:

Table 6.15: Whalsay – in travelling to mainland Shetland less often than you would like, what activities / opportunities are you missing out on (n=49, multiple response question)

Activity / opportunity missed out on	No. of responses	% of sub-sample	% of total Whalsay sample
Visiting friends and relatives less often	45	92%	28%
Other social activities	41	84%	26%
Shopping	30	61%	19%
Sports, leisure and cultural activities - participating	29	59%	18%
Sports, leisure and cultural activities – spectating / attending	29	59%	18%
Personal business	23	47%	14%
Attending health appointments	20	41%	13%
Employment opportunities	15	31%	9%
Education opportunities	14	29%	9%
Business opportunities	13	27%	8%
Training opportunities	13	27%	8%

6.3.32 The above table highlights that Whalsay residents who are travelling less often than they would like are primarily missing out on social opportunities. Each option increment would improve comparative access by geographic location or, put another way, would reduce the barrier to accessing opportunities imposed by living on an island. A fixed link would deliver the most significant improvement in this respect, subject to affordability (see below).

Comparative access by people group

6.3.33 The EqIA workstream found that the incidence of connectivity related inequality did not fall evenly across different people groups. It noted that:

- There is persistent inequality of access for disabled people, older people, families with young children, and those requiring accompanied travel.
- Young people and working age adults face constrained access to education, training and employment opportunities, reinforcing demographic imbalance.

6.3.34 Each option increment for Whalsay would progressively improve comparative access by a range of different people groups, including those with protected characteristics.

- Overall, a fixed link would deliver the most significant improvement in comparative access by people group, particularly for spontaneous travel and out of hours journeys. There are four key caveats here however:
  - The cost of tolls relative to ferry fares (which is discussed in more detail in the next section).

- Accessibility for those who either do not have access to a car or do not wish to drive one. For there to be no less of accessibility with a fixed link, bus services through the tunnel would need to be at least approaching the frequency of the current ferry services, on which island residents can travel as a foot passenger (albeit only a very small number of services connect with bus services at Laxo).
- The tunnel design does not allow use by cyclists. Again, for there to be no loss of accessibility with a fixed link, the bus services provided in lieu of a ferry would need to be capable of accommodating bicycles.
- There is a risk of increased geographic inequality overall, with islands getting a fixed link becoming comparable to mainland locations, potentially widening disparities with non-linked islands.

- With regards to the ferry options:
  - The immediate replacement of MV *Hendra* in all three ferry options **(Wha1-Wha3)** would record an immediate benefit in terms of disabled access.
  - Incremental improvements such as **Wha2** may benefit regular users, but may not fully address structural accessibility barriers such as the need to book.
  - In contrast, a step change in the ferry service under **Wha3** would significantly reduce competition for space on this route, benefiting carers, families and those travelling for health or education purposes.
- It has to be recognised that there is an equality and accessibility risk associated with potential public service reform in the context of the Ferry Do Max or a fixed link, if fewer services were based on island. This could have particularly negative implications for certain protected characteristic groups.

Affordability

6.3.35 The EqIA highlighted affordability as a major source of inequality for island communities. Households on lower incomes experience disproportionate affordability pressures linked to fares and occasional off island overnight accommodation and lost income. The resident survey responses for Whalsay found that:

- Of those who **use the ferry service less often than they like (31%, n=49)**, the level of car fares (**41%** major / **33%** minor) and passenger fares (**27%** major, **43%** minor) were identified as factors contributing to this.
- Of those who **travel as often as they would like but for whom the ferry service negatively impacts their day-to-day activities (37%, n=59)**, the level of car fares (**31%** major / **37%** minor) and passenger fares (**39%** major, **14%** minor) were identified as factors contributing to this.

6.3.36 Affordability is therefore a key issue impacting on travel from Whalsay. The impact of the options with respect to affordability is largely dependent on the balance of ferry fares versus tolls. It is assumed in the appraisal that tunnel tolls are set at a level equivalent to current ferry fares revenue raised and thus there would be little difference between the options if this was the case.

6.3.37 The Ferry Do Something and Ferry Do Max assume an in-principle commitment to reduced and free resident fares respectively. On this basis, these options would score most positively with regards to affordability. However, the detail around ferry fares and tunnel tolls would need to be worked through in some detail in a project-level business case (and potentially at a network level with respect to fares) and thus there is uncertainty over the impacts at this programme stage.

Key Point: A fixed link offers a potentially transformative change in accessibility for both Whalsay residents and those visiting the island. This in-turn would assist in tackling some of the inequalities faced as a consequence of geographic remoteness and low population density, with specific benefits for some protected characteristic groups. However, the scale of the benefit / impact would be dependent on the relative balance of tunnel tolls to ferry fares (i.e., affordability) and ensuring that bus services were provided to a frequency at least approaching that of the current ferry service, without which new inequalities could arise. These inequalities would be most keenly felt by those without access to a car or who do not wish to drive one.

Feasibility, Affordability and Public Acceptability

Feasibility

- The physical infrastructure options (vessels, ferry terminals and fixed links) are all technically feasible.
- Outline and detailed design work would be required for ferry terminals and fixed links, inclusive of e.g., surveys, ground investigations, environmental consenting etc.
- The proposed redevelopment of Symbister Pelagic Basin in **Wha2** is technically deliverable. However, the detailed designed would be required to minimise disruption to ferry and wider harbour operations during the construction phase.
- It should be noted that, whilst **Wha3** is technically deliverable, there are likely to be significant planning and consenting challenges associated with developing North Voe, whilst developing an approach channel that does not adversely affect the fish farm could be difficult.
- The ferry revenue options, and in particular the Ferry Do Max, would have significant deliverability considerations, particularly with respect to the recruitment of crew (impacts on the assets would be less prominent on this route as **Wha2** and **Wha3** entail the development of new ferry terminals). These would need to be considered in the context of a project business case.
- This is also true of any scaling-up of bus services in **Wha2, Wha3 and Wha4** – securing sufficient vehicles and drivers to operate these services is a deliverability challenge that would need to be considered in detail at the project level.

Affordability

- As will be explained in the Financial Dimension, affordability is the primary challenge across all options. Outwith the ongoing procurement of one new Type 1 vessel, the Council does not have committed funding for any capital works.
- External funding will be required for any of the options progressed through this business case. Naturally, the larger the scale of the option, the higher its cost and thus the more significant the affordability gap. It is essential to note on the Whalsay route however that any option other than the BaU would represent a major capital outlay on either a fixed link, a new terminal at North Voe **(Wha3)**, the redevelopment of the pelagic basin in Symbister **(Wha2)** and the redevelopment of Laxo and Vidlin **(Wha2 and Wha3)**.
- The options will have different spend profiles and affordability will also be shaped by the financing mechanism adopted. The BaU is however, by some distance the lowest cost option on this route.
- It is important to recognise that any scaling-up of ferry or bus services will impose an ongoing financial commitment on the Council for which funding is not presently in place.
- As all Shetland Islands Council ferry services operate at a deficit, any reduction in or removal of fares would have a direct revenue impact. At present, the annual operating

deficit is funded by the Scottish Government, but it is possible / probable that any increase in this deficit as a consequence of a deliberate policy choice would be a matter for the Council.

Public acceptability

6.3.38 The Whalsay public drop-in session was held on 28th May, with **51** island residents attending. It is important to note at the outset that there has always been a finely balanced view on the future connectivity of Whalsay, with some residents in favour of a tunnel and others preferring a ferry solution. The IITCP public drop-in session was a useful barometer of public opinion but cannot be considered as a genuinely representative sample of the Whalsay community. A statistically robust survey would be required in any project business case to establish a genuinely representative community view in Whalsay.

6.3.39 The key points of note were as follows:

- Of those who attended the public drop-in session, there was a relatively strong preference for a fixed link **(Wha4)**.
- Residents noted that a fixed link **(Wha4)** would enhance opportunities for commuting, reduce inequalities in terms of accessing employment and leisure opportunities and potentially support industrial growth on the island. This in-turn is considered the optimal means of growing the population and retaining young people in the island.
- It was recognised that a fixed link **(Wha4)** could impact on Whalsay's very distinctive island culture and give rise to inequalities for those without access to a car or who would prefer not to drive one. However, from those who attended the drop-in session, the societal benefits were generally considered to outweigh the costs.
- There was also recognition that there is 'no easy answer' in Whalsay, with each of the Ferry Do Something **(Wha2)**, Ferry Do Max **(Wha3)** and fixed link **(Wha4)** being significant and expensive options. It was noted in particular that the relocation of the service to North Voe in **Wha4** had been controversial previously due to impacts on surrounding properties.
- Regardless of the long-term option, there was a strong consensus that a short-term replacement is required for MV *Hendra* given her age, capacity and physical access limitations.

6.4 Preferred Option

6.4.1 The preferred option selected by Shetland Islands Council Members on 30th June 2026 will be recorded in this report post-decision.

7 Economic Dimension - Yell Sound

7.1 Overview

7.1.1 This section provides the Economic Dimension for Yell Sound, commencing with a brief summary of the option packages followed by their appraisal against the TPOs and STAG criteria. ASTs for each option detail the appraisal against each individual criterion, with the narrative below drawing out the key issues and supporting interpretation.

7.2 Option Packages

7.2.1 This section briefly recaps the option packages progressed from the SOC - for reference, Table 3.1 sets out how each element of the option packages has been treated in the Network Strategy OBC.

Option Yell 1: Business-as-Usual

7.2.2 The BaU broadly maintains the present-day operation whilst addressing some of the more recent resilience issues on routes, such as a reduction in sailings during refit periods. On Yell Sound, the BaU is primarily a continuation of the present-day operation combined with a proposal to maintain a two-vessel service during refit once additional tonnage is introduced in the wider fleet. This is summarised in the table below:

Table 7.1: Yell Sound Business-as-Usual option components

Approach / Principles	Component Options
Capital measures	
Like-for-like asset replacement at life expiry	- 2 * Type 3 vessels at life expiry of MV *Daggri* and MV *Dagalien*
Ferry revenue measures	
Operate service to timetable year-round (weather events excepted)	- Not applicable
Address refit impacts – additional vessels to remove / mitigate refit timetable impacts	- Fleet reserve vessel to ensure no reduction in service during refit - For Yell Sound, this would need to be of a higher capacity than the current occasional relief vessel, MV *Fivla*, and would thus require a multi-route cascade (i.e., reallocation of vessels across the wider network to maintain capacity).

Option Yell 2: Ferry Do Something

7.2.3 The Ferry Do Something represents the minimum viable upgrade to maintain a sustainable and reliable service. On Yell Sound it is primarily focused on expanding the service using the current vessels, providing additional weekday sailings and a two-vessel weekend service. This is summarised in the table below

Table 7.2: Yell Sound Ferry Do Something option components

Approach / Principles	Component Options
Capital measures	
Larger vessels to increase vehicle capacity	- As per BaU
Fully accessible vessels	

Approach / Principles	Component Options
Foot passenger waiting facilities	- Provide waiting room at Ulsta - Relocate Toft waiting room
Ferry revenue measures	
Common Monday to Friday timetable	- Already in place
Timetable intensification – increase frequency with existing assets	- Intensification of the timetable to fill gaps across the day and in the evening - Extend the operating day of the 'day vessel'
Improved Saturday service	- Operate the 'shift vessel' on the same basis as a Monday to Friday - Operate the 'day vessel' on a Saturday
Improved Sunday service	- Operate the 'shift vessel' on the same basis as a Monday to Friday - Operate the 'day vessel' on a Sunday
Earlier first sailings to enable shift work / airport access	- The SOC included an option for an 05:15 start to the service, but this has since been delivered through the crewing changes made as part of the Ferries Resilience Review
Public transport integration measures	
Improved bus connections	- Mainland bus service to connect with every other Toft arrival - Ulsta – Gutcher bus service to connect with every other Toft arrival
Fares	
Lower fares for residents	- Reduced fares for residents

Capital measures

Vessels

7.2.4 The Yell Sound Ferry Do Something assumes continued operation of MV *Dagalien* and MV *Daggri* until they are life expired, at which point they would be replaced by two equivalent Type 3 vessels.

Harbour infrastructure

7.2.5 Harbour infrastructure requirements at both ports would be minimal in the Ferry Do Something, consisting primarily of:

- A small area of land reclamation at **Toft** to expand the **marshalling capacity**, addressing the traffic management and blocking back issues experienced at that port currently.
- The construction of **new waiting rooms at each location**. These waiting rooms would include areas for seating, toilets, vending machines, Wi-Fi facilities and similar amenities.

7.2.6 Images showing the proposed works at each port are provided below:

Figure 7.1: Yell Sound – Toft – Ferry Do Something

Figure 7.2: Yell Sound – Ulsta – Ferry Do Something

Ferry revenue measures

7.2.7 The proposed ferry revenue measures entail expansion of the use of the current day vessel to intensify the timetable and improve the weekend service. As noted previously, whilst this option is deliverable in principle, its implementability would need to be worked through in detail with respect to e.g., crew availability, maintenance implications etc.

7.2.8 The table below summarises the indicative number of sailings in the Ferry Do Something relative to the BaU:

Table 7.3: Yell Sound – number of sailings in Ferry BaU and Ferry Do Something

	Monday- Friday	Saturday	Sunday
BaU	26	17	17
Do Something	33	33	21
Do Something v BaU	***+7***	***+16***	***+4***

Option Yell 3: Ferry Do Max

7.2.9 The Ferry Do Max would represent a major scaling-up of the Yell Sound service, moving to a three vessel, 24-hour operation. The component elements of the Ferry Do Max are set out in the table below:

Table 7.4: Yell Sound Ferry Do Max option components

Approach / Principles	Component Options
Capital measures	
Additional vessels and harbour infrastructure required to deliver an increased service intensity	- 3 * Type 3 65m length overall double-ended vessels - Increase service frequency to near 20-minutes, with two vessels operating on a shift basis and one on a day basis (reducing to two shift vessels on a Sunday) - Additional linkspan berths at Toft and Ulsta
Ferry revenue measures	
Provide 'turn-up-and-go' service, no bookings required between 06:00-00:00	- Increase service frequency to 20-minutes Monday to Saturday - Increase service frequency to hourly or greater on a Sunday
Provision for 24-hour travel with request sailings 00:00-06:00	- Hourly scheduled service 00:00-05:00
Public transport integration measures	
Through bus services (i.e., which travel on the ferry to the end destination)	- Ferry Do Something plus three through bus services from Yell to deliver working-day and part-day connectivity to Lerwick, seven days per week
Fares	
Free fares for residents (or toll equivalent for fixed link comparison)	- Free fares for residents

Capital measures

Vessels

7.2.10 The Yell Sound Ferry Do Max assumes the introduction of a third Type 3 vessel to the route. This would operate alongside MV *Dagalien* and MV *Daggri* until those vessels become life expired, at which point they would be replaced by two equivalent Type 3 vessels.

Harbour infrastructure

7.2.11 Unlike the Ferry BaU and Ferry Do Something, the Ferry Do Max for Yell Sound would require significant harbour works. This would entail the construction of additional operational berths at both ends of the route, whilst marshalling areas would need to be expanded to provide enough capacity for the service to operate with three Type 3 vessels. General arrangement drawings and summaries of the works required at each port are provided below.

Toft

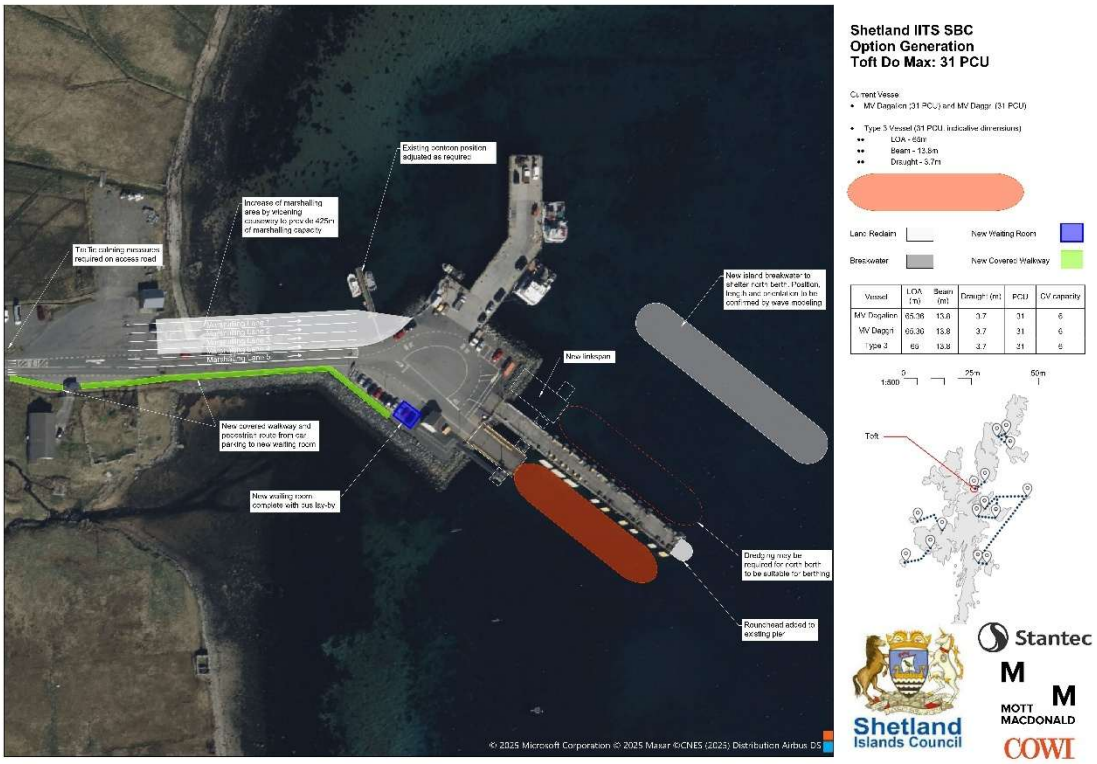

Figure 7.3: Yell Sound – Toft – Ferry Do Max

7.2.12 The following works would be required at Toft:

- Construction of a new 90 metre long island breakwater to the north of the existing pier to provide shelter to the north side of the pier.
- Reclamation of land to the north of the existing marshalling lanes to provide enough capacity for the service to operate with three Type 3 vessels.
- Construction of a new piled roundhead on the end of the existing pier to allow vessels to manoeuvre onto either berth.

- Construction of new linkspan support structures and installation of a new linkspan on the north side of the pier.
- Construction of a new waiting room near to the existing south linkspan.
- Installation of a 140 metre long covered walkway from the car parking area to the west of the site to the new waiting room.
- Installation of traffic calming measures on the approach road to limit the speed of approaching vehicles.

Ulsta

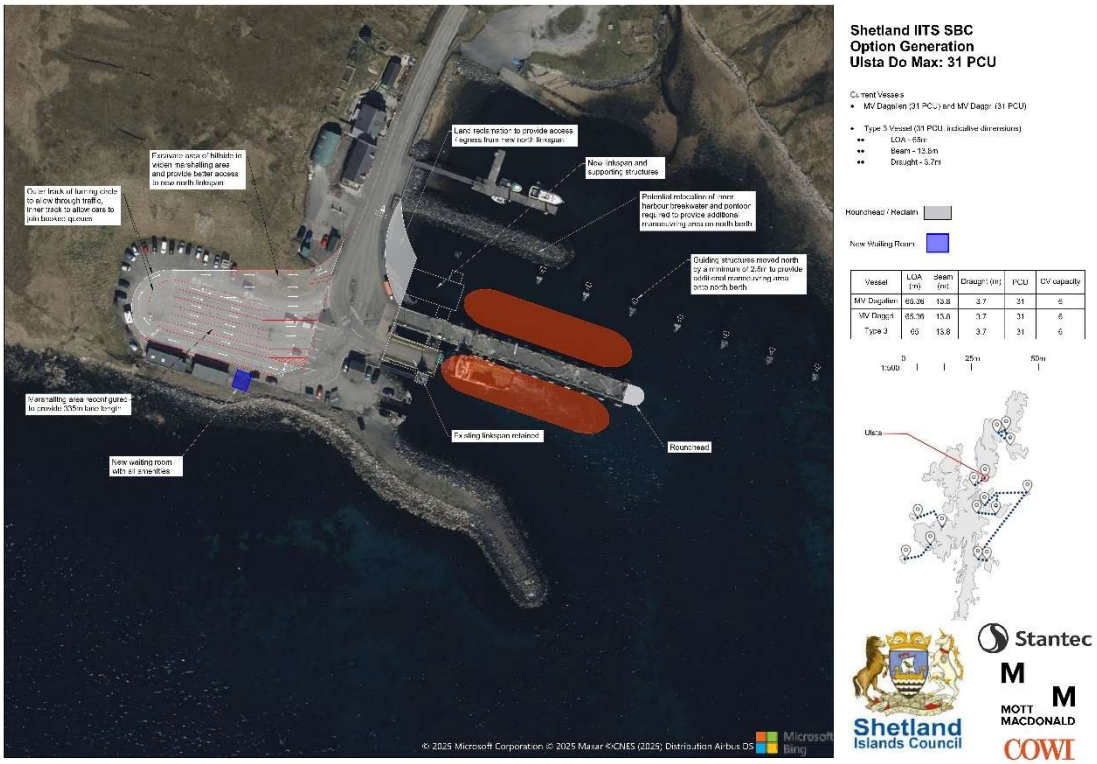

Figure 7.4: Yell Sound – Ulsta – Ferry Do Max

7.2.13 The following works would be required at Ulsta:

- Reclamation of land to the north of the existing finger pier, building out from the land, for the approach to the new linkspan.
- Installation of a new linkspan to the north of the existing pier.
- Construction of a new piled roundhead on the end of the existing pier to allow vessels to manoeuvre onto either berth.
- Repositioning of the guiding dolphins on the north berth by 2.5 metres (minimum) to provide greater manoeuvring area.
- Construction of a new waiting room beside the existing store building.
- Excavation of land to the north of the existing marshalling area to provide greater space for additional marshalling lanes.
- Reconfiguration of the existing marshalling area to provide greater capacity.

7.2.14 The availability of a new operational berth to the north side of the pier at Ulsta may require the removal / repositioning of the small inner harbour breakwater and pontoons as it is understood that the north berth is currently limited in terms of available water area, particularly during inclement weather. This would need to be explored in more detail in a project level business case.

Ferry revenue measures

7.2.15 The Yell Sound Ferry Do Max would entail a major scaling-up of the current service with a:

- **Monday to Saturday**
  - Hourly scheduled overnight service (i.e., not on-request).
  - Three vessel service from circa 06:00-18:00 operating a 20-minute frequency.
  - Two vessel service from 18:00 to midnight.
- A two vessel **Sunday** service from 06:15-23:40, with drills and maintenance on a Sunday, subject to contractor availability.

7.2.16 This is again a conceptually deliverable solution, but it would clearly require significant work around deliverability in any project business case. Moreover, expanding the service on this and other routes to this sort of level would require a scaling-up of overhead support, e.g., an increase in the number of marine superintendents.

7.2.17 The table below summarises the number of sailings in the Ferry Do Max relative to the BaU:

Table 7.5: Yell Sound – number of sailings in Ferry BaU and Ferry Do Max

	Monday - Friday	Saturday	Sunday
BaU	26	17	17
Ferry Do Max	50	50	26
Ferry Do Max v BaU	***+24***	***+33***	***+9***

Option Yell 4: Fixed Link

Alignment

7.2.18 The fixed link alignment for Yell Sound is based on the design developed as part of the FLM and thus can be treated with a high level of confidence for this stage of a business case.

7.2.19 The alignment connects mainland Shetland at Toft beside the existing ferry port and runs close to the island of Bigga to a point on Yell adjacent to the existing ferry port. The tunnel is 6.4 km long, with a maximum vertical grade of 5%, and is designed as a single tunnel link with two lanes, supporting safe travel at a design speed of 40mph in both directions. The tunnel would not allow pedestrian or bicycle access. This exclusion is to ensure safety within the tunnel, given its length, bi-directional traffic operation and fire and life safety considerations. An emergency pedestrian full-length walkway, vehicle laybys and turning niches are provided at regular intervals to support safety and maintenance.

7.2.20 On the mainland Shetland side, the south portal links directly to the A968, the primary road serving Toft ferry terminal, ensuring smooth onward connections into the main north–south route through mainland Shetland.

7.2.21 On Yell, the alignment has been positioned to avoid the extensive peat and soft soil deposit present around Copister. Instead, the northern portal is located further north, near Ulsta,

where stronger bedrock provides more stable ground conditions and reduces the scale of ground improvement works required.

7.2.22 The figures below show an indicative alignment and long section for a subsea tunnel between Yell and mainland Shetland that has been developed from the FLM:

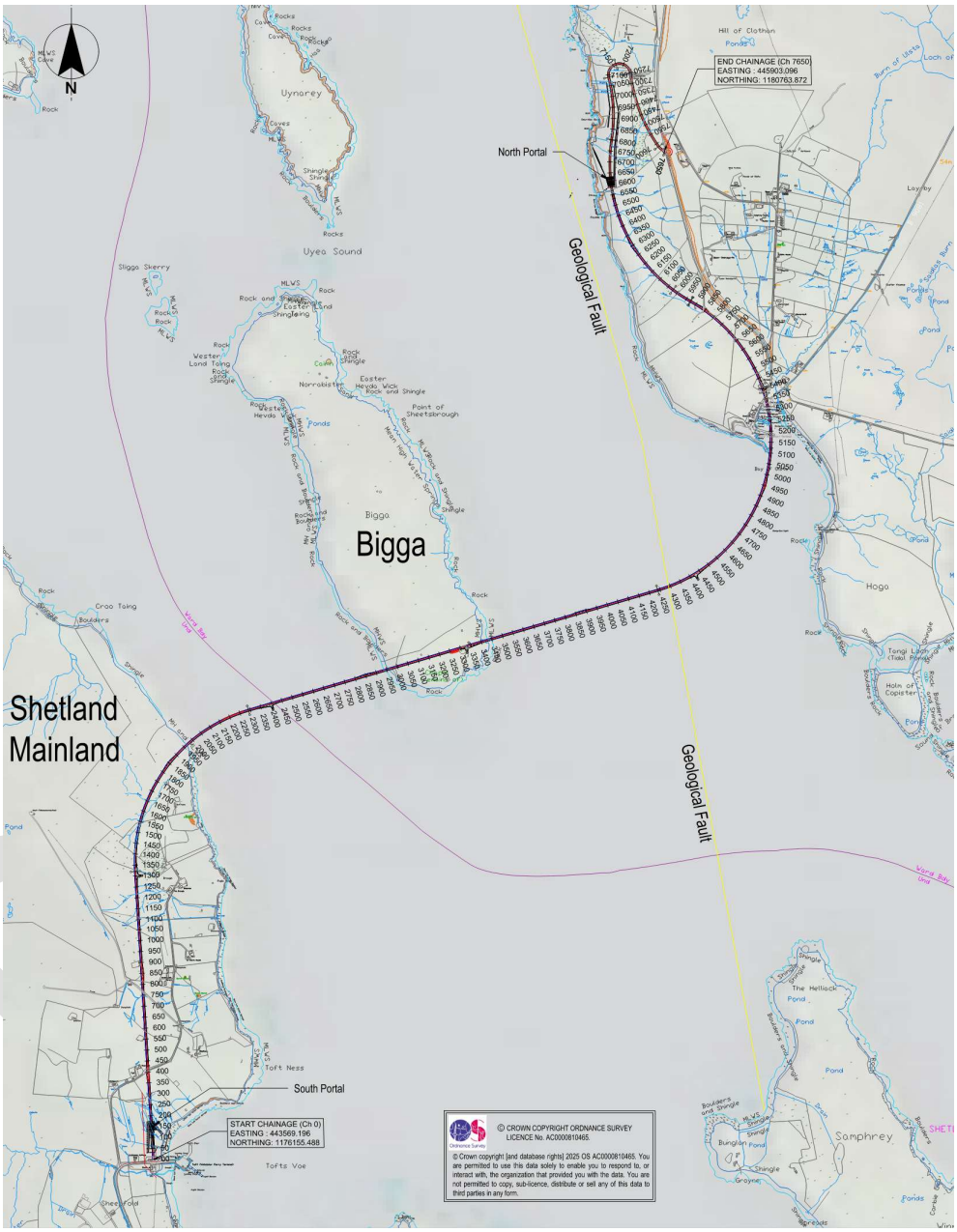

Figure 7.5: Horizontal tunnel alignment form mainland Shetland to Yell

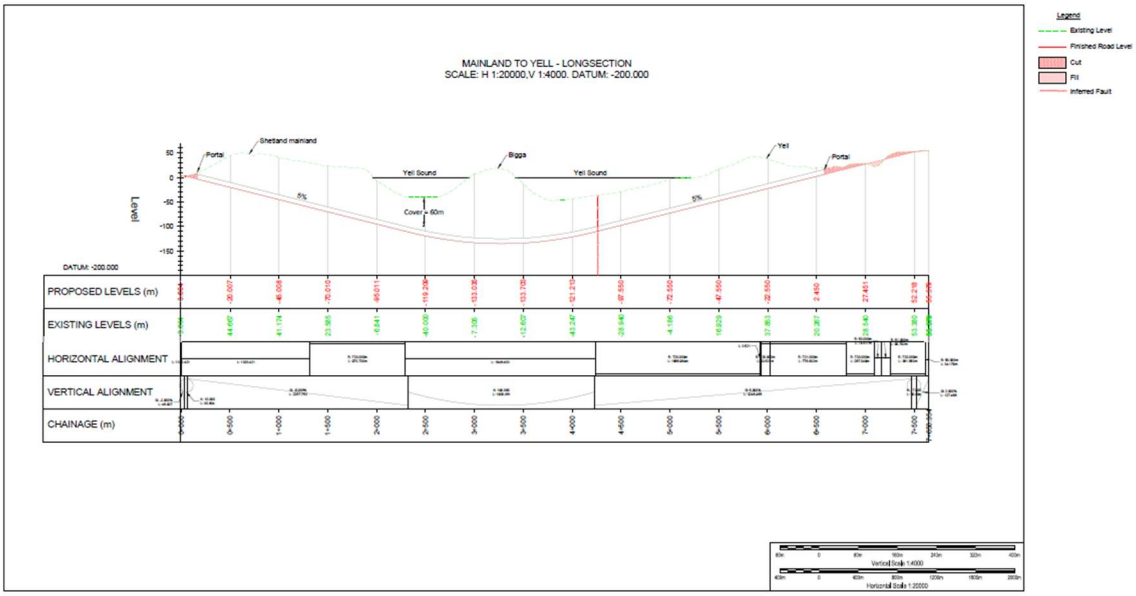

Figure 7.6: Vertical tunnel alignment from mainland Shetland to Yell

Option costs

7.2.23 As explained in Chapter 3, all costs in the Economic Dimension are presented on a present value basis. In the economic appraisal, capital (initial and lifecycle) and operating and maintenance costs are profiled over 60 years and discounted to a present value.

7.2.24 These include:

- Vessel and harbour infrastructure replacement for all ferry options from 2026 to 2095, including cyclical renewals and refurbishment.
- Pre-construction and construction costs for a fixed link. It should be noted that major refurbishment and renewal of tunnel infrastructure is **not** included.
- Operating and day-to-day maintenance costs over the same period for all options (i.e., excluding fare / toll revenue, which would reduce the net cash cost).
- For ferry options, the **PVC** includes all capital expenditure, operating and maintenance costs and fares revenue, and is presented in 2023 market prices.[38]
- For the fixed link option, the **PVC** includes capital expenditure, operating, day-to-day maintenance costs and toll revenue, but excludes major refurbishment and renewal of tunnel infrastructure. Costs are again presented in 2023 market prices.
- Subsidies, fares and tolls are treated as public / private sector transfers and are typically reflected through the Public Accounts framework. In this appraisal, fare / toll revenues have been included within the PVC for each option. However, changes in ferry operating subsidy requirements have not been quantified and will be developed alongside the Public Accounts position at the next stage of appraisal.

[38] PVCs are presented in market prices in line with TAG convention (i.e. costs in factor prices are uplifted to market prices), ensuring costs and benefits are compared on a consistent basis. These should not be interpreted as the Council's cash outlay or funding requirement though, which is addressed separately in the Financial Dimension.

- For clarity, the 'Appraisal PVC' is the 'Absolute PVC' of each intervention less the 'Absolute PVC' of the BaU. This is because the appraisal is focused on incremental costs and benefits relative to the BaU.

Table 7.6: Yell Sound - Option costs, PVC

	Absolute PVC (2023 market prices, 60-years)	Appraisal PVC (2023 market prices, 60-years)
Yell1: BaU	£295.6m	-
Yell2: Ferry Do Something	£333.1m	£37.5m
Yell3: Ferry Do Max	£535.0m	£239.4m
Yell4 Fixed Link	£539.2m	£243.6m

7.3 Options Appraisal

Transport Planning Objectives

7.3.1 The table below summarises the performance of the Yell Sound option packages against the TPOs:

Table 7.7: Yell Sound – appraisal against TPOs

	Yell1: BaU	Yell2: Do Something	Yell3: Do Max	Yell4: Fixed link
TPO1: Resilience	O	O	✓✓	✓✓✓
TPO2: Capacity	O	✓	✓✓	✓✓✓
TPO3: Limited, fixed times of travel in operating day	O	✓	✓✓	✓✓✓
TPO4: Cost	O	✓	✓✓✓	O
TPO5: Physical accessibility	O	O	O	✓✓
TPO6: Length of operating day	O	O	✓✓	✓✓✓
TPO7: Non-car travel options	O	✓✓	✓✓✓	O

7.3.2 The nature of the option packages for Yell Sound means that each increment will deliver progressively larger benefits with respect to the TPOs. However, this varies by objective, particularly in relation to cost and non-car accessibility.

7.3.3 This ultimately culminates in a fixed link, which would remove almost all of the identified barriers to travel, except from the cost of travel where tolls are levied. The key points of note in relation to appraisal against the TPOs are as follows:

- **Resilience (TPO1)**
  - The Ferry Do Max would deliver a significant resilience benefit through introducing a third vessel to the route, ensuring that an at least two vessel service could be maintained if there is a breakdown and during refit.
  - A fixed link would deliver a major resilience benefit by removing the reliance on sea-based travel altogether.
- **Capacity (TPO2):**
  - Capacity is not a major issue on the Yell Sound route overall, but **Yell2** would provide additional capacity in the evening and at the weekend. The Ferry Do Max would

provide plentiful capacity, which could meet almost all foreseeable future growth needs of the route.

- A fixed link **(YeII4)** would remove all capacity related constraints for Yell.

- **Limited, fixed times of travel in the operating day (TPO3)**
  - This TPO is about frequency, and thus each ferry option therefore offers an increment on the last through expanding the number of sailings.
  - A fixed link **(YeII4)** would provide unfettered vehicular access between Yell and mainland Shetland, thereby recording a major benefit with respect to this TPO, although non-car users would remain dependent on the bus service with frequency equivalent to BaU.
- **Cost (TPO4)**
  - The impact on **TPO4** (cost to the user) remains to be established and would depend on the balance between ferry fares and tunnel tolls. It is assumed for this appraisal that a tunnel would be tolled and thus would be higher cost than the Ferry Do Max **(YeII3)**, where free fares are assumed in principle for residents.
  - However, there is also a scenario where a tunnel could be operated without tolls and thus would be cost equivalent to the Ferry Do Max in this respect.
  - For clarity, the economic appraisal assumes consistent fare and toll treatment across options. The assessment of user costs within the TPO framework is indicative and reflects potential policy choices rather than modelled outputs.
  - The future of ferry fares is a network-wide issue for the Council to consider, whilst the approach to tolling and the basis on which the tariff is set would be a matter for a project level business case.
  - A fixed link would also increase driving distance and correspondingly increase vehicle operating costs.
- **Physical accessibility (TPO5)**
  - The current (and future) Yell Sound vessels meet modern accessibility standards and thus the ferry options would be neutral with respect to this TPO.
  - A fixed link would evidently provide a major step change in accessibility, as passengers could remain in their cars for any journey.
- **Length of operating day (TPO6)**
  - **YeII1** and **YeII2** retain the current operating day and thus are neutral with respect to this TPO. However, the Ferry Do Max would move the Yell service to a 24-hour operation, with an hourly scheduled service overnight.
  - A fixed link would again remove all barriers with respect to travel time for those with access to a vehicle, providing 24-hour access to Yell and mainland Shetland.
- **Non-car travel options (TPO7)**
  - **YeII2** and **YeII3** both score positively with respect to this TPO, as they include an in-principal commitment to expand the bus service.
  - With a fixed link, it is assumed that the bus service is scaled up to a level that approaches the frequency of the current ferry service. Without this, there would be a reduction in accessibility for those without a car or who would prefer not to drive one, as pedestrians and cyclists would not be able to use the tunnel. While non-car service frequency is equivalent to the BaU ferry service, it is assumed that the bus via the fixed link may be quicker than the corresponding ferry service.

7.3.4 The estimated quantitative impact on the level of disstisfaction (as described in Section 3.4) is shown in the figure below.

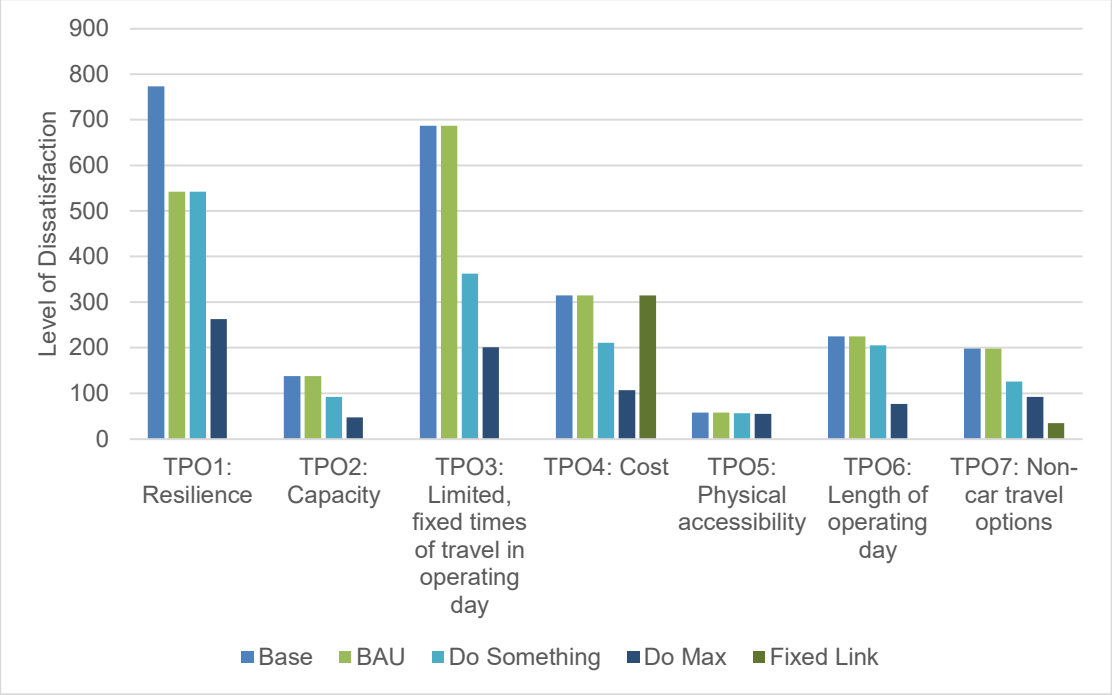

Figure 7.7: Yell, Estimated level of dissatisfaction with each TPO by option

7.3.5 In the present day ('base') it can be seen that the highest levels of dissatisfaction are with TPO1 – Resilience, TPO3 – Limited, fixed times of travel in operating day, and TPO4 – Cost.

7.3.6 Overall, the options would reduce the level of dissatisfaction from the present day by:

- **9%** in the BaU
- **30%** in the Ferry Do Something
- **60%** in the Ferry Do Max
- **87%** with the Fixed Link

Key Point: The nature of the option packages for Yell Sound means that each increment will deliver progressively larger benefits with respect to the TPOs. This ultimately culminates in a fixed link, which would remove almost all of the identified barriers to travel, except from the cost of travel where tolls are levied.

STAG criteria

Environment

7.3.7 The figure below maps the main environmental constraints across Yell Sound and at both ends of the crossing:

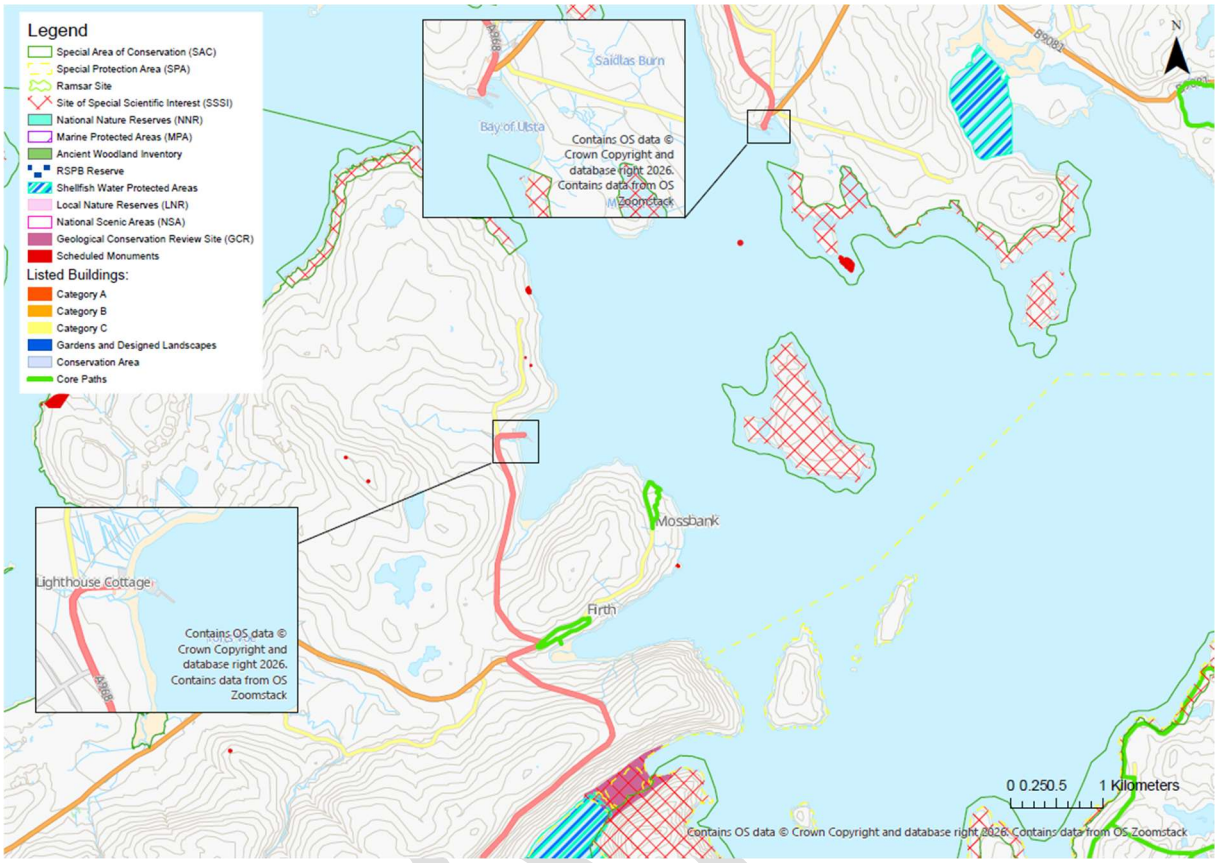

Figure 7.8: Yell Sound – environmental constraints maps

7.3.8 The key points of note from the above figure are as follows:

- Both Toft and Ulsta are working ferry terminals and are not directly covered by any specific environmental designations.
- At **Toft**:
  - There are a small number of residential properties in close proximity to the ferry terminal, including one house at the head of the marshalling area and another around 50 metres to the west.
- At **Ulsta**
  - There are also residential properties in very close proximity to the ferry terminal, which could be affected by any material expansion of that terminal.
  - Ulsta is also adjacent to the Yell Sound Coast Special Area of Conservation (SAC) and Site of Special Scientific Interest (SSSI).
  - Ulsta Pier House is a Category C listed building and, as its name suggests, is located immediately adjacent to the ferry terminal.

7.3.9 The table below summarises the performance of the Yell Sound option packages against the STAG Environment criterion:

Table 7.8: Yell Sound – appraisal against STAG Environment criterion

	Yell1: BaU	Yell2: Do Something	Yell3: Do Max	Yell4: Fixed link
Environment	**O**	**O**	**×**	**××**

- The environmental impacts of the options increase with each increment in scale, with a fixed link **(YeII4)** clearly being the most significant in this respect. However, it is important to recognise that **most impacts will be short-term and associated with construction only**.
- From a timing perspective, the BaU **(YeII1)** and Ferry Do Something **(YeII2)** entail only very minimal works until the point at which Toft and Ulsta are life expired and need to be replaced wholesale. Even at this stage, the scale of the works will be comparatively minimal, broadly replacing the current ferry terminal on a like-for-like basis. There may be some short-term environmental impacts associated with construction such as **noise and vibration** for surrounding properties, reduced **water quality** and impacts **on air quality** associated with construction dust. The overall environmental impact is however likely to be negligible.
- The Ferry Do Max **(YeII3)** does however imply more significant environmental impacts given the larger scale of the works – these impacts may include:
  - The same **short-term construction impacts** would emerge as for option **YeII2**, but these would be more significant given the larger scale of the works.
  - Impacts on **biodiversity and habitats**, including potential for disturbance of the qualifying features of the Yell Sound Coast SAC during construction, which could trigger a Habitats Regulation Assessment (HRA). There could also be impacts on otters and / or other marine mammals in the construction area, but this is unlikely to be significant in the context of disturbance within the existing harbour.
  - With respect to **land-use**, there would be a very small amount of land take and land reclamation to expand the marshalling area. The more significant impact through would be the construction a new 90 metre island breakwater at Toft.
  - The slight expansion of Ulsta and the addition of a breakwater at Toft would have an impact on **landscape**, creating a marginally more industrialised feel to both ports. Any such impact would though be very minor.
- A fixed link **(YeII4)** would evidently have a range of environmental considerations, for example the impacts on geology and soils, noise and vibration etc. This would particularly be the case during construction, as this would be a major project in this geographic context. Disposal of tunnel spoil would be a significant environmental consideration, even if a purpose could be found for it. A fixed link would undoubtedly be subject to full EIA through which environmental protections, mitigations and enhancements would be developed.

7.3.10 Whilst a fixed link **(YeII4)** would evidently have the most significant environmental impacts (at least during construction), one key point of note here is that, as the fixed link would take the form of a tunnel, its physical environmental impacts would be limited, for example on the landscape, historic environment and water quality, drainage and flooding. Indeed, this type of solution has been successfully delivered at scale in the Faroe Islands and Norway, where the environmental impacts have been carefully managed. Moreover, the Faroese have created positive landscape features around the tunnel portals, adding to rather than subtracting from local visual amenity.

Key Point: The environmental impacts of the Yell options increment relative to the scale of the options. The BaU **(Yell1)** and Ferry Do Something **(Yell2)** would have relatively minimal impacts as they are focused broadly on like-for-like asset replacement at life expiry. The Ferry Do Max **(Yell3)** would have more significant impacts associated primarily with the provision of a new breakwater at Toft, whilst a fixed link **(Yell4)** would evidently have the most significant impacts given its scale (and a key consideration here would be the approach to the disposal of spoil).

Key Point: Whilst each of the options would have an environmental impact to a lesser or greater degree, there is precedent for the delivery of similar solutions across Scotland and beyond. The undertaking a full EIA for the ultimate preferred option emerging from a subsequent project business case will allow for environmental impacts to scoped, fully assessed and mitigated where possible.

Climate Change

Table 7.9: Yell Sound appraisal against STAG Climate Change criterion

	Yell1: BaU	Yell2: Do Something	Yell3: Do Max	Yell4: Fixed link
Climate change	0	×	××	✓

Greenhouse gas emissions

7.3.11 A programme level comparison of whole life carbon (WLC) has been developed – this incorporates an estimate of:

- Embodied and operational carbon associated with the fixed link provided by COWI.
- Embodied carbon associated with harbour infrastructure improvements based on estimated quantities provided by Mott MacDonald.
- Operational carbon associated with the continued operation of ferry services.
- Road operational carbon associated with additional vehicle kilometres relative to the BaU.

7.3.12 The methodological approach to developing this comparison is detailed in **Appendix A**, but it should be noted that the WLC comparison is highly sensitive to the underpinning assumptions, particularly in relation to when the ferry fleet is decarbonised.

7.3.13 The table below shows the estimated WLC for the Yell options in tonnes of carbon dioxide equivalent (tCO_2e):

Table 7.10: Yell Sound WLC comparison (tCO_2e), round to nearest thousand

Option	Whole Life Carbon - tCO_2e
Yell1: BaU	99.000
Yell2: Ferry Do Something	136,000
Yell3: Ferry Do Max	193,000
Yell4: Fixed Link	80,000

7.3.14 The following points should be noted in relation to the above table:

- MV *Dagalien* and MV *Daggri* are the two largest vessels in the Shetland fleet and thus Yell Sound is a more emissions heavy route than the other candidate fixed link routes. To

this end, a fixed link **(Yell4)** has a lower WLC than each of the ferry options **(Yell1-Yell3)**, whose carbon intensity increases with each increment in service.

- It should be noted that **Yell2** and **Yell3**, especially the latter, would increase the route capacity and the number of sailings. This would generate additional vessel emissions and vehicle kilometres, with the longevity of this impact depending on when the vehicle fleet and the ferry fleet is decarbonised.

Adaptation to climate change

7.3.15 Island communities dependent on ferry services are uniquely exposed to climate change. Continued dependence on ferry services will retain and amplify this risk as the climate continues to change, whereas a fixed link **(Yell4)** would almost entirely remove this vulnerability for Yell.

Key Point: The Yell Sound vessels are the largest in the Shetland fleet and thus the Yell Sound route is more emissions intensive than the other candidate fixed link routes. For this reason, the WLC of a fixed link is estimated to be less than the comparative ferry options. These figures are however highly sensitive to the underpinning assumptions.

Health, Safety and Wellbeing

Table 7.11: Yell Sound – appraisal against STAG Health, Safety and Wellbeing criterion

	Yell1: BaU	Yell2: Do Something	Yell3: Do Max	Yell4: Fixed link
Health, safety and wellbeing	**O**	✓	✓	✓✓

7.3.16 The three material considerations in this study with regards to this criterion are:

- Accidents
- Health outcomes
- Access to health and wellbeing infrastructure

7.3.17 It should be noted that, in this context, **access to health and wellbeing infrastructure** and **health outcomes** are intrinsically linked and are addressed together.

Accidents

*It should be noted that the monetary valuation of **accidents** of differing severity is standard practice in cost-benefit analysis and is thus captured under the **Economy** criterion. It is though important to recognise that such impacts will be very small given the low traffic volumes and the inferred number of accidents.*

7.3.18 With the two ferry increments, the Do Something **(Yell2)** and the Do Max **(Yell3)**, there are several 'competing' factors at play with respect to accidents:

- Each increment in service level will generate **additional vehicular demand and thus vehicle kilometres** - there is therefore an increased risk of accidents in terms of vehicle collisions driven purely by this increase in traffic volumes (and it is this that is quantified and monetised under the Economy criterion).
- Moreover, **Yell2** and **Yell3** include **increments in the number of sailings relative to the BaU**. This again increases the risk of an incident, particularly where more sailings are introduced in the hours of darkness. However, the Council's ferry service has a long-term reputation for high safety standards and thus any such risk is minimal.

- On the other side of the equation, a higher frequency ferry service would **reduce the wait time between sailings and therefore the temptation to rush to catch a specific connection**, particularly when travelling through Yell from Fetlar or Unst.
- The **expansion of the marshalling areas at both ports** to a size commensurate with the Type 3 vessels in **Yell2 and Yell3** would also reduce the risk to motorists and pedestrians.
- The provision of new waiting rooms at Toft and Ulsta in **Yell2** and **Yell3** would also reduce the vehicle interaction risk for foot passengers, and would improve personal security.

7.3.19 A fixed link **(Yell4)** would evidently create the scope for an expansion of vehicle movements and increased driving distances (~18km more per return trip) for journeys between mainland Shetland and Yell and thus would record a minor disbenefit against this criterion (albeit Annualised Average Daily Traffic (AADT) would remain very low by national standards). On the other hand, a fixed link **(Yell4)** would remove all risks associated with ferry-borne travel including vehicle marshalling, vehicle and foot passenger interaction, rushing for a ferry and incidents at sea.

Key Point: The impact of the options with respect to the Accidents criterion is finely balance. In terms of a fixed link **(Yell4)**, there would be scope for a notable increase in vehicle kilometres increasing the risk of accidents but, at the same time, this would remove all risks associated with seaborne travel. Overall, it is important to recognise that the low traffic volumes associated with the options, even in the context of a fixed link, means that accident impacts will be fairly minimal overall.

Access to health and wellbeing infrastructure and health outcomes

7.3.20 Yell has a GP practice and dental surgery on island, meaning that most of the day-to-day needs of island residents can be met locally. However, Shetland's only hospital – Gilbert Bain – is located in Lerwick, whilst off-island travel to Aberdeen can be necessary for more specialist care. The ferry service therefore plays an important role in meeting community health needs. In the 2024 resident survey:

- **4% (n=7)** of Yell residents selected 'Health Visit' as their main reason for travelling by ferry in a typical month (although **27% (n=49)** highlighted a 'combination of reasons' for making a journey, so home health visits are likely to be included within this figure).
- **12% (n=60)** of Yell residents selected 'Health Visit' as one of the 'other reasons' for which they travel off-island in a given month.

7.3.21 Moreover, in an emergency, casualties from Yell need to be moved by ambulance using the Yell Sound ferry service. Whilst the frequency on this route is relatively high and there is out of hours cover, the long journey can create both anxiety and potential risk / discomfort for the patient. Note however, in life threatening situations, the air ambulance is summoned.

7.3.22 Each option increment therefore improves access to health and wellbeing infrastructure. A fixed link **(Yell4)** would however evidently be transformative in this respect as it would provide unfettered 24-hour access to Gilbert Bain Hospital, including for attendance at Accident and Emergency. It would also significantly reduce ambulance response times and transit time back to the hospital. Moreover, from a risk perspective, a fixed link **(Yell4)** would mitigate the twin risks of the ferry being unable to sail due to weather or technical problems and the air ambulance being unavailable due to another call out.

7.3.23 The impact assessment process specifically considered the impact of the different options on access to health and wellbeing infrastructure and health outcomes. The following key points emerged:

- In the BaU **(Yell1)**, continued reliance on existing ferry timetables may constrain timely access to preventative health appointments, allied health services, acute and specialist healthcare and mental health support, much of which is located on mainland Shetland. Issues around frequency, reliability and reduced service in refit may exacerbate stress, anxiety and social exclusion, particularly for older people, carers and those with long-term health conditions.
- Each increment in the ferry service **(Yell2 and Yell3)** would support improved access to health and wellbeing infrastructure and associated health outcomes - for example:
  - Improved service frequency and reliability may support better access to routine healthcare, reducing missed or delayed appointments.
  - Improved service reliability and resilience may improve health equity by reducing e.g., weather related cancellations, single vessel working during refit etc, increasing predictability of travel for treatment.
  - Whilst capacity is not a major issue on Yell Sound, the expansion of capacity in **Yell3** would reduce the occasional risk of not getting a booking, and the anxiety associated with this. It would also support health service workforce mobility, including visiting clinicians and social care staff.
  - An overall reduction in travel stress and fatigue may positively influence mental wellbeing, particularly for frequent travellers.
- The impact assessment work noted that a fixed link **(Yell4)**:
  - Would provide a step-change in access to emergency and unscheduled healthcare, including reduced response times and great flexibility for time critical journeys.
  - Offer potential long-term public health benefits associated with reduced isolation and improved access to health promoting activities and services.
  - However, it did also recognise the point that increased traffic volumes would increase accident risks.

Key Point: Whilst Yell does have on-island health provision, there is still a dependence on travel to Lerwick and sometimes mainland Scotland for health purposes, including in emergencies. Each option increment would therefore make an improvement to access to health and wellbeing infrastructure. A fixed link **(Yell4)** would however be genuinely transformative in this respect, improving access to Gilbert Bain Hospital, reducing response and transit times in the event of an emergency and addressing the risks associated with on-island emergencies.

Economy

Table 7.12: Yell Sound – appraisal against STAG Economy criterion

	Yell1: BaU	Yell2: Do Something	Yell3: Do Max	Yell4: Fixed link
Economy	O	✓	✓	✓✓✓

Transport Economic Efficiency

7.3.24 The table below summarises the CBA for the Ferry Do Something **(Yell2)**, Ferry Do Max **(Yell3)** and the Fixed Link **(Yell4)** options. It includes the core scenario and sensitivity tests. It should be noted that the BaU is not included as it is the baseline against which other options are compared:

Table 7.13: Yell Sound options cost-benefit summary (£m, 2023 values and prices)

Scenario	Option	PVB (£000)	PVC (£000)	NPV (£000)	BCR
Core	**Do Something**	**13,955**	**37,424**	***-23,469***	**0.4**
	Do Max	**28,134**	**239,391**	***-211,257***	**0.1**
	Fixed Link	**109,603**	**243,614**	***-134,010***	**0.4**
ST1: Reduced tunnel optimism bias	Do Something	Not applicable			
	Do Max				
	Fixed Link	109,603	163,019	*-53,416*	0.7
ST2: Waiting time assumed to have same value as in-car	Do Something	6,701	37,470	*-30,770*	0.2
	Do Max	18,056	239,448	*-221,392*	0.1
	Fixed Link	79,229	243,772	*-164,543*	0.3
ST3: Optimism bias applied to vessel costs	Do Something	13,955	37,424	*-23,469*	0.4
	Do Max	28,134	264,890	*-236,756*	0.1
	Fixed Link	109,603	194,553	*-84,950*	0.6
ST4: 100-year appraisal period	Do Something	19,070	42,982	*-23,911*	0.4
	Do Max	38,448	281,150	*-242,702*	0.1
	Fixed Link	150,631	151,006	*-375*	1.0

7.3.25 The key points of note from the above table are as follows:

- In the core appraisal scenario, all of the options record a BCR of less than one (i.e., costs exceed benefits).
  - ST1 reduces the PVC of the fixed link and hence increases the BCR from 0.4 to 0.7.
  - ST2 reduces the PVB of all three options, making all BCRs worse.
  - ST3 increases the PVC of the ferry options, including BaU, increasing the fixed link BCR from 0.4 to 0.6.
  - ST4 increases BCRs for all options. The PVC for the fixed link reduces (since ferry costs rise faster than fixed link costs in years 61-100), **increases the BCR to 1.0**.
- The Ferry Do Something and fixed link perform broadly equivalently in most scenarios in terms of their BCRs (Scenario Test 4 excepted), although their respective PVBs and PVCs vary considerably.
- A combination of sensitivity tests would likely tip the fixed line BCR above 1.0 for the 60-year appraisal period.
- The Ferry Do Max performs very poorly across all scenarios, highlighting that the incremental benefits of this are significantly exceeded by the incremental cost. It implies from a value for money perspective that there is limited scope for expanding the ferry service beyond what is laid out in the Ferry Do Something.

7.3.26 These results should be interpreted alongside the wider strategic, social and economic case for investment set out in this report, recognising that conventional appraisal metrics do not fully capture the benefits of improved connectivity for island communities.

Key Point: In the core appraisal scenario, all options have a BCR of less than one, so costs exceed benefits, although a fixed link achieves parity over a 100-year appraisal horizon. The Ferry Do Something and fixed link perform broadly similarly from a value for money perspective, but they have very different benefit and cost profiles. The Ferry Do Max performs very poorly across all scenarios, highlighting the limited scope to improve the ferry service beyond the Ferry Do Something.

Wider Economic Impacts (Economic Narrative)

7.3.27 This section sets out the economic narrative relating to the options for Yell, considering how investment in improved transport connectivity could support the economy and society of the island. The economic narrative has been informed by the analysis undertaken as part of the case for change (e.g., the resident survey, community and business engagement, socio-economic analysis, case studies etc).

7.3.28 Two points should be noted with regards to the economic narrative:

- It has been **developed in the context of improved connectivity generally**. However, it is important to recognise that a **fixed link would by some distance be the most economically transformative of the options**, and indeed **several of the benefits would only emerge with the provision of a fixed connection**.
- Improvements to connectivity across Yell Sound, and in particular a fixed link, would be materially advantageous to **Fetlar and Unst** as well as Yell, and the economic narrative developed below reflects this.

7.3.29 The key economic benefits of improved connectivity for Yell can be defined as follows:

- Unlike most Scottish islands, Shetland is a net exporter of goods, and Yell and Unst reflect this. At the heart of this export driven economy is the **aquaculture / fisheries sector**, but the emerging **SaxaVord Spaceport** is creating a nationally significant development in Unst. These anchor industries, when combined with staples like agriculture and construction and an emerging tourism offer mean that **the North Isles collectively make an outsized economic contribution**. However, as noted in the Case for Change Report, current connectivity imposes substantial economic costs across multiple sectors, constraining growth, with all of the implications that this has for employment population retention etc.
- The reality of being dependent on a ferry service and the perception of what this means for an island can damage competitive positioning and investment confidence. Enhanced connectivity could therefore support improved business productivity and the formation of new businesses (e.g., the tourism offer around SaxaVord Spaceport). This was a unanimous point made by stakeholders in the consultation work. A fixed link is considered to be a 'game changer' in this respect, and stakeholders indicated that a fixed link could generate **£30m-£60m in additional output per annum** by lifting production constraints (with much of this figure attributable to the fisheries / aquaculture sector). This scale of production uplift would provide a significant economic benefit for Shetland overall, aided by the introduction of the new NorthLink Freight Flex vessels from 2029.
- Perhaps the key challenge faced by Yell (and Unst) businesses is **access to labour**. Every North Isles business consulted highlighted labour recruitment and retention as a critical business constraint, with ferry dependency cited as the primary barrier to attracting workers from mainland Shetland. The psychological impact of breaking a commute journey with a ferry crossing emerged consistently, with multiple stakeholders noting that potential employees view a 60-minute direct drive to Lerwick as reasonable but resist a 45-minute drive that includes a 10-20 minute ferry crossing despite a shorter overall journey time. Reliability and resilience risks are, of course, layered on top of this. A fixed link would clearly address this issue in its entirety. The Ferry Do Something and

Ferry Do Max could also contribute positively to labour mobility, but they could not address the fundamental break in the journey.

- Businesses in the North Isles noted that ferry dependency imposes **three distinct categories of cost premium across all sectors: (i) direct ferry charges, i.e., fares; (ii) extended journeys; and (iii) uncertainty risk premiums**. Whilst fares are perhaps the most visible element, the **latter two categories were deemed by businesses to be the most impactful**. Uncertainty costs prove particularly insidious, manifesting as inflated quotations, declined work and strategic business decisions. Construction contractors apply supplemental charges or minimum day rates to account for stranding risks and weather delays. Service providers from Lerwick add travel charges reflecting unproductive time and disruption risk. In extreme cases, businesses simply refuse to quote for North Isles work, or customers cannot proceed with necessary maintenance and repairs due to prohibitive costs. **In short, doing business on Yell costs more than on mainland Shetland**. Once again, improved ferry services would be advantageous here, but it is a fixed link that would be economically transformative, removing the second and third factors cited above.
- By extension, there is very little **house building** activity in the North Isles – indeed, it is understood from one stakeholder that no new social housing has been built in Yell, Unst or Fetlar for over three decades. The limited and ageing housing stock is a barrier to maintaining sustainable communities. Improved connectivity, most notably a fixed link would have material benefits in this respect, supporting construction viability but also the demand to live in Yell, by effectively making it part of mainland Shetland.
- The higher cost of doing business in the North Isles also impacts the **public sector**, both in terms of service provision (e.g., health, education etc) and the maintenance of assets (e.g., buildings utilities etc). Whilst any improvements to connectivity may not be cash releasing overall, it would allow for more efficient and lower cost service delivery.

7.3.30 The economic benefits of a Yell Sound fixed link **(Yell4)** would be amplified by an equivalent fixed link across Bluemull Sound **(BISo4)** with respect to Unst-based opportunities, e.g., SaxaVord Spaceport.

Key Point: Overall, stakeholder consultations reveal consistent, compelling evidence that ferry-dependent connectivity imposes substantial economic costs across multiple sectors while constraining growth trajectories and threatening long-term community viability. Improved transport connectivity, and in particular a fixed link, would provide scope for significant economic benefits additional to those monetised in conventional option economics.

Equality and Accessibility

Table 7.14: Yell Sound – appraisal against STAG Equality and Accessibility criterion

	Yell1: BaU	Yell2: Do Something	Yell3: Do Max	Yell4: Fixed link
Equality and Accessibility	O	✓	✓✓	✓✓

7.3.31 The material considerations in this study with regards to this criterion are:

- Comparative access by geographic location
- Comparative access by people group
- Affordability

Comparative access by geographic location

7.3.32 Shetland's island communities are, with some limited exceptions, less well-connected to the key destinations in the archipelago (e.g., Lerwick, Sumburgh etc) than mainland communities. In the resident survey, **32% (n=57)** of Yell residents responded that they travel off-island less than they would like to, which has a negative impact on the things they would like to do. This subset of the sample was asked what opportunities they are missing out on as consequence of not travelling off-island as much as they would like to, the responses to which are summarised in below:

Table 7.15: Yell – in travelling to mainland Shetland less often than you would like, what activities / opportunities are you missing out on (n=57, multiple response question)

Activity / opportunity missed out on	No. of responses	% of sub-sample	% of total Yell sample
Other social activities	46	81%	25%
Visiting friends and relatives less often	42	74%	23%
Shopping	34	60%	19%
Attending health appointments	32	56%	18%
Sports, leisure and cultural activities – spectating / attending	31	54%	17%
Sports, leisure and cultural activities – participating	29	51%	16%
Personal business	23	40%	13%
Employment opportunities	17	30%	9%
Training opportunities	14	25%	8%
Business opportunities	13	23%	7%
Educational opportunities	13	23%	7%

7.3.33 The above table highlights that Yell residents who are travelling less often than they would like to are primarily missing out on social opportunities, although there is also some loss of employment, education and business opportunities. Each option increment would improve comparative access by geographic location or put another way, would reduce the barrier to accessing opportunities imposed by living on an island. A fixed link would clearly deliver the most significant improvement in this respect, subject to affordability (see below).

Comparative access by people group

7.3.34 The EqIA workstream found that the incidence of connectivity related inequality did not fall evenly across different people groups. It noted that:

- There is persistent inequality of access for disabled people, older people, families with young children, and those requiring accompanied travel.
- Young people and working age adults face constrained access to education, training and employment opportunities, reinforcing demographic imbalance.

7.3.35 Each option increment would progressively improve comparative access by a range of different people groups, including those with protected characteristics. It is important to note that a fixed link across Yell Sound would also support improved equality of access for those living in Fetlar and Unst.

- Overall, a fixed link **(Yell4)** would deliver the most significant improvement in comparative access by people group, particularly for spontaneous travel and out of hours journeys. A

fixed link across Bluemull Sound would extend this benefit to Unst. There are four key caveats here however:

- The cost of tolls relative to ferry fares (which is discussed in more detail in the next section).
- Accessibility for those who either do not have access to a car or do not wish to drive one. For there to be no less of accessibility with a fixed link **(YeII4)**, bus services through the tunnel would need to at least approach the frequent of the current ferry services, on which island residents can travel as a foot passenger (albeit only a small number of services connect with bus services at either end).
- The tunnel design does not allow use by cyclists. Again, for there to be no loss of accessibility with a fixed link **(YeII4)**, the bus services provided in lieu of a ferry would need to be capable of accommodating bicycles.
- There is risk of increased geographic inequality overall, with islands getting a fixed link becoming comparable to mainland locations, potentially widening disparities with non-linked islands.
- Freight / business users would derive particular benefits from a fixed link **(YeII4)** as it would entirely remove the productive time lost waiting for and travelling on ferries – this is a key benefit for Yell given the high freight intensity on the Yell Sound route.

- With regards to the ferry options:
  - The current Yell Sound ferries are compliant with regards to disabled access. Whilst there may be some minor benefits from upgraded tonnage over time, these would likely be limited.
  - Incremental improvements such as **YeII2** and **YeII3** may benefit regular users, but may not fully address structural accessibility barriers such as the need to book.
- It has to be recognised that there is an equality and accessibility risk associated with potential public service reform in the context of the Ferry Do Max or a fixed link, if fewer services were based on island. This could have particularly negative implications for certain protected characteristic groups.

Affordability

7.3.36 The EqIA highlighted affordability as a major source of inequality for island communities. Households on lower incomes experience disproportionate affordability pressures linked to fares and occasional off island overnight accommodation and lost income. The resident survey responses for Yell found that:

- Of those who **use the ferry service less often than they would like to (32%, n=57)** the level of car fares (**37%** major / **32%** minor) and passenger fares (**21%** major, **39%** minor) were identified as factors contributing to this.
- Of those who **travel as often as they would like but for whom the ferry service negatively impacts their day-to-day activities (39%, n=70)**, the level of car fares (**39%** major / **30%** minor) and passenger fares (**19%** major, **43%** minor) were identified as factors contributing to this.

7.3.37 Affordability is therefore a key issue impacting on travel to and from Yell. The impact of the options with respect to affordability is largely dependent on the balance of ferry fares versus tolls. It is assumed in the economic appraisal that tunnel tolls are set at a level equivalent to current ferry fares revenue raised, and thus there would be little difference between the options if this was the case. A further consideration is the extra costs incurred as a result of a fixed link increasing the distance driven.

7.3.38 The Ferry Do Something **(YeII2)** and Ferry Do Max **(YeII3)** assume an in-principle commitment to reduced and free island resident fares respectively. On this basis, these

options would score most positively with regards to affordability. However, the detail around ferry fares and tunnel tolls would need to be worked through in a project-level business case (and potentially at a network level with respect to fares) and thus there is uncertainty over the impacts at this programme stage.

7.3.39 It is important to note that, whilst ferry fares impose a cost on island businesses (as would tunnel tolls), the consultation identified that the uncertainty / risk cost of working around a ferry service was the more significant factor. A fixed link **(Yell4)** would address this risk in its entirety.

Key Point: A fixed link offers a potentially transformative change in accessibility for both Yell residents and businesses and those visiting the island. This in-turn would assist in tackling some of the inequalities faced as a consequence of geographic remoteness and low population density. However, the scale of the benefit / impact would be dependent on the relative balance of tunnel tolls and increased mileage to ferry fares (i.e., affordability) and ensuring that bus services were provided to a frequency approaching that of the current ferry service, without which new inequalities could arise. These inequalities would be most keenly felt by those without access to a car or who would prefer not to drive one.

Key Point: Yell has a significant manufacturing sector and is also the gateway to SaxaVord Spaceport on Unst. Yell Sound is therefore the most freight intensive route on the network. Stakeholder consultation highlighted that the cost risk premium of working around a ferry service is a much more significant issue than the ferry fare itself – a fixed link would address this risk in its entirety.

Feasibility, Affordability and Public Acceptability

Feasibility

- The physical infrastructure options (vessels, ferry terminals and fixed links) are all technically feasible.
- Outline and detailed design work would be required for ferry terminals and fixed links, inclusive of e.g., surveys, ground investigations, environmental consenting etc.
- The ferry revenue options, and in particular the Ferry Do Max **(Yell3)**, would have deliverability considerations, including with respect to the recruitment of crew, the maintenance implications for ageing assets etc. These would need to be considered in the context of a project business case.
- This is also true of any scaling-up of bus services in **Yell2, Yell 3 and Yell4** – securing sufficient vehicles and drivers to operate these services is a deliverability challenge that would need to be considered in detail at the project level.

Affordability

- As will be explained in the Financial Dimension, affordability is the primary challenge across all options. Outwith the ongoing procurement of one new Type 1 vessel, the Council does not have committed funding for any capital works.
- External funding will be required for any of the options progressed through this business case. Naturally, the larger the scale of the option, the higher its cost and thus the more significant the affordability gap.
- The options will however have different spend profiles and the affordability will also be shaped by the financing mechanism adopted.

- It is important to recognise that any scaling-up of ferry or bus services will impose an ongoing financial commitment on the Council for which funding is not presently in place.
- As all Shetland Islands Council ferry services operate at a deficit, any reduction in or removal of fares would have a direct revenue impact. At present, the annual operating deficit is funded by the Scottish Government, but it is possible / probable that any increase in this deficit as a consequence of a deliberate policy choice would be a matter for the Council.

Public acceptability

7.3.40 The Yell public drop-in session was held on 26th May, with **37** island residents attending. The key points of note were as follows:

- As in neighbouring Unst, there was near universal support for a fixed link **(Yell4)** in Yell, with a belief that the ferry service is constraining both resident travel and strategic business interests in aquaculture, shellfish and whitefish, as well as the emerging SaxaVord Spaceport.
- It was noted that the Ferry Do Something **(Yell2)** and Ferry Do Max **(Yell3)** would add capacity and connectivity at times when it is less needed.
- There was also a fairly strongly held view that a fixed link between Yell and Unst would amplify the benefits of a Yell Sound fixed link for the North Isles overall.

7.4 Preferred Option

7.4.1 The preferred option selected by Shetland Islands Council Members on 30th June 2026 will be recorded in this report post-decision.

8 Economic Dimension – Foula

8.1 Overview

8.1.1 This section provides the Economic Dimension for Foula, commencing with a summary of the option packages followed by their appraisal against the TPOs and STAG criteria. ASTs for each option have been provided alongside this report, detailing the appraisal against each individual criterion.

8.2 Option Packages

8.2.1 For the islands for which fixed links are not in-scope (Foula, Papa Stour and Skerries), the option packages were limited to the business-as-usual and Ferry Do Something.

8.2.2 It should be noted that, as the air service provides for most passenger travel and the ferry service is operated on a flexible basis that suits the community, **revenue measures to expand the service were not considered for Foula**.

Option Foula 1: Business-as-Usual

8.2.3 Engagement with the community in March 2025 – including some crew members of MV *New Advance* – identified broad satisfaction with the current ferry arrangements, including the contracted-out delivery of the service and relief arrangements. Feedback from the crew suggested that MV *New Advance* is in reasonably good condition and is likely to have another decade or so in service with appropriate maintenance (albeit for cost forecasting purposes, we are assuming a shorter-term replacement).

8.2.4 The BaU is therefore essentially continuation of the existing service and represents the appraisal baseline.

Capital measures

Vessel

8.2.5 While feedback from crew suggests that MV New Advance remains in good condition and could operate for another decade, this appraisal has assumed replacement at life expiry (2026-2028), with a bespoke vessel designed for the Walls – Foula route. Given the spatial constraints at Ham and the capacity of the lifting davits, it is assumed that this vessel would be of the same dimensions as MV *New Advance*.

Harbour infrastructure

Ham

8.2.6 Bathymetric information is required to inform the extent of any dredging works at Ham for the BaU option, along with sediment sampling and transportation modelling to inform the future intervals between maintenance dredging to prevent sediment build up within the harbour.

8.2.7 Summary of works required at each port to facilitate use by the existing vessel (LOA 9.75m) and a like-for-like replacement vessel once the existing vessel reaches the end of its operational life:

- Minor concrete repairs to pier and quay walls.
- Replacement of fenders on pier.

- Dredging of inner harbour to approximately -3.5mCD to provide adequate depth within the entire harbour area (extent of dredge area and depth to be confirmed).

8.2.8 It is estimated that the existing pier and boat lift quay at Ham will require replacement by 2035 given the current condition of the structure. The maintenance works described above will enable the existing structure to remain in service until 2035. The replacement works are as follows:

- Installation of precast concrete blocks surrounding the existing pier and boat lift quay to encapsulate the structures.
- Anchors between the precast concrete blocks and the existing structures to be installed and voids between the precast concrete blocks and the existing structures shall be infilled.
- New concrete pier deck installed over the top of the existing pier and around the boat lift quay, and new fenders, bollards and pier furniture installed.

Walls

8.2.9 At Walls, the works would include:

- Repairs to the western pontoon pile
- Repairs to the pier piles as required

Option Foula 2: Ferry Do Something

8.2.10 Whilst our consultation in March 2025 identified that the community is satisfied with the current arrangements, it is important to have a point of comparison in an appraisal. To this end, the Ferry Do Something entails the delivery and operation of a 'Fair Isle Class' vessel for this route.

Capital measures

Vessel

8.2.11 This option would entail the introduction of a new Fair Isle Class vessel to the route in the short-term. This would be a materially larger vessel than MV *New Advance*, providing scope for the carrying of greater cargo payloads.

Harbour infrastructure

8.2.12 The increase in vessel size to the Fair Isle Class would require considerable dredging of the inner harbour area and of the harbour entrance channel at Ham. Detailed bathymetric information would be required to determine if the vessel could safely manoeuvre within the harbour area, and consultation with vessel masters would be required to obtain their opinions prior to validating this with simulations. This would be required for both ports on the route as the Fair Isle Class vessel would also have limited manoeuvring area at Walls.

8.2.13 The new boat lift at Ham would require a large area of reclaim. However, the existing boat lift would also need to be maintained and operational until the new vessel was in service in order to maintain the ferry service. The community also noted the importance of maintaining the quayside crane at Ham, which has much wider use than the ferry alone.

8.2.14 A general arrangement drawing and description of the works required at each port is provided below:

Ham

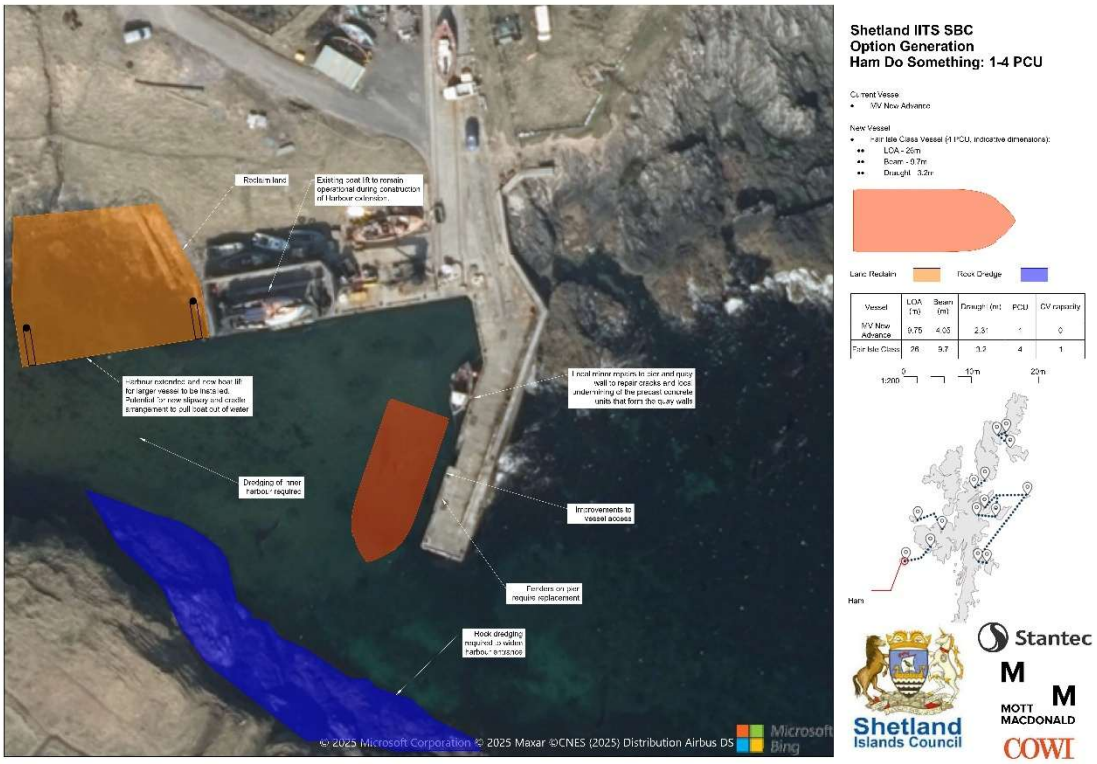

Figure 8.1: Foula – Ham – Ferry Do Something

8.2.15 The following works would be required at Ham:

- Minor repairs to pier and quay walls
- Upgrade of fenders on pier
- Land reclamation for new boat lift capable of lifting new Fair Isle Class vessel
- New larger cranes for boat lift
- Dredging of inner harbour to provide adequate depth within the entire harbour area for new Fair Isle Class vessel (extent of dredge area and depth to be confirmed)
- Potential rock dredging to widen harbour entrance
- Improvements to vessel access for passengers

Walls

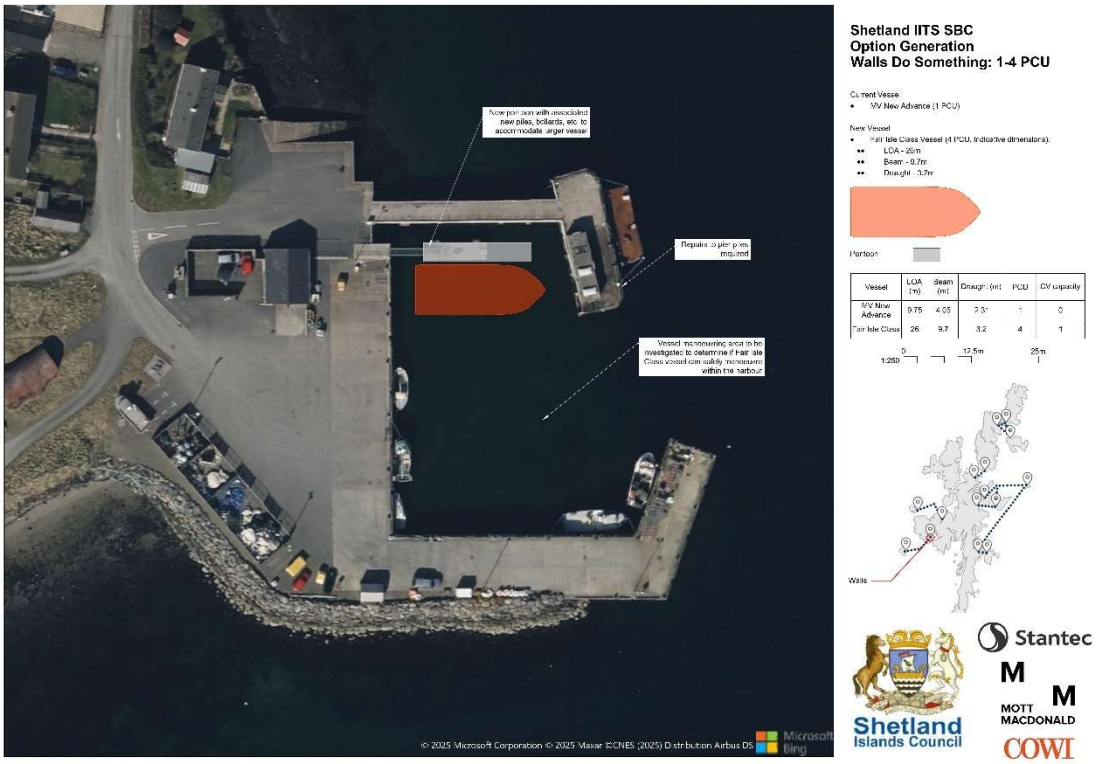

Figure 8.2: Foula – Walls – Ferry Do Something

8.2.16 The following works would be required at Walls:

- A new pontoon to accommodate the Fair Isle Class vessel, including pontoon piles and furniture.
- Repairs to the pier piles as required.
- Potential dredging of the harbour area to accommodate the new Fair Isle Class vessel, the requirement for which would be confirmed at project business case level.

8.2.17 As per the BaU, it is assumed Ham Pier would be replaced at life expiry.

Option costs

8.2.18 As explained in Chapter 3, all costs in the Economic Dimension are presented on a present value basis. In the economic appraisal, capital (initial and lifecycle) and operating / maintenance costs are profiled over 60 years and discounted to a present value. See table below. The following points should be noted:

- **PVCs** include all capital expenditure and operating and maintenance costs and are presented in 2023 market prices.[39]
- The Absolute PVC represents the total discounted cost of each option over the appraisal period. The Appraisal PVC shows the incremental cost of each option relative to the BaU

[39] PVCs are presented in market prices in line with TAG convention (i.e. costs in factor prices are uplifted to market prices), ensuring costs and benefits are compared on a consistent basis. These should not be interpreted as the council's cash outlay or funding requirement though, which is addressed separately in the Financial Case.

(i.e. 'Absolute PVC' of each intervention less the 'Absolute PVC' of the BaU). This is because the appraisal is focused on incremental costs and benefits relative to the BaU.

- Fares revenue has been excluded as it totals less than £20,000 per annum and is not expected to materially change. Similarly, changes in ferry operating subsidy requirements have not been quantified and will be developed alongside the Public Accounts position at the next stage of appraisal.

Table 8.1: Foula PVCs (2023 market prices, 60-years)

	Absolute PVC (2023 market prices, 60-years)	Appraisal PVC (2023 market prices, 60-years)
Fou1: BaU	£93.4m	-
Fou2: Ferry Do Something	£143.0m	£50.6m

8.3 Options Appraisal

Transport Planning Objectives

8.3.1 The table below summarises the performance of the Foula option packages against the TPOs:

Table 8.2: Foula – appraisal against TPOs

	Fou1: BaU	Fou2: Do Something
TPO1: Resilience	O	O
TPO2: Capacity	O	✓
TPO3: Limited, fixed times of travel in operating day	O	O
TPO4: Cost	O	O
TPO5: Physical accessibility	O	✓
TPO6: Length of operating day	O	O
TPO7: Non-car travel options	O	O

8.3.2 It is important to note at the outset that the Foula community is broadly satisfied with its current ferry service. An island-based workboat maximises flexibility to work around weather windows with a salaried island-based crew who are completely invested in the success of the service.

8.3.3 The Ferry Do Something **(Fou2)** would fulfil largely the same function as the BaU **(Fou1)** but would also increase the capacity of the service and potentially improve physical accessibility. There are few impacts on the TPOs beyond this.

STAG Criteria

8.3.4 The table below summarises the performance of the Foula option packages against the STAG criteria:

Table 8.3: Foula – appraisal against the STAG criteria

	Fou1: BaU	Fou2: Do Something
Environment	O	✗

	Fou1: BaU	Fou2: Do Something
Climate change	O	O
Health, safety and wellbeing	O	✓
Economy	O	✓
Equality and accessibility	O	O

8.3.5 A qualitative appraisal against each of these criteria is now provided in turn, with detail on the individual sub-criteria included in the ASTs.

Environment

8.3.6 The figure below maps the main environmental constraints at Foula and Walls:

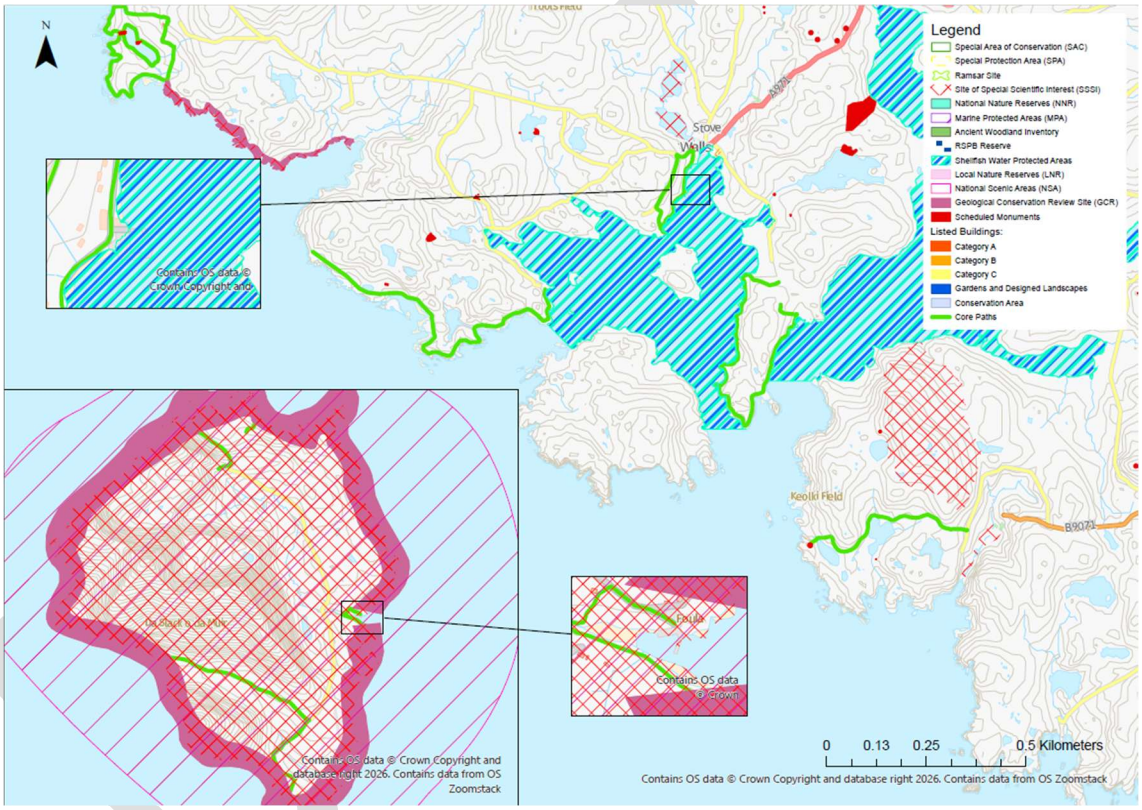

Figure 8.3: Foula and Walls – environmental constraints maps

8.3.7 The key points of note from the above figure are as follows:

- At **Foula**:
  - Foula, the island itself and the marine environment surrounding it, is entirely designated as a Special Protection Area (SPA). The island is also designated as a SSSI – any significant works in the harbour at Ham would likely trigger a Habitats Regulations Assessment (HRA).
  - Foula is also located wholly within a designated National Scenic Area (NSA).
  - The Foula Geodiversity Conservation Review covers much of the island and partly underpins the SSSI.

- There are residential properties within 50 metres of the pier, including a Category B listed building.
- There is a Core Path in close proximity to Ham.

- At **Walls**
  - Walls sits within / adjacent to the Vaila Sound Shellfish Water Protected Area and Grunting Voe Shellfish Water Protected Area.
  - There are residential properties in close proximity to the pier.
  - There are several Category B listed properties close to the pier.

8.3.8 This is evidently an environmentally sensitive area and any significant works, particularly at Foula, would require a full EIA, likely inclusive of HRA considerations.

8.3.9 The BaU **(Fou1)** involves a like-for-like replacement of the existing vessel with minor repairs to the existing pier, followed by replacement at life expiry. This option does however include dredging in the inner harbour, which could lead to loss of marine sediment and could have potential short-term impacts on water quality and biodiversity and habitats. These works are essential if the Foula ferry service is to be maintained, and it is against this baseline that **Fou2** is assessed.

8.3.10 The redevelopment of Ham in **Fou2** would have more significant potential effects, including:

- Potential for disturbance of qualifying features of the SPA during construction, which could trigger HRA.
- Loss of marine sediment from dredging.
- Short-term impacts on biodiversity and habitats, including for otters and marine mammals. These impacts would though likely be limited as the works would be within the existing harbour.
- Short-term impacts on local properties, including noise, construction dust, visual amenity and impacts on water quality.

8.3.11 Whilst there would undoubtedly be an environmental impact associated with **Fou2**, the overall scale of the development would be minor and could likely be managed with suitable mitigation measures identified through an EIA.

Climate Change

8.3.12 The replacement of the 1996-built MV *New Advance* with a vessel of a modern design **(Fou1)** would record a minor positive benefit with respect to the Climate Change criterion. While feedback from crew indicates that the MV New Advance may be able to operate for a further decade, it has been assumed that the vessel would be replaced at 30 years old (i.e., immediately) under both BaU and Do Something options.

8.3.13 While alternative low carbon fuel vessels may be available, itis important to recognise that the Foula route is one of the most exposed ferry crossings in Scotland and indeed Europe and thus mechanical reliability is paramount. This point was tested at some length as part of the Fair Isle Ferry Replacement Project, where it was accepted in the business case that reliability is the most essential feature of any vessel operating the route. Therefore, for the purposes of this appraisal, it has been assumed that any replacement for MV *New Advance* would be conventionally fuelled but would undergo a decarbonisation refit at fifteen years old to reduce emissions.

8.3.14 Deployment of a Fair Isle Class vessel on the route **(Fou2)** would record a disbenefit with respect to this criterion. Her larger dimensions and deadweight would mean that the power

required to operate her would likely negate any benefit from a more modern vessel. As with **Fou1**, there is medium-term scope for a Fair Isle Class vessel to be operated using a low or zero carbon fuel, however as that would apply to **Fou1** and **Fou2**, the net impact during those later years would be neutral.

8.3.15 Island communities dependent on ferry services are uniquely exposed to climate change, a particular issue for Foula, which is almost wholly dependent on the ferry service for its supply-chain. The use of a larger vessel and harbour works to accommodate it in **Fou2** would therefore support adaptation to climate change.

8.3.16 On balance, the emissions disbenefit associated with operating a larger vessel is broadly offset by the adaptation benefits of enhanced capacity and resilience, resulting in a neutral overall assessment against this criterion.

Health, Safety and Wellbeing

8.3.17 Option **Fou2** would deliver a larger vessel with better seakeeping capability than MV *New Advance* and thus would record a minor benefit relative to **Fou1** through reducing operational risks.

8.3.18 There would also be some minor improvements to vessel access in **Fou2**.

8.3.19 As the primary function of the Foula route is to meet the supply-chain needs (rather than passenger needs) of the island, there would be no material impacts on health outcomes and access to health infrastructure.

Economy

8.3.20 As noted above, the current solution very much works for the Foula community. It offers an island-based crew and jobs, personal investment in the service and the ability to operate sailings flexibly around weather windows. Both options presented seek to maintain this arrangement and thus are unlikely to have fundamental impacts with respect to the Economy criterion.

8.3.21 Relative to **Fou1**, a Fair Isle Class vessel **(Fou2)** would provide a minor Economy benefit through potentially:

- Reducing journey times, which in turn could allow sailings to be operated in tighter weather windows (so more sailings operated to timetable or overall), albeit these sailings are very lightly used.
- Reducing the number of at-capacity sailings / short-shipped goods (i.e., goods presented for carriage for which there is insufficient capacity), given the larger deck capacity of the Fair Isle Class vessel compared with the like-for-like BaU replacement.
- Allowing larger single items to be moved, such as plant, thus providing efficiencies when undertaking activities on Foula.

8.3.22 However, this benefit would be marginal, and the community has not expressed any dissatisfaction with the current arrangements. Additionally, given the very low usage of the ferry service by a small population, any BCR is likely to be very low.

Equality and Accessibility

8.3.23 The Foula service is not fully accessible at present. Whilst not ideal, it was noted in discussions with the community that there is an acceptance of the realities of living in Foula and the challenges of ensuring, for example, step-free access to the ferry. It is likely that the

new vessel in both options would provide improved onboard access for persons of reduced mobility, but ship-to-shore access would remain a challenge.

8.3.24 It is assumed that both piers would be replaced at life expiry under the BaU and Fou2. At that point there would be greater scope for making accessibility improvements but these improvements would be just as viable under BaU and Fou2, generating a neutral net benefit for **Fou2**.

8.3.25 As the air service is the main mode of passenger travel for Foula, neither option would have any significant impacts on equality and accessibility.

Feasibility, Affordability and Public Acceptability

Feasibility

- The physical infrastructure options are all technically feasible.
- Outline and detailed design work would be required for ferry terminal works, inclusive of e.g., surveys, ground investigations, environmental consenting etc.
- The above said, it does have to be recognised that delivering a more significant harbour upgrade at Ham in **Fou2** would give rise to a range of engineering challenges:
    - As experienced in the Fair Isle Ferry Replacement Project, delivering a project of scale on a remote island and around weather windows is challenging. Everything from getting materials and labour to site, accommodating the workforce, access to utilities etc is more difficult than an equivalent project on mainland Shetland. Whilst the project is deliverable, careful planning would be required.
    - Any contractor in **Fou2** would need to ensure that the service could be maintained during construction, given the lifeline nature of the connection.
    - A key consideration noted in the SOC is how the vessel could be removed from the water when not in service. It is understood that the davits in Ham Harbour were the largest of their kind when installed but would be too small for a Fair Isle Class vessel. The geometry of the harbour would also make it difficult to deliver a slipway, cradle and rails solution as per Fair Isle. Initial work suggests that a boat lift with sufficient capacity could be delivered, but this would require further consideration in a project-level OBC.
    - Replacement of the pontoon berth at Walls would need consultation with other harbour users as it could limit berth availability and vessel manoeuvrability.

Affordability

- As will be explained in the Financial Dimension, affordability is the key challenge across all options. Outwith the ongoing procurement of one new Type 1 vessel, the Council does not have committed funding for any capital works.
- External funding will be required for any of the options progressed through this business case. Naturally, the larger the scale of the option, the higher its cost and thus the more significant the affordability gap.
- The BaU **(Fou1)** is effectively the minimum investment required over time to maintain the service. However, the Ferry Do Something **(Fou2)** represents a significant increase in the scale of works at Ham, and thus affordability would be a key consideration here (as it was for Fair Isle and Grutness).

Public acceptability

8.3.26 Arrangements for a meeting with the Foula community are being made and the feedback provided will be recorded in this report post 30th June 2026 decision.

8.4 Preferred Option

8.4.1 The preferred option selected by Shetland Islands Council Members on 30th June 2026 will be recorded in this report post-decision.

9 Economic Dimension – Papa Stour

9.1 Overview

9.1.1 This section provides the Economic Dimension for Papa Stour, commencing with a summary of the option packages followed by their appraisal against the TPOs and STAG criteria. ASTs for each option have been provided alongside this report, detailing the appraisal against each individual criterion.

9.2 Option Packages

9.2.1 For the islands for which fixed links are not in-scope (Foula, Papa Stour and Skerries), the option packages were limited to the business-as-usual and Ferry Do Something.

Option Papa Stour 1: Business-as-Usual

9.2.2 The short-term requirement on the Papa Stour route is a **new vessel to replace MV *Snolda***. The SOC eliminated consideration of a like-for-like replacement of the existing vessel and so the BaU for Papa Stour reflects continuation of the existing service with a new Type 1 vessel. The BaU represents the appraisal baseline.

Capital measures

Vessel

9.2.3 When developing the options, we considered the case for a Fair Isle Class vessel which could be considered proportionate for the route. However, a smaller workboat would maintain the at times problematic 12-passenger cap and would significantly reduce the vehicle carrying capacity of the service. This was therefore not considered further.

9.2.4 The BaU therefore is the **replacement of MV *Snolda* with a Type 1 vessel**. It is recognised that the design for the Type 1 vessel currently being built by the Council may not correspond exactly to the seakeeping needs of this route. It is therefore possible that this design may be modified to meet route specific needs, but its broad dimensions would remain the same, and thus the infrastructure has been sized to accommodate a Type 1.

9.2.5 A Type 1 or equivalent vessel would offer a larger passenger and vehicle carrying capacity, roll through capability and the ability to carry larger agricultural vehicles.

Harbour infrastructure

9.2.6 Introduction of the larger Type 1 or equivalent vessel onto the Papa Stour route would require the berthed centre line of the new vessel, which is beamier than the existing, to be assessed against the existing linkspans.

9.2.7 Berth extension works at Papa Stour and West Burrafirth would also need to be constructed whilst maintaining the ferry service, given the absence of alternative ports. This constraint will inform the type of berth extension that is constructed.

9.2.8 Bathymetric information would be required to inform if any dredging works are required at both ports in order to provide adequate manoeuvring area for the larger Type 1 or equivalent vessel.

9.2.9 No significant landside works have been identified at either port.

9.2.10 General arrangement drawings and summaries of the works required at each port are provided below.

Papa Stour

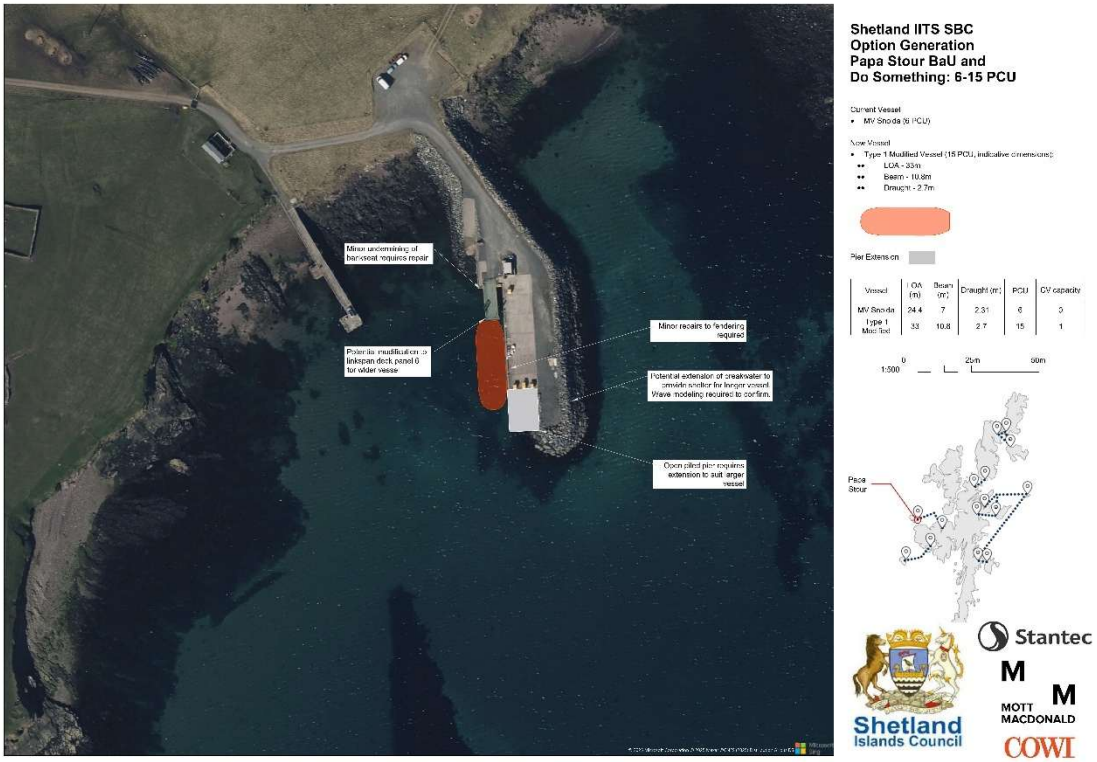

Figure 9.1: Papa Stour – Business-as-Usual

9.2.11 The following works would be required at Papa Stour:

- Minor repairs to the linkspan bank seat.
- Minor repairs to the pier fendering.
- Extension of the existing open piled pier by 16 metres, likely building end-over from the land.
- Potential modification to linkspan deck panel number six in order to accommodate the new beamier vessel.
- Potential extension of the breakwater to provide adequate shelter for the new longer vessel.

West Burrafirth

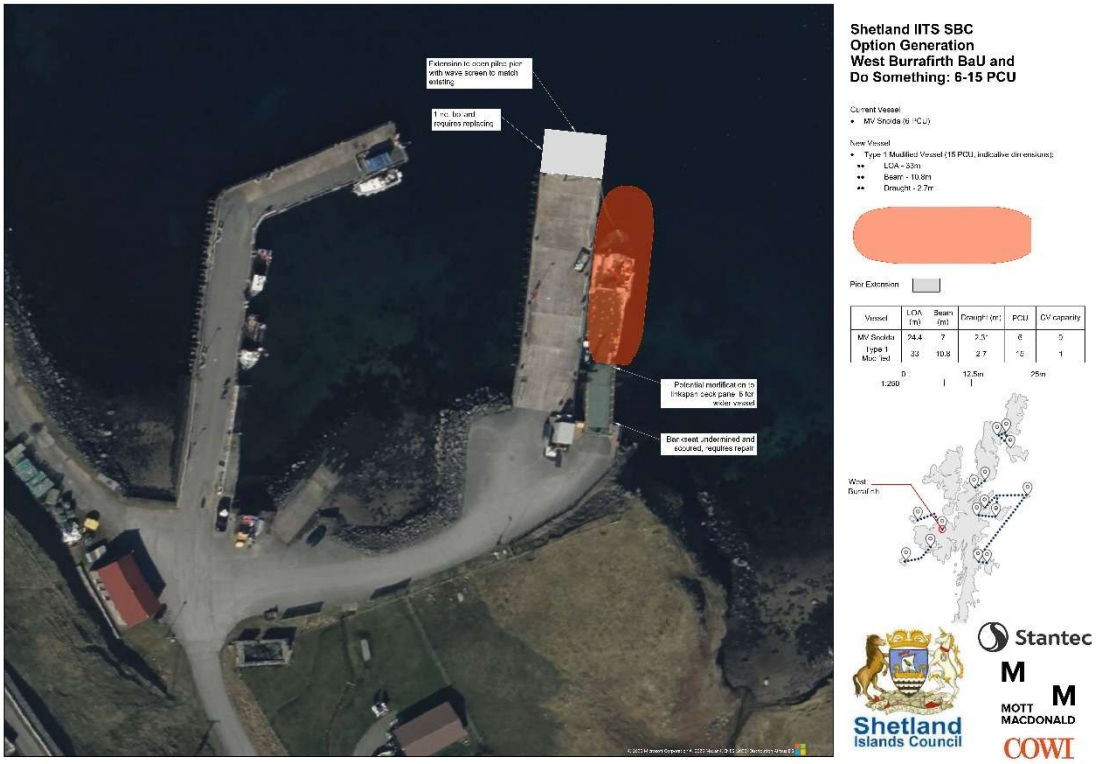

Figure 9.2: West Burrafirth – BaU

9.2.12 The following works would be required at West Burrafirth:

- Extension of the open piled pier with wave screen by 8 metres, likely building end-over from the existing pier.
- Replacement of one mooring bollard.
- Potential modification to linkspan deck panel number six in order to accommodate the new larger vessel.
- Bank seat repairs.

Ferry revenue measures

9.2.13 There are no ferry revenue measures associated with this option.

Option Papa Stour 2: Ferry Do Something

9.2.14 The Ferry Do Something for Papa Stour is focused on revenue measures only, expanding the timetable to provide seven-day sailings by introducing two return sailings on a Tuesday and Thursday.

Capital measures

Vessel

9.2.15 A Type 1 or modified Type 1, as per the BaU.

Harbour infrastructure

9.2.16 The required harbour works to accommodate the Type 1 or equivalent would be as per the BaU. There would be no increment in the Ferry Do Something.

Ferry revenue measures

9.2.17 The Papa Stour Ferry Do Something would entail delivering two return crossings on each of a Tuesday and Thursday, transitioning the service to a seven-day operation.

9.2.18 This is a conceptually deliverable solution, but it would require additional crew. The deliverability of securing those crew and the value for money of doing so would need to be considered in a project-level business case.

9.2.19 The table below summarises the number of sailings in the Ferry Do Something relative to the BaU:

Table 9.1: Papa Stour – number of sailings in Ferry BaU and Ferry Do Something

	Mon	Tues	Wed	Thurs	Fri	Sat	Sun
BaU	2	0	2	0	3	2	2
Ferry Do Something	2	2	2	2	3	2	2
Ferry Do Something v BaU	***0***	***+2***	***0***	***+2***	***0***	***0***	***0***

Option costs

9.2.20 As explained in Chapter 3, all costs in the Economic Dimension are presented on a present value basis. In the economic appraisal, capital (initial and lifecycle) and operating / maintenance costs are profiled over 60 years and discounted to a present value. The following points should be noted:

- **PVCs** include all capital expenditure, operating and maintenance costs and are presented in 2023 market prices.[40]
- The Absolute PVC represents the total discounted cost of each option over the appraisal period. The Appraisal PVC shows the incremental cost of each option relative to the BaU (i.e. 'Absolute PVC' of each intervention less the 'Absolute PVC' of the BaU). This is because the appraisal is focused on incremental costs and benefits relative to the BaU.
- Fares revenue has been excluded as it totals less than £20,000 per annum and is not expected to materially change. Similarly, changes in ferry operating subsidy requirements have not been quantified and will be developed alongside the Public Accounts position at the next stage of appraisal.

Table 9.2: Papa Stour PVCs (2023 market prices, 60-years)

	Absolute PVC (2023 market prices, 60-years)	Appraisal PVC (2023 market prices, 60-years)
PS1: BaU	£119.0m	-
PS2: Ferry Do Something	£124.4m	£5.4m

[40] PVCs are presented in market prices in line with TAG convention (i.e. costs in factor prices are uplifted to market prices), ensuring costs and benefits are compared on a consistent basis. These should not be interpreted as the council's cash outlay or funding requirement though, which is addressed separately in the Financial Case.

9.3 Options Appraisal

Transport Planning Objectives

9.3.1 The table below summarises the performance of the Papa Stour option packages against the TPOs:

Table 9.3: Papa Stour – appraisal against TPOs

	PS1: BaU	PS2: Do Something
TPO1: Resilience	O	O
TPO2: Capacity	O	✓
TPO3: Limited, fixed times of travel in operating day	O	✓
TPO4: Cost	O	O
TPO5: Physical accessibility	O	O
TPO6: Length of operating day	O	✓
TPO7: Non-car travel options	O	O

9.3.2 The replacement of MV *Snolda* with a Type 1 or equivalent vessel would address the resilience risks associated with continuing operation with a ferry that is now over 40-years old. Whilst physical accessibility is less of a problem on the Papa Stour route than on other routes, a modern Type 1 or equivalent vessel would be fully Equality Act compliant. The key benefit of the new vessel however is that it would lift the 12-passenger capacity threshold in place at present and would also expand vehicle carrying capacity. All of these benefits apply to both **PS1** and **PS2, meaning that the net impact is neutral in terms of resilience and physical accessibility.**

9.3.3 **PS2**, the Ferry Do Something, offers the incremental benefit of improving the flexibility of travel through expanding the number of days on which the service operates and potentially its frequency. Through adding sailings on Tuesdays and Thursdays, **PS2** also increases weekly carrying capacity by 35% and expands the operating day on those days. In these respects, **PS2** offers a minor benefit over the BaU in terms of TPO2, TPO3 and TPO6.

STAG Criteria

9.3.4 The table below summarises the performance of the Papa Stour option packages against the STAG criteria:

Table 9.4: Papa Stour – appraisal against the STAG criteria

	PS1: BaU	PS2: Do Something
Environment	O	O
Climate change	O	✗
Health, safety and wellbeing	O	✓
Economy	O	✓
Equality and accessibility	O	✓✓

9.3.5 A qualitative appraisal against each of these criteria is now provided in turn, with detail on the individual sub-criteria included in the ASTs.

Environment

9.3.6 The figure below maps the main environmental constraints at Papa Stour and West Burrafirth:

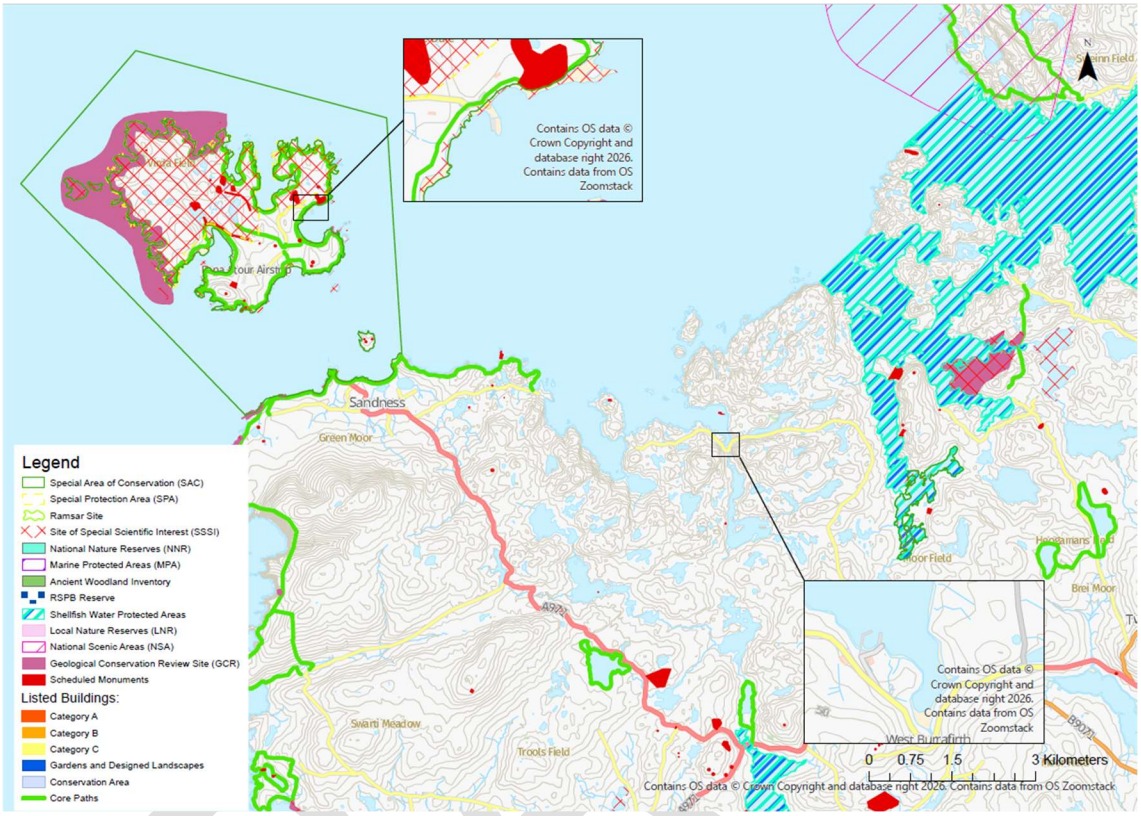

Figure 9.3: Papa Stour and West Burrafirth – environmental constraints maps

9.3.7 The key points of note from the above figure are as follows:

- At **Papa Stour**:
  - The ferry terminal at Papa Stour is within a Special Area of Conservation (SAC) and part of the terminal is within a SSSI.
  - It is also within 200m of a Special Protection Area for breeding Arctic Tern and Ringed Plover.
  - There are residential properties in relatively close proximity to the ferry terminal.
  - There are also Scheduled Monuments to the north-west and north-east of the ferry terminal.
  - There is a Core Path in close proximity to the ferry terminal.
- There are no environmental designations of significance at **West Burrafirth** outwith one residential property within 250 metres of the pier and a Scheduled Monument within 200 metres of the north-east of the harbour.

9.3.8 Papa Stour is therefore an environmentally sensitive area, but the proposed works in **PS1** and **PS2** are generally minimal (a short pier extension) and equivalent. PS2 is therefore scored as neutral overall with respect to the STAG Environment criterion.

Climate Change

9.3.9 MV *Snolda* is one of the oldest vessels in the Shetland fleet, built in 1983. Her replacement by a new Type 1 or equivalent vessel built to a modern design would likely record an emissions reduction benefit, particularly if such a vessel is powered by a zero-emission fuel or could be retrofitted to do so in the future (the age of MV *Snolda* would make such a retrofitting cost prohibitive).

9.3.10 **PS2** assumes the same vessel as the BaU **(PS1)**, and so in most respects the **PS1** and **PS2** are equivalent. The only difference in terms of Climate Change is service frequency as **PS2** will increase the number of sailings per week by 35%, generating a minor negative impact.

Health, Safety and Wellbeing

9.3.11 The provision of a new Type 1 or equivalent vessel in both options would record a minor safety benefit (or, more accurately, a risk reduction benefits) relative to the current situation but, as the benefits apply equally to the **PS1** and **PS2**, the overall safety impact is neutral.

9.3.12 There is no health, dentistry or social care provision on Papa Stour, meaning residents must travel to their GP in West Mainland or further afield to Lerwick for hospital appointments etc. Both **PS1** and **PS2**lift the 12-passenger cap on MV *Snolda*, thus reducing the likelihood of being unable to get a booking when travelling to or from an appointment (recognising that a booking is required on both the outbound and return sailing, of which there is only one option in each direction (Friday excepted) if a day return is to be made). The net impact relative to the BaU is therefore neutral.

9.3.13 Option **PS2** would be particularly beneficial for access to healthcare, as it would increase the number of days on which Papa Stour residents could travel for appointments. This would be particularly valuable for any residents travelling back from an appointment on mainland Scotland and arriving back in Shetland on a non-sailing day to Papa Stour. Overall, this reflects a minor positive impact for **PS2**.

Economy

9.3.14 Engagement with the Papa Stour community in March 2025 highlighted the economic constraints placed on the island by the ferry service. A combination of a low passenger capacity cap and non-sailing days make travelling to and from the island more difficult and inflate the cost of doing business in the island.

9.3.15 The replacement of MV *Snolda* would lift the 12-passenger capacity cap and would also expand vehicle deck capacity, including the ability to carry large vehicles and plant. This would be economically advantageous for Papa Stour, particularly in the summer months when there is a growing number of tourists visiting the island. However, this applies to both **PS1** and **PS2**.

9.3.16 Option **PS2** would have the most significant benefits by filling the non-sailings days. This would assist in reducing the cost of doing business on the island and by extension the fees paid by residents for essential services. Indeed, as part of the SOC consultation, the community provided a recent example of how costs escalated on an island construction project due to the challenges of getting contractors and equipment to and from the island. Seven-day sailings would assist in addressing this.

9.3.17 The ability to make a day return to Papa Stour on any day of the week **(PS2)** would also support the island's nascent tourism industry, an important economic growth opportunity, generating a minor positive economic impact.

Equality and Accessibility

9.3.18 Both options would improve physical accessibility on the vessel. Whilst the passenger lounge on MV *Snolda* is on the same level as the car deck, there are doorway sills which can be a problem for Persons of Reduced Mobility. A new Type 1 or equivalent vessel built to modern design standards would deliver step free access throughout.

9.3.19 Perhaps the more significant benefit however would be the increase in connectivity delivered by **PS2**. At present, non-sailing days (layered on top of the limited capacity) are a barrier to travel for Papa Stour residents. For example, if a Papa Stour resident is travelling back to the island from e.g., mainland Scotland on a non-sailing day, they will require at least one overnight stay, potentially at considerable expense. This is a material inequality not experienced by larger communities in Shetland, which can always make day returns to Lerwick and, in some instances, mainland Scotland (albeit it is a long day).

9.3.20 Option **PS2** would also support greater equality of access for those with the 'age' protected characteristic. There are two parts to this:

- Primary school age children could commute daily to school in West Mainland, providing greater interaction with their peers and, within the constraints of the timetable, access to extra-curricular activities. An earlier first departure first departure from Papa Stour and later last departure from West Burrafirth (Friday excepted for the latter) would be advantageous.
- With no social care provision on the island, older people in residential care homes off-island could more readily be visited by island-based family. Similarly, it would be easier for older people on island (and indeed island residents generally) to benefit from visits from family and friends on mainland Shetland.

9.3.21 Filling gaps in the timetable would therefore be beneficial from an equalities perspective and would assist in reducing some of the inequalities faced by island residents.

Feasibility, Affordability and Public Acceptability

Feasibility

- The physical infrastructure options (vessels, ferry terminals and fixed links) are all technically feasible.
- Outline and detailed design work would be required for ferry terminal works inclusive of e.g., surveys, ground investigations, environmental consenting etc. However, it is recognised that the scale of the proposed works at both Papa Stour and West Burrafirth are minimal in both options.
- The key feasibility challenge is associated with **PS2** – despite its significant advantages, scaling-up to a seven-day service would require additional crew. The ability to recruit and retain these crew would potentially be a challenge given that West Mainland is sparsely populated.

Affordability

- As will be explained in the Financial Dimension, affordability is the primary challenge across all options. Outwith the ongoing procurement of one new Type 1 vessel, the Council does not have committed funding for any capital works.
- External funding will be required for any of the options progressed through this business case. Naturally, the larger the scale of the option, the higher its cost and thus the more significant the affordability gap.

- The BaU **(PS1)** is effectively the minimum investment required over time to maintain the service. The increment in **PS2** would be the requirement to (broadly) double the number of crew – whilst the absolute cost of this would be very low compared to some of the other routes, value for money would need to be assessed given the relatively low demand on the route.

Public acceptability

9.3.22 The public engagement with regards to the Papa Stour route will take place on 22nd June and this be recorded in this report post 30th June 2026 decision.

9.4 Preferred Option

9.4.1 The preferred option selected by Shetland Islands Council Members on 30th June 2026 will be recorded in this report post-decision.

10 Economic Dimension - Skerries

10.1 Overview

10.1.1 This section provides the Economic Dimension for Skerries, commencing with a brief summary of the option packages followed by their appraisal against the TPOs and STAG criteria. ASTs for each option have been provided alongside this report, detailing the appraisal against each individual criterion.

10.2 Option Packages

10.2.1 For the islands for which fixed links are not in-scope (Foula, Papa Stour and Skerries), the option packages were limited to the business-as-usual and Ferry Do Something.

Option Skerries 1: Business-as-Usual

10.2.2 The BaU includes the replacement of MV *Filla* with a Type 1 vessel at life expiry and replacement of the life expired finger pier at Skerries. The BaU represents the appraisal baseline against which costs and benefits are assessed.

Capital measures

Vessel

10.2.3 The BaU is for the replacement of MV *Filla* with a Type 1 vessel at life expiry (2031 to 2033). It is recognised that the design for the Type 1 vessel currently being built by the Council may not correspond exactly to the seakeeping needs of this route. It is therefore possible that this design may be modified to meet route specific needs, but its broad dimensions would remain the same, and thus the infrastructure has been sized to accommodate a Type 1.

10.2.4 A Type 1 or equivalent would offer a slightly larger passenger and vehicle carrying capacity, roll through capability and the ability to carry larger agricultural vehicles.

10.2.5 It is important to note that MV *Filla* is the most fuel intensive vessel in the Council fleet. Reflecting this, it is possible that the Implementation Route Map may suggest its earlier replacement if this is considered a value for money proposition.

Harbour infrastructure

10.2.6 Due to the poor condition of the finger pier at Skerries, full replacement is required to support berthing vessels in the near future. The pier design would need to consider the alignment of both MV *Filla* and any replacement Type 1 or equivalent vessel, whilst minimising any modifications to the linkspan which was installed in 2021.

10.2.7 Careful planning would be needed to ensure that the ferry service could be maintained throughout the construction works.

10.2.8 A General arrangement drawing and summary of the works required at Skerries is provided below. It should be noted that the BaU for Vidlin is covered in the Whalsay section (Chapter 6), and these works would envelop the Skerries BaU and Do Something options

Skerries

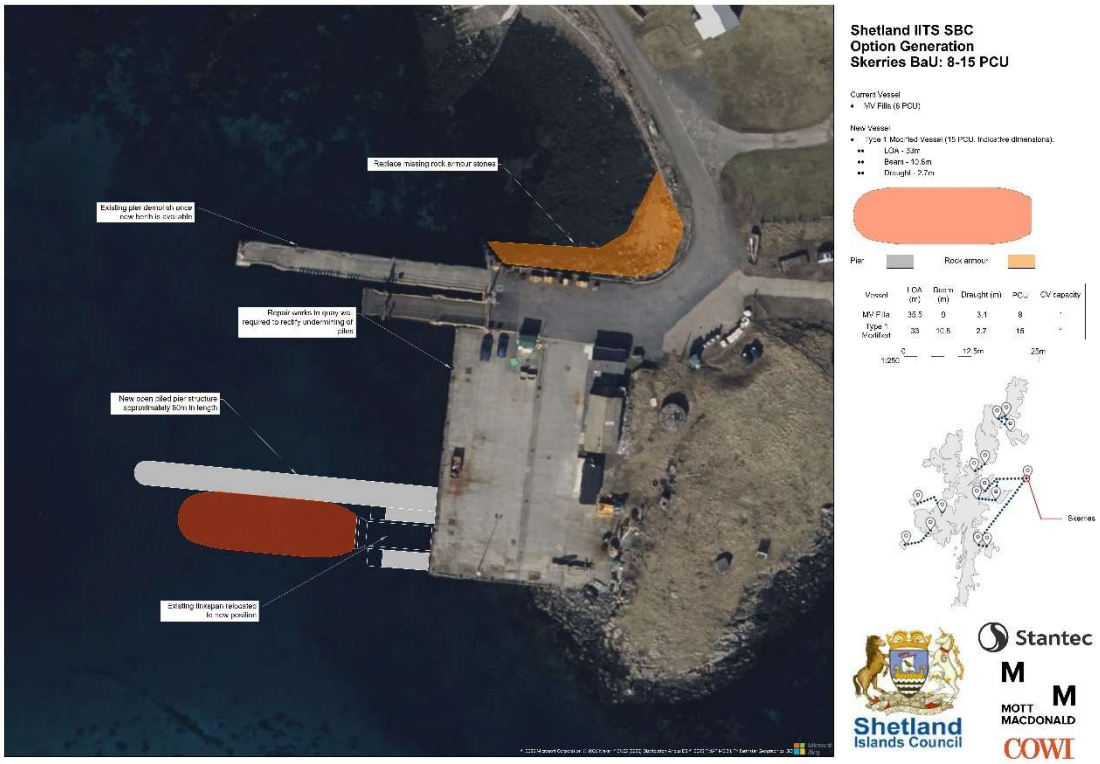

Figure 10.1: Skerries – Business-as-Usual

10.2.9 The following works would be required at Skerries:

- Replacement of the existing finger pier with a new 60-metre-long open piled pier, including fenders, bollards, ladders etc.
- Replacement of missing rock armour stones to the north of the pier.
- Repairs to the sheet pile wall to the south of the berth required.

Ferry revenue measures

10.2.10 There are no ferry revenue measures associated with this option.

Option Skerries 2: Ferry Do Something

10.2.11 The Ferry Do Something for Skerries is focused primarily on revenue measures, but includes coastal protection works on the road to the ferry terminal.

Capital measures

Vessel

10.2.12 A Type 1 or modified Type 1, as per the BaU.

Harbour infrastructure

10.2.13 The required harbour works to accommodate the Type 1 or equivalent would be as per the BaU. The only increment here would be coastal protection works / reinforcement of the access road to the ferry terminal, which is being undermined by coastal erosion.

Ferry revenue measures

10.2.14 The Ferry Do Something **(Ske2)** would entail delivering an additional sailing on a Wednesday, transitioning the service to a seven-day operation. It is assumed that the current Friday timetable would operate on a Wednesday, thus providing three return sailings to Vidlin.

10.2.15 This is a conceptually deliverable solution, but it would require additional crew. The deliverability of securing the required crew and the value for money of doing so would need to be considered in a project-level business case.

10.2.16 The table below summarises the number of sailings in the Ferry Do Something relative to the BaU. It should be noted that the figures do not account for positioning runs to and from Symbister – it should be noted though that routing via Symbister does provide an alternative connection to mainland Shetland.

Table 10.1: Skerries – number of sailings in Ferry BaU and Ferry Do Something

	Mon	Tues	Wed	Thurs	Fri	Sat	Sun
BaU	1	1	0	1	3	1	2
Ferry Do Something	1	1	3	1	3	1	2
Ferry Do Something v BaU	***0***	***0***	***+3***	***0***	***0***	***0***	***0***

Option costs

10.2.17 As explained in Chapter 3, all costs in the Economic Dimension are presented on a present value basis. In the economic appraisal, capital (initial and lifecycle) and operating / maintenance costs are profiled over 60 years and discounted to a present value.

10.2.18 However, to provide an indication of the scale of the costs associated with the different options, the table below presents the Present Value of Costs (PVC) on both an absolute and incremental basis. The following points should be noted:

- **PVCs** include all capital expenditure, operating and maintenance costs and is presented in 2023 market prices.[41]
- The Absolute PVC represents the total discounted cost of each option over the appraisal period. The Appraisal PVC shows the incremental cost of each option relative to the BaU (i.e. 'Absolute PVC' of each intervention less the 'Absolute PVC' of the BaU). This is because the appraisal is focused on incremental costs and benefits relative to the BaU.
- Fares revenue has been excluded as it totals less than £20,000 per annum and is not expected to materially change. Similarly, changes in ferry operating subsidy requirements have not been quantified and will be developed alongside the Public Accounts position at the next stage of appraisal.

Table 10.2: Skerries PVCs

	Absolute PVC (2023 market prices, 60-years)	Appraisal PVC (2023 market prices, 60-years)
Ske1: BaU	£119.7m	-
Ske2: Ferry Do Something	£132.6m	£12.9m

[41] PVCs are presented in market prices in line with TAG convention (i.e. costs in factor prices are uplifted to market prices), ensuring costs and benefits are compared on a consistent basis. These should not be interpreted as the council's cash outlay or funding requirement though, which is addressed separately in the Financial Case.

10.3 Options Appraisal

Transport Planning Objectives

10.3.1 The table below summarises the performance of the Skerries option packages against the TPOs:

Table 10.3: Skerries – appraisal against TPOs

	Ske1: BaU	Ske2: Do Something
TPO1: Resilience	O	✓
TPO2: Capacity	O	✓
TPO3: Limited, fixed times of travel in operating day	O	✓
TPO4: Cost	O	O
TPO5: Physical accessibility	O	O
TPO6: Length of operating day	O	O
TPO7: Non-car travel options	O	O

10.3.2 Resilience is not, at present, a particular challenge on the Skerries route – MV *Filla* is still one of the newer vessels in the fleet (although still over 20-years old) and the infrastructure does what is required of it. However, the finger pier at Skerries is in need of short-term replacement and the vessel is beginning to age, both of which present resilience risks. **Ske2** is as per the BaU in this respect, replacing the finger pier and introducing a new Type 1 vessel; however, Option **Ske2** records an additional benefit with regards to resilience, reducing the risk of the ferry access road becoming unusable as a consequence of coastal erosion / flooding.

10.3.3 **Ske2** records a minor capacity benefit as it also includes a Wednesday sailing day, effectively providing more capacity through frequency. As well as increasing absolute capacity, this option would also address the capacity issues that can emerge either side of a non-sailing day, particularly if there is a cancellation of the service the day before or the day after a non-sailing day.

10.3.4 The introduction of an additional sailing on a Wednesday would also represent a minor positive of **Ske2** against TPO3, providing Skerries with a seven-day timetable, removing the costs and other impacts of having a non-sailing day.

STAG Criteria

10.3.5 The table below summarises the performance of the Skerries option packages against the STAG criteria:

Table 10.4: Skerries – appraisal against the STAG criteria

	Ske1: BaU	Ske2: Do Something
Environment	O	O
Climate change	O	✓
Health, safety and wellbeing	O	✓
Economy	O	✓✓
Equality and accessibility	O	✓

10.3.6 A qualitative appraisal against each of these criteria is now provided in turn, with detail on the individual sub-criteria included in the ASTs.

Environment

10.3.7 The figure below maps the main environmental constraints at Skerries and Vidlin:

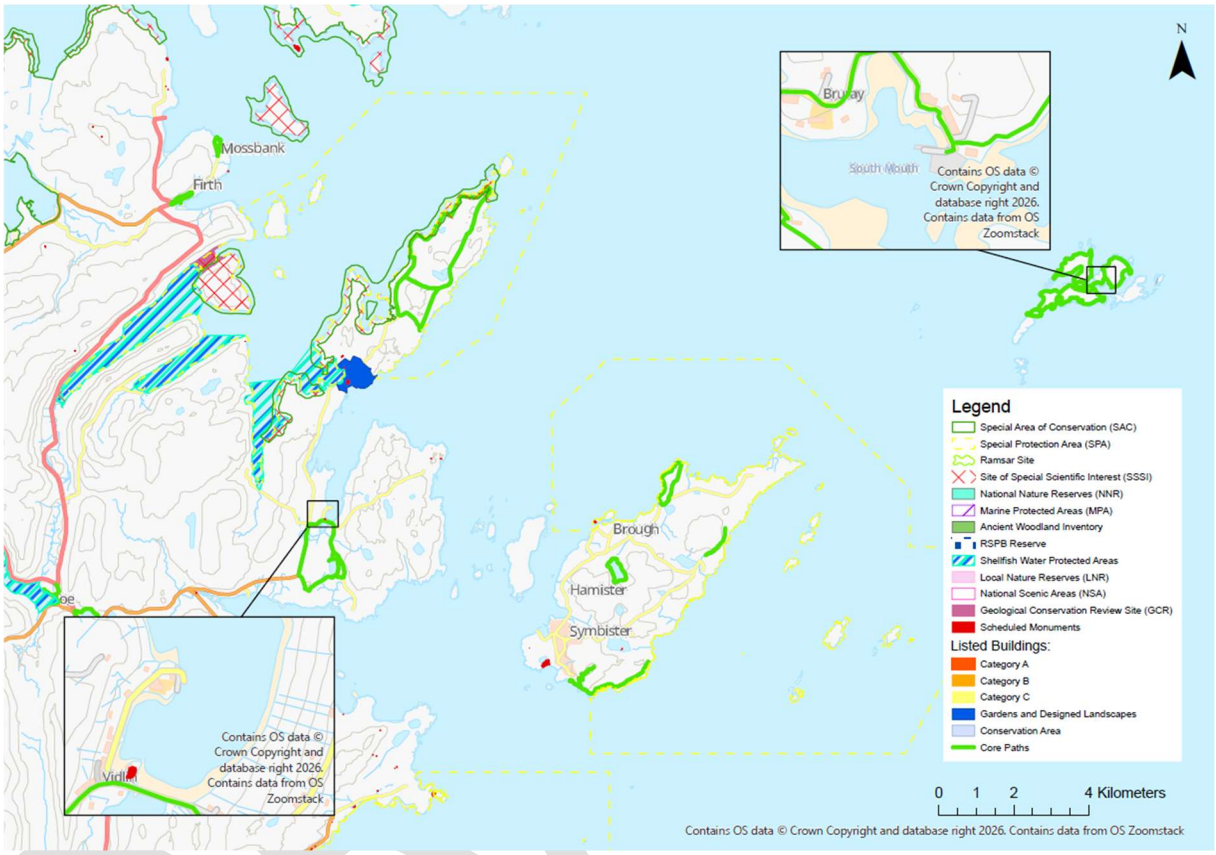

Figure 10.2: Skerries and Vidlin – environmental constraints maps

10.3.8 The key points of note from the above figure are as follows:

- At **Skerries**
  - There are residential properties in relatively close proximity to the ferry terminal.
  - There is a Category B listed building within circa 100 metres of the ferry terminal.
  - There is a Core Path in close proximity to the ferry terminal.
  - There is a coastal flooding risk affecting the ferry terminal access road.
- At **Vidlin**:
  - Lunnasting Primary School and residential properties are immediately adjacent to the ferry terminal.
  - There is Core Path, which passes immediately opposite the ferry terminal.
  - Vidlin Broch, a scheduled monument, is on the edge of the harbour area.

10.3.9 The construction of a new berth at Skerries in both options could have some short-term environmental impacts associated with e.g., noise, construction dust and biodiversity and habitats. However, the new pier would be built within the existing harbour and would be

unlikely to impact on any particularly sensitive receptors. As this is true of **Ske2** and the BaU **(Ske1)**, this is assessed as a neutral environmental impact.

10.3.10 As noted in the Whalsay chapter, there is a requirement for a new berthing structure at Vidlin. This would likely be built behind the current structure and was scored neutral from an environmental perspective.

Climate Change

10.3.11 Whilst MV *Filla* is one of the newer vessels in the fleet, she is very fuel intensive (she consumes 225 litres per hour (l/ph) relative to 204 l/ph for MV *Dagalien*, the largest vessel in the Shetland fleet) and thus is 'emission heavy' relative to her size. Her replacement with a Type 1 or equivalent vessel in both options would therefore be positive with respect to this criterion.

10.3.12 Whilst **Option Ske2** would increase the number of sailings, it is likely that overall emissions would reduce with a new and more fuel-efficient vessel.

10.3.13 **Option Ske2** would also record a benefit with regards to adapting to the effects of climate change. The access road to the ferry terminal is becoming increasingly threatened by coastal erosion and this option entails coastal defence measures to protect the road. Without these works, there is a long-term possibility that several households on Skerries could be cut off from the ferry terminal.

Health, Safety and Wellbeing

10.3.14 The provision of a new Type 1 or equivalent vessel in both options would record a minor safety benefit (or, more accurately, a risk reduction benefit) relative to the existing situation as it would be roll through. This would reduce the risks associated with motorists reversing onto the ferry. However, the net benefit of **Ske2** compared with the BaU **(Ske1)** is neutral in this respect, as a new vessel would be delivered under both scenarios.

10.3.15 Whilst there is a health care assistant in Skerries, health provision is otherwise limited and there is no dentistry or social care provision on island, meaning residents must travel to access these services. Most of the health needs of the island are delivered in Lerwick, although it is understood that at least some Skerries residents are registered with the Whalsay dental practice. Regardless, Option **Ske2** would record a benefit in terms of access to healthcare by scaling-up to a seven-day timetable.

10.3.16 Option **Ske2** would be particularly beneficial for any residents travelling back from an appointment on mainland Scotland and arriving back in Shetland on a non-sailing day to Skerries (for example, arriving back on a Tuesday evening and the next sailing is not until Thursday).

Economy

10.3.17 Engagement with the Skerries community in March 2025 highlighted several of the economic challenges facing the island, most notably its limited on-island services and uncertainty over the future of the island's shops. This makes connections to mainland Shetland critically important from the perspective of both the island's residents and its supply-chain. The new vessel which would be delivered under both options would be advantageous given it would increase vehicle capacity.

10.3.18 However, it is again option **Ske2** that would have the most material benefit, as it would deliver seven-day services. This would support increased resident travel, improve the functioning of the supply-chain and make it easier and potentially lower cost to deliver services to Skerries

(particularly if the Tuesday service is cancelled as those travelling to or from the island would not need to wait until Thursday for the next connection, assuming there is space on it).

10.3.19 The enhanced coastal protection for the ferry terminal access road delivered under **Ske2** would safeguard / support the resilience of the Skerries economy. If this road became unusable at some point in the future, it would be highly detrimental to Skerries.

Equality and Accessibility

10.3.20 As the same vessel will operate under both BaU and **Ske2**, the more significant benefit of **Ske2** would be the increase in connectivity delivered by **Ske2**. At present, the non-sailing day is a barrier to travel for Skerries residents. For example, if a Skerries resident is travelling back to the island from e.g., mainland Scotland on a Tuesday, they will require at least two overnight stays, potentially at considerable expense. This is a material inequality not experienced by larger communities in Shetland, which can always make day returns to Lerwick and, in some instances, mainland Scotland (albeit it is a long day).

10.3.21 Filling gaps in the timetable would therefore be beneficial from an accessibility perspective and would assist in reducing some of the inequalities faced by island residents.

Feasibility, Affordability and Public Acceptability

Feasibility

- The physical infrastructure options (vessels, ferry terminals and fixed links) are all technically feasible.
- Outline and detailed design work would be required for the berth at Skerries inclusive of e.g., surveys, ground investigations, environmental consenting etc. The key requirement would be to ensure no disruption to services when the new berth is being built.
- The key feasibility challenge is associated with **Ske2** – despite its significant advantages, scaling-up to a seven-day service would require additional crew. The ability to recruit and retain these crew would potentially be a challenge as MV *Filla* is Whalsay-based and is one of three vessels already crewed from that island. The practicalities of finding a further crew would need to be worked through in a project-level business case.

Affordability

- As will be explained in the Financial Dimension, affordability is the primary challenge across all options. Outwith the ongoing procurement of one new Type 1 vessel, the Council does not have committed funding for any capital works.
- External funding will be required for any of the options progressed through this business case. Naturally, the larger the scale of the option, the higher its cost and thus the more significant the affordability gap.
- The replacement of the finger pier at Skerries **(Ske1 and Ske2)** is effectively the minimum investment required over time to maintain the service. There is an argument that the coastal defence works required under **Ske2** could also feature in the BaU (or may do so over time).
- The increment in **Ske2** would be the requirement to recruit a second crew for MV *Filla* – whilst the absolute cost of this would be very low compared to some of the other routes, value for money would need to be assessed given the relatively low demand on the route.

Public acceptability

10.3.22 Engagement with the Skerries community at the Whalsay public drop-in session - as per March 2025 - could not be arranged. Therefore, the public engagement with regards to the

Skerries route is still to take place and arrangements for a meeting are in progress. The feedback provided will be recorded in this report post 30th June 2026 decision.

10.4 Preferred Option

10.4.1 The preferred option selected by Shetland Islands Council Members on 30th June 2026 will be recorded in this report post-decision.

11 Financial Dimension

11.1 Overview

11.1.1 The purpose of the Financial Dimension is typically to demonstrate the affordability of a project or programme with respect to total programme costs, funding sources and their status and key financial risks. The IITCP is however a somewhat unusual programme in several respects:

- A business case is conventionally developed on the basis of an investment (a 'Do Something') to improve on the present-day position (the business-as-usual), with the assumption being that the BaU is broadly static. The question then becomes whether that 'Do Something' is affordable. However, in the context of IITCP, **very significant investment in the Council ferry service will be required over the next decade purely to maintain the BaU (i.e., the BaU is not a static position).**
- A **programme business case generally covers a fixed time period** – i.e., it has an end point by which all individual projects within the programme will be delivered. For example, the A9 Dualling programme business case consists of multiple individual projects which will collectively deliver a dual carriageway from Perth to Inverness by 2035. However, given the need to continually invest even to maintain the BaU, the IITCP is effectively a rolling programme with no fixed end date. The phasing of IITCP options will not be determined until Shetland Islands Council Members have selected a preferred option (June 2026) and these are profiled in the Implementation Route Map (autumn 2026).
- The **starting position in the IITCP is that the programme is unaffordable** in the context of currently available Council funding. Indeed, the purpose of the business case is to make the case to government for funding to support the delivery of the IITCP. At this stage, even the BaU across all routes is unaffordable for the Council.
- The **absence of committed funding makes it difficult to develop a funding profile** for the emerging preferred options as it is unclear at this stage when they will come forward and thus what investment in the BaU will be required prior to this.

11.1.2 The above points make it difficult at this stage to develop a conventional Financial Dimension showing programme costs, funding sources etc. The purpose of this chapter is therefore twofold:

- To detail in the **required capital funding to maintain a 'base case' sustainable ferry service over the next 10 years**.
- To set out **in principle the financial considerations associated with fixed links**, and the potential **funding and financing strategies** that could deliver one or more tunnels in Shetland.

Implementation Route Map

11.1.3 The IRM, which will be produced following the selection of preferred route options, will set out a timed programme of investment over circa 30-years. The IRM will be accompanied by an indicative programme-level cost profile, showing the funding requirement over the duration of the IITCP.

Project business cases

11.1.4 Whilst the IRM will establish a programme-level cost profile, the stage of development of the ultimate IITCP projects and the uncertainty over funding means that this will be largely indicative. The development of robust and fully detailed project cost profiles will only realistically be plausible in project level business cases where there is greater certainty on costs, timing and funding and financing approaches. We discussed this issue with Transport

Scotland when preparing this Network Strategy OBC, and it was agreed that detailed financial analysis should only be undertaken at project business case stage.

11.2 Ferry Service - Short-Term Capital Funding Requirements

11.2.1 The Strategic Dimension of this OBC highlighted the various challenges associated with an ageing ferry fleet and infrastructure, including resilience issues, worsening reliability and escalating maintenance costs. The IITCP has established that **a significant programme of capital investment in the Council ferry service will be required in the short-term simply to maintain the BaU / present day position**.

11.2.2 Almost all of this investment will be required irrespective of whether one or more fixed links is progressed or otherwise. The age of the assets and the lead time for a fixed link (even if funding was provided immediately) means that investment will be needed across most routes, the one exception potentially being Yell Sound, where the assets could realistically be maintained through to a fixed link delivery in the mid to late 2030s.

11.2.3 This section therefore provides a high-level profile of the capital funding requirement of the ferry service over the next decade. It should be noted that:

- A **10-year horizon** has been chosen on the basis that all vessels in the current fleet will need to be replaced within that time period, assuming a 30-year vessel life (acknowledging that, in-practice, several vessels will continue beyond this). In addition to harbour upgrades to accommodate new tonnage, several discrete harbour infrastructure investments will be required to address asset life expiry, the provision of a new finger pier in Skerries for example.
- The **focus here is solely on capital expenditure**. The annual revenue funding requirements of the ferry service are well understood and less lumpy in nature.
- The figures have been developed on the basis that assets on **all routes and will need to be replaced and that there is no commitment to fixed links**, which may reduce the BaU spend if a 'make do and mend' approach is adopted until a fixed link is opened. They can therefore be thought of as **top line figures / higher-end estimates of spend**.
- A **15% contingency** has been applied to all costs. This figure has been selected because it aligns with the contingency figure used for the tunnel estimates. It is a proportionate approach for a programme business case, but a much more robust **Quantitative Cost Risk Analysis (QCRA)** will be required in individual project business cases.

10-year cost profile

11.2.4 The table below sets out the indicative ten-year capital cost profile for the ferry network from 2026/27 to 2035/36, based on a profile costs provided by Mott MacDonald. This represents the investment requirement, capturing the timing and scale of vessel replacement and harbour infrastructure works required to maintain and renew the network over the short to medium-term.

11.2.5 For all routes, costs are presented on a Business-as-Usual (BaU) basis, with the exception of Bluemull Sound, where Ferry Do Something values are shown reflecting the removal of the BaU option at SOC stage and the requirement for enhanced investment to address existing capacity constraints.

11.2.6 The cost estimates are based on Q4 2025 prices expressed in factor prices. Base cost data were provided by Mott MacDonald. These costs have been converted to market prices using the standard TAG uplift for indirect taxation (e.g., VAT) and uplifted in real terms using the TAG Databook real cost factor (RCF) of 2.1% per annum (Pmean, Table A1.2.1) and the GDP deflator series to reflect expected construction-specific and general inflation.

11.2.7 All values are presented in undiscounted nominal terms and represent the expected financial outturn cost. A contingency allowance of 15% has been applied to base cost estimates prior to the application of inflation to align with the contingency allowance applied to fixed link options and is presented separately below for transparency.

11.2.8 The profile reflects capital costs only and excludes operating expenditure.

Table 11.1: 10-year ferry service business-as-usual capital investment profile by route and financial year (£000, nominal prices, including real cost inflation and general inflation)

Route	Item	2026/27	2027/28	2028/29	2029/30	2030/31	2031/32	2032/33	2033/34	2034/35	2035/36
Bluemull Sound[42]	Vessels	£0	£647	£20,679	£30,743	£10,130	£0	£0	£0	£0	£0
	Harbours	£3,407	£961	£46,588	£0	£0	£1,140	£397	£0	£0	£0
Bressay	Vessels	£0	£0	£202	£490	£21,864	£10,566	£0	£0	£0	£0
	Harbours	£932	£0	£269	£811	£13,047	£21,310	£0	£0	£0	£0
Foula	Vessels	£93	£129	£2,829	£0	£0	£0	£0	£0	£0	£0
	Harbours	£342	£98	£5,572	£0	£0	£2,377	£2,482	£12,105	£12,643	£13,205
Papa Stour	Vessels	£0	£129	£404	£21,989	£0	£0	£0	£0	£0	£0
	Harbours	£323	£423	£3,412	£6,066	£0	£0	£0	£0	£0	£0
Skerries	Vessels	£0	£0	£0	£0	£0	£152	£476	£26,041	£0	£0
	Harbours	£903	£552	£16,567	£0	£0	£0	£0	£0	£0	£0
Whalsay	Vessels	£124	£388	£21,150	£0	£146	£456	£24,932	£0	£0	£0
	Harbours	£426	£1,026	£13,295	£790	£17,620	£5,085	£195	£14,107	£0	£0
Yell	Vessels	£0	£0	£0	£0	£328	£950	£32,396	£45,614	£12,993	0
	Harbours	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0
Contingency (15% of base costs)		£982	£653	£19,645	£9,133	£9,470	£6,306	£9,132	£14,680	£3,845	£1,981
Total capital cost (including contingency)		£7,532	£5,007	£150,613	£70,023	£72,605	£48,342	£70,010	112,547	£29,481	£15,186

[42] It should be noted that the figures for Bluemull Sound are the Ferry Do Something, as the Business-as-Usual was ruled out in the SOC.

11.2.9 The key points of note from the above table are as follows:

- Due to the number of vessels which are at or have passed their design life, capital expenditure is highly front-loaded. While this makes sense on a single link basis, this could be smoothed in reality to create a steadier annual investment profile.
- The Bluemull Sound route accounts for a disproportionate share of early-period investment, reflecting the requirement to move beyond a BaU approach and address existing problems.
- Peak investment occurs in 2028/29, with annual capital expenditure exceeding £150m, driven by concurrent vessel replacement and harbour infrastructure programmes across multiple routes.
- Contingency accounts for approximately 15% of base costs across the programme, providing an allowance for uncertainty at this stage and reflecting the preliminary nature of design and cost development.
- The profile relates to capital investment only and excludes operating and maintenance costs.
- The total cost over ten years is **£581m**, including 15% contingency.

11.2.10 The scale and timing of this investment requirement indicates that maintaining the existing ferry network will require significant funding support, even before consideration of any service enhancements or fixed link options.

Funding strategy

11.2.11 The operation of the ferry service and the maintenance and replacement of the assets associated with it is a business-as-usual activity for the Council. All routes and thus the service overall operate at an annual deficit.

11.2.12 The table below summarises how the ferry service is currently funded:

Table 11.2: Shetland Islands Council Ferry Service – current funding arrangements

Source	Contribution / Role
Fares	• Fares revenue is used to partially offset the deficit of each route and the network overall • The revenue only covers a very small proportion of total operating costs, <10% on average
Shetland Islands Council	• Operator of the service and responsible for the allocation of capital and revenue funding associated with the service • Contribution towards annual operating deficit where this is not covered by the Scottish Government allocation in the General Revenue Grant • Allocation of any capital grant funding for the ferry service • Part-funding of asset investment through capital programmes or borrowing
Scottish Government	• Annual allocation of funding to the Council through the General Revenue Grant to cover the operating deficit. This funding is not ring-fenced for the ferry service but has been used for this purpose • Provision of grants for capital investment, e.g., £10m in the Scottish Budget 2025/26 for the new relief vessel
UK Government	• No formal role, but Shetland Islands Council is eligible to apply for UK Government funding programmes, the delivery of the Fair Isle Ferry Replacement Project through the *Levelling-Up Fund* for example

11.2.13 The Council had historically funded all capital investment in the ferry service through its capital programme and / or prudential borrowing. However, funding constraints meant that no new ferries were built between MV *Dagalien* and MV *Daggri* entering service in 2004 and the order being placed for the new Fair Isle ferry in 2025. Both the Fair Isle vessel and the new Type 1 resilience vessel currently on order were largely funded through capital grant from government (UK and Scottish respectively), with a contribution from the Council.

11.2.14 It is likely that future investment in the ferry service will come from a combination of the Council's capital programme, borrowing and government grants. The Council will remain responsive to specific funding opportunities as they arise, but funds aligned with this purpose are relatively few and far between.

11.2.15 The Council has previously explored opportunities associated with private finance for vessels – delivered via tendering – but concluded that this represented poor value for money relative to direct public funding.

11.2.16 It is important to recognise with vessels that there are economies of scale and resultant cost savings to be obtained from ordering multiple vessels of the same class, allowing design and 'first of class' costs to be spread over several vessels. The potential cost savings are one reason for the IITCP commitment to develop broad vessel types, i.e., Type 1, Type 2 etc. It would therefore be advantageous to secure funding that allows the bulk ordering of vessels rather than single procurements. This approach has been adopted by the Council in its order for the fleet resilience vessel (a Type 1), where the Council has reserved the option to procure two further vessels from the successful tenderer.

11.2.17 The funding strategy for any future vessel or harbour infrastructure programme or project will be determined in the relevant project business cases.

Affordability

11.2.18 It is essential to reiterate here that **the scale of capital investment required over the next ten years to ensure a modern and resilient ferry service is currently unaffordable to the Council**.

11.2.19 At present, the only committed funds for major capital works (outwith the Fair Isle Ferry Replacement Project) are **the £10m** allocated as part of the **2025/26 Scottish Budget** – this has been allocated for the construction of the new resilience vessel currently being procured.

11.2.20 As can be seen with reference to Table 11.1, the committed capital funding is some way short of that required to maintain the ferry service. **The affordability of asset replacement is therefore the most fundamental challenge facing the Council ferry service at present.**

Financial risks

11.2.21 There are several financial risks with respect to investment in the inter-island ferry service over the next decade, which are summarised in the table below:

Table 11.3: Financial risks associated with investment in the inter-island ferry service

Risk	Impact
The cost estimates provided are based on Q4 2025 prices, uplifted by forecast inflation for year of spend. There is however a risk that **inflation could be higher than forecast**, and in particular that construction price inflation could outpace general inflation. This risk has been exacerbated by recent geopolitical tensions, which have	Construction costs are higher than forecast, even with the inclusion of contingency. This could have an effect on the Council's financial position given that grant funding is usually only allocated as a percentage of costs or as a fixed sum.

Risk	Impact
increased the cost of energy and other raw materials.	
Any **delay to investment could lead to cost increases**, both directly as a consequence of inflationary impacts and indirectly through maintaining older assets for a longer period of time (with increased scope for major breakdowns / failures).	This could have an effect on the Council's financial position given that grant funding is usually only allocated as a percentage of costs or as a fixed sum. There could also be short-revenue impacts associated with maintaining / repairing older assets, longer and more expensive refits for example.
Cost overruns are frequent occurrences in infrastructure projects, particularly on large-scale, long-term investments.	This could again have an effect on the Council's financial position given that grant funding is usually only allocated as a percentage of costs or as a fixed sum.
There are **cost savings available from ordering** multiple common vessels through a single procurement. However, if **available funding does not allow for this**, there is a of an overall increase in investment costs for the Council, and potentially external funders.	As well as the direct impact on the Council's financial position, there would be opportunity costs associated with overpaying for an asset that could be purchased at a lower unit price if funding was in place for bulk orders.

11.3 Fixed Links

11.3.1 As explained at the outset of this chapter, the starting position with regards to all four of the candidate fixed links is that the Council faces a significant affordability gap with respect to tunnels. Low traffic volumes mean that toll revenue will, at best, cover annual tunnel operating costs and thus capital costs must be sourced externally to this revenue stream.

11.3.2 In an attempt to quantify this challenge, the FLM considered the affordability and potential funding strategies for a fixed link across Yell Sound as a test case. This section summarises the outcomes of this work and draws out key findings for the other candidate fixed link islands.

11.3.3 Affordability and the preferred funding strategy for any single tunnel would ultimately be a matter for the project business case, when there is greater certainty on potential funding contributions.

Cost

Capital expenditure

11.3.4 Capital expenditure represents the total upfront investment required to deliver a tunnel. This is summarised in the table below for the four candidate fixed links. It should be noted that:

- The costs for Yell Sound are based on the detailed cost submissions provided by the three participating contractors in the FLM, with a normalisation exercise undertaken by COWI to ensure a like-for-like comparison between those contractors.
- Based on the FLM, a replicable cost model was created to allow for consistent assessment of the other three candidate fixed links. This model was then scaled and interpolated for each additional fixed link by adjusting key cost drivers such as tunnel length, approach road length, construction duration and programme-level budgeting.
- In the Financial Dimension, costs are typically profiled by year of spend and adjusted for inflation accordingly. However, given that there is as yet not committed funding for one or more tunnels, costs are reported in base prices (Q4 2025) only.

Table 11.4: Estimated tunnel capital costs – Q4 2025 prices (£m), rounded to the nearest £m

	Bressay	Unst	Whalsay	Yell
Pre-construction cost	£15	£20	£30	£25
Prelims, start-up and general costs	£30	£35	£43	£38
Site establishment	£39	£40	£42	£41
Project and technical management	£18	£24	£33	£27
Roads and surfacing	£13	£15	£25	£19
Spoil management	£2	£4	£5	£4
Tunnel portals construction	£12	£12	£12	£12
Tunnel works	£74	£120	£186	£145
Tunnel mechanical, electrical and plumbing	£21	£33	£51	£40
Testing and commissioning	£1	£1	£1	£1
Contingency @15%	£32	£42	£60	£49
Total cost	**£257**	**£346**	**£488**	**£401**

11.3.5 Taken together, the four candidate fixed links would cost **£1.49bn** in Q4 2025 prices.

Operational expenditure

11.3.6 Operation and maintenance (O&M) costs for tunnels are influenced by factors such as tunnel length, age, construction type, traffic load, safety system requirements and the complexity and quality of technical installations.

11.3.7 Indicative O&M costs were developed using a benchmarking approach drawing primarily on operational data from Norwegian and Danish road tunnels, where long-established national tunnel networks provide reliable reference points for factors such as tunnel length, traffic volumes, technical system complexity and safety critical installations.

11.3.8 For the FLM, on which the estimates in the IITCP are based, these benchmarks were adjusted to reflect UK-specific conditions, the increased complexity of the proposed tunnels and the absence of comparable domestic assets. This estimate includes key operational activities such as major repairs, inspections, cleaning, consumables, energy demands for ventilation and lighting and personnel and administrative costs. The estimated cost **excludes** major renewals or system replacements.

11.3.9 The O&M costs have been interpolated for each candidate fixed link tunnel option based on the tunnel length parameter to ensure consistent and proportionate estimation. The table below summarises **annual O&M costs** for each of the candidate fixed links based on a rate of **£225** per metre per annum:

Table 11.5: Estimate annual O&M costs (£M), Q4 2025 prices, round to nearest £0.1m

	Bressay	Unst	Whalsay	Yell
Annual O&M cost	£0.7	£1.2	£1.9	£1.5

Funding strategy

11.3.10 The FLM considered the potential means by which a fixed link could be funded. It considered three main options for funding and financing a tunnel project of this scale, each of which differs in how capital costs are met and the extent to which the costs are paid up-front or spread over time. These three options are:

- **Option 1:** Capital grant funding
- **Option 2:** Shetland Islands Council borrowing
- **Option 3:** Private finance

11.3.11 The particulars of these three options are summarised below and their advantages and disadvantages established. It should be noted that:

- These **options are not mutually exclusive** and blended approaches are possible, and indeed probable.
- A **preferred option is not defined at this stage** – given uncertainty over when a fixed link may be delivered and the actual funding requirement, it is prudent to keep all options on the table at this stage.

Option 1: Capital grant funding

11.3.12 The Council's capital budget is some way short of that required to deliver even one fixed link and is also heavily committed to a wide range of priorities. Delivering one or more tunnels in Shetland through public funding will therefore almost certainly require capital grant from the Scottish Government and / or UK Government. Under this option, the capital cost would be largely met-up front, reducing or eliminating the need for long-term borrowing or ongoing financing costs.

11.3.13 The **advantages** of capital grant funding are that it would:

- Provide **maximum commercial flexibility**, with the Council retaining the freedom to determine the most appropriate procurement model and risk allocation strategy.
- **Reduce the long-term financial exposure of the Council** and **avoid reliance on future revenue** to support borrowing.
- Create the potential to establish a **unified operational model across multiple tunnels** over time, which would deliver efficiencies and consistency of service.

11.3.14 The disadvantages of capital grant funding are:

- Difficulty in **securing grant funding** within constrained national budgets.
- The Council would retain **greater cost and programme risk** unless this was effectively transferred through a contracting approach.
- The Council would **require strong internal capability** to manage delivery and risk.

11.3.15 From a **deliverability** perspective, the key issue with this option is that it its primarily dependent on the availability and timing of capital grant allocations from Scottish Government and, where relevant, UK Government. The principal constraint therefore is competition for limited national capital budgets, particularly when each of the candidate fixed links would be nationally significant from a cost perspective.

Option 2: Shetland Islands Council borrowing

11.3.16 Under this option, the Council would fund the construction of one or more tunnels through borrowing and repay it over time. Local authorities traditionally borrow from the Public Works Loan Board (PWLB), but the National Wealth Fund (NWF) is also a potential lender for long-term infrastructure. The Council would be required to repay the borrowing over time using various revenue streams.

11.3.17 Financing the project through borrowing by the Council shares many of the same characteristics as capital grant funding. The Council would have access to the necessary capital at the outset, albeit through loan finance rather than grant, and would therefore retain a high degree of commercial flexibility.

11.3.18 The **advantages** of this approach are that it would:

- Provide maximum **flexibility** in procurement and risk allocation.
- Create the potential to establish a **unified operational model across multiple tunnels** over time, which would deliver efficiencies and consistency of service.
- Spread the **costs over the lifetime of the asset**.
- Offer a **lower cost of borrowing** compared to private finance.

11.3.19 The **disadvantages** of Council borrowing are:

- It would create **long-term financial exposure for the Council**, with a reliance on future revenue to support borrowing and the associated exposure to inflation and wider fiscal pressures.
- Supported borrowing rules may also **constrain the ability to borrow directly against specific central government revenue support** if made available.
- The Council would retain **greater cost and programme risk** unless this was effectively transferred through a contracting approach.
- The Council would **require strong internal capability** to manage delivery and risk.

11.3.20 From a **deliverability** perspective, the primary consideration with this option is the Council's long-term revenue capacity to service its debt. Whilst borrowing mechanisms and a lender are readily available, the practical limit is set by affordability thresholds and the impact of repayments on annual budgets and financial ratios. This option is therefore deliverable provided that a realistic borrowing envelope is established and supported by stable revenue streams. It also depends on strong financial governance and ongoing monitoring of fiscal exposure over the life of the loan period, typically 30 to 40 years.

Option 3: Private finance

11.3.21 This option would entail attracting private investment through a project finance structure[43]. The private sector would fund the construction and would be repaid over time through availability payments from the Council. This would require the Council to secure revenue grant from government and could potentially also be supported by toll revenue if an operating surplus emerged.

11.3.22 The **advantages** of private finance are that it would:

- Deliver **greater risk transfer** through the contract structure and by integrating design, build, operations and lifecycle maintenance.

[43] Project finance is a type of structured finance, which is structured around cash flows and risk allocation.

- Bring **specialist tunnel management expertise**, allowing the Council to focus on contract management.
- **Spread costs** over the life of the asset.
- Allow for the **use of specific revenue grant from government** within this structure.

11.3.23 The **disadvantages** of private finance are:

- **Long-term unitary payment commitments** with the associated risk of fiscal and inflationary pressures over time.
- A **higher cost of finance** than using Council borrowing.
- **Contractual complexity** when setting-up contracts and, as a long-term fixed price contract, there would be reduced flexibility once in force.
- A **risk of fragmented operations** if tunnels are procured separately, although this could be mitigated through procurement design and operational planning.

11.3.24 As part of the FLM, COWI engaged with infrastructure funds / investors, debt providers, financial advisory firms and government finance bodies to understand the appetite for a project finance structure. The overall feedback from the market was that a project finance structure could be **deliverable** for a tunnel project of this nature, subject to several key fundamentals being put in place, including:

- **Revenue risk** should be **retained by the public sector**, with long-term revenue support available to underpin availability or unitary payments, requiring commitment from central government.
- The Council ensuring that it has **suitable expertise and governance** to deliver the project.
- The Council undertaking **early enabling activity prior to procurement** – this includes securing land ownership or control, utility connections, site investigations and statutory consents and environmental approvals.
- The availability of a **suitable construction partner** with the necessary skills, capacity and balance sheet to take on construction risk.
- **Realistic performance regimes** that take account of travel times, availability of specialist skills and the logistics of spare parts and equipment.

Affordability

11.3.25 Having set out the capital and O&M costs of the candidate fixed links, this section summarises the FLM commentary around affordability. It is again important to note that:

- The FLM was developed for a test case Yell Sound tunnel and thus the other proposed fixed links are only commented on in the generality.
- Toll revenue will at best cover annual O&M costs but will contribute little to nothing with respect to capital. With no committed Council or grant funding for any of the candidate fixed links, tunnels will remain unaffordable unless external funding can be obtained.

Funding sources

11.3.26 The FLM split potential funding sources into four tiers, as follows:

- **Tier 1 – existing sources of funding:** These include the Council's Core Capital Grant; toll revenue; public sector savings that could be delivered by a fixed link; and the

Council's annual ferry revenue support grant, which it receives from Scottish Government (estimated at circa £5m per annum for Yell Sound).

- **Tier 2 – Additional Scottish and / or UK Government support:** This is effectively capital grant funding or revenue grant funding to underpin a project finance structure.
- **Tier 3 – strategic local funds:** These include the Council's long-term investment reserves and funding from other potential sources.
- **Tier 4 – innovative funding options:** These include a non-domestic rates levy, Tax Incremental Financing, Council Tax increases and developer contributions.

Available borrowing

11.3.27 The analysis focused **on 'Tier 1' funding** to assess the affordability position, on the basis that funding in this stream is nominally 'available' to the Council, albeit recognising that this would require e.g., a commitment from Scottish Government to allow ferry revenue support to be used to fund borrowing, public sector savings to be realised etc. The following points were made with respect to **Tier 1 funding**:

- Annual revenue of **£5.6m-£7.6m** million could be derived from:
  - Toll revenue: **£0.6m £1.3m**
  - Public sector savings: **£0m-£1.3m**
  - Ferry revenue support grant: **£5m**
- Allowing **£1.5m per annum for O&M** would reduce this to a maximum range of **£4.1m - £6.1m**.
- The FLM assumed as its central case that **£5m** per annum indexed at CPI would be available to support borrowing for a fixed link.
- Based on a high-level assessment and indicative modelling from the National Wealth Fund, **£5m indexed could support borrowing by the Council of £91m - £106m over 30 to 40 years**.
- The analysis therefore used a figure of **£100m** of borrowing against Tier 1 funding to gauge overall affordability.

11.3.28 Based on this scenario for the Yell Sound test case tunnel, there would be a circa **£300m funding gap**, which would require significant capital or revenue grant to be closed.

Closing the affordability gap

11.3.29 The FLM identified four scenarios which could deliver the necessary funding to meet the affordability requirement – these are shown in the figure below. Each scenario is dependent on:

- Availability of the existing Scottish Government ferry subsidy to borrow against.
- Securing additional capital grant from the Scottish or UK Governments.

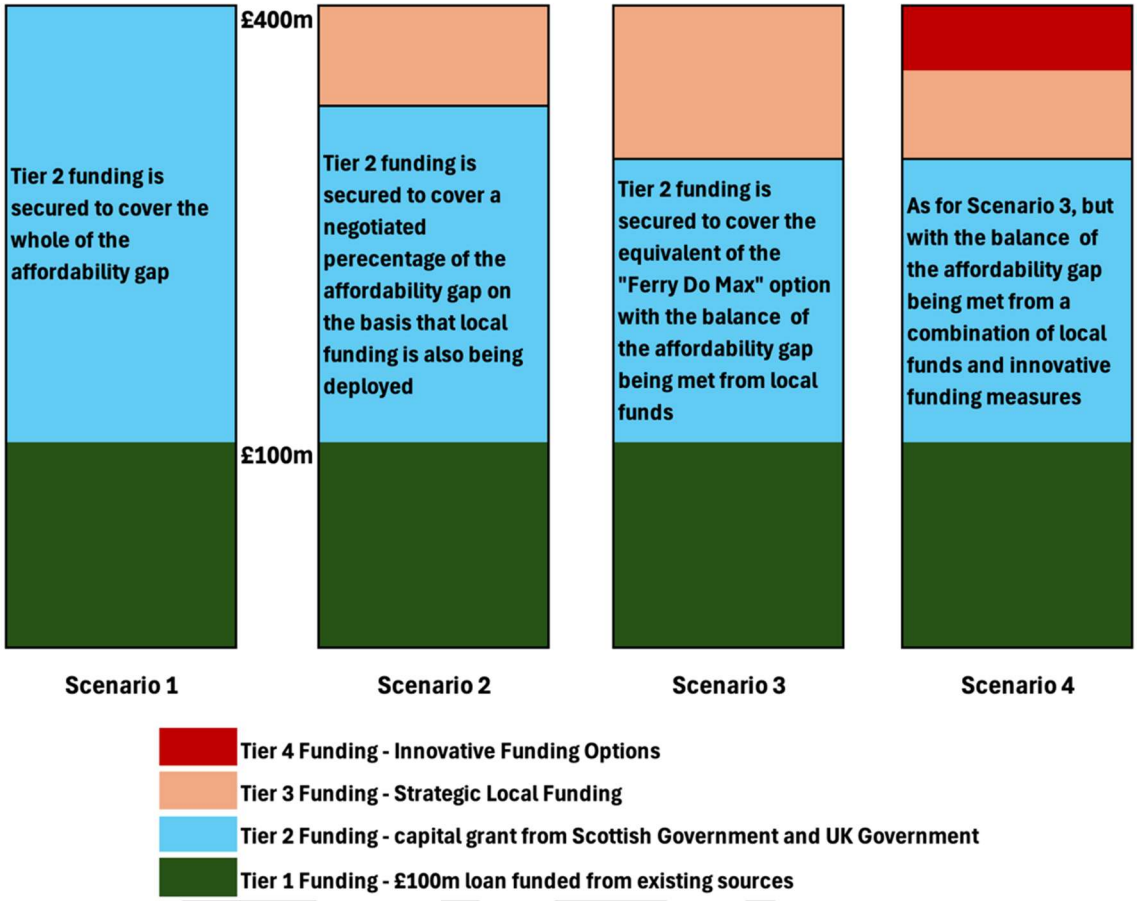

Figure 11.1: Visual comparison of four funding scenarios to close the funding gap for a Yell Sound test case fixed link

11.3.30 The scenarios can be described as follows:

- **Scenario 1** relies on central government agreeing to fund the affordability gap.
- **Scenario 2** envisages a negotiated additional capital agreement being reached where an element of the affordability gap is from local funds with the remaining balance funded centrally. For illustration, assuming an 80:20 split, this would reduce the required capital support from central government to circa **£240m**. It would however provide a challenge in funding the 'local 20%', some **£60m**.
- **Scenario 3** is where negotiations with central government are approached on the basis of the status quo is not acceptable and if the tunnel were not to be built then the strategic need would be a 'Ferry Do Max' approach on this route. Therefore, central funding to support the tunnel could be provided at the equivalent level of a Ferry Do Max option, which would include multiple cycles of ferry replacement.
    - This does though seem, by some distance, the least likely of the scenarios given that there is no commitment from government to fund any service improvements, let alone to the scale of a Ferry Do Max (which is some cases is not that different from a tunnel). It can therefore be considered a purely hypothetical scenario.
- **Scenario 4** is broadly the same as scenario 3 but here the remaining gap is funded in part by strategic local funding but also introducing innovative funding measures, although this could be financially and politically challenging. The same issue with respect to funding the Ferry Do Max applies in this scenario.

11.3.31 Whilst a graphically useful means of showing potential options, several caveats and limitations need to be noted here:

- There is, as it stands, **no commitment from either the Scottish or UK Government to fund any element of a fixed link in Shetland**, or indeed any improvement to the ferry service in the form of a Ferry Do Something or Ferry Do Max.
- Whilst the **assumption that the current ferry revenue grant could be used to support borrowing, there is no commitment to this, nor an agreement that this grant will increase with CPI over time.** Given the centrality of this funding to the 'Tier 1' contribution, it is an important risk to note.
- Assuming the £5m per annum ferry revenue grant could be used for this purpose, it would likely be needed during tunnel construction. There is therefore a question as to **how the ferry service deficit could be funded during the construction period**.
- The **estimated toll revenue is predicated on tunnel users paying the equivalent of the current ferry fare**. This is a reasonable assumption for the purpose of this business case, but it does have to be recognised that commercial vehicle ferry fares – which make-up a significant proportion of Yell Sound route revenue – are of a multiple greater than typical tunnel tolls for commercial vehicles in the UK. It is debatable whether this level of toll could be sustained.

What does this mean for the other candidate fixed link routes?

11.3.32 As previously noted, the FLM was specifically focused on Yell Sound as a test case. Detailed financial modelling would be required with respect to the affordability of the other candidate fixed link routes.

11.3.33 However, as a rough rule of thumb, the 'Tier 1' funding against which the Council could borrow equated to about one quarter of the capital cost of a Yell Sound tunnel. The table below shows the funding / affordability gap if that proportion of available funding was applied to all four candidate fixed links:

Table 11.6: Illustrative funding / affordability gap (£m), assuming Tier 1 funding covers 25% of capital costs, rounded to nearest £m

Fixed Link	Capital Cost	Tier 1 Funding @25%	Funding Gap
Bressay	£257	£64	£193
Unst	£346	£87	£260
Whalsay	£488	£122	£366
Yell	£401	£100	£301
Total	***£1,492***	***£373***	***£1,119***

11.3.34 The table shows that, if **25%** of fixed link costs could be secured through Tier 1 funding, there would be a combined funding / affordability gap of circa of **£1.1 billion** in Q4 2025 prices.

11.3.35 The following points should be noted with respect to this simplifying assumption:

- Yell Sound, on which the original calculation is based, accounted for **48% of all ferry service revenue in 2024/25**. This is because of the high volume of commercial vehicle traffic (and indeed higher volumes generally) and also because much of the Bluemull Sound revenue is apportioned to this route, as those travelling from Fetlar / Unst to mainland Shetland get one leg free in each direction.
- **Bressay (24% of total ferry service revenue), Unst (1%) and Whalsay (25%)** therefore could not be expected to generate toll revenue equivalent to Yell Sound, and thus there would likely be an O&M affordability issue as well as capital funding shortfall. This would

be particularly material for Unst (as very little revenue is assigned to the route) and Whalsay (which would be the longest tunnel and thus would have the largest O&M costs).

- Costs on the other three routes are also smaller. The **Yell Sound** route accounted for **26%** of ferry service costs in 2024/25, compared to **Bressay (12%)**, **Unst (9%)** and **Whalsay (22%)**. The proportion of the annual ferry service grant that could be 'assigned' to these routes would therefore be smaller, which would in-turn reduce the revenue which could be borrowed against.

11.3.36 The differing cost and revenue profiles across the routes would therefore likely reduce 'Tier 1' funding available, widening the notional (i.e., Tier 1 funding based on 25% of capital costs) funding contribution from existing funds and increasing the grant requirement. This would be particularly material for Whalsay, where the capital and operating costs of the tunnel would be highest but the fares revenue and proportion of the total grant available would be lower than the Yell example.

11.3.37 In short, whilst detailed funding analysis would be required to calculate the exact affordability shortfall, it is **likely to be greater than the nominal £1.1 billion noted above**. This is a particularly material point with regards to any Tier 3 (Strategic Local Funds) and Tier 4 (Innovative Funding Options), which are clearly finite funding sources which could not be (easily) repeatedly used.

Financial risks

11.3.38 There are numerous financial risks with respect to investment in prospective fixed links, which are summarised in the table below:

Table 11.7: Financial risks associated with investment in fixed links

Risk	Impact
The most fundamental risk at present is the absence of the **funding** required to deliver even one tunnel.	There is a risk of significant abortive technical work and / or a stasis on essential ferry service investment whilst pursuing funding for a fixed link.
The cost estimates provided are based on Q4 2025 prices. There is however a risk that **inflation could be higher than forecast**, and in particular that construction price inflation could outpace general inflation. This risk has been exacerbated by recent geopolitical tensions, which have increased the cost of energy and other raw materials.	Construction costs are higher than forecast, even with the inclusion of contingency. This could have an effect on the Council's financial position given that grant funding is usually only allocated as a percentage of costs or as a fixed sum.
The current cost estimates have been developed to a level appropriate to this programme level business case. However, **cost escalation pre-construction and cost overrun in construction** are a significant risk, particularly on large-scale, long-term investment propositions of a type not commonly delivered in the UK (although widely delivered in Scandinavia and elsewhere).	Cost escalation pre-construction could weaken the investment case or leave the project with a wider or new funding gap. Cost overruns could again have an effect on the Council's financial position given that grant funding is usually only allocated as a percentage of costs or as a fixed sum.
There is a risk that **toll revenue is less than forecast** - note that detailed forecasting informed by primary research would be required in any project level business case for a tunnel.	Even with a project finance option, revenue risk will lie with the public sector. The broad assumption in the FLM was that Yell Sound tolls would cover O&M, so any shortfall would lead to an ongoing revenue deficit for the Council to fund. It is probable that the other routes would start from a position where toll revenues are less than O&M costs.

Risk	Impact
While the **interest rates**, based on prevailing UK gilt rates, will be fixed at the time of borrowing, they will **vary between now and the time of borrowing**.	Borrowing capacity will vary with UK gilt rates. Broadly, a +/- 0.5% movement in the cost of gilts could have a +/- £6m impact on borrowing potential.
The repayment profile for any borrowing will be known at the time of that borrowing and will be based on assumptions on future availability of revenue. The analysis in the FLM assumes that the revenue stream used for repayment will continue to index at 2% per annum – the government target for CPI. There is a risk over a 30–40-year repayment cycle that if **inflation was lower than the assumed rate then the revenue stream would be smaller than forecast.**	This could have an effect on the Council's financial position, reducing the revenue available to make repayments and thereby creating an operating deficit for the Council.
The costs allow for **annual O&M spend based on an assumed rate per metre**. If this **rate per metre is ultimately higher**, the annual operating costs may exceed toll revenue or widen any annual deficit that already exists.	This could have an effect on the Council's financial position, increasing the annual operating costs against a fixed revenue base, thereby creating an or widening an operating deficit for the Council.
The annual O&M estimate does not include costs for **major repairs or replacement**. There is no specific allowance made at this stage, in part because a well-constructed tunnel should have a relatively low lifecycle cost in its early life. However, if an unexpected major repair or replacement is beyond what the Council's capital budget can absorb, additional borrowing may be required.	This could have an effect on the Council's financial position, increasing the annual operating costs (through new borrowing) against a broadly fixed revenue stream, thereby creating or widening an operating deficit for the Council.

11.4 Next Steps

11.4.1 The Financial Dimension has highlighted the funding challenges facing Shetland Islands Council with regards to the inter-island transport network. Even maintaining the current level of service over the next decade will require significant investment regardless of whether more substantive options such as fixed links are pursued or otherwise.

11.4.2 Ultimately, the scale of the funding requirement for maintaining the ferry service alone will require external (government) support. That need becomes even more manifest when considering transformative investments such as fixed links. A programme of engagement with government, with the IITCP as the basis, will be key, with the requirement broken down and phased as per the IRM.

12 Commercial Dimension

12.1 Overview

12.1.1 The purpose of the Commercial Dimension is to demonstrate that a programme and its inherent projects are commercially viable, deliverable and attractive to the market, and that a robust approach has been put in place to procure and manage it effectively.

12.1.2 As with the Financial Dimension, it is only possible to set out the Commercial Dimension in outline in the IITCP given the uncertainty around the availability of funding and the timescale in which that could be provided. The procurement strategy for any option will be linked to how it is funded and financed. For example, the procurement strategy for a tunnel would be very different if it was procured using project finance rather than grant funding or borrowing.

12.1.3 It is also important to note that vessels, harbour infrastructure and fixed links all have very different considerations with regards to procurement. This chapter therefore highlights the main considerations for each investment type separately.

12.2 Harbour Infrastructure

12.2.1 Shetland Islands Council currently owns and operates all of the inter-island ferry terminals, with the exception of Lerwick (for the Bressay service), which is under the ownership of Lerwick Port Authority. It therefore has expertise and extensive experience in procuring and managing works, with recent examples including the Linkspans Life Extension Project and the works at Grutness and Fair Isle, undertaken as part of the Fair Isle Ferry Replacement Project.

12.2.2 It should be noted that any works at Lerwick will require a bespoke procurement strategy reflecting the respective role of the Council and LPA in funding and delivery.

Market analysis and capacity

12.2.3 The Scottish publicly funded ferry network is extensive, and a contracting market has become established around the maintenance and replacement of ferry terminal assets, including piers, linkspans, marshalling etc. Indeed, there are local contractors within Shetland capable of delivering smaller contracts independently or larger contracts as consortia.

12.2.4 It is though important to recognise that the maritime contracting market is currently very buoyant, driven by the generational replacement needs of numerous ferry terminals, most of which were built in their current form between the 1960s and 1980s. This is compounding an already busy market, where contractors are involved in related activities such as offshore renewables work and electricity grid upgrades.

Procurement strategy

Delivery models

12.2.5 There are two broad procurement strategies which the Council has historically adopted for harbour works and which would be appropriate in the context of the IITCP:

- **'Traditional':** the client prepares a fully designed output, with detailed drawings, materials and workmanship specification. This is tendered and the successful contractor delivers the contract to the tendered design and specification.
    - The advantage of this approach is increased certainty of outcome – i.e., the client gets exactly what they want in terms of an output. The preparation of a well-developed

design early in the process also allows the consenting process to commence early, reducing the time required for this activity later in the project.

- The disadvantage is that it limits scope for innovation and may lead to higher capital costs.

- **Design and Construct (D&C):** the customer sets out in broad terms what they want delivered and invites the market to bid for designing and ultimately delivering the solution.
  - The advantage of this approach is that it allows the market to offer different and sometimes innovative solutions and, as a result, may provide a lower capital cost.
  - Conversely, the disadvantage is that elements of the design may not reflect the exact preferences of the client (although this could be resolved to some degree through a competitive dialogue). There is also a risk attached to variations in the specification, whereby tenderers offer less durable solutions thus reducing the capital cost but thereby transferring the costs to future maintenance / refurbishment. In rural locations, this is generally not considered good practice due to the often disproportionate cost of mobilising to undertake maintenance works.

12.2.6 The above options do of course represent polar positions, and it is possible to blend elements of each approach, particularly if procuring multiple contracts as part of the overall delivery.

12.2.7 The Council's recent procurement experience in this field has highlighted the importance and value of **Early Contractor Involvement (ECI)** in optimising the solution ultimately procured.

12.2.8 The procurement strategy for any given investment will be determined in a project business case. However, given the importance of ensuring durable long-term solutions, **the Council has generally adopted a 'traditional' approach**, with certain contractor designed elements, where the contractor is better placed to manage the risk.

Procurement route

12.2.9 The appropriate procurement route would again be dependent on the size and number of projects to be procured. Major ferry terminal projects in Shetland have been relatively few and far between in the last two decades, and thus each project has been approached on its own merits, with the procurement route defined in the project business case.

12.2.10 In the event that a large-scale and funded programme of works emerges from the IITCP, there may be merit in the **Council setting-up one or more dedicated frameworks to provide it with efficient access to the market**. This framework approach could help reduce procurement timescales for individual projects, while maintaining a level of competition that guarantees value for money (VfM). It could also provide confidence to the local market with regards to the future pipeline of work. The success of a framework, however, would be dependent on the Council's ability to secure sufficient funding to deliver the required works within the planned timescales.

12.2.11 Other advantages of setting up a framework could include:

- Enabling the **full alignment of procurement activities with the long-term desired outputs of the IITCP**, ensuring consistency across projects of a similar nature.
- **Avoiding full-scale tendering exercises for each individual project**, with the potential to generate significant savings at programme level.
- The opportunity to **develop a long-term relationship with the selected contractors and consultants**, thus improving collaboration and the potential for more efficient working over time.
- Reducing disputes and **improving cost predictability**.

- The possibility of **designing the framework (or frameworks) to match local priorities**, e.g., local market participation, sustainability, local labour etc.

12.2.12 Establishing a framework that is compliant with Public Contracts (Scotland) Regulations 2015 and the Procurement (Scotland) Regulations 2016 would require a significant upfront effort (drafting specifications, evaluating suppliers, checks etc), which may require additional legal and commercial support. Additionally, if the pipeline of projects under the IITCP stalls due to funding or planning delays, the framework (or frameworks) may go underutilised, which is inefficient operationally, financially and reputationally.

12.2.13 To address these risks, the Council could use some of the established frameworks currently in operation across Scotland, including the **Crown Commercial Service Framework Agreements** or the **Scottish Government's Civil Engineering Framework** for construction.

12.2.14 Whilst frameworks can offer an efficient route to market, it is important to note that the Council's recent experience of using a single-supplier construction framework on the Fair Isle Ferry Replacement Project was mixed. Given timescale pressures, the Council originally adopted the SCAPE Scotland Framework to procure the works at Fair Isle and Grutness but ultimately had to abandon this approach due to escalating costs and go out to tender, which delivered a significant reduction in the tender price.

12.2.15 Ultimately, the procurement approach adopted will reflect the prevailing circumstances and funder requirements as each IITCP project progresses towards delivery. In defining this approach, the Council will draw on lessons learned from other recent projects.

Professional advisers

12.2.16 For any harbour infrastructure project, the Council will require external support on a range of functions including design, ground investigations, environmental consenting etc. Whilst the level of support will vary by location and option scale, there are a range of frameworks open to the Council which could be used to procure this advice including, but not limited to, Scotland Excel and the City of Edinburgh Council Framework.

12.2.17 It is perhaps worth noting here that, as part of the Fair Isle Ferry Replacement Project Process Evaluation, the Council noted that any use of frameworks must clearly demonstrate rather than just assume VfM. Where the Council is not confident in this, it reserves the right to pursue a tendering exercise.

Contract strategy

12.2.18 When procuring marine civil engineering projects, there are a number of considerations in relation to the contract strategy adopted. These are ultimately matters for the project business case, which will consider each procurement in its own merits. However, the key considerations for any project business case are summarised below:

Single or multiple contracts

12.2.19 As a programme, the IITCP will be required to deliver multiple projects. In some cases, these will be distinct investments but in others work will be required at a portfolio of harbours serving a common route. For example, any option progressed for Bluemull Sound will require significant works with several specialisms at both Belmont and Gutcher. There is therefore a question as to whether the Council should procure single or multiple contracts for each port.

12.2.20 Maritime projects are typically procured via a single contract. However, this is ultimately a project business case consideration reflecting the specific circumstances of each procurement, but there is value in setting out the advantages and disadvantages of each approach in broad terms.

12.2.21 The key advantages of procuring works via a **single contract** are:

- It simplifies the procurement process for the client as all works can be procured via a single procurement exercise rather than multiple procurements.
- It reduces the volume of contract administration.
- It can attract larger contracting companies who can provide a 'one-stop-shop' to provide all elements of the scope of works.
- It minimises the number of interfaces between contracts and contractors.
- It avoids knock-on impacts across contracts and avoids a ‘blame game’, thus simplifying matters and minimising the contractor interface risks.

12.2.22 The key reasons for splitting the works across **multiple contracts** are:

- To efficiently manage time sensitive working.
- To ensure efficiency regarding the nature of works under the contract and specialist skills involved, e.g., machinery, marine civils etc.
- To spread the resource risk across multiple suppliers.
- To increase the scope for local / SME companies to bid, making the tender process more competitive.

Open or restricted tender procedure

12.2.23 There is also a requirement to determine whether any contracts should be let using an open or restricted tender procedure, whether advertised on a public procurement portal or as a mini-competition on a framework. This is again a question for the project business case, but there is merit in setting out the advantages and disadvantages of each option here with respect to the IITCP.

12.2.24 The **open procedure**, where the works are advertised and any contractor can submit a tender, can result in numerous tenders being received thus maximising competition and, in theory, increasing the likelihood of a good value for money procedure being realised. However, depending on factors such as the weighting of any quality component of the tender assessment, there is a risk that this approach could also result in the contract being awarded to a tenderer with sub-optimal experience of works of this nature, thus exposing the Council to increased delivery and financial risk. Open procedures work well for small, uncomplicated projects.

12.2.25 A risk with an open procedure is that it could prove unattractive to tendering contractors, particularly when the market is busy. Contractors are selective with tendering commitments given the resources required to submit a full tender submission. For this reason, open procedures can result in receipt of fewer tenders than expected. Given that the maritime market is currently busy and is anticipated to remain busy due to the generational nature of maritime infrastructure works, this is a key risk to consider with regards to an open procedure across the lifetime of the IITCP.

12.2.26 These risks could be addressed by using a **framework** (as previously discussed) or a **restricted procedure**, which includes a pre-qualification stage to the tender (whereby prospective bidders have to respond to a Single Procurement Document) covering topics such as legal, ethical, health and safety, financial strength and relevant technical experience). Only the top scoring tenderers are shortlisted and progressed to the quality and price tender process. The introduction of the pre-qualification element would manage the risk of an inexperienced contractor being awarded the contract.

12.2.27 The key challenge with the restricted procedure is that it could increase the resource input required for both the procuring party and the tenderers (who will weigh the cost of bidding against the risk-adjusted expected profit), when compared to an open, price only bid. However, if prequalification is carried out in advance with only shortlisted contractors invited to tender (or the opportunity is tendered as a mini-competition on a framework), many contractors may view this favourably as it would minimise their initial input and, assuming they are pre-qualified, theirs would be one of a smaller number of tenders under consideration, giving them a statistically increased chance of being successful.

Lump sum or re-measurable

12.2.28 Lump sum versus re-measurable is essentially a decision on who carries the risk over quantities:

- In a **re-measurable** contract, the employer carries the risk on quantities.
- In a **lump sum** contract, the contractor carries the risk.

12.2.29 The key point of note here is that, in a lump sum contract, the fixed price is likely to be higher as the contractor has to account for the quantities risk in their price, albeit the presence of competition exerts some pressure in the opposite direction. However, the risk envelope is much narrower and hence there is a higher level of price certainty. In a re-measurable contract, the anticipated contract tender price may be lower as the contractor is not including for that risk. However, the risk envelope is much larger and there is thus less certainty over the final price.

Fixed price or target price contract

12.2.30 The option of a fixed price versus target price contract centres around the degree of flexibility which the Council wishes to permit in the design of any future harbour works. A **fixed price contract** works to an exact specification for a fixed sum – there is limited opportunity for design innovation or methodology-led cost savings.

12.2.31 A **target price contract** allows the contractor to introduce cost savings by reducing the requirements of the specification, often through a value engineering process. There are potentially programme issues with target price and assessing a reduced specification, but these should be allowed for in the contract period and procedure. However, the required inputs to administer the contract must also be considered and balanced with the potential savings on offer. The required level of administrative input on a target price contract can be significantly more than on a fixed price contract, which is due to the need to consider the merits of alternatives promoted by the contractor and the need to administer the 'pain / gain' share mechanism, requiring an open book approach. In addition, the target price option again introduces the risk of less durable solutions being adopted, thus moving costs from capital to maintenance through the life of the structures. This can be particularly unattractive in rural locations where mobilisation costs become a disproportionately large element of maintenance costs.

Form of contract - ECC or ICC

12.2.32 The two main suites of contracts currently used for construction contracts in the UK are:

- The Engineering and Construction Contract 3 or 4 (ECC3 and ECC4)
- The Infrastructure Conditions of Contract (ICC)

12.2.33 The Infrastructure Conditions of Contract are based on what was previously known as the ICE Conditions of Contract and are generally considered to be more adversarial than the more modern ECC conditions which were also created by the ICE. The ECC is a more collaborative

form of contract where risks and change are proactively managed throughout the duration of the contract. ECC is endorsed for public sector use by the UK Government Construction Strategy, the Association for Project Management and others.

12.2.34 In the NEC ECC the main options are:

- **Option A:** Priced contract with activity schedule (lump sum)
- **Option B:** Priced contract with bill of quantities (remeasurable)
- **Option C:** Target price contract with activity schedule (lump sum, target price)
- **Option D:** Target price contract with bill of quantities (remeasurable, target price)
- **Option E:** Cost reimbursable contract (cost plus basis)
- **Option F:** Management contract (Contractor manages with all works sub-contracted to others)

Risk allocation

12.2.35 The strategic approach to risk to be adopted by the IITCP will be to allocate risks to the party best placed to manage them. This is again a topic that would need to be considered on a project-by-project basis, but the following table sets out an indicative risk allocation by category, based on recent marine infrastructure works procured by Shetland Islands Council and organisations around Scotland. This would need to be revisited and reassessed in each project level business case:

Table 12.1: Risk allocation by category

Risk category	Risk allocation - SIC	Risk allocation – Contractor
Design	Assuming the adoption of a 'traditional' approach, which has been adopted by the Council on recent procurements, SIC would own this risk as it would provide the design to the contractor to progress The only exception to this would be where there are contractor designed elements	Contractor designed elements only
Cost	This would be dependent on the form of contract adopted In recent procurement exercises, the Council has adopted an ECC Option A (NEC4) form of contract, transferring risks to the contractor (although the Council has retained the cost risk for any changes to the scope / design)	This would be dependent on the form of contract adopted In the event that an ECC Option A (NEC4) – priced contract with activity schedule – is adopted (as it has been in recent contracts), this would impose the financial risk on the contractor
Transition and implementation	Not applicable	Successful commissioning is a contractor risk
Operating	The Council would continue to own this risk.	Not applicable
Variability of revenue	Not applicable – revenue in this context is payment of pier and berthing dues but this is effectively a circular flow of money within the Council. For the ferry service overall, the Council retains responsibility for ongoing operational funding, including for any deficit	

Risk category	Risk allocation - SIC	Risk allocation – Contractor
Termination	Assuming the adoption of an NEC4 ECC contract, the standard termination provisions would apply, with additional grounds for termination if the contractor was e.g., convicted of a criminal offence, commits an act of grave misconduct etc	
Technology and obsolescence	The Council would own this risk, assuming the obsolescence risk over the operational life of the asset. It is a minimal risk unless the ferry service was ultimately replaced by a fixed link at some point in the future	Not applicable
Residual value	The Council would own this risk as the owner of the asset	Not applicable
Funding and financing	The Council would own this risk, as it would be responsible for ensuring funding to deliver the works and meeting any financing commitments emerging from them	Not applicable
Legislative	The Council would have overall responsibility for ensuring that the contractor discharged all legal commitments, including consenting requirements, in the agreed manner	The contractor would be responsible for ensuring that it was fully compliant with legislation and delivered all consents in the agreed manner

12.2.36 It should be noted that a bespoke approach to risk allocation and management would be required for any works at Lerwick, as this ferry terminal is owned by LPA.

12.3 Vessels

12.3.1 As with the harbour infrastructure, Shetland Islands Council owns and operates all of the vessels in the inter-island ferry fleet. It has recent experience of procuring new tonnage, including a new vessel for Fair Isle and the first of the Type 1 class as part of the Ferries Resilience Review.

12.3.2 As with harbour infrastructure, the solution ultimately adopted will be dependent on the availability of funding and any requirements attached to it. Selecting a preferred procurement strategy and commercial model will therefore be a consideration for the project business case.

Market analysis and capacity

12.3.3 There is a wide range of shipyards in the UK and abroad with a credible track record of building the types of vessels which are emerging from the IITCP.

12.3.4 Market interest and prices in the shipbuilding industry reflect prevailing market conditions at the time of procurement. However, the recent procurement experiences of both Shetland Islands Council and CMAL has highlighted that there is a supplier market that would be interested in tendering for vessel-build contracts.

Procurement strategy

Delivery models

12.3.5 When placing an order for a new ferry, there are several potential ways of doing this:

- Procuring a bespoke vessel based on a **precise specification**:

- With this approach, the Council would set out an exacting specification based on vessel general arrangement drawings which could include requirements in terms of engine type, fuel type, fit out requirements etc.
- The advantage of this approach is that it ensures that the vessel design is precisely aligned with the specified requirements of the client. However, the disadvantage is that it limits scope for innovation and may lead to higher capital costs.

- Providing an **output specification** to the market:
  - With this approach, the Council would define a set of broad parameters such as required passenger capacity, speed, physical dimension ranges etc. Shipyards would then be invited to present their own costed solutions.
  - The advantage of this approach is that it allows the market to offer different and often innovative solutions and, as a result, may provide a lower capital cost. Conversely, the disadvantage is that elements of the design may not reflect the exact preferences of the client.
- Using an **existing proven design**:
  - With this approach, the Council would know that the design provides the level of specification and efficiencies required but can be modified to meet their detailed requirements.
  - The advantage of this approach is that the Council would know that the design would provide what they are seeking in terms of specification. However, it may not 'tick every box' in that the vessel would not be specifically designed for the route.
- Develop a **concept design** to take to the market to complete detailed **design and build**:
  - With this approach, the Council would engage a naval architect to develop a concept design based on in-depth design and feasibility studies. This would include developing general arrangement drawings and associated specifications that would allow shipyards to tender for the detailed design and build of the vessel on a fixed price basis whilst reducing design, construction and operating risks for the Council.
  - The advantage of this option is that the Council would have an active input throughout concept design and would know that the design would provide what is required. This option may seem to be more costly initially – however, the output concept design would provide a more secure position, reducing the risk of cost escalation through the build.
  - This option could be combined with the **existing proven design** option above, effectively providing a **'build only'** contract.
- Identify suitable **second-hand tonnage** on a purchase or charter basis.

12.3.6 The above options represent the most popular ship design solutions however it is possible to blend elements of each approach.

12.3.7 In its most recent procurement for the first of the Type 1 Class, the Council has adopted a **design and build** approach. Indeed, this has been a common approach adopted across most new build vessels in Scotland, including several recent procurements for the CMAL fleet.

Professional advisers

12.3.8 The Council will require support from naval architects with respect to design and potentially shipyard supervision services. It currently has a Framework Agreement for the Provision of Naval Architecture with Macduff Ship Design, which was procured through an open procedure in 2023 in accordance with regulation 28 of the Public Contracts (Scotland) Regulations 2015.

Contract strategy

Procurement procedure

12.3.9 As with harbour infrastructure, a key consideration is again which procurement procedure to use. This choice is defined by the likely market appetite and complexity of the build. For example:

- For the new **Fair Isle vessel**, the Council chose to adopt an **open procedure** (Public Contracts Scotland Regulation 28), reflecting the fact that the vessel is of a relatively simple design and could be built by a wide range of shipyards around the United Kingdom and further afield.
- For the **Small Vessels Replacement Programme Phase 1 (SVRP1)** – a programme to build seven small electric ferries – CMAL chose to adopt a **restricted (two-stage) procedure** (Public Contracts Scotland Regulation 29).
- For the new **Type 1 vessel**, the Council adopted a **Competitive Procedure with Negotiation (CPN)** (Public Contracts Scotland Regulation 30). Reserved for more complex contracts, this procedure involves an initial selection or prequalification stage using the SPD, after which a minimum of three eligible candidates are invited to negotiate the contract before a preferred bidder is selected.

12.3.10 Defining the most appropriate procedure is a matter for the project business case, when there is greater clarity on what is being procured. However, it is worth reflecting that the Council's lessons learned over the Fair Isle Ferry Replacement Project and the Relief Vessel Project would support a Competitive Procedure with Negotiation (CPN) in any future vessel builds where it is a design and build.

Multi-vessel orders

12.3.11 When building a series of vessels, the first in class is always the most expensive, with design and construction economies of scale being realised for each subsequent vessel. Where there is an option for repeat orders with the same shipyard, there are often economies of scale associated with:

- **Building vessels in classes:** this is the approach being adopted in the IITCP, where three broad Ro-Ro vessel typologies have been developed, as well as a Fair Isle Class for workboat operated routes (although Foula may continue to need a bespoke vessel).
- **Building multiple vessels of the same type at the same shipyard:** this is the approach which CMAL has adopted for SVRP1, where all seven vessels are being built under a single contract at the Remontowa yard in Poland. Similarly, the Council's recent tender for the first of the Type 1 fleet includes an option for the purchase of two equivalent vessels on a direct award basis.

12.3.12 The commercial strategy for the IITCP assumes that, **subject to funding**, the Council will aim to adopt the above approach of building vessels in classes and ordering multiple vessels in a single procurement.

Contract type

12.3.13 Whilst a matter for the project business case, the Council will likely adopt the standard **BIMCO New Build Contract (NEWBUILDCON)** for any new vessel, which is used throughout the shipping industry.

12.3.14 This is a build only contract in which the shipyard undertakes to build the vessel to meet the buyer's specification at a fixed price. The contract stipulates that the full risks of the build remain with the shipyard through the construction of the vessel. The contract includes the

requirement for a Builders Refund Guarantee, which is an integral part of the BIMCO contract and is the main source of security for the ship buyer.

Risk allocation

12.3.15 As per the harbour infrastructure, the strategic approach to risk which will be adopted in the IITCP will be to allocate risks to the party best placed to manage them. This is again a topic that would need to be considered on a project-by-project basis, but the following table sets out an indicative risk allocation by category, based on recent vessel procurements undertaken by Shetland Islands Council and CMAL. This would need to be revisited and reassessed in each project level business case:

Table 12.2: Risk allocation by category - vessel

Risk category	Potential allocation - SIC	Potential allocation - shipyard
Design	If a design and build contract is adopted for future vessels, the Council would be responsible for providing the outline design with the tender documents	The shipyard would be responsible for the detailed design and building the vessel in accordance with the agreed contract
Transition and implementation	The Council would own this risk, subject to successful commissioning of the vessel	Successful commissioning would be a shipyard risk
Availability and performance	In a design and build contract, the Council would be responsible for the outline design, which would be provided as part of the tender package	The shipyard would be provided with an outline design to develop and deliver. They would assume responsibility for completing the detailed design and vessel delivery
Operating	The Council would own this risk	Not applicable
Variability of revenue	For the IITCP overall, the Council would retain responsibility for ongoing operational funding, including for any deficit	
Termination	This risk would likely be shared as per Core Termination Provisions (Clause 39) and Annex D of the BIMCO NEWBUILDCON contract, assuming this contract form is adopted	
Technology and obsolescence	The Council would own this risk	Not applicable
Residual value	The Council would own this risk	Not applicable
Financing	The Council would own this risk	Not applicable
Legislative	Not applicable	The shipyard would be responsible for meeting the Council's requirements and those of the approval authority (the Maritime and Coastguard Agency) and all other relevant statutory requirements

12.4 Fixed Links

12.4.1 The commercial strategy for a fixed link or links is uncertain at this programme business case stage, as it is ultimately contingent on the funding and financing model adopted by the Council.

12.4.2 As part of the Fixed Link Model study, COWI engaged with three international tunnelling contractors to obtain an industry view on the preferred contracting model that they would wish to be appointed under. Feedback from this activity is captured below, so as to provide some

early guide rails for shaping the procurement strategy should a fixed link progress in the future.

Market analysis and capacity

12.4.3 Subsea tunnelling is a specialist and international industry. In deciding which opportunities to pursue, contractors weigh-up the comparative merits of opportunities with respect to e.g., profitability, risk, programme and a range of other factors. Whilst building subsea tunnels in Shetland is technically deliverable, there has been long-term uncertainty over whether the proposition would be of interest to contractors.

12.4.4 In order to test market appetite, the FLM included the issuing of a Prospectus for a test case Yell Sound tunnel to a long-list of firms in the contractor market. Following an assessment and shortlisting process, three internationally experienced tunnelling contractors entered into a paid professional services agreement with COWI with a view to understanding:

- The constructability and practical delivery of the Reference Design provided in the Prospectus.
- Their preferred contracting model.
- The cost and schedule applicable to constructing the tunnel.
- Risks and risk management

12.4.5 This exercise established that there is market interest in building tunnels in Shetland, subject to a suitable contracting model with appropriate risk allocation (as will be discussed later in this section.

Procurement strategy

Delivery models

12.4.6 Scandinavia has set a strong precedent in the delivery of subsea tunnels, with extensive networks that have transformed regional connectivity. Whilst there is limited experience in the UK, developments in the **Faroe Islands** and countries like **Norway** and **Iceland** offer compelling delivery and procurement models and could help inform the viability of any fixed links emerging from the IITCP.

12.4.7 For a subsea tunnel in Scotland built using drill-and-blast, the potentially suitable procurement and contracting models are likely to be either a single option or a combination of the following frameworks, each tailored to the tunnel works-specific setting and balancing risk, cost certainty, and collaboration in different ways.

Design-Bid-Build (DBB)

Table 12.3: Design-Bid-Build procurement model

	Comment
Structure	Shetland Islands Council would define the full design - the design team would be employed directly by the client to fully develop the design prior to going out to tender. Suitable contractors would then be invited to submit tenders priced against the Council's requirements, and the tenders would be evaluated through a competitive bidding process. The contract would be awarded based on the lowest cost compliant bid
Advantages	• Clear roles and responsibilities • Competition is maximised • Clear cost certainty at award • Competitively tendered

	Comment
Limitations	• Reduced flexibility for accommodating complex subsea risks, e.g., water ingress, geological variability etc • Bids (and awards) are likely to be significantly inflated to cover such risks, so the Council would effectively pay for that risk • A claims culture can emerge if unforeseen ground conditions arise • Longer overall duration due to sequential phases, less flexibility for contractor-led improvements • Heightened risk of project collapse, with consequential reputation damage
Suitability	With adjustments and risk sharing taken into account, this model could be adapted for subsea drill-and-blast tunnelling but requires careful consideration of risk allocation. A traditional DBB is liked by investors and clients, less so by contractors

Design-Build (DB)

Table 12.4: Design-Build procurement model

	Comment
Structure	Under this model, the contractor is responsible for both design and construction, streamlining execution and improving integration. This model can adopt a single-stage procedure, restricted procedure, or restricted procedure with open-book ECI
Advantages	• Single point of responsibility • Potential innovation in drill-and-blast sequencing, grouting and waterproofing
Limitations	• The Council would lose design control • Requires strong technical specifications upfront • If a single-stage procedure is adopted, it can result in an inflated project cost. If a two-stage procedure is adopted, it can also result in an inflated project cost or an optimal project cost, depending on the nature of the design phase
Suitability	This is a good candidate model for subsea tunnels where integration of design and construction mitigates geological risks. It is favoured by investors and clients, although contractors' liking depends on whether it is a single or two-stage procedure

Design-Build-Maintain-Operate (DBMO)

12.4.8 Design, Build, Maintain and Operate (DBMO) is an integrated project delivery model in which a single private entity manages a project's entire lifecycle, including design, construction, long-term operation and maintenance. All of these components are covered under one contract, often for public infrastructure, streamlining processes, allocating risk and incentivising performance.

12.4.9 There are several variations to this model such as DBFOM (Finance) or DBOT (Transfer) that add funding or ownership transfer.

12.4.10 This approach leverages private sector expertise in specialised areas and improves delivery efficiency by enabling integrated teams to complete projects faster. It incentivises long-term operational cost savings and allows public bodies to conserve capital by accessing private investment.

Table 12.5: Design-Build-Maintain-Operate procurement model

	Comment
Structure	This approach procures an entity - or more commonly a joint venture - for the entirety of the asset's lifecycle to the point where the initial funding mechanism is completed and closed
Advantages	• Allows for the widest spectrum of funding options

	Comment
	• Single point of responsibility • Potential innovation in drill-and-blast sequencing, grouting and waterproofing • The client deals with a single entity, simplifying management and accountability, though potentially at the expense of some direct control • The contractor designs for efficiency and low maintenance (long-term incentives) since they are responsible for ongoing costs, aligning private interests with public goal • Allows for risk transfer by shifting construction and operational risks from the public sector (the Council) to the private partner
Limitations	• The client loses design control • Requires strong technical specifications upfront
Suitability	This is a good candidate model for subsea tunnels where integration of design and construction mitigates geological risks. It is liked by investors, clients and contractors alike

Public-Private Partnership (PPP) – PFI / BOOT

Table 12.6: Public Private Partnership procurement model

	Comment
Structure	The Private Finance Initiative (PFI) is a specific Public-Private Partnership (PPP) model used in the UK since 1992, in which the private sector finances, designs, builds and operates public infrastructure. The key elements of this mechanism are: • Special Purpose Vehicle (SPV): A private consortium (the SPV) is created specifically for the project, involving a construction firm, a bank or a fund, and a service provider • Unity charge: The public sector makes a single monthly or annual payment (the 'unitary charge') to the SPV once the asset is operational • No service, no fee: Payments are performance-linked. If the tunnel is unavailable or services fail to meet agreed standards, the public body makes deductions from the unitary charge • Risk transfer: Risks associated with construction delays, cost overruns, and long-term maintenance are transferred to the private partner
Suitability	Effective for large-scale tunnels where risk transfer and long-term maintenance are critical

12.4.11 The PPP variant also includes a sub-variant - BOOT – Build, Own, Operate, then Transfer at the end of the contract. In the UK, infrastructure projects have historically used models such as BOOT to fund and share risks.

Early Contractor Involvement (ECI)

Table 12.7: Early Contractor Involvement procurement model

	Comment
Structure	Long-term collaborative agreements, often under NEC or bespoke partnering contracts
Advantages	• Early contractor input into design, risk-sharing, innovation in safety and blasting methods • Further de-risking opportunity via open-book stage two price development
Limitations	• Less competitive tension, requires trust and governance • Can fail to deliver the optimum stage two price if the ECI phase is insufficiently collaborative
Suitability	Strong fit for subsea tunnels, especially where safety and risk management are paramount. Liked by contractors

Management Contracting / Construction Management

Table 12.8: Management Contracting / Construction Management procurement model

	Comment
Structure	The client retains design responsibility and the contractor manages trade packages. This is a 'fast track' strategy that overlaps the design and construction stages and enables contracts for early work packages, such as groundworks, service diversions or upgrades, and early enabling works, to be awarded before the overall design is complete
Advantages	• Flexibility, early contractor input, and staged procurement, in which work packages are let before the design of later packages is completed
Limitations	• Cost uncertainty • Fragmented responsibility
Suitability	Useful if the project is politically sensitive or requires phased delivery, but less optimal for high-risk subsea tunnelling.

Summary

12.4.12 The table below summarises main procurement models for a subsea tunnel in Shetland:

Table 12.9: Summary of subsea tunnel procurement models

Model	Risk allocation	Financing	Duration	Best suited to
DBB	Council retains most risks	Public	Longest	Well-defined scope projects
DB	Shared	Public	Moderate	Integrated delivery need
DBMO	Shared	Public	Moderate	Integrated delivery need
PPP / BOOT	Contractor-heavy	Private PPP	Mid to long-term	When requiring off-balance-sheet financing
ECI	Shared	Varies	Short in itself; with an installation phase, longer than a D&B	Well-defined scope, where safety and risk management are paramount.
MC / CM	Council retains most risks	Public	Intended to be short	Other works

12.4.13 The procurement model for any subsea tunnel in Shetland will ultimately be shaped by how it is funded and financed, which will be resolved as part of any project level business case.

Professional advisers

12.4.14 Any fixed link project will require significant external advice associated with design, planning and delivery. As with harbour works, there are a range of frameworks such as Scotland Excel which could be used to procure such resources. However, the Council again reserves the right to pursue a tendering exercise if it considers this the most appropriate means of achieving value for money.

Contract strategy

12.4.15 As part of the FLM study, a Yell Sound Tunnel Prospectus was developed, which included an assumed contracting model. Feedback was sought from the three contractors on the suitability of this model.

FLM contracting model

12.4.16 The proposed form of contract comprised the FIDIC Emerald Book for the tunnel excavation and tunnel linings. The Emerald Book is a standard form of contract designed specifically for use in tunnel contracts. It takes an approach of equitable risk share between the contractor and owner related to the ground conditions that will be encountered during tunnel construction.

12.4.17 The risk is apportioned by reference to a Geotechnical Baseline Report (GBR). The GBR sets out a contractually binding set of anticipated ground conditions or baselines, which are the basis for both cost and construction schedule. The Owner defines the anticipated ground conditions that will be encountered and defines the support required for each rock 'class'. The contractor provides costs and progress rates for each class during tender. The class is determined by inspection in the tunnel during excavation and the contractor paid in accordance with the baselines. The speed of excavation is the contractor's responsibility; should it be slower than baseline, the contractor will incur costs, i.e., it takes the progress risk. With thorough investigation and experienced drafting, a GBR is an effective method of managing ground risk and is industry best practice.

12.4.18 The Prospectus outlined a potential approach to tendering, under which elements of the project, reasonably certain in cost, such as the mechanical, electrical and plumbing provisions required in a tunnel, would be provided under a lump-sum approach.

Contractor feedback

12.4.19 Collated feedback from the three selected contractors identified the following points with regards to the proposed contracting model:

- All of the contractors stated that they **would not enter a construction contract where all risk related to ground conditions was to be carried by them**, the approach set out in the Prospectus therefore being acceptable, i.e., a combination of a re-measurable sum for the tunnel excavation and lining works and a lump sum for the provision and installation of mechanical, electrical and plumbing provisions. The market position is, therefore, that **a lump sum construction contract is not acceptable**.
- The contractors noted that they would expect the **Council or the public sector more generally to retain the revenue risk** associated with tolls.
- The Prospectus set out that **the Council would procure the detailed design and the construction contract would be build-only**. All three contractors supported this approach but would also take responsibility for the design if required.
- The contractors favoured a period of **Early Contractor Involvement**, this a period after contract award but before commencement when the contractor can influence the risk profile of the project by bringing its experience to the design and pre-construction planning, including discussion on GBR baselines.
- All **contractors defined exclusions for works undertaken prior to their mobilisation to site**. These exclusions primarily related to preparatory works, including utility relocations and site preparation to accommodate the main tunnelling contractor, as well as environmental constraints and land access.

Risks and opportunities

12.4.20 As part of the FLM, the three selected contractors provided a schedule of risks and opportunities, and the actions required to mitigate or realise these. The key risks and opportunities are summarised below.

Risks

Ground conditions

12.4.21 Ground conditions represent a key consideration for any tunnel project. At this stage of development, it is standard and accepted practice to rely on published geological maps, regional datasets and professional judgement informed by comparable projects.

12.4.22 Site specific ground investigation would be undertaken at a later stage to confirm and refine assumptions, reduce residual uncertainty and inform detailed design and cost development.

12.4.23 The interpretation of the investigation results would allow characterisation of rock conditions, including faults, the development of the detailed design for tunnel support, the assessment of groundwater inflows, and the development of the GBR to manage ground risk during construction.

Site logistics and island location

12.4.24 The island setting creates logistical challenges, including the transport of materials, equipment and personnel. Accommodation for the workforce is not in plentiful supply at either end of any of the proposed tunnels.

12.4.25 These constraints increase both the mobilisation and running costs for delivering a tunnel. To overcome this, detailed planning by the contractor of logistics would be required, as well as the establishment of a strong local supply-chain. It would be necessary to establish temporary accommodation adjacent to both tunnel portals.

Environmental consents, planning and land access

12.4.26 Experience shows that delays and therefore cost increases on tunnelling projects are commonly incurred due to a combination of factors related to obtaining statutory consents, securing EIA approvals and planning permission, as well as land and access requirements.

Spoil disposal

12.4.27 Ownership of excavated soil and rock (“spoil”) arising from the surface and tunnel excavation works would be defined within the project’s contract documents. However, in most major infrastructure projects, spoil ownership is assigned to either the client or the Contractor, depending on how risk allocation, reuse opportunities and disposal responsibilities are structured.

12.4.28 It should be noted that there would be an opportunity associated with the potential reuse of spoil for local construction activities or landscaping applications, thereby reducing disposal volumes, transport demands and associated environmental impacts.

Opportunities

Early enabling works

12.4.29 Undertaking early enabling works, including site preparation, intrusive ground investigations, land and access requirements, and utility diversions, reduces risk ahead of the main construction contract.

Parallel working

12.4.30 Tunnelling from both portals simultaneously is required. Without this, the construction programme would be unjustifiably long and the costs higher. This would be a requirement in any tender for tunnel construction in Shetland.

12.5 Legal and regulatory considerations

Subsidy Control

12.5.1 The release of funding for any project emerging from the IITCP will be contingent on Shetland Islands Council demonstrating that any project grant does not constitute a subsidy which, if it did, would require further analysis to ensure compliance with the principles of the Subsidy Control Act 2022.

12.5.2 All procurement relevant to each project will be undertaken in accordance with the Public Contracts (Scotland) Regulations 2015 and thus will be compliant with the Subsidy Control Act 2022.

Consents – harbour infrastructure and fixed links

12.5.3 This section introduces the likely consents and approvals required to deliver the key outputs of the IITCP, treating harbour infrastructure and fixed links separately and assuming these are progressed as individual projects. The complexity and requirement will vary depending on the scale of the project. Requirements such as the EIA will be much more onerous for a fixed link or a Ferry Do Max option, for example, whereas it may not even be required for minor harbour works.

Table 12.10: Likely consents requirements for individual projects under the IITCP

Consent Type	Issuing Authority	Harbour Infrastructure	Fixed Links
Planning Permission	SIC as Planning Authority	Required for works above the Mean Low Water Springs (MLWS) level such as terminal buildings, roads and storage areas	Required for works above the MLWS level such as portals, access roads and ventilation shafts
Marine Licence(s)	Marine Directorate	Required for all construction and dredging works below MLWS level such as new quays and sheet piling. A separate licence will be required for dredging and disposal activities	Required for construction works below the MLWS level, such as tunnelling. A separate licence will be required for disposal activities
Environmental Impact Assessment	SIC as Planning Authority and Marine Directorate	May be required depending on the scale and location of the works, i.e., near designated sites, involving dredging, disposal at sea etc	This is a statutory requirement for major infrastructure – it could be needed separately for planning and marine licence applications
Habitats Regulation Appraisal	NatureScot and Marine Directorate	Required if the proposed project affects protected sites. In Scotland, Special Areas of Conservation (SACs) and Special Protection Areas (SPAs) are given legal protection by the Habitats Regulations[44]	

[44] The Conservation (Natural Habitats, &c.) Regulations 1994

Consent Type	Issuing Authority	Harbour Infrastructure	Fixed Links
Protected Species Licence	NatureScot	Required if otters, seals or nesting birds are disturbed or relocated.	
Land acquisition	Landowners, SIC, Crown Estate Scotland	Will only be required in certain cases, including to cover construction-stage requirements	Required for landfall, tunnelling alignment, compounds and other construction-stage requirements

12.5.4 As the IITCP will result in a long-term investment programme with different infrastructure features, a Strategic Environmental Assessment (SEA) of the programme is being undertaken to assess, consult on and monitor its likely impact. The SEA is governed by the Environmental Assessment (Scotland) Act 2005[45] and will provide a framework for future development consents for individual projects.

Consents – vessels

12.5.5 Any shipyard building one or more new ferries for the Council will be required to demonstrate that the vessel(s) complies with all regulations defined by the Maritime and Coastguard Agency as the UK Flag State Authority, the requirements of the classification society as well as those of any other relevant authorities. Acceptance of any vessel by the Council will only be provided once these approvals are in place.

[45] Environmental Assessment (Scotland) Act 2005

13 Management Dimension

13.1 Overview

13.1.1 The purpose of the Management Dimension of the programme business case is to demonstrate that robust arrangements are in place for the delivery, monitoring and evaluation of the IITCP. Demonstrating that the preferred investment programme can be successfully delivered requires evidencing that the programme is being managed in accordance with best practice, subjected to independent assurance and that the necessary arrangements are in place for change and contract management, benefits realisation and risk management.

13.1.2 As with the Financial and Commercial Dimensions, the Management Dimension is provided in outline at this stage given uncertainty over funding and programme. This chapter will also be updated once Council Members have made a decision on the preferred option for each island and will be coordinated with the Implementation Route Map.

13.2 Evidence of Similar Projects

13.2.1 The Network Strategy SOC presented a comprehensive review of lessons learned from projects of a similar nature to those that will make up the IITCP, i.e., new and replacement vessels, harbour infrastructure and fixed links. In the interests of brevity, this is not repeated here but can be found in the SOC Report.

13.3 Programme Plan

13.3.1 A detailed programme plan will be prepared once the Council has made a decision in relation to the preferred option for each island. This will inform the development of a more detailed Implementation Route Map. This section, therefore, reflects on the most urgent requirements for ferry replacements and introduces an indicative timeline for a prospective fixed link based on the outputs of the FLM study.

Ferry replacements

13.3.2 As noted in the Strategic Dimension, the Shetland internal ferry fleet is ageing, with an average age of 32.5 years and seven of the eleven vessels now exceeding 30 years in service. Several vessels are therefore operating beyond their intended design life, with consequential impacts on **reliability, compliance with modern regulatory standards and passenger expectations**.

13.3.3 This presents a **critical resilience challenge**, with increasingly frequent breakdowns, extended refit periods and crew availability constraints already affecting service delivery. **Fleet renewal will be required over the next 10-15 years**. At present, however, no committed funding has been identified to support this scale of renewal.

13.3.4 In response to immediate resilience concerns, the Council commissioned a Ferries Resilience Review in 2024, which identified a series of short-term interventions to stabilise service delivery, including changes to crew working arrangements and remuneration (now implemented), alongside the procurement of an additional vessel (currently in order). These interventions reinforce a **business-as-usual option package** that assumes services are operated in line with published timetables through improved resilience measures.

13.3.5 Notwithstanding these short-term actions, **the underlying structural issue of an ageing fleet remains**. Options generation therefore considered both capital interventions (such as phased vessel replacement) and revenue measures (e.g., changes to fares, service frequency or operational practices). While some revenue measures could be implemented in the near

term, they are unlikely to fully offset the impacts of ageing assts and will only provide partial mitigation.

13.3.6 Over the programme period, **capital investment in vessel replacement will be required across all routes**, implying multiple renewal cycles and reinforcing the need for a clear, prioritised and deliverable replacement strategy. A detailed timeline will be developed following the Council's decision on the preferred option for each island / route, informed by the Implementation Route Map.

Fixed links

13.3.7 This section provides details of the estimated programme for the delivery of a reference tunnel between mainland Shetland and Yell as detailed in the FLM study. This information was obtained from the contractors engaged in the study and is considered broadly portable to the other candidate fixed links.

13.3.8 Delivery of a subsea tunnel would be done in stages:

- The **'Define'** stage would cover preconstruction activities.
- The **'Procure'** stage is where contractors are appointed, and some advanced works are executed.
- Finally, the **'Deliver'** stage covers construction, fit-out, testing and commissioning before opening.

13.3.9 The FLM study concluded that **it could take up to three years from a given start date to the point where tunnelling is ready to commence**. This period covers the Define and Procure stages. In this time, all finance would be raised, consents awarded, advisors and contractors appointed and the Council prepared as an 'informed client' fit to deliver a major infrastructure project of this scale.

13.3.10 Critically, the land would have been secured for use, surveys would be complete, and the results would have fed into the design and procurement process to help manage risk. The ground works for compounds and associated infrastructure, and for tunnel portals, would be complete, with utilities diverted and services laid.

13.3.11 Further details of the activities in each of the three stages are provided below.

Define Phase (Years 1 and 2)

13.3.12 The activities making up the Define phase include:

- Develop scope and tender for the Council's Advisors: Legal, Engineering, Finance and External Affairs
- Plan, tender and appoint Site Investigation contractor
- Undertake site investigation (intrusive boreholes, geophysics and bathymetry)
- Geological mapping by the British Geological Survey to renew dated published maps
- Environmental Impact Assessment
- Outline Business Case and Full Business Case
- Consenting
- Stakeholder engagement
- Interpretation of data from site investigations and creation of a ground model and geotechnical factual and interpretative reports

- Commence Detailed Design
- Prepare GBR, contract documents for tunnel contract, including technical specifications
- Plan procurement of the tunnel construction contract
- Market engagement with tunnel contractors
- Advocacy for funding
- Plan, tender and appoint advanced works contractor(s)

Procure Phase (Year 3)

13.3.13 The activities making up the Procure phase include:

- Land and access requirements
- Complete detailed design
- Tender and award the tunnel construction contract
- Execute advanced work contract for utility diversions and service route preparation
- Execute advanced works contract for ground works for site access, roads, compound, welfare, roads, explosives magazine and tunnel portals
- Early works for the tunnel contractor to construct the site compound, welfare facilities and explosives magazine
- Tunnel Contractor's ECI engagement

Delivery Phase (Years 4 to 8)

13.3.14 The activities making up the Delivery phase include:

- Tunnelling works
- Internal works fit-out works
  - Internal structures and civil works
  - Mechanical, Electrical and Plumbing fit-out (ventilation, lighting, fire safety, drainage, pumps etc.)
  - Tunnel roadway construction
  - Surface road connections and approach road tie ins
  - Construction of technical building(s)
- Testing and commissioning
  - Systems integration (power, communications, safety etc)
  - Emergency drills and regulatory approvals
  - Trial operations
- Handover and operations
  - Formal acceptance by Shetland Islands Council

13.4 Programme Governance

13.4.1 The IITCP will be delivered by the Council, which has assembled a **qualified and experienced programme team** that has a strong track record of delivering major projects in Shetland, including the £56 million Anderson High School, which opened in 2018.

13.4.2 While the Council has **extensive experience in delivering vessel and harbour infrastructure**, there is no precedent in Shetland (or Scotland) for the delivery of subsea tunnels. As such, the delivery of fixed links represents a **step change in capability and approach**.

13.4.3 This section therefore sets out a **Target Operating Model (TOM)** that defines how the Council will operate across the three stages of fixed link delivery (Define, Procure, Deliver). This is expected to be the primary area of organisational change and will play a key role in shaping **programme-level governance and delivery arrangements**.

13.4.4 A more detailed **Programme Delivery Plan (PDP)**, including governance and organisational structures, roles and programme management arrangements, will be prepared following the Council's decision on the preferred option for each route / island.

Setting the strategic considerations

13.4.5 There are five areas that will be central to the successful delivery of a fixed link tunnel:

- **Accountability:** the Council will balance its statutory duties with the added responsibility of overseeing the development, delivery and operation of the tunnel option.
- **Governance:** existing governance systems may have to be modified, and new ones introduced to ensure the Council retains appropriate oversight.
- **Control:** no statutory authority can completely de-risk the investment; it's all about the extent to which Elected Members wish the Council Executive to retain control.
- **Ownership:** funding may well dictate the ownership and therefore the degree to which the Council manages, influences and controls each stage of the project.
- **Risk:** determining the risk profile will require debate and an understanding of the time and focus required to mitigate the risks.

Retained accountabilities

13.4.6 The Council has twelve principal accountabilities which must be upheld as part of its strategic duties. These are set out in the figure below:

Figure 13.1: The twelve principal accountabilities of an 'Informed Client'

The Target Operating Model (TOM)

13.4.7 A TOM is a high-level, strategic blueprint which defines **how an organisation will** operate **throughout the various stages of project development and delivery** to achieve its goals,

serving as a bridge between strategy and execution. It translates vision into an operational model, covering people, processes, technology and governance.

13.4.8 A comprehensive TOM covers multiple 'layers' often defined as:

- **Processes:** end-to-end workflows, key activities, and value chains
- **People and Organisation:** capabilities, competencies, structure, and roles
- **Technology and Systems:** digital platforms, tools, and infrastructure
- **Information and Data:** data governance and reporting
- **Governance and Performance:** decision-making frameworks and KPIs
- **Location and Channels:** where work is done and routes to market

13.4.9 For a fixed link project, it is proposed to adopt the three-stage delivery model, namely **Define**, **Procure**, and **Deliver**, with each stage tailored to the Council's needs, governance and, in particular, financial scrutiny. Proposals are set out below on how the Council could approach each stage.

13.4.10 The TOM is not just an organisational chart. It is a blueprint of how to deliver value through processes and systems. It will be an **iterative process that requires refinement through the life of the project** to ensure that the Council is adequately informed and skilled to navigate the changes in direction which are typical on projects of this nature. Central to this is the person with overall accountability for the delivery, the **Senior Responsible Owner (SRO)**.

13.4.11 The options around the TOM can be viewed in each of the three stages. These recommendations are based on the working assumption that **funding for any fixed link will be government-backed, self-funded or a combination thereof**.

Define Stage

13.4.12 Any tunnel option proceeding to a project business case would enter the Define stage, with further work required to complete this stage.

13.4.13 A focused **consultation or advocacy programme** is core to the Define stage. Engagement with the **Scottish Government** and **UK Government** would be key. Early engagement with key government stakeholders ensures that any project's strategic intent, funding assumptions and delivery approach are fully aligned with national policy and emerging infrastructure strategy.

13.4.14 Scottish Government involvement at this early stage would be vital to **unlocking potential financing pathways** and ensuring that the project is positioned for successful progression into the Procure and Deliver stages. Other possible funders, such as the **National Wealth Fund**, would also be part of this programme.

13.4.15 The details of what should be progressed and, more importantly, the pace at which these are executed, would depend entirely on the availability of funding to progress this stage. What is set out below is an option that, **if sufficient funding is made available, would enable the project to commence at pace**. Clearly, with reduced funding, the pace would be reduced. Options are agnostic to these constraints insofar as the models are inherently flexible.

13.4.16 It is estimated that the shortest period required to complete the Define Stage **is around two years, and this is considered a stretch target**. This stage concludes after the necessary statutory consents have been secured, the advanced construction contracts have been awarded and the main tunnel contract is ready for tender. This period is characterised by committed funding for 24-months with an extremely busy schedule to be completed.

13.4.17 The Council's existing governance in terms of its current **Programme Board**, which gives oversight to the overall IITCP **should be fit for purpose for the Define Stage**, although the membership should be reviewed to ensure that the Council can **balance its statutory duties with oversight** of delivering one or more significant pieces of infrastructure. The Programme Board should be reviewed to ensure it has sufficient expertise in project finance, procurement and project delivery.

13.4.18 A key action would be to **review the function of the SRO**, who would be accountable for the success or failure of the tunnel project(s), including the definition of cost, programme and scope. This role should have prerequisite experience in the delivery of infrastructure projects. **The SRO would build a team to help manage the delivery** or rely on appointed advisors for support. The SRO would be a full-time role, or it would become a full-time role as the Define Stage develops.

13.4.19 The SRO would ensure that processes are in place to manage the delivery of various tasks, that the people and organisations appointed are appropriate, that the technology, digital systems and data management used are fit for purpose, that sustainability and biodiversity aspects are to the fore in delivery, and that channels for governance oversight are maintained.

13.4.20 The SRO would coordinate the appointment of various advisors early in the project to ensure that all of the actions required under Define are executed.

13.4.21 In this role, there would be merit in splitting the management (development) functions from the design functions or, at least, ensuring they are clearly separated with good accountability.

13.4.22 It is considered that the Council may want to consider **employing a single Engineering Partner** to manage the delivery of all surveys, undertake design and tunnel development services through to the securing of statutory consents. This would eliminate the interfaces between multiple consulting parties and foster a stronger collaborative team with the Council's client team.

Procure Stage

13.4.23 The procurement stage would be the process by which to appoint the contracting parties to deliver the tunnel, including advisors, surveys, utility diversions, advanced works and tunnel construction.

13.4.24 Effective procurement prevents cost overruns, avoiding significant schedule delays, and ensuring high-quality outcomes. Many lessons can be learned from recent project delivery across the UK, which have been characterised by cost escalations and delays to programme delivery. A fundamental lesson from this experience is that a high degree of project definition at the point of procurement of construction contracts yields optimal outturn in terms of cost and programme.

13.4.25 One of the twelve retained accountabilities of the Council is to **hold the principal contracts with all the suppliers**. Resourcing the Council's team to oversee all procurement workstreams is a critical responsibility for the SRO. It may be the case that the SRO would continue with the services of the advisors appointed under the Define stage, although the legal advisor for this stage must be an expert in procurement.

13.4.26 During this stage, the SRO would strengthen the Council's team or rely on advisors to focus on the following areas as the TOM moves towards Delivery:

- Programme controls
- Risk management
- Change control

- Stakeholder engagement
- Communications
- Community relations
- Benefit realisation
- Data management
- Land and property
- Reporting
- Assurance.

13.4.27 The Council may determine the extent of oversight applied to the SRO's approach, meaning **the level of authority and scrutiny exercised over the SRO's decision-making**. A higher degree of control would involve closer supervision and greater influence over decisions that directly shape project outcomes. This is not an unusual model and **tends to be more widely used where the work is in line with normal business operations**, e.g. Network Rail, and depends to a large part on the skills and experience of that individual.

13.4.28 Alternatively, the Council may choose to develop an operational model in which it holds the controls over project development**, while the SRO relies on partners to take the primary 'frontline' management duties** for the contracts. This is a common approach in the contracting industry.

13.4.29 Whether the project is being financed via a direct grant or through a project finance arrangement, **the role of the SRO is central to ensuring the client has the right team directly employed to assume the accountabilities** outlined in Figure 13.1.

13.4.30 Structured finance projects, typically **based on private sector investment into project finance structures**, require different skills and an operational model that aligns with the transfer of risk. Traditional models pass down the responsibilities for design, build, finance and operations to a **Special Purpose Vehicle (SPV)**, which then contracts with a supplier, assuming most of the risk.

Deliver Stage

13.4.31 The Deliver stage requires **different skills and expertise** from the Define and Procure stages but is rooted in the work done in the early stages of the project. The choice of delivery method directly impacts budget control, timeline and quality.

13.4.32 While the basic TOM may not have changed throughout this period, there will be modifications to address, including **risk and contingency management, corporate governance, assurance, control structures and the Council's retained functions**. The Council would retain its accountabilities, make payments, assure design and construction deliverables, manage land, agree to contract changes, oversee stakeholder and community relationships and control risk. Options include:

- Continue the appointment of **the Engineering Partner adopting a delivery partner role** to oversee the construction contracts having carried out detailed design.
- Shift the principal responsibility for downstream delivery to a **dedicated Programme Delivery Partner** under the direction of a Council senior lead (such as the SRO).
- **De-risking the delivery to an SPV** as part of a structured finance arrangement under a design and build approach.
- Appointing a strengthened Council team under the direction of a **Project Director**. Some projects also have an **Advisory Panel**.

13.4.33 Given the relative simplicity of the proposed tunnels and assuming government-backed funding, it is considered that a continued role for the Engineering Partner would be most appropriate under either a government or self-funded model.

13.4.34 Advisors such as the lawyers, financial advisors, Principal Designer etc described in the Procure stage would be retained to provide continued advice throughout the Delivery stage.

Other TOM Considerations

13.4.35 A robust TOM is not merely about the principal structure and the contracting relationship among all parties:

- **The 'wiring' or the processes and systems which support the accountabilities and responsibilities are critical** in determining the quality of the outcomes. Establishing a Common Data Environment and defining data systems, digital solutions and processes is the backbone of efficiency and value.
- Developing the right culture by **creating the right behaviours and ways of working** releases the innovation, enthusiasm and motivation needed to deliver quality infrastructure.
- Embedding a **strict assurance function** supports all processes and systems, including design and on-site delivery.
- Finally, attention should always be given to the **corporate and project governance arrangements**. Maintaining control through clear lines of accountability and responsibility ensure that the parties respect each other and deliver safely and within cost and time parameters.

13.5 Programme Dependencies

13.5.1 The high-level programme dependencies have been outlined in the Strategic Dimension (Section 2.7 and Table 2.10). These will be developed in more detail as part of the PDP, which will be prepared following the Council's decision on the preferred option for each route / island.

13.6 Programme Assurance

Current Decision Gateways

13.6.1 There are three key decision points in the development of the Network Strategy for the IITCP:

- **SIC Decision Point 1:** Approval by Elected Members on the option packages to be taken forward into the OBC for detailed appraisal. This Decision Point was **completed in June 2025**.
- **SIC Decision Point 2:** Selection of a preferred option for each island. The Council meeting for this Decision Point is **set for 30th June 2026**.
- **SIC Decision Point 3:** Development of the Implementation Route Map. This Decision Point is anticipated to take place in **autumn 2026**.

Assurance framework

13.6.2 Assurance is 'the process of providing confidence to stakeholders that projects, programmes and portfolios will achieve their scope, time, cost, quality objectives and realise their

benefits'[46]. A key part of the assurance process is the conduct of reviews, whether on specific elements or on the entirety of the programme.

13.6.3 A detailed assurance framework will be included in the PDP as it will be heavily dependent on whether any fixed links emerge as the preferred option for any given candidate island. The framework will follow guidance from the **Association for Project Management's Assurance Specific Interest Group**. The framework will include a number of strategic points based on the Council's own experience of delivering infrastructure and building projects:

- The IITCP should be **regularly updated** to ensure that the Case for Change and investment priorities reflect prevailing policy, economic and operational circumstances.
- Any projects emerging from the IITCP should be anchored **in a coherent Case for Change** and expression of desired outcomes and an objective-led appraisal process.
- Where possible, there should be an agreement at the outset of a project as to whether it is being presented in accordance with Scottish Government or UK Government guidance. This includes any detailed assurance and approvals plan.
- On inherently risky projects, there would be benefit in undertaking QRA as early in the process as possible and regularly updating it. The QRA should be as much of a risk management tool as a key component of a robust assurance framework.
- The Council should seek to establish a strong project partnership with any Scottish or UK Government representatives. This will be beneficial in relation to rigour, access to expertise and effective sponsorship.
- The Council should adopt a robust assurance process in line with the **Three Lines of Defence (3LoD) assurance model** for projects emerging from the IITCP.

13.7 Risk, Opportunity and Issues Management

Risk process

13.7.1 The risk management process should facilitate the ongoing identification, analysis, treatment and review of risk throughout the life of the IITCP and its individual projects. This represents common best practice steps to identify and understand the range of risks faced by a programme and set out actions to manage them:

- **Identification:** New risks are identified and incorporated into a risk register.
- **Analysis and evaluation:** Each risk is assessed and analysis is undertaken to facilitate prioritisation.
- **Treatment:** Actions are identified to actively manage risk to the benefit of the programme.
- **Monitoring and review:** Monitor progression of risks over the life of the programme.
- **Communication and consultation:** Create a clear line of targeted information flows within the agreed governance structure, ensuring the right stakeholders remain informed of relevant risks.

Risk management interventions

13.7.2 In order to ensure the continuous management of risks, the IITCP and its individual projects will be subject to the schedule of risk activities detailed below.

[46] *APM Body of Knowledge 6th edition*. ISBN 978-1-903494-40-0

Risk Register Reviews

13.7.3 There is an expectation that a **Master Risk Register** will be maintained at programme level. The current Master Risk Register was developed at the outset of the Programme and was last updated in April 2026. It will be reviewed after the Council's decision on the preferred option for each island / route in June 2026.

13.7.4 Individual **Project Risk Registers** will be developed as individual projects are progressed under the umbrella of the IITCP. The PDP will provide further details about the hierarchy and relationship between the Master Risk Register and each individual Project Risk Register but:

- The Master Risk Register will contain risks which are strategic in nature, associated with the overall coordination of the IITCP, not specific to individual projects and / or have the potential to directly impact the IITCP TPOs.
- Project Risk Registers will contain risks which are localised and specific to the deliverables of an individual scheme.
- There should be options to escalate risks, when identified across more than one project, to the Master Risk Register, particularly if there is indication of a common cause of risk.

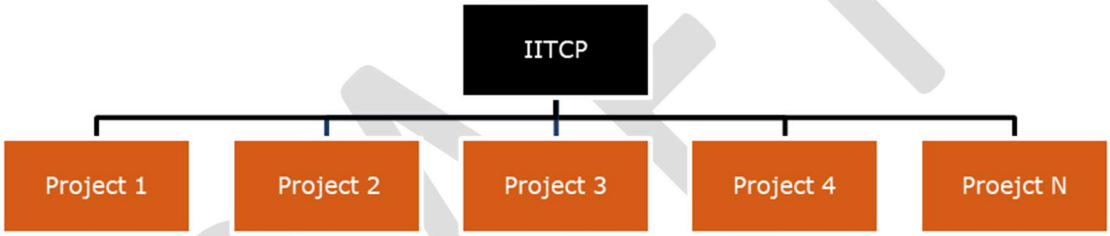

Figure 13.2: Programme / Project Hierarchy

13.7.5 The frequency of future risk register reviews will also be set out in the PDP. However, the general structure of any risk register review, whether at programme or project level, will be as follows:

- Review the potential risks associated with any key emerging developments
- Review of the previous top risks
- Review of risk treatment actions which have been selected as targeted or are approaching their completion dates
- Capturing new risks
- Review of the remaining risks in order of current risk score

Risk Dashboard Reporting

13.7.6 The outputs of any future risk register reviews and any other risk activity will be summarised in a risk dashboard report that will be reported to the Programme Board. This will summarise the details of the top risks to the IITCP and any 'live' projects and provide an overview of the current estimated risk exposure.

Quantitative Risk Assessment

13.7.7 Quantitative Risk Assessment (QRA) modelling is a more advanced form of risk analysis, providing a higher level of granularity to the basis of the risk assessment process. QRA

modelling is typically used to evaluate the expected impacts of risk in terms of **cost (QCRA)** and **schedule (QSRA)**, at any given confidence level.

13.7.8 QRA is recommended to be carried out at project level at the earliest possible stage. In any case, any project-level OBC should include a first pass of QRA to inform any risk provisions around cost and programme. This does not preclude the consideration of additional Optimism Bias if deemed necessary to cover any residual uncertainty.

Risk Forum

13.7.9 Given the nature of some projects within the IITCP, it is recommended to establish a **Risk Forum** to discuss and obtain a resolution to key risks or risk findings as appropriate. This will be further defined in the PDP, but it could be a short session focused on a specific risk with the potential to be incorporated into an existing risk-related regular meeting when required.

Opportunity management

13.7.10 Opportunity management is an approach to enhance programme and project benefits, potentially saving time, cost and improving performance.

13.7.11 Opportunities will be assessed going forward following the same criteria as risks. Once the opportunities have been assessed, the following response options should be considered:

- **Exploit:** Maximise the probability of the outcome through extensive measures to ensure that the opportunity can become a certainty
- **Enhance:** Consider actions to increase the likelihood of the opportunity occurring, rather than making the opportunity a certainty
- **Transfer:** Transfer the opportunity to the organisation or individual best able to maximise the opportunity
- **Accept:** This is the 'do-nothing' approach by which the opportunity may occur, but nothing is done to prepare for impact

Issues management

13.7.12 An 'issue', for risk management purposes, can be defined as a risk that has materialised and needs to be resolved as soon as possible. Issues will be recorded in a separate **Master Issues Log** at programme level and a recovery plan developed to ensure the issue is rectified as a matter of urgency. Individual projects will develop and manage their own Issues Log.

13.8 Benefits Realisation Plan

13.8.1 The **Benefits Realisation Plan (BRP)** will enable the benefits that are expected to be delivered by the IITCP to be planned, their progress monitored and ultimately realised. It will define the activities that are required to manage the realisation of these benefits – i.e., what needs to be done, by whom and when.

13.8.2 The benefits associated with the IITCP can be structured by linking outputs to **transport network and user and supply-chain outcomes** and, ultimately, to **wider societal impacts**. These are detailed in Section 2.7.

13.8.3 A BRP will be developed to accompany the IITCP and included in the PDP. The BRP will reflect the outputs of the Implementation Route Map and will set out how these benefits will be tracked, measured and managed over time.

13.8.4 **Overall accountability for benefits realisation will sit with the SRO**, who will be responsible for ensuring that the intended benefits are delivered and that appropriate monitoring and reporting processes are in place across the programme lifecycle.

14 Conclusions and Next Steps

14.1 Conclusions

14.1.1 The Shetland Islands Council ferry service was substantively modernised in the 1970s and 1980s, offering frequent services over a long-operating day for the short Ro-Ro routes and a more flexible model for outlying communities. This approach to service delivery has been underpinned by a fares regime that has offered a lower cost of travel for most islands than is experienced elsewhere in Scotland.

14.1.2 Over time, Shetland's highly efficient ferry service operating model has shaped the economic geography of the islands that it serves, particularly on the larger population islands served by the short Ro-Ro routes (Bressay, Fetlar, Unst, Whalsay and Yell). The ability to travel between these island communities and mainland Shetland – particularly Lerwick – created opportunities for employment, employers' and personal business and leisure activities, whilst also shaping supply-chains and public service delivery. Growth begets growth, and this ability to routinely travel to mainland Shetland has become normalised. As a consequence, the average resident of Shetland's island communities makes at least double the number of annual trips of the average resident of Orkney's island communities.

14.1.3 Until the early years of the 21st century, this growth was accommodated through a rolling programme of investment to build more and larger ferries and associated harbour infrastructure. This culminated in the entry into service of the current Yell Sound ferries MV *Dagalien* and MV *Daggri* in 2004, which at that point were to be the template vessels for the Ro-Ro fleet. However, the global financial crisis followed by a period of national fiscal austerity was compounded by a financial crisis in the Council in the early 2010s, as the oil-related revenue required to maintain extant levels of Council spending gradually tapered off. As a consequence of these financial pressures, no new vessels have entered service since 2004, and harbour works have been largely restricted to routine maintenance and some minor upgrades. There was also a substantial programme of service reductions in 2012, driven by a requirement to reduce the ferry service's budget.

14.1.4 With vessels having an approximately 30-year service life in Scottish waters and much of the ferry terminals dating from the 1980s, an urgent need for investment is emerging if the Council ferry service is to avoid the type of disruption recently experienced in the Clyde and Hebrides and at the Corran Narrows. Moreover, whilst the ferry service has largely stood still since 2012 (when the service cuts were made), demand for personal and commercial travel has continued to grow, even after the COVID-19 pandemic.

14.1.5 The ferry service in Shetland is now therefore in a critical position, wrestling with ageing assets, an escalating cost base and crew recruitment difficulties, all set against a backdrop of growing demand and evolving societal expectations around the ability to travel.

14.1.6 The IITCP will ultimately set out a long-term investment programme for the eight in-scope island communities, detailing the means by which such investment will provide safe, resilient and reliable connectivity that meets the needs of communities. It will also support the delivery of the ZetTrans Regional Transport Strategy, which the IITCP itself is rooted.

14.1.7 The SOC was approved by Shetland Islands Council Members in June 2025, establishing the case for investment. This Network Strategy OBC has provided Shetland Islands Council Members with the evidence to select a preferred option for each route / island at the Council meeting on 30th June 2026. The eight preferred options will be record in an update to this report post-decision.

14.1.8 This programme of options evidently entails a significant uplift in capital and potentially revenue expenditure, which is additional to over **£500m** of funding over the next decade purely to reliably maintain the ferry service in its present-day form. This level of investment is

significantly beyond the means of Shetland Islands Council, and thus additional investment from Scottish and / or UK Government will be required for the programme to be realised.

14.2 Next Steps

14.2.1 Recognising the need for external funding, the next step following the Council meeting on 30th June 2026 will be to develop a prioritised and phased programme of investment, defining the order in which the eight island preferred options should be delivered. This is known as the Implementation Route Map and will be presented to Shetland Islands Council Members in autumn 2026.

14.2.2 The IRM will serve two purposes – it will allow the Council to:

- Determine and progress its short-term project priorities within the context of a longer-term programme.
- Provide the Scottish and UK Governments and other potential funders with a timed and costed programme setting out the Council's investment priorities and funding requirements. Whilst this programme will inevitably evolve over time, it will allow funding discussions to progress within a structured long-term plan, providing funders with confidence in the overall strategic approach being adopted by the Council.

14.2.3 The IRM is the next major governance control point for the IITCP.

14.2.4 Following the completion of the IRM and the prioritisation of options, the next step will be move to individual project business cases for the highest priority options.

Appendix A Economic Appraisal Modelling

A.1 Overview

This appendix sets out the economic appraisal modelling undertaken to support the Network Strategy Outline Business Case and should be read alongside the economic results presented in the main body of the report. The purpose of the economic modelling is to provide a consistent and proportionate basis for comparing option packages at a programme level. Given the strategic nature of the business case, the modelling relies on a number of simplifying assumptions and high-level inputs. These are appropriate for this stage and will be refined in subsequent project-level business cases.

The modelling estimates the relative economic performance of options based on standard transport appraisal metrics, including journey time, waiting time and operating costs. It does not fully capture all wider impacts of improved connectivity, such as economic transformation, population change or service reliability. These impacts are considered separately in the appraisal narrative.

The approach and terminology follow standard UK transport appraisal conventions, including the use of Transport Economic Efficiency (TEE), Public Accounts (PA) and Analysis of Monetised Costs and Benefits (AMCB) tables as the principal reporting outputs.

The outputs of the economic appraisal, including present value benefits (PVB), present value costs (PVC) and benefit-cost ratios (BCRs), are presented in the relevant chapters of the main report. This appendix sets out the methodology and assumptions underpinning those results.

It is important to note that conventional transport appraisal metrics primarily capture changes in travel time and cost. In the context of island communities, however, the principal value of transport interventions often lies in improved connectivity, reliability, and access to services. These aspects are not fully reflected in monetised benefits and are therefore considered alongside the quantitative appraisal.

A.2 Options, scenarios and appraisal cases

The model assesses the incremental impacts of a selected Do Something (DS) scenario relative to a Do Minimum (DM) / Business as Usual case.

For all islands, the scenario set includes:

- DM Ferry (Business as Usual) – replacement of existing ferry assets; existing timetable and fare structure.
- DS Ferry (Mid) – replacement of existing ferry assets; reduced headways/extended operating hours; existing fare structure.
- DS Ferry (Max) – further reduced headways/extended operating hours; existing fare structure.
- DS Tunnel – new fixed link tunnel (with access road); tunnel open 24 hours; tolls based on existing average ferry yields.

It should be noted that for Bressay, the DS Tunnel scenario also assumes that a new bus service would begin operation with services mirroring the existing DM ferry timetable, to ensure that there is not a loss of accessibility for the substantial foot-passenger market on that route. Given the early stage of this appraisal, the modelling simply assumes that these travellers transfer to bus and that there is no material change to their generalised cost of travel. More detailed analysis will be undertaken at the next stage of the appraisal process.

A.3 Appraisal period and opening year

For all scenarios, an opening year of 2035 was assumed with a 60-year appraisal period. A 100-year appraisal period was also explored under Sensitivity Test 4.

A.4 Price base, unit of account and discounting

The model reports appraisal outputs as discounted present values in 2023 prices and values, consistent across TEE/PA/AMCB tables.

Cost inputs largely originated in other price bases (e.g., cost year 2025) and are rebased within the cost schedules.

The capital cost schedules apply a factor-to-market prices conversion factor of 1.19 (i.e., an indirect tax uplift consistent with TAG practice), with costs then reported in market prices for appraisal outputs.

Discounting was applied to express streams of costs and benefits as present values in the 2023 base year in line with TAG guidance.

A.5 Demand, demographics and forecasting approach

Demographic baseline and demand

Population data sourced from the Scottish Censuses 2001, 2011 and 2022 with growth factors derived from National Records of Scotland (NRS) population forecasts.

The DM demand baseline was derived from ferry carryings data for 2023/24, including passengers and vehicle categories. 2023/24 was selected since corresponding fares data was available for this period, and data pertaining to cancelled sailings was excluded.

Route	Fare Paying Passengers	Car / LGV / Motorcycle	Non-commercial Trailer	CV / Tanker / Plant	PSV / Bus
Belmont ↔ Gutcher	120,161	61,941	1,792	3,727	940
Bressay ↔ Lerwick	184,369	67,561	1,487	3,054	1,46
Toft ↔ Ulsta	262,351	138,179	4,217	8,950	1,023
Whalsay ↔ Laxo	142,060	71,960	1,976	1,591	52

Except in the case of Bressay, it was assumed that all ferry passengers travelled with a vehicle, given that there are limited jobs and housing within walking distance of the ferry terminals.

However, the Bressay to Lerwick service drops passengers into Lerwick town centre, facilitating car-free travel, and travel surveys indicate that only approximately 35% of travellers take their car on-board. This is a person-based value and not a trip-based value and so fare data from SIC, and journey purpose and average car occupancy data from the TAG Databook was used to estimate the number of passengers who do not travel with a vehicle (40% true walk-on/walk-off passengers on Bressay-Lerwick service).

Demand response to generalised cost (elasticities)

The model applies an elasticity-based approach to forecast DS demand changes in response to changes in generalised cost (time, charges, and service factors), with elasticity values obtained from TAG:

- Non-work elasticity: −0.1506
- Business elasticity: −0.1
- CV elasticity: 0 (CV demand treated as non-responsive)

A.6 User benefits methodology (TEE / consumer and business impacts)

Overview

User benefits are calculated for Consumers (commuting and other purposes) and Business users and providers, and are reported through the TEE Table, feeding into total Present Value of Benefits (PVB) in the AMCB.

The TEE tables are expressed as discounted present values in £000s, 2023 prices and values.

It is important to bear in mind that the appraisal quantifies the monetised impacts captured within the standard appraisal framework; it does not represent the total value of all impacts associated with improved connectivity. Where impacts cannot be accurately monetised at this stage (for example, wider social and economic effects), these are considered qualitatively within the main report.

Benefit components

The model includes monetised impacts for:

- Travel time changes (including ferry wait components under ferry scenarios)
- Vehicle operating costs (VOC) (calculated using forecast fuel efficiency, fuel costs, and non-fuel VOC components)
- User charges (fares/tolls)
- Service quality / scheduling / inconvenience costs, incorporating headway effects and operating hours effects for ferry services.

Treatment of wait time / inconvenience

For the ferry DM case, the model includes:

- A compulsory minimum waiting time of 5 minutes
- A remaining headway derived from the timetable, which is converted into an equivalent "inconvenience time" using the Illustrative Wait Curve (Figure 2 TAG 3.2) and factored by the PT wait time multiplier of 2 (TAG A1.3)[47].

The table below indicates average headways and estimated inconvenience costs for each route under Do Minimum / Business as Unusual.

Route	Average Headway (hh:mm)	Compulsory Wait Time (min)	Inconvenience Cost (min)
Belmont ↔ Gutcher	00:40	00:05	00:24
Bressay ↔ Lerwick	00:42	00:05	00:25

[47] Note: this PT wait time multiplier has been removed under Sensitivity Test 2. The logic being that people waiting on a ferry typically do so inside a vehicle or in a waiting room, and so the perceived cost of waiting is likely to be lower than for the average PT user at a bus stop or platform.

Route	Average Headway (hh:mm)	Compulsory Wait Time (min)	Inconvenience Cost (min)
Toft ↔ Ulsta	00:42	00:05	00:25
Whalsay ↔ Laxo	00:54	00:05	00:28

Mode and purpose segmentation

Demand and benefits are segmented by:

- Journey purpose (business vs non-business, with non-business split into commuting and other)
- Vehicle/user type (cars/LGVs; CVs including tankers and plant; PSVs; plus passenger categories)

A.7 Costs: investment, operating and maintenance

Cost categories and inclusion

For each option, the model includes:

- Investment (capital) costs, including replacement and renewal schedules for vessels/terminals (ferry options) and construction of tunnel/roads (fixed link option)
- Operating and maintenance costs, with annual profiles applied and discounted.

Investment Costs

Mott MacDonald produced replacement and renewal cost estimates for all ferry services and options with cost allocations from 2026 to 2095 (2025 market prices). For the 100-year sensitivity test (ST4), Stantec extended these patterns up to 2034. It is noted that for some ferry options, infrastructure construction and/or vessel purchase are scheduled to occur some years ahead of the opening year. It has been assumed however, that no benefits would be accrued prior to the opening year.

Fixed Link preconstruction and construction costs were developed by COWI for Yell Sound, Bluemull Sound, Bressay and Whalsay. However, it should be noted that fixed link costs do not include renewal or replacement of tunnel infrastructure, although this will require estimation at the next stage of appraisal. COWI provided information on the phasing of costs for the Yell Sound link only, and the proportional split of costs by year for Yell Sound was applied to the capital costs for each of the other links.

	Capital Costs (2025 market prices)			
Route	***DM 2026 - 2034***	***DS Ferry (Mid) 2026 - 2094***	***DS Ferry (Max) 2026 - 2094***	***DS Fixed Link 2026 - 2034***
Belmont ↔ Gutcher	£230.4m	£291.5m	£530.7m	£303.0m
Bressay ↔ Lerwick	£135.1m	£135.4m	£157.3m	£224.0m
Toft ↔ Ulsta	£276.0m	£280.8m	£438.2m	£352.0m
Whalsay ↔ Laxo	£188.8m	£330.7m	£603.5m	£427.5m

Another point which requires further consideration at the next stage of the appraisal, is the costs associated with improvements to existing or running of new bus services. This applies to all links but is particularly relevant to the Bressay - Lerwick connection which currently carries a substantial amount of foot traffic, which could not pass through a fixed link without a vehicle.

Optimism Bias (OB) and cost uplift parameters

The cost schedules apply the following OB assumptions:

- Ferry infrastructure: 44% (Standard Civil Engineering (Upper), Table 1, Optimism Bias Supplementary Green Book Guidance).
- Vessels: 0% (per STAG)
- Fixed link construction: 55% (Stage 1, Table 7, TAG A1-2)
- Road infrastructure: 46% (Stage 1, Table 7, TAG A1-2)

Sensitivity Test 2 applies Stage 2 OB rates to fixed link costs, and Sensitivity Test 3 applies Stage 2 Rolling Stock OB to vessel costs.

Real cost inflation (RCI)

Real cost inflation (RCI) accounts for the observed tendency for construction costs to increase faster than general inflation. In line with TAG (Databook Table A1.2.1), a 2.1% annual RCI has been applied to capital costs.

This uplift is applied prior to discounting to reflect real increases in input costs over time (e.g. labour, materials and regulatory requirements), ensuring that long-term capital costs are represented on a consistent and realistic basis within the appraisal.

Operating cost assumptions

Existing operating costs for all routes were obtained from SIC accounting information for 2015/16 to 2025/26. An 11-year average was calculated and used as base operating costs for Do Minimum / BaU. Do Something operating costs were estimated through factoring up BaU costs in line with proposed changes to crewing and operating hours under each option.

	Operating Costs per annum (2025 market prices)			
Route	***DM***	***DS Ferry (Mid)***	***DS Ferry (Max)***	***DS Fixed Link***
Belmont ↔ Gutcher	£4.1m	£4.9m	£7.4m	£1.2m
Bressay ↔ Lerwick	£2.6m	£2.7m	£2.9m	£0.7m
Toft ↔ Ulsta	£6.0m	£7.8m	£10.8m	£1.5m
Whalsay ↔ Laxo	£5.3m	£6.3m	£8.2m	£1.9m

It should be noted that for the tunnel option the model only accounts for day-to-day tunnel maintenance, and notes that larger-scale renewals will be needed in the long term but are not included in the current calculation.

The model applies nominal increase in ferry operating costs per annum of 2% to reflect inflation.

A.8 Fares, tolls, VAT and revenues

Do Minimum / BaU Ferry Yields

SIC ferry fares are primarily charged per vehicle, with the vehicle fare covering the driver. Passenger fares are charged separately for any additional travellers. SIC provided detailed fare breakdown information for all ferry crossings for the 2023/24 financial year, showing ticket volumes by type and associated revenue. This data included both fare paying and zero fare

carryings, including infants, SIC Disabled Concessionary Pass Holders, and vehicles registered to SIC Disabled Concessionary Pass Holders.

Fare breakdown information included the equivalent number of trips made using multi journey (MJ) tickets but did not include associated revenue. Revenue for MJ tickets was therefore estimated using published 10 trip MJ ticket prices, divided by ten to provide an average per trip approximation. SIC ferry fares have been frozen since 2023/24; accordingly, it was assumed that ferry fares in 2025/26 prices were equivalent to those observed in 2023/24.

Based on this information, the total number of one-way trips undertaken by each ticket type was estimated for each route. Average one-way yields were then calculated by dividing total revenue by the estimated number of one-way trips, producing average yields for:

- Car / light goods vehicle (LGV) plus driver
- PSVs
- Commercial vehicles (CVs)
- Individual passenger carryings

These average yields reflect all carryings, including zero fare passengers and vehicles.

It was assumed that only CV fares included VAT and that ferry fares would remain constant in real terms, only growing with inflation.

Do Something Ferry Yields

It was assumed that any Do Something Ferry scenario, ferry fares / yields would be as per the Do Minimum / BaU.

Do Something Fixed Link Tolls

For the purposes of the high-level economic modelling, users were assumed to pay a 'return' toll per vehicle, with tolls collected via an automatic number plate recognition (ANPR) type system at one of the tunnel portals. Unlike the existing ferry fare system, tolls will be a vehicle-based charge, with all travellers assumed to cross the fixed link within a vehicle.

Fixed link tolls have therefore been derived by translating observed average ferry yields into a vehicle-based charge that is internally consistent with ferry revenues at an aggregate level. The use of average yields incorporates the financial effect of zero fare passenger and vehicle carryings, including SIC Disabled pass holders and infants, at an aggregate level, but does not replicate the distributional characteristics of individual concessionary journeys[48].

Equivalent tolls were estimated as follows:

- PSV and CV tolls were set equal to the observed average one way ferry yield for the relevant vehicle plus driver category
- Car tolls were derived by combining the average car and driver ferry yield with an allowance for accompanying passengers, calculated using
    - Average car occupancy for work and non-work trips (in absence of route specific data, these were sourced from the TAG Databook)
    - Average ferry passenger yield

[48] The detailed design of any future tolling regime, including the treatment of SIC Disabled pass holders travelling either as drivers or as passengers, would require structured development and assessment at later project stage.

Separate calculations were undertaken for work and non-work trips, with the resulting tolls weighted by the proportion of work and non-work car trips and average car occupancy by purpose.

The model adopts a nominal fare/toll increase of 2% per annum (real fares/tolls assumed constant).

A.9 Public Accounts, subsidy treatment and transfers

In economic appraisal, it is important to distinguish between 'real resource costs' (which reflect impacts on society as a whole) and financial flows between different parties, including fares, tolls and subsidies. The latter are treated as transfers rather than additional costs, as they redistribute money between users and the public sector rather than changing total economic value.

Subsidies, fares and tolls are therefore treated as public/private sector transfers within economic appraisal and are typically reflected through the Public Accounts framework. In this appraisal, fare/toll revenues have been included within the PVC for each option for the larger island connections, but excluded for the minor islands where revenue is less than £20k per annum. However, changes in ferry operating subsidy requirements have not been quantified and will be developed alongside the Public Accounts position at the next stage of appraisal.

To provide transparency on these financial flows, the model includes a dedicated Public Accounts (PA) table which presents the fiscal impacts of each option on the public sector. This shows how each option affects public sector revenues and expenditure over the appraisal period, including fare/toll income and any subsidy requirements.

At this stage, the PA analysis is indicative and proportionate to a programme-level business case, focusing on revenue streams rather than the full net fiscal position. A more complete assessment of subsidy implications will be undertaken at the next stage, once preferred options and operating assumptions are more clearly defined.

A.10 Environmental and safety impact treatment

Environmental and safety impacts are incorporated in the appraisal where they can be robustly quantified and valued using standard TAG methods. These impacts form part of the monetised cost–benefit analysis and are reported within the Analysis of Monetised Costs and Benefits (AMCB).

Carbon

Operational greenhouse gas emissions generated by road traffic are included in the appraisal and monetised using standard carbon values, reported as "carbon costs during operation". This accounts for induced trips generated by improvements to the service and changes to car travel distances where the ferry is replaced by a tunnel.

Operational emissions associated with the ferries themselves have been quantified by Stantec for ferry options but have not been monetised. These calculations are based on existing fuel consumption, expected fuel efficiency improvements and proposed changes to vessels and operating hours, but have not been monetised. Operating, maintenance, replacement and renewal emissions were estimated by COWI for fixed link options but similarly have not been monetised at this stage.

Similarly, construction (embedded) carbon is not currently included in the monetised appraisal but can be found within the Whole Life Carbon assessment. Embedded carbon volumes have been estimated by Stantec for all ferries options (and BaU), based on construction produced by Mott MacDonald and by COWI for the tunnel schemes. The Whole Life Carbon estimates

are provided as an indicative figure for the Programme OBC. These values are not included in the BCR assessment for each option and will require review and greater detail in any project level Business Case. Road-based operational carbon has been added based on the tonnages from the economic appraisal calculations.

The key assumptions for Whole Like Carbon assessment include:

- Embodied carbon values cover 2026 to 2094, while operational carbon appraisal cover 2035-2094.
- New vessels are assumed to be 20% more efficient than existing. After decarbonisation refit, vessels are a further 10% more efficient than existing. At the time of the next vessel replacement, it is assumed that vessels will be zero emission.
- The Bressay Fixed Link assessment does not include carbon emissions associated with the proposed new bus service.
- COWI state that infrastructure replacement and renewal is covered by the whole life carbon estimates they have provided, but it should be noted no costs for renewal/replacements were included in the commercial estimates, so this should be verified.
- COWI provided tCO2e values for all fixed links over a 120-year period. To simplify to a 60-year periods these have been halved for the Programme OBC reporting. This could be an underestimate given that CO2 emission likely to be front loaded with the efficiency gains which will be accrued in future but deemed proportionate for the Programme OBC.

A.10.1 The whole life carbon results for the four schemes with fixed link options are provided below:

Scenario	Carbon Type	Years	CO2e Tonnes			
			Bluemull	Bressay	Whalsay	Yell
BaU	Embodied	2026-94	2,731	1,974	4,324	1,007
	Road Operational (additional to BaU)	2035-94	-	-	-	-
	Maritime Operational	2035-94	42,095	47,027	98,557	98,557
	TOTAL		**42,095**	**47,027**	**98,557**	**98,557**
Ferry Do Something	Embodied	2026-94	3,663	2,034	10,236	765
	Road Operational (additional to BaU)	2035-94	19	7	14	91
	Maritime Operational	2035-94	88,754	51,328	100,510	133,494
	TOTAL		**88,772**	**51,335**	**100,524**	**133,586**
Ferry Do Max	Embodied	2026-94	16,229	4,188	17,284	3,495
	Road Operational (additional to BaU)	2035-94	62	11	44	184
	Maritime Operational	2035-94	162,846	64,232	147,673	192,631
	TOTAL		**162,908**	**64,243**	**147,717**	**192,815**
Fixed Link	Upfront Carbon	2026-35	38,800	26,100	60,700	47,000

Scenario	Carbon Type	Years	CO2e Tonnes			
			Bluemull	Bressay	Whalsay	Yell
	Road Operational (additional to BaU)	2035-94	1,133	6,865	2,882	5,805
	Maintenance, Repair, Replacement & Operation	2035-94	22,600	15,050	35,350	27,400
	TOTAL		**62,533**	**48,015**	**98,932**	**80,205**

Collisions

The model includes a monetised estimate of collisions based on changes in road vehicle kilometres and induced demand. These impacts are valued using standard TAG parameters and are reported as a change in the number and severity of accidents and casualties.

For all islands, this results in a net disbenefit, reflecting increased vehicle travel and therefore a higher statistical risk of collisions as a result of increased demand and/or increased travel distance in the case of the fixed link option.

Noise and local air quality

The model includes monetised impacts relating to noise and local air quality as part of the marginal external costs of transport. These impacts are estimated based on changes in vehicle kilometres and are reported within the AMCB.

These effects are typically small in magnitude in the context of the study area but are included to ensure consistency with TAG appraisal practice.

A.11 Wider impacts

In addition to the core transport user benefits captured in the central cost–benefit analysis, the model allows for the inclusion of certain wider impacts. This includes:

- Option values, which reflect the value placed on having the ability to make a journey even if it is not currently undertaken
- Selected Wider Economic Benefit (WEB) elements, such as increased output in imperfect markets

In the context of Shetland's island communities, option values are particularly important as the ferry often represents the only means of accessing essential services, employment, education and social opportunities. The value of being able to travel when required (including in emergencies or for infrequent but essential trips) is therefore likely to be higher than in mainland locations, where alternative travel options exist.

These impacts are not included in the core BCR but are presented as an additional sensitivity, producing an alternative BCR that reflects a broader view of potential economic benefits.

Consistent with TAG guidance, these wider impacts are treated with caution and are reported separately to avoid overstating the central value for money case.

A.12 Sensitivity tests

The model also allows generates outputs for four sensitivity tests, which can be selected via a drop-down menu on the Front Page. These are as follows:

- ST1: Stage 2 optimism bias on tunnel options
- ST2: No weighting on ferry waiting times
- ST3: Stage 2 OB to vessel costs (based on rate for rolling stock, Table 7, TAG Unit A1.2)
- ST4: 100-year appraisal period.

These sensitivities reflect key areas of uncertainty at the programme stage and are intended to illustrate the robustness of the appraisal outcomes rather than define precise ranges of impact.

A.13 Known limitations and items flagged for future refinement

Limitations are inherent to programme-level appraisal, and these reflect the early stage of development of the option packages. They will be addressed in subsequent project-level business cases through further design development, refined demand forecasting, environmental assessment and development of detailed funding and operating strategies. Key limitations of the assessment include:

- Toll setting: the analysis assumes that tunnel tolls will be equivalent to average vehicle + passenger yield for ferry; however, the move from a combined vehicle and passenger based ferry fare structure to a purely vehicle based tunnel toll gives rise to a number of complexities which will require more detailed investigation if a fixed link option is ultimately selected. These include SIC Disabled Concessionary Pass benefits; interaction with ferry use on a subsequent link in the same journey (e.g. Yell Sound and Bluemull Sound), the potential role of season tickets or multi journey products and differentiated tolling arrangements for commercial traffic given that weight is less of a factor in tunnel scenario.
- Residual values: TAG A1.1 Para 2.3.9 notes that residual asset values should be excluded from CBA for those assets with indefinite lifespans / life span of over 60 years. Given that this applies to both the tunnel and a proportion of harbour infrastructure, the decision was taken to exclude residual values across the board.
- Tunnel renewals: the model notes only day-to-day tunnel maintenance is included and that larger-scale renewals are not yet costed.
- Carbon: carbon from during construction has been excluded from the programme business case. Additionally, the Whole Life Carbon is reported as an indicative figure for the Programme OBC which are not included in the BCR assessment for each option and will require refinement during the individual scheme business cases.

It is important to bear in mind that not all impacts of the options could be monetised within the appraisal (for example, wider social and economic effects), and these are considered qualitatively within the main report.