Item: 15

Development and Infrastructure Committee: 15 February 2022.

Orkney Inter Island Transport Study – Outline Business Case.

Report by Interim Executive Director of Finance, Regulatory, Marine and Transportation Services.

1. Purpose of Report

To consider the Orkney Inter Island Transport Study Outline Business Case Phase 2 reports for the Outer North Isles and Rousay, Egilsay and Wyre networks following consultation with the communities and the next steps for the ferry replacement/infrastructure programme.

2. Recommendations

The Committee is invited to note:

2.1.

That, in Autumn 2016, an Orkney Inter Island Transport Study Strategic Business Case was completed, which included capital and revenue options for all 13 islands connected by inter-island air and ferry services, and a timeline for progressing specific elements of the Strategic Business Case to Outline Business Case stage, which would determine a preferred option and the means by which it should be funded, procured and delivered.

2.2.

That, at a seminar held on 12 January 2021, Members were provided with an update on the emerging conclusions from the Outer North Isles and Rousay, Egilsay and Wyre Outline Business Cases Phase 2 work and given the opportunity to provide feedback prior to presenting the work to communities.

2.3.

That, on 18 May 2021, when considering progress on work carried out as part of the Orkney Inter Island Transport Study Outline Business Case Phase 2 and the proposed consultation process with communities, the Development and Infrastructure Committee recommended:

- That the Executive Director of Development and Infrastructure should undertake a further period of engagement with the relevant communities and key stakeholders in respect of the Outline Business Case Phase 2 and thereafter submit, to the Development and Infrastructure Committee, the final Outline Business Case report detailing the recommended vessel and infrastructure requirements for the Outer North Isles and Rousay, Egilsay and Wyre.

2.4.

That, during summer 2021, consultants Stantec undertook a further period of engagement with the relevant communities and key stakeholders in respect of the Outline Business Case Phase 2.

2.5.

The objectives and main findings of the Outline Business Cases for the Outer North Isles and Rousay, Egilsay and Wyre, as detailed in sections 4 and 5 respectively of this report.

2.6.

That, on 27 October 2021, the Outline Business Case Phase 2 reports and possible next steps were presented to the Senior Management Team.

2.7.

That, at a seminar held on 17 January 2022, Members considered the findings of the Outline Business Case Phase 2 reports and next steps.

2.8.

The Outline Business Case Phase 2 report considering the Outer North Isles network, attached as Appendix 1 of this report.

2.9.

The Outline Business Case Phase 2 report considering the Rousay, Egilsay and Wyre network, attached as Appendix 2 of this report.

2.10.

The presentation by officers, attached as Appendix 3 to this report, presented to the seminar held on 17 January 2022, which recommends further feasibility work relating to Papa Westray connectivity, a fixed link between Egilsay and Rousay and the possible relocation of the Stronsay ferry terminal.

It is recommended:

2.11.

That the Interim Executive Director of Finance, Regulatory, Marine and Transportation Services should arrange for further feasibility work to be carried out in respect of the following matters:

- Papa Westray connectivity, including links to Westray and onwards to Kirkwall, vessel suitability and infrastructure requirements, considering both Pierowall and Rapness connectivity and vessel implications to North Ronaldsay.
- Relocating the Stronsay ferry terminal to the west side of the island, on environmental, sustainability and operational grounds.

- A fixed link between Egilsay and Rousay on environmental, connectivity and sustainability grounds.

2.12.

That, during 2022/23, the Interim Executive Director of Finance, Regulatory, Marine and Transportation Services should arrange for an evaluation of hull form to be undertaken and thereafter vessel designs should be progressed to Outline Design Specification stage, at an estimated cost of £95,000, to aid procurement of the Design and Build of the Outer North Isles and Rousay, Egilsay and Wyre vessels, which are in immediate need of replacement.

2.13.

That the Interim Executive Director of Finance, Regulatory, Marine and Transportation Services should submit the Outline Business Case reports, referred to at paragraphs 2.8 and 2.9 above, to Scottish Government, with the caveat that further feasibility work is required, and that the Council remains open to having continued engagement with Transport Scotland and the Scottish Futures Trust regarding the capital funding required as part of Orkney's Inter Island Ferry Replacement Programme.

2.14.

That a post of Ferries Replacement Project Officer, estimated at G12, be established, initially for a period of 23 months, to co-ordinate the land side infrastructure and vessel requirements for the Outer North Isles, Rousay, Egilsay and Wyre networks, followed by the remaining Inner and South Isles network as a rolling programme, and, in tandem, consider innovative transport solutions as the market continues to develop.

2.15.

That all costs associated with the post of Ferries Replacement Project Officer, estimated at £59,300 per annum, be met from the Transportation Infrastructure Fund.

2.16.

That engagement continues with the Scottish Government on securing appropriate funding for the Orkney Inter Island Ferry Replacement Programme.

2.17.

That the Committee endorse the submission of an application to the United Kingdom Government's Levelling-Up Fund in respect of ferry transport.

3. Background

3.1.

The Orkney Inter Island Transport Study (OIITS) was commissioned in 2015 by Orkney Islands Council in partnership with Highlands and Islands Transport Partnership (HITRANS) and Highlands and Islands Enterprise (HIE).

3.2.

The purpose of the study was to provide the evidence base required for Scottish Government to consider the significant capital investment required for Orkney's Inter Island Air and Ferry Services. The output of the study was the development of a Strategic Business Case (SBC) which established the 'case for change' and identified a set of capital and revenue options which, if delivered, would in part or in full, address the identified transport problems.

3.3.

The SBC was completed in August 2016 and set out a range of capital and revenue options of all 13 islands connected by air and ferry services together with a timeline for progressing specific elements of the SBC to Outline Business Case (OBC) stage.

3.4.

One of the priorities emerging from the SBC was development of an OBC for new vessels and supporting infrastructure for the Outer North Isles and Rousay, Egilsay and Wyre. The SBC work concluded that there was a requirement for four new vessels for the Outer North Isles network if the level of service offered is to be in line with the Routes and Services Methodology (RSM) year-round and address the limited frequency over refit period.

3.5.

The preferred options from the Phase 1 report are summarised as follows:

- Papa Westray converted to Ro-Ro with a service to Kirkwall, at least on the current timetable which could be gradually expanded.
- Berth at North Ronaldsay converted to Ro-Ro.
- Stronsay ferry terminal retained in Whitehall in the short-term.
- Longer term option to relocate the Stronsay terminal at point of life expiry has been retained as a longer-term option.
- Overnight berths should not be developed at Eday and Westray, as early morning and later evening departures facilitated by Kirkwall based vessels operating a longer day.

3.6.

On 18 May 2021, when considering progress on work carried out as part of the Orkney Inter Island Transport Study Outline Business Case Phase 2 and the

proposed consultation process with communities, the Development and Infrastructure Committee recommended:

- That the Executive Director of Development and Infrastructure should undertake a further period of engagement with the relevant communities and key stakeholders in respect of the Outline Business Case Phase 2 and thereafter submit, to the Development and Infrastructure Committee, the final Outline Business Case report detailing the recommended vessel and infrastructure requirements for the Outer North Isles and Rousay, Egilsay and Wyre.

3.7.

The focus during Phase 2 of the OBC was as follows:

- Develop the capacity and connectivity requirements (air and ferry) to the six Outer North Isles.
- Establish an appropriate vessel mix and vehicle carrying capacity.
- Further develop harbour infrastructure options to reflect the emerging preferred vessel solution.
- Consider requirement for a third aircraft and how it could be used.
- Further develop capital and operating costs.
- Establish a preferred Outer North Isles Network Plan to be presented to communities.

3.8.

The OBC Phase 2 considers the capital requirements for the vessels in immediate need of replacement on the Outer North Isles and Rousay, Egilsay and Wyre network, as well as the cost of associated land side improvements.

3.9.

Despite ongoing discussions with Transport Scotland and Ministers, there has been no commitment from the Scottish Government to financially support the Ferry Replacement Programme for Orkney's Inter Island Ferry Services.

3.10.

The Outline Business Case Phase 2 reports and recommendations of further feasibility work from officers was considered by SMT on 27 October 2021, followed by an Elected Members Seminar on 17 January 2022. The summary presentation information is attached as Appendix 3 to this report.

3.11.

Stage 1 of the Orkney Inter Island Ferry Replacement Programme will be replacement vessels and upgrade of associated land side infrastructure for the Outer North Isles network and Rousay, Egilsay and Wyre, as these vessels are in immediate need of replacement. The Ferry Replacement Programme will then consider the remaining Inner and South Isles network as a rolling programme.

3.12.

As outlined at the Members Seminar, in tandem with the Orkney Inter Island Ferry Replacement Programme, innovative transport solutions will be explored as this market develops, such as the use of robotics, drones, Autonomous Vehicles (AV) and low carbon technologies.

4. Outer North Isles Network

4.1.

The case for change is evident given the Outer North Isles fleet is now over 30 years old, parts are challenging to source, some sailings at peak times are at capacity and the accessibility of the vessels is very poor. The current frequency and length of operating day also falls short of the Scottish Government benchmark Routes and Services Methodology recommended levels.

4.2.

The OBC Phase 1 considered the revenue options for the entire network; however, the Phase 2 report, attached at Appendix 2, was completed following the consultation process which was carried out during summer 2021 and focuses on the capital aspect and those vessels which are in immediate need of replacement. The Ferry Replacement Programme will therefore consider the Rousay, Egilsay and Wyre network and Outer North Isles network in the first instance.

4.3.

As outlined in the OBC Phase 2 report for the Outer North Isles, attached as Appendix 2 to this report, following the consultation process, the recommendations for the Outer North Isles network are to operate services using four vessels, which would provide more connectivity and address the refit issues that exist at present. A fourth vessel would however introduce a steep change in revenue running costs, the subsidy for which is not currently assured. The size and type of of vessels also merits further consideration when considering Papa Westray connectivity and what impact this would have on North Ronaldsay.

4.4.

Following consideration, the recommendation from the OBC report is to consider vessels which are up to 65 metres in size with a car carrying capacity of 28 PCU’s (passenger car equivalent) which is comparable to MV Varagen. The vessel will be larger to address the current capacity constraints and will be designed to comply with accessibility requirements and meet Disability Discrimination Act (DDA) legislation. The OBC recommendation is to extend the operating day by providing earlier sailings in the morning and slightly later evening sailings, particularly at the weekends. The timetable enhancements can be achieved through a combination of single crew and standard and split shifts, providing a maximum of 364 sailing hours per week. As the vessels would start and end the day in Kirkwall, large accommodation blocks above the water line would not be required on the vessels

however consideration will be given to providing a minimum number of cabins for crew that may stay on board.

4.5.

As the recommendation is to convert Papa Westray and North Ronaldsay to Ro-Ro, then four sister vessels could be used which would provide more interchangeability in the network as well as benefits for staffing and engineering purposes. The vessels would therefore not require cranes to lift goods on and off. Given the decision to upgrade to Ro-Ro in Papa Westray and North Ronaldsay, it is envisaged that the Ferry Replacement Programme and associated infrastructure works will consider an upgrade to Ro-Ro at North Hoy and Graemsay.

4.6.

Overnighting in Westray and Eday was considered under the OBC; however, as the recommendation was to lengthen the operating day and start/end services in Kirkwall, then there is no need to develop Westray or Eday to overnight vessels. Whilst the aspiration may have been for staff to live and work on the isles, this is a challenging proposition given the difficulty in obtaining skilled staff currently and that the same vessel would not return to the same island each night unlike the inner and south isles.

4.7.

The OBC estimated cost of infrastructure works for the Outer North Isles is as follows:

Infrastructure Works	**Capital Costs (2021)**	**Capital Costs plus 44% Optimum Bias (2021 prices)**
Eday	£4.3 million	£6.3 million
North Ronaldsay	£17.4 million	£25.1 million
Papa Westray	£17.9 million	£25.8 million
Sanday	£1.6 million	£2.3 million
Stronsay	£4.9 million	£7 million
Westray	£4.1 million	£5.8 million
Total	£50.2 million	£72.3 million

4.7.1.

The costs outlined were estimated pre COVID-19 and will therefore be subject to increase. The vessel costs for the Outer North Isles have not been estimated as this stage as there are no comparable vessels on the market at present and the final costs will vary significantly depending on propulsion and design.

4.8.

The Outline Business Case Phase 2 report in broad terms provides recommendations for the level of service to the community, recommends the number and size of vessels and infrastructure requirements for the Outer North Isles to deliver that service, however it is felt that further feasibility work is required for Papa Westray, North Ronaldsay and Stronsay, and on the number and mix of vessels. The design of hull form for the fleet must also be agreed upon.

4.9.

The Outline Business Case considered the relocation of the Stronsay harbour to the west side of the island to provide a shorter point to point crossing. This would reduce sailing time and would also release hours in the timetable to provide enhancements. The recommendation of the OBC was to improve the existing harbour and to consider the relocation to the west side in the long term. This was largely because the timetable could be enhanced using a fourth vessel which made it challenging to recommend the move of harbour given the costs involved. The view from residents remains fairly split, with some reluctant to see the harbour move from the heart of the island whereas others see the benefits in moving the harbour to create a shorter route.

4.10.

When considering the Stronsay harbour relocation over a longer timeframe, and taking into consideration the environmental benefits of reduced sailing times and the current issues of dredging at Whitehall, the question is raised whether the move of the harbour should be considered at the same time as vessel replacement, ie now rather than in 30 years' time for example. The estimated cost to relocate the harbour excluding land side costs would be in the region of £27.1m or £39m with Optimism Bias included.

4.11.

Added to the above, the Papa Westray community have asked that further consideration is given to their ferry connectivity. The Outline Business Case recommends the continuation of a direct service to Kirkwall, possibly enhancing to three times per week. The alternative proposal from the community is that they are served via Westray which could give them daily links onwards to Kirkwall. The Papa Westray connectivity could be provided with a smaller vessel, perhaps comparable to a vessel recommended for some of the Inner/South Isles routes which would provide interchangeability of vessels across the network.

4.12.

Therefore, if the fourth vessel was of a different type and size serving Papa Westray and North Ronaldsay, the viability of the Stronsay harbour relocation increases as this would provide an improved timetable for Eday, Sanday, Stronsay and Westray with a three-vessel operation.

4.13.

It is recommended that the Papa Westray and North Ronaldsay connectivity and Stronsay harbour relocation requires further feasibility work during 2022/23 and consideration under the Harbour Masterplan Phase 2. Further consultation with the communities may be required as appropriate.

4.14.

In conjunction with the above works, it is recommended that officers proceed to the Outline Design Specification for the Outer North Isles vessel(s) during 2022/23, in preparation for the procurement process to commission the design and build of the vessels. As the vessels will be bespoke for Orkney, it is difficult to estimate the cost of replacing the vessels for the Outer North Isles at this stage. Costs will vary significantly depending on Final Design Stage and propulsion.

5. Rousay, Egilsay and Wyre Network

5.1.

The MV Eynhallow is now 34 years old with parts becoming harder to source. The vehicle deck is capacity constrained at peak times and the deadweight carrying capacity is limited to 40 tonnes.

5.2.

The Outline Business Case, attached at Appendix 3, considered three options as follows:

- Option 1 – replace MV Eynhallow with one larger vessel.
- Option 2 – replace with two ‘like for like’ vessels.
- Option 3 – supplement Option 2 with a passenger only vessel.

5.3.

Following a STAG based appraisal process, option 1 increases capacity by increasing the size of the vessel, whilst option 2 increases capacity by providing a second vessel. Option 3 was not recommended to take forward on the basis of a passenger vessel direct to Kirkwall. As option 2 would require the maintenance and running of two vessels and additional crew, the recommended option to take forward was option 1. It is estimated that the larger vessel will cost in the region of £15-17 million in current prices depending on propulsion. From the consultation responses, the majority of residents would like to see a larger vessel on route however Egilsay residents felt that they would benefit from a second vessel.

5.4.

The OBC recommends a larger double ended through and through ferry with a target capacity of approximately 22 PCU’s which is more than double the current vessels carrying capacity.

5.5.

Operating costs are expected to increase due to the increase in vessel size and the recommended increase in frequency and length of operating day, subject to additional revenue budget from Scottish Government.

5.6.

The infrastructure upgrades on Rousay, Egilsay, Wyre and Tingwall are expected to cost in the region of £20.3 million, or £29.2 million with optimism bias added. Given the current increase in the cost of materials and building supplies, it is likely that the costs would be in excess of the optimism bias amount stated. The estimated costs by island are outlined in the table below.

	Capex 2021	**Capex 2021 + 44% Optimum bias**
Rousay	£6.7 million	£9.6 million
Egilsay	£5.9 million	£8.5 million
Wyre	£4.1 million	£5.9 million
Tingwall	£3.6 million	£5.2 million
Total	£20.3 million	£29.2 million

5.7.

Consideration of a fixed link between Egilsay and Rousay was not taken forward under the Outline Business Case given the expected costs involved and further feasibility studies required. However, when considered over a longer timeframe, like the Stronsay harbour relocation, the environmental benefits as well as the economic benefits, resilience and equity for the community become key reasons why the fixed link concept should be considered in more detail. The estimated fixed link costs are outlined in the table below.

Capital Cost Element	**£m**	**Optimum Bias (OB) level**	**Total cost including OB (£m)**
New roads on Rousay and Egilsay (approx. 2,800m)	£4.50	40%	£6.30
Total causeway core fill (approx. 95,000m3)	£2.40	70%	£4.08
Total causeway rock armour protection (approx. 20,000m2)	£5.40	70%	£9.18
Bridge costs	£9.50	100%	£18.28
Design and construction procurement	£1.60	None	£1.60

Site investigation	£0.80	None	£0.80
10% contingency	£2.42		
Total	£26.62		£40.20

5.8.

It is therefore recommended that further feasibility work is required to consider the viability of a fixed link between Egilsay and Rousay; however, this should not impede on the progression to Outline Design Specification stage for the Rousay, Egilsay, Wyre service. It is proposed that this work is progressed during 2022/23.

5.9.

As work progresses to Outline Design Specification stage for the Rousay, Egilsay and Wyre replacement vessel and Outer North Isles replacement vessels, additional staffing will be required to effectively manage Orkney's Inter-Island Ferry Replacement Programme and associated land side infrastructure. Additional Marine Engineering expertise is required to effectively carry out the procurement process associated with the Design and Build of the vessels as well as the land side infrastructure works. A new Project Manager post to take this work forward is therefore recommended.

6. Human Resource Implications

6.1.

A job description for the recommended post of Ferry Replacement Programme Project Manager has not been completed but based on similar roles it is estimated that it would be evaluated at Grade 12.

6.2.

If approved, recruitment to the post will be undertaken in accordance with the Council's policy on Recruitment and Selection. Due consideration of any existing employees who may be eligible for redeployment would also have to be given prior to an open recruitment process.

6.3.

Employees have a statutory right to a redundancy payment after being employed for two years continuously. Under the Council's Redeployment policy, they would also be entitled to redeployment as an alternative to redundancy after this period. It is therefore suggested the post be filled on a temporary contract of 23 months in the first instance so that the post can be reviewed, and if necessary terminated, prior to the Council creating a redundancy or redeployment liability.

7. Links to Council Plan

7.1.

The proposals in this report support and contribute to improved outcomes for communities as outlined in the Council Plan strategic priority of Connected Communities.

7.2.

The proposals in this report relate directly to Priority 1.9, Work with Scottish Government and other partners to progress the outcomes of the Inter Isles STAG (Strategic Transport Appraisal Guidelines) Strategic Business Cases in order to develop and then deliver the Outline and final Business Cases for improved inter isles transport services and the associated ferry, air and infrastructure improvements, of the Council Delivery Plan.

8. Links to Local Outcomes Improvement Plan

The proposals in this report support and contribute to improved outcomes for communities as outlined in the Local Outcomes Improvement Plan priority of connectivity.

9. Financial Implications

9.1.

The Outline Business Case Phase 1 and Phase 2 reports have cost a total of £314,120 to date, with part funding from Highlands and Islands Enterprise (HIE), HITRANS and the Council. Funding from the Council totalled £158,577 towards the project, met from the Transportation Infrastructure Fund.

9.2.

Further feasibility work is recommended to consider the Stronsay ferry terminal relocation to the west side of the island, as well as the fixed link proposal between Egilsay and Rousay. The feasibility work will have cost implications and if services require to be bought in that are over the value of £10,000, will require to go through the necessary procurement process during 2022/23 financial year.

9.3.

The report recommends progressing to an evaluation of hull form and thereafter Outline Design Specification stage for the Outer North Isles and Rousay, Egilsay and Wyre vessels during 2022/23. It is estimated that this could cost in the region of £95,000. Funders HIE and HITRANS will be approached to establish if they are able to part-fund the specification work as they have contributed to the current Outline Business Case preparation to date. The net cost, which may also be the full cost, could be met from the Transportation Infrastructure Fund.

9.4.

Efforts to secure funding to allow the replacement of the fleet is ongoing, with regular officer engagement with Transport Scotland and at a political level between the Council Leader and the Cabinet Secretary for Finance.

9.5.

The Transportation Manager has submitted an expression of interest proposal for replacement ferries to the Council's internal process for development of a bid to the United Kingdom Government's Levelling Up Fund. This will be further developed to the stage of a worked-up bid utilising funding awarded by the United Kingdom Government for this purpose which will cover 100% of the cost. It is intended that the Levelling Up Fund bid, which can be for up to £50m, will be considered in due course by the Policy and Resources Committee, although submission deadlines may dictate that an alternative approval process will have to be followed.

9.6.

Supervision of the build stage of vessels to ensure that the specifications are met would form part of the capital cost once the project progresses to that stage.

9.7.

Based on the recommendations of the Outline Business Case (OBC), the infrastructure upgrades in the Outer North Isles are estimated to cost between £50.2 million and £72.3 million with optimism bias however building and material costs have increased since the estimates were provided so these figures are likely to increase. This does not include the Stronsay Ferry Terminal relocation or any change to Papa Westray connectivity.

9.8.

The Stronsay Ferry Terminal relocation is estimated to cost between £27.1 million and £39 million with optimism bias, which does not take into consideration acquisition of land and the development of associated roads.

9.9.

The fixed link between Egilsay and Rousay requires further feasibility to establish more accurate costings; however, a preliminary estimate is that a fixed link would cost in between £26.62 million and £40.20 million with optimism bias.

9.10.

The report recommends the appointment of a project manager with engineering experience or equivalent, on a temporary basis to take forward the Ferry Replacement Programme. A G12 post would cost between £59,300 at the bottom of the scale and £68,200 at the top of the scale including all employer's costs. An entitlement to redundancy pay arises after two years of continuous service. The recommendation is to establish the post for an initial period of 23 months. A funding source for the temporary post exists in the Transportation Infrastructure Fund.

10. Legal Aspects

10.1.

The Local Government (Scotland) Act 1973 section 95 requires the Council to make arrangements for the proper administration of its financial affairs. As part of that, the Council is expected to have regard to economy, efficiency and effectiveness in its use of resources.

10.2.

The Local Government in Scotland Act 2003 section 35(1) and (2) requires the Council to determine and keep under review the maximum amount which it can afford to allocate to capital expenditure. In so doing, the Council must comply with regulations made by Scottish Ministers.

10.3.

Section 64(1) of the Local Government (Scotland) Act 1973 obliges the Council to appoint such officers as they think necessary for the proper discharge of their function.

10.4.

Section 153 (2) of the Local Government (Scotland) Act 1973 empowers the Council to "acquire, provide, maintain, improve and operate any ferry situated wholly or partly within their area". Orkney Ferries Limited operates the ferry services on behalf of Orkney Islands Council under Service Level Agreements dated 30 May 2008 in return for funding from the Council.

11. Contact Officers

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12. Appendices

Appendix 1 - Outline Business Case Phase 2 Outer North Isles Report.

Appendix 2 - Outline Business Case Phase 2 Rousay, Egilsay and Wyre Report.

Appendix 3 - Orkney Inter Island Transport Study – Outline Business Case (OBC) Presentation Slides from Elected Members Seminar.

Appendix 1

Orkney Inter-Island Transport Study

Outer North Isles Outline Business Case, Phase 2 – Final Report

On behalf of **Orkney Islands Council**

Project Ref: 41029 | Date: September 2021

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Date: 23rd September 2021

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Approved by:	Dr Scott Leitham	Director, Transport Planning	Scott Leitham	23/09/21
For and on behalf of Stantec UK Limited				

Revision	Date	Description	Prepared	Reviewed	Approved
VFinal	14/01/2022	Final Report	Stephen Canning	Scott Leitham	Scott Leitham

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Executive Summary

Orkney Islands Council (the Council) funds lifeline[1] transport connections to thirteen islands across the archipelago. These connections are delivered through a combination of air and ferry services which have been supported in both capital and revenue terms by the Council over many years. Ferry services are operated by Orkney Ferries, an arms-length company of the Council, whilst Loganair provides the air service under contract to the Council. These services all represent a net-cost to the Council.

In 2014 Orkney Islands Council, through the 'Our Islands Our Future' initiative, began a dialogue with the Scottish Government on establishing some principles for the 'Fair Funding' of Orkney's inter-island transport services and infrastructure. The basis of these discussions was that the financial burden upon the Council in providing inter-island transport is disproportionate.

Scottish Government accepted in principle that a 'Fair Funding' position needed to be established and, to inform that, Orkney Islands Council and the Highlands and Islands Transport Partnership (HITRANS) agreed to undertake studies, now in the form of business cases, to establish and appraise the service and infrastructure requirements for inter-island transport over a 30-year planning horizon.

In October 2015, the Council, in partnership with HITRANS and Highlands and Islands Enterprise (HIE), commissioned the Orkney Inter-Island Transport Study (OIITS), with a view to developing and appraising options for the future of the inter-island transport services. The output of the study was the development of a Strategic Business Case (SBC), which established the 'case for change' and identified a set of capital and revenue options which, if delivered, would in-part or in-full address the identified transport problems.

In parallel to the SBC, the Council, together with HITRANS, HIE, Shetland Islands Council and ZetTrans established a Fair Funding Group with Transport Scotland intended to explore the wider question of roles and responsibilities, and in accordance with a nationally recognised approach and references in terms of other lifeline services. An early output from this group was the agreement of additional Scottish Government funding which contributed towards partially and then latterly fully offsetting the deficit revenue funding. However, there is no commitment beyond this period for further capital or revenue funding.

The Strategic Business Case (SBC) was completed in Autumn 2016 and set out a range of capital and revenue options for all 13 islands connected by the air and ferry services, together with a timeline for progressing specific elements of the SBC to Outline Business Case (OBC) stage. One of the priorities emerging from the SBC was the development of an OBC for new vessels and supporting infrastructure for the Outer North Isles (Eday, North Ronaldsay, Papa Westray, Sanday, Stronsay and Westray). To this end, the Council, in partnership with HITRANS and Highlands & Islands Enterprise (HIE) commissioned Stantec, formerly Peter Brett Associates, Mott MacDonald (MML) and ProVersa to develop an *Outer North Isles Outline Business Case*.

Outer North Isles Outline Business Case

The Outer North Isles (ONI) OBC has been completed in two phases:

- **Phase 1** confirmed the Strategic Case (including the rationale for a four passenger and vehicle (Ro-Pax) vessel and three aircraft solution) and answered a set of network definition questions designed to shape the network being planned for in Phase 2. The key decisions were as follows:

[1] As defined on page 53 of the *Scottish Ferries Plan 2013-22*.

- **Papa Westray** should be served by a **new Ro-Ro service operating between Moclett and Kirkwall**, initially at least on the current timetable, which would be gradually expanded as new vessels come into the fleet.
- The **berth at North Ronaldsay should be converted to Ro-Ro**.
- **Stronsay ferry terminal should be retained in Whitehall**. The possibility of relocating the terminal to a site in the west of the island in the lee of Linga Holm should be retained as a long-term option which should be revisited when significant works are required at Whitehall. Indeed, this is an aspiration of the Orkney Harbours Masterplan and may be progressed independently of this OBC if funding becomes available.
- **Overnight berths should not be developed at Eday and Westray**, rather the requirement for an early morning departure should be facilitated by Kirkwall-based vessels operating a longer day.
- It was further decided at the outset of the Phase 2 work that the **vessels should be entirely Kirkwall-based** and thus **will not incorporate a full accommodation block**, with the majority of crew being shore-based.

- **Phase 2** – this report - defines the broad service to be operated to the six islands through further development and **completion of the Socio-Economic Case**

How are the Outer North Isles transport services used?

In order to inform the required service for the six islands, an extensive research and stakeholder engagement programme (including an island-resident survey) was undertaken in 2019 to establish how the Outer North Isles transport services are used and problems / challenges associated with them. Three areas were considered: (i) supply-chain; (ii) essential service delivery; and (iii) personal travel.

Supply-chain

- The Outer North Isles freight market is of critical importance to the isles, but at the same time is highly marginal and requires several workarounds to deliver a satisfactory level of service to customers. This includes the provision of an Eday – Stronsay connection, as Eday is served by the Stronsay haulier.
- Livestock exports account for a significant proportion of the overall freight volume moved on the ONI ferry network. This market is traditionally concentrated in September and October, although this peak has flattened somewhat in recent years.
- All ‘less than full load’ goods being moved to Eday, Sanday, Stronsay and Westray are consolidated at the ONI hub in Hatston Industrial Estate. At present, the timetable for the ONI services reflects the requirement for hauliers and businesses to have sufficient time in Kirkwall to offload, reload and organise multiple vehicles before returning on the ferry back to their respective islands on the same day.
- Island hauliers have developed effective operating systems within the constraints imposed by the low demand, the tariff structure and the ferry timetable. There is a focus on minimising the vehicle-deck footprint of freight to minimise cost, meaning that loads are often very heavy relative to the length of the vehicle, and thus can amplify the occasional deadweight capacity issues faced on the ferries.
- It is important to note that there is anticipated to be growth in the export of hydrogen in the years ahead, which will present a challenge in terms of how this ‘dangerous good’ can be handled alongside regular passenger traffic. It is unlikely that there will be sufficient clarity within the timescale of this OBC to pronounce on this issue, but hydrogen transport needs should be kept under review as the design and FBC progresses, with the ultimate preferred option potentially refined to reflect future needs.

Essential Service Delivery

- The Sunday afternoon and Monday morning flight schedules are largely defined by the requirement to get children into Kirkwall for school. Whilst the school travel arrangements do work, they lead to a truncated weekend for children in most islands or, for those travelling in on a Monday, a late start to the school day. There is also a gap between finishing school in Kirkwall on a Friday afternoon for those travelling home to Eday, Sanday, Stronsay and Westray.
- The air service plays an essential role in conveying itinerant teachers to and from the isles, ensuring the provision of education in specialist subjects and allowing for McCrone cover. However, the first outbound to and last inbound flights from Sanday / Stronsay and Westray / Papa Westray are heavily used by teachers, particularly in the case for the former. There is very limited capacity on these services for others, and they cannot therefore realistically be considered public transport connections for the isles.
- The inter-island air and ferry services are essential in ensuring that Eday, North Ronaldsay and Papa Westray receive a GP service, whilst allowing GPs for the other islands to live off-island and travel in for a period of time. It also facilitates travel to Orkney mainland for island residents attending appointments and the movement of medical goods, supplies and samples.
- The ONI ferry service moves all waste and recyclate from the ONI to Orkney mainland for processing and / or onward transportation.
- The air and ferry services facilitate travel to the ONI for regular and emergency veterinary appointments. However, issues of capacity and frequency and indirect routing on the ferry services make the operation challenging and often expensive to deliver. Improved air and ferry frequency and integration would support a more efficient and lower cost service offer.
- The inter-island air service facilitates the weekly operation of bank branches on Sanday, Stronsay and Westray, as well as irregular visits to North Ronaldsay and Papa Westray. This is an essential service for island residents, although it does use up another seat on the same flight used by itinerant teachers.

Personal Travel

Personal travel behaviour was established through the resident survey, which obtained very high sample sizes relative to the adult population of each island. The main headlines are as follows:

- The use of the ONI air and ferry service is relatively infrequent, with around a half of residents typically making 1-3 journeys per month. More frequent trip making is observed on islands with fewer services or industries such as Eday. Nonetheless, almost all island residents make at least a handful of trips to Orkney mainland each year, highlighting the importance of Kirkwall as the main service centre for the isles.
- The air and ferry services are used for a wide variety of purposes, dominated by personal business and leisure activities. Whilst shopping, health, business travel and visiting friends and relatives are the main reasons for travelling, any single trip is likely to combine multiple activities.
- Whilst inter-island travel is important for a number of reasons, most notably business and family ties, the absolute volumes are very low when compared to island-to-mainland services.
- ONI residents are broadly satisfied overall by secondary schooling arrangements, but there is a common concern across several islands about children having to travel into Kirkwall for school on a Sunday afternoon, giving rise to a truncated weekend for isles' families.
- Around three quarters of residents in each of the ONI (slightly fewer in Stronsay) do not consider the current air and ferry connections from their home island to Orkney mainland as sufficient for their family's day-to-day needs now and in the future. The common factor

connecting the problems identified through the resident survey and consultation is that the number of vessels, aircraft and human resource are too few to deliver a level of service comparable with national benchmarks.

- On the whole, island residents responded that the current air and ferry connections are sufficient to ensure the long-term sustainability of the islands (North Ronaldsay being the major exception), but a large proportion noted that there is room for improvement through investment in both the air and ferry service.
- There is an overwhelming desire for improved connectivity to Orkney mainland amongst island communities.

How full are the ferries?

In considering the future development of the ONI network, it is important to ensure that appropriate capacity is provided to meet the needs of island residents, businesses and visitors. Passenger capacity on the ferries is rarely constrained but vehicle deck and deadweight capacity constraints are a more regular challenge

- **17%** of sailings on the Eday-Sanday-Stronsay route combination and **15%** on Westray demonstrate a vehicle-deck utilisation of greater than 90% (i.e., they are effectively full to capacity). Median vehicle-deck utilisation is much closer to **60%** or less in most cases, which highlights that capacity problems are clustered around specific sailings.
- Deadweight limitations are a particular issue on the Westray route, where **17%** of all sailing legs were identified as having reached their weight capacity. The equivalent figure for Eday / Sanday / Stronsay is **2%**, which highlights deadweight constraints are an occasional but infrequent problem.

There are three recurring factors where load factors are high:

- The sailing is **indirect**, calling at two or three islands on a single rotation from Kirkwall
- The **sailing is operated by either MV *Earl Sigurd* or MV *Earl Thorfinn*** rather than MV *Varagen*
- The **timetable for that day only provides two island calls**, thus clustering demand onto a particular sailing in each direction

What are the principles of timetable setting?

This OBC brings together the outputs of the Routes and Services Methodology (RSM) study, the SBC, the ONI Phase 1 outputs, and the analysis undertaken in Phase 2 to shape an illustrative air and ferry service specification for the Outer North Isles network. The objective is to establish a working timetable concept and appraise options for its delivery, ultimately arriving at a preferred option. The principles underpinning the illustrative timetables are as follows:

- The timetable structure should facilitate a **consistent year-round timetable**, albeit the Council and Orkney Ferries may, in consultation with communities, choose to reduce services in line with demand during the winter months.
- The one exception to the above is **refit**, where the service will reduce to three vessels. The refit timetable will therefore be **equivalent to the current summer timetable, or the current winter timetable** if a 'current summer' is considered by the Council, Orkney Ferries and the communities to be excessive.
- The timetable for **Eday, Sanday, Stronsay and Westray** will be capable of delivering **three return connections per day Monday to Saturday**, with early evening (i.e around 18:30-20:00) Kirkwall departures on a Friday and Saturday
- The timetable for **Eday, Sanday, Stronsay and Westray** will also be capable of facilitating **two return connections per day on a Sunday**. These will take the form of a morning and

evening connection, providing a reasonable amount of time in Kirkwall as well as a later than current service into Kirkwall for school children, extending the weekend at home.

- It is assumed that the timetable will be focused on providing **direct connections** where possible. However, the **key indirect connection (for freight) between Stronsay and Eday** will be protected. There may however be merit in considering whether alternative haulage options could be developed for Eday in the longer-term so as to release this time back into the timetable.
  - The exception to the above is on Papa Westray and North Ronaldsay days. Whilst three return sailings can still be achieved from each of Eday, Sanday, Stronsay and Westray, there will be a requirement for a number of these sailings to be indirect, which may actually assist in delivering the current Eday – Stronsay supply-chain link.
- The timetable will, as far as possible, be clockface, providing **consistent daily departure and arrival times**. The exceptions to this will be as follows:
  - **Monday:** Pre-09:00 arrival into Kirkwall for one or more of Eday, Sanday, Stronsay and Westray services. This will allow early access to the marts and will allow some children to travel into school on a Monday morning, albeit arrivals after 08:30 would miss the first period.
    - There will be a scheduling challenge around the single linkspan in Kirkwall and it is thus unlikely that all four islands could benefit from a pre-09:00 arrival unless a second linkspan is pursued in Kirkwall in the longer-term. This makes the later departures on a Sunday evening important.
  - **Friday**
    - Early afternoon departure to Eday, Sanday, Stronsay and Westray, circa 13:00 – 14:30
    - Evening departure to Eday, Sanday, Stronsay and Westray between 18:30-20:00
  - **Saturday:** Standard three rotations but last departure between 18:30-20:00
  - **Sunday:** Mid-morning and early evening rotation. This will allow children still choosing to travel into Kirkwall Grammar School on a Sunday to continue doing so.

It is important to note that there is an <u>established timetable setting process in place for both ferry and air services which incorporates both community and Member inputs</u>. It is not therefore the intention to develop hour-by-hour timetables which are cast in stone, rather to provide an indication of what could be achieved under different supply-side scenarios in terms of vessels, aircraft and ferry / air crew.

How can these timetable principles be delivered?

Ferry Services

There are three broad options

- **Option 1: Single Crew, Split-Shifts** - this option is broadly a continuation of the current day arrangements, although supplemented by a fourth vessel – this can effectively be thought of as the 'Do Minimum' and would provide a maximum of **364** sailing hours per week.

- **Option 2: Single crew, combination of 'standard' and split shifts -** This option is a variation on Option 1, providing the same number of maximum hours across the week, **364**[2]. The primary difference here is that most operating days would be 'standard' (i.e.,

[2] If working on the basis of 84-hours per week and 4-hours contracted overtime, this option would provide 352 hours per week.

without a break in the middle of the day), with split shifts only used to extend the day on Fridays and Saturdays and allow for meaningful time in Kirkwall on a Sunday.

- **Option 3: Shift-Based System -** An alternative option would be to transition the current crewing model to a shift-based system. There are numerous different models which could be adopted, which could provide a maximum **448 to 504** operating hours per week, a maximum increase of **84 to 140** hours per week on the four-vessel single crew model.

It should be noted that the timetable principles cannot be delivered with four single crews working on a 'straight' day (i.e., continuous operation over the length of the operating day).

Preferred Option

The preferred option is **Option 2: Single crew, combination of 'standard' and split shifts**. This option will facilitate a service which delivers most of the timetable 'principles' and is also a proportionate solution in that the only additional cost is the crewing of the fourth vessel, which will be required irrespective of which crewing model is chosen. This option also does not preclude future migration to Option 3: shift-based system at some point in the future if this is deemed necessary or desirable. It is therefore future-proofed.

In providing an extended operating day on a Friday and Saturday whilst accommodating sufficient crew rest time, there are two broad timetable approaches. These are:

- '2 gap 1' – where each vessel completes **two** island return trips then has a four-hour rest period then completes a further **one** island return trip; or
- '1 gap 2' – where each vessel completes **one** island return trip, then has a four-hour rest period, then completes a further **two** island return trips.

Under the '2 gap 1' option, the options for an island resident arriving in Kirkwall on the first departure from island is to return directly (i.e., within the vessel turnaround time) or wait until the third and final Kirkwall departure. However, a '1 gap 2' option provides the choice of two return sailings – one after the break and one in the evening – providing both a part day and full day option in Kirkwall. The trade-off is that the timing of the first island departure would be early and a mainland to island trip would be limited to a full day on island. On these extended operating days, it is assumed a '1 gap 2' option would be pursued.

Air Services

The air service can be scaled-up much more easily than the ferry service. The current aircraft deliver circa 1,200 flying hours per annum, but this can only just be delivered within the required maintenance schedule and thus there is limited resilience with the current service. Whilst a third aircraft could add approximately 600 additional hours of flight time, the analysis concluded that the most effective use of a third aircraft would be to increase flying hours by only circa **300 hours** and use the remaining hours to improve the resilience of the service (i.e., ensuring that two aircraft are always available).

The most effective way to deploy the additional flying hours is to **split out the 'double-drops'** – i.e., making almost all services direct to and from Kirkwall (albeit the tourism benefit of the Papa Westray – Westray flight in summer is well understood and can be retained). This will have the added benefit of reducing flight time between the isles (on average around 8 minutes) and turnaround time in the isles (on average around 5 minutes), allowing a roughly hourly departure schedule from Kirkwall. It will also provide some flexibility at the margins to support islands with a reduced ferry service during refit.

The scale of improvement offered by the illustrative timetables by island is shown in Tables A (summer and winter) and B (refit):

Table A: Change in weekly 1-way connections, summer and winter timetable

	Timetable	Total 1-way weekly sailings	Total No. of 1-way direct sailings	Total No. of 1-way indirect sailings	Total No. of 1-way direct flights	Total No. of 1-way indirect flights
Eday	Current	41	20	21	4	2
	Preferred	**42**	**30**	**12**	**6**	**0**
North Ronaldsay	Current	4	3	1	28	10
	Preferred	**6**	**3**	**3**	**40**	**0**
Papa Westray	Current	4	2	2	19	19
	Preferred	**6**	**3**	**3**	**38**	**0**
Stronsay	Current	28	16	12	12	12
	Preferred	**50**	**41**	**9**	**24**	**0**
Sanday	Current	29	20	9	11	13
	Preferred	**40**	**37**	**3**	**24**	**0**
Westray	Current	34	33	1	12	12
	Preferred	**40**	**40**	**0**	**24**	**0**

Table B: Change in weekly 1-way connections, refit timetable

	Timetable	Total 1-way weekly sailings	Total No. of 1-way direct sailings	Total No. of 1-way indirect sailings	Total No. of 1-way direct flights	Total No. of 1-way indirect flights
Eday	Current	28	14	14	7	1
	Preferred	**41**	**20**	**21**	**12**	**0**
North Ronaldsay	Current	2	2	0	27	5
	Preferred	**4**	**3**	**0**	**32**	**0**
Papa Westray	Current	4	2	2	15	15
	Preferred	**4**	**2**	**2**	**30**	**0**
Stronsay	Current	26	13	13	12	12
	Preferred	**28**	**16**	**12**	**24**	**0**
Sanday	Current	30	5	25	11	13
	Preferred	**29**	**20**	**9**	**24**	**0**
Westray	Current	34	33	1	12	12
	Preferred	**34**	**33**	**1**	**24**	**0**

It can be seen from the above tables that the illustrative preferred timetable option represents a significant scaling up in direct connectivity, particularly in the refit timetable period. The total number of sailings for Eday is particularly high due to its continued connection with Stronsay to maintain the freight link. In the event that an alternative freight model was adopted in Eday, the number of sailings would reduce to a level akin to that in Sanday, Stronsay and Westray.

What Passenger Car Unit (PCU) capacity should the future vessels offer?

Analysis has suggested that any four-vessel scenario would address the current capacity pinch points, these being: **multi-island sailings, use of *Earls* sized vessels, and days when Westray has only two connections**. The number of island connections would increase by

around a quarter, deadweight restrictions would be removed for routine traffic, and all individual sailings would be undertaken by a vessel providing PCU capacity of at least that of MV *Varagen*. In itself, the replacement of multi-island connections with single island connections on the Eday / Sanday / Stronsay routes would reduce the number of high load factor sailings by over 70%.

Since 1994, vehicular carryings on the combined Eday, Sanday, Stronsay and Westray routes have increased by 70%-80% with growth in both cars and commercial vehicles. Car ferry traffic has grown much faster than general car traffic in Scotland. Passenger growth has been more modest at 38%. These trends have been against the backdrop of static, at best, island population levels. Two questions emerge from this:

- ***Will these trends continue for the next 30 years?*** The aftermath of COVID-19 allied to ongoing societal trends (greater working and shopping from home) and technological change in the transport sector would appear to be reducing the demand for travel and diminishing the importance of the private car in particular. However further development of tourism in the islands would increase (seasonal) demand, as would increased population and commerce in the isles. There will be a range of factors which could see travel grow or decline and there is a high degree of uncertainty associated with this.
- ***What level and type of growth does the Council wish to plan for?*** This is essentially a policy decision for the Council and other partners and funders to consider. It is very clear though that the thrust of much of transport policy is to move away from the private car[3] where possible towards more sustainable and active modes. If this business case is to reflect Scottish Government policy, the Sustainable Transport and Sustainable Investment Hierarchies will need to be demonstrably followed. This would imply that the provision of new capacity aimed at the private car should only go ahead after other avenues are exhausted.

The analysis suggests that, i**n the event of trend growth continuing, it could be accommodated with four MV *Varagen* capacity vessels (28 PCUs), assuming a significant redistribution of demand from 'existing' to 'new' connections**. In the event that vehicle-deck capacity issues did emerge in the longer-term with the new solution, there are a number of potential ways in which this could be managed including scaling-up the services to a 16-18 hour day (albeit capacity would be provided at less useful times), adding a fifth vessel or implementing demand management measures.

Vessel and Infrastructure Design

Based on the above discussion, it was agreed that the most appropriate solution is to develop a standard fleet of four vessels with a **target PCU carrying of 28**, which could accommodate existing trend growth. However, it is only through the design stage which follows on from this OBC that the size of vessel required for a given PCU capacity will become clear, and indeed the target PCU capacity will be revisited as part of that exercise.

As the length of vessel required to provide the target PCU carrying (28 PCUs) is not known at this stage, we have taken a conservative approach and **sized the ferry terminal infrastructure for a 65m LOA vessel**, an assumption that will be refined through the design phase and FBC. This also future proofs the infrastructure against the next generation of vessels, given that infrastructure typically has a 60-year life, whilst a vessel works to a nominal 30-year life.

The other key design feature determined in consultation with Orkney Ferries and the Council is the desired environmental credentials of the new vessels. Orkney Islands Council declared a 'Climate Emergency' in May 2019 and is working to deliver the Scottish Government's commitment to net zero emissions of all greenhouse gases by 2045. As ferries are amongst the largest emitters of greenhouse gases under Council control, the future vessels will use a

[3] Note that although electric vehicles remove tailpipe emissions in use, they are carbon intensive in manufacture and therefore are not seen as a complete 'solution' to the car 'problem'.

greener / zero emission fuel, although the exact fuel type will be determined at Final Business Case stage through liaison with vessel designer(s) / shipyard(s).

How does the preferred option perform against the TPOs and STAG Criteria?

Transport Planning Objectives

Table C below reassesses the performance of the preferred option package against the TPOs using the following notation:

✓✓✓ - major positive

✓✓ - moderate positive

✓ - minor positive

O - neutral

× - minor negative

×× - moderate negative

××× - major negative

Table C: Preferred option package – appraisal against objectives

	Preferred option package
Transport Planning Objective 1: *The capacity of the services should not act as a constraint to regular and essential personal, vehicular and freight travel between the island(s) and Orkney Mainland.*	✓✓✓
Transport Planning Objective 2b: *Where an island does not have a 'commutable' combined ferry or air / drive / public transport / walk time to a main employment centre, the scheduled connections should permit at least a half day (e.g., 4 hours) in Kirkwall or Stromness 7-days a week, all year round.*	✓✓✓
Transport Planning Objective 3: *The scheduled time between connections should be minimised to increase flexibility for passengers and freight by maximising the number of island connections across the operating day.*	✓✓✓
Transport Planning Objective 4: *The level of connectivity provided should minimise the variation within and between weekdays, evenings, Saturdays and Sundays.*	✓✓
Transport Planning Objective 5: *Where practical, islanders should be provided with links to onward strategic transport connections which minimise the number of off-island overnight stays on Orkney mainland or further afield.*	✓✓

Overall, the preferred option package makes a highly positive contribution to the TPOs, with the illustrative timetables providing an increase in capacity, frequency and weekend service provision. The solution is also scalable, with opportunities to provide additional connections through the adoption of a different crewing model, realising the TPOs in full. However, such a solution would, at this stage, appear disproportionate.

STAG Criteria

Table D below provides an equivalent appraisal against the STAG criteria:

Table D: Preferred option package – appraisal against STAG criteria

	Preferred Option package
Environment	✓✓
Safety	O
Economy	✓✓✓
Integration	✓
Accessibility and Social Inclusion	✓✓✓

The following points are of note from the above table:

- From an **environmental** perspective, the primary benefit will be the replacement of the current aged hydrocarbon-fuelled vessels with four new vessels operating with a green propulsion system.
- It is important to note that the majority of the **safety** benefits associated with the preferred option package (e.g., discontinuation of Lo-Lo, all accommodation above the water line etc) were captured in the 'Phase 1' work – they are not therefore referenced again here as this would be double counting of benefits.
- From the **'Economy'** perspective, the preferred option package will offer significant benefits through: (i) equating the refit timetable to the current summer timetable; (ii) increasing the number of ferry and air connections across the year; (iii) allowing for a meaningful return trip to be made 7-days a week; and (iv) ensuring that such connections have the capacity to accommodate demand. It will also:
  - improve access to a variety of personal services and leisure opportunities on Orkney mainland;
  - potentially provide an extended weekend in the isles for school children;
  - improve the efficiency of the island supply-chains, particularly for North Ronaldsay and Papa Westray when compared to the current Lo-Lo operation and for the other islands in terms of e.g., access to marts;
  - support service delivery in the isles, reducing the cost of such services (e.g., education provision, utilities maintenance, veterinary services etc) to the Council, companies and the customer;
  - potentially reduce the cost of travelling to / from the Scottish mainland if fewer off-island overnight stays are required; but
  - it is also important to note that improved connections are a 'two-way street', whereby the isles will be opened up to increased competition from Orkney mainland and potentially increased visitor numbers.
- From an **'Integration'** perspective, the preferred option package will improve integration with middle of the day ferries and flights to / from Orkney mainland, together with later arrivals on a Friday and Saturday. It will also support project and other development work in the isles, particularly in North Ronaldsay and Papa Westray, where moving products (e.g., building materials) in any significant scale is difficult.
- The preferred option package will also make a moderately positive contribution in terms of **policy integration**. As well as supporting the functioning and development of the ONI, the deployment of a low or zero emission ferry fleet will contribute strongly towards reducing carbon dioxide emissions and net zero targets. However, the solution does cater for increased car use, which is very much at odds with current government policy.
- The preferred option package will improve **community accessibility** to employment, business, personal services and leisure opportunities. It will also improve accessibility to

the isles for business, service delivery and tourist travel. From a **comparative accessibility** perspective, there will be a significant benefit for persons of reduced mobility across the network through the provision of fully accessible vessels. Moreover, access to the vessels in both North Ronaldsay and Papa Westray will be over the linkspan and thus represent a significant improvement on current arrangements.

What is the cost to government of the preferred option package?

Capital Costs

New vessels

It is not possible to determine the capital costs of the four proposed new vessels at this stage. Vessel costs will only become clear following the design process, which is undertaken subsequent to this OBC. The vessel costs will vary in response to the procurement approach adopted (and in particular the extent of risk sharing), buyer requirements and market conditions. The purchase of four sister ships will however provide economies of scale and thus potentially significant reductions in costs for later vessels in that series.

Ferry terminal infrastructure

The table below sets out capital cost estimates in undiscounted 2021 prices for the ferry terminal infrastructure, exclusive and inclusive of 44% optimism bias[4]. Maintenance costs will be in addition to this and are reported in the main body of the OBC.

Table E: Ferry terminal infrastructure costs (£m, 2021 prices)

Infrastructure Works	Capital Cost (£m, 2021 prices)	Capital Cost +44% OB (£m, 2021 prices)
Eday	£4.3	£6.3
North Ronaldsay	£17.4	£25.1
Papa Westray	£17.9	£25.8
Sanday	£1.6	£2.3
Stronsay	£4.9	£7.0
Westray[5]	£4.1	£5.8
Total	**£50.2**	**£72.3**

As previously noted, depending on the final design of vessels and the timetable to be delivered, an additional linkspan may be desirable at Kirkwall and would have to be costed separately.

Net Additional Operating Costs

Ferry operational costs

Orkney Ferries provided operating costs by vessel for the period Financial Year (FY) 2013/14 – FY2017/18. The average operating costs of the ONI network over this period was circa **£5.8m**, with the average operating deficit being circa **£4.4m** per annum.

[4] Optimism bias is applied to costs in a business case to reflect the systematic tendency to under-estimate costs. Whilst optimism bias is typically reduced at OBC stage, the actual costs of marine civil engineering work cannot be developed with significant additional certainty until design work is undertaken, which is subsequent to this OBC. Optimism bias is therefore retained at 44%, the upper bound for standard civil engineering projects – see H.M. Treasury *Supplementary Green Book Guidance – Optimism Bias*, p. 2.

[5] Note that a further £850k (£1.2 including OB) would be required to upgrade the passenger ferry access at Pierowall to a level equivalent to that at Moclett.

Whilst new vessels will offer some cost efficiencies associated with e.g., modern engines and hull design, low / zero emission fuel etc, it is a reasonable assumption that operating costs will increase by one third of their current level to circa **£8m** per annum. Whilst a combination of new tonnage, additional connections and direct services will increase revenue, it is likely that most sailings will continue to operate at a loss, particularly given the recent reduction in fares. The operating deficit can also therefore be reasonably assumed to increase by one third to circa **£6m** per annum.

3rd aircraft – operational costs

The Orkney inter-island air services were retendered in August 2020, with a new four-year contract commencing on 1st April 2021. The value of the contract excluding VAT is £5.3m, or **£1.33m** per annum.[6] The cost of adding a third aircraft into the contract will be dependent on market conditions at that time, including aircraft and pilot availability and interest in / competition for any future contracts. Given that overheads are likely to be largely fixed, it is unlikely that a third aircraft will increase the cost of the air services contract by 50%. Our assumption in this report is therefore that these costs will increase by one third to circa **£1.75m** per annum.

Conclusions

This two-part OBC has identified a preferred option package for the future development of the Outer North Isles network. The primary components of this option package are as follows:

- The Outer North Isles network will be operated by a fleet of four new and interchangeable Ro-Pax ferries. These vessels will be Kirkwall based. Detailed capacity utilisation analysis has highlighted that vessels with a broadly equivalent vehicle carrying capacity to MV *Varagen* (28 PCUs) will offer sufficient capacity to meet the needs of the network, both now and in the future.
- The exact size and specification of any new vessels will be determined through the outline and detailed design processes which follow on from this OBC. The infrastructure options presented in this OBC have been sized to accommodate a maximum 65m length overall (LOA) vessel.
- The addition of a fourth vessel to the fleet will provide a maximum of **364** additional operating hours per week, a 91-hour increase on the currently available operating hours (although note that actual operating hours now and the future are likely to be marginally below the maximum). The preferred option emerging from this OBC assumes a mix of 'straight days' Monday to Thursday and 'split shift' extended days Friday to Sunday, allowing for later weekend services.
- Illustrative timetables have been developed which highlight how these additional vessel hours could be used. It should be noted that these timetables are only intended to show what could be delivered, with the democratic processes for timetable setting within the Council used to determine the actual level of service.
    - For Eday, Sanday, Stronsay and Westray, this will allow for three Kirkwall calls per day Monday to Saturday (morning, middle of the day and late afternoon / early evening) and two rotations per day on a Sunday. This will facilitate a half-day and full-day in Kirkwall on extended days (Friday and Saturday); a near-full day on a Monday to Thursday; and several hours in Kirkwall / on-island on a Sunday.
    - The North Ronaldsay and Papa Westray services could be gradually scaled-up to offer improved supply-chain efficiency. The number of calls per week for these two islands will be dependent on the balance of calls to the other islands and will be determined through the timetable setting process.
    - The essential Eday – Stronsay freight link will also be maintained.

[6] https://www.publiccontractsscotland.gov.uk/search/show/search_view.aspx?ID=AUG392832

- The addition of a third aircraft will significantly improve the resilience of the air services and will also expand flight hours by around a quarter, from circa 1,200 hours per annum to circa 1,400-1,500. Additional flight hours could be most effectively used to split-out 'double-drops' and focus on direct connections.
- It is clear overall that the cost of both capital replacement and scaling up services for the Outer North Isles will be significant, both in terms of the capital costs of the vessels and ferry terminal infrastructure and the revenue costs associated with expanding the operational envelope. This expenditure is however required to provide the Outer North Isles with an equitable service provision when compared to benchmarks elsewhere in Scotland, particularly in the context of the Routes and Services Methodology.
- The preferred option package aligns well with the Transport Planning Objectives and STAG criteria and will provide a significant increase in the number of connections available for each island.

Next Steps

This report has confirmed the Strategic and developed the Socio-Economic Case for the Outer North Isles Business Case.

Commercial, Financial and Management Cases

A combination of the Strategic and Socio-Economic Cases effectively define **why** investment is required and **what** is to be delivered. The next step in the process is the preparation of the Commercial, Financial and Management Cases, which define **how** it will be delivered – i.e., how will the preferred option be funded, procured, delivered and managed / operated.

Responsibility for the development of the **Commercial, Financial and Management Case** elements of the OBC currently rests with the Council. The contents of these cases will depend on the outcomes of the aforementioned *Fair Funding* discussions.

The addition of the Commercial, Financial and Management Cases completes the OBC phase.

Final Business Case

The Final Business Case (FBC) is an updated version of the OBC following outline and detailed design. Everything on which the OBC is based is revisited at this stage. In this context, detailed design and costing of infrastructure will require to be incorporated, together with a procurement strategy for engaging with shipyards for the build of new vessels and contractors for the infrastructure. The output of the FBC should be a preferred option with a detailed plan for financing the investment and a strategy for procuring, delivering and managing the outputs of that investment.

Note that a key element of the FBC will be ensuring that the preferred option package remains appropriate and accounts for any changes in e.g., community views and the macro context in the gaps between these stages.

1 Introduction

1.1 Overview

1.1.1 Orkney Islands Council (the Council) funds lifeline[7] transport connections to thirteen islands across the archipelago. These connections are delivered through a combination of air and ferry services which have been supported in both capital and revenue terms by the Council over many years. Ferry services are operated by Orkney Ferries, an arms-length company of the Council, whilst Loganair provides the air service under contract to the Council. These services all represent a net-cost to the Council.

1.1.2 In 2014 Orkney Islands Council, through the 'Our Islands Our Future' initiative, began a dialogue with the Scottish Government on establishing some principles for the 'Fair Funding' of Orkney's inter-island transport services and infrastructure. The basis of these discussions was that the financial burden upon the Council in providing inter-island transport is disproportionate.

1.1.3 Scottish Government accepted in principle that a 'Fair Funding' position needed to be established and, to inform that, Orkney Islands Council and the Highlands and Islands Transport Partnership (HITRANS) agreed to undertake studies, now in the form of business cases, to establish and appraise the service and infrastructure requirements for inter-island transport over a 30-year planning horizon.

1.1.4 In October 2015, the Council, in partnership with HITRANS and Highlands and Islands Enterprise (HIE), commissioned the Orkney Inter-Island Transport Study (OIITS), with a view to developing and appraising options for the future of the inter-island transport service. The output of the study was the development of a Strategic Business Case (SBC), which established the 'case for change' and identified a set of capital and revenue options which, if delivered, would in-part or in-full address the identified transport problems.

1.1.5 In parallel to the SBC, the Council, together with HITRANS, HIE, Shetland Islands Council and ZetTrans established a Fair Funding Group with Transport Scotland intended to explore the wider question of roles and responsibilities, and in accordance with a nationally recognised approach and references in terms of other lifeline services. An early output from this group was the agreement of additional Scottish Government funding which contributed towards partially and then latterly fully offsetting the deficit revenue funding. However, there is no commitment beyond this period for further capital or revenue funding.

1.1.6 The Strategic Business Case (SBC) was completed in Autumn 2016 and set out a range of capital and revenue options for all 13 islands connected by the air and ferry services, together with a timeline for progressing specific elements of the SBC to Outline Business Case (OBC) stage. One of the priorities emerging from the SBC was the development of an OBC for new vessels and supporting infrastructure for the Outer North Isles (Eday, North Ronaldsay, Papa Westray, Sanday, Stronsay and Westray). To this end, the Council, in partnership with HITRANS and Highlands & Islands Enterprise (HIE) commissioned Stantec, formerly Peter Brett Associates, Mott MacDonald (MML) and ProVersa to develop an *Outer North Isles Outline Business Case*.

1.2 Business Case Context

1.2.1 This section sets out the approach taken to the development of the business case and specific considerations in relation to business case preparation in this context.

[7] As defined on page 53 of the *Scottish Ferries Plan 2013-22*.

Transport Scotland Business Case Guidance

1.2.2 As funding dialogue has been ongoing with the Scottish Government, the OBC has been undertaken in accordance with the *Guidance on the Development of Business Cases* (Transport Scotland, 2016). This guidance is based on the H.M. Treasury *Green Book* and is similar to the Department for Transport guidance, *The Transport Business Case*. The Transport Scotland guidance sets out three main stages which need to be completed in developing a compliant business case:

- Stage 1 - Scoping: Strategic Business Case (SBC) – analyses a variety of options which tackle the problems, issues and objectives identified;
  - *The SBC was completed and signed off in Autumn 2016 (see below).*
- Stage 2 – Planning: Outline Business Case (OBC) – identifies the Preferred Option(s) and establishes how that option(s) should be funded, procured managed and delivered; and
- Stage 3 – Procurement: Final Business Case (FBC) – undertaken during procurement phase.

1.2.3 Within each 'stage' of the business case, there are five 'cases', which provide a structured approach to detailing each component of the overall proposition. These are as follows:

- **Strategic Case:** Defines the case for change / rationale for intervention and identifies a shortlist of options which could deliver the project-specific and wider policy objectives.
- **(Socio)[8] Economic Case:** Assesses the options to determine their value for money in terms of economic, social and environmental benefits and costs.
- **Financial Case:** The financial case involves undertaking a full financial appraisal of the preferred option, based on resource accounting and budgeting principles, including information on funding, budgeting over the life of the project and scheme cash flow.
- **Commercial Case:** The commercial case provides evidence on the commercial viability of a proposal and the procurement strategy that will be used to engage the market.
- **Management Case:** Details the project management plans, outlining the framework for managing risk, benefits realisation and post-project evaluation.

1.2.4 The focus on each 'case' varies by stage of the business case – this is highlighted in the figure below, with the size of the box showing the emphasis placed on that component of the business case at each stage of the process.

[8] The Economic Case is referred to as the Socio-Economic Case by Transport Scotland. This subtlety reflects a desire to more fully reflect wider social and economic factors alongside the traditional estimation of value for money determined by a benefit-cost ratio and net present value.

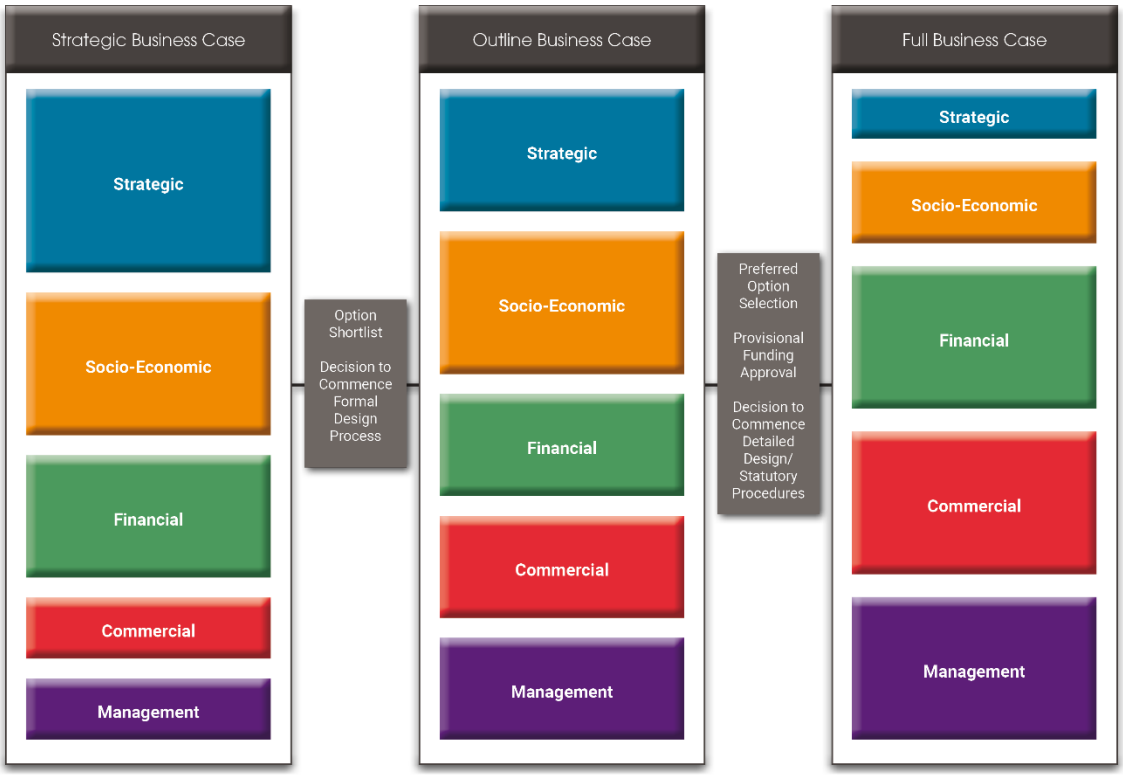

Figure 1.1: Business Case Stages

1.2.5 As noted above, the **Strategic Case** was largely defined in the SBC, which was completed in 2016. This was revisited and confirmed as part of the first phase of the Outer North Isles OBC (see Section 1.3) below. **This report is therefore focused almost exclusively on the completion of the Socio-Economic Case – i.e., defining infrastructure and connectivity solution for the Outer North Isles.**

1.2.6 The **Commercial, Financial and Management Cases** are being considered separately by the Council under the 'Fair Funding' workstream.

1.3 The Story to Date

SBC Reporting

1.3.1 The SBC was published in late 2016 and the appraisal papers can be found on the HITRANS website. In the interests of brevity, this report does not include detailed background information - reference should be made to the above papers if such information is required.

Outer North Isles OBC, 'Phase 1'

It should be noted that the Outer North Isles OBC is divided onto two phases. Phase 1 was completed in summer 2019 – the final report is included in Appendix A and should be read in tandem with this report.

Note also that the intention was for this OBC to be completed over two years (2019 and 2020) but the study was delayed by the onset of the COVID-19 pandemic. The 'Year 1' and 'Year 2' notation previously used has therefore been updated to 'Phase 1' and 'Phase 2' to avoid any confusion.

1.3.2 Phase 1 of the Outer North Isles OBC undertook a **detailed review of the Strategic Case** to **ensure that it remained valid, which was confirmed as part of that audit process**. It thereafter considered and identified a preferred option relating to a set of 'network definition' questions, namely:

- the future infrastructure solutions for **North Ronaldsay** and **Papa Westray**;
- whether **Stronsay ferry terminal** should be relocated to the west side of the island;
- whether an **overnight berth** should be developed at **Eday**; and
- whether an **overnight berth** should be developed at **Westray**.

1.3.3 The recommended preferred options emerging from the 'Phase 1' report were as follows:

- The requirement for a four Ro-Ro vessel and three aircraft solution identified in the SBC was confirmed.
- Papa Westray should be served by a new Ro-Ro service operating between Moclett and Kirkwall, initially at least on the current timetable, which would be gradually expanded as new vessels come into the fleet. The option of a Papa Westray – Westray Ro-Ro service was excluded from further consideration.
- The berth at North Ronaldsay should be converted to Ro-Ro.
- Stronsay ferry terminal should be retained in Whitehall. The possibility of relocating the terminal to a site in the west of the island in the lee of Linga Holm should be retained as a long-term option which should be revisited when significant works are required at Whitehall. Indeed, this is an aspiration of the Orkney Harbours Masterplan and may be progressed independently of this OBC if funding becomes available.
- Overnight berths should not be developed at Eday and Westray, rather the requirement for an early morning departure should be facilitated by Kirkwall-based vessels operating a longer day.

1.4 'Phase 2' Scope

1.4.1 Having defined the network to be served in Phase 1, the Phase 2 work (i.e., this report) will go on to define the service to be operated to the six islands through further development and **completion of the Socio-Economic Case**. Working on the basis of the network defined in Phase 1, this report will:

- develop the capacity and connectivity requirements (air and ferry) of all six islands;
- establish the appropriate vessel mix and required vehicle carrying capacity;
- further develop the infrastructure requirements at all ONI harbours to reflect the emerging preferred vessel solution;
- consider the requirement for a third aircraft and, if progressed, how it should best be used;
- develop a set of outline illustrative timetables;
- further develop capital and operating costs; and
- establish the preferred ONI Network Plan and consult on this with Members and communities.

Scope of OBC Socio-Economic Case

1.4.2 It is important to note at the outset that a business case in the context of small island communities differs from that which would typically be associated with, for example, a road or rail scheme in mainland Scotland, particularly in relation to the Socio-Economic Case.

1.4.3 The Socio-Economic Case typically involves revisiting the assessment against the STAG criteria undertaken in the SBC and, where practical, monetising the social welfare benefits and comparing them to the cost to government to establish a benefit-cost ratio. However, the conventional means of monetising benefits (e.g., journey time savings, agglomeration, reduced accidents, land value uplift etc) does not always easily translate to island related studies, since the objectives of any scheme are not generally focused on issues like travel time savings or reducing accidents.

1.4.4 The focus here is instead very much on access to services and social inclusion, and in particular the extent to which transport connections define the economy, supply-chain, service provision etc in a given island. This is particularly the case in the Outer North Isles, where many key services are located off-island or people travel to the island to deliver these services. Analysis of benefits is therefore more qualitative, setting out how an intervention could address one or more transport problems which in turn are impacting on the life and / or economy of an island. This is entirely consistent with the approach taken for Transport Scotland business cases in this context.

1.5 Changes in the Wider Environment

1.5.1 It is best practice in an OBC to revisit the SBC to review and where appropriate update its findings, taking account of any changes which have occurred since its submission. This task was undertaken in the 'Phase 1', which confirmed that the Strategic Case remains robust, and is thus not repeated here. However, over the timescale in which the 'Phase 2' has been undertaken, there have been several changes in the macro environment. These are detailed here and will be accounted for as appropriate in the option development and appraisal.

Funding

1.5.2 In terms of **funding**, the Scottish Government Budget for financial years 2018/19, 2019/20 and 2020/21 committed additional revenue funding to Orkney Islands Council to address a proportion of its deficit from operating ferry services. This was topped-up to full funding of the deficit for financial year 2021/22, with additional monies provided to introduce year-round Sunday sailings on the Inner and South Isles routes and reduce fares across the network (see below).

1.5.3 It is however our understanding that, at present, there is no commitment to additional funding beyond this financial year (i.e., FY2021/22) and therefore any solution(s) emerging from this OBC remain predicated on the availability of funding from either central or local government.

Fares

1.5.4 As noted above, the additional funding for FY2021/22 included monies to reduce fares across the Orkney Ferries network. The new fares were introduced on 14th June 2021 and offer a discount of **38%** on the standard passenger and car fares. For the ONI routes:

- The adult single passenger fare has reduced from **£8.85** to **£5.49**
- The car single fare has reduced from **£20.90** down to **£12.96**
- Although discounted books of 10 and 20 single tickets are no longer available, discounted pre-paid books of 50 tickets have been retained at the current rate – i.e., users of these tickets see no discount compared to the position before June 2021. The validity period of these tickets has also reduced from 500 days to 365 days.[9]

1.5.5 This represents a major reduction in the walk-up / drive-up fare for travelling on the ONI routes. It should however be noted that:

[9] Orkney Ferries Rates June 2021 RET.xls

- The new fares are subject to review post-implementation, and in particular in response to the post-COVID-19 world.
- Whilst the reduction in the headline fare is significant, it is still less than the previous reduction associated with the 50-ticket book, which some regular ferry users will hold. The actual reduction in fares will therefore be less than the headline 38% reduction (discounted books are 24% cheaper than the new walk-up fare), albeit the differential between the standard and discounted ticket prices has narrowed significantly and the discounted ticket books still also need to be paid up-front.
- The impact of the new fares is unlikely to fully bed down until at least 2022. The impact of COVID-19 restrictions until late July 2021 (and some ongoing restrictions around foreign travel, physical distancing and the wearing of face coverings) followed by the staycation effect will mean that 2021 will be an atypical year. Moreover, it is unlikely that island residents will make permanent changes to their travel behaviour until the new fares system is settled / finalised.

1.5.6 The preferred option emerging from this report was defined in **October 2020** and consulted on with Members and the public throughout the first half of 2021. It therefore reflects the pre-reduction fares position, which is the only practical approach. However, the solution will need to be revisited at FBC stage as the impacts of the new fares system crystallise. The most significant impact will likely be increased car use from less frequent ferry users, given the near 40% reduction in car fares. This clearly has the potential to impact on vehicle deck capacity requirements.

COVID-19

1.5.7 The onset of the COVID-19 pandemic and associated lockdowns and travel restrictions from March 2020 led to an immediate change in short-term travel behaviour and could potentially impact on long-term demand for ferry services. There are four potential impacts:

- At present, there is some infrequent commuting on the ONI routes. Evidence from across the UK suggests that, where a person works in a 'location independent' job, there will be a reduced propensity to commute, even if they already do so infrequently. This will put **downward pressure** on travel demand, albeit in a marginal way given low commuting related volumes on the ONI network.
- Similarly, there are weekly (Sunday / Monday to Friday) flows of children travelling from the ONI to Kirkwall Grammar School, plus inter-island travel to access Junior High Schools. The pandemic-related lockdowns introduced mass home schooling for the first time and there could at the margin be a move towards this for some children in the longer-term, particularly given that such a model of education is more widely practiced in Orkney than elsewhere. Whilst this would also put **downward pressure** on travel demand, any such impact is likely to be **very marginal** given that the majority of children will return to school full-time.
- On the other side of the equation, the reduced need for location independent employees to live physically close to their place of work may lead to a growth in demand for rural and island property. Anecdotal evidence from estate agents[10] suggests that this effect is prevalent across the UK, including in Orkney. A loosening of the ties between the home and the workplace may address one of the barriers to island-life and could grow the population in the ONI. This would put an **upward pressure** on travel demand.
- Restrictions on international travel have resulted in a surge in domestic tourism, particularly in rural areas and the islands of Scotland. It is possible that this effect may be short-lived as the restrictions on international travel ease. However, there may remain a long-term requirement for testing etc. that will act as a deterrent to travelling abroad, whilst a proportion of the UK market has been introduced to domestic holidays which they would

[10] For example - https://www.heraldscotland.com/news/homenews/19446619.revealed-scots-house-price-boom-hotspots-fuelled-covid-craving-open-spaces/

not previously have considered (and may wish to repeat). If sustained, this would put an **upward pressure** on travel demand.

1.5.8 As with the change in fares, the long-term behavioural impact of COVID-19 on travel behaviour will not be fully understood for some time yet. This OBC has to work on the basis of pre-pandemic travel, partly because much of the work was undertaken pre / during COVID-19 and partly because there is as yet no firm evidence of what the pandemic could mean for the ONI. However, the Final Business Case should incorporate research and analysis to validate or update the preferred option based on any permanently observed changes in travel behaviour.

1.6 Report Structure

1.6.1 This report consists of a further eight chapters, as follows:

- **Chapter 2** recaps on the key 'Network Design Principles' established towards the end of the Phase 1 work.
- **Chapters 3-5** establish the role of the ONI air and ferry services in meeting the supply-chain, essential service delivery and personal travel needs of the six islands.
- **Chapter 6** sets out current ferry carryings and capacity utilisation across the Outer North Isles, providing a basis for option development.
- **Chapter 7** sets out a series of illustrative air and ferry timetables arriving at a preferred option for the ONI.
- **Chapter 8** finalises the vessel and harbour specification.
- **Chapter 9** updates the appraisal of the remaining options against the Transport Planning Objectives and STAG criteria and cost to government.
- **Chapter 10** sets out the study conclusions and next steps.

2 ONI Ferry Network Design Principles

2.1 Overview

2.1.1 As explained in the introductory chapter, the Phase 1 work was principally focused on validating the Strategic Case and defining the network to be served through answering a set of landside infrastructure questions. The outcomes of that work were presented to communities, stakeholders, Orkney Islands Council Members and the then Minister for Energy, Connectivity and the Islands, Paul Wheelhouse MSP, in June 2019.

2.1.2 In order to appropriately frame the Phase 2 analysis, the first step was to define a set of 'ONI Ferry Network Design Principles' upon which timetables would be based.[11] These covered:

- vessel overnighting arrangements; and
- crewing.

2.1.3 These principles were established through a workshop with the client group and key stakeholders at Orkney Marine Services' office in Scapa on Monday 28th October 2019. The key points from the discussion in relation to the above two themes are set out below.

2.2 Vessel Overnighting Arrangements

2.2.1 There are two related questions with respect to future vessel overnighting arrangements:

- Should vessels overnight in Kirkwall, the isles, or a combination of the two?
- Should future vessels have an onboard accommodation block?

2.2.2 Each of these questions is now explored in turn.

Overnight Location

2.2.3 The current overnighting arrangement for the Outer North Isles vessels is as follows:

- All three vessels have onboard crew quarters. However, as this accommodation is below the waterline, the crew can only be rostered to remain onboard a maximum of two nights per week. This issue would be resolved with any new tonnage and there are no other hard constraints preventing the crew remaining onboard overnight.
- The vessels can lie overnight at Kirkwall, Sanday and Stronsay year-round and in Westray in the summer only. The vessels cannot overnight at Eday, North Ronaldsay or Papa Westray at present due to the absence of suitably sheltered berths.
- For a vessel to lie overnight at Westray in winter and Eday year-round, overnight berths would be required at both ports.
- The current timetable is structured as far as possible to provide a combination of the first sailing being inbound to the island and outbound from the island.
- Only a small number of the current crew compliment are Outer North Isles residents.

2.2.4 The Phase 1 OBC set out the technical solution, costs and benefits of overnight berths at Eday and Westray but deferred a decision on whether they should be progressed or otherwise until

[11] Network design principles are not required for the air service as there are fewer fixed assets and much greater flexibility in how they are operated.

the Phase 2 workshop. Having explored these issues further, the Phase 2 workshop concluded that:

- Given the cost of delivering year-round overnight berths at Eday and Westray and that there are alternative ways of delivering an early first sailing from both islands, **these options will not be progressed**.
- The focus will be on developing crewing and timetabling solutions which facilitate the desired early morning departure from these islands.

Key Point: Overnight berths at Eday and Westray will not be considered further in this report. Crewing and timetabling solutions which facilitate the desired early morning departures from Eday, Sanday, Stronsay and Westray will however be an important component of the analysis.

Onboard Accommodation

2.2.5 Having confirmed that year-round overnight berths will not be provided at Eday and Westray, the next issue is whether the current practice of overnighting in Stronsay and Sanday and in Westray in the summer should be continued and / or be expanded, or whether the service should become entirely Kirkwall-based. From a feasibility perspective, the primary question is whether the new vessels should be built with an onboard accommodation block which could accommodate the entire crew.

2.2.6 The obvious benefit of incorporating an accommodation block in the vessel design is that it provides maximum flexibility, allowing the vessels to lie at and operate from any harbour which can safely accommodate them. The major downside is that it adds to the overall size and complexity of the vessel design, with knock-on implications for the scope and scale of associated landside infrastructure works. This in turn makes the overall funding case weaker, particularly when considered in the context of six harbours (seven if Kirkwall is included) and four vessels.

2.2.7 A potential hybrid solution suggested would be to have shore-based overnight accommodation on the islands where the vessel can overnight (Sanday, Stronsay and Westray). Whilst this would facilitate the vessel lying in these islands, it is unlikely to be popular with the crew and may make recruitment and retention more difficult (this point could though be explored with the relevant trade unions and remains on the table as a future option, should this ever be deemed necessary).

2.2.8 It was concluded that a **full accommodation block should not be incorporated in any future tonnage**, **with crew therefore living ashore**. However, around four cabins would be included on the new vessels - as well as allowing for watch duties, this would allow island-based crew members who currently live aboard to continue doing so (subject to operational requirements).

2.2.9 It therefore follows that the vessels will be **Kirkwall-based** with an expanded crewing-led solution being used to maintain / enhance the timetable. Whilst the desire for island-based crews is well understood, it is highly unlikely that suitably qualified staff could be recruited from the current or future island populations. Unlike the Inner and South Isles routes, which operate within categorised waters, the Outer North Isles lie within waters classified as 'open sea' and thus the vessel crew require a much higher level of certification than on, for example, MV *Hoy Head* or MV *Eynhallow*. Indeed, senior crew would require certification to the level of Standards of Training, Certification and Watchkeeping (STCW), which entails significant sea-time on a qualifying vessel. Moreover, even if the vessels were not based in Kirkwall, they often overnight in different locations and, as such, an accommodation block would still be required for when a crewman is away from their home island.

Key Point: The new fleet will not incorporate a full crew accommodation block. The crew will be predominantly shore-based and the vessels will overnight in Kirkwall at all times.

2.3 Crewing

2.3.1 In order to progress the ONI network towards the Routes and Services Methodology (RSM) service level, reduce the impact of the vessel refit period, and provide early morning connections from the isles, a revision to the current crewing model may be required.

2.3.2 At present, all three ONI vessels work on the basis of two crews (with additional cover for leave, sickness etc.) working on a two-weeks on, two-weeks off basis. The case for adopting a different crewing model will be assessed through the options considered in this OBC.

2.4 Operating four vessels from Kirkwall

2.4.1 Kirkwall only has a single linkspan which will have to be capable of accommodating the loading and discharging of all four vessels. The working assumption – agreed with Orkney Ferries - is that this will likely be possible and thus a second linkspan in Kirkwall is neither designed nor costed in this OBC. However, this assumption should be kept under review through the design and FBC process, and the case for a second Kirkwall linkspan revisited if necessary / desirable.

2.5 Next Steps

2.5.1 Having further refined the ONI Ferry Network Design Principles, the next three chapters establish the role of the inter-island transport services in meeting the supply-chain, service delivery and personal travel needs of the Outer North Isles.

3 Supply-Chain

3.1 Overview

3.1.1 The current Outer North Isles air and ferry timetables reflect a balance between meeting the travel needs of island residents, facilitating an effective supply-chain and ensuring the delivery of essential public and business services to the islands. The next three chapters explore each of these issues in turn, defining the 'need' which the ONI inter-island transport services must meet.

3.1.2 This chapter focuses on island supply-chains, how these are facilitated by the transport connections at present, and any problems which could be resolved through investment. The analysis is based on depth interviews in early summer 2019 with individual haulage firms, Orkney Ferries and the operator of the ONI hub at Hatston.

3.2 Outer North Isles Freight Market - Overview

3.2.1 Freight traffic moves to/from the ONI in one of four main ways:

- **Full load traffic**: This is effectively limited to bulk freight of different types including aggregates, timber, feed, project traffics and livestock floats.
- **Consolidated traffic**: This forms the majority of freight and includes the full range of product types moved in small volumes which pass through the ONI Distribution Centre at Hatston, as will be explained below.
- **Private freight**: This is freight traffic moved by individual island residents using their own equipment and includes towed trailers, vans and similar.
- **Lo-Lo freight**: This is freight moved to/from North Ronaldsay and Papa Westray by Orkney Ferries. In this instance, Orkney Ferries itself is the logistics service provider.

3.2.2 Each of the Outer North Isles are, in absolute terms, very small but highly diverse freight markets. This characteristic lies at the heart of the challenges of serving them efficiently because there are relatively few 'conventional' means for operators to achieve a critical mass of freight traffic that enables them to achieve scale economies. Low overall volumes also mean that the choices of individual end users or implementation of any project on the ONI has a very material impact on the day-to-day demand on hauliers and the ferry service to enable movements. In short, there is insufficient overall traffic to absorb the fluctuation of different demands in the same way as would be the case on higher volume routes. Direct sailings to Kirkwall are more desirable than sailings via other islands so, where there is a choice, these are preferred by customers as they enable better productivity and asset utilisation.

3.2.3 The haulage market and wider supply-chain of the islands has developed around these characteristics. Hauliers have adapted to become multi-functional and creative in their choice and operation of equipment, the expectation of island residents appears to be reasonable in the realities of what is possible, and a supply-chain structure has developed that delivers consolidated efficiencies.

3.2.4 Each of the four Ro-Ro islands has evolved a primary haulier (either based on the island or a neighbouring island). Moreover, because of the low volumes and diversity of goods being moved, it was noted through our consultations that serving the ONI is unattractive to the larger hauliers who dominate the supply routes to Orkney itself. These operators achieve scale efficiency on the much higher consolidated volumes to/from Orkney and are ill-equipped – in terms of vehicle assets and staff – to serve the ONI effectively. Overall, there appeared to be a high sensitivity to cost born of the ONI already operating with the disadvantage of geography and connection times compared to other islands.

3.2.5 Hauliers are allowed to 'block book' capacity on sailings and there is no penalty for not using this booked capacity, as is common across other Scottish islands. This approach recognises that the hauliers are generally responding to the demands of their customers and may not know until shortly before a sailing what loads are to be moved. Their businesses could not function without the assurance that there is space on sailings to use.

3.2.6 Through the consultation, hauliers noted that the piers at the current Ro-Ro ports were never originally designed for Ro-Ro freight operation. This means turnaround times can be slow as, while the traffic is 'driver accompanied' (i.e., not drop trailers), many actually send one driver with multiple vehicles. Operationally, it means vehicles being unloaded one at a time, parked, the driver returning to vessel to move the next vehicle etc. This process is then repeated when reloading the vessel. Where vehicle parking is not close to vessel, this extends overall time to discharge the vessel and reload and can impact on maintaining the timetable.

3.2.7 One-off and project traffic tends to be problematic as it usually involves larger freight and higher volume over shorter periods than the normal background pattern of movements, public infrastructure projects like runway or road resurfacing that require aggregate, tar and machinery for example.

3.2.8 The business cost of serving the ONI and the already long days it involves was also noted. Extending the operating day therefore has limited attraction for hauliers as this would trigger overtime costs for little real supply-chain benefit. For the ONI hauliers, the current arrangement allows for preparing loads before the first sailing and finishing at a 'reasonable' time.

3.2.9 There was a general view amongst the haulage community that a fourth vessel would be valued, if not a consistent view on what it would do. The primary value appeared to be linked to service resilience, especially in the winter and refit timetable periods when poor weather has the severest impacts on connectivity and at times of service disruption where the current fleet struggles to catch up with backlog after an extended period of delay.

Key Point: The Outer North Isles freight market is of critical importance to the isles, but at the same time is highly marginal and requires several workarounds to deliver a satisfactory level of service to customers.

3.3 Types of Traffic

Livestock

3.3.1 Livestock farming is a key industry across the Outer North Isles and insight into movements related to agriculture was therefore sought from the Orkney branch of the National Farmers Union.

Exports

3.3.2 Of the 22,000 cattle moved from Orkney in 2018, an estimated 30% originated from the ONI, principally Westray, then Sanday and Stronsay – this is a significant volume given that only around 10% of the Orkney population live in the ONI. Farming is also an integral component of the economies of North Ronaldsay and Papa Westray, but the volumes are unsurprisingly comparatively lower because both islands have a lower population and suffer from infrequent connectivity and regular cancellations.

3.3.3 The movement of livestock is linked to the sector wide pattern of mart sales and exports from Orkney to mainland destinations. The trade traditionally peaks during September and October, with the Monday sales in Kirkwall Auction Mart being a primary focus and driver of ferry demand patterns.

3.3.4 Changes in the sector and a trend away from raising cattle to full weight in Orkney has though had a flattening effect on demand through the year. The Mart has moved to monthly 'special

sales', and weekly sales of younger cattle, whereas historically, sales and movement were more polarised towards September and October (as the NorthLink monthly freight lane meterage carryings demonstrate). The movement of smaller stock (i.e., younger cattle) reduces the demand on sailings as more head can be moved in a single vehicle shipment. The potential for growth in livestock related freight volume is therefore suppressed.

3.3.5 The current pattern creates regularity in the flows, with farmers moving stock towards the end of the week to be at the mart and sale-ready for Monday and onwards to the Scottish mainland on the Monday evening NorthLink sailing to Aberdeen.

3.3.6 The majority of stock is moved in cattle floats – double decker from Westray and Stronsay, generally single deck from Sanday. Stock from Papa Westray and North Ronaldsay is moved in Lo-Lo cassettes that are road legal trailers. Being road legal means cattle shipped in them are counted as being in 'travel time' from a regulation perspective, unlike the NorthLink livestock units which are not road legal. Journey time is therefore important in the overall supply-chain from farm to destination given the requirement to work within animal welfare regulations.

3.3.7 Most farmers and hauliers are creative with their fleets, modifying them to be flexible for a mix of traffics. For example, they can be configured for livestock out, then to accommodate feed, fertilisers, straw and other consumables back again, maximising the efficiency of their asset and minimising the cost of shipping. Behaviours, choice of fleet and use of the network is heavily influenced by the ferry tariff (and working around it), doing the most for least cost as agriculture is a low margin business. Inevitably on a length-based tariff, the focus is to put as much on a small footprint as possible, driving up weight for a given vehicle length.

Key Point: Livestock exports account for a significant proportion of the overall freight volume moved on the ONI ferry network. This market is concentrated in September and October, although this peak has flattened somewhat in recent years.

Imports

3.3.8 Consumables for the livestock sector include dangerous goods, i.e., hay, fertilisers, fuel, gas etc, which need to be moved in accordance with the International Maritime Dangerous Goods (IMDG) code. These goods are not as time sensitive as livestock and can be planned around other traffics if required.

3.3.9 Westray is the only island which still receives bulk fertiliser by coaster. Suitable vessels are aging, and the rest of the market has shifted to bagged fertiliser shipped on the ferry. In the long-term, Westray may need to switch to bagged fertilisers moved by ferry increasing freight demand on what is already the highest volume route and most under pressure route in the ONI network.

3.3.10 Agricultural machinery also regularly moves onto the islands. This wheeled traffic is either driven on or carried on returning haulier vehicles. Although this machinery is growing in size and weight, it is unlikely to exceed the dimensions and weights normally associated with a fully-laden HGV trailer.

3.3.11 It was noted by consultees that understanding the overall vehicle demand (i.e., car and CV), particularly for Westray, has always been a challenge as unmet demand for travel in the booking system is not captured. There is a perception that 'real' demand is not understood, although block booking and wait lists do at least indicate a degree of suppressed demand for travel.

ONI Distribution Centre

3.3.12 The ONI Distribution Centre is a Council funded facility established when Ro-Ro services were initially introduced to the Outer North Isles. Its operation is currently contracted to JBT Distribution and operates from a building alongside their depot in Hatston Industrial Estate, along with a large external space for bulkier goods or those not needing weather protection.

The facility operates as a transhipment hub for freight to / from the ONI with the exception of Papa Westray and North Ronaldsay as they are still served by Lo-Lo operation from Kirkwall pier, with Orkney Ferries acting as the *de facto* haulier.

3.3.13 Although it was originally intended to cater only for small package freight, over the years it has developed to cater for most cargoes other than bulk full loads and livestock. Most freight is palletised and outsized goods, such as timber and building materials, are routinely consolidated through the hub.

3.3.14 The hub opens at 08:00 (although bakers can deliver stock from 06:00) and between 10:00 and 13:00, suppliers of 'less than full load' freight deliver goods into the hub. Between 13:00 and 15:30, island hauliers collect freight during the turnaround time of the inter-island services to take back to the islands, and vice versa. JBT themselves are purely the operator of the hub and do not directly deliver any freight to the ONI.

3.3.15 Any freight coming from the ONI to Orkney mainland for onward distribution is dropped at the hub for collection by Orkney mainland operators through the afternoon. This includes parcel returns, export crafts, processed fish and island produce for consumption or further processing on Orkney mainland.

Key Point: At present, the timetable for the ONI services therefore needs to reflect the requirement for hauliers and businesses to have sufficient time in Kirkwall to offload, reload and organise multiple vehicles before returning on the ferry back to their respective islands on the same day – this in-part shapes the way in which the timetable is designed.

3.3.16 All freight is pre-addressed and sorted into island destinations. All freight is palletised where possible and includes medicines and routine NHS supplies. The hub's ability to cater for chilled and fresh produce is delivered by having a regular JBT chilled trailer available. Some suppliers to the islands also utilise insulated boxes, which can hold goods at temperature for 24 hours.

3.3.17 The ONI supply chain therefore revolves around the activity in the hub. Many hauliers bring multiple vehicles from their home island, depending on the demand and requirement of the day, shuttling around to drop and collect freight as required. Other than full, bulk loads – typically full loads of aggregate, fertilisers, seed and similar – almost every consumable for the islands passes through the hub. Due to the low island populations, movement of everyday consumables is small in absolute volumes, but very diverse. The photographs below provide some examples of goods moving through the hub.

Figure 3.1: Insulated container for Sanday - retail products (Credit: Martin Bignell, ProVersa)

Figure 3.2: Refrigerated trailer used as the temperature controlled holding area (Credit: Martin Bignell, ProVersa)

Figure 3.3: Freight ready for collection for Stronsay – milk, meat, cat food, roofing felt, salt, parcels (Credit: Martin Bignell, ProVersa)

Figure 3.4: Freight ready for collection for Sanday – bread, parcels, chilled produce (Credit: Martin Bignell, ProVersa)

Figure 3.5: Freight ready for collection for Westray – milk, parcels, general goods (Credit: Martin Bignell, ProVersa)

3.3.18 Very little freight is a 'through traffic' to or from the ferry services connecting Orkney to the Scottish mainland; supply or receipt of ONI freight is almost exclusively with a trader, supplier, wholesaler or other intermediary or consolidator on Orkney mainland. The hub is in effect a small-scale mirror of how many other supply chains operate.

Key Point: All 'less than full load' goods being moved to Eday, Sanday, Stronsay and Westray are consolidated at the ONI hub in Hatston Industrial Estate. There is a regularity to the operation of this depot, built around the current ferry timetables, allowing a reliable consolidated freight operation to / from the ONI.

3.3.19 The island hauliers are hugely pressurised to keep freight moving, with each island's sustainability largely in their hands. Most island hauliers are fragile small businesses often dependent on aging staff with intimate knowledge of the timetables and what needs to happen to make things work within the constraints imposed by the ferry service.

3.3.20 The freight equipment is often tailored for its purpose and designed to maximise the amount of freight that can be moved for minimum shipping cost. Ongoing viability is only possible through this creativity. Loads therefore are **often very heavy for the length of vehicle**, which can give rise to **issues of vessel deadweight capacity**. It also highlights the importance of pier and linkspan infrastructure that can take the loads being placed upon them. Examples of the freight vehicles used are shown in the pictures below:

Figure 3.6: Loaded freight ready for shipment to Stronsay (Credit: Martin Bignell, ProVersa)

3.3.21 The above vehicle, bound for Stronsay, is carrying a bulk load of aggregates, with a pallet of coal strapped on top. It should be noted that the vehicle is designed to be within 7m length to maximise cost effectiveness within the current tariff structure. The rear unit can be swapped for livestock, box, bulk, flat or other type depending on demand on the day.

Figure 3.7: Freight loaded ready for shipment (Credit: Martin Bignell, ProVersa)

3.3.22 The above photographed vehicle is carrying bulk aggregate, with lamp posts strapped to the top. It should be noted that the vehicle is a 3x axle short unit to maximise cost effectiveness within the tariff.

Key Point: Island hauliers have developed effective operating systems within the constraints imposed by the low demand and the ferry timetable. There is a focus on minimising the vehicle-deck footprint of freight to minimise cost, meaning that loads are often very heavy relative to the length of the vehicle, and thus can amplify the occasional deadweight capacity issues faced on the ferries.

3.3.23 All islands tend to follow the same pattern. The hub is historically **busier on Tuesdays and Thursdays** in the week. Seasonal peaks occur through **March and April** when seed barley is shipped in volume to the ONI to improve the quality of grazing.

3.3.24 Summer usage is generally higher as island residents are able to progress building projects in the good weather and long days, plus the volume of domestic consumables, including food and drink, increases as there are more tourists and visitors to the isles.

3.3.25 For the six weeks prior to Christmas, there is an uplift in demand with festive preparations and gifts being shipped.

3.3.26 Internet retail is growing, driving an uplift in parcel traffic. This is understood to be more pronounced in the ONI as, unlike Orkney Mainland, the population does not have as many alternative options, such as high street retail or supermarkets. Internet returns therefore are also a growing volume coming off of the islands.

3.3.27 Although freight to and from the ONI has significant seasonal peaks due to livestock, this is not reflected in volume through the hub as agricultural traffic moves on dedicated equipment to and from the mart.

Growth

3.3.28 The consultation found that, with growing economic prosperity in addition to improved communications, expectation is growing on what the ferry service should be capable of. There is a growing trend on the isles for smaller and more frequent deliveries, which reflects shopping and delivery trends more widely.

3.3.29 These impacts have been felt through the ONI Distribution Centre, where there has been recent year-on-year volume growth and a large increase in returned freight, particularly internet parcel returns.

3.4 Island Specific Supply-Chains

3.4.1 The overall structure of distribution is described above. This section considers the specifics of the supply-chain on each island. It should be noted that the commentary is based on early summer 2019 consultation with the main haulier and key retail businesses on each island, and therefore represents their views at that time.

Eday

3.4.2 There is no 'island haulier' on Eday, with the island being served by Jim Holland Transport, based on, and also the primary haulier for, Stronsay. At present there is a Stronsay-Eday-Kirkwall morning connection and a Kirkwall-Eday-Stronsay afternoon connection on a Monday, Wednesday, Thursday and Friday.

3.4.3 The only shop on Eday is operated by Eday Community Enterprises and is a Co-op supplied store. It sells a full range of everyday consumables such that an island resident would not need to travel to Kirkwall for much other than more specialist items (e.g., tools / car parts etc). The Co-op website estimates that it caters for 90% of the food shopping demand of island residents.[12]

3.4.4 The Co-op supply chain to Orkney operates through distribution hubs in the Central Belt of Scotland via Inverness to Orkney, and from there daily deliveries to the Kirkwall store. For Eday, goods are consolidated at the ONI Distribution Centre, collected and delivered by Jim Holland Haulage. Primary delivery days for the shop are Monday, Wednesday and Thursday, although items like fresh meat sourced from other local suppliers (including from Westray and Kirkwall) are delivered on any day that there is a sailing.

3.4.5 Co-op goods are moved in roll-cages (standard retail units) on the Jim Holland vehicle, which discharges the load into some metal containers near the pier. Roll cages are picked up by the shop's own 7.5t vehicles. Empty roll cages are returned the same way, loading onto the Jim Holland vehicle for shipping back through the Co-op supply chain.

3.4.6 Eday is served by unloading the vehicle within the 15-minute vessel turnaround time, driving to a concrete transhipment area about 100 yards from the pier where freight can be discharged and reloaded using a forklift truck that is available there. This is where the metal storage containers are also located. The vehicle then returns back to the vessel. Whilst this arrangement works well, it is not particularly efficient and has the potential to impact on vessel turnaround times.

3.4.7 Royal Mail post is delivered on the ferry and collected by the island postman direct from the pier. Parcel and courier type freight for the island arrives on the Jim Holland vehicle. There are two postcodes on Eday – parcels and courier freight for one postcode are taken to the shop for island residents to collect, whilst for the other postcode, parcels are put into the transhipment point storage units for collection.

3.4.8 Eday has comparatively few farms - although there are livestock movements, they are not as significant as those from Westray, Stronsay and Sanday. Fertiliser is also moved to island. This occasionally comes direct by boat from Aberdeen, where it is lifted onto pier for farmers to collect.

[12] https://www.uk.coop/directory/eday-community-enterprises

Key Point: In terms of general consumables, Eday is served by the Stronsay haulier, Jim Holland Haulage, primarily using a trans-shipment model, with goods dropped off at a container at the foot of the pier and picked up by the island Co-op van.

Hydrogen

3.4.9 There is potential for significant growth in the movement of hydrogen from Eday (and potentially other islands) in the years ahead, which will present a challenge for the ferry service as this a dangerous good and can require a limitation / exclusion of other traffics on the ferry (i.e., dedicated freights sailings).

3.4.10 Orkney Ferries has not carried hydrogen from Eday for around two years, as the electrolyser has been dismantled for an upgrade. However, it is understood that the reinstallation of this unit with increased capacity is approaching the commissioning stage, aligning with new projects surrounding renewables emerging. Orkney Ferries therefore anticipates that the requirement for the transport of hydrogen trailers will resume in the near future.

3.4.11 The shipping of hydrogen is an important opportunity for the island, but also presents a challenge for the operator. The Maritime and Coastguard Agency (MCA) has restricted passenger numbers to 25 when hydrogen trailers are being carried, which can be highly problematic on the low sailing frequency on the Eday route. Orkney Ferries cannot limit the number of walk-on passengers on any scheduled sailing, whilst the hydrogen transport company understandably will not commit a driver and tractor unit on the basis of a standby opportunity on an infrequent sailing schedule, therefore creating something of an impasse.

3.4.12 At present, the hydrogen project operators charter a vessel for exclusive use rather than displace a tractor unit and driver assets who may end up stranded on Eday should an inbound (from Eday) passenger sailing be carrying more than 25 passengers. However, this is a high cost and potentially unsustainable approach, and thus there remains uncertainty over how this product will be transported in the future. As this business case progresses through design and then into FBC, greater clarity may be provided and the ultimate preferred option potentially refined to reflect future needs.

Key Point: It is important to note that there is anticipated to be growth in the export of hydrogen in the years ahead, which will present a challenge in terms of how this 'dangerous good' can be handled alongside regular passenger traffic. It is unlikely that there will be sufficient clarity within the timescale of this OBC to pronounce on this issue, but hydrogen transport needs should be kept under review as the design and FBC progresses, with the ultimate preferred option potentially refined to reflect future needs.

Stronsay

3.4.13 Jim Holland Transport is also the haulier for Stronsay and operates a mixed fleet of four vehicles, of which two are tractor units configured to be adaptable with a range of demountable and tipping body types, and one is a short rigid vehicle for general freight. The fleet also includes a single deck 30ft livestock cattle float for moving livestock. The fleet can therefore cater for a wide range of goods, including bulk aggregates, palletised goods, building materials and bagged bulk freight etc.

3.4.14 The freight moved is diverse and, on any day could involve the need to ship any type of island consumable. The logistics around the fleet therefore requires forward planning on what equipment to have mounted to what vehicle and where each vehicle is best located.

3.4.15 Jim Holland Haulage is primarily run by Jim Holland himself, who organises the delivery and collection of freight, scheduling of vehicles and drives them too. Depending on demand, he has access to a couple of other people who can also drive the vehicles, but often multiple vehicles will be moved on the same ferry with one driver. This means loading / unloading one vehicle, then going back to the vessel and loading / unloading the next.

3.4.16 Volume of freight is an underlying factor that drives the need to maximise the use of every vehicle load. Stronsay and Eday do not have the volume to allow multiple vehicles to specialise in different traffics. This is why the fleet is designed to fit most efficiently within the tariff and must routinely be loaded to maximum weight with a mix of freight. This is the only way freight can be moved in a financially viable way. The use of smaller vehicles and trailers means that there is generally less 'self-haulage' of freight by island residents. It was noted through the consultation that deadweight, therefore, can be a challenge on the vessels in addition to available lane metreage. When the vessel is loaded to its safe maximum, freight is occasionally left on the quayside.

3.4.17 The movement of dangerous goods presents a challenge to Orkney Ferries, particularly if petrol and bottled gas are to be shipped. Regulations demand that these cannot be mixed with other dangerous goods classes, for example straw, fertilisers, heating oil etc.

3.4.18 Livestock is the core of Jim Holland's business though, with movement of livestock to the Orkney mart a regular traffic and return movements of feed going onto the islands. Cattle and sheep movements peak in livestock season (September–October) where livestock is sold through Orkney Mart or shipped to Aberdeen Mart.

3.4.19 Agricultural inputs, including feed and hay are unpredictable year-on-year as they are dictated by the weather. When there is good grazing on the island, there is less feed required, whilst poor weather leads to greater need for feed, hay and fertilisers.

3.4.20 There is potential future growth as Orkney Marine Farms Ltd has applied for licences for two fish farms which may be realised in the near future. This will drive demand for fish feed onto the island and salmon off the island if approved.

3.4.21 With regards to a longer operating day, Jim Holland explained that both AM outbound from Stronsay and PM inbound sailings are equally important due to the round trip nature of most traffic being just between Stronsay and Orkney mainland. With the current timetable, his day starts hours before the first sailing to prepare vehicles, collect freight and be ready for the sailing when the vessel arrives. Time in Kirkwall is important as there are usually a number of vehicles to unload and reload, at the distribution hub and elsewhere for bulk freight, and then to catch the sailing back. On arrival back in Stronsay, there are several hours of making deliveries and organising vehicles for the next day. As the only freight operator serving Eday and Stronsay, extending the operating day would extend an already lengthy working day for no immediate supply-chain benefit.

Key Point: Stronsay has an on-island haulier who also serves Eday using a flexible fleet of vehicles. Outwith general consumables, the main movements are related to the livestock sector – i.e., outbound movement of livestock and inbound movement of feed, hay etc. In recognition of the tariff structure, the operation is designed around maximising weight per lane metre which is efficient but can present deadweight challenges on the vessel.

Sanday

3.4.22 The island haulier for Sanday is Sinclair Haulage, which moves the majority of freight, including shop retail, building materials, domestic fuels, animal feed, aggregates and is a licensed livestock haulier.

3.4.23 The greatest challenge which they face is vessel capacity, both deadweight and lane meterage. Sinclair Haulage regularly has to make multiple movements (at additional cost) due to vessel deadweight limitations. Vehicle deck lane width is also a limiting factor as the vessels are not quite wide enough to accommodate two standard freight vehicles side-by-side in the car lanes without touching mirrors and vessel sides. This is common with many older vessels.

3.4.24 Freight is generally conveyed in rigid rather than articulated vehicles, which is similar to Stronsay. These vehicles are 8-9m in length but the mixed nature of goods mean that they can be heavy for their length. The tariff drives the vehicle choice, and it was noted that from 5m upwards, the tariff rate per metre increases considerably incentivising the use of shorter vehicles.

3.4.25 Demand through the year is relatively stable, although different commodities peak within this. Fertilisers are moved in greater volume in spring, livestock in late summer, bulk stone and other construction commodities through summer. Hauliers are able to block book, but the bookings (i.e., vessel capacity) are usually limited by weight, rather than length.

3.4.26 Generally, the amount of self-haulage of freight by island residents is more than Stronsay, but less than Westray, and the community shop has its own van that is used for collection of supplies from the ONI hub, or direct from wholesalers on Orkney mainland.

Key Point: The supply-chain structure of Sanday is similar to that of Stronsay, albeit the haulier serves that island only. The island community shop has its own van that is used for the collection of supplies and self-haulage is higher than in Stronsay. The primary challenge again is that the tariff structure incentivises shorter, heavier vehicles, leading to deadweight limits being reached on the current vessels and thus meaning that full use is occasionally not made of lane meterage on these sailings.

Westray

3.4.27 The island haulier for Westray is R. Rendell & Co. / Rendell Haulage who choose to use conventional HGV articulated vehicles and trailers up to 44 tonnes rather than the smaller bespoke vehicles found serving Stronsay, Eday and Sanday. Haulage rates tend to be slightly more expensive due to this arrangement, so there are higher levels of own-vehicle freight movements to / from Westray. Own account freight customers often keep trailers parked in Kirkwall if not needed on the island and load them when needed with mixed goods (from shopping to building products).

3.4.28 Rendall Haulage carries the vast majority of freight to / from Westray, including for WFM Brown Ltd (Westray Bakehouse) who are a main supplier for Orkney mainland outlets – shops, hotels, B&Bs - and also export beyond Orkney.

3.4.29 Westray has a much stronger volume of outbound freight than the other ONI due to the industry and businesses based there, making both directions important for different customers. While the imbalance is still thought be 90%-import, 10%-export, the 10% is economically valuable and typically time sensitive freight, including fresh seafood and bakery products.

3.4.30 Typically, Rendall Haulage move 2-3 HGV vehicle accompanied trailers per day from Westray to Kirkwall, returning on the same day. Collection and delivery in Kirkwall tends to be either through the ONI Distribution Centre or to / from merchants if full loads are involved, e.g., fertilisers and fish feed. Vehicles are either flat-bed trailers for bulk goods or refrigerated trailers for Westray's aquaculture exports of live shellfish and similar goods.

3.4.31 Rendall Haulage operates a number of other trailer types for different traffics, some specifically designed as shorter than conventional to benefit from the length-based tariff.

3.4.32 Westray's aquaculture output, including shellfish, is destined for markets off-Orkney. The trailers used for this are taken to a mainland haulier depot, for example JBT or Northwards, who then take responsibility for distribution to the mainland destination, e.g., Central Belt fish markets, thus maintaining the cold-chain integrity. Rendall Haulage rarely send any of their own equipment off of Orkney.

3.4.33 Westray's freight includes some sectoral peak periods. Fish feed for the salmon farm peaks in March where demand is circa 25 tonnes per day (one full trailer load). During March and April,

farmers bring in large quantities of fertiliser, estimated at 800–1,000 tonnes over an eight-week period. Both are heavy loads and fall within the winter timetable, putting pressure on available capacity.

3.4.34 Also outside of the summer timetable, in September – October, livestock moving to market peaks with circa 1,000 head typical to be moved in that period. These are moved on double deck livestock floats that have capacity for 38-40 cattle (or 400 lambs, or a mix of the two). This too is a heavy traffic. The majority of livestock movements are for Orkney Auction Mart. Sale day is Monday, and onward transport via NorthLink is provided by the scheduled Monday evening freight sailing to Aberdeen.

3.4.35 During these periods, Rendall Haulage block book a significant amount of deck space for an extended time to ensure freight that needs to move can move. It was recognised that this also limits passenger options to travel through this period.

Key Point: The haulage arrangements in Westray are similar to mainstream haulage arrangements in other islands of a comparable size, Tiree and Barra for example. There is a single haulier who uses conventional commercial vehicles and comparatively high-levels of self-haulage. This reflects the higher overall volumes in Westray.

Key Point: The Westray market overall is the largest of the ONI, with a range of products being moved from the island including livestock, bakery products and aquaculture amongst others. These are key and high value industries contributing to the economic success of the island and it is essential that the ferry connections support them.

Vessel Capacity

3.4.36 The most significant challenge identified by the Westray haulier is deadweight capacity of the vessels, as opposed to lane metre capacity, which is a more common issue elsewhere. This is particularly the case with the *Earls*, where it was noted that capacity has gradually reduced as they have become older. **It was noted that, physically, the vessels could fit 2 x 16m (livestock float length) and 2 x 'shorter' HGVs on them, but weight restrictions (100 tonnes) mean that only two vehicles can be shipped in practice.** If these are particularly heavy vehicles, then the ability to carry passenger cars is reduced considerably.

Timetable

3.4.37 The timetable in summer was thought to be generally suitable. Three sailings a day allows flexibility, separation of freight and passenger traffic to an extent and for freight to be distributed across sailings to allow other traffics.

3.4.38 It was noted that very little freight uses the 07:20 Kirkwall – Westray other than fuel and oil tankers, of which there are 1-2 a week. This is because to get the 07:20, operators and businesses would have to deploy staff earlier and at overtime rates, increasing the cost of business. The main connection onto the island in winter is therefore the 16:20. With regard to fresh produce and retail, this means that goods arrive at the end of the trading day, so anything 'fresh' has lost 24 hours before it is sold compared to Orkney mainland. In summer, freight onto the island can travel on the middle sailing, reaching stores just after lunch. This sailing is also generally less in demand from Westray visitors, who would only get a very short time on the island if using it. The summer timetable is considered more effective for freight as it allows turnaround in Kirkwall in a shorter period and avoids the overtime of long working days arriving back in Westray at 18:00 or later.

Early morning departures from Westray

3.4.39 It was noted that there is little value for freight in basing the vessel in Westray. Connections with inbound / outbound Pentland Firth services would not be significantly improved, whilst earlier departures from Westray would also mean products from Westray businesses would

have to be prepared earlier – e.g., bakery start times and fish processing. This would generally add cost for little real advantage in getting products to Kirkwall markets earlier.

3.4.40 The exception identified is meeting the needs of farmers getting livestock to the Monday mart sales. Currently, the only options are shipping livestock on Thursday / Friday for the Monday sales, which attracts mart and lairage costs over the weekend and is believed to mean cattle lose 'condition' (and therefore potential value). The alternative option available is to ship on the Monday 09:00 *ex* Westray, meaning cattle reach the auction later in the day. This may mean missing the prime sale window where bigger buyers are active (they tend to get late afternoon flights back to the mainland), and potentially missing the window to get through the sale, into the NorthLink lairage and into livestock cassettes on the Monday evening sailing to Aberdeen. This is perceived as also having negative economic impact on Westray farmers.

3.4.41 Sunday sailings which allow shellfish to move off Orkney on the early Monday Pentland Firth crossings were thought to add potential value, as reaching mainland markets on a Monday is effectively missed under the current service patterns.

Key Point: The current structure of the winter timetable leads to a clustering of demand on the 16:20 ex Kirkwall sailing when there is no 'middle boat' as the 07:20 is too early for hauliers and most of the general public. There is a strong desire for an early morning departure from Westray (particularly on a Monday) in the agricultural community to facilitate mart access.

Papa Westray

3.4.42 Papa Westray is served by a Lo-Lo service from a goods hub at Kirkwall pier operated by Orkney Ferries. In principle, this works in the same way as the ONI Distribution Centre; goods for Papa Westray (and North Ronaldsay) are delivered into and consolidated in a small building equipped with a deep freeze for keeping chilled goods. They are generally on pallets and lifted onto the vessel by crane. At Papa Westray, the goods are craned onto the pier and received by an Orkney Ferries agent and / or harbour staff based on the island and held at a pier-based collection point.

3.4.43 The overall volume is very small in absolute terms and this arrangement covers almost all inbound and outbound freight - every consumable of island life from fresh produce, to building materials to paint to fuel to stationary to livestock and supplies.

3.4.44 There is a Co-op supplied store in Papa Westray and if the Lo-Lo service is delayed, it is served via Westray, where a van delivers to the passenger ferry service and the supplies are moved as loose freight by hand. It is collected by the Co-op shopkeeper. Volumes are small enough for this arrangement to work effectively.

3.4.45 It should be noted that, for both Papa Westray and North Ronaldsay, Orkney Ferries acts as the *de facto* haulier, and thus these islands do not bear the cost of contracting with a haulage company, which would be prohibitive for them. Moreover, freight is generally charged by weight / tonnage rather than the incremental half lane metre (as is the case for the other islands) and is thus cheaper. Any move away from Lo-Lo would give rise to the question as to how future freight rates should be set.

North Ronaldsay

3.4.46 North Ronaldsay is served in the same way as Papa Westray. A refrigerated container is moved on the vessel for chilled and fresh goods, which is swapped on-island for the unit left there on the previous call. Otherwise, the majority of goods are lifted on pallets.

3.4.47 The requirement of the service includes the need to handle livestock and machinery, as well as palletised goods. Specific examples were for the movement of livestock in cattle floats, tractors

and JCBs, which are critical to supporting agricultural activity on the islands. These require a lifting capability of 11-12 tonnes.

3.4.48 The island benefits from price concessions including free delivery of petrol, oil, diesel, kerosene. For these products, a bowser is used to move between suppliers on Orkney Mainland and North Ronaldsay. This equipment is also hired out for use by Papa Westray and other islands.

3.4.49 Whilst the solution at North Ronaldsay just about works at present, it is operationally challenging to maintain and deliver.

3.5 Summary

3.5.1 This chapter has set out the supply-chain arrangements for the Outer North Isles in some detail. It is clear from the preceding analysis that the ONI supply-chain has developed over time around the current vessels and timetables. It is not without its challenges and compromises, but it does function in terms of meeting the island import and export needs.

3.5.2 The timetables developed through this OBC must therefore protect these key connections at least in the short-term (e.g., Eday- Stronsay) and identify where additional sailings could be of value to the haulage sector (or at the very least ensure that the current position is protected.

4 Essential Service Delivery

4.1 Overview

4.1.1 The current inter-island air and ferry timetables facilitate the delivery of essential public and commercial services across all six islands. This chapter sets out the current arrangements by sector, as it will clearly be essential to account for these when developing future timetables.

It should be reiterated that the information in this section relates to the position as at mid-2019.

4.2 Education

4.2.1 One of the most fundamental service delivery roles played by the inter-island transport network is to facilitate education. There are two components to this:

- movement of secondary school children (all islands have a primary school); and
- movement of 'itinerant' teachers to cover specialist subjects and provide McCrone cover[13].

4.2.2 Each of these components is now considered in more detail.

Children

4.2.3 All six of the ONI have on-island nursery and primary school education, although the primary school on North Ronaldsay is currently mothballed due to lack of pupils.

4.2.4 Sanday, Stronsay and Westray each have junior high schools serving S1-S4, with all other secondary education being provided on a Sunday / Monday to Friday board basis at Kirkwall Grammar School (KGS). The table below summarises the total number of secondary school children by island, by school:

Table 4.1: Number of Secondary School Children by Island by School (Source: Orkney Islands Council, 2019)

	Kirkwall Grammar School	Sanday Junior High	Stronsay Junior High	Westray Junior High
Eday	3	1	0	0
North Ronaldsay	1	0	0	0
Papa Westray	1	0	0	6
Sanday	8	27	0	0
Stronsay	8	0	9	0
Westray	4	0	0	29

4.2.5 The arrangements for children travelling to Kirkwall are set out in the table below:

[13] The McCrone Agreement was a settlement on teachers' pay and conditions reached in 2001. Within the agreement, there was a commitment to provide 2.5 hours per week non-class contact time for planning and preparation.

Table 4.2: Arrangements for travelling to/ from Kirkwall Grammar School (Source: Orkney Islands Council, 2019)

	Outbound		Homeward	
	Air or Ferry	***Day***	***Air or Ferry***	***Day***
Eday S1-S2	Air	Monday	Ferry	Friday
Eday S3-S6	Ferry	Sunday	Ferry	Friday
North Ronaldsay	Air	Monday	Air	Friday
Papa Westray	Air	Sunday	Air	Friday
Sanday	Ferry	Sunday	Ferry	Friday
Stronsay	Ferry	Sunday	Ferry	Friday
Westray	Ferry	Sunday	Ferry	Friday

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

- S1-S2 children from Eday are considered too young to be away from Sunday to Friday and thus are allocated a place on a shared flight with North Ronaldsay on a Monday morning.
- The North Ronaldsay and Eday children travelling by plane on a Monday morning will be late to school. Therefore, arrangements have been made for the single North Ronaldsay child to travel in on a Sunday afternoon flight should they wish to do so.
- There is currently a pilot underway whereby one child from Eday (it was initially two) travels to Sanday Junior High on a Tuesday, returning on a Thursday. This child is home schooled on a Monday and Friday, this approach being considered preferable to the child being off-island Sunday to Friday.
- Children from Papa Westray attending Westray Junior High travel daily on MV *Nordic Star*, the replacement for MV *Golden Mariana*.
- For children from Eday, Sanday, Stronsay and Westray, there is spare time in Kirkwall on a Friday afternoon – school finishes at 12:20 and the ferries do not depart until 16:00 or later. This is not an issue for North Ronaldsay and Papa Westray children, with the return flight being 14:00 or 14:20 depending on season.

Key Point: The Sunday afternoon and Monday morning flight schedules are largely defined by the requirement to get children into Kirkwall for school. Whilst the school travel arrangements do work, they lead to a truncated weekend for children in most islands or, for those travelling in on a Monday, a late start to the school day. There is also a gap between finishing school in Kirkwall on a Friday afternoon for those travelling home to Eday, Sanday, Stronsay and Westray.

Itinerant Teachers

4.2.7 The movement of itinerant teachers is exclusively by air, with daily travel outbound from Kirkwall on the first flight of the day, returning on the last return flight from the island. The table below shows the movement of itinerant teachers in the summer timetable period (the days and teacher numbers in the winter timetable are the same, but the times slightly different).

Table 4.3: Itinerant teacher movements (Source: Orkney Islands Council, 2019)

Flight No.	Day	Time	From	Via	To	Number
LM702	Monday	08:40	Kirkwall		Westray	2
LM703	Monday	09:40	Kirkwall	Sanday	Stronsay	2 Stronsay. 4 Sanday
LM705	Monday	16:01	Westray	Arrives from P. Westray	Kirkwall	2

Flight No.	Day	Time	From	Via	To	Number
LM706	Monday	16:43	Sanday	Stronsay	Kirkwall	2 Stronsay. 4 Sanday
LM708	Tuesday	08:30	Kirkwall	Stronsay	Sanday	3 Stronsay. 2 Sanday
LM709	Tuesday	09:30	Kirkwall		Westray	4
LM710	Tuesday	15:50	Sanday	Stronsay	Kirkwall	3 Stronsay. 2 Sanday
LM711	Tuesday	17:01	Westray	Arrives from P. Westray	Kirkwall	4
LM713	Wednesday	08:40	Kirkwall	Stronsay	Sanday	5 Stronsay. 2 Sanday
LM714	Wednesday	09:40	Kirkwall		Westray	1
LM710	Wednesday	15:50	Sanday	Stronsay	Kirkwall	5 Stronsay. 2 Sanday
LM711	Wednesday	17:01	Westray	Arrives from P. Westray	Kirkwall	1
LM708	Thursday	08:30	Kirkwall	Stronsay	Sanday	5 Stronsay. 2 Sanday
LM709	Thursday	09:30	Kirkwall		Westray	2
LM710	Thursday	15:50	Sanday	Stronsay	Kirkwall	5 Stronsay. 2 Sanday
LM711	Thursday	17:01	Westray	Arrives from P. Westray	Kirkwall	2
LM718	Friday	08:30	Kirkwall	Stronsay	Sanday	4 Stronsay. 3 Sanday
LM709	Friday	09:30	Kirkwall		Westray	1
LM710	Friday	15:50	Sanday	Stronsay	Kirkwall	4 Stronsay. 3 Sanday
LM711	Friday	17:01	Westray	Arrives from P. Westray	Kirkwall	1

4.2.8 The main point to note from the above table is that the first outbound and last inbound flights of the day to Sanday / Stronsay and Westray / Papa Westray are heavily utilised by itinerant teachers Monday to Friday. Indeed, on the Sanday / Stronsay run, these aircraft are all but full and cannot therefore realistically be considered public transport connections.

Key Point: The air service plays an essential role in conveying itinerant teachers to and from the isles, ensuring the provision of education in specialist subjects and allowing for McCrone cover. However, the first outbound to and last inbound flights from Sanday / Stronsay and Westray / Papa Westray are heavily used by teachers, particularly in the case for the former. There is very limited capacity on these services for others, and they cannot therefore realistically be considered public transport connections for the isles.

4.3 Health

4.3.1 The ONI air and ferry network also fulfils an essential role in the delivery of healthcare across the islands. There are two components to this:

- Transporting patients into Balfour Hospital in Kirkwall (or beyond to the Scottish mainland) for scheduled appointments, including dental appointments. This is considered in more detail in Chapter 5 (Personal Travel).
  - Note that emergency patient movements are covered by the air ambulance.
- Facilitating general practice in the isles through the movement of both staff and goods.

4.3.2 The table below sets out the model for the delivery of general practice across all six of the Outer North Isles:

Table 4.4: ONI General Practice delivery model (Source: NHS Orkney, 2019)

	Model of Care	GP Visit (Y/N)	Island Staff
Eday	Nurse practitioner	Yes, from Stronsay by ferry on a Wednesday	2 nurse practitioners - 1 resident on island - 1 from outwith island
North Ronaldsay	Nurse practitioner	Yes, from mainland by air on a Tuesday	1 nurse practitioner, resident on island
Papa Westray	Nurse practitioner	Yes, from Westray by ferry on a Wednesday	2 nurse practitioners, both resident on island
Sanday	GP cover Community nursing	No	3 GPs - 1 resident on island - 2 from outwith island
Stronsay	GP cover Community nursing	No	3 GPs - 2 resident on island - 1 from outwith island
Westray	GP cover Community nursing	No	3 GPs, none of which are permanent island residents

4.3.3 The key points from the above table are as follows:

- All six islands have 24/7 medical cover, either through a resident GP or nurse practitioner.
- The ferry and air services are essential in providing GP cover to Eday, North Ronaldsay and Papa Westray. They also allow health staff not permanently based on each island to travel there for work, the GPs not resident on Sanday for example.
- Medical supplies, samples etc move through the general island supply-chain described in Chapter 3.

4.3.4 Whilst the current general practice delivery model is effective and built around the current timetables, NHS Orkney did note that:

- Island residents travelling into Kirkwall for an appointment effectively require a full day for a generally short appointment slot. As well as being time consuming and expensive, this can be physically challenging for someone who is unwell, particularly in the winter months.
- Discharging isles patients from hospital after 16:00 can also be an issue as they cannot get home. This can lead to 'bed blocking' or additional accommodation costs in Kirkwall.
- The accessibility and comfort of the vessels (and to some extent the aircraft) is less than ideal for patients with reduced mobility travelling into Kirkwall for an appointment.

Key Point: The inter-island air and ferry services are essential in ensuring that Eday, North Ronaldsay and Papa Westray receive a GP service, whilst also allowing GPs to live off-island and travel in for a period of time. It also facilitates travel to Orkney mainland for island residents attending appointments and the movement of medical goods, supplies and samples.

4.4 Waste Management

4.4.1 The ONI ferry services also facilitate waste management within the isles, although the approach varies by island. With the exception of Westray, the collection of waste in the ONI is contracted out, likely a reflection of the low volumes making this approach more economical. Arrangements are as follows:

- In **Westray**, there is an alternate weekly collection between general waste and recyclate. Collection day is a Tuesday, with the Council refuse lorry understood to travel out on the 16:20 Tuesday sailing, returning on the 09:00 departure from Westray the next day, overnighting in Westray.
- **Eday (Wednesday), Sanday (Monday) and Stronsay (Monday)** receive a weekly 'black bag' / residual waste[14] collection. This is a contracted service delivery by island-based haulage firms. Our understanding from consultation is that this waste is consolidated on island and moved to Orkney mainland by the haulier as part of their general activities – it may not therefore move on the same day as it is collected.
- **North Ronaldsay and Papa Westray (both Thursday)** also receive a weekly 'black bag' / residual waste collection. Given the Lo-Lo nature of the ferry service, waste is consolidated in containers on the quayside and then craned onto the vessel.

4.4.2 Once waste arrives on Orkney mainland:

- it is transported to Chinglebraes waste transfer station in St Ola;
- all waste is sent to Shetland for energy recovery, which is contracted to North Isles Freightways (Streamline), who use NorthLink to move the product from Kirkwall to Lerwick; and
- all recyclates (excluding glass, which is processed locally) are sent to the Central Belt of Scotland for sale to market.

Key Point: The ONI ferry service moves all waste and recyclate from the ONI to Orkney mainland for processing and / or onward transportation. Westray is the only island with a scheduled Council collection service and thus demand for this service on the ferry is well understood. On the other islands, waste is consolidated within the general haulage operations of the contracted provider or in quayside containers for Lo-Lo cranage.

4.5 Veterinary Services

4.5.1 As noted in Chapter 3, an estimated 30% of the circa 22,000 cattle which are exported from Orkney annually originate in the ONI, whilst there is also a large sheep population in the isles. The provision of veterinary and animal welfare services to the isles is therefore essential, and the inter-island transport network plays a key role in facilitating this. Feedback from Orkney-based veterinary practices was sought through the consultation programme, with one practice providing a detailed description of how they use the services.

[14] Residual waste is non-hazardous industrial waste material produced by industrial and agricultural operations.

Travel to the ONI

4.5.2 The practice use a combination of the air and ferry services to attend island appointments.

4.5.3 The benefit of the ferry service is that the vet can take a vehicle, which means they are better equipped with emergency equipment and medicines. However, they will travel on foot if no space for a vehicle is available (noted as a relatively common issue in summer) or to save costs for the client if only attending one or two appointments. The main challenges with the ferry service currently identified are:

- The service frequency, particularly during the winter and refit timetable periods, can make use of the ferry services difficult, particularly when attending more urgent calls.
- Indirect routing, particularly during the refit timetable, means that a veterinary surgeon can spend almost seven hours on a ferry during a single day's work, which makes planning logistically difficult and visits costly.
- The absence of Sunday return ferries and limited weekend frequency overall means that clients can be left with animals suffering and no access to vets and medicines, unless very costly private boat hire is used.
- The absence of Ro-Ro facilities for North Ronaldsay and Papa Westray mean that a vehicle cannot be taken to these islands, which imposes a limit on the equipment and medicines largely to that which can be carried by hand.

4.5.4 The main challenges identified with the air service are as follows:

- The air service is generally the preferred mode for travelling to an appointment. However, the main challenge is securing a booking on flights (at least during school term time) without a long notice period, making it difficult to attend emergency appointments. As noted previously, many of the morning flights to the isles and late afternoon flights from the isles are heavily utilised by itinerant teachers.
- It was further noted that wait lists are not kept, so the practice will not typically be notified if a seat does become available.
- Integration between air and ferry services is also considered to be limited.

Travel to Kirkwall

4.5.5 The veterinary practice noted that the ferry timetable imposes limitations on clients bringing animals in to be seen at the surgery in Kirkwall. Time on mainland is likely to be limited to a few hours at best on most days, thus making it difficult to fit surgical procedures into the time slot available. Overnights stays for the client and animal(s) are typically required.

Key Point: The inter-island air and ferry services facilitate travel to the ONI for regular and emergency veterinary appointments. However, issues of capacity and frequency and indirect routing on the ferry services make the operation challenging and often expensive to deliver. Improved air and ferry frequency and integration would support a more efficient and lower cost service offer.

4.6 Banking

4.6.1 Whilst there has been a society-wide trend towards a reduction in branch-based banking and cash usage, banking facilities in the isles remain essential. As well as having a generally older demographic who more typically engage in branch-based banking, cash remains a frequent method of payment.

4.6.2 On **Eday, North Ronaldsay and Papa Westray**, the island Post Office provides the majority of banking facilities through the 'Payzone' facility. A Royal Bank of Scotland employee also visits North Ronaldsay and Papa Westray once a month.

4.6.3 **Sanday, Stronsay and Westray** each have a small branch of the Royal Bank of Scotland. Each branch is open one day a week for a few hours, as follows:

- Stronsay – RBS Whitehall, Tuesday 09:15 – 14:45
- Westray – RBS Pierowall, Wednesday 09:15 – 14:45
- Sanday – RBS Kettletoft, Thursday 09:15 – 15:00

4.6.4 Each branch is operated by an RBS employee who flies in from the mainland on the first flight and returns on the last flight. This is understood to be an effective and much valued service, although it is important to note that, on each of the days listed above, this takes up a further seat on the same plane used by itinerant teachers during term time, heightening the capacity challenge for members of the travelling public.

4.6.5 It is understood that, on days when the bank branch is not open on Sanday, Stronsay and Westray, the Post Office is used for banking business.

Key Point: The inter-island air service facilitates the weekly operation of bank branches on Sanday, Stronsay and Westray, as well as irregular visits to North Ronaldsay and Papa Westray. This is an essential service for island residents, although it does use up another seat on the plane also used by itinerant teachers.

4.7 Utilities

4.7.1 We were unable to specially consult with any of key utilities providers to the islands, e.g., Scottish Water, Scottish & Southern Energy, Openreach etc. However, our understanding from the supply-chain research and work undertaken on other islands is that these organisations will typically take company vans on the ferry for day-to-day / maintenance work.

4.7.2 Specific project traffic will also be moved on the ferry and may cause capacity challenges for larger commissions.

4.7.3 Our understanding from recent work in Fair Isle is that Lo-Lo as a mode of cargo handling presents a particular challenge in terms of getting large pieces of equipment on and off islands. This further justifies the case for converting North Ronaldsay and Papa Westray to Ro-Ro.

Key Point: Regular utilities related traffic will generally travel in own-company vehicles and will be absorbed within the wider car carryings data for the network.

4.8 Summary

4.8.1 This chapter has demonstrated the essential role which the inter-island transport network plays in delivering key services to the islands or allowing island residents to access services on Orkney mainland. Of perhaps greatest importance in terms of timetabling is facilitating travel to school by island children and the conveyance of specialist and itinerant teachers to the isles. The pressure on air capacity arising from service delivery is significant and demonstrates that many of the scheduled flights cannot realistically be considered viable 'public' transport connections.

5 Personal Travel

5.1 Overview

5.1.1 Having established the role of the ONI air and ferry network in facilitating service delivery and the supply-chain of the islands, this chapter considers how it facilitates personal travel by island residents. It is the final step in piecing together the volume and type of demand on the ONI transport network, informing the development of illustrative timetables in Chapter 7.

5.1.2 The narrative which follows predominantly draws upon a programme of engagement with the ONI communities incorporating:

- outcomes from telephone consultations with island transportation representatives at the outset of the SBC process (autumn 2015);
- feedback from the SBC public exhibition events (summer 2016), including from the 'exit questionnaires' provided at those events;
- stakeholder consultation undertaken at the outset of the OBC process (early 2019); and
- an island resident survey which explored use of the current air and ferry services (2019).

5.2 Resident Survey

5.2.1 The Outer North Isles resident survey was issued to Eday, North Ronaldsay, Sanday, Stronsay and Westray residents in early 2019. It was a web-based survey (with paper survey back-up) and was open to all island residents over the age of 16. The response rates are shown in Table 5.1:

Table 5.1: Outer North Isles Resident Survey Responses

	No. of Responses	Population aged 16+ at 2011 Census	Response as % of 16+ Population
Eday	33	141	23%
North Ronaldsay	17	57	30%
Sanday	131	405	32%
Stronsay	147	270	54%
Westray	168	503	33%

5.2.2 The percentage response rates are higher than those typically obtained in surveys of this nature (often single figure percentages), and thus there can be a degree of confidence that the findings are broadly representative of the population of each island and the ONI as a whole (as at 2019).

Papa Westray

5.2.3 The approach taken to the resident survey in Papa Westray was slightly different to that for the other five islands. For that island, there was a need to make a more fundamental choice in the 'Phase 1' work about whether it would be served by a Kirkwall-based Ro-Ro or a Westray Ro-Ro. This required a bespoke resident survey which explored the pros, cons and trade-offs of the different solutions for serving the island. The 'standard' questions in the survey (e.g., journey purpose, trip frequency etc) were broadly but not directly comparable to the resident survey for the other five islands. The Papa Westray resident survey outputs are therefore be reported alongside those from the main survey where appropriate, but are not be included (unless directly comparable) in e.g., charts, data tables etc given the slight difference in methodological approach.

5.2.4 The Papa Westray survey was completed by 54 island residents, a response rate of 76% based on the adult population of the island in the 2011 Census (71).

5.3 Frequency of Travel

5.3.1 In developing future ONI timetables, it is important to understand how frequently island residents are travelling to Orkney mainland. All respondents to the survey were asked how many trips they had made to Orkney mainland by air or ferry over the previous 12 months, with the results shown in the figure below:

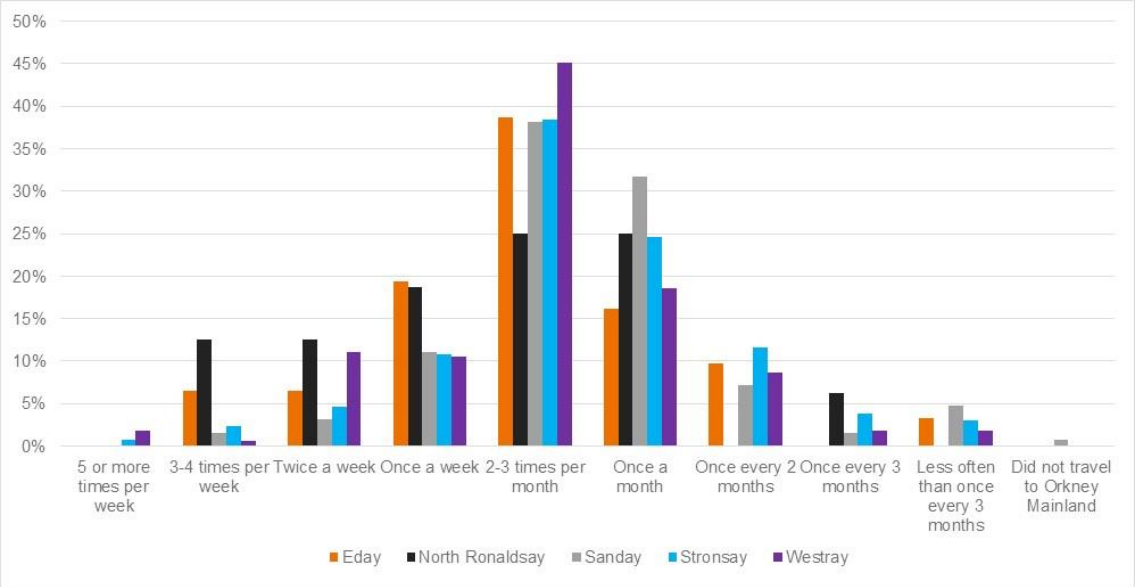

Figure 5.1: Frequency of Trips to Orkney Mainland (n=465)

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

- Trips to Orkney mainland are relatively infrequent, with over half of the respondents from Eday, Sanday, Stronsay and Westray travelling either '2-3 times per month' or once a month (the equivalent figure for North Ronaldsay being 48%). This likely reflects the predominant use of the service for personal business (see Section 5.5) and both the time and cost of making more frequent journeys.
- As would be expected, there is virtually no daily commuting, although the number of responses in the '3-4 times per week' or 'twice a week' category does suggest that there is some non-daily or weekly (i.e., travel to Orkney mainland on Monday and return on Friday) commuting. This is particularly the case in North Ronaldsay, where 24% of all trips fall into these categories, reflecting the role of the air service in providing a 'working day' in Kirkwall. Note though that these responses were pre-COVID-19.
- Trip frequency is also higher on islands with fewer on-island services, particularly North Ronaldsay and Eday. Conversely, on islands such as Sanday and Westray which have a larger economic and service base, residents tend to make fewer trips.
- Whilst trip making is generally infrequent, only a small number of respondents (n=26) noted that they travel quarterly or less frequently, which reaffirms the importance of Orkney mainland, and in particular Kirkwall, as the primary service centre for the isles.
- The Papa Westray resident survey was focused on how many trips respondents had actually made in the last 12 months. 61% (n=33) of residents made between 7 and 20 trips in the last year.
- It is important to acknowledge that, at least to some degree, current trip frequency will reflect the level of service provided which makes, for example, daily commuting difficult or

regular travel during refit more challenging. There may therefore be a degree of suppressed demand for more regular travel.

Key Point: The use of the ONI air and ferry service is relatively infrequent, with around a half of residents typically making 1-3 journeys per month. More frequent trip making is observed on islands with fewer services or industries such as Eday. Nonetheless, almost all island residents make at least a handful of trips to Orkney mainland each year, highlighting the importance of Kirkwall as the main service centre for the isles.

5.4 Mode of Travel

5.4.1 The preferred mode of travel from each of the ONI is determined by a range of factors including frequency, capacity, journey purpose and the length of day in Kirkwall offered. In North Ronaldsay and Papa Westray, the air service accounts for around 95% of all movements, which is a reflection of the infrequent and unreliable Lo-Lo ferry services and the long journey times. The picture across the other four islands is however more complex and the survey therefore explored how often island residents used each mode of travel and their reasons for doing so.

5.4.2 Figure 5.2 below shows the use of the ferry and air services across all three ferry timetable periods (summer, winter and refit) for Eday, Sanday, Stronsay and Westray. The profile of usage was broadly the same across all four islands and thus the figure below presents the average with the main differences brought out in the subsequent narrative:

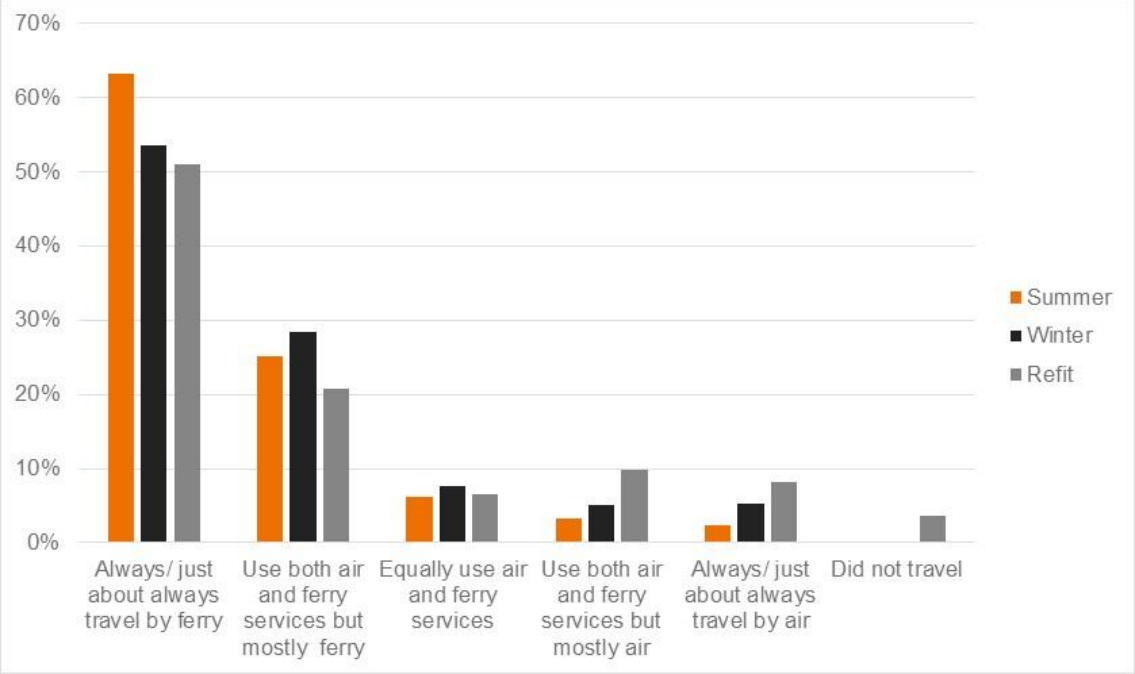

Figure 5.2: Use of ferry and air services by timetable period – average of Eday, Sanday, Stronsay and Westray (n=459)

5.4.3 The main points of note from the above figure are as follows:

- The ferry is the dominant mode of travel for island residents across all timetable periods. This is particularly the case in Eday, where the air service is extremely limited at present. This is to be expected given the limited capacity of the air service *vis a vis* the larger populations of these islands, particularly Sanday and Westray.
- During the winter timetable period, there is a marginal increase in the use of the air service compared to the ferry service.

- The significant curtailment of the ferry service during the refit timetable leads to an increase in the use of the air service. This is particularly the case in Sanday and Stronsay, where ferry journey times are extended due to the increase in indirect sailings (note – this would also likely be the case in Eday if the air service was improved). Westray feels the least impact from refit timetable because its services are almost all direct and thus the switch to air is much less pronounced. Despite increased use of the air service in the refit timetable period, the ferry remains by some distance the dominant mode of travel.

Key Point: The ferry is the dominant mode of travel for residents of Eday, Sanday, Stronsay and Westray. Whilst use of the air service does increase in the winter and refit timetable period, the ferry still accounts for over 50% of all journeys in these timetable periods.

Why do residents use the ferry?

5.4.4 Respondents to the survey from Eday, Sanday, Stronsay and Westray were asked why they typically use the ferry service in preference to the air service - the key reasons were as follows:

- The dominant reason for using the ferry is the desire to travel with a car, which was particularly prominent in Westray, but also Sanday and Stronsay. Whilst for many journeys the final destination will be Kirkwall, ONI residents will often undertake a single journey for multiple purposes, and having a car offers flexibility in this respect.
- Linked to the above point is 'travelling with too much luggage / goods / equipment for the plane', which was again a common response in Westray, Sanday and Stronsay. In some cases, this may be specifically linked to the conveyance of livestock in car-accompanied trailers, but more commonly residents will use a single trip to bring back e.g., goods and shopping to the isles, fill-up with lower cost fuel etc. This may include items for friends / family in other households.
- The second most prominent reason for taking the ferry is the difficulty in getting a booking on the air service, a particular issue on shared 'middle legs' between Sanday and Stronsay, where several flight seats across the week are block booked for use by itinerant teachers and other service providers. The capacity of the aircraft relative to the size of the populations in Westray, Sanday, Stronsay and, to a lesser extent, Eday mean that the air service will never be the 'volume' mode of transit.
- The responses for Eday reflect the very limited air service to and from the island, with prominent reasons for using the ferry related to 'no air service' days, a very limited timetable on days on which there is a service and limited time available in Kirkwall.
- For North Ronaldsay, the answers clearly highlight that the current ferry service is only used when either (i) the air service is not a practical option (when taking a vehicle or pet for example); or (ii) when the air service is disrupted or fully booked. This finding was broadly reflected in the Papa Westray survey, albeit residents of that island do on some occasions use the passenger only service to Pierowall and the Westray ferry from Rapness.

Key Point: In the main, where island residents choose to take the ferry, it is because they want to take a car or are conveying goods, luggage or animals which cannot be taken on the plane. The ability to secure a booking on the air service is also an issue in the larger population islands.

Why do residents use the air service?

5.4.5 Where an island resident responded that they predominantly choose to use the air service, they were asked why this was the case. The key reasons were as follows:

- With the exception of North Ronaldsay (and Papa Westray), where the air service provides such a clear advantage over the ferry service in almost every respect, there is no dominant reason for residents choosing to use the air service.

- The main reasons for using the air service for the other four islands tend to be clustered around journey times, an early arrival into Kirkwall and facilitating onward connections to the Scottish mainland. In short, the air service appears to be preferred amongst those who have a higher value of time for a given journey, for example people travelling for business or trying to get to mainland Scotland by early afternoon.

Key Point: Outwith North Ronaldsay and Papa Westray, there is no dominant reason for residents choosing to use the air service. The main reasons for use tend to be clustered around time sensitive trips where the journey time, arrival time into Kirkwall or connection with an onward flight or ferry to the Scottish mainland is of importance.

5.5 Journey Purpose(s)

5.5.1 Residents of each of the six islands were asked the reasons for which they made trips to Orkney mainland over the preceding 12 months. It is important to note here that, whilst this is an essential question, it is a challenging one to frame in the context of travel from the ONI. In most travel behaviour surveys, respondents are making a journey for a sole purpose (e.g., commuting, business etc). However, in the context of the ONI where fares and journey times are major considerations, most trips will be multi-purpose, maximising the use of time 'in town'. Many trips also involve one or more overnight stays. For example, a Sanday resident who has travelled in for a medical appointment may take that opportunity to visit friends and / or relatives, go for a meal and stock-up on goods at Tesco before returning home. To this end, residents were asked what their main travel purpose was over the preceding 12 months and then all of the other reasons for which they have travelled.

5.5.2 Figure 5.3 is focused on the **primary** journey purpose of each survey respondent, whilst Figure 5.4 considers all **other** journey purposes.

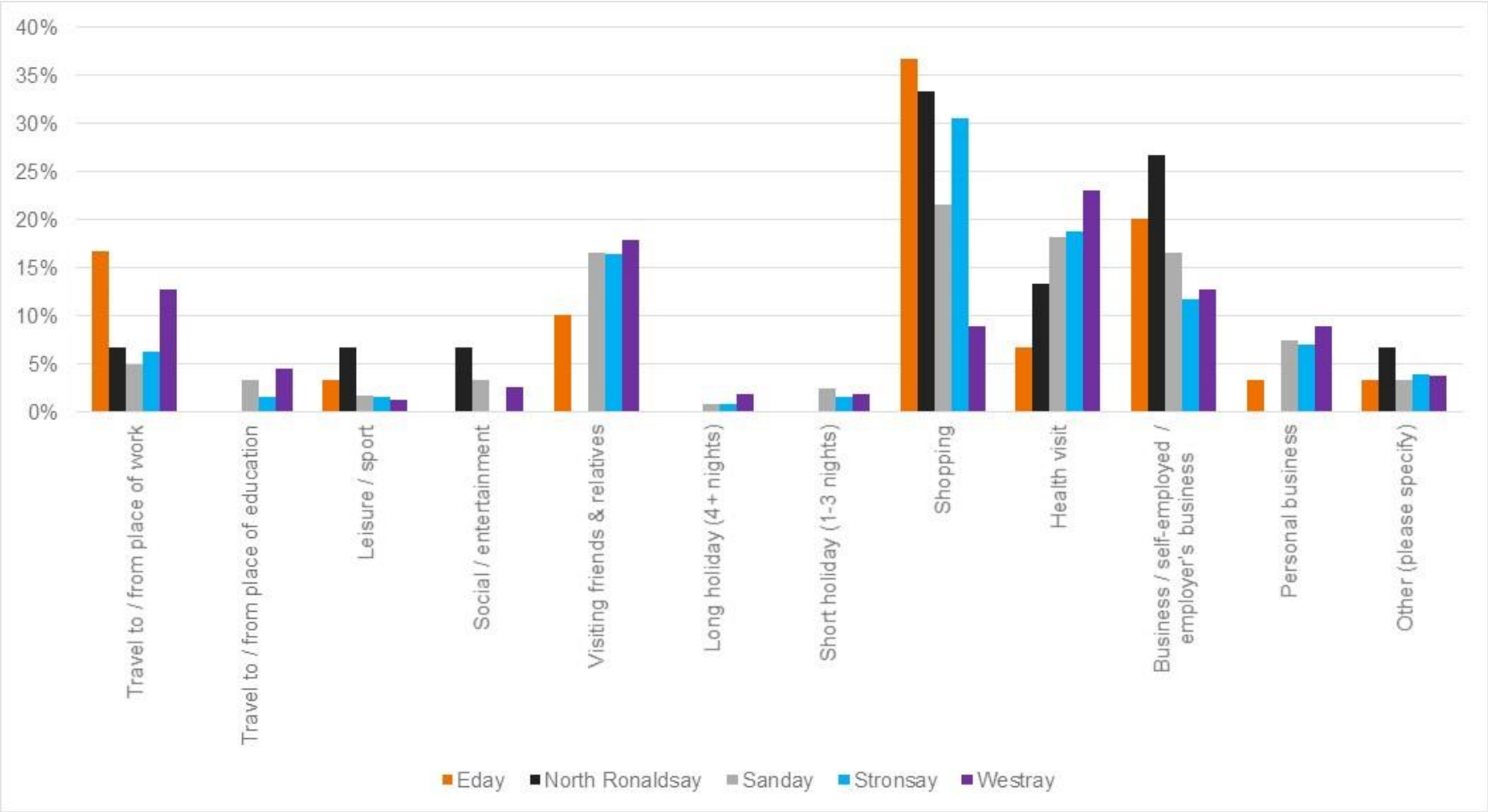

Figure 5.3: Primary journey purpose (n=451)

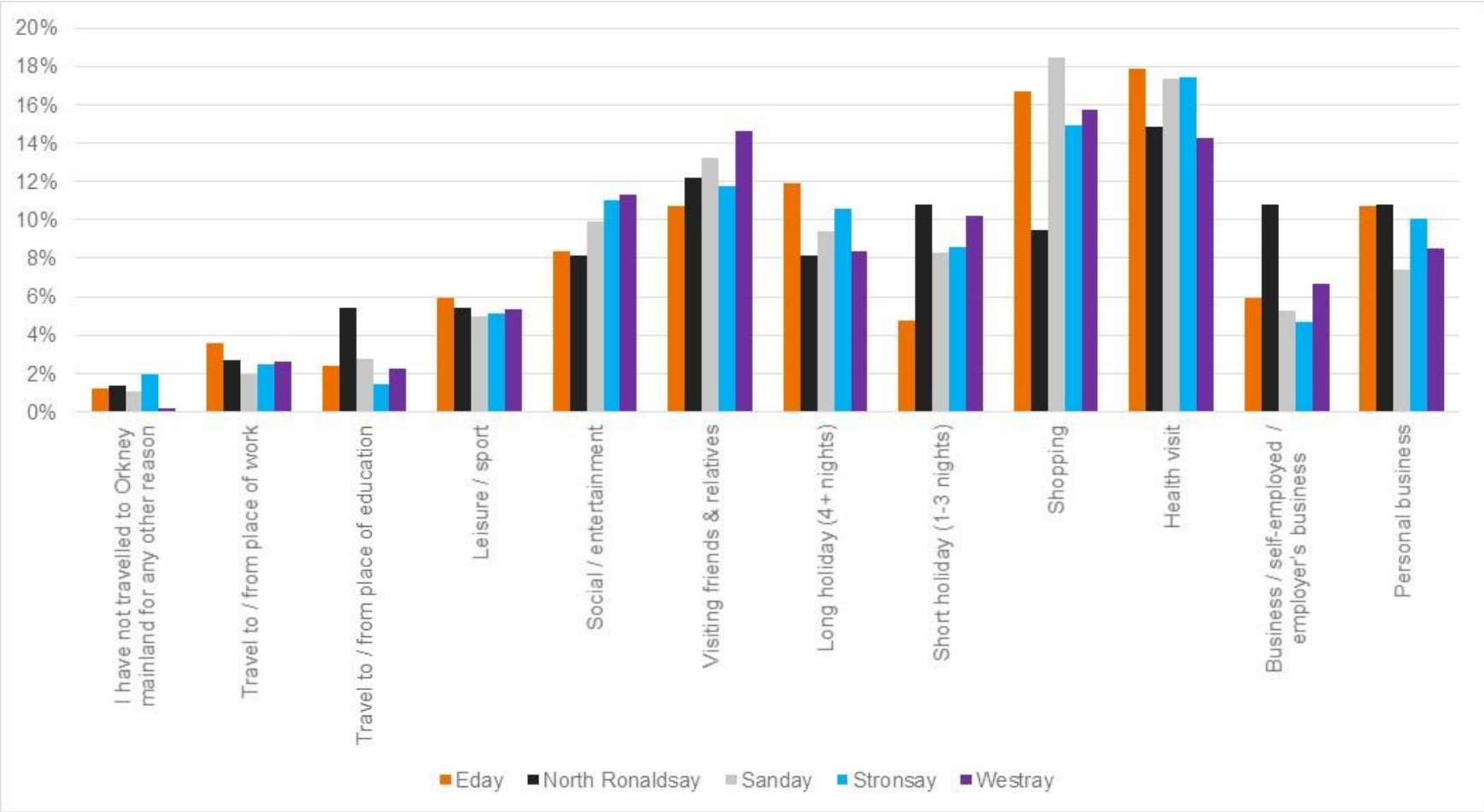

Figure 5.4: Other journey purposes (n=multiple response question)

5.5.3 The key points from Figures 5.3 and 5.4 are as follows:

- Primary journey purposes are dominated by personal business and leisure activities, with around three quarters of all responses falling into these categories. Around 14% of the sample primarily travel for business and 9% for work.
- There is a strong degree of commonality across the islands in terms of their main journey purpose. Eday (33%), North Ronaldsay (29%), Stronsay (27%), Sanday (20%) record shopping as their most frequent reason for visiting the mainland. Westray (8%) and Papa Westray (7%) are the outliers in this respect, which may reflect the larger retail offering on Westray and the successful community cooperative on Papa Westray.
- Travel for health, business / self-employed / employer's business and visiting friends and relatives (VFR) account for the majority of non-shopping trips. In both Westray and Papa Westray, health related travel followed by VFR are the most common journey purposes.
- The same subset of activities largely dominates the secondary purposes for travelling. However, what is evident from Figure 5.4 is that residents use the air and ferry services for almost all purposes across the year, highlighting the multi-purpose role which transport connections play in the life of the ONI. As noted, any one trip is likely to combine multiple journey purposes.

Key Point: The ONI air and ferry services are used for a wide variety of purposes, dominated by personal business and leisure activities. Whilst shopping, health, business travel and VFR are the main reasons for travelling, any single trip is likely to combine multiple activities.

5.6 Inter-Island Travel

5.6.1 The majority of travel on the ONI network is between each island and Orkney mainland. Whilst smaller in number, inter-island trips are however important in terms of some business interactions, service delivery, education and in maintaining family ties. The resident survey therefore explored the use of the ONI services for inter-island travel and the balance between island-to-mainland and island-to-island travel.

Frequency of Travel

5.6.2 Whilst inter-island travel is important, journeys between the isles are nonetheless infrequent. Of the 402 respondents who answered the question as to whether they had made a trip to another of the ONI by air or ferry in the preceding 12 months:

- an average of 40% had not done so;
- only 9% had travelled once a month or more frequently;
- a quarter of the sample travelled to another ONI 1-2 times per annum;
- inter-island travel was slightly higher in Papa Westray given its close links with Westray but was generally still less frequent than once per month.

5.6.3 For context, Orkney Ferries' data suggest that the most used inter-island connections are as follows:

- **Summer timetable:** Eday > Sanday, Sanday > Eday and Eday > Stronsay
- **Winter timetable:** Sanday > Eday and Eday > Stronsay
- **Refit timetable:** Eday > Sanday, Sanday > Eday and Sanday > Stronsay

5.6.4 Where a resident had made a trip to another ONI island or islands, they were asked to specify which island and how many times they had visited it. The responses are summarised in the table below:

Table 5.2: ONI Residents - Trips to other ONI in last 12 months

	No. of Visits to Island	Total Visits	Average Visits per Person
Eday	145	533	3.7
North Ronaldsay	139	80	0.6
Papa Westray	150	1,157	7.7
Sanday	130	247	1.9
Stronsay	115	900	7.8
Westray	112	176	1.6

5.6.5 It should be noted that this question was not asked in the Papa Westray resident survey and thus trips **from** that island **to** other ONI are not counted, albeit it is likely that most of those trips are to Westray (the Westray figure thus being an underestimate) and we do have an understanding of the frequency of those trips.

Key Point: Whilst inter-island travel is important for a number of reasons, most notably business and family ties, the absolute volumes are very low when compared to island-to-mainland services.

Mode of Travel

5.6.6 Figure 5.5 below shows the use of the ferry and air services across all three ferry timetable periods (summer, winter and refit) for inter-island travel. The profile of usage was broadly the same across all four islands[15] and thus the figure below presents the average with key differences brought out in the subsequent narrative (note that, given the small volumes, the figures are presented as absolute numbers rather than percentages):

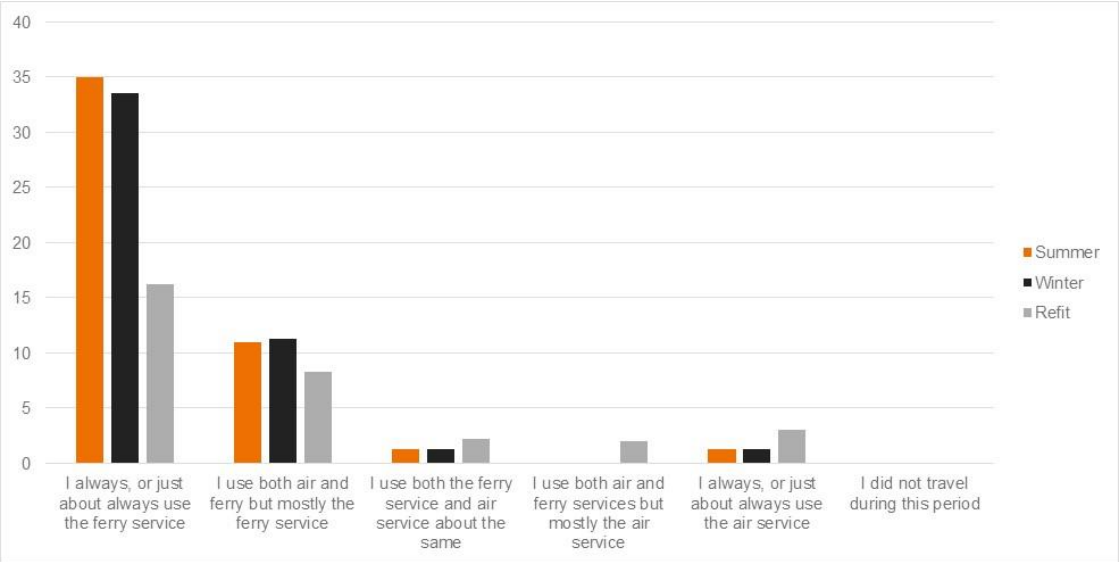

Figure 5.5: Use of inter-island ferry & air services by timetable period – average of Eday, Sanday, Stronsay and Westray (n=194)

[15] North Ronaldsay is again excluded given the very low overall volumes.

Key Point: The picture in terms of inter-island travel is largely similar to that for island-mainland travel, whereby the ferry is by some distance the dominant mode of travel. Again, use of the air service is slightly higher in winter and refit timetable

Journey Purpose(s)

5.6.7 Respondents who had made ONI inter-island trips in the past 12 months were asked for their reasons for travelling to their most frequently visited island(s): The key points of note from the above results were as follows:

- Inter-island travel is overwhelmingly for leisure purposes – there are very few business, travel-to-work or travel-to-education movements, particularly when considered in terms of absolute numbers.
- Day-trip, VFR, social / entertainment and leisure / sport are the most common travel purposes, highlighting the historic social ties between the isles.

Key Point: The majority of inter-island travel within the ONI is leisure-based and reflects the historic social ties between the isles.

5.6.8 Finally, respondents were asked whether the current balance between island-mainland and island-to-island travel across both modes is appropriate. The responses are presented in the figure below:

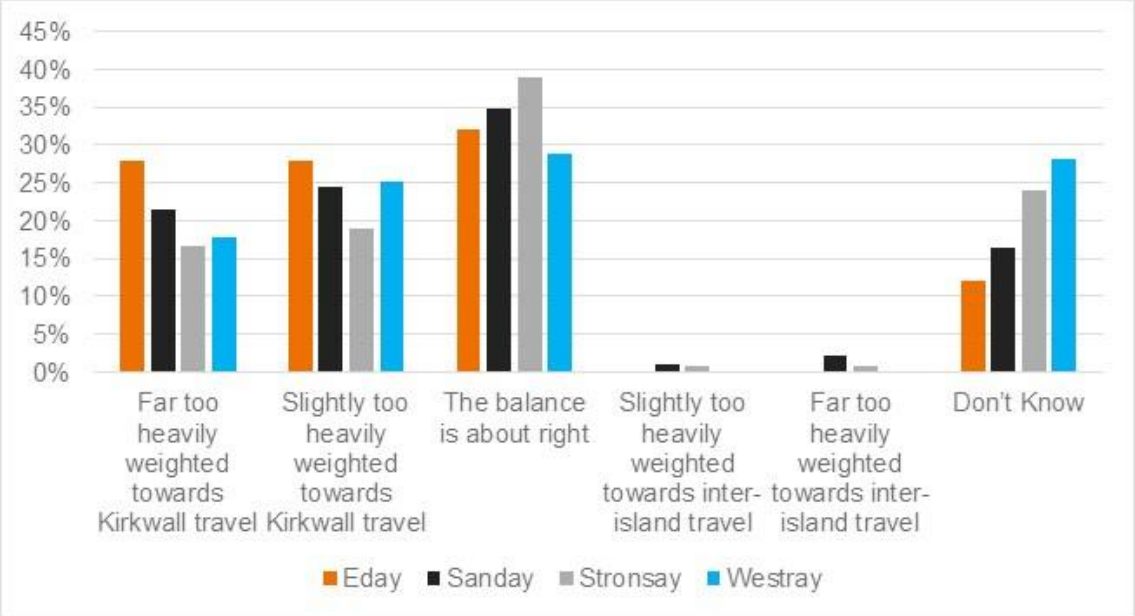

Figure 5.6: Balance of island-to-mainland and island-to-island travel (n=379)[16]

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

- Across all four islands, the largest single response was that the balance between Kirkwall and inter-island connections is 'about right'.
- It is however notable that, despite the very low levels of inter-island travel, a significant proportion of respondents across all islands (Eday 56%, Sanday 45%, Stronsay 36% and Westray 43%) consider the balance to be either 'far too' or 'slightly too' heavily weighted

[16] Note: North Ronaldsay is excluded due to small sample sizes, whilst this question was not directly asked in the Papa Westray survey.

towards Kirkwall travel. This is an interesting finding and suggests that there may be an element of suppressed demand for inter-island travel.

- The above said, given other survey responses, it appears likely that not all respondents fully considered the implication of additional inter-island connections on: (i) the number of Kirkwall connections; (ii) capacity; and (iii) overall journey times to Kirkwall given that the refit timetable is typically the largest source of dissatisfaction with the ferry service (and seat capacity with the air service).

Key Point: Despite the low volumes of inter-island travel, the resident survey suggests that the timetable is too heavily weighted in favour of connections to Kirkwall, implying a degree of suppressed demand. It does however seem probable that the implications of increased inter-island connections on current Kirkwall air and ferry connections may not have been fully considered by all respondents given their main sources of dissatisfaction with the service (i.e., multi-leg journeys, journey times, capacity etc).

5.7 Travel to Education

5.7.1 Access to education is an issue of critical importance in the isles, both in terms of the life chances of the children, but also in terms of influencing population retention and in-migration. As explained in the previous chapter, all isles' children will, at some point in their education, have to go to school in Kirkwall, boarding in the KGS hostel. The resident survey therefore asked several questions around this issue.

5.7.2 The table below shows the total sample of children identified by island and age group:

Table 5.3: Children by island and age group

	Eday	N. Ron	Sanday	Stronsay	Stronsay	Papa Westray	Total
Children not yet at school	0	0	0	6	7	1	**14**
Children at early years / pre-school	0	0	2	5	4	0	**11**
Children at primary school	0	0	28	26	27	3	**84**
Children at secondary school in this or a neighbouring island	1	0	18	8	16	8	**51**
Children at secondary school in Kirkwall	0	2	3	5	5	5	**20**
Total	**1**	**2**	**51**	**50**	**59**	**17**	**180**

5.7.3 As previously noted, secondary school often involves travel off-island (including for all children in S5-S6) and thus respondents with children at this stage of their school career were asked how satisfied they were with schooling arrangements. The figure below shows the level of satisfaction by island, together with a 'net satisfaction' score (i.e., satisfied and very satisfied minus dissatisfied and very dissatisfied):

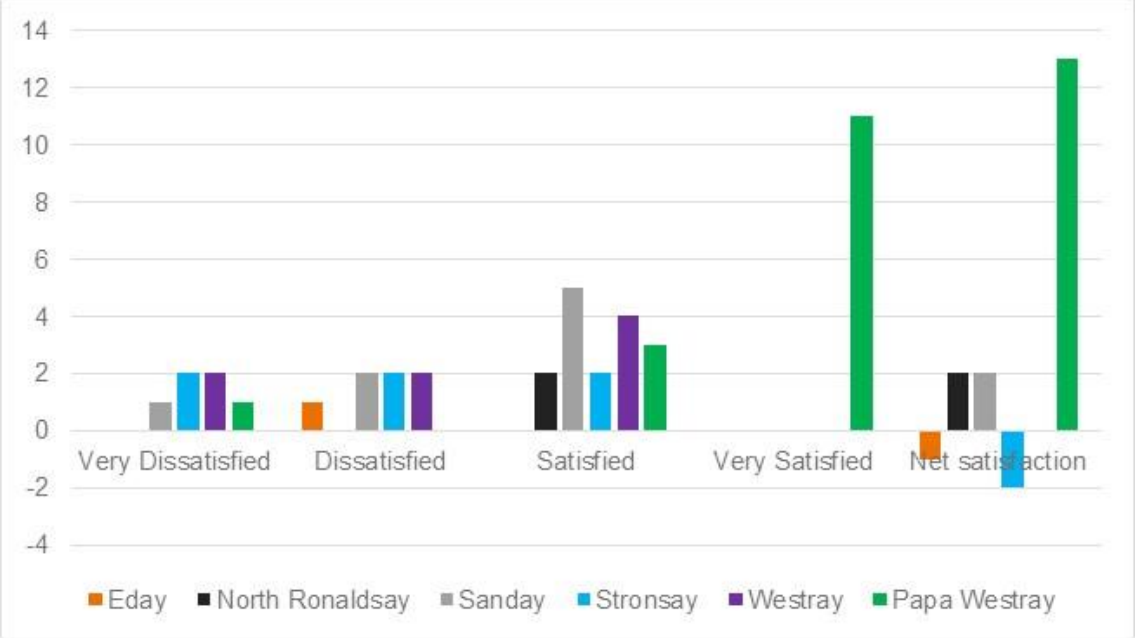

Figure 5.7: Net satisfaction with secondary school arrangements by island (n=46, excluded "Don't Knows" and "Neither Satisfied nor Dissatisfied" responses)

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

- Whilst a relatively small sample, ONI residents do appear to be broadly satisfied with the arrangements for secondary school children, although net dissatisfaction is reported in Eday and Stronsay, whilst Westray records a neutral score.
- Whilst it is a generally accepted facet of island life that children will have to board in Kirkwall at some point in their education, the main point of contention across most islands is the need to travel in on a Sunday afternoon, providing a truncated weekend as the children do not get home until late on a Friday afternoon.
- Papa Westray records a high net satisfaction score, which the survey suggests is predominantly due to the opportunity for children to commute daily to school in Westray up to and including S4, something which is uncommon for an island of this size.

5.7.5 The survey and stakeholder consultation explored the views of island residents whose children board in Kirkwall Grammar School across the week. The following main points were repeatedly cited:

- Whilst there is a degree of apprehension about children boarding on Orkney mainland, it is a broadly accepted facet of island life.
- The major concern raised is that children need to travel into Kirkwall late afternoon on a Sunday and do not get back to their home island until late afternoon / early evening on the Friday. This gives rise to a truncated weekend and was identified by several stakeholder consultees as a 'push' factor for young families to leave the island or a deterrent to families moving there in the first place.
- Linked the above point, there is a significant desire for an early Monday morning departure to Kirkwall across all islands, with the school week tweaked to accommodate this (i.e., later start on a Monday and later finish on a Friday).

Key Point: ONI residents are broadly satisfied overall by secondary schooling arrangements, but there is a common concern across several islands about children having to travel into Kirkwall for school on a Sunday afternoon, giving rise to a truncated weekend for isles' families.

5.8 Overall Views of Transport Connections

5.8.1 The resident survey concluded by collecting overall views on the effectiveness of the current air and ferry services in supporting island life. It should be noted that these questions were not asked in the Papa Westray survey as the focus in that research was very much on the future form of the ferry connection to / from that island. The response to these questions provides an indication of suppressed demand for travel from the isles.

Day-to-Day Needs

5.8.2 Island residents were asked whether the current air and ferry connections from their home island to Orkney mainland are sufficient for their / their family's day-to-day needs now and in the future. The responses are summarised in the table below:

Table 5.4: Overall, do you think the current air and ferry connections from your home island to Orkney mainland are sufficient for you and your family's day-to-day needs now and in the future (n=394)

	Yes	No	*Yes %*	*No %*
Eday	7	18	*28%*	*72%*
North Ronaldsay	3	12	*20%*	*80%*
Sanday	28	70	*29%*	*71%*
Stronsay	54	67	*45%*	*55%*
Westray	37	98	*27%*	*73%*

5.8.3 It is notable from the above table that around three quarters of respondents in all islands (except Stronsay) do not feel that the current air and ferry connections meet their needs now and in the future. Several key issues were identified through the open-ended questions in the survey and through stakeholder consultation. These issues were largely captured in the Strategic Business Case and associated baselining papers – they are therefore briefly summarised below and not repeated at length here:

- In terms of the ferry timetable:
  - The **refit ferry timetable** is considered a major problem for the isles, particularly Eday, Stronsay and Sanday. Whilst it was widely acknowledged in the consultation that Orkney Ferries is delivering the maximum possible with the current vessels and crew, the extended journey times, capacity sharing and limitations on time in Kirkwall are considered to make this an extremely challenging time of year for island residents.
  - The inability to make a day return trip by ferry on a **Sunday** from any island was also frequently cited as an issue (albeit it was acknowledged that this ties into the school travel issue). Indeed, there was a general dissatisfaction expressed through the survey on the level of connectivity offered by the **weekend ferry timetable**.
  - There was a strongly expressed desire through the survey and consultation for **three ferry rotations per day** consisting of a **morning,** '**middle' and afternoon / evening service**, facilitating a half-day or full day in Kirkwall as required. The desire for an **earlier morning arrival** was a particularly common theme across the isles. Several survey respondents noted that, given the cost of travel to the mainland, they wish to maximise the number of activities which they can carry out in a single trip and the more time available in Kirkwall, the easier this becomes. Moreover, several respondents

reported issues around having to reschedule e.g., hospital appointments to fit with timetables.

- As would perhaps be expected, there was significant dissatisfaction with a combination of the frequency and reliability of the ferry service to **North Ronaldsay**. The very limited sea connections are considered to place a constraint on the economy, supply-chain and service delivery to the island.

- In terms of the **air timetable**:
  - The **weekend timetable** was generally seen to be limited across most islands.
  - There was significant dissatisfaction expressed in **Eday** about the very limited number of connections it gets compared to the other five islands.
  - In both **Papa Westray and North Ronaldsay**, the frequency of the air service is considered to be good, but the requirement to share some flights with other islands diminishes capacity, which is considered a major negative given that this is the 'lifeline' mode for these islands (albeit the importance of the Papa Westray – Westray flights from a tourism perspective is widely acknowledged).
  - In **Sanday and Stronsay**, the use of the service by itinerant teachers is viewed as a major constraint on capacity, as is being unable to book the Sunday flight (which is shared with North Ronaldsay) until 48-hours before.
  - In **Westray**, the absence of a day return service on a Saturday except during refit timetable is considered a negative.
- **Vehicular and deadweight capacity** on the ferry was the most cited issue amongst **Westray** residents and businesses. The inability to secure a booking in one or both directions is considered to be constraining the capacity of a vibrant economy, whilst deterring tourists from visiting the island, particularly where they are unfamiliar with the standby system. Capacity was also cited as an issue in **Sanday and Stronsay**, particularly on shared sailings.
- **Aircraft capacity** was also cited as an issue across several islands. For Sanday and Stronsay, the key issue is itinerant teachers, whereas in Westray it relates more to the air service being the lifeline mode for Papa Westray, and its popularity in the summer for tourists making the world's shortest scheduled flight.
- It was acknowledged by most consultees and survey respondents that there will always be limitations in terms of connecting with **onward travel** (in both directions) to / from the Scottish mainland. However, a strong desire emerged across the isles for improved integration with the 'middle' Pentland Ferries and NorthLink (when operating) sailings and the afternoon flight arrivals into Kirkwall.
- Considerable dissatisfaction was expressed with the age and condition of the **vessels** and the quality of onboard accommodation. Accessibility for **persons of reduced mobility** was a strongly recurring theme in the survey.
- Whilst not an issue which will be considered by this study, the **cost of travel** was a common concern raised across all islands, particularly when cross-referenced with the Shetland Islands or the Clyde and Hebridean islands (note that this finding pre-dates the introduction of reduced fares in June 2021). As well as being a barrier to travel (or more frequent travel), it is also leading to some island residents maintaining **an island and mainland car**, effectively a form of forced car ownership, an inequality uniquely experienced by island residents.

5.8.4 As can be seen from the above bullets – and in more detail in the SBC – island residents experience and perceive a range of problems with the current air and ferry services. The impact of each problem on each island differs – for example, whilst ferry capacity is perhaps the key issue on Westray, overall connectivity is the main issue on Eday and reliability and resilience on North Ronaldsay. However, with the exception of the cost of travel, the common factor connecting all of these problems is that the number of vessels, aircraft and human resource is too few to deliver a level of service comparable with national benchmarks. Moreover, the

supporting infrastructure is in many cases operationally sub-optimal further constraining the service. It is these factors which form the 'case for change' in the context of this study.

Key Point: Around three quarters of residents in each of the ONI (slightly fewer in Stronsay) do not consider the current air and ferry connections from their home island to Orkney mainland as sufficient for their family's day-to-day needs now and in the future. The common factor connecting the problems identified through the resident survey and consultation is that the number of vessels, aircraft and human resource are too few to deliver a level of service comparable with national benchmarks.

Long-Term Sustainability

5.8.5 Survey respondents were then asked to look beyond their own family and take a view on whether current air and ferry connections are sufficient to ensure the long-term sustainability of their island community. The results are summarised in the table below:

Table 5.5: Overall, do you think that current air and ferry connections to Orkney mainland are sufficient to ensure the long-term sustainability of your island as a community? (n=392)

	Yes, definitely	Yes, but they could be improved	No
Eday	4%	64%	32%
North Ronaldsay	15%	23%	62%
Sanday	4%	61%	35%
Stronsay	15%	55%	30%
Westray	8%	59%	33%

5.8.6 It is interesting to note that, despite a net negative on the current transport services from a personal / family perspective, around two thirds on average of ONI residents noted that current transport connections are sufficient to ensure the long-term sustainability of communities, albeit around half think that they could be improved.

5.8.7 The one exception to this is of course North Ronaldsay, where the ferry service is so heavily constrained that almost two thirds of island residents feel that current connections are insufficient to safeguard the future sustainability of the island.

5.8.8 The responses in the table above broadly reflect the stakeholder consultation and the comments provided in the 'open response' questions. There was an appreciation of the work that Orkney Ferries and Loganair do, and the competing priorities of serving six islands with three vessels and two aircraft. On the whole, it was considered that the current services meet most needs (although could be improved) with only a few occasions cited where travel or the movement of goods was prevented / reduced in value (typically relating to refit timetable). It nonetheless has to be acknowledged that almost a third of most island respondents answered 'no', whilst very few did not see room for improvement through investment in the service.

Key Point: On the whole, island residents responded that the current air and ferry connections are sufficient to ensure the long-term sustainability of the islands (North Ronaldsay being the major exception), but a large proportion noted that there is room for improvement through investment in both the air and ferry service.

Improved Connectivity

5.8.9 Finally, island residents were asked whether improved connectivity between their island and Orkney mainland would make it a more attractive place to live and bring up families in the future.

Table 5.6: Do you think that improved connectivity between your island and Orkney mainland would make it a more attractive place to live and bring up families in the future? (n=389)

	Yes, definitely	Yes, perhaps	No	Don't know
Eday	72%	24%	4%	0%
North Ronaldsay	75%	8%	8%	8%
Sanday	63%	29%	2%	6%
Stronsay	57%	29%	8%	6%
Westray	58%	33%	4%	6%

5.8.10 The above table establishes an overwhelming desire for improved connectivity, with an average of **90%** of respondents across all five islands responding positively to this question. The desire for improved connectivity was most marked in the two islands where connectivity is currently poorest, North Ronaldsay and Eday.

5.8.11 Whilst there is a clear desire for improved connectivity, several respondents to the survey highlighted the need to ensure that such improvements did not dilute the island economy or way of life. This is indeed a trend which has been observed throughout the Scottish islands, whereby improved connectivity can lead increased off-island activity (e.g., shopping, socialising etc) and at its most extreme, a dormitory effect. Based on our experience and research elsewhere in Scotland, it is though important to point out that:

- the distance of the Outer North Isles from Orkney mainland – combined with the cost of travel – mean that such effects are likely to be comparatively weak.
- improved connectivity can reduce cost / prices for island residents, for example allowing a tradesperson to visit an island for a half day rather than a full-day; and
- where people do make additional journeys to their nearest major centre, they do so because they derive a benefit from it. Improved connectivity to such services may be a driver in encouraging people to remain in the isles or to move to them.

Key Point: There is an overwhelming desire for improved connectivity to Orkney mainland amongst island communities.

5.9 What are the priorities of communities?

5.9.1 As part of the public engagement component of the SBC, respondents to the public exhibition feedback form were asked to identify what their 'Top 3' service improvement priorities would be in the event that additional funding was made available. Whilst not a comprehensive record of community views, the survey outputs provide a useful cross-reference for the timetable development process and are thus repeated below.

5.9.2 The number of completed questionnaires was:

- Eday: 13
- North Ronaldsay: 7
- Papa Westray: 13
- Sanday: 38
- Stronsay: 53
- Westray: 22

5.9.3 The 'Top 3' priorities for each island, together with the number of respondents who selected each, is shown below.

Eday

1) Earlier first sailings from the island (38%)

2) A daily air and / or ferry service to / from Kirkwall for schoolchildren (23%)

= A late evening sailing to the island (e.g., 2200), (23%)

= More inter-island ferry connections (23%)

= More frequent services across the current operating day (23%)

North Ronaldsay

1) More frequent air services across the current operating day (43%)

= Greater availability of seats on the air service (43%)

= Combination of ferry improvements related to frequency and reliability (43%)

Papa Westray

1) Greater availability of seats on the air service (85%)

2) More frequent air services across the current operating day (46%)

= More direct rather than indirect air services (46%)

Sanday

1) Winter ferry timetable to run for the whole winter period (i.e., no refit timetable), (39%)

2) Greater availability of seats on the air service (37%)

3) Earlier first sailings from the island (29%)

Stronsay

1) Greater availability of seats on the air service (42%)

2) Winter ferry timetable to run for the whole winter period (i.e., no refit timetable), (38%)

3) More direct rather than indirect ferry services (28%)

Westray

1) Earlier first sailings from the island, (36%)

= Linked to the above, first sailing departing from Westray (36%)

3) Longer operating period for summer ferry timetable (27%)

5.10 Next Steps

5.10.1 This and the previous two chapters – together with the SBC and 'Phase 1' work – have set out in detail how the inter-island transport network is used from the perspective of island residents and visitors, the supply-chain and for service delivery. This profile, together with the capacity analysis (Chapter 6), will be fed into the development of a set of illustrative timetables in Chapter 7.

6 Carryings and Capacity Utilisation

6.1 Overview

6.1.1 This chapter sets out recent carryings trends and vehicle deck utilisation providing the baseline for forecasting and option development in Chapter 8 of this report.

6.1.2 It should be noted that the data analysis was undertaken in 2019 based on information extracted from the carryings data and bookings system at that time. It thus reports up to and including Financial Year 2017/18.

6.2 What has been the general trend in network carryings?

6.2.1 By way of context, in terms of the balance of ONI carryings, Westray accounts for the largest proportion of traffic followed by Sanday, Stronsay, Eday and then the smaller islands of North Ronaldsay and Papa Westray. Westray accounts for 42% of all passenger traffic on the network and 39% of all vehicular traffic.

6.2.2 Figures 6.1 and 6.2 below illustrate the trend in annual passenger and vehicle carryings for each of the islands on the ONI network over the period 2009/10 – 2017/18, indexed to 2009/10.

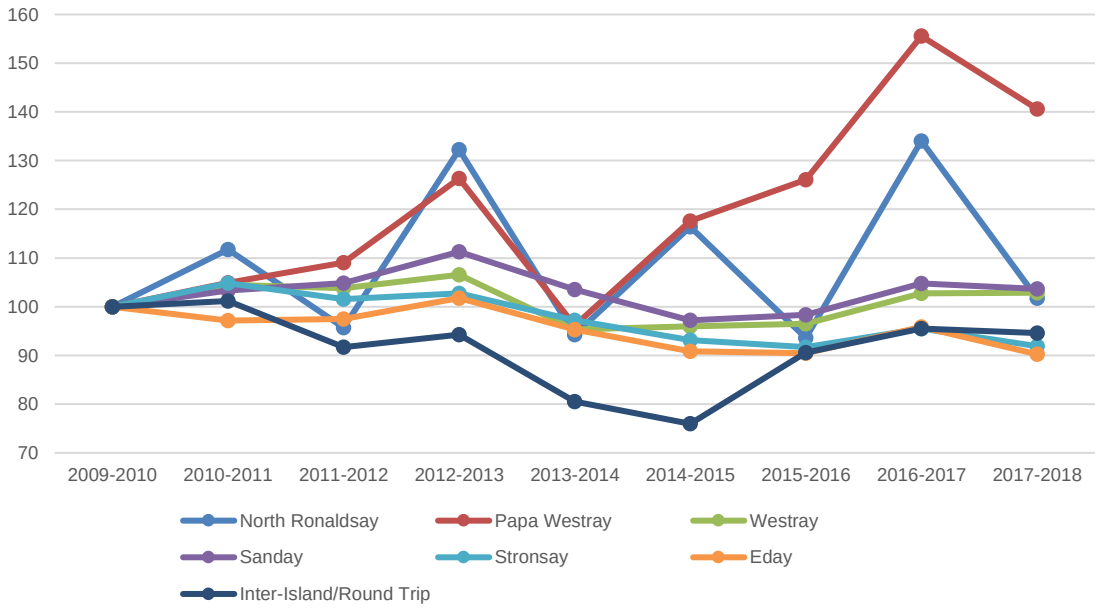

Figure 6.1: Change in Annual Passenger Carryings 2009/10 – 2017/18 (2009/10=100), (Source: Orkney Ferries)

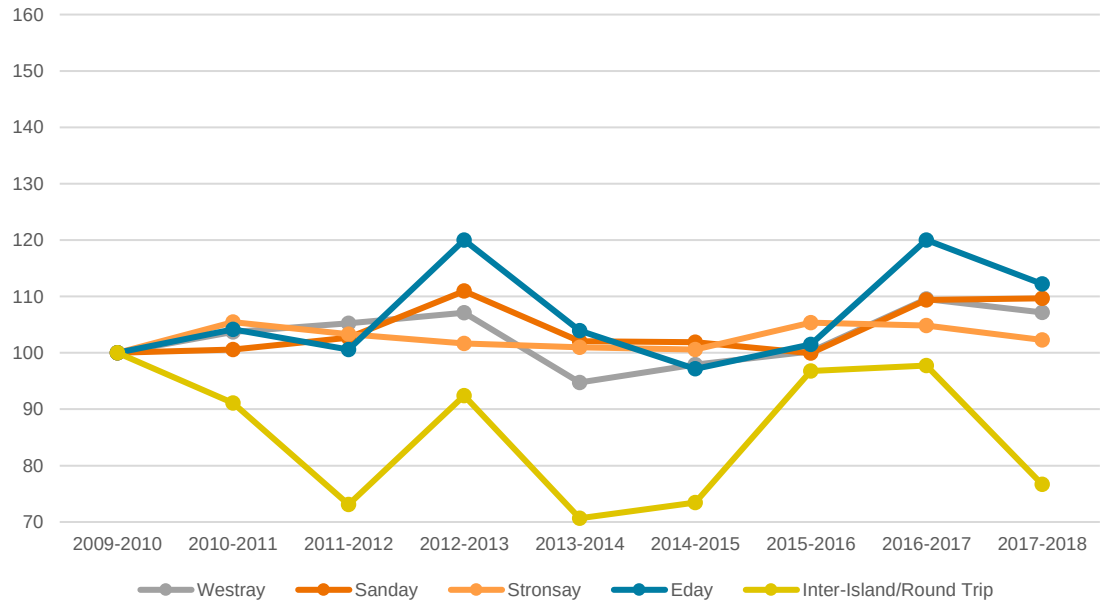

Figure 6.2: Change in Annual Vehicle Carryings 2009/10 – 2017/18 (2009-2010=100), (Source: Orkney Ferries)

6.2.3 The key point of note from the passenger chart is that, over the eight-year period, passenger carryings have remained stable for the four main population islands, while the lower population islands fluctuate more widely (albeit from much smaller absolute numbers). Vehicle carryings display a similar trend across the eight-year period. Carryings on the Eday run have shown a degree of volatility, but broadly align with the trend for the wider network over the duration of the period being analysed.

6.2.4 On average 37% of all vehicle carryings are classed as commercial vehicles, with Stronsay accounting for the highest proportion at 43%. It is this underlying CV traffic and the changes in demand that impacts the above vehicle carryings chart, as car carryings display an almost flat line.

Key Point: There was a very modest growth in passenger and vehicle carryings over the period 2009/10 to 2017/18. The picture overall is however one of stability. Westray is by some distance the dominant island in terms of carryings, accounting for 42% of all passenger traffic and 39% of all vehicular traffic.

6.3 ONI Carryings – 2017/18

6.3.1 The table below provides a summary of the recorded carryings by island for the period April 2017 to March 2018. The numbers represent the two-way carryings across the year by carrying type to / from each island. It should be noted that car and CV carryings to North Ronaldsay and Papa Westray are recorded by tonnage due to the Lo-Lo nature of these routes and are thus marked as N/A in the table below.

Table 6.1: 2017 - 2018 Total Carryings (Source: Orkney Ferries)[17]

Island	Passengers		Cars		Commercial Vehicles	
	To	From	To	From	To	From
Eday	4,588	4,520	1,258	1,176	709	690
Stronsay	8,337	8,116	1,670	1,660	1,307	1,239
Sanday	14,516	14,162	3,613	3,582	2,369	2,308
Westray	21,293	21,227	4,650	4,554	2,572	2,403
Papa Westray	284	260	N/A	N/A	N/A	N/A
North Ronaldsay	297	274	N/A	N/A	N/A	N/A
Inter-Island	3,865		325		148	
Total	**51,247**	**50,491**	**11,353**	**11,134**	**7,031**	**6,714**

6.3.2 For each Ro-Ro route, the table below shows the days of the week on which carryings type is highest:

Table 6.2: Peak carryings day by route, timetable period and type (Source: Orkney Ferries)

	Passenger	Car	CV
Summer			
Kirkwall>Eday>Stronsay>Sanday	Friday	Wednesday	Wednesday
Kirkwall>Westray>Papa Westray	Wednesday	Wednesday	Thursday
Winter			
Kirkwall>Eday>Stronsay>Sanday	Thursday	Thursday	Thursday
Kirkwall>Westray>Papa Westray	Wednesday	Wednesday	Wednesday
Refit			
Kirkwall>Eday>Stronsay>Sanday	Friday	Monday	Monday
Kirkwall>Westray>Papa Westray	Friday	Friday	Tuesday

6.3.3 The table below highlights the most popular sailings by island (Ro-Ro only) to Kirkwall and to the island from Kirkwall.

Table 6.3: Most Popular Sailings 2017 – 2018 (Source: Orkney Ferries)

	Monday to Friday			Saturday and Sunday		
From Island	**Summer**	**Winter**	**Refit**	**Summer**	**Winter**	**Refit**
Eday	09:40	08:20	10:40	18:25	18:25	11:05
Stronsay	18:15	17:15	18:45	09:20	17:45	18:05
Sanday	18:15	09:15	12:05	17:40	11:15	11:05
Westray	17:55	09:00	09:00	18:00	18:35	18:00
To Island						

[17] Note that, because vehicles and freight moved to and from North Ronaldsay and Papa Westray is Lo-Lo based, it is classified by tonnage moved rather than in the 'Cars' or 'CVs' categories.

	Monday to Friday			Saturday and Sunday		
Eday	16:00	16:00	16:00	19:15	07:00	15:20
Stronsay	07:00	07:00	15:40	16:00	15:20	08:00
Sanday	16:40	15:20	07:40	16:40	16:20	15:20
Westray	16:20	16:20	07:20	16:20	16:20	16:20

6.3.4 The times in the table are representative of total carryings across the year, in terms of total passengers and vehicles carried. Across each week of the year, preferred sailings may vary based on the different daily timetable variations, however, across the year the above sailings are those which have witnessed the highest levels of carryings.

6.4 Capacity Analysis – Present Day

6.4.1 A key question in determining the design vessel(s) is whether it / they would provide sufficient capacity over their lifetime (assumed 30 years) to meet the needs of the Outer North Isles network. If not, it can be argued that the vessels may act as a constraint in the growth of the ONI economies and / or the sustainability of the island communities. It should be noted that, when referring to capacity in this context, it is meant as **vehicle capacity** as this is much more frequently constrained than passenger capacity. This section considers the present-day situation whilst future projections are analysed in the next section.

6.4.2 Sailing-by-sailing data for the full 2017-2018 financial year supplied by Orkney Ferries provides the basis for this analysis. In addition to the April 2017 to March 2018 sailing-by-sailing data, Orkney Ferries also provided deck log-books for calendar months June and November 2017 to provide representations of summer and winter vehicle carryings in more detail. The capacity utilisation (load factor) analysis considers carryings on each *leg* between two harbours. This provides an indication of the maximum utilisation across a chain of legs on any given timetable rotation, identifying any corresponding constraints.

6.4.3 Both actual useable deck space of the vessels (capacity utilisation) and the weight limitations of the vessels (approximately 100 tonnes for the *Earls* and 120 tonnes for MV *Varagen*) have been considered here. This section does not consider sailings to Papa Westray or North Ronaldsay as vehicle deck space is never an issue on these sailings given the Lo-Lo operation on these routes.

Load factor analysis

Determining a commercial vehicle PCU factor

6.4.4 Vehicle carrying ferry capacity is generally defined in Passenger Car Units (PCUs) where a standard car is one PCU and larger vehicles have a range of PCU values of >1 to represent the fact that they have a larger footprint on the vehicle deck. In order to analyse load factors, it is therefore necessary to derive a total PCU figure for each sailing and compare it with the vessel's stated PCU capacity. This is not however an exact science. The PCU factor for a commercial vehicle (CV) on ferries varies depending on the configuration of the ferry. This value is particularly important here because CVs form a high proportion of total vehicular carryings on the ONI routes.

6.4.5 For the purposes of load factor analysis here, a CV PCU factor was determined as follows:

- 'Standard' reporting of carryings does not disaggregate CVs by type / length. Sample CV length data for June and November by sailing was therefore obtained from logbooks where tally marks are placed into nine CV length bandings. We then extracted the corresponding sailing-by-sailing data for June and November from the ONI booking system which records 'open' deck space on each sailing and selected sailings that recorded a zero or negative

value against the open deck space column, indicating sailings which were **at / or over capacity**. So we have therefore detailed carryings data for each 'full' sailing.

- Then, for each 'full' sailing:
  - take the reported PCU capacity for each ship – **22** for the *Earls* and **28** for MV *Varagen*[18];
  - estimate the total length of commercial vehicles (CVs) carried using the distance bandings provided (CVm);
  - subtract the cars carried (1 car = 1 PCU) from the PCU capacity;
  - assume that the remaining PCU capacity is fully occupied by the CVs carried; and
  - divide the remaining PCU capacity by CVm to get a PCU / CVm factor for each sailing.
- Determine the average PCU / CVm factor for all full sailings.
- Multiply this by the average CV length determined from the data (9.2m).
- This produces an average PCU per CV of 5.3 for MV *Varagen* and 5.4 for the *Earls*, an overall average of **5.3**.
- This means that, broadly speaking, a commercial vehicle will on average occupy the space of around five cars. This is intuitive as almost any commercial vehicle on these vessels will straddle two lanes given how narrow the vehicle lanes are.

6.4.6 In the subsequent sailing-by-sailing load factor analysis, all CV figures are multiplied by 5.3 to provide a PCU estimate which is added to car carryings to provide a total PCU figure. This figure is compared to the stated vessel PCU capacity to produce a 'load factor'.

6.4.7 This approach was used to produce a load factor for each harbour-to-harbour sailing on the Eday / Sanday / Stronsay and Westray routes. The findings are summarised below.

Eday, Sanday and Stronsay load factor analysis

6.4.8 Overall, 525 of the 3,461 recorded sailing legs had a load factor of greater than 90% across these routes, accounting for **17%** of all sailings across the year. Those with the most significant capacity constraints involve Eday and Sanday, especially those which involve routing to / from Kirkwall via both islands. Indeed, around **71% of all of these high load factor sailings were found to be on multi-island connections** from Kirkwall. Additional details are provided in **Appendix B**.

6.4.9 The sailings which most frequently see >90% load factors are:

- Kirkwall → Sanday:
  - 15:00 Summer and Winter sailings
  - 15:20 Winter sailing
  - 16:40 Summer sailing
- Sanday → Kirkwall
  - 09:15 Winter sailing
- Kirkwall → Eday:
  - 16:00 in all three timetables
- Eday → Kirkwall

[18] Note though that analysis of vessel deck plans by the team derived figures of 20 and 24 cars respectively.

- 17:00 Summer and Winter sailings

6.4.10 Analysis was also undertaken of recorded tonnage. In total only 66 sailings (**2%** of overall sailings) were identified as over their stated weight capacity. 52% of these sailings occurred during the refit timetable. This aligns with the supply-chain consultation, which highlighted the deadweight capacity of the vessels – and in particular the *Earls* – as a problem.

6.4.11 A further review of the data found that almost all capacity constrained sailings were operated by one of the *Earls*, which carry six PCUs less than MV *Varagen*.

Westray load factor analysis

6.4.12 Overall, 217 of the 1,404 recorded sailings saw a load factor greater than 90% on this route. This accounts for **15%** of all sailings over the one-year timetable period.

6.4.13 The sailings which most frequently see >90% load factors are:

- 07:20 Kirkwall → Westray Summer and Winter sailings
- 09:00 Westray → Kirkwall Summer and Winter sailings
- 14:35 Westray → Kirkwall sailing Summer
- 16:20 Kirkwall → Westray Summer and Winter sailings

6.4.14 There are two key factors underpinning when Westray services experience capacity problems:

- when there are only two connections per day, leading to clustering of demand; and
- when the service is operated by one of the *Earls* rather than the larger MV *Varagen*.

6.4.15 Analysis of tonnage carried was also undertaken to identify any weight-based capacity issues. A total of 155 sailings across the year were identified as having reached their weight capacity. This is a substantial **17%** of all sailings and so weight is a much bigger issue for Westray than for Eday / Sanday / Stronsay – this aligns with the feedback from the supply-chain consultations which highlighted deadweight constraints as a major issue for Westray. 40% of these sailings took place during the operation of the winter timetable, while a further 34% were recorded during the operation of the refit timetable. These weight-constrained sailings most frequently occurred on a 'two-rotation day' and the operation of the service by one of the *Earls*.

6.5 Summary

6.5.1 The capacity analysis set out above confirms that, on occasions, vehicle-deck capacity can be a problem on the ONI routes.

6.5.2 Whilst there is some evidence of vehicle-deck capacity problems, only **17%** of sailings on the Eday-Sanday-Stronsay route combination and **15%** on Westray demonstrate a vehicle-deck utilisation of greater than 90%. Median vehicle-deck utilisation is much closer to **60%** or less in most cases (see **Appendix B**), which suggests capacity problems are clustered around specific sailings.

6.5.3 Deadweight limitations are a particular issue on the Westray route, where **17%** of all sailing legs were identified as having reached their weight capacity. The equivalent figure for Eday / Sanday / Stronsay is **2%**, which highlights deadweight constraints are an occasional but not frequent problem.

6.5.4 There are also generally **three recurring factors where load factors are high**:

- The **sailing is indirect**, calling at two or three islands on a single rotation from Kirkwall

- The sailing is **operated by either MV *Earl Sigurd* or MV *Earl Thorfinn*** rather than MV *Varagen*
- The **timetable for that day only provides two island calls**, thus clustering demand onto a particular sailing in each direction

6.5.5 It is important to note that under the proposed new service emerging from this business case:

- multi-island sailings will be significantly reduced;
- the timetables will offer three island calls per day for Eday, Sanday, Stronsay and Westray across most days of the year providing a step-change in total capacity; and
- the capacity provided by each vessel will be at least equivalent to that provided by MV *Varagen*, the largest of the current ferries.

7 Option Development and Appraisal

7.1 Overview

7.1.1 This chapter brings together the outputs of the Routes and Services Methodology (RSM) study, the SBC, the ONI Phase 1 analysis and the preceding chapters in this report to shape an illustrative service specification for the Outer North Isles network. The objective is to establish a working timetable concept and appraise options for its delivery, ultimately arriving at a preferred option.

7.1.2 It is important to note that there is an established timetable setting process in place for both ferry and air services which incorporates both community and Member inputs. It is not therefore the intention to develop hour-by-hour timetables which are cast in stone, rather to provide an indication of what could be achieved under different supply-side scenarios in terms of vessels, aircraft and ferry / air crew. A detailed timetable model has been provided to Orkney Ferries as a separate output of this study and can be used in future operational planning.

7.1.3 The timetables have been developed to provide an integrated air and ferry offering. However, from a process perspective, it is necessary to consider the ferry timetables first as they are the most constrained in terms of distances, infrastructure, crew hours etc.

7.2 Ferry Timetable Principles

7.2.1 With six islands and a proposed four vessels and three aircraft, there are almost countless timetable permutations which could be developed. The first step in this process therefore is to define a set of timetable 'principles' which can be used to bound in the various options. These 'principles' have been informed by the study objectives, the RSM and the evidence collected through the various stages of this work from 2015 onwards, including that set out in the preceding chapters.

What did the SBC say the level of service should be?

7.2.2 The appropriate level of service was an issue which the SBC wrestled with at some length, primarily in trying to reconcile the formulaic 'top down' solution defined by the RSM and the 'bottom-up' approach established through research and community engagement, ultimately reflected in the TPOs. Recognising that ferry is the lifeline mode for Eday, Sanday, Stronsay and Westray and air for North Ronaldsay and Papa Westray, a set of broad principles was defined. These are recapped verbatim below and form the basis of the later analysis in this chapter.

Eday, Sanday, Stronsay and Westray

7.2.3 The proposed timetable model for the Eday / Sanday / Stronsay / Westray routes identified in the **SBC** was as follows:

- 3-5 sailings per day (Monday-Saturday)
  - Westray and Sanday have the highest populations and carryings and may merit 3-4 rotations per day, e.g., 4 each day, or 3 one day, 4 the next; or 3.5 each day if the ferry could overnight in the islands.
  - Stronsay is some way behind in terms of population and carryings so may merit 3 or 3.5 alternating.
  - Eday has a much lower population so could receive the minimum of 3, although its geographic proximity to Kirkwall could suggest that a level of connectivity similar to Stronsay would be more appropriate.

- substantively the same timetable in summer and winter;
- substantively the same timetable Monday to Saturday;
- a refit timetable with minimal differences from the winter timetable;
- reduced Sunday service;
- 12-14 hour operating day;
- potentially later / request sailings on Fridays and Saturdays; and
- potentially early / request sailings on weekdays.

North Ronaldsay and Papa Westray

7.2.4 The SBC identified the following for North Ronaldsay and Papa Westray:

- 2 rotations per week from Orkney mainland to each island, e.g., on alternate days; or
- 3-4 rotations a week serving both islands across the year
- Bespoke freight flights when required

How has the service specification been developed in the OBC?

7.2.5 The service specification defined in the SBC formed the basis of the network planning undertaken in the 'OBC Phase 1' and the research specification which has informed this report. The Phase 1 work allowed for a narrowing of the timetable planning parameters, for example by ruling out overnight berthing in the isles. The resident survey and consultation have provided further evidence by which to refine the requirements and aspirations of island residents, businesses, hauliers and service providers.

7.2.6 The service specification identified in the SBC appears, from the evidence collected, to largely reflect the aspirations of communities and stakeholders. The focus has therefore been on incremental evolution of this specification rather than wholesale change. The following points are worthy of note:

- There remained an open question in the SBC as to whether the ferry service should facilitate **daily commuting**. The resident survey highlighted that, whilst there are some people currently commuting and an appetite to do so from a small number of others, this was very limited. The cost, logistics and impact on the later sailings of providing a daily commutable service cannot in our view therefore be justified, particularly when technological change and potential COVID-19 related behavioural change may weaken the standard 09:00-17:00 working day and the link between the home and workplace. There is however an argument for allowing early access to Orkney mainland on a Monday for weekly commuters and some early services from each island across the week to support non-daily commuting. Mid-morning arrivals could also support more flexible working days.
- There was strong representation within the resident survey about the need to facilitate **regular and reliable access to Orkney mainland for essential services**. Indeed, several island residents noted that they are paying Council Tax for services which they cannot regularly access, particularly at weekends (e.g., the Pickaquoy Centre), a clear inequality. This further sharpens the requirement of **TPO2b** to provide at least a half day in Kirkwall and on island seven days per week.
- The **haulage sector** requires a daily return service with a period of time on Orkney mainland to travel to the ONI hub amongst other destinations, offload and then reload with goods to take back to the isles. There is however no express desire amongst supply-chain providers for a longer operating day as it would increase the workload faced by the haulage firms with little in the way of supply-chain benefits,
- There were **no significant aspirations for the scaling up of the service beyond three return sailings per day**, the lower end of the RSM scale. In most islands, the desire is for

a **daily morning, 'middle' and early evening ferry**. There was little demand for late evening services (except on a Friday and Saturday, see below) and indeed these would be unpopular with certain groups, hauliers for example. Indeed, whilst there is an overwhelming desire for improved connectivity, there is also a fear that an island becoming too well connected could dilute the economy and threaten the viability of local services.

- There was a desire expressed through the resident survey for a **later last departure on a Friday and Saturday,** circa 19:30-20:00 so as to:
  - provide the maximum amount of time on mainland for island residents undertaking **leisure trips**; and
  - allow island residents a window of time to access **evening economy** activities in Kirkwall, bars and restaurants for example.
- There was a strong desire across Eday, Sanday, Stronsay and Westray for an **early Monday** arrival into Kirkwall to facilitate travel-to-school (ending the practice of a truncated weekend), employment and the Monday mart sales. There was also a desire for an **early afternoon departure on a Friday** to reduce the time spent in Kirkwall by school children travelling home, further extending the weekend.
- It was recognised that it is impractical for ONI residents to access the first ferry services and flights to the Scottish mainland, as well as the last ferry services back to Orkney in the evening. However, there was a strong aspiration expressed through the survey and consultation for improved connectivity with **the 'middle' Pentland Ferries and NorthLink Ferries (when operating three services per day) for journeys south, and the last inbound flights to Orkney**.
- There is an understanding in **North Ronaldsay and Papa Westray** that the ferry service will always likely be less than daily. However, scaling up to a minimum 2-3 connections per week year-round, combined with a potentially enhanced air service, would promote improved connectivity and greater supply-chain resilience.

7.2.7 Based on the above, the principles underpinning the illustrative timetables which will be developed in this chapter are therefore as follows:

- The timetable structure should facilitate a **consistent year-round timetable**, albeit the Council and Orkney Ferries may, in consultation with communities, choose to reduce services in line with demand during the winter months.
- The one exception to the above is **refit**, where the service will reduce to three vessels. The refit timetable will therefore be **equivalent to the current summer timetable, or the current winter timetable** if a 'current summer' is considered by the Council, Orkney Ferries and the communities to be excessive.
- The timetable for **Eday, Sanday, Stronsay and Westray** will be capable of delivering **three return connections per day Monday to Saturday**, with evening (i.e., around 18:30-20:00) Kirkwall departures on a Friday and Saturday
- The timetable for **Eday, Sanday, Stronsay and Westray** will also be capable of facilitating **two return connections per day on a Sunday**. These will take the form of a morning and evening connection, providing a reasonable amount of time in Kirkwall as well as a later than current service into Kirkwall for school children, extending the weekend at home.
- It is assumed that the timetable will be focused on providing **direct connections** where possible. However, the **key indirect connection between Stronsay and Eday** will be protected. There may however be merit in considering whether alternative haulage options could be developed for Eday in the longer-term so as to release this time back into the timetable.
  - The exception to the above is on Papa Westray and North Ronaldsay days. Whilst three return sailings can still be achieved from each of Eday, Sanday, Stronsay and Westray, there will be a requirement for a number of these sailings to be indirect, which may actually assist in delivering the current Eday – Stronsay supply-chain link.

- The timetable will, as far as possible, be clockface, providing **consistent daily departure and arrival times**. The exceptions to this will be as follows:
  - **Monday:** Pre-09:00 arrival into Kirkwall for one or more of Eday, Sanday, Stronsay and Westray services. This will allow early access to the marts and will allow some children to travel into school on a Monday morning, albeit arrivals after 08:30 would miss the first period.
    - There will be a scheduling challenge around the single linkspan in Kirkwall and it is thus unlikely that all four islands could benefit from a pre-09:00 arrival unless a second linkspan is pursued in Kirkwall in the longer-term. This makes the later departures on a Sunday evening important.
  - **Friday**
    - Early afternoon departure to Eday, Sanday, Stronsay and Westray, circa 13:00 – 14:30
    - Evening departure to Eday, Sanday, Stronsay and Westray between 18:30-20:00
  - **Saturday:** Standard three rotations but last departure between 18:30-20:00
  - **Sunday:** Mid-morning and early evening rotation. This will allow children still choosing to travel into KGS on a Sunday to continue doing so.

7.2.8 Whilst the above principles are based on all of the evidence collected to date, it is important to reiterate that the **final timetables will be subject to agreement with communities** through the timetable setting process. The **principles are not therefore entirely conflict free** and are intended to act as a starting point to inform the timetable setting process.

7.3 How can this outline service specification be delivered?

7.3.1 The key parameter in the development of a timetable which delivers the principles / service specification set out above is crewing hours. This section therefore considers three options which would facilitate the delivery of the outline service specification. Ultimately, these options define the quantum of hours which can be used to deliver the service and will therefore form the basis of the timetable setting process.

Crewing Hours Regulations

7.3.2 Potential service enhancements which increase the operating intensity of any of the Orkney Ferries' services must do so within the regulations governing the hours which crew work.

7.3.3 The routes within the ONI are classified as 'open sea' and the crew are defined as 'sea-going' – the appropriate legislation is The Merchant Shipping (Maritime Labour Convention) (Hours of Work) Regulations 2018). The provisions of this legislation are covered in Merchant Shipping Notice (MSN) 1877. The key stipulations of MSN 1877 in so far as they relate to the ONI are as follows:

- On a sea-going vessel, the minimum hours of rest are:
  - 10-hours in any 24-hour period;
  - 77-hours in any seven-day period, which implies a **maximum working week of 91 hours**; and
  - The 10-hours of rest may be divided into no more than two periods, one of which is to be at least 6-hours in length (so as a minimum 10 hours straight, or 9/1, 8/2, 7/3, 6/4).
- The regulations allow for 2.5 days of paid annual leave per month of employment, and an additional 8 days of paid leave per year in respect of public holidays.

- It is also noted that, where a seafarer whose normal period of rest on board a ship is disturbed by a call-out, they are entitled to a period compensatory rest.[19]

7.3.4 The future timetable solution for the Outer North Isles services will need to be developed in accordance with the above regulations, ensuring that crew continue to get their minimum hours of rest. It also has to be acknowledged that these regulations are not a target, rather they define the **maximum** hours which can be worked. In practice, weekly timetabled hours will be less than the maximum to provide flexibility and minimise the risk of crew fatigue.

Current ONI Crewing Model

7.3.5 In considering how to deliver the outline service specification, it is beneficial to set out the current crewing model for the ONI, as this will be the baseline for any future service. Current (i.e., as at summer 2019) crewing arrangements are as follows:

- The three Outer North Isles vessels, MV *Earl Sigurd*, MV *Earl Thorfinn* and MV *Varagen*, all have a crew of nine, although the passenger certificate can be increased by adding a tenth crewman. Each vessel has two crews and there is a total of 60 crew (excluding reliefs) assigned to the ONI (i.e., six crews of nine, plus six seasonal crew).
- The three vessels generally lie overnight in Kirkwall, MV *Varagen* on the layby berth and the *Earls* on the East Berth and Tanker Berth. At the start and end of the sailing day, each vessel repositions from their overnight berth to the linkspan berth.
- As the crew accommodation is below the waterline, the ONI vessels can only lie in the isles a maximum of two nights per week. Only Sanday and Stronsay have safe and tenable year-round overnight berths and, when lying in these islands, the vessel remains on the linkspan berth but will pull back a safe distance from the linkspan.
- Each crew works two weeks on, two weeks off with three weeks of rostered leave per year, so a 24.5 working week year in total. The rostered week of leave is added onto the end of the third rotation (i.e., every 12 weeks).
- The start-up period for the ONI vessels is 30-60 minutes before the first scheduled departure each morning. The operating day ends 15 minutes after the vessel is moored at its overnight berth in the evening.
- Orkney Ferries explained that each of the Outer North Isles crews is contracted to work 84 hours per week, or 2,058 hours per annum based on a 24.5 working week year. Where the crew exceed 84 hours, they can claim up to four hours of overtime if still on roster and then hourly thereafter up to a maximum of 91 hours per week (to achieve the minimum required 77-hours of rest per week).

7.3.6 The service which can be delivered is therefore bounded by the total crew hours across the vessels – i.e., 273 hours per week (91 hours per vessel) maximum, but in practice generally slightly less than this for the reasons explained earlier.

Crewing Models - Options

7.3.7 Three broad timetable options which could deliver the outline service specification have been identified. These options make use of different crewing models which are summarised below.

7.3.8 It should be noted that the timetable principles cannot be delivered with four single crews working on a 'straight' day (i.e., continuous operation over the length of the operating day), and thus this option is not considered further here.

19 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/697916/MSN1877_Combined.pdf

Option 1: Single Crew, Split-Shifts

7.3.9 This option is broadly a continuation of the current day arrangements, although supplemented by a fourth vessel – this can effectively be thought of as the 'Do Minimum'. It would work as follows:

- Each vessel would operate with a **single crew** working on a two-weeks on, two-weeks off basis (i.e., the same arrangement as at present). This would provide 91-hours per vessel per week, or a maximum **364**[20] hours in total.
- It would not be possible to deliver the required rotations every day of the week in an unbroken shift. A split-shift approach would therefore be needed, with the 'gap' between the two shifts being no less than **four hours**.

7.3.10 The operational advantages and disadvantages of this model are as follows:

- **Advantages**
  - It is comparatively lower cost than any shift-based solution, as it would only require additional crew for the fourth vessel (eight crews across four vessels).
  - There would be no requirement to change the terms and conditions of the current crew (i.e., working pattern, salaries, leave entitlement etc). It does not however preclude moving to a shift-based system in the future.
- **Disadvantages**
  - This model imposes a firm cap of 364 hours of operating time per week. Whilst this could deliver the required timetable, there would be little scope for additional services beyond this.
  - There would be a requirement for a minimum four-hour break in the middle of every day to maintain rest hours. This would leave a fixed gap in the timetable every day, albeit this is not significantly different from what happens at present.
  - As there will only be minimal accommodation on the vessel, consideration would have to be given to the quality of the rest in the four-hour period of downtime. Local crewmen could go home but a crew mess or a similar facility may need to be provided for other off-duty crew.
  - Whilst within the regulations, continuous split-shifts over a 14-day roster period could lead to fatigue amongst the crew and would need to be appropriately risk-assessed.
  - Moreover, whilst crew would not be working more hours, they could be at their workplace longer and have less leisure time. This could impact both on retention and the recruitment of crew for a fourth vessel.

Option 2: Single crew, combination of 'standard' and split shifts

7.3.11 This option is a variation on Option 1, providing the same number of maximum hours across the week, **364**[21]. The primary difference here is that most operating days would be 'standard' (i.e., without a break in the middle of the day), with split shifts only used to extend the day on Fridays and Saturdays and allow for meaningful time in Kirkwall on a Sunday. An example week is shown below:

- **Monday:** Standard day with an early start – e.g., 05:00-17:00
- **Tuesday to Thursday:** Standard day e.g., 06:00-18:00

[20] If working on the basis of 84-hours per week and 4-hours contracted overtime, this option would provide 352 hours per week.

[21] If working on the basis of 84-hours per week and 4-hours contracted overtime, this option would provide 352 hours per week.

- **Friday and Saturday:** Split shift, e.g., 06:30-13:30 – break – 17:00-21:00
- **Sunday:** Split shift with two rotations, e.g., 09:00-13:00 – break – 17:00-21:00
- On North Ronaldsay and Papa Westray days, the timetable for these islands would be largely structured as at present, providing maximum flexibility.

7.3.12 In providing an extended operating day on a Friday and Saturday whilst accommodating sufficient crew rest time, there are two broad timetable approaches. These are:

- '2 gap 1' – where each vessel completes **two** island return trips then has a four-hour rest period then completes a further **one** island return trip; or
- '1 gap 2' – where each vessel completes **one** island return trip, then has a four-hour rest period, then completes a further **two** island return trips.

7.3.13 Under the '2 gap 1' option, the options for an island resident arriving in Kirkwall on the first departure from island is to return directly (i.e., within the vessel turnaround time) or wait until the third and final Kirkwall departure. However, a '1 gap 2' option provides the choice of two return sailings – one after the break and one in the evening – providing both a part day and full day option in Kirkwall. The trade-off is that the timing of the first island departure would be early and a mainland to island trip would be limited to a full day on island. On these extended operating days, it is assumed a '1 gap 2' option would be pursued.

7.3.14 The operational advantages and disadvantages of this model are as follows:

- **Advantages**
  - It is comparatively lower cost than any shift-based solution, as it would only require additional crew for the fourth vessel (eight crews across four vessels).
  - There would be no requirement to change the terms and conditions of the current crew (i.e., working pattern, salaries, leave entitlement etc). It does not however preclude moving to a shift-based system in the future.
  - This option is much less intensive for the crew than continuous split shifts over a 14-day period, which could be very fatiguing. It also concentrates later evening services on the days which they are most likely to be required.
- **Disadvantages**
  - This model again imposes a firm cap of 364 hours of operating time per week. Whilst this could deliver the required timetable, there would be little scope for additional services beyond this.
  - As there will only be minimal accommodation on the vessel, consideration would have to be given to the quality of the rest in the four-hour period of downtime. Local crewmen could go home but a crew mess or a similar facility may need to be provided for other off-duty crew.

Option 3: Shift-Based System

7.3.15 An alternative option would be to transition the current crewing model to a shift-based system. There are numerous different models which could be adopted. For example:

- On several of their routes, Shetland Islands Council adopts a three-week shift pattern consisting of: one week of 12-hour dayshifts; one week of 6 hour backshifts; and one week off.
- On the Colintraive – Rhubodach and Largs – Cumbrae routes, CalMac Ferries Ltd adopts a three-week shift pattern consisting of: one week of 8-hour dayshifts; one week of 8-hour backshifts; and one week off.

7.3.16 The appropriate model in the Orkney context would ultimately be developed by Orkney Ferries in consultation with the relevant trade unions. However, the principle of any shift system is to work towards a 16-18 hour day. Based on the models set-out above, this would provide a maximum **448 to 504** operating hours per week, a maximum increase of **84 to 140** hours per week on the four-vessel single crew model.

7.3.17 The operational advantages and disadvantages of this model are as follows:

- **Advantages**
  - The large increase in hours would allow for a significant scaling up of the service – indeed, it would provide a service comfortably in excess of that established in Section 7.2 should the revenue funding be available to deliver it.
  - There would be a major resilience benefit – even if one vessel was out of service, the remaining three vessels could deliver a denser timetable than is currently offered in summer. By extension, the refit timetable could be better than the current summer timetable.
  - Assuming the vessels are interchangeable, there would be additional slack in the timetable to accommodate tidal / weather conditions at North Ronaldsay, improving the reliability of the service to that island.
  - There would be no requirement for a middle of the day break as would be required with a split shift arrangement.
- **Disadvantages**
  - A four-vessel shift model would require a doubling of the current crew complement. This could pose a challenge in terms of recruiting the required number of sufficiently qualified crew. Perhaps more significantly however, the ongoing cost increase would be substantial and there would therefore need to be confidence that this level of funding could be sustained in the long-term before migrating to a different crewing model.
  - The migration to a shift-based system would lead to crew working fewer hours in an average week and across the year, although sometimes at less sociable times. Consultation and discussion would clearly be required with the relevant trade unions about how to implement such a substantial change. Consideration of leave entitlement would also be required.
  - The operation of a clearly demarcated shift system could present a challenge in serving North Ronaldsay and, to a lesser degree, Papa Westray. The weather and tidal conditions at the berth – even with a linkspan – may mean that significant flexibility would need to be built into the timetable to serve the island – in effect, a vessel is blocked off for the majority of the day when a North Ronaldsay run is scheduled to allow it to work around weather and tidal windows. A shift changeover in the middle of the day would mean that providing this level of flexibility could be challenging and could lead to a poorer level of service to North Ronaldsay, which already suffers from a low frequency and a very unreliable service. There is no easy answer to this issue – there would perhaps need to be a different shift pattern on a North Ronaldsay day or a bespoke agreement with the crew for that day.

7.3.18 A hybrid option would be to have a mix of crew contracted to operate a straight day and crew contracted to operate on a shift basis. However, it is considered that this would be logistically complex to implement and would also create an undesirable two-tier workforce within Orkney Ferries. This hybrid option is not therefore considered further.

Preferred Option

7.3.19 The preferred option is **Option 2: Single crew, combination of 'standard' and split shifts**. This option will facilitate a service which delivers most of the timetable 'principles' set out in

Section 7.2. It is also a proportionate solution in that the only additional cost is the crewing of the fourth vessel, which will be required irrespective of which crewing model is chosen.

7.3.20 The combination of standard and split shifts also concentrates sailings at the times of the day where the evidence suggests they are most needed. From an Orkney Ferries perspective, **Option 2** also avoids any major change to current practice (and hence terms and conditions) and also avoids the crew fatigue risk associated with continuous split shifts.

7.3.21 This option also does not preclude future migration to Option 3: shift-based system at some point in the future if this is deemed necessary or desirable. It is therefore future-proofed.

7.4 How can the air service be scaled-up?

7.4.1 In contrast to the ferry service, the air service has fewer hard constraints outwith those imposed by operating under Visual Flight Rules (VFR). Britten-Norman Islander aircraft are readily available on the market and consultation with Loganair suggests that pilot recruitment is relatively easy at the moment, with around three-months from recruitment required to get a pilot approved for single pilot flying in Orkney. There is therefore significant flexibility in how the air service can be expanded.

7.4.2 The two Islander aircraft can currently deliver around 725 hours per annum (1,450 hours in total) but this is taxing. Airborne hours are closer to 600, or 1,200 hours in total. Consultation with Loganair established that the current operation with the Islander aircraft is quite constrained, with each aircraft requiring two 300-hour checks per annum, so 1,200 hours per annum in total. Both aircraft are currently working towards the maximum end of available flying hours, particularly between October and February, where a two aircraft service is required to maintain the schedule. The primary benefit of inserting a third aircraft into the schedule is that it will alleviate the maintenance challenge and provide improved resilience (i.e., there will always be two aircraft available).

7.4.3 It would however also provide scope for expanding the current service. Consultation with Loganair suggested that the resilience benefit would be lost if the third aircraft was operated for the maximum 600 hours per annum. Instead, it was suggested that flying hours could be expanded by around half that amount, from 1,200 hours per annum to circa 1,400-1,500 hours per annum. Assuming the latter figure, this will represent around a 25% increase in flight hours for serving the islands. Note the timetable model developed for this study is working on the basis of the three aircraft delivering **1,480** hours per annum.

Deployment of additional flying hours

7.4.4 The evidence presented in Chapters 3-5 of this report highlight capacity problems on the air service, particularly where a rotation from Kirkwall serves more than one island. The main problem is where seat capacity on the 'middle leg' caps out. This latent demand is not systematically recorded but evidence from the survey and consultation (including with Loganair) highlighted this issue as the main problem.

7.4.5 To this end, the most effective way to deploy the additional flying hours is to split out the 'double-drops' – i.e., making almost all services direct to and from Kirkwall. This will have the added benefit of reducing flight time between the isles (on average around 8 minutes) and turnaround time in the isles (on average around five minutes), allowing a roughly hourly departure schedule from Kirkwall. It will also provide some flexibility at the margins to support islands with a reduced ferry service during refit. Whilst there are examples of beneficial inter-island flights, particularly Papa Westray – Westray in the summer months, the illustrative timetables which follow therefore make use of these additional hours primarily to split out indirect connections.

7.4.6 It should again be noted that this is an illustrative exercise to demonstrate what can be achieved through the deployment of a third aircraft. The air service timetables will ultimately be

determined by the democratic approach to timetable setting adopted by the Council, and the key metric is therefore the total increase in available flight hours.

7.5 Illustrative Timetable

7.5.1 The combined ferry and air service preferred options have been brought together to provide a set of illustrative timetables by island. For simplicity, these timetables largely represent a scaling up of the current service received by each island and do not involve any significant reallocation of services between them – this would be a matter to be determined through the timetable setting process based on the total ferry and air service hours available.

7.5.2 In the interests of brevity, only the illustrative timetable for Kirkwall - Westray is shown below, with those for the other five islands included in **Appendix C**.

Figure 7.1: Preferred Option – Illustrative Kirkwall - Westray Timetable

7.5.3 The benefits of the preferred timetable solution for Westray are as follows – it:

- broadly delivers the minimum **Routes and Services Methodology** outcome;
- provides a **half-day and /or full-day in Kirkwall** Monday to Saturday;
- facilitates a Sunday day-return to Kirkwall;
- provides for **later evening sailings on a Friday and Saturday**; and
- the **third aircraft** will eliminate most of the multi-leg journeys (although it is expected the summer flights to Papa Westray will be maintained for their tourism benefit), creating a **largely point-to-point network**.

7.5.4 The scale of improvement offered by island is shown in Tables 7.1 (summer and winter) and 7.2 (refit):

Table 7.1: Change in weekly 1-way connections, summer and winter timetable

	Timetable	Total 1-way weekly sailings	Total No. of 1-way direct sailings	Total No. of 1-way indirect sailings	Total No. of 1-way direct flights	Total No. of 1-way indirect flights
Eday	Current	41	20	21	4	2
	Preferred	**42**	**30**	**12**	**6**	**0**
	Current	4	3	1	28	10

	Timetable	Total 1-way weekly sailings	Total No. of 1-way direct sailings	Total No. of 1-way indirect sailings	Total No. of 1-way direct flights	Total No. of 1-way indirect flights
North Ronaldsay	**Preferred**	**6**	**3**	**3**	**40**	**0**
Papa Westray	Current	4	2	2	19	19
	Preferred	**6**	**3**	**3**	**38**	**0**
Stronsay	Current	28	16	12	12	12
	Preferred	**50**	**41**	**9**	**24**	**0**
Sanday	Current	29	20	9	11	13
	Preferred	**40**	**37**	**3**	**24**	**0**
Westray	Current	34	33	1	12	12
	Preferred	**40**	**40**	**0**	**24**	**0**

Table 7.2: Change in weekly 1-way connections, refit timetable

	Timetable	Total 1-way weekly sailings	Total No. of 1-way direct sailings	Total No. of 1-way indirect sailings	Total No. of 1-way direct flights	Total No. of 1-way indirect flights
Eday	Current	28	14	14	7	1
	Preferred	**41**	**20**	**21**	**12**	**0**
North Ronaldsay	Current	2	2	0	27	5
	Preferred	**4**	**3**	**0**	**32**	**0**
Papa Westray	Current	4	2	2	15	15
	Preferred	**4**	**2**	**2**	**30**	**0**
Stronsay	Current	26	13	13	12	12
	Preferred	**28**	**16**	**12**	**24**	**0**
Sanday	Current	30	5	25	11	13
	Preferred	**29**	**20**	**9**	**24**	**0**
Westray	Current	34	33	1	12	12
	Preferred	**34**	**33**	**1**	**24**	**0**

7.5.5 It can be seen from the above tables that the illustrative preferred timetable option represents a significant scaling up in direct connectivity, particularly in the refit timetable period. The total number of sailings for Eday is particularly high due to its continued connection with Stronsay to maintain the freight link. In the event that an alternative freight model was adopted in Eday, the number of sailings would reduce to a level akin to that in Sanday, Stronsay and Westray.

8 Vessels & Infrastructure – Option Development

8.1 Overview

8.1.1 Having defined the preferred timetable option, the final step in the option development process is to identify the vessel and infrastructure investment required to support the future delivery of the service.

8.1.2 Again, the starting point for this analysis is the four-vessel solution identified through the SBC and confirmed through the review of the Strategic Case in the OBC (Chapter 2 of the Phase 1 report – see **Appendix A**).

8.2 Forecast Horizon

8.2.1 Chapter 6 of this report established the recent trends in carryings and capacity utilisation. In defining the potential vessel requirement, it is however important to provide a forecast of potential future demand. Note that this exercise is based on 2019 carryings and fares and will need to be updated at FBC stage to account for the impact of fares reductions on the ONI routes (and COVID-19) once the impacts have bedded in.

8.2.2 This exercise has a planning horizon of around 30 years, reflecting the assumed design life of the new vessels which will be brought into service on the ONI network. It is therefore instructive to look back over a similar timeframe. Scottish Transport Statistics reports ONI carryings from 1994 to 2018 and these trends are shown in the figure below.

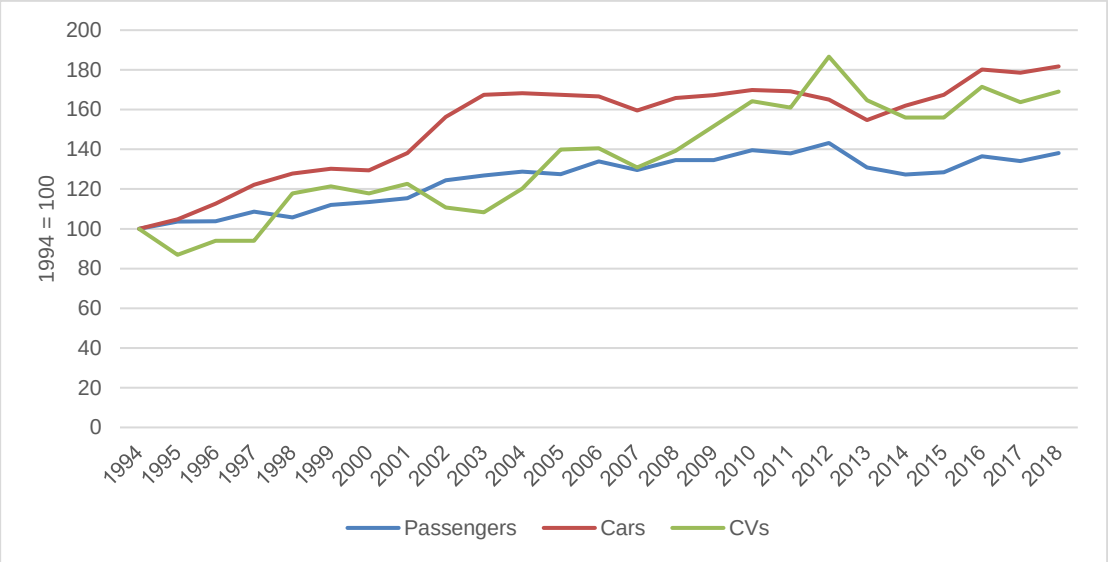

Figure 8.1: Long Term Trend on ONI Routes (1994=100), (Source: Scottish Transport Statistics)

8.2.3 The main points to take from the above figure are:

- Car carryings grew substantially between 1994 and 2003. There was then a flat period until 2013 from when growth resumed. Overall, carryings have grown by 80% since 1994. By way of context general car traffic (vehicle kilometres, Scotland) has only grown by around 23% across this period.
- For commercial vehicles (as defined by Orkney Ferries) the picture is one of steady growth across the period with a particular spike in 2012, which may be project related. Commercial vehicle carryings have grown by 70% since 1994, a figure much closer to the national figure

of 74%, although the national figure is driven by LGVs rather than HGVs (109% and 15% respectively).

- Growth in passengers has been around half that of cars at 28% suggesting a switch from travelling as a foot passenger to car-based travel.

8.2.4 The key trends in terms of per annum growth and associated 30-year demand projections are shown in the table below.

Table 8.1: Long Term Trends and Demand Projections

	Historic Trend (per annum)		30 Year Projection	
	Last 10 Years	***Last 20 Years***	***Using…10 year trend***	***Using…20 year trend***
Passengers	0.3%	1.3%	+8%	+49%
Cars	0.9%	1.8%	+32%	+70%
Commercial Vehicles	2.0%	1.8%	+79%	+72%
PCUs	1.7%	1.8%	**+60%**	**+71%**

8.2.5 Under the higher (last 20 year) trend forecast projected over 30 years, PCU carryings (i.e., demand on the vehicle deck) would rise by 71%. Under the lower (last 10 year) trend, carryings would increase by 60%.

8.2.6 So, if these long-term trends were to continue for 30 years there would be an **increase in demand for vehicle carryings of around two-thirds**. Clearly, any external changes which lead to a marked departure from this trend (e.g., mass movement of hydrogen by ferry or significantly reduced travel post-COVID-19) would impact on this forecast, which should be kept under review as the business case progresses.

8.2.7 The trend-based forecast, if realised, would represent a significant increase in demand. In the current climate there is a policy question for the Council, HITRANS and Transport Scotland (as potential funders) as to whether, or how to cater for this potential growth in vehicular traffic. To a degree, there is a choice between 'predict and provide' or other approaches which seek to manage or guide travel behaviour away from private car usage in particular. Reflecting this, the national policy context is highlighted below.

National policy context

National Transport Strategy 2

8.2.8 Transport Scotland published its updated **National Transport Strategy 2 (NTS2)** in February 2020[22]. This sets out two separate hierarchies which provide important context when developing options in any transport project. These are the *Sustainable Travel Hierarchy* and the *Sustainable Investment Hierarchy*, each of which is shown in the figures below. They essentially set out a sequence of steps which should be considered when developing potential solutions to identified transport problems.

[22] https://www.transport.gov.scot/our-approach/national-transport-strategy/

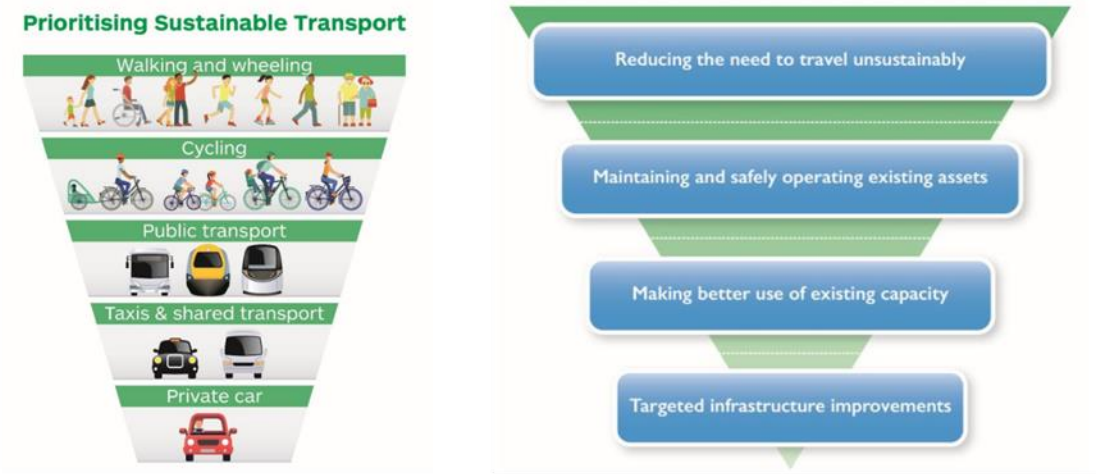

Figure 8.2: Sustainable Transport Hierarchy and Sustainable Investment Hierarchy

8.2.9 The key implication of the above is that the Council, through this business, case should be seeking to reduce the need to travel unsustainably, with targeted infrastructure improvements implemented only once all other avenues are exhausted. Providing new infrastructure to facilitate the private car therefore sits at the foot off these hierarchies.

8.2.10 Whilst the case for new tonnage cannot be argued, building in substantial additional vehicle-carrying capacity without: (i) a clear and evidence-based need to do so; and (ii) first attempting to influence travel behaviour or manage demand may be viewed negatively in this policy context.

8.2.11 It should be noted though that Transport Scotland is currently developing an **Islands Connectivity Plan** which flows from the new NTS2. Recognising the unique nature of islands, this Plan may take a view on the applicability of these hierarchies in an island / lifeline context where travel by car is often essential. The direction of travel implied by these hierarchies would be expected to remain however.

Climate Change Plan Update 2020

8.2.1 The Scottish Government's *Update to the Climate Change Plan 2018 – 2032*[23] published in December 2020 notes the commitment to reduce emissions by 75% by 2030 (compared to the 1990 benchmark) and achieve 'net-zero' by 2045. There is also a commitment reduce car kilometres by 20% by 2030 (assumed to be from the 2020 level but this has not yet been specified)[24]. This implies a general policy position against catering for unrestrained car growth, albeit there is again an island-specific context here.

COVID-19

8.2.2 The COVID-19 pandemic has the potential to bring about permanent change in society which will likely impact on travel patterns. Many employers and service providers are planning to adopt at least some of the remote practices which the pandemic has forced them to implement. This represents a major uncertainty in any transport planning exercise at present, but the emerging consensus is that travel volumes (at least for some purposes (commuting, health, business travel, shopping etc.)) will reduce as a result of the pandemic and travel for other purposes (leisure, parcel delivery) may increase.

[23] https://www.gov.scot/publications/securing-green-recovery-path-net-zero-update-climate-change-plan-20182032/

[24] https://www.transport.gov.scot/our-approach/environment/mission-zero-for-transport/

Technological change

8.2.3 The next 30-years will also bring further uncertainty and change in the supply of transport services. Decarbonisation, the advent of 'smart mobility' and eventual automation will all impact on the way in which we use transport over this period, including car ownership. This will inevitably impact on the use of ferry services, and smart mobility solutions in particular may reduce the need for people taking private cars on ferries.

A four-vessel solution – forecast load factor analysis

8.2.4 As demonstrated in Chapter 7, the four-vessel solution will provide a significant increase in the number of connections to the ONI. Passengers will therefore have the choice of their 'current' sailings or the 'additional' sailings. Our analysis to-date suggests that under a four-vessel scenario there would be around a 26% increase in sailings.

8.2.5 So as a hypothetical example, on a given day between a given island and Kirkwall:

- There are currently two sailings per day between the island and Kirkwall, these two sailings carry 50 PCU, 25 PCU per sailing.
- Over time, demand will grow by two thirds to 83 PCU per day.
- As a result of the fourth ferry, a third connection is added.
    - If *nobody* used the additional connection, then demand on existing sailings would grow to 41.5 PCU per sailing.
    - However, if *10%* switched to the additional sailing, demand on existing sailings would reduce to 37.5 PCU per sailing, with 8 PCU on the 'new' sailing.
    - And if *25%* switched to the additional sailing, demand on existing sailings would reduce to 31.25 PCU per sailing, with 21 PCU on the 'new' sailing.

8.2.6 Analysis of the capacity of the Eday / Sanday / Stronsay and Westray services to accommodate projected increases in demand for vehicle carryings has been undertaken as follows:

- All existing sailings have had growth applied in a range of increments from 5% to 100%.
- The resulting proportion of sailings projected to operate at >90% load factor has been determined in the context of the assumed PCU capacity.
- These values can be compared with the present-day situation and therefore it can be determined whether things get better or worse relative to the present day.
- These growth rates have then been reduced in a range of increments from 5% to 30% to account for people switching to the 'new' connections and in effect reducing demand on 'existing' sailings as set out above.
- A 'matrix' is then produced showing the projected proportion of >90% load factor sailings under a range of 'growth' and 'switching' scenarios.

8.2.7 A further likely consequence of moving to a four-vessel fleet is that there will be a higher proportion of sailings undertaken with very low load factors. This is also touched on below.

Vessel Scenario 1

8.2.8 In vessel Scenario 1, as a 'worst case', we have assumed that each new vessel would provide the same (stated) PCU carrying capacity as MV *Varagen*, circa 28 PCUs. Given that the two *Earls* have a lower PCU capacity, this would still provide an increase in fleet PCU capacity of **56%** (72 PCU up to 112 PCU). It is assumed that the current deadweight limits would not apply to the new vessels so this constraint would be removed. Given that vessels are now built to different standards and cars are larger, a 'like-for-like' vessel in this context would need to be

larger. The working assumption is that such a vessel would be circa 55m length overall (LOA), but this will only be confirmed upon the appointment of a naval architect.

8.2.9 The results are summarised below. Pink cells show a worsening of the present-day position (where **16%** of sailings have a > 90% load factor) while green cells show an improvement against this benchmark. The row showing 66% growth is highlighted in bold as this would represent trend growth as set out above.

8.2.10 As an example, if demand was to increase by 20% and there was to be a 5% switch to new sailings, then 14% of all existing sailings would operate at >90% load factors, a slight improvement on the present day figure of 16%.

		% switching to new sailings				
		0%	5%	10%	20%	30%
% growth in PCU demand	0%	6%	4%	2%	1%	0%
	5%	8%	6%	4%	1%	0%
	10%	11%	8%	6%	2%	0%
	20%	17%	14%	10%	4%	1%
	30%	25%	20%	16%	8%	3%
	40%	31%	26%	21%	13%	5%
	50%	37%	31%	26%	17%	8%
	66%	**47%**	**42%**	**37%**	**26%**	14%
	75%	48%	47%	42%	31%	20%
	100%	59%	59%	53%	42%	31%

Figure 8.3: % Sailings with load factor >90%, 4 * 55m vessel scenario

8.2.11 Under this scenario:

- In the unlikely event that no demand switched to the new connections (i.e., the additional sailings were empty), a growth of around 20% could be accommodated from the present day until present day conditions are reached again. This would happen in 10-11 years.
- More trend growth could be accommodated as the level of vehicles switching to new sailings increases**. The full 66% trend growth could be accommodated if 30% of total demand were to switch to the 'new' sailings.**
- With a broadly *pro rata* switch to new sailings (20%), growth of up to 50% could be accommodated until present day load factors are once again reached.
- Under an illustrative 50% growth / 20% switch scenario, **35%** of all sailings would sail with a load factor of less than 50%, a similar level to the present day

8.2.12 Note though that this analysis represents a '**worst case**' as it is based on *current sailings* and therefore does not reflect the fact that **many 'shared' Kirkwall connections would become direct connections, which in itself would free up significant capacity.**

Vessel Scenario 2

8.2.13 Vessel Scenario 2 assumes four slightly larger vessels of 32 PCU carryings. These vessels are assumed to be 65m LOA, which is considered to be the maximum length which can be accommodated without significant adaptations to terminal infrastructure. Four vessels with a PCU capacity of 32 would provide a **78%** increase in fleet capacity.

% growth in PCU demand	% switching to new sailings				
	0%	5%	10%	20%	30%
0%	0%	0%	0%	0%	0%
5%	1%	0%	0%	0%	0%
10%	1%	1%	0%	0%	0%
20%	3%	2%	1%	0%	0%
30%	6%	4%	3%	1%	0%
40%	11%	7%	5%	2%	0%
50%	16%	11%	8%	3%	1%
66%	**25%**	**20%**	14%	7%	3%
75%	29%	25%	20%	11%	4%
100%	42%	36%	31%	21%	11%

Figure 8.4: % Sailings with load factor >90%, 4 * 65m vessel scenario

8.2.14 Under this scenario:

- A 'worst case' 50% growth in PCUs could be accommodated assuming no switching to new sailings
- **The full 66% could be accommodated with only a 10% switch to the new sailings**
- With a broadly *pro rata* switch to new sailings (20%), growth of up to 100% could be accommodated until present day load factors are once again reached.
- Under an illustrative 50% growth / 20% switch scenario, **53%** of all sailings would sail with a load factor of less than 50%, compared to roughly one third in the present day

8.2.15 As noted above these figures represent a '**worst case**' as most of the multi-island connections would be replaced with direct connections freeing up significant capacity.

Summary

8.2.16 At the outset of this process, much of the underlying rationale for a fourth ferry was concerned with **connectivity** rather than **capacity**, rooted as it was in Transport Scotland's Routes and Services Methodology (RSM). Nevertheless, it is clearly important to determine whether the new service envisaged for the ONI will provide sufficient capacity across the 30-year lifespan of the assets, such that the ferry network does not unduly constrain the development of the islands over this period. This section has undertaken analysis to this end.

8.2.17 Any four-vessel scenario would address the current capacity pinch points, these being: **multi-island sailings, use of *Earls* sized vessels, and days when Westray has only two connections**. The number of island connections would increase by around a quarter, deadweight restrictions would be removed for routine traffic, and all individual sailings would be undertaken by a vessel providing vehicle capacity of at least that of MV *Varagen*. In itself, the replacement of multi-island connections with single island connections on the Eday / Sanday / Stronsay routes would reduce the number of high load factor sailings by over 70%.

8.2.18 Since 1994, vehicular carryings on these routes have increased by 70%-80% with growth in both cars and commercial vehicles. Car ferry traffic has grown much faster than general car traffic in Scotland. Passenger growth has been more modest at 38%. These trends have been against the backdrop of static, at best, island population levels. Two questions emerge from this:

8.2.19 ***Will these trends continue for the next 30 years?*** The aftermath of COVID-19 allied to ongoing societal trends (greater working and shopping from home) and technological change in the transport sector would appear to be reducing the demand for travel and diminishing the importance of the private car in particular. However further development of tourism in the islands would increase (seasonal) demand, as would increased population and commerce in

the isles. There will be a range of factors which could see travel grow or decline and there is a high degree of uncertainty associated with this.

8.2.20 ***What level and type of growth does the Council wish to plan for?*** This is essentially a policy decision for the Council and other partners and funders to consider. It is very clear though that the thrust of much of transport policy is to move away from the private car[25] where possible towards more sustainable and active modes. If this business case is to reflect Scottish Government policy, the Sustainable Transport and Sustainable Investment Hierarchies will need to be demonstrably followed. This would imply that the provision of new capacity aimed at the private car should only go ahead after other avenues are exhausted. These avenues could include:

- Increased parking provision at island terminals and improved connectivity from Kirkwall ferry terminal to key locations around the town and island, e.g., shuttle buses, e-bike, electric scooter and bike hire, (electric) car clubs etc. allowing more people to travel as foot passengers, priced accordingly
- Approaches to 'pooling' of movement / delivery of household goods – internet-based shopping is essentially a version of this
- Video-based health consultations and other virtual appointments – these have increased with the pandemic and we understand that some health boards are planning to continue this at scale
- Introducing price-based demand management measures – reducing fares on quiet sailings and / or increasing fares on busy sailings

8.2.21 The main headlines of this analysis are as follows:

- At present, around **16%** of connections on the Eday / Sanday / Stronsay and Westray routes recorded a load factor of >90% in this analysis.
- Hypothetically, if the supply side remained unchanged and trend growth of 66% was applied, this figure would increase to **59%** of connections.
- A 4-vessel MV *Varagen* size (28 PCU) solution would reduce this figure to **47%** without any switching to new sailings - if *30%* of total demand was to switch to new sailings, this figure would reduce further to **14%**, lower than the present rate
- A 4-vessel 65m (32 PCU) solution would reduce this figure to **25%** without any switching to new sailings - if only *10%* of total demand was to switch to new sailings, this figure would reduce further to **7%**

8.2.22 **In the event of the trend growth continuing, this could therefore be accommodated with MV *Varagen* sized vessels (28 PCU), assuming a significant redistribution of demand from 'existing' to 'new' connections**. A 4 x 32 PCU solution would accommodate the full trend demand with a much lower assumed switch. However, the number of sailings with very low load factors would be much higher under this scenario. If the trend demand of 66% is deemed unlikely / undesirable, then these issues become somewhat academic as the 'lesser' solution could cope with demand.

8.2.23 In the event that vehicle-deck capacity issues did emerge in the longer-term with the new solution, there are a number of potential ways in which this could be managed:

- Scaling up the service operated on each of the four vessels, working towards a circa 16-18-hour day.

[25] Note that although electric vehicles remove tailpipe emissions in use they are carbon intensive in manufacture and therefore are not seen as a complete 'solution' to the car 'problem'.

- Whilst this would provide more capacity, much of it would be at less useful times of the day and it is debatable whether such additional capacity would fully alleviate high load factor 'peak' sailings.

- Adding a fifth vessel to the fleet, albeit this would incur significant additional capital and revenue costs for limited benefit.

8.3 Outline Vessels Specification

8.3.1 From a vessels perspective, one challenge is developing a vessel solution for North Ronaldsay and Papa Westray which is proportionate to the needs of those islands whilst at the same time providing maximum flexibility within the wider ONI fleet.

8.3.2 Following a review of potential design vessel options, the Phase 1 report narrowed the choice down to two potentially workable options.

- **Option 1:** 1 * circa 45m length overall (LOA) Ro-Pax linkspan vessel for North Ronaldsay and Papa Westray (also serving the other four islands) and 3 * circa 65m LOA Ro-Pax linkspan vessels for Eday, Sanday, Stronsay and Westray. This vessel mix is dependent on securing appropriate **refit cover** for the North Ronaldsay and Papa Westray vessel – **if this could not be provided**, the preferred vessel mix was…
- **Option 2:** 2 * circa 45m LOA and 2 * circa 65m LOA Ro-Pax linkspan vessels.

8.3.3 At the outset of the Phase 2 study, a workshop was held with the Council, Orkney Ferries, HITRANS and HIE to further consider the potential vessel solution. The discussion at the workshop concluded that:

- There are no workable long-term solutions for covering refit at North Ronaldsay and Papa Westray if these islands were served by a *single* 45m LOA vessel. Whilst freight flights can provide for some of the supply-chain needs of the islands, they cannot meet the full range of needs and thus a reliable scheduled ferry service is required. Therefore, **Option 1 was discounted from further consideration** – i.e., the future fleet either has to offer four standard vessels or a dual fleet with two vessels in two different size categories.
- The capacity utilisation forecast analysis suggests that a solution where 2 * 45m LOA vessels is provided may not provide sufficient network-wide capacity. Moreover, the use of a dual fleet of two different vessel sizes would reduce inter-changeability and thus operational flexibility unless all ONI harbours were scaled up to accept the larger of the two vessel classes.
- It was also determined that the current infrastructure can accommodate vessels of maximum length of circa 55m LOA (MV *Varagen* is 50 metres). Any larger vessels would require more significant harbour infrastructure works, entailing greater cost and construction related disruption.

8.3.4 Based on the above discussion, it was agreed that the most appropriate solution is to develop a standard fleet of four vessels with a **target PCU carrying of 28**, which could accommodate existing trend growth (see Section 8.2). However, it is only through the design stage which follows on from this OBC that the size of vessel required for a given PCU capacity will become clear, and indeed the target PCU capacity will be revisited as part of that exercise.

8.3.5 As the length of vessel required to provide the target PCU carrying (28 PCUs) is not known at this stage, we have taken a conservative approach and **sized the ferry terminal infrastructure for a 65m LOA vessel**, an assumption that will be refined through the design phase and FBC. This also future proofs the infrastructure against the next generation of vessels, given that infrastructure typically has a 60-year life, whilst a vessel works to a nominal 30-year life.

8.3.6 Other desirable design characteristics (again subject to further development through the design process) determined at the workshop included:

- The maximum draught of the fleet will be determined by Stronsay Channel, as this is effectively the lowest common denominator in relation to this parameter, and where maintenance dredging should be minimised where practical. It was agreed with the Council and Orkney Ferries that a draught of 3.7m will be allowed for on the new vessels, which compares to 3.25m draught on the current vessels. Dredge quantities in the analysis which follows reflect this, with a further 1m under-keel clearance (UKC) plus 1m overdredge to allow for 1m UKC to be maintained.
- Proposed vessel speed is 12 knots at 85% maximum continuous revs.
- Orkney Islands Council declared a 'Climate Emergency' in May 2019 and is working to deliver the Scottish Government's commitment to net zero emissions of all greenhouse gases by 2045. As ferries are amongst the largest emitters of greenhouse gases under Council control, the future vessels will use a low / zero emission fuel, although the exact fuel type will be determined at Final Business Case stage through liaison with vessel designer(s) / shipyard(s).
- The hull form will be dependent on advice from naval architects but Orkney Ferries anticipates at this stage that the vessels will have a traditional hull form (monohull) with a bulbous bow.

8.3.7 The approach to specifying the vessel parameters and design will be established in more detail in the Commercial Case (separate to this report).

Key Point: The broad vessel specification used in this report assumes a target PCU capacity of 28. However, given uncertainty over future vessel dimensions relative to capacity and the need to future proof against a further cycle of ferry replacement, the ferry terminal infrastructure will be conservatively sized for a 65m LOA vessel, an assumption that will be revised through the design stage and FBC.

When is vessel specification finalised?

- At the Socio-Economic Case stage of the OBC (i.e., this work), 'design vessels' are used as the basis of costing and identifying the scope, scale and cost of harbour works required to accommodate them. The vessel specification is not typically advanced much beyond this at this stage.
- At the Commercial Case stage of the OBC, initial consideration is given as to how the vessels will be procured, and the extent to which the buying party wishes to influence the overall design. There are a wide range of options, ranging from the two extremes of providing a full design for yards to bid against to an 'output specification', which sets out key design parameters the buyer wants incorporated in the vessel (e.g., PCU capacity, speed, fuel type etc) but leaves it to naval architects and shipyards to come forward with ideas on how best to deliver this.
- The updated Commercial Case in the Final Business Case (FBC) will confirm a preferred option in terms of how the new vessels are specified. The extent of the design at FBC stage will depend on the procurement route chosen and who the buying party is.

8.4 Harbour Infrastructure Requirements

8.4.1 This section sets out the ferry terminal infrastructure requirements required across the six ONI ports. A general arrangement drawing and supporting commentary is provided for each port. For each drawing, a 65m LOA vessel is shown on the berth, which has been used to size the infrastructure appropriately. Larger versions of these general arrangement drawings can be found in **Appendix D**.

8.4.2 Drawings and costings allow for 3.7m draught, with 1m under keel clearance and a further 1m overdredge to ensure appropriate maintained depth.

Eday

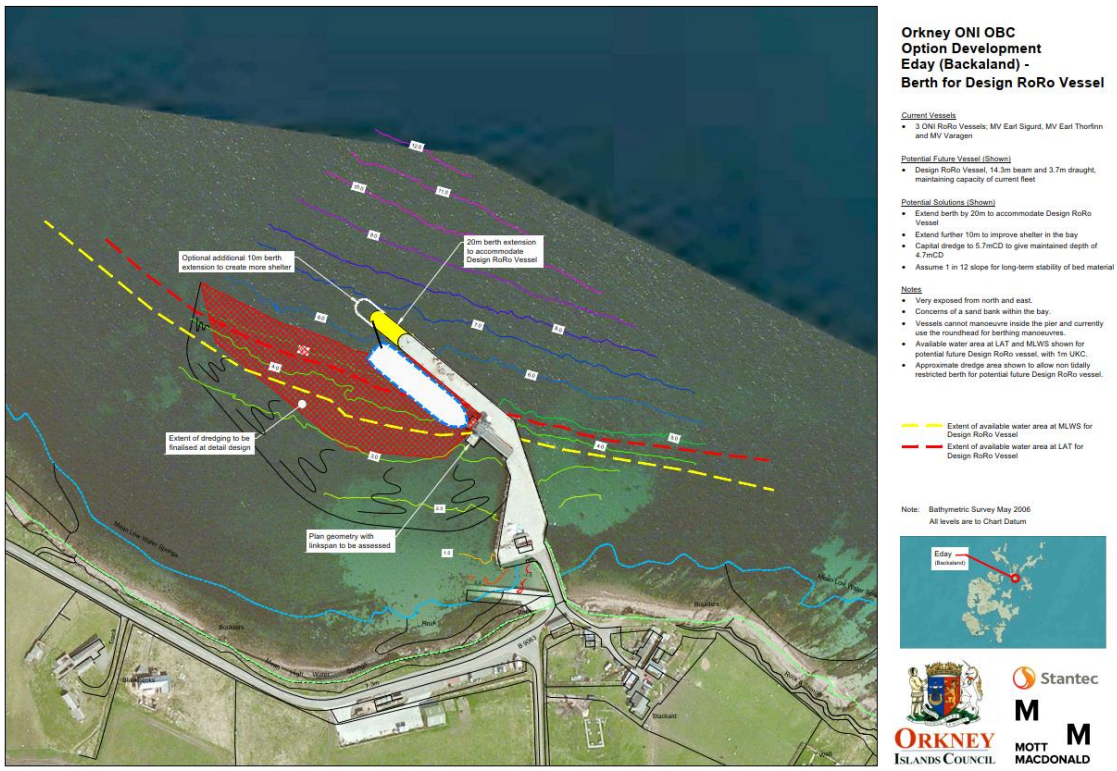

Figure 8.5: Eday General Arrangement

8.4.3 At Eday, it is recommended that the existing berth is extended by a minimum of 20m. This will allow berthing of a Ro-Ro vessel up to 65m in length. The figure above shows an optional additional 10m berth extension, which will aim to further improve conditions at the berth.

8.4.4 Dredging will be required to facilitate use of the berth by vessels larger than the current incumbents. The volume of dredging is to be confirmed at detailed design stage on confirmation of vessel draught. The plan geometry of the new vessel with the existing linkspan is also to be assessed at detailed design.

North Ronaldsay

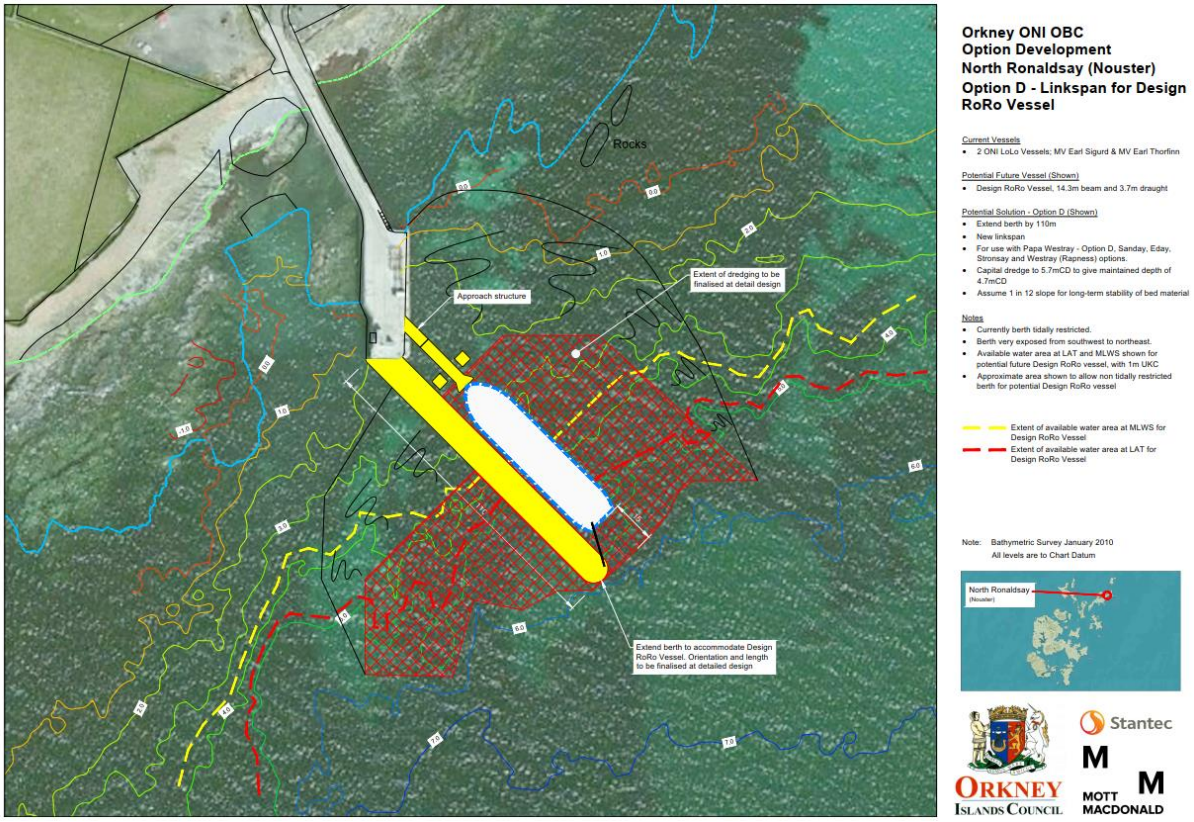

Figure 8.6: North Ronaldsay General Arrangement

8.4.5 To accommodate a Ro-Ro vessel at North Ronaldsay, it is recommended that the infrastructure is upgraded to include a pier extension and new linkspan with approach structure.

8.4.6 Dredging will be required at North Ronaldsay to facilitate use of the terminal by a larger vessel than those which currently serve the island. The volume of dredging is to be confirmed at detailed design stage, on confirmation of vessel draught.

8.4.7 The orientation and length of the berth extension will be optimised at detailed design stage, taking account of location specific wave modelling.

Papa Westray

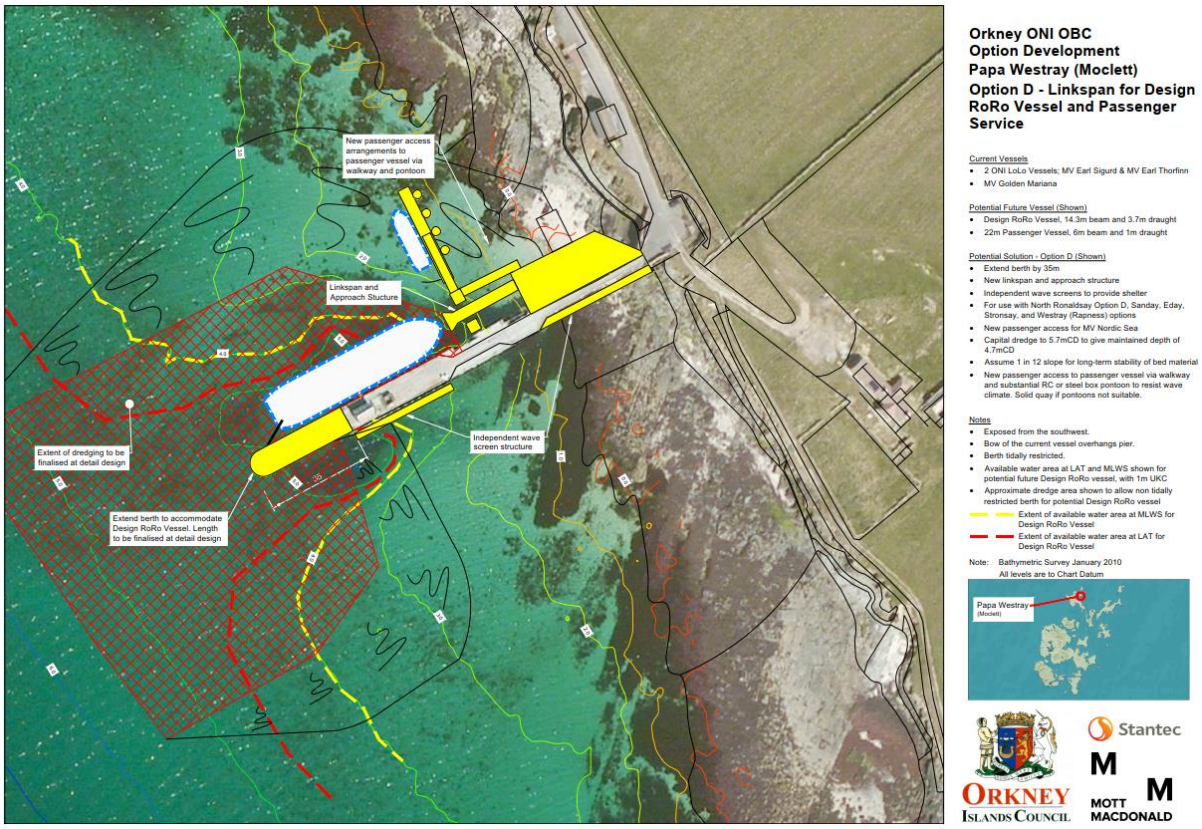

Figure 8.7: Papa Westray General Arrangement

8.4.8 To accommodate a Ro-Ro vessel at Papa Westray, it is recommended that the infrastructure is upgraded to include provision of a pier extension, new linkspan with approach structure and independent wave screens to improve shelter on the linkspan berth.

8.4.9 It is anticipated that dredging will be required to facilitate use of the terminal by the design Ro-Ro vessel. The volume of dredging is to be confirmed at detailed design stage, on confirmation of vessel draught.

8.4.10 In addition, it is recommended that improvements to passenger access to the passenger vessel to Pierowall are provided via a gangway and pontoon arrangement.

Sanday

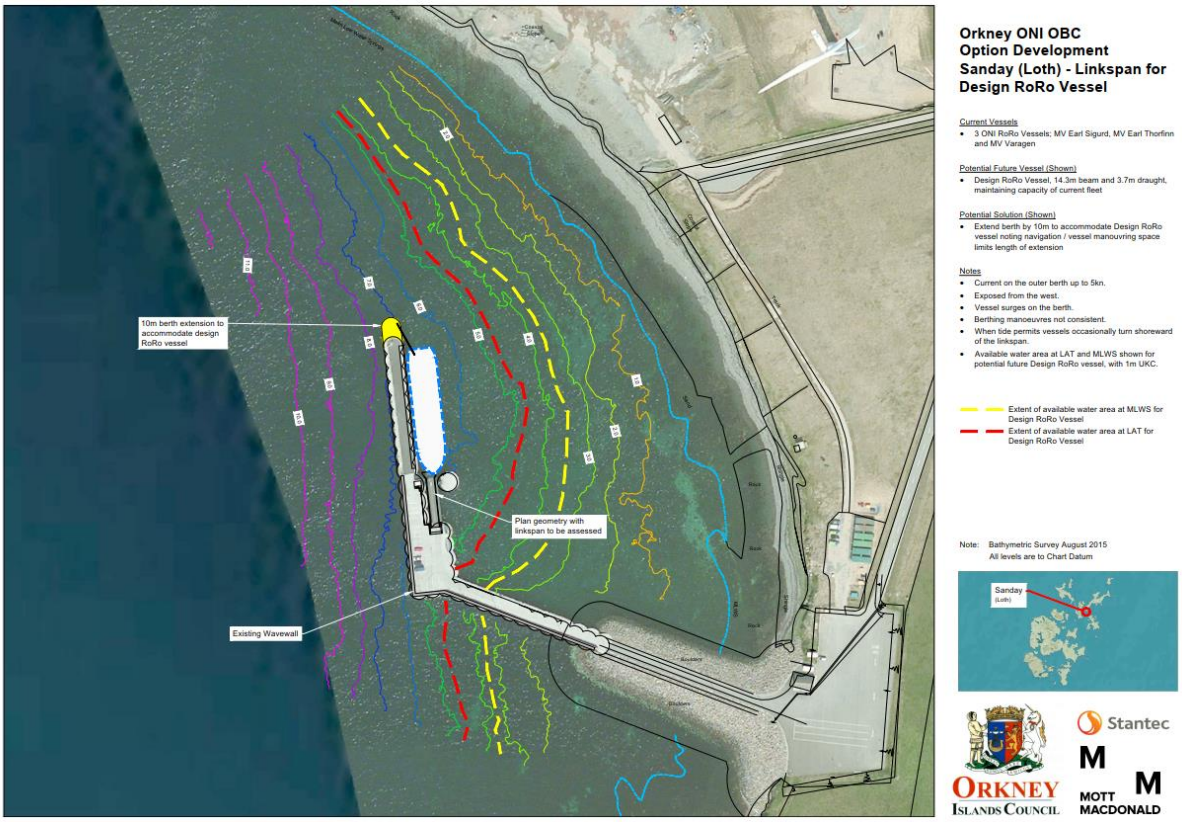

Figure 8.8: Sanday General Arrangement

8.4.11 At Sanday, it is recommended that the existing berth is extended by 10m to provide sufficient mooring arrangements for the design vessel. It should be noted that a berth extension of greater than 10m could have a detrimental impact on navigation due to the proximity of the shore to the north – this will need to be further considered during the design stage.

8.4.12 The plan geometry of the new vessel with the existing linkspan will be assessed at detailed design.

Stronsay

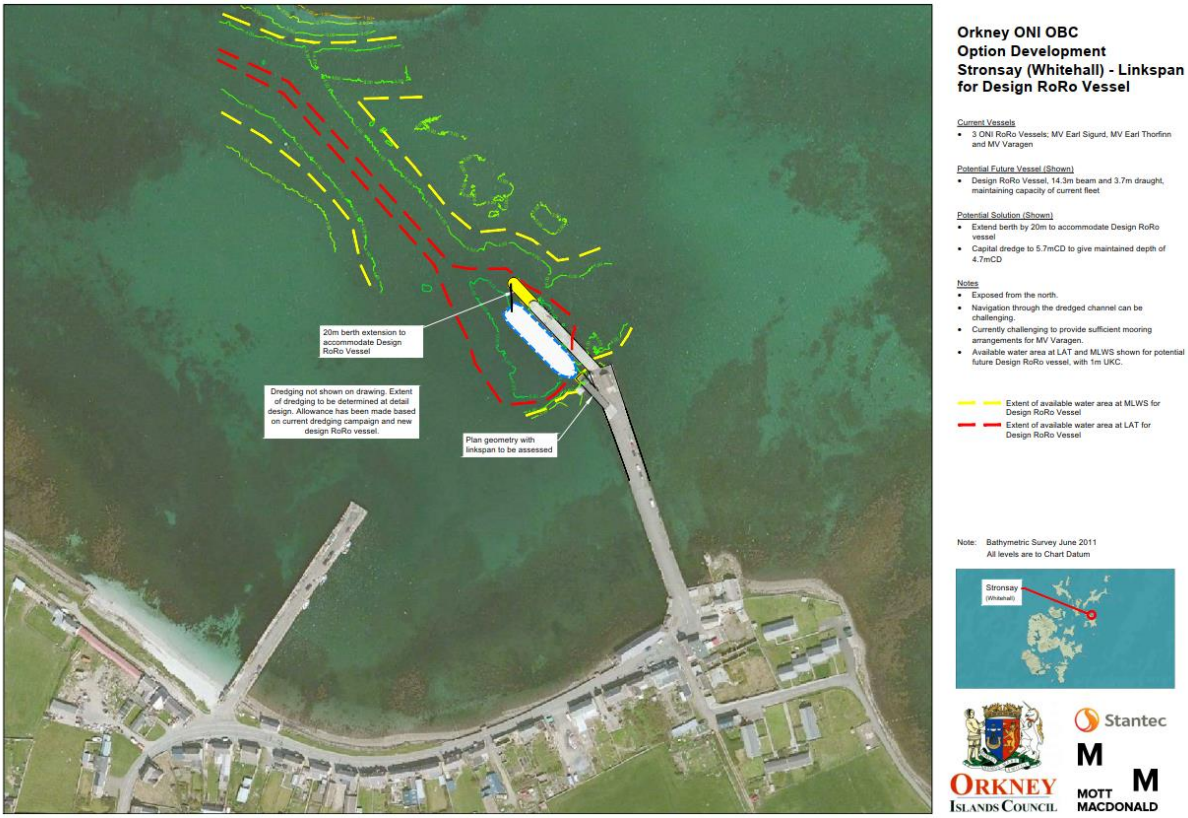

Figure 8.9: Stronsay General Arrangement

8.4.13 The proposed solution at Stronsay is to retain the ferry terminal at Whitehall and extend the existing berth by 20m to provide sufficient mooring arrangements to accommodate a larger Ro-Ro vessel than those which currently ply the route.

8.4.14 A continuation of the existing dredging campaign is recommended to further deepen the approach channel for a larger vessel, noting that the vessel draught is yet to be confirmed.

8.4.15 The plan geometry of the new vessel with the existing linkspan will be assessed at detailed design.

Westray

Rapness

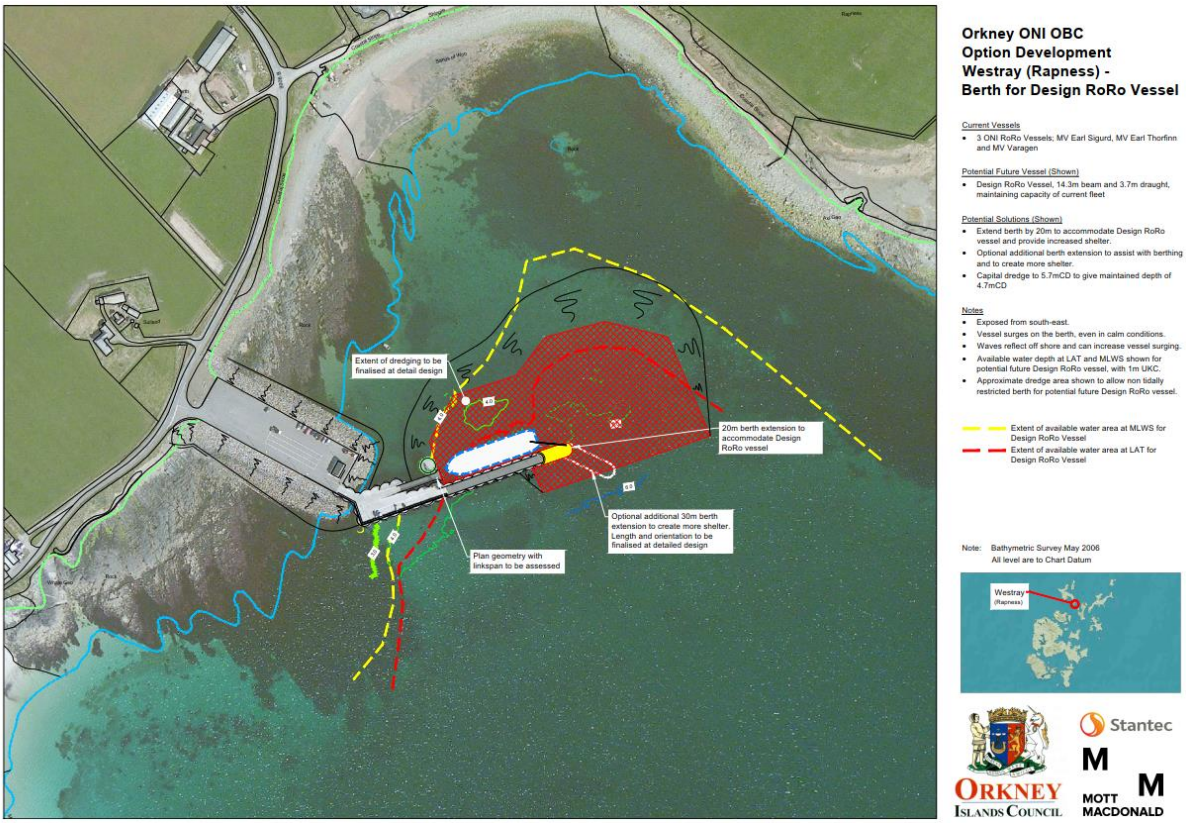

Figure 8.10: Rapness General Arrangement

8.4.16 It is recommended that the existing berth at Westray (Rapness Terminal) is extended by 20m to allow berthing of a larger Ro-Ro vessel. The figure above shows an optional additional 30m 'dog-leg' berth extension, which will aim to further improve conditions at the berth.

8.4.17 The orientation and length of the berth extension will be optimised at detailed design stage, taking account of location specific wave modelling.

8.4.18 Dredging will be required to facilitate use of the berth by the design vessel. The volume of dredging is to be confirmed at detailed design stage, on confirmation of vessel draught.

8.4.19 The plan geometry of the new vessel with the existing linkspan is to be assessed at detailed design.

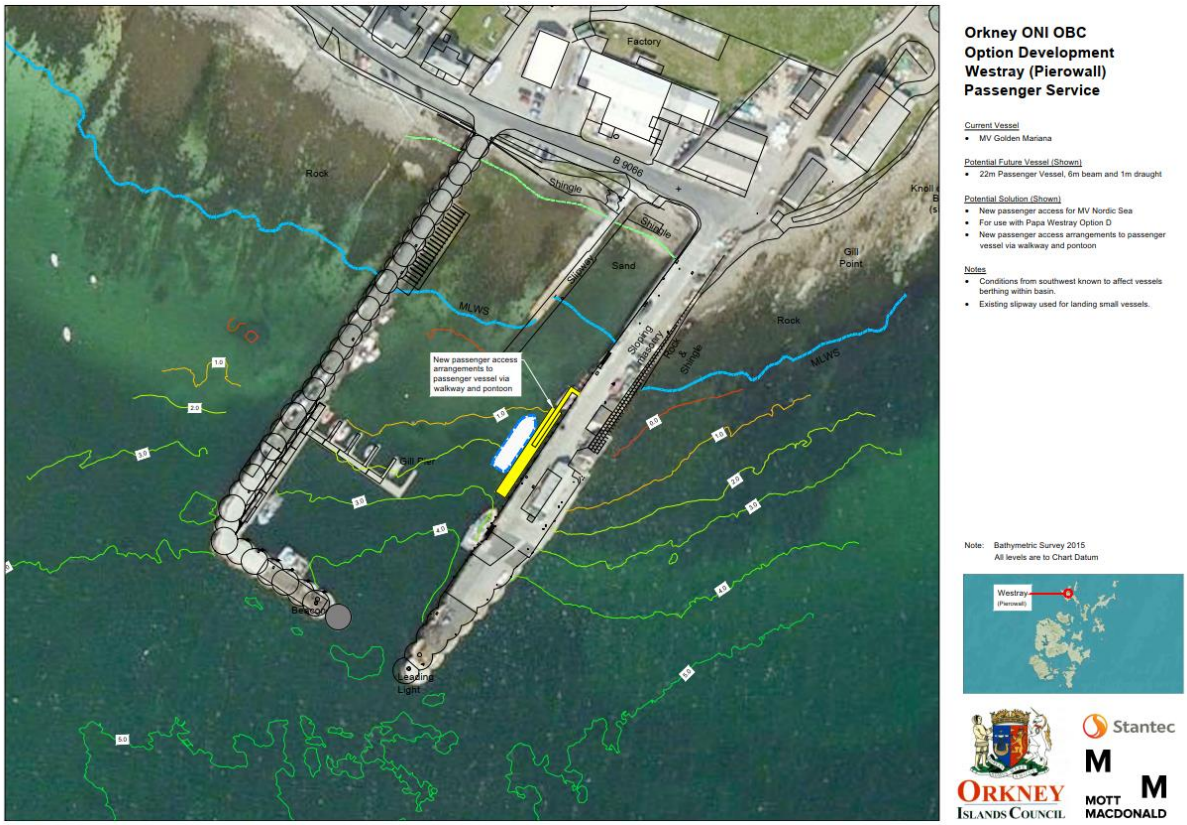

Figure 8.11: Pierowall General Arrangement

8.4.20 At Pierowall, it is recommended that improvements to access to the passenger vessel to Papa Westray is provided via a gangway and pontoon arrangement within the existing harbour. This will provide consistency of provision at both ends of the route.

8.5 Phasing of Options

8.5.1 The approach to the delivery of the preferred option package is typically set out in detail in the Commercial and Management Cases of the OBC. However, the working assumptions are that:

- The first phase of investment will be focused on addressing the most vulnerable parts of the network first; North Ronaldsay and Papa Westray. By removing the reliance on Lo-Lo as a first step, this will provide for a full Ro-Ro timetable to be developed, even if using the current vessels for a period.
- One new vessel will be delivered every 12-18 months.
- The programme for the remaining ports will be dependent the scale of work, how new vessels are introduced and the associated timetable, form of contract and a range of other variables.

9 Options Appraisal and Costing

9.1 Overview

9.1.1 The SBC (2016) incorporated a detailed appraisal of all potential options for serving the Outer North Isles against the Transport Planning Objectives (TPOs) and STAG criteria. It was through this analysis that a four-vessel and three aircraft solution was arrived at. The OBC has therefore been focused on how those four vessels and the third aircraft should best be deployed. It has not therefore involved comparing options which provide demonstrably different outcomes (i.e., the outcome in each case is additional direct connections). To this end, the focus has predominantly been on operational considerations setting out how these additional connections can best be delivered.

9.1.2 This appraisal chapter therefore is not a conventional multi-criteria comparison of different options, rather a validation exercise to ensure that the preferred option in terms of vessels, infrastructure and illustrative timetables aligns with the study TPOs and STAG criteria. Feedback from the public engagement on the preferred option package is also set out.

9.2 Transport Planning Objectives

9.2.1 Table 9.1 below reassesses the performance of the preferred option package against the TPOs. In keeping with the STAG guidance, the following notation is used:

✓✓✓ - major positive

✓✓ - moderate positive

✓ - minor positive

O - neutral

× - minor negative

×× - moderate negative

××× - major negative

Table 9.1: Preferred option package – appraisal against objectives

	Preferred option package
Transport Planning Objective 1: *The capacity of the services should not act as a constraint to regular and essential personal, vehicular and freight travel between the island(s) and Orkney Mainland.*	✓✓✓
Transport Planning Objective 2b: *Where an island does not have a 'commutable' combined ferry or air / drive / public transport / walk time to a main employment centre, the scheduled connections should permit at least a half day (e.g., 4 hours) in Kirkwall or Stromness 7-days a week, all year round.*	✓✓✓
Transport Planning Objective 3: *The scheduled time between connections should be minimised to increase flexibility for passengers and freight by maximising the number of island connections across the operating day.*	✓✓✓
Transport Planning Objective 4: *The level of connectivity provided should minimise the variation within and between weekdays, evenings, Saturdays and Sundays.*	✓✓
Transport Planning Objective 5: *Where practical, islanders should be provided with links to onward strategic transport connections which minimise the number of off-island overnight stays on Orkney mainland or further afield.*	✓✓

9.2.2 The main points of note from the above table are as follows:

- From the perspective of **TPO1**, the analysis highlighted that capacity problems outwith refit tend to occur on: (i) multi-leg sailings; (ii) when the sailing is operated by one of the *Earls*; or (iii) on days where there are only two Westray rotations. The preferred option package will resolve each of these factors, providing significant additional capacity on the network. Section 8.2, the forecast horizon, sets out in detail how the emerging solution will provide a major increase in network capacity. Reducing the number of indirect flights will also lead to a significant improvement in the capacity of the air service.
- The preferred option supports the delivery of **TPO2**. The provision of three return sailings per day to Eday, Sanday, Stronsay and Westray will allow for a half-day or full-day in Kirkwall by ferry on the extended days of Friday and Saturday and a near-full day on a Monday to Thursday, and a half day in Kirkwall on a Sunday. This level of connectivity will reduce slightly during the refit timetable, but that will still be equivalent to the current summer timetable. The illustrative timetables for North Ronaldsay and Papa Westray do not fully deliver this level of connectivity, but almost do so on most days of the week. This increase in frequency also contributes strongly to **TPO3** by reducing the gap between ferry connections and providing a degree of regularity to the timetable.
- The resident survey highlighted dissatisfaction with weekend services, which were seen as a barrier to accessing Orkney mainland attractions. The preferred option package makes a strong contribution to addressing this **(TPO4)** through broadly equating the Saturday service to the weekday service and providing morning and evening round-trip opportunities on a Sunday.
- The preferred option package will allow island residents to regularly connect with the mid-morning / early afternoon ferries and flights to and from Orkney and thus makes a moderate contribution to **TPO5**. The timing of the early morning flights to the Scottish mainland and evening arrivals from the Scottish mainland make integrating with inter-island services more challenging. That said, there will be improved opportunities to connect with late afternoon flight arrivals on a Friday and Saturday, when the length of the operating day will be extended through the split shift arrangements.

9.2.3 Overall, the preferred option package makes a highly positive contribution to the TPOs, with the illustrative timetables providing an increase in capacity, frequency and weekend service provision. The solution is also scalable, with opportunities to provide additional connections through the adoption of a different crewing model, realising the TPOs in full. However, such a solution would, at this stage, appear disproportionate.

9.3 STAG Criteria

9.3.1 This section undertakes a confirmatory appraisal of the preferred option package against the five STAG criteria and respective sub-criteria.

Environment

9.3.2 The table below summarises the appraisal of the preferred option package against the 'Environment' sub-criteria:

Table 9.2: Preferred option package – Environment sub-criteria

	Preferred Option package
Noise and Vibration	O
Global Air Quality	✓✓✓
Local Air Quality	O
Water Quality, Drainage and Flood Defence	×
Geology	O
Biodiversity and Habitats	×

	Preferred Option package
Landscape	O
Visual Amenity	O
Agriculture and Soils	✗
Cultural Heritage	O
Overall Assessment	✓✓

9.3.3 From an environmental perspective, the primary benefit will be the replacement of the current aged hydrocarbon-fuelled vessels with four new vessels operating with a green propulsion system. Whilst the precise form of the propulsion system will not be confirmed until design stage, the Council's 'climate emergency' position and wider net zero targets suggest that only a low / zero carbon solution will be acceptable given the lifespan of these vessels.

9.3.4 There will be minor negative impacts on water quality, biodiversity and habitats and agriculture and soils during the construction works for the ferry terminal infrastructure, particularly at North Ronaldsay and Papa Westray where the scale of work is anticipated to be most significant. That said, such impacts are only anticipated to be short-term / temporary and can be mitigated to some degree in the construction programme.

Safety

9.3.5 The table below summarises the safety benefits associated with the preferred option package:

Table 9.3: Preferred option package – Safety sub-criteria

	Preferred option package
Accidents	O
Security	O
Overall Assessment	O

9.3.6 It is important to note that the majority of the safety benefits associated with the preferred option package (e.g., discontinuation of Lo-Lo, all accommodation above the water line etc) were captured in the 'Phase 1' work – they are not therefore referenced again here as this would be double counting of benefits.

9.3.7 Whilst not a safety benefit, it is worth noting that a fourth vessel and third aircraft will improve the resilience of the ONI network.

Economy

9.3.8 The definition of 'Economy' benefits in the STAG guidance is not strictly relevant in the context of ONI. Transport Economic Efficiency (TEE) benefits are typically generated through journey time savings and, in the context of public transport, a higher frequency service which offers journey time benefits through reducing wait times. Wider-economic impacts only tend to be manifested in the largest schemes and reflect improvements in productivity and labour market impacts as a result of transport investment bringing places 'closer' together. The table below does identify TEE and WEI benefits for the options, but these have to be considered in the context of the ONI only

Table 9.4: Preferred option package – Economy sub-criteria

	Preferred option package
Transport Economic Efficiency (TEE)	✓✓

	Preferred option package
Wider-Economic Impacts	✓✓✓
Overall Assessment	✓✓✓

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

- From a conventional TEE perspective, the preferred option package will offer significant benefits through: (i) equating the refit timetable to the current summer timetable; (ii) increasing the number of ferry and air connections across the year; (iii) allowing for a meaningful return trip to be made 7-days a week; and (iv) ensuring that such connections have the capacity to accommodate demand.
- It is however from the perspective of 'wider impacts' that the proposed solution will have the most significant effect – amongst other impacts, it will:
  - improve access to a variety of personal services and leisure opportunities on Orkney mainland;
  - potentially provide an extended weekend in the isles for school children;
  - improve the efficiency of the island supply-chains, particularly for North Ronaldsay and Papa Westray when compared to the current Lo-Lo operation and for the other islands in terms of e.g., access to marts;
  - support service delivery in the isles, reducing the cost of such services (e.g., education provision, utilities maintenance, veterinary services etc) to the Council, companies and the customer;
  - potentially reduce the cost of travelling to / from the Scottish mainland if fewer off-island overnight stays are required; but
  - it is also important to note that improved connections are a 'two-way street', whereby the isles will be opened up to increased competition from Orkney mainland and potentially increased visitor numbers.

Integration

9.3.10 The performance of the preferred option package in terms of the 'Integration' sub-criteria is set out in the table below:

Table 9.5: Preferred option package – Integration sub-criteria

	Preferred option package
Transport Integration	✓
Transport and Land-Use Integration	✓
Policy Integration	✓
Overall Assessment	✓

9.3.11 The key points from the above table are as follows:

- As highlighted in relation to the TPOs, the preferred option package will improve integration with middle of the day ferries and flights to / from Orkney mainland, together with later arrivals on a Friday and Saturday. There is therefore a minor benefit in terms of transport integration. The above said, it does have to be noted that the illustrative timetables, as presented, will lead to a diminution of inter-island connectivity.
- From a transport and land-use integration perspective, improved ferry services will support project and other development work in the isles, particularly in North Ronaldsay and Papa Westray, where moving products (e.g., building materials) in any significant scale is difficult.

That said, given the size of the island markets, any such improvement will likely be relatively minor.

- The preferred option package will also make a moderately positive contribution in terms of policy integration. As well as supporting the functioning and development of the ONI, the deployment of a low or zero emission ferry fleet will contribute strongly towards reducing carbon dioxide emissions. However, the solution does cater for increased car use, which is very much at odds with current government policy.

Accessibility and Social Inclusion

9.3.12 The performance of the preferred option package in terms of the 'Accessibility and Social Inclusion' sub-criteria is set out in the table below:

Table 9.6: Preferred option package – Accessibility and Social Inclusion sub-criteria

	Preferred option package
Community Accessibility	✓✓✓
Comparative Accessibility	✓✓
Overall Assessment	✓✓✓

9.3.13 The key points from the above table are as follows:

- The preferred option package will improve community accessibility to employment, business, personal services and leisure opportunities. It will also improve accessibility to the isles for business, service delivery and tourist travel.
- From a comparative accessibility perspective, there will be a significant benefit for persons of reduced mobility across the network through the provision of fully accessible vessels. Moreover, access to the vessels in both North Ronaldsay and Papa Westray will be over the linkspan and thus represent a significant improvement on current arrangements.

Summary

9.3.14 Overall, it is evident from the comparison of the preferred option package against both the TPOs and STAG criteria that it will make a highly positive contribution across a range of criteria.

9.4 Cost to Government

9.4.1 There are four components to the cost to government in this context - the:

- **capital cost** of **new vessels** and supporting **ferry terminal infrastructure**
- ongoing **maintenance costs** for the **ferry terminal infrastructure**
- The increase in **operational costs** associated with adding a **fourth vessel** to the fleet
- The increase in **operational costs** associated with adding a **third aircraft** to the fleet.

9.4.2 Each of the above costs is considered in turn.

9.4.3 It should be noted that, in a typical business case, all costs are presented in 'discounted' 2010 prices. This approach allows for all costs to be presented in a common price base and equates future year costs and benefits to their value in the present day (i.e., their 'present value'). The purpose of converting costs to a present value is to allow comparability between options where their costs and benefits accrue at different points in time. However, as the options in this OBC were timetable related and a preferred option has been arrived at, all costs are presented in undiscounted 2021 prices.

Capital Costs

New vessels

9.4.4 It is not possible to determine the capital costs of the four proposed new vessels at this stage. Vessel costs will only become clear following the design process, which is undertaken subsequent to this OBC. The vessel costs will vary in response to the procurement approach adopted (and in particular the extent of risk sharing), buyer requirements and market conditions. The purchase of four sister ships will however provide economies of scale and thus potentially significant reductions in costs for later vessels in that series.

Ferry terminal infrastructure

9.4.5 The table below sets out capital cost estimates for the ferry terminal infrastructure, exclusive and inclusive of 44% optimism bias[26]. It should be noted that optional items included in Chapter 7 are not included within these costs. A full breakdown of costs is provided in **Appendix E**.

Table 9.7: Ferry terminal infrastructure costs (£m, 2021 prices)

Infrastructure Works	Capital Cost (£m, 2021 prices)	Capital Cost +44% OB (£m, 2021 prices)
Eday	£4.3	£6.3
North Ronaldsay	£17.4	£25.1
Papa Westray	£17.9	£25.8
Sanday	£1.6	£2.3
Stronsay	£4.9	£7.0
Westray[27]	£4.1	£5.8
Total	**£50.2**	**£72.3**

9.4.6 As previously noted, depending on the final design of vessels and the timetable to be delivered, an additional linkspan may be desirable at Kirkwall and would have to be costed separately.

Operating Costs

Ferry terminal maintenance

9.4.7 To provide an indication of whole life costs, MML has developed a set of maintenance costs for the six island Ro-Ro terminals and the improved foot passenger infrastructure at Pierowall, Westray. These maintenance costs are worked up from a standard set of rates and are included in **Appendix F**.

Ferry operational costs

9.4.8 In undertaking the Revenue OBC, Orkney Ferries provided operating costs by vessel for the period Financial Year (FY) 2013/14 – FY2017/18. The average operating costs of the ONI network over this period was circa **£5.8m**, with the average operating deficit being circa **£4.4m** per annum.

[26] Optimism bias is applied to costs in a business case to reflect the systematic tendency to under-estimate costs. Whilst optimism bias is typically reduced at OBC stage, the actual costs of marine civil engineering work cannot be developed with significant additional certainty until design work is undertaken, which is subsequent to this OBC. Optimism bias is therefore retained at 44%, the upper bound for standard civil engineering projects – see H.M. Treasury *Supplementary Green Book Guidance – Optimism Bias*, p. 2.

[27] Note that a further £850k (£1.2 including OB) would be required to upgrade the passenger ferry access at Pierowall to a level equivalent to that at Moclett.

9.4.9 Whilst new vessels will offer some cost efficiencies associated with e.g., modern engines and hull design, it is a reasonable assumption that costs will increase by one third of their current level to circa **£8m** per annum. Whilst a combination of new tonnage, additional connections and direct services will increase revenue, it is likely that most sailings will continue to operate at a loss, particularly given the recent reduction in fares. The operating deficit can also therefore be reasonably assumed to increase by one third to circa **£6m** per annum.

3rd aircraft – operational costs

9.4.10 The Orkney inter-island air services were retendered in August 2020, with a new four-year contract commencing on 1st April 2021. The value of the contract excluding VAT is £5.3m, or **£1.33m** per annum.[28] The cost of adding a third aircraft into the contract will be dependent on market conditions at that time, including aircraft and pilot availability and interest in / competition for any future contracts. Given that overheads are likely to be largely fixed, it is unlikely that a third aircraft will increase the cost of the air services contract by 50%. Our assumption in this report is therefore that these costs will increase by one third to circa **£1.75m** per annum.

Summary

9.4.11 It is clear overall that the cost of both capital replacement and scaling-up services for the Outer North Isles will be significant, both in terms of the capital costs of the vessels and ferry terminal infrastructure and the revenue costs associated with expanding the operational envelope. This expenditure is however required to provide the Outer North Isles with something approaching an equitable service provision when compared to benchmarks elsewhere in Scotland, particularly in the context of the Routes and Services Methodology.

9.4.12 It should also be noted there will remain significant cost uncertainty until the procurement approach is specified in the Commercial Case and outline and detailed design work is undertaken for both the vessel and ferry terminal infrastructure. The Financial Case will therefore have to include a significant degree of contingency until the FBC is developed.

9.5 Public Acceptability

9.5.1 The final step in the appraisal process was the testing of the preferred option package with the public. This would conventionally be done through a public exhibition in each of the islands but unfortunately COVID-19 related restrictions on indoor gatherings prevented such exhibitions taking place. To this end, an entirely web-based programme of engagement was undertaken, with the study exhibition boards being hosted online by the Council and respondents asked to complete an online survey in MS Forms.

9.5.2 The preferred option package was presented to Orkney Islands Council Members at a Members' Seminar on Tuesday 12th January 2021.

Public Survey

9.5.3 Whilst online engagement was the only option open to the study team at that time, such an approach does limit both the communication of the key information and the engagement with the process. This was reflected in the public survey, where only 34 responses were received, of which almost half (16) were from Papa Westray, responding to a very specific local issue (see the next section). A small number of written responses were also received by e-mail.

9.5.4 From the limited survey and written responses provided, there appears to be broad satisfaction with the preferred option package as presented, with the increase in connectivity and improved

[28] https://www.publiccontractsscotland.gov.uk/search/show/search_view.aspx?ID=AUG392832

weekend and refit timetable being seen as beneficial. Points of concern raised in the survey were as follows:

- There was a strong concern from one respondent about over-provision of services and the potential dilution of island economies. Whilst the risk of a two-way street does exist and it is understood that this will be a concern for some people, there is overwhelming evidence from the public survey of a desire for better connectivity amongst most residents.
- There are various references in the survey responses to the deployment of catamaran type vessels and changes in operational practices. Whilst the study is currently working on the basis of monohull design vessels, it is important to reiterate that vessel design is not confirmed at this stage, with design work following on from the OBC.
- There remains a desire for fixed links amongst a handful of respondents. Whilst such links were not in scope for this OBC, the preferred option package also does not mitigate against them in the longer-term should funding become available. The vessels will be cascadable and, outwith Papa Westray and North Ronaldsay, ferry terminal infrastructure costs are modest, so there is little in the way of sunk costs which would prevent future fixed links.

9.5.5 What is evident from the survey material is that continued community involvement in the timetable setting process will be important in ensuring a solution that works for all islands. Whilst it is accepted that the current timetable work is illustrative, each community has its own aspirations that will need to be reconciled or otherwise against the total quantum of operating hours available and the equitable sharing of those hours.

Papa Westray

9.5.6 The 'Phase 1' component of the OBC considered two potential future solutions for Papa Westray's ferry service (after ruling out the continuation of Lo-Lo):

- Conversion of the Moclett – Kirkwall service from Lo-Lo to Ro-Ro, with a new passenger only vessel to operate between Moclett – Pierowall on Westray; or
- Development of a Ro-Ro service between Moclett – Pierowall, with the Kirkwall service discontinued.

9.5.7 It should be noted that the intention of this business case process overall is to **improve the service to all six islands**, as per the TPOs. One issue which we are aware will be a challenge for both Papa Westray and North Ronaldsay is that of the movement of freight. Under the current Lo-Lo arrangements, Orkney Ferries acts as the *de facto* haulier for Papa Westray and North Ronaldsay, as explained in Chapter 3. In the event that these two islands move to Ro-Ro, there is an argument that they should migrate to the haulage practice of the other four islands, namely contracting a haulier to move goods who would then pay the commercial vehicle rates of Orkney Ferries. This would however lead to a significant increase in costs for island businesses and at the margin would make at least some unviable, with the successful community shop in Papa Westray being under particular threat. We were and are well aware of this issue but, in keeping with precedent elsewhere in Scotland, our working assumption is that whichever option is chosen, mitigations will be put in place to ensure that freight rates do not increase. Examples of potential mitigations included:

- Orkney Ferries continuing to act as haulier on the Kirkwall Ro-Ro service, the only difference being that freight would be loaded / discharged from the vessel on wheels (e.g., forklift, tug etc) rather than by crane, with freight rates remaining unchanged. This was the model adopted when the **Small Isles** converted to Ro-Ro.
- Orkney Ferries providing a van-based service, loading the van in Kirkwall, onto the ferry and discharging at the pierhead or to specific points in the island. This was the model adopted in **Raasay** when the **Sconser – Raasay** route was converted to Ro-Ro.
    - Both of these options assume vessel standing time in North Ronaldsay and Papa Westray to allow these essential supply-chain functions to be accommodated within a

single call. The illustrative timetables continue to include a block of time for North Ronaldsay and Papa Westray to ensure the currently built-in flexibility on these routes remains.

- It should however be noted that a challenge with these options is that Orkney Ferries is required to assume a wider role than purely a ferry company and, of particular importance, it would become part of the food supply-chain. Whilst they fulfil this role at present, and indeed CalMac Ferries Ltd does so for the Small Isles, it is not without its risks and it can be argued that it is outwith the remit of a ferry company.

- Application for / provision of grant funding to start an island-haulage business, with current freight rates remaining unchanged.
- Other funding / subsidy to ensure that North Ronaldsay and Papa Westray are no worse off as a result of any investment.

9.5.8 Whilst mitigations are a policy rather than an analytical question, the assumed position of 'no net detriment' is inherent throughout the reporting and is based firmly on precedent across Scotland.

9.5.9 It is important because the future form of Papa Westray's ferry service was one of several 'network definition' questions addressed in 'Phase 1', which in turn provided the foundation for option development and illustrative timetables in 'Phase 2' (this report). It is worth briefly recapping on the 'Phase 1' outcomes to provide context for the feedback to the preferred option package identified in this report which follows.

Phase 1 Outcome – Preferred Option

9.5.10 The **preferred option** for Papa Westray's future ferry connection was identified as the provision of a **Papa Westray–Kirkwall Ro-Ro service with a year-round passenger only connection to Westray**. The option of a Papa Westray – Westray Ro-Ro was discounted. The rationale underpinning the preferred option (repeated verbatim from the 'Phase 1' work) was as follows:

- *There is little difference in the capital costs between the two options, whilst the operating costs of a Papa Westray–Westray Ro-Ro would make this option more expensive overall. This additional cost may have been justifiable if there was strong community support for the land-bridge option, but engagement at various points throughout the study found this not to be the case. In addition, it is well established that people prefer to avoid interchange when travelling.*
- *A year-round passenger-only service to Westray would provide many of the benefits of a Ro-Ro service in terms of e.g., access to services on Westray, connection to the Rapness ferry etc, assuming public / community transport is provided from Pierowall.*
- *A Papa Westray–Westray Ro-Ro would require the use of a haulier, which would increase the costs of bringing goods to the island, potentially threatening the viability of the island shop.*
- *Whilst a number of the disadvantages raised by Papa Westray residents are either perceived (e.g., a reduction in air services) or could be worked around (i.e., the double-fare for travelling via Rapness or increased vehicle traffic on the island), it is clear from the engagement that a majority of local residents believe that reliance on a Westray-only ferry link would be detrimental to the island way of life which is highly valued locally.*
- *In contrast, there are several advantages to a Kirkwall Ro-Ro service, including the potential to continue with the current supply-chain arrangements, improved service reliability, potentially higher frequency in the future and the ability to more readily take a car to and from the island.*

Public Acceptability

9.5.11 The future form of Papa Westray's transport connection has been a matter of longstanding debate within the local community. Therefore, whilst a survey and a programme of stakeholder consultation was undertaken to support the appraisal, it was also essential to objectively record the views of the wider Papa Westray community in relation to the proposed preferred option. This was done through a public drop-in session held in Papa Westray on 24th June 2019. The event was attended by 26 island residents, with 40 residents completing the feedback form available on the evening or online at a later date.

9.5.12 Respondents to the feedback form were asked:

- *Do you think that the preferred option presented here [i.e., Kirkwall Ro-Ro with year-round Westray passenger service] would meet the ferry travel needs of you, your family and the Papa Westray community for the foreseeable future?*

9.5.13 Of the 40 respondents, 36 answered this question. Of those who responded, there was a clear majority **in favour of the preferred option** – 78% (n=28). The reasons for this included:

- A significant number of respondents expressed concern about the reorientation of the Papa Westray supply-chain, with the requirement to move to wheeled haulage through Westray. Whilst it was accepted that there are other islands around Scotland where such arrangements are in place, there was a strong belief that costs will increase and that the viability of the community shop will be threatened.
- The requirement for personal trips by ferry to route via Westray was also seen to be negative by a number of Papa Westray residents. The requirement for interchange, the need to make a journey across Westray and potential vehicle capacity issues on the Rapness – Kirkwall ferry were all cited as issues.
- Concerns were also expressed about reductions in the air service and the loss of local services should the current Kirkwall Lo-Lo service be replaced by a Ro-Ro connecting Papa Westray with Westray.
- Should the Kirkwall Ro-Ro service be progressed, the community is seeking the continuation of current freight arrangements, with Orkney Ferries managing their haulage arrangements (in line with previously cited precedents elsewhere). There is not however an aspiration for a significant enhancement in frequency, with a desire for 1-2 additional connections per week and an enhanced air service.
- There was a desire for the future Ro-Ro vessel to operate in 'Ro-Pax' mode – i.e., not operated as a freight service limited to 12-passengers. It should be noted that this is what is proposed for Papa Westray.
- A desire was also expressed through the consultation responses for a permit system (as per Iona and the Small Isles) to control vehicle movements onto the island.

9.5.14 The preference of the other **eight** respondents was for a year-round Ro-Ro service between Papa Westray – Westray, with the Kirkwall calls being discontinued. The main reasons for this tended to reflect a concern that a reliable Kirkwall Ro-Ro could not be operated from Papa Westray and the potential opportunity to base and crew a Westray Ro-Ro from Papa Westray, providing employment opportunities.

9.5.15 It should be noted that, whilst the responses to the feedback form highlighted a clear preference for the Kirkwall Ro-Ro, the view of our team was that, at the exhibition itself, opinions on the preferred option appeared much more balanced.

Engagement on preferred option package

9.5.16 Following on from the above engagement, the Phase 2 work (this report) progressed on the basis of a Kirkwall Ro-Ro with a new passenger only vessel between Moclett – Pierowall (which

has now been delivered – MV *Nordic Star*). However, it has been evident through engagement as the Phase 2 work has progressed and from public survey responses that there has been a significant change of views in Papa Westray.

9.5.17 To explore this further, our team (together with Council Officers and Orkney Ferries) met with (via MS Teams) Papa Westray Community Council on the evening of Wednesday 18th August 2021.

Freight rates

9.5.18 A primary concern of the community remains the question of haulage rates, and they provided a technical paper setting out costs which they had calculated for moving goods to the island using the two different routes. In the event that goods are moved by Ro-Ro using a haulier and at full ferry freight rates, this would be more expensive than the route via Westray. However, it is also assumed in the paper that the Moclett – Pierowall leg would be free for freight transiting through Westray to Kirkwall, which will not necessarily be the case and would offset the cost saving at least to some degree.

9.5.19 The key point here overall is that any move away from Lo-Lo will in theory result in a change to the way in which freight is handled and charged. Indeed, it is the current freight handling and rates that are the subject of debate here rather than the infrastructure solution *per se*. In order for Papa Westray to be in a 'no worse off' position, mitigating measures will be required, for example no change to freight arrangements for a Kirkwall Ro-Ro or a 'no fare' on freight moving via Westray to Kirkwall. This is a matter of policy for the Council and Orkney Ferries and will require further engagement with the community regardless of which solution is progressed.

Non-freight issues

9.5.20 The Papa Westray community also highlighted issues such as the low frequency of the Ro-Ro service to Kirkwall, reliability and a desire to access services in Westray as supporting the case for a Moclett – Pierowall Ro-Ro. These issues were all discussed in some detail in the 'Phase 1' work and weighed against the disbenefits of the 'via Westray' service, such as the risk of economic leakage and capacity pressures on the Rapness ferry. Nonetheless, there does appear to have been a shift in community attitudes which will need to be considered as the OBC progresses through outline and detailed design and ultimately Final Business Case.

Progressing the Papa Westray solution

9.5.21 As noted at the outset, the 'network' solution for the ONI was developed on the basis of the parameters agreed at the conclusion of the 'Phase 1' work. This study therefore reflects these parameters.

9.5.22 Ultimately, this business case is being used to make the case to Scottish Government and other potential funders (e.g., the UK Government) for funding for the Outer North Isles ferry network (and potentially revenue funding for the air service). The ask is already a significant one, particularly in such a competitive field and, in our view, it will be challenging to make the case for four Ro-Ro vessels for Eday, North Ronaldsay, Sanday, Stronsay and Westray plus an additional Ro-Ro slipway vessel for Moclett – Pierowall. Another role would also have to be found for MV *Nordic Star*. Such a solution would also leave North Ronaldsay very much out on its own, facing the same issue of increased freight costs without an equivalent land bridge option. This is ultimately a judgement for the Council to make in the context of their wider engagement with prospective funders.

9.5.23 It is important to recognise the shift in views amongst the community in Papa Westray – there is no intention or desire to deliver an investment which materially worsens the position of any island. In the first instance, it is recommended that the Council and Orkney Ferries continue to engage with the community to further explore options in relation to freight handling and potential mitigating measures, both for the Kirkwall and Westray Ro-Ro options. Representatives of

North Ronaldsay should ideally be brought into this discussion as that island would also be impacted, and potentially more so.

9.5.24 In the event that the Moclett – Pierowall Ro-Ro is the new favoured option of the community, there is an opportunity to revisit the OBC either prior to design or at FBC stage should the Council wish to do so.

10 Conclusions and Next Steps

10.1 Conclusions

10.1.1 This two-part OBC has identified a preferred option package for the future development of the Outer North Isles network. The primary components of this option package are as follows:

- The Outer North Isles network will be operated by a fleet of four new and interchangeable ferries. These vessels will be Kirkwall based. Detailed capacity utilisation analysis has highlighted that vessels with a broadly equivalent vehicle carrying capacity to MV *Varagen* will offer sufficient capacity to meet the needs of the network, both now and in the future.
- The exact size and specification of any new vessels will be determined through the outline and detailed design processes which follow on from this OBC. The infrastructure options presented in this OBC have been sized to accommodate a maximum 65m length overall (LOA) vessel.
- The addition of a fourth vessel to the fleet will provide a maximum of **364** additional operating hours per week, a 91-hour increase on the currently available operating hours (although note that actual operating hours now and the future are likely to be marginally below the maximum). The preferred option emerging from this OBC assumes a mix of 'straight days' Monday to Thursday and 'split shift' extended days Friday to Sunday, allowing for later weekend services.
- Illustrative timetables have been developed which highlight how these additional vessel hours could be used. It should be noted that these timetables are only intended to show what could be delivered, with the democratic processes for timetable setting within the Council used to determine the actual level of service.
    - For Eday, Sanday, Stronsay and Westray, this will allow for three Kirkwall calls per day Monday to Saturday (morning, middle of the day and late afternoon / early evening) and two rotations per day on a Sunday. This will facilitate a half-day and full-day in Kirkwall on extended days (Friday and Saturday); a near-full day on a Monday to Thursday; and several hours in Kirkwall / on-island on a Sunday.
    - The North Ronaldsay and Papa Westray services could be gradually scaled-up to offer improved supply-chain efficiency. The number of calls per week for these two islands will be dependent on the balance of calls to the other islands and will be determined through the timetable setting process.
    - The essential Eday – Stronsay freight link will also be maintained.
- The addition of a third aircraft will significantly improve the resilience of the air services and will also expand flight hours by around a quarter, from circa 1,200 hours per annum to circa 1,400-1,500. Additional flight hours could be most effectively used to split-out 'double-drops' and focus on direct connections.
- It is clear overall that the cost of both capital replacement and scaling up services for the Outer North Isles will be significant, both in terms of the capital costs of the vessels and ferry terminal infrastructure and the revenue costs associated with expanding the operational envelope. This expenditure is however required to provide the Outer North Isles with an equitable service provision when compared to benchmarks elsewhere in Scotland, particularly in the context of the Routes and Services Methodology.
- The preferred option package aligns well with the Transport Planning Objectives and STAG criteria and will provide a significant increase in the number of connections available for each island.

10.2 Next Steps

10.2.1 This report has confirmed the Strategic and developed the Socio-Economic Case for the Outer North Isles Business Case.

Commercial, Financial and Management Cases

10.2.2 A combination of the Strategic and Socio-Economic Cases effectively define **why** investment is required and **what** is to be delivered. The next step in the process is the preparation of the Commercial, Financial and Management Cases, which define **how** it will be delivered – i.e., how will the preferred option be funded, procured, delivered and managed / operated.

10.2.3 Responsibility for the development of the **Commercial, Financial and Management Case** elements of the OBC currently rests with the Council. The contents of these cases will depend on outcomes of the aforementioned *Fair Funding* discussions.

10.2.4 The addition of the Commercial, Financial and Management Cases completes the OBC phase.

Final Business Case

10.2.5 The Final Business Case (FBC) is an updated version of the OBC following outline and detailed design. Everything on which the OBC is based is revisited at this stage. In this context, detailed design and costing of infrastructure will require to be incorporated, together with a procurement strategy for engaging with shipyards for the build of new vessels and contractors for the infrastructure.

10.2.6 The output of the FBC should be a preferred option with a detailed plan for financing the investment and a strategy for procuring, delivering and managing the outputs of that investment.

Appendix A ONI OBC Phase 1 Report

now part of

Orkney Inter-Island Transport Study

Outer North Isles – Outline Business Case Year 1

On behalf of **Orkney Islands Council**

ORKNEY ISLANDS COUNCIL

Project Ref: 41029 | Rev: SC | Date: September 2019

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Revision	Date	Description	Prepared	Reviewed	Approved
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Executive Summary

Orkney Islands Council (OIC) funds lifeline[1] transport connections to 13 islands across the archipelago. These connections are delivered through a combination of air and ferry services which have been supported in both capital and revenue terms by the Council over many years. Ferry services are operated by Orkney Ferries, an arms-length company of the Council, whilst Loganair provide the air service under contract to the Council. These services all represent a net-cost to Orkney Islands Council.

The Council receives an increment on its annual Grant Aided Expenditure (GAE) settlement from the Scottish Government for ferry services, which accounts for some of the cost it accrues in operating these services. However, even with this additional funding, the ferry service runs at a deficit of around £2.5m-£3m per annum (and with only limited provision for capital replacement of life-expired assets), whilst the air service operates at a deficit of around £250k-£300k per annum.

In 2014 Orkney Islands Council, through the 'Our Islands Our Future' initiative, began a dialogue with the Scottish Government on establishing some principles for the 'Fair Funding' of Orkney's inter-island transport services and infrastructure. The basis of these discussions was that the financial burden upon the Council in providing inter-island transport was disproportionate.

Scottish Government accepted in principle that a Fair Funding position needed to be established and, to inform that, Orkney Islands Council and the Highlands and Islands Transport Partnership (HITRANS) agreed to undertake studies, now in the form of business cases, to establish and appraise the service and infrastructure requirements for inter-island transport over a 30-year planning horizon

In October 2015, the Council, in partnership with HITRANS and Highlands & Islands Enterprise (HIE) commissioned the Orkney Inter-Island Transport Study (OIITS), with a view to developing and appraising options for the future of the inter-island transport service. The output of the study was the development of a Strategic Business Case (SBC), which established the 'case for change' and identified a set of capital and revenue options which, if delivered, would in-part or in-full address the identified transport problems.

The Strategic Business Case (SBC) was completed in Autumn 2016 and set out a range of capital and revenue options for all 13 islands connected by the air and ferry services, together with a timeline for progressing specific elements of the SBC to Outline Business Case (OBC) stage. One of the priorities emerging from the SBC was the development of an OBC for new vessels and supporting infrastructure for the Outer North Isles (Eday, North Ronaldsay, Papa Westray, Sanday, Stronsay and Westray). To this end, OIC in partnership with HITRANS and Highlands & Islands Enterprise (HIE) commissioned Peter Brett Associates (PBA), now part of Stantec, Mott MacDonald (MML) and ProVersa to develop an *Outer North Isles Outline Business Case*.[2]

The ONI OBC is a complex piece of work combining both infrastructure and service-related questions. It is thus split into two parts, the first of these considering a set of 'network definition' questions and the second establishing the level of service (air and ferry) to be delivered. The two parts are explained in more detail below.

[1] As defined on page 53, paragraph of the Scottish Ferries Plan 2013-22.

[2] The Revenue Outline Business Case is making the case for top-up funding from Scottish Government for financial year 2020/21 to deliver service improvements with the current assets. Parallel capital OBCs for the Outer North Isle and Rousay, Egilsay & Wyre are expected to be completed in late 2019.

Year 1: Autumn 2018-Autumn 2019

The SBC concluded the following for the Outer North Isles network:

- There is a requirement for **four** new vessels if the level of service offered is to be in line with the Routes and Services Methodology (RSM) year-round.
- This may be either 4 Ro-Pax (roll-on / roll-off passenger and vehicle ferries) or 3 Ro-Pax vessels and 1 freighter (which would carry freight and cars but would be limited in terms of passenger numbers).
- A new Ro-Pax or passenger only vessel is also required for the Papa Westray (Moclett) – Westray (Pierowall) route.

In delivering a four vessel solution, and determining the appropriate mix of vessels, a set of infrastructure questions needs to be resolved. These are as follows:

- What is the most appropriate infrastructure solution for **Papa Westray**?
- Should the berth at **North Ronaldsay** be converted to Ro-Ro and, if so, what form should this take (i.e. slipway or linkspan)?
- Should **Stronsay Harbour** be relocated to a site on the west side of the island?
- Should year-round overnight berths be developed at **Eday** and **Westray**?

The emerging preferred option package was presented to communities, stakeholders, Orkney Islands Council Members and the Minister for Energy, Connectivity and the Islands, Paul Wheelhouse MSP, in June 2019.

Whilst the Year 1 reporting presented in June 2019 broadly resolved the network definition questions, there remained a number of uncertainties at the time of reporting which could only be resolved through refining the vessel specification and future crewing arrangements. To this end, a workshop attended by OIC, Orkney Ferries, HITRANS, HIE and PBA / MML was held at the outset of Year 2 (October 2019) to resolve outstanding Year 1 questions and finalise the parameters within which the future network should be planned. This Executive Summary therefore reflects the position established at the conclusion of that workshop.

A summary of the derivation of the preferred option in relation to the above listed network definition questions is provided below.

How should North Ronaldsay and Papa Westray be served?

Strategic Choice

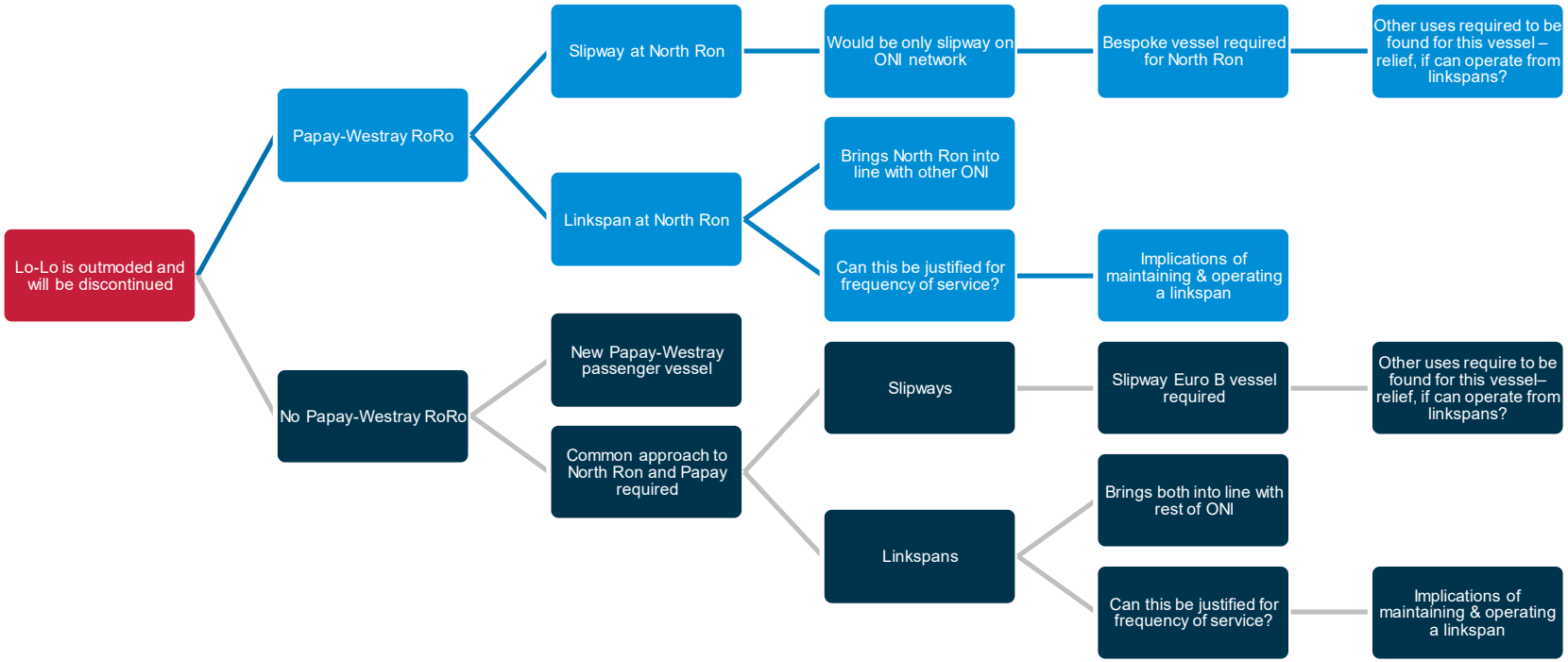
The solutions for North Ronaldsay and Papa Westray are intrinsically linked and derive from a strategic choice surrounding future ferry provision for the latter island. It was concluded early in the OBC process that continuation of Lo-Lo operations at both islands is not sustainable in the long-term and there are therefore two options for Papa Westray's future ferry connection, either:

- a year-round **Ro-Ro vessel connecting Papa Westray with Westray**, with the current Kirkwall Lo-Lo service being discontinued; or
- development of a **Kirkwall Ro-Ro service**, with a year-round passenger only service between Papa Westray and Westray operated by a new vessel.

Should the first option be progressed, the question would be how to develop marine infrastructure at North Ronaldsay to a level equivalent to the other islands (as Papa Westray's connection would effectively fold into the Rapness (Westray) – Kirkwall service). Should the latter option be progressed, the question would be whether to equalise infrastructure at North

Ronaldsay and Papa Westray with the other four islands or develop a bespoke Ro-Ro solution for those islands given the scale of infrastructure work required to provide equivalence and the low volumes carried.

The strategic choice is summarised in the flowchart below:



Future Infrastructure Solution for North Ronaldsay and Papa Westray – Strategic Choice

Should the decision be taken to progress with a **Papa Westray – Westray Ro-Ro service** (the light blue boxes in the above flowchart):

- Papa Westray would in effect be withdrawn from the 'main' Outer North Isles network, with all traffic hubbed through Westray.
- The Ro-Ro solution at North Ronaldsay could be either a slipway or a linkspan.
    - A slipway would be lower cost and would also be simpler to maintain and operate. However, it would be the only slipway on the Outer North Isles network and would therefore require a bespoke vessel for North Ronaldsay. It is possible that this vessel could be used elsewhere on the network but would require the slipway vessel to interface with linkspans, which is operationally sub-optimal and particularly challenging in the Orkney context without significant modifications to, or replacement of the linkspans.
    - The provision of a linkspan would bring North Ronaldsay into line with the wider Outer North Isles network but would represent an expensive infrastructure solution for the scale of the service operated.

Should the decision be taken to progress with a **Papa Westray – Kirkwall Ro-Ro service** (the dark blue boxes in the above flowchart):

- A common solution would be developed for Papa Westray and North Ronaldsay. This could either be a slipway or a linkspan.
    - A slipway would again be lower cost and the two islands would share a Euro B standard slipway vessel. Ideally this vessel could be used elsewhere on the network when not serving the above mentioned islands but, as noted, there are operational challenges surrounding the use of a slipway vessel on a linkspan.
    - With regards to a linkspan, the infrastructure at both ports could be developed to accommodate a small linkspan vessel (a lower cost solution) or the larger 65m length overall (LOA) 'design vessel' planned for elsewhere on the Outer North Isles network, a higher cost solution but one which provides equivalence and interchangeability.

The above flowchart and commentary therefore identify **the strategic choice as being whether Papa Westray should be served by a Westray or Kirkwall Ro-Ro service**.

Preferred Option for Papa Westray

The **preferred option** for Papa Westray is a **Papa Westray – Kirkwall Ro-Ro service** with a year-round passenger only connection to Westray. The option of a Papa Westray – Westray Ro-Ro is therefore discounted. The rationale underpinning this is as follows:

- There is little difference in the capital costs between the two options, whilst the operating costs of a Papa Westray – Westray Ro-Ro would make this option more expensive overall. This additional cost may have been justifiable if there was strong majority community support for the 'land-bridge' option, but engagement at various points throughout the study found this not to be the case.
- A year-round passenger only service to Westray would provide many of the benefits of a Ro-Ro service in terms of e.g. access to services on Westray, connection to the Rapness ferry etc., assuming suitable onward connections.
- The reliance on, and cost of a Papa Westray – Westray Ro-Ro would have a negative impact on the current supply-chain arrangements for Papa Westray and could threaten the viability of the island shop.
- Whilst a number of the disadvantages raised by Papa Westray residents are either perceived (e.g. a reduction in air services) or could be worked around (i.e. a double-fare or increased vehicle traffic on the island), it is clear from the engagement that a majority of

local residents believe that being served by a Westray-only ferry link would be detrimental to the island way of life.

- In contrast, there are several advantages to a Kirkwall Ro-Ro service, including the likely continuation of current supply-chain arrangements, improved service reliability, compared to current LO-Lo operations, a potentially higher frequency compared to the present day and the ability for island residents to more readily take a car to and from the mainland.

Having identified a **Kirkwall Ro-Ro as the preferred option for Papa Westray**, the question is therefore: what is the most appropriate infrastructure solution, common to the two islands, and how does this impact on the Outer North Isles network overall?

North Ronaldsay and Papa Westray – Common Infrastructure Solution

The solution for North Ronaldsay and Papa Westray has to be considered in terms of the overall vessel and infrastructure solution for all six islands as there are inter-dependencies between them. In the context of these two islands alone, three common infrastructure solutions were considered to cover a range of vessel sizes and ship-shore interface types:

- **Scenario 1:** Procure a **Ro-Pax linkspan** vessel of a broadly similar length to the MV *Earl Sigurd* and MV *Earl Thorfinn*, circa 45m LOA.
- **Scenario 2:** Procure a **Ro-Pax slipway vessel** broadly equivalent to the Small Isles vessel MV *Lochnevis*, circa 50m LOA. Whilst this vessel would be slightly longer than the *Earls*, it would have a lower carrying capacity, circa 10-14 cars.
- **Scenario 3:** This can be thought of as the **'Papa Westray-max'** option, whereby the Outer North Isles 'design vessel' – a circa 65m LOA linkspan vessel – would serve both islands (as well as Eday, Sanday, Stronsay and Westray).

Of these three scenarios, the 50m LOA slipway vessel option would be the lowest cost. However, it is considered that the requirement for a bespoke vessel that cannot easily be used elsewhere on the network is a major negative, whilst there would be significant technical challenges associated with a slipway vessel interfacing with Orkney Ferries' linkspans at Kirkwall or elsewhere. **Scenario 2 was therefore excluded from further consideration.**

Having determined that a linkspan is the appropriate solution at both islands, and that there should be four ferries in the 'main' ONI fleet, this analysis initially determined that the following would provide a proportionate solution:

- 1 * circa 45m LOA Ro-Pax linkspan vessel for North Ronaldsay and Papa Westray and 3 * circa 65m LOA Ro-Pax linkspan vessels for the Eday, Sanday, Stronsay and Westray.

However, the study concluded that there are no workable long-term solutions for covering refit at North Ronaldsay and Papa Westray if these islands were served by a *single* 45m LOA vessel. Whilst freight flights can provide for some of the supply-chain needs of the islands, they cannot meet the full range of needs and thus a reliable scheduled ferry service is required. Therefore, this option was **discounted from further consideration.**

The working vessel mix assumptions at this stage therefore emerged as:

- 2 * circa 45m LOA Ro-Pax linkspan vessels and 2 * circa 65m LOA Ro-Pax linkspan vessels; or
- 4 * circa 50-55m LOA Ro-Pax linkspan vessels which would provide complete interchangeability and minimise harbour works.

These options will be developed further as the study progresses and demand, vessel capacity and connectivity analysis is worked-up.

Stronsay Harbour

Stronsay ferry terminal is located in the main settlement of Whitehall in the north of the island. During the conversion of the ONI network to Ro-Ro in the 1980s, a number of ferry terminals were relocated to create a shorter route to both Kirkwall and the other islands. Proposals for relocating Stronsay ferry terminal to the west of the island were considered at this time but it is understood that they were rejected as a result of split views within the community. The retention of Whitehall as Stronsay's ferry terminal created a number of operational issues, including:

- The steaming time to Stronsay from Kirkwall, Eday and Sanday is longer than would be the case if the terminal was located in the west of the islands.
- The berth at Whitehall is exposed to wind and wave motion from the north.
- The passage to / from the berth is exposed to easterly and south-easterly winds in Sanday Sound and the channel at Papa Stronsay.
- The channel also requires regular dredging to maintain adequate under-keel clearance.

Based on the above issues, and in planning for the future ONI network, the SBC identified a review of the location of Stronsay ferry terminal as a key 'network definition' task in the OBC.

A site on the west side of the island in the lee of the island of Linga Holm was identified as the preferred location for any new ferry terminal. The cost of developing this site to accommodate a 65m LOA vessel would be **£27.1m (£39.0m including Optimism Bias)**, although the relocation would generate Transport Economic Efficiency (TEE) benefits of **£64k per annum (£1.7m present value of benefits (PVB) over 60 years)** and **£47.5k per annum (£1.3m PVB over 60 years)** of fuel savings. The cost of upgrading the current terminal at Whitehall to accommodate a 65m LOA vessel would be **£2.7m (£3.8 including optimism bias)**.

The **preferred option** is therefore to retain and upgrade the terminal in Whitehall. Whilst there would be a range of benefits associated with relocating Stronsay ferry terminal to the west of the island, the cost of doing so significantly exceeds the benefits which would be generated and the cost of the alternative option. As well as the marine infrastructure work, there would be a requirement for land acquisition, construction of an access road, remediation of the current site at Whitehall, and potentially an ongoing revenue cost associated with providing a scheduled or demand responsive bus service to the site.

The relocation of the ferry terminal should however be **retained as a long-term option** when substantial expenditure is required at the current facility. It should also be noted that the proposed four vessel solution for the Outer North Isles could reduce the impact of the longer steaming times to Stronsay through a reduction in indirect connections (and at least maintaining the current summer timetable during refit).

Eday and Westray Overnight Berths

The final 'network definition' question is whether secure, year-round overnight berths should be developed at Eday and Westray.

The ability to berth overnight in the isles facilitates a timetable which offers a mix of the first connection being to the island or from the island. Of the Outer North Isles harbours:

- Only **Sanday and Stronsay** offer safe year-round overnight berths.
- Overnighting in **Westray** is possible in calm conditions only.
- The pier at **Eday** is exposed and vessels cannot overnight there at any time.

The cost of the respective overnight berths is shown in the table below:

Capital Cost of Eday and Westray Overnight Berths

	Cost (£m)	Cost including OB (£m)
Eday		
Extend berth by 20m to accommodate 65m LOA vessel	£2.8	*£4.1*
Extend berth by a further 10m to provide additional shelter	£3.6	*£5.1*
Total	**£6.4**	***£9.2***
Westray		
Extend berth by 20m to accommodate 65m LOA vessel	£2.1	*£3.0*
30m dog-leg extension to provide additional shelter	£4.3	*£6.2*
Total	**£6.4**	***£9.2***

With respect to Eday and Westray, the study concluded that **overnight berths will not be considered further in the Year 2** work due to the capital cost of overnight berths and the availability of other methods for delivering an early morning departure from these islands. Crewing and timetabling solutions which facilitate the desired early morning departures from Eday and Westray will therefore be an integral component of the Year 2 analysis.

Operational Principles

The Year 1 work also concluded that:

- The new fleet will not incorporate a full accommodation block, although there will be limited onboard accommodation for watch purposes and island-based crew members. The crew will be predominantly shore-based and the vessels will overnight in Kirkwall.
- The crewing model for the new fleet will be designed so as to facilitate up to a 16-18 hour operating.

One or more indicative timetables for the ONI ferry network will be worked-up in the Year 2 analysis. The following principles will be applied:

- Depending on connectivity requirements, one or more vessels may operate on the basis of a 16-18 hour day.
- The refit timetable will provide a level of connectivity at least equivalent to the current summer timetable.
- Eday, Sanday, Stronsay and Westray will be progressed towards the 'Rotes & Services Methodology' (RSM) service level, albeit the exact level of connectivity will be dependent on the balance of costs and benefits.
- North Ronaldsay and Papa Westray will have an enhanced service, with circa 2-3 connections to Kirkwall per week.
- Eday, Sanday, Stronsay and Westray will benefit from early morning connections to Kirkwall on at least some days of the week – the number of these early morning sailings will be determined through the Year 2 analysis. On these mornings, the outbound 'dead-leg' from Kirkwall may be used as a dangerous goods run.

Conclusions

Year 1 of the Outer North Isles OBC has considered and identified a preferred option relating to a set of 'network definition' questions, namely the future infrastructure solutions for North Ronaldsay and Papa Westray; whether Stronsay ferry terminal should be relocated to the west of the island; and whether overnight berths should be developed at Eday and Westray.

The recommended preferred options to be progressed from Year 1 are as follows:

- Lo-Lo has been ruled out as a future means to serve North Ronaldsay and Papa Westray.
- Papa Westray should be served by a new Ro-Ro service operating between Moclett and Kirkwall, initially at least on the current timetable, which could be gradually expanded as new vessels come into the fleet. The option of a Papa Westray – Westray Ro-Ro service has been excluded from further consideration, although the passenger only service will be continued and extended to a year-round operation, with a new vessel being procured to operate it.
- The berth at North Ronaldsay should be converted to Ro-Ro.
- Two vessel mix options will be taken forward into the Year 2. This will be subject to review as the Year 2 connectivity and timetable analysis progresses. Only minimal crew accommodation will be provided on these vessels and all vessels will therefore overnight in Kirkwall.
- Stronsay ferry terminal will be retained in Whitehall. The possibility of relocating the terminal to a site in the west of the island in the lee of Linga Holm should be retained as a long-term option which should be revisited when significant works are required at Whitehall.
- Overnight berths at Eday and Westray will not be considered further in Year 2. Crewing and timetabling solutions which facilitate the desired early morning departures from Eday and Westray will however be an important component of the analysis.
- The crewing models for the new fleet will include the option of a 16-18 hour operating day on one or more of the vessels. This will allow timetables to be developed which offer an increased number of connections and a combination of early morning, afternoon and evening services, which will be established through the Year 2 work.

Next Steps – Year 2

Having defined the network to be served in this report, Year 2 will go on to define the service to be operated to the six islands. This will involve:

- Developing both the air and ferry capacity and connectivity requirements of all six islands. This will be done on the basis of the current length of ferry crew day and on an extended operating day, which could be provided if additional revenue funding is secured.
- In defining the network in Year 1, a set of design vessels has been used which will increase the vehicle carrying capacity over that of the current tonnage. These design vessels will be refined as vessel capacity, demand requirements and the cost of supporting infrastructure upgrades become clearer.
- Through an iterative process, the infrastructure requirements at all six ONI harbours plus Kirkwall will be further developed to reflect the emerging preferred vessel solution.
- The case for a third aircraft will also be considered and, if progressed, the study will consider how it should best be deployed.
- A set of illustrative Outer North Isles air and ferry timetables will be developed as part of a 'Network Plan' for the islands.
- The 'Network Plan' will be presented to communities and Members to obtain views and thereafter gradually refined.

- The final ‘Network Plan’ will form the capital and revenue ask for the Outer North Isles.

1 Introduction

1.1 Overview

1.1.1 Orkney Islands Council (OIC) funds lifeline[3] transport connections to 13 islands across the archipelago. These connections are delivered through a combination of air and ferry services which have been supported in both capital and revenue terms by the Council over many years. Ferry services are operated by Orkney Ferries, an arms-length company of the Council, whilst Loganair provides the air service under contract to the Council. These services all represent a net-cost to the Council.

1.1.2 The Council receives an increment on its annual Grant Aided Expenditure (GAE) settlement from the Scottish Government for ferry services, which accounts for some of the cost it accrues in operating these services. However, even with this additional funding, the ferry service runs at a deficit of around £2.5m-£3m per annum (and with only limited provision for capital replacement of life-expired assets), whilst the air service operates at a deficit of around £250k-£300k per annum.

1.1.3 In 2014 Orkney Islands Council, through the 'Our Islands Our Future' initiative, began a dialogue with the Scottish Government on establishing some principles for the 'Fair Funding' of Orkney's inter-island transport services and infrastructure. The basis of these discussions was that the financial burden upon the Council in providing inter-island transport was disproportionate.

1.1.4 Scottish Government accepted in principle that a Fair Funding position needed to be established and, to inform that, Orkney Islands Council and the Highlands and Islands Transport Partnership (HITRANS) agreed to undertake studies, now in the form of business cases, to establish and appraise the service and infrastructure requirements for inter-island transport over a 30-year planning horizon.

1.1.5 In October 2015, the Council, in partnership with the HITRANS and Highlands & Islands Enterprise (HIE) commissioned the Orkney Inter-Island Transport Study (OIITS), with a view to developing and appraising options for the future of the inter-island transport service. The output of the study was development of a Strategic Business Case (SBC), which established the 'case for change' and identified a set of capital and revenue options which, if delivered, would in-part or in-full address the identified transport problems.

1.1.6 In parallel to the SBC, the Council, together with HITRANS, HIE, Shetland Islands Council and ZetTrans established a Fair Funding Group with Transport Scotland intended to explore the wider question of roles and responsibilities, and in accordance with a nationally recognised approach and references in terms of other lifeline services. An early output from this group was the agreement of additional Scottish Government funding which contributed towards offsetting the deficit in financial years 2018-19 and 2019-20. However, there is no commitment beyond this period for further capital or revenue funding.

1.1.7 The Strategic Business Case (SBC) was completed in Autumn 2016 and set out a range of capital and revenue options for all 13 islands connected by the air and ferry services, together with a timeline for progressing specific elements of the SBC to Outline Business Case (OBC) stage. One of the priorities emerging from the SBC was the development of an OBC for new vessels and supporting infrastructure for the Outer North Isles (Eday, North Ronaldsay, Papa Westray, Sanday, Stronsay and Westray). To this end, OIC in partnership with HITRANS, Highlands & Islands Enterprise (HIE) commissioned Peter Brett Associates (PBA), now part of

[3] As defined on page 53 of the *Scottish Ferries Plan 2013-22*.

Stantec, Mott MacDonald (MML) and ProVersa to develop an *Outer North Isles Outline Business Case*.[4]

1.2 Business Case Context

1.2.1 This section sets out the approach taken to the development of the business case and specific considerations in relation to business case preparation in this context.

Transport Scotland Business Case Guidance

1.2.2 The project has been undertaken in accordance with the *Guidance on the Development of Business Cases* (Transport Scotland, 2016). The guidance sets out three main stages which need to be completed in developing a compliant business case:

- Stage 1 – Scoping: Strategic Business Case (SBC) – analyses a variety of options which tackle the problems, issues and objectives identified;
  - *The SBC was completed and signed off in Autumn 2016 (see below).*
- Stage 2 – Planning: Outline Business Case (OBC) – identifies the **Preferred Option**(s) and establishes how that option(s) should be funded, managed and delivered; and
- Stage 3 – Procurement: Final Business Case (FBC) – undertaken during procurement phase.

1.2.3 Overall, the Transport Scotland Business Case development process aligns with the H.M. Treasury 'five-case model' as follows:

- the Strategic Case – making the case for change;
- the (socio) Economic Case – optimising value for money in terms of economic, social and environmental impacts;
- the Commercial Case – commercial viability;
- the Financial Case – financial viability; and
- the Management Case – achievability.

1.2.4 This report briefly recaps on the **Strategic Case** and develops the **Socio-Economic Case**. It will also provide inputs to the **Commercial, Financial and Management Cases**, although these will be undertaken internally by OIC in dialogue with Scottish Government / Transport Scotland, as part of a wider discussion around future methods of funding and delivery.

SBC Reporting – The Story to Date

1.2.5 The SBC was developed between September 2015 and October 2016. It took the form of a STAG-based appraisal, developing and appraising options for the thirteen island communities served by the inter-island transport network.

1.2.6 Given the varied nature of the study area, it was essential to undertake a systematic baselining exercise to establish the specifics of each community and the problems & opportunities associated with their current transport connections to Orkney mainland. There were two parallel streams to this baselining exercise – the first component of this was a review of the **services** from the perspective of the **public**. This included:

[4] The Revenue Outline Business Case is making the case for top-up funding from Scottish Government for financial year 2020/21 to deliver service improvements with the current assets. Parallel capital OBCs for the Outer North Isle and Rousay, Egilsay & Wyre are expected to be completed in Summer 2020.

- **Market analysis:** a review of carryings, utilisation and reliability for the ferry and air services, so far as data were available.
- **Consultation:** engagement with the island transport representatives and public sector stakeholders.
- **Timetables & services:** a review of timetables, connectivity, public transport integration and fares.
- **Socio-economic baselining & future planning horizon:** analysis of the socio-economic position of each island, key industries and future expectations. This review also set out the national, regional and local policy context in relation to island transport provision.

1.2.7 The second component of the baselining was a review of the **services** from the perspective of **Orkney Islands Council**. This included:

- **Vessels & operations:** a review of the current fleet and the operational practices (e.g. crewing, overnight berth locations etc.) associated with the current operation.
- **Harbours:** assessment of the capability of the current harbours and, where information was available, the condition and life expectancy of assets.
- **Air assets and operations:** a review of the current inter-island air service considering aircraft, airfields, service levels, operational practices and potential opportunities in relation to new aircraft and navigational aids.
- **Finance:** a review of the historic and current funding and financial position of the inter-island air and ferry services.
- **Fixed links:** a summary of fixed link studies undertaken to date.

1.2.8 This exercise provided a basis for systematically identifying and recording the transport problems & opportunities which any subsequent intervention should be seeking to resolve / realise. A 'logic map' was also developed setting out the potential 'outcomes' and 'impacts' of investing in the inter-island transport network. This logic map, combined with the analysis of problems & opportunities, can form the basis of any *ex post* evaluation of the outcomes and impacts associated with any intervention (i.e. assessing the extent of benefits realisation). This benefits mapping exercise will be set out in Year 2 of this study – see Section 1.3 below.

1.2.9 A long-list of **capital** and **revenue** options (the latter covered in a separate report) was developed at both the network and island level for both air and ferry services. These options were then appraised against the OIITS Transport Planning Objectives and the STAG criteria. The outcomes of the SBC were presented to and agreed with the communities, and feedback was sought on both local aspirations and the potential benefits of different options.

1.2.10 The outputs of this OBC study, when combined with the three cases being developed by OIC, will provide the basis for moving towards the Final Business Case (FBC) and the subsequent procurement and delivery of the preferred option for the Outer North Isles.

SBC Reporting

1.2.11 The SBC appraisal papers can be found at on the HITRANS website, with a link on the Orkney Islands Council website. In the interests of brevity, this report does not include detailed background information - reference should be made to the above papers if such information is required.

Scope of OBC Socio-Economic Case

1.2.12 It is important to note at the outset that a business case in the context of small island communities differs from that which would typically be associated with for example, a road or rail scheme in mainland Scotland.

1.2.13 The Socio-Economic Case typically involves revisiting the assessment against the STAG criteria undertaken in the SBC and, where practical, monetising the social welfare benefits and comparing them to the cost to government to establish a benefit-cost ratio. However, the conventional means of monetising benefits (e.g. journey time savings, reduced accidents, wider economic impacts associated with e.g. enhanced productivity and labour market efficiency etc) does not always easily transfer to island related studies, since the objectives of any scheme are not generally focused on issues like travel time savings or reducing accidents.

1.2.14 The focus here is instead very much on access to services and social inclusion, and in particular the extent to which transport connections define the economy, supply-chain, service provision etc in a given island. Analysis of benefits is therefore more qualitative, setting out how an intervention could address one or more transport problems which in turn are impacting on the life and / or economy of an island. This is entirely consistent with the approach taken for Transport Scotland business cases in this context.

1.2.15 Given the above, the STAG-based analysis undertaken at SBC is cross-referenced and, where appropriate, updated rather than repeated in this study.

1.2.16 The principal development of the SBC within the Socio-Economic Case at OBC stage is the refinement of options to arrive at a 'preferred option'. The OBC Socio-Economic Case develops the SBC options and, based on evidence obtained through desk-based analysis, surveys and stakeholder engagement, arrives at a preferred option.

1.3 Study Scope

1.3.1 As noted above, the main purpose of this work is to confirm the Strategic Case and develop the Socio-Economic Case. The ONI OBC is a complex piece of work combining both infrastructure and service-related questions. It is thus split into two parts, the first of these considering a set of 'network definition' questions and the second establishing the level of service (air and ferry) to be delivered. The two parts are explained in more detail below.

Year 1: Autumn 2018-Autumn 2019

1.3.2 The SBC concluded the following for the Outer North Isles network:

- There is a requirement for **four** new vessels if the level of service offered is to be in line with the Routes and Services Methodology (RSM) year-round.
- This may be either 4 Ro-Pax (roll-on / roll-off passenger and vehicle ferries) or 3 Ro-Pax vessels and 1 freighter (which would carry freight and cars but would be limited in terms of passenger numbers).
- A new Ro-Pax or passenger only vessel is also required for the Papa Westray – Westray route.

1.3.3 The technical development and costing of options undertaken in 'Year 1', whilst providing sufficient detail to make a decision on the above considerations, is still relatively high level. Any options progressed will be subject to further development in 'Year 2' of the OBC.

1.3.4 The focus of Year 1, and thus this report, is on resolving these questions – the report is structured as follows:

- Chapter 2 reviews the SBC to ensure that the conclusions remain current (i.e. it confirms the Strategic Case).
- Chapter 3 details the key aspects of the service from the operator perspective.
- Chapters 4 and 5 identify the infrastructure solutions for North Ronaldsay and Papa Westray.

- Chapter 6 assesses the case for relocating Stronsay Harbour.
- Chapter 7 considers the case for year-round overnight berths at Eday and Westray.
- Chapter 8 sets out the conclusions and the scope for Year 2 of the project.

Year 2: Autumn 2019-Summer 2020

1.3.5 Having defined the network to be served in Year 1, the second part of the work will determine the preferred vessel mix, the case for a third aircraft and timetables / services which could be / derived from this.

2 Review of the Strategic Business Case

2.1 Overview

2.1.1 The first step in developing this OBC, and the purpose of this chapter, is to review and where appropriate update the SBC, taking account of any changes which have occurred since its submission.

Scope of Review

2.1.2 The scope of this review is as follows:

- Review the **Transport Planning Objectives** set in the SBC process.
- Review the **capital investment timeframe** set in the SBC.
- Revisit the **options emerging from the SBC** to determine whether they continue to remain appropriate.
- Set out any changes in the **wider environment** since the SBC was published, which may have an impact on the study.

2.2 Transport Planning Objectives

2.2.1 A key challenge in the development of the OBC is ensuring that the outcomes align with the processes outlined in the Scottish Transport Appraisal Guidance (STAG) and the Transport Scotland *Business Case Guidance*.

2.2.2 The Transport Planning Objectives (TPOs) established in the SBC / STAG were systematically developed to reflect the transport problems and opportunities associated with the inter-island transport services. The problems and opportunities were in turn rooted in a wide-ranging baselining exercise. In developing this section, we have reviewed the evidence developed at SBC stage to confirm whether the TPOs remain relevant.

2.2.3 The TPOs relevant to the Outer North Isles are set out below. For each objective, a restatement of the main transport problems and opportunities is provided:

- **Transport Planning Objective 1:** The capacity of the services should not act as a constraint to regular and essential personal, vehicular and freight travel between the island(s) and Orkney Mainland.
  - A shortage of capacity creates uncertainty of travel, or an actual barrier to travel. The capacity issue is a particular problem for the Sanday and Westray routes, and across the islands during refit timetable. Capacity problems vary by type across island but exist in terms of:
    - car deck lane metres;
    - vessel deadweight limitations;
    - reduced vessel winter passenger certificates; and
    - a shortage of seats on the air services (exacerbated by education and health use).
- **Transport Planning Objective 2b:** Where an island does not have a 'commutable' combined ferry or air / drive / public transport / walk time to a main employment centre, the scheduled connections should permit at least a half day (e.g. 4 hours) in Kirkwall or Stromness 7-days a week, all year round.

- Curtailed periods of time on the mainland can limit the ability to undertake personal and employer's business at these locations. This is a particularly key problem in Orkney where the limited ferry and air assets and typically single crew operation leads to a relatively short operating day and many indirect connections to Kirkwall.

- **Transport Planning Objective 3:** The scheduled time between connections should be minimised to increase flexibility for passengers and freight by maximising the number of island connections across the operating day.
  - Frequent timetabled connections provide flexibility and minimise 'dead' time for passengers between ferries / flights. A low service frequency is a particular issue in the Outer North Isles (especially Eday).
- **Transport Planning Objective 4:** The level of connectivity provided should minimise the variation within and between weekdays, evenings, Saturdays and Sundays.
  - Whilst there is a generally accepted position with transport services that weekend (particularly Sunday) connectivity is less than that on a typical weekday, the evidence gathered suggests that variations in weekday and weekend services are having a negative impact on islanders in terms of their ability to: interact with Orkney mainland; make weekend trips to the Scottish mainland; and for tourists to make weekend trips to the islands.
- **Transport Planning Objective 5:** Where practicable, islanders should be provided with links to strategic onward transport connections without the need for an overnight stay on Orkney mainland.
  - None of the Outer North Isles can connect with the first flights / ferries out of Orkney or return to their home island by returning to Orkney on the last flight / ferries. This limits the ability to undertake a day return trip to the Scottish mainland for employer or personal business and leads to costly overnight stays.

2.2.4 Our review of the TPOs set at the SBC stage largely confirms that they continue to reflect the transport problems and opportunities faced by the six islands. In the context of future capital planning, there is however a need to amend **TPO5** to specifically reflect the longer distance routes to and from the Outer North Isles, where a day return trip from e.g. Sanday to Aberdeen is not readily achievable. There nonetheless remains an issue with ONI residents being off-island for extended periods of time as a result of the limited service frequency and comparatively short operating day. TPO5 in the context of the Outer North Isles is therefore amended to read:

- ***Amended Transport Planning Objective 5:*** *Where practical, islanders should be provided with links to onward strategic transport connections which minimise the number of off-island overnight stays on Orkney mainland or further afield.*

2.2.5 Two specific questions / issues were raised during the review in relation to the TPOs, as follows:

- It was suggested that an individual set of objectives should be developed for each island. However, the Outer North Isles is a network, and all of the planning to date has been undertaken on a network basis – the benefit of this is that it permits a consistent and equitable approach to the planning of services. Some objectives will be more relevant to certain islands than others but taken as a whole they encapsulate the full range of transport problems faced by each of the six individual islands. This approach is also entirely consistent with the approach to network planning adopted by Transport Scotland.
- It was also noted that the transport network in the Outer North Isles should be geared towards commuting. However, the ONI household survey and consultation identified limited appetite for a commutable service, with concerns around the service focused more on accessing opportunities related to e.g. health, personal business, visiting friends and relatives etc. Moreover, the level of investment required to provide a fully commutable daily service to all six islands would be hugely disproportionate to the problems identified. The air service does offer limited ability to commute but, outwith North Ronaldsay and Papa Westray, its capacity will never cater for a mass market in the larger islands (even with the addition of a third aircraft).

2.2.6 Whilst the level of investment and logistical implications of fully delivering solutions to address all aspects highlighted by the TPOs likely remains prohibitive, the outcomes expressed by them reflect a reasonable set of aspirations for the service and will form the basis of this OBC.

2.3 Capital Investment Timeframe

2.3.1 A significant programme of investment was undertaken across the Outer North Isles in the late 1980s. Eday, Sanday, Stronsay and Westray were converted to Ro-Ro and two new vessels, the MV *Earl Sigurd* and MV *Earl Thorfinn* (both 1989), were constructed to operate the service. They were soon after supplemented by the MV *Varagen* which was transferred to the ONI fleet after a short period operating across the Pentland Firth. No investment of any significance was made at North Ronaldsay or Papa Westray.

2.3.2 Although the shoreside infrastructure is in serviceable condition, it is limited in terms of the size and weight of vessels it can accommodate. Much more pressingly, the three vessels which serve the ONI are life expired – their condition is deteriorating; they can no longer maintain their service speed; they are capacity constrained; and, on the *Earls*, the passenger accommodation is below the water line. The main focus of this OBC is therefore making the case for new tonnage and supporting infrastructure.

2.3.3 The passenger only vessel which operates between Westray and Papa Westray, the MV *Golden Mariana*, is 46 years old and is also in urgent need of replacement.

2.3.4 Once the OBC is complete and the preferred vessel solution and associated harbour infrastructure details are known for the Outer North Isles network, the anticipated timescales for vessel design, procurement, construction and sea trials can be confirmed. An immediate replacement programme is therefore required, albeit it is likely that the solution will be phased in over a number of years, noting that a tender exercise and contract to purchase sister vessels over a time period could lead to savings over tendering vessels individually.

2.4 Capital Options Emerging from the SBC

2.4.1 As noted in Chapter 1, the option package emerging from the SBC is for **four** new vessels, either:

- four Ro-Pax; or
- three 3 Ro-Pax vessels and 1 freighter.

2.4.2 In addition, a new Ro-Pax or passenger-only vessel is also required for the Papa Westray – Westray route.

2.4.3 In undertaking this review, two assumptions emerging from the SBC require critical assessment before proceeding with option development:

- the future of Lo-Lo; and
- the design vessels to be used in this OBC.

The Future of Lo-Lo

Background

2.4.4 The SBC ruled out converting North Ronaldsay and Papa Westray (Kirkwall service) to Ro-Ro. This judgement was made on the basis of:

- the technical challenges and high cost of converting both sites to Ro-Ro; together with

- the fact that the air service accounts for around 95% of all passenger movements from both islands, meaning that the ferry primarily fulfils a supply chain role.

2.4.5 The proposal to retain Lo-Lo at North Ronaldsay and Papa Westray would represent a fundamental step in shaping the future Outer North Isles network, both in terms of infrastructure and vessels. Given the centrality of this issue, it was important to revisit and critically assess this decision at the outset of the OBC stage.

2.4.6 As will be explained in later chapters of this report, the costs of Ro-Ro conversions would be significant, irrespective of whether the ship-shore interface is a slipway or linkspan. The requirement for a pier extension at both ports, the potential construction of shelter at North Ronaldsay and upgrades to landside infrastructure would be a significant construction projects at a mainland port, let alone at more distant islands subject to challenging weather and sea conditions.

Implications for Vessel Design

2.4.7 Whilst the cost of Ro-Ro conversions at North Ronaldsay and Papa Westray would be significant, the continuation of Lo-Lo would have implications for both of those islands, and for the Outer North Isles network overall. From the perspective of the two islands, the continuation of Lo-Lo would lock-in the supply-chain challenges which they currently face.

2.4.8 In a future four-vessel solution for the ONI, the continuation of Lo-Lo would also require at least two vessels to be built with an onboard crane, one to provide the regular service and the other to provide breakdown / refit cover. The inclusion of a crane in the vessel design would have fundamental implications in terms of size, layout and cost, with knock-on effects for Eday, Sanday, Stronsay and Westray.

Precedent

2.4.9 Until the 1970s (and late 1980s in Orkney), the majority of ferry routes in Scotland operated on a Lo-Lo basis. Ro-Ro first began to emerge in the form of stern and side loading vessels before the more conventional roll through ferries came to dominate the Scottish ferries landscape. Throughout the period of Ro-Ro conversion, there are no obvious examples of where a life-expired Lo-Lo vessel was replaced on a like-for-like basis – even with small and more remote islands, a programme of Ro-Ro conversion was undertaken. The rationale for this is likely to have been a combination of efficiency and a reduction of the risks associated with crane-based operations.

2.4.10 Perhaps the most obvious comparator for Papa Westray and North Ronaldsay is the Small Isles (Canna, Eigg, Muck and Rhum), which have a combined population of around 150. Until the early 2000s, the route was served by the small ferry MV *Lochmor*, the last of the West Highland ferries not to carry cars. Upon arrival in the Small Isles, passengers and freight were transferred to a small 'flit boat' the latter using a vessel mounted hydraulic crane.[5] Recognising the limitations of this method of passenger and cargo handling, plans were developed for a new 14-car ferry with a lengthy stern ramp, the MV *Lochnevis*. Launched in 2000 at a cost of £5.5m (circa £9.2m in 2019 prices), her long ramp allows her to work off the linkspan at Mallaig and newly built slipways in each of the four islands without the risk of grounding or damaging her propellers.

2.4.11 Like North Ronaldsay and Papa Westray, the challenging nature of serving the Small Isles, together with their low population meant that making a conventional business case for investment would not be possible. The investment was instead made to put them on a broadly equivalent footing to the rest of network, an important precedent when considered in the context of North Ronaldsay and Papa Westray. It should however be noted that the Small Isles are

[5] Smith, C. J., *In Fair Weather and in Foul – 30 Years of Scottish Passenger Ships and Ferries* (Ferry Publications, 1999), p. 66.

entirely dependent on their ferry service for the movement of passengers and goods as they do not have air services, which is an important difference in this respect.

Regulatory Risk

2.4.12 Any new vessel will have a design life of circa 30-years and it is therefore important to ensure that it can meet the needs of the islands served over that period. As noted above, other than some of the very smallest islands, there are very few islands left in the UK where Lo-Lo operations take place, some exceptions being Fair Isle and Foula in Shetland and the Isles of Scilly. If a commitment is made to continue with Lo-Lo, the appropriateness of crane-based operation over that period has to be critically assessed.

2.4.13 There is a concern within the communities, and in particular North Ronaldsay, that the regulations surrounding Lo-Lo operations may tighten over the years ahead. This could be through a combination of Maritime and Coastguard Agency (MCA) restrictions on the conditions in which Lo-Lo operations can take place (e.g. wind speed, swell etc) and / or intervention from the Health and Safety Executive, either due to site specific concerns or as a result of concerns or an incident elsewhere in the UK or beyond. Any tightening of regulations could have two impacts – it could:

- further impact the reliability of the service if the tolerances for crane-based operations are reduced (a key issue given the poor reliability at present); and
- impact on the ability to handle specific goods and commodities, e.g. livestock or large pieces of plant.

2.4.14 It is essential to note that there is at present no apparent or imminent threat with regards to regulatory change, rather it is a perceived concern of the communities. It does nonetheless appear a reasonable concern, especially when comparing changes in regulation and practice between 1989 and 2019 (i.e. 30 years) and thus has to be regarded as a risk in this context.

Conclusion and Implications

2.4.15 On the basis of the above points, the SBC conclusion that North Ronaldsay and Papa Westray should continue with Lo-Lo is no longer appropriate. It is therefore excluded from further consideration, with subsequent chapters considering **Ro-Ro options only for the two islands**.[6]

2.4.16 This conclusion has an implication for the ONI vessel mix options set out above. If all islands are to be served by Ro-Ro vessels, there is no requirement for crane-based operation, i.e. the 'freighter' option in the '3 * Ro-Pax plus 1 * Freighter' option, so this option drops out by extension.[7] This means that all vessel options will involve **4 * Ro-Pax vessels**, the sizes and specifications of which remain to be developed.

Design Vessels

2.4.17 The Strategic and / or Socio-Economic Case of an OBC do not typically establish the exact vessel to be used on a route. This is first covered in the Commercial Case of the OBC (which lays out procurement options) and further developed in the Final Business Case, the point at which the project is moving towards procurement. The Commercial Case will generally set out the extent to which the buying party wishes to specify all elements of the vessel or provide an output-based specification against which shipyards can tender. Whilst a preferred vessel is not

[6] Note that PBA has recently completed the development of an OBC for Fair Isle in Shetland. Several of the same issues arose in that context and the study concluded that Fair Isle should also migrate towards a Ro-Ro solution.

[7] It would of course be possible to specify a basic 'freight' Ro-Pax. However, this would imply a limit of e.g. 12 passengers which would make the vessel of very little use across the rest of the network. This option is therefore discounted.

specified, it is necessary at this stage of the OBC to provide a high-level design vessel as the basis for scoping out necessary infrastructure works.

2.4.18 The SBC included two high-level design vessels, as follows:

- Type 2a: 45m-50m Ro-Pax vessel capable of carrying around 25 passenger car units (PCUs). This would be a broadly like-for-like vessel, providing a level of capacity between that of the *Earls* and the MV *Varagen*.
- Type 2b: 60m-75m Ro-Pax vessel capable of carrying around 35-50 PCUs. This vessel would provide an increase in vehicle capacity when compared to the ONI fleet.

2.4.19 As noted in Chapter 1, Year 1 of the OBC is focused on answering a set of infrastructure questions – in order to answer these questions, a single design vessel is required to ensure that the study is developing options on a consistent basis. This will be subject to further refinement as the OBC progresses.

2.4.20 It is therefore assumed that the **'indicative ONI design vessel'** would provide a broadly like-for-like vehicle carrying capacity to the MV *Varagen* (circa 28 cars), the largest vessel in the ONI fleet. As part of the OBC work, a design for a 31-car (based on today's size of car) Euro B certified ferry was provided by a naval architect. The vessel is 65m LOA and thus can be used as a reasonable proxy for the future size (if not necessarily design as it is open bow) of any future vessel. Further development of the vessel specification will be undertaken as part of this OBC.

Westray-based Freighter

2.4.21 It should be noted that an additional solution proposed for North Ronaldsay and Papa Westray at the outset of this OBC is the deployment of a Westray-based freighter or small Ro-Pax vessel. This proposal would involve constructing or buying a small Ro-Ro freight vessel which would be based in Pierowall and operate from Rapness.

2.4.22 This vessel would provide circa 3-4 services per week to North Ronaldsay and Papa Westray, whilst operating the Papa Westray – Westray service at other times. All freight from North Ronaldsay and Papa Westray would be land-bridged through Westray. The main advantage of this approach is that it would provide increased frequency and a shorter crossing to both islands, whilst also providing a degree of flexibility to work around weather windows.

2.4.23 Whilst there is some merit in this option, it is excluded from further consideration for the following reasons:

- All freight (and any passengers) would need to be double-handled, which has both cost and journey time implications (and could in particular impact on animal welfare where livestock is being moved).
- The capital cost of the proposed vessel would be disproportionate to the scale of operation being delivered. It is our view that the addition of a fourth Ro-Ro vessel to the Outer North Isles fleet should benefit all six islands.
- There would be additional vehicle deck capacity pressure on the Rapness (Westray) – Kirkwall service.
- The timetable for the Papa Westray – Westray service would be constrained by the requirement to serve North Ronaldsay. The reliability of this service would also be poorer if the North Ronaldsay service was flexibly worked around weather and tidal windows.

2.5 Changes in the Wider Environment

2.5.1 As the SBC was only completed in late 2016, there have been very few changes in the wider environment.

2.5.2 In terms of **funding**, the Scottish Government Budget for financial years 2018-19 and 2019-20 committed additional revenue funding to Orkney Islands Council to address a proportion of its deficit from operating ferry services (the funding was provided as part of the local government settlement rather than as a ferry specific pot). There is at present no commitment to additional funding beyond this financial year.

2.6 Conclusion

2.6.1 The review of the SBC has resulted in two key changes / refinements to the options taken forward to the OBC as follows:

- Lo-Lo options will not be taken forward at North Ronaldsay and Papa Westray, instead Ro-Ro options are developed; and, as a consequence,
- the '3 * Ro-Pax + 1 * Freighter' vessel solution is now dropped. All vessel options will involve 4 * Ro-Pax vessels, the sizes and specifications of which remain to be developed. Options around this are developed in Chapter 4.

2.6.2 It should be noted that further development of the options has been facilitated by a range of research tasks undertaken as part of this OBC, which will be cross-referenced throughout this report. These have included:

- Site visits by MML to the harbours being considered in the first year of this OBC (Eday, North Ronaldsay, Papa Westray, Stronsay (Whitehall and proposed new sites) and Westray (Rapness and Pierowall)).
- A dedicated Papa Westray resident survey, to which 54 island residents responded
- A wider Outer North Isles survey, to which 496 island residents responded (Eday = 33; North Ronaldsay = 17; Sanday = 131; Stronsay = 147; and Westray = 168).
- Telephone-based stakeholder consultation with island businesses and public service providers.
- Analysis of the Outer North Isles supply-chain by freight and logistics specialists ProVersa.
- Public exhibitions to consult on the preferred options in North Ronaldsay, Papa Westray and Stronsay.

3 Review of Current Service

3.1 Overview

3.1.1 This chapter briefly profiles the current assets and operational practices in the delivery of the Outer North Isles service, providing context for the subsequent option development process.

3.2 Vessels

3.2.1 The Outer North Isles network is served by three vessels – the MV *Earl Sigurd*, MV *Earl Thorfinn* and the MV *Varagen*. A brief profile of these vessels is provided below.

MV *Earl Sigurd* and MV *Earl Thorfinn*

3.2.2 The MV *Earl Sigurd* and MV *Earl Thorfinn* (the *Earls*) are sister ships and thus are reported together.

3.2.3 The *Earls* are combined small Lo-Lo / Ro-Ro vessels capable of accommodating vehicles and craned freight. They have been working the Outer North Isles service since their respective introduction in 1989 and 1990 respectively. The *Earls* are used to provide Ro-Ro services to Eday, Sanday, Stronsay and Westray and Lo-Lo services to North Ronaldsay and Papa Westray (as they are both fitted with 12 tonne cranes).

3.2.4 The vessels hold MCA Class IIA certificates in the summer and Class III (Euro B) certificates in the winter.

3.2.5 Key statistics include:

- Gross Tonnage: 771
- Speed: 12 knots
- Length: 45 metres
- Beam: 11 metres
- Draft: 3.25 metres

Classification

3.2.6 The *Earls* are MCA Class IIA / III vessel (summer / winter). Any replacement would need to be EC Class B (Euro B).

Passenger Numbers

3.2.7 The *Earls* can carry 150 passengers in the summer and 100 passengers in the winter. The absence of sufficient suitable indoor seating on the vessels to accommodate all of the passengers in the often inclement winter sea conditions is the main reason for this differential passenger certificate.

Vehicle Numbers and Types

3.2.8 The *Earls* can carry a reported 22 cars all year round. However, given the increasing size of cars since the vessels were built, it is likely that their actual capacity is now some way short of this (likely to be around the 16-20 car mark).

Freight Types

3.2.9 The *Earls* can carry up to 100 tonnes of freight (assuming no cars are carried). Freight can range from vans to larger commercial vehicles and loose freight.

Deadweight Tonnage

3.2.10 The *Earls* have a DWT of 231 tonnes.

Relief / Cover

3.2.11 There are no spare vessels available to cover the *Earls* during refit or unscheduled maintenance – they are effectively self-relieving. The refit timetable reduces the service to a two-vessel operation, with one *Earl* always kept in service to provide the North Ronaldsay and Papa Westray Lo-Lo connection. Given the age of the vessels, this represents an increasing risk associated with reliability.

Quality and Type of Accommodation

3.2.12 The *Earls* both have passenger accommodation below the main deck. Access to, and / or means of escape from the passenger accommodation does not comply with the IACS[8] and SOLAS[9] regulations. It is understood that the vessels operate under 'grandfather rights' exemptions, but any new tonnage would need to comply with the latest legislated safety regulations.

3.2.13 The vessels otherwise have passenger accommodation which is sufficient but somewhat spartan given the longer services which these vessels operate (particularly during refit timetable).

3.2.14 Crew accommodation on the vessels is below the waterline and thus there is an MCA restriction which limits each vessel to lying out a maximum of two nights per week.

3.2.15 Disabled access is poor. Whilst there is a toilet on the main deck, disabled customers require support in being lifted across the deck sills.

Condition

3.2.16 Both vessels are now approaching life expiry and are in urgent need of replacement. They both operate under a set of grandfather rights with regards to crew accommodation, which is below the waterline. The vessels also struggle to maintain their 12 knots service speed and the sourcing of spare parts is becoming increasingly problematic.

MV *Varagen*

3.2.17 The MV *Varagen* was originally built (in 1989) to operate the short-sea Pentland Firth crossing between Burwick and John O'Groats. As a result, she is larger and faster than the *Earls* but does not have an onboard crane, and thus cannot service North Ronaldsay or Papa Westray.

3.2.18 Like the *Earls*, the MV *Varagen* has sufficient passenger capacity in the summer months but is more restricted during the winter as interior seating falls short of the passenger certificate. The vessel holds an MCA Class IIa certificate in the summer and Class III (Euro B certificate in the winter).

3.2.19 Key statistics include:

- Gross Tonnage: 928

[8] International Association of Classification Societies

[9] Safety of Life at Sea

- Speed: 15 knots
- Length: 50 metres
- Beam: 11 metres
- Draft: 3 metres

Classification

3.2.20 The MV *Varagen* is an MCA Class IIA / III vessel. Any replacement would need to be EC Class B (Euro B).

Passenger Numbers

3.2.21 The MV *Varagen* can carry 142 passengers in the summer and 91 passengers in the winter. The absence of sufficient seating on the vessel to accommodate all of the passengers in the often inclement winter sea conditions is the main reason for this.

Vehicle Numbers and Types

3.2.22 The MV *Varagen* can carry 28 cars all year round. As with the *Earls*, it is likely that the increase in the average size of a car over the last three decades means that the actual capacity is now less than this, likely to be in the 22-26 car mark.

Freight Types

3.2.23 The MV *Varagen* can carry up to 120 tonnes of freight (assuming no cars are carried). Freight can range from vans to larger commercial vehicles and loose freight.

Deadweight Tonnage

3.2.24 The MV *Varagen* has a DWT of 321 tonnes.

Vehicle and Freight Dimensions

3.2.25 The MV *Varagen* can accommodate cars, coaches and almost any commercial vehicles within her available lane meterage and deadweight restrictions. It should be noted that deadweight restrictions can sometimes constrain the service, particularly on larger / more populous islands.

Degree of Cover

3.2.26 There are no spare vessels available to cover the MV *Varagen* during refit or unscheduled maintenance. She is relieved by the *Earls* when at refit.

Quality and Type of Accommodation

3.2.27 Outwith the lack of seating, the vessel otherwise has passenger accommodation which is sufficient but somewhat basic given the longer services which it operates (particularly during refit timetable).

3.2.28 The MV *Varagen* is the only vessel where mobility impaired people can access the main lounge. She has an retro-fitted stair lift at the stern.

Condition

3.2.29 Like the *Earls*, the MV *Varagen* is approaching the end of her service life and is in need of replacement.

MV *Golden Mariana*

3.2.30 The MV *Golden Mariana* is a small passenger-only vessel which operates between Pierowall in Westray and Moclett in Papa Westray. The vessel is 15m LOA and can carry 40 passengers. She is 46 years old having entered service in 1973 – she is thus in urgent need of replacement and indeed Orkney Ferries has been assessing potential replacements for several years.

Classification

3.2.31 The MV *Golden Mariana* is an MCA Class VI / VIA vessel:

- The Class VI certificate applies during the summer months, which allows her to operate with not more than 250 passengers onboard, in favourable weather and during restricted periods (i.e. summer) in the course of which the vessel is at no time more than 15 miles from the point of departure or three miles from land.
- The Class VIA certificate operates during the winter months and applies a 50-passengers restriction for a distance of not more than 6 miles from the point of departure.

3.3 Operational Practice

Vessel Base

3.3.1 The *Earls* and MV *Varagen* each have an accommodation block onboard and thus are capable of lying in the isles overnight. However, the accommodation on the vessels is below the waterline and thus there is a MCA restriction which limits each vessel to lying out a maximum of two nights per week. Outwith these evenings, the vessels lie in Kirkwall.

3.3.2 Of the island berths, only Sanday and Stronsay support year-round overnight berthing, whilst a vessel can lie at Westray in calm conditions. The infrastructure does not currently allow a vessel to lie overnight at Eday, North Ronaldsay and Papa Westray.

3.3.3 The MV *Golden Mariana* overnights at Pierowall in Westray and is crewed from that island.

Timetable

3.3.4 The Outer North Isles timetable is complex, with three vessels having to balance the passenger and freight needs of six islands. Key points of note include:

- The requirement to serve six islands with three single-crewed vessels means that a number of services are shared between islands, particularly for Eday, Sanday and Stronsay.
- As noted above, the inability for the vessels to lie out more than two nights per week and a lack of overnight facilities at a number of ports is a key factor in shaping the timetable.
- A number of hours are blocked off in the timetable each week to serve both North Ronaldsay and Papa Westray. The tidal issues with the berth at North Ronaldsay are particularly severe and thus require significant flexibility to be built into the timetable, effectively blocking off a morning and afternoon for one vessel on all North Ronaldsay days.
- During the refit timetable, typically a 9-week period between January and March, the service reduces to two vessels. This leads to a small reduction in overall connections and an increase in indirect connections. This leads to significantly extended journey times and a truncated day in Kirkwall, acting as a barrier to travel for many.

3.3.5 During the summer timetable, the Papa Westray – Westray passenger service operates 4-6 return crossings on a weekday, reducing slightly at the weekend. In the winter months, the service reduces to two return crossings on a weekday (providing a school charter service which

can be used by other island residents) with no service at the weekend. There is however an aspiration within the Papa Westray community for a year-round scheduled service.

Cargo Handling

3.3.6 Cargo handling at Eday, Kirkwall, Sanday, Stronsay and Westray is via wheeled vehicle over the linkspan.

3.3.7 At North Ronaldsay and Papa Westray, vessel-based cranes are used to handle all cargo. A forklift is generally used to load / unload cargo at Kirkwall (although some livestock moves on the hoof) whilst a forklift is also used to move goods to quayside storage on both islands. The Kirkwall forklift travels with the vessel and is used to position cargo on the vessel, either for lifting by the crane, or to its transit position once lifted on board.

3.3.8 The MV *Golden Mariana* is a passenger-only vessel and can thus only convey cargo carried onboard, e.g. small parcels, shopping bags etc.

3.4 Crewing

Legislation

Outer North Isles

3.4.1 All routes to the Outer North Isles from Kirkwall are classed as 'open sea' and the crew are defined as 'sea-going' – crewing is therefore governed by the stipulations of Merchant Shipping Notice (MSN) 1877. Key points of note from MSN 1877 are as follows:

- On a sea-going vessel, the minimum hours of rest are:
  - 10-hours in any 24-hour period;
  - 77-hours in any seven-day period; and
  - The 10-hours of rest may be divided into no more than two periods, one of which is to be at least 6-hours in length.
- The regulations allow for 2.5 days of paid annual leave per month of employment, and an additional 8 days of paid leave per year in respect of public holidays.
- It is also noted that, where a seafarer whose normal period of rest on board a ship is disturbed by a call-out, they should have a period compensatory rest.[10]

3.4.2 Any scaling up of the Outer North Isles services beyond a single crew day would need to be undertaken in line with the above regulations, ensuring that crew continue to get their minimum hours of rest.

Crew Complement

3.4.3 The following table sets out the crew complement of each vessel in the ONI fleet:

Table 3.1: Vessel Crewing Arrangements

	Varagen	*Earl Thorfinn*	*Earl Sigurd*	*Golden Mariana*
Master	1	1	1	1
Chief Officer / Mate	1	1	1	1

10 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/697916/MSN1877_Combined.pdf

	Varagen	*Earl Thorfinn*	*Earl Sigurd*	*Golden Mariana*
Chief Engineer	1	1	1	
Second Engineer	1	1	1	
Bosun	1	1	1	
Seaman 1A/1B	2	2	2	
Dual Purpose				
Motorman				
Chief Steward	1	1	1	
Cook Steward	1	1	1	
Total	***9***	***9***[11]	***9***[12]	***2***

3.4.4 It should be noted in relation to the above table that several crew on the three larger vessels hold dual qualifications, which allow them to act up where appropriate, for example allowing a Mate to act up to Master.

3.4.5 Additional crew are available for holiday cover / illness / shift rotation etc.

3.5 Harbours

3.5.1 The figures below are in relation to the ONI ferry berth within each of the harbours.

Key Characteristics

Depth at ONI Berths

- Kirkwall: 3.0m – 6.2m below Chart Datum (CD)
- Eday: 4.0m - 6.0m below CD
- North Ronaldsay: 2.0m - 3.0m below CD
- Papa Westray: 0.3m – 4.0m below CD
- Sanday: 6.2m – 6.8m below CD
- Stronsay: 4.0m - 5.0m below CD
- Westray (Rapness): 4.0m - 5.0m below CD
- Westray (Pierowall): 0.0m – 4.5m below CD

Length

- Kirkwall: Maximum berthing length = 119 metres
- Eday: Maximum berthing length = 55 metres beyond the linkspan
- North Ronaldsay: Maximum berthing length = 44 metres – the *Earls* overhang the berth by a minimum of one metre, often greater as the Earls tend to surge on the exposed berth.
- Papa Westray: 44 metres – the *Earls* overhang the berth by a minimum of one metre.
- Sanday: Maximum berthing length = 70 metres beyond the linkspan
- Stronsay: Maximum berthing length = 60 metres beyond the linkspan

[11] It should be noted that the MV *Earl Sigurd* requires 10 crew to operate with her 200-passenger certificate.
[12] It should be noted that the MV *Earl Thorfinn* requires 10 crew to operate with her 200-passenger certificate.

- Westray (Rapness): Maximum berthing length = 65 metres beyond the linkspan
- Westray (Pierowall): Maximum berthing length = 80m (however this length is limited by the available water depth within the basin)

Linkspan Dimensions

- Kirkwall: Two lane, 22.5m long * 14.1m wide at outer end.
- Eday: Single lane portal, 28.7m long * 7.8m wide at outer end.
- Sanday: Single lane portal, 28.7m long * 7.8m wide at outer end.
- Stronsay: Single lane portal, 28.7m long * 7.8m wide at outer end.
- Westray (Rapness): Single lane portal, 28.7m long * 7.8m wide at outer end.

Berthing

Kirkwall

3.5.2 The harbour provides a sheltered basin and vessels are berthed at the tanker berth, the layby berth and the linkspan berth interchangeably. Vessels are then brought to the linkspan berth when required. The system appears to work well with a 20-minutes or less turnaround. However, this can lead to knock-on delays if the linkspan berth is not cleared by the previous sailing.

Eday

3.5.3 Current ONI vessels do not berth overnight at Eday. The terminal is extremely exposed from the North and East. Easterly conditions make turning onto the berth challenging. There are concerns over a sand bank building up within the bay as a result of the ONI vessels manoeuvring at the Ro-Ro berth, particularly on departure from the terminal. The sand bank has reduced water depths, meaning that small fishing boats are required to be taken out of the water over winter.

3.5.4 The ONI vessels cannot turn inside of the pier and they use the roundhead for berthing manoeuvres. However, use of the roundhead has resulted in damage to the fenders due to them being undersized to transfer large midship berthing loads from the ONI vessels.

North Ronaldsay

3.5.5 North Ronaldsay is a challenging, tidally constrained berth. The service to North Ronaldsay operates on a tidal timetable where time is blocked out to accommodate the tidal restrictions. It is exposed from the south-west round to the north-east, with the pier's location within the bay providing little shelter. Wave motion tends to run along the relatively short pier, causing the vessel to move whilst on the berth. This is aggravated because the vessel overhangs the seaward end of the berth. When conditions permit, the *Earls* do not fully berth against the structure as there is no fender system in place. Although the vessel is tied to the pier, she will remain off the berth during Lo-Lo activities. She keeps the power on to keep mooring lines tight; thus, minimising vessel surge along the berth. This is an important consideration for Lo-Lo activities.

3.5.6 The berth is orientated north to south and the pier can be awash during strong prevailing winds from the south-east to the south-west. In these conditions, the service to North Ronaldsay can be compromised, with several weeks between sailings recorded. Due to its location within the bay, the berth is sheltered from northerly windS. However, northerly conditions are challenging for the vessel crossing the North Ronaldsay Firth. The approach to the berth is relatively shallow in places and there can be rough seas on the approach from Start Point in Sanday towards the berth.

3.5.7 The berth is 44 metres long and, as the Earl's are 45m LOA, mooring arrangements are less than ideal as the vessel cannot be held appropriately alongside the berth during Lo-Lo operations. Berthing lines lead across the vessel, rather than to the stern which would provide a more secure arrangement. As the conditions are difficult in winter, she requires considerably heavier mooring lines than would be used at other piers. On the vessel, there is little room on deck to use these heavier moorings.

Papa Westray

3.5.8 Due to the location of the crane on the vessel, the vessel berths on the northern face of the pier. Sections of the pier are open piled construction and wave / tidal motion runs through the berthing structure from the south, causing the vessel to move on the berth. The ONI berth is effectively approximately 40 metres long due to tidal constraints, with the *Earls* often overhanging the seaward end of the berth. The berth runs north-east to south-west with very little shelter, notably strong winds from the south make a controlled approach to the pier difficult.

Sanday

3.5.9 Current ONI vessels berth overnight at Sanday during the summer timetable only. There are no tidal constraints on this berth for the current ONI vessels. The ONI vessels / Masters do not have a consistent method for berthing at the Sanday linkspan. The vessels either travel past the pier structure to reverse against the berth or they place their bow against the roundhead and rotate the stern round onto the berth. The vessels have also been noted to turn in the area shoreward of the linkspan, if water depth permits.

3.5.10 Due to its geographical location, Loth terminal is very exposed from the west. Easterly and south-easterly winds can result in the crossing of the Sanday Sound from Eday being challenging. Vessels cannot manoeuvre to the east of the pier due to the considerable tidal currents. Winds of over 40 knots from a Westerly direction can lead to overtopping of the pier.

Stronsay

3.5.11 Current ONI vessels berth overnight at Stronsay year-round. However, it can be challenging to provide sufficient mooring arrangements for the larger ONI vessel, MV *Varagen*, for overnight berthing at Whitehall. The current ONI vessels usually approach the linkspan for loading and unloading activities bow first. When berthing overnight, the vessels are moved back from the linkspan, the linkspan is parked and a mooring line passes beneath the linkspan to a bollard on the dolphin structure.

3.5.12 In terms of navigation to / from Whitehall, the terminal is exposed from the north, navigation through the narrow approach channel can be challenging and turning into the dredged channel at Papa Stronsay can also be challenging.

Westray (Rapness):

3.5.13 Current ONI vessels berth overnight at Westray during the summer timetable only. The berth at Rapness is exposed and it is understood that vessels cannot reliably berth overnight due to movement and surging of the vessel on the berth caused by wind and waves, even in calm conditions. South-easterly conditions are considered to be the most challenging as they can significantly impact manoeuvrability. Despite the challenging weather conditions that may impact vessel movements, the service to Rapness is seldom cancelled, with arrival and departure times altered to accommodate the weather. Available water depth can often hinder vessel manoeuvring at the pier, as there is a gravel beach and shallow bed to the east.

Westray (Pierowall):

3.5.14 The eastern finger pier structure within the basin is currently used as the primary berth for the MV *Golden Mariana*. Despite the recent improvement works to narrow the harbour entrance,

south-westerly conditions are still known to affect the vessels berthing in the basin, with the south-west corner within the basin considered the most sheltered. Waves regularly overtop the finger piers. The available water depth at Pierowall is one of the key constraints for current vessel use. The harbour has not been dredged and the basin dries out beyond the toe of the central slipway. Access to the MV *Golden Mariana* is via boat steps.

Condition

Kirkwall

3.5.15 We understand the current Masterplan being completed for Kirkwall Harbour will include options for construction of a new basin to the north, along with increased berthing and marshalling capabilities at the pier. The linkspan will remain an integral part of the Masterplan to allow continuation of the Ro-Ro service from Kirkwall.

3.5.16 The linkspan berth is a solid structure and is faced by 10No. extruded diagonal rubber fenders. The linkspan itself has recently been refurbished as part of OIC's phased linkspan maintenance works. The refurbishment works have included grit blasting and painting of the linkspan deck, replacement of handrails and replacement of the operating systems. There is no height restriction from the Kirkwall linkspan however it is understood that any load greater than 44T is subject to a specific assessment to determine suitability for travel. There is 1No. MV fender with a facing panel on the western side of the nose of the linkspan. Having been recently refurbished, the linkspan and machinery appear to be in good condition. There is some corrosion of the linkspan deck plates evident at the nose of the linkspan where the non-slip surfacing has been damaged by contact from vessel ramps.

3.5.17 The tanker berth is approximately 110m in length. It consists of a sheet piled berthing face with 14No. extruded rubber fenders, concrete cope and concrete deck.

3.5.18 The layby berth is approximately 65m in length. It is also a sheet piled berthing face with concrete cope and concrete deck. The layby berth was dredged as part of the 2011 campaign where the entrance to the basin was dredged to 3m below Chart Datum.

3.5.19 The condition of the linkspan berth, the tanker berth and the layby berth appear to be fair. More detailed inspections, including dive surveys, are required to fully determine the condition of the structure above and below the water and fully inform the need or otherwise for any repair / upgrade works.

Eday

3.5.20 The date of construction of the original stone blockwork and open-piled deck with concrete roundhead is unknown. The original pier is in fair to poor condition with cracking and movement of the deck surface noted at several locations. Repair works have been completed recently to rebuild the wave wall to the east of the original structure. The fenders and wave screen on the original pier are in very poor condition. The wave screen does not extend to the soffit of the concrete deck and therefore does not protect the open piled structure or the berths within the basin from wave action.

3.5.21 The terminal was converted to Ro-Ro in the early 1990's with the construction of a finger pier with roundhead, linkspan and lifting dolphin, all located beyond the original pier. During construction of the Ro-Ro facilities, cylindrical fenders were removed from the original roundhead and tie rods were fixed into the original concrete to support the steel sheet pile finger pier. The linkspan deck and machinery have been recently refurbished.

3.5.22 The landside infrastructure associated with the ferry terminal is located on the original pier structure and includes a small marshalling area, and a waiting room with a telephone and toilet facilities. The waiting room is in very poor condition.

3.5.23 A dive survey was carried out by OIC in 2015, which included a visual inspection of all piles and an ultrasonic steel thickness survey of 10% of the piles. The survey highlighted complete loss of section (holing) of a large number of piles and that the steel was easily punctured when struck with a chipping hammer. As a result of the 2015 dive surveys across the ONI terminals, it is understood that OIC is carrying out installation of cathodic protection (notably sacrificial anodes) at the required ONI terminals. Anodes were not noted at Eday during MML inspection in January 2019, however it is anticipated that these will be installed as part of the OIC improvement works programme.

3.5.24 An OIC visual inspection carried out in 2018 highlighted the roundhead fenders are warped, torn and in poor condition; 3No. fender facing panel fixings have failed; life ring brackets are in poor condition; ladders are corroded and a number of railings are damaged; timber fenders on the original pier are in very poor condition with failed fixings; and the waiting room is in very poor condition.

North Ronaldsay

3.5.25 The pier was constructed in 1906 and has remained substantially unchanged since. From review of existing information, it is a solid masonry structure with a crushed stone infill and concrete deck. The approach structure is approximately 65m in length and the main ONI berth is 44m in length. It is understood that the original pier was constructed directly onto rock.

3.5.26 There have been no noted recent repair works undertaken at Nouster. A General Arrangement drawing from September 1965 indicates that there were extruded cylindrical fenders bolted to the concrete berthing face. These have since been removed as no fenders were present on the structure. It is understood that surveys were undertaken in early 2000's due to concerns over undermining of the pier structure, however we have not been provided with the survey data for comment. There is a small area for car parking and vehicles turning at the landward end of the pier. There is a waiting room with toilet facilities and a larger store for distribution of goods to island residents. On the pier, there are steel pens for livestock, a small store and a structure to provide shelter for freight.

Papa Westray

3.5.27 The age of Moclett Pier is unknown and it appears to have been extended several times, with the form of construction changing along its length. The pier extends from an area of hardstanding where the concrete deck is supported by tubular raking piles over a length of approximately 50m. There are concrete collars to the piles at bed level, which are exposed at low tide. It is assumed these are concrete repair collars; however, they may be part of the original design to provide fixity at the toe of the piles.

3.5.28 Moving seaward from the end of the suspended deck, the form of construction changes to a masonry blockwork structure. On the northern face of this section of the pier, there are two sets of stone steps, used for access to smaller vessels with shallower draughts, including MV *Golden Mariana*. There are both timber and steel fenders on the seaward face of these steps, creating a berthing line. On the southern berthing face, there is a row of steel sheet piles which appear to have been driven in front of the solid masonry structure over a length of approximately 25m.

3.5.29 Moving seaward, the structure returns to open piled construction over the final 45m length of the pier. The northern face of this open-piled section of pier is used by the *Earls*. There are 14No. timber fenders along the north and south faces. The condition of the supporting structure at the seaward end of the pier is unknown. It includes concrete piers at regular centres located at a lower level than the deck soffit. The actual form of construction could not be determined without closer inspection from a small workboat.

3.5.30 There is an area for car parking and vehicles turning at the landward end of the pier. There is a small waiting room with toilet facilities nearby. On the pier, there are steel pens for livestock and a storage building.

3.5.31 Aside from the concrete collars to the approach way support piles (assumed to be repair collars), there are no obvious recent repair works undertaken at Moclett Pier.

Sanday

3.5.32 The pier was constructed in the early 1990s and consists of a stone filled and rock armoured approach embankment, cellular steel sheet pile approach structure, cellular steel sheet pile berthing structure with roundhead, linkspan and lifting dolphin. A 2m high reinforced concrete wave wall is located above deck level along the south face of the approach structure and along approximately 70m of the west face of the berthing structure. The wave wall does not extend north beyond the nose of the linkspan, allowing vessels to berth on the seaward side of the berthing structure when weather permits.

3.5.33 The berth used by ONI vessels is faced by 9No. steel fender piles at 7m spacings. The fender piles have ultra-high-molecular-weight polyethylene (UHMWPE) rubbing strips and rubber MV fenders at cope level. The fenders appear to be undersized as several were noted to have moved or twisted from their original position. At the seaward extent of the existing pier, there is a roundhead structure to assist with berthing onto the linkspan. The roundhead has 5No. steel fender piles with UHMWPE rubbing strips. A number of the MV fender units between the fender piles and the concrete cope are torn and warped, indicating they are undersized for use by the ONI vessels. The steel chains between the roundhead fender piles have been upgraded recently.

3.5.34 The linkspan is in fair to poor condition and is yet to undergo OIC planned maintenance works. The paint system has broken down and, if left unaddressed, this will result in section loss to the steel deck members, which may lead to a reduction of capacity in the deck.

3.5.35 The landside infrastructure at the terminal includes car parking close to the linkspan, a marshalling area and waiting room with a telephone and toilet facilities.

3.5.36 A dive survey was commissioned by OIC in 2016, which included a visual survey of all piles and an ultrasonic steel thickness survey of 10% of the piles. The survey highlighted loss of section (including holing) of a number of the piles. Anodes were not noted on the caisson piles at Sanday during MML inspection in January 2019, however it is anticipated these will be installed as part of the OIC improvement works programme.

3.5.37 An OIC visual inspection carried out in 2018 highlighted damage to steel fender F4 on the berthing face, paint breakdown on the linkspan, an uneven concrete deck to the south of the pier, corrosion to ladders and damaged railings.

Stronsay

3.5.38 The date of construction of the original 160m long stone blockwork pier is unknown. The original pier looks to be in poor condition, with cracking evident on the vertical masonry faces, typical of older masonry structures.

3.5.39 The terminal was converted to Ro-Ro in the early 1990s, which included the construction of the finger pier and roundhead, linkspan and lifting dolphin, all beyond the original pier. The finger pier and roundhead are constructed from steel sheet piles with associated tie rods and wailing beams, infilled with crushed stone, with a concrete cope beam and a 150mm thick reinforced concrete deck slab. Damage and cracking of the concrete was noted on the cope beam at a number of locations. The ONI berth is faced by 8No. steel fender piles at 6.3m spacings. The fender piles have UHMWPE rubbing strips and MV fenders at cope level. The fenders appear to be undersized as several were noted to have moved or twisted from their original position.

3.5.40 At the seaward extent of the existing pier, there is a roundhead structure to assist with berthing onto the linkspan berth. The roundhead has 6No. steel fender piles with UHMWPE rubbing strips. The MV fender units between the fender piles and the concrete cope are deformed,

indicating they are undersized and have been damaged on impact from the ONI vessels. The linkspan is in relatively poor condition and is yet to undergo OIC planned maintenance works. The paint system has broken down and if left unaddressed this will result in section loss of the steel deck members, which may lead to a reduction of capacity in the deck.

3.5.41 There is a waiting room for passengers close to the linkspan. There is no designated parking or marshalling, with the original pier currently being used for parking and marshalling of vehicles. The narrow approach channel into Stronsay is dredged to maintain a depth of 3.5m below Chart Datum.

3.5.42 A detailed OIC visual and dive inspection carried out in 2001 highlighted loose stone and missing masonry blocks on all vertical faces of the original pier; damage to timber fenders along the eastern face of the existing pier (close to the waiting room); a large area of undermining of the concrete pier structure >10m in length; 2m deep under the linkspan; damage to 1No. fender on the ONI berth; and damage to the concrete cope beam on the west face of the finger pier. Repairs to address these defects have been carried out since the 2001 inspection.

3.5.43 A dive survey was commissioned by OIC in 2016, which included a visual survey of all piles and an ultrasonic steel thickness survey of 10% of piles which highlighted holing and loss of section of a number of piles. Anodes were not noted on the piles at Stronsay during MML inspection in December 2018, however it is anticipated these will be installed as part of the OIC improvement works programme.

Westray (Rapness)

3.5.44 The pier was constructed in the early 1990s and consists of a stone filled and rock armoured approach embankment, cellular steel sheet pile approach, cellular steel sheet pile berthing structure with roundhead, linkspan and lifting dolphin. A 2m high reinforced concrete wave wall is located along the south face of the berthing structure to the end of the linkspan. The wave wall does not extend north beyond the nose of the linkspan.

3.5.45 The ONI berth is faced by 9No. steel fender piles at 7m spacings. The fender piles have UHMWPE rubbing strips and MV fenders at cope level. The fenders appear to be undersized as several were noted to have moved or twisted from their original position. At the eastern extent of the pier, there is a roundhead structure to assist with berthing onto the linkspan berth. The roundhead has 5No. steel fender piles with UHMWPE rubbing strips. The MV fender units between the fender piles and the concrete cope are torn and warped, indicating they are undersized for use by the ONI vessels. Fender piles on the roundhead could be seen to sway under light wave action during the MML inspection, indicating insufficient penetration into dense strata.

3.5.46 The southern face of the finger pier is used by small craft, weather permitting.

3.5.47 The linkspan has been refurbished recently.

3.5.48 The landside infrastructure at the terminal includes car parking close to the linkspan at the wave wall, a large marshalling area and a waiting room with telephone and toilet facilities.

3.5.49 A dive survey was commissioned by OIC in 2016, which included a visual survey of all piles and an ultrasonic steel thickness survey of 10% of the piles. This survey highlighted loss of section (including holing) of a number of piles. Anodes were not noted on the caisson piles at Westray during MML inspection in December 2018, however it is anticipated these will be installed as part of the OIC improvement works programme.

3.5.50 An OIC visual inspection carried out in 2018 highlighted cracking of the concrete bollard upstands; poor condition of the roundhead fenders; damage to ladders; and uneven concrete deck slabs.

Westray (Pierowall)

3.5.51 The harbour consists of 2No. piers with pontoons and a narrow concrete slipway located within the basin. The original east pier is stone blockwork construction with a wave wall along the eastern face. This eastern pier was extended by approximately 60m with cellular steel sheet piles in 1981. The western pier, also constructed in 1981, is constructed from cellular steel sheet piles with a concrete deck, with the return pier forming the basin and providing shelter.

3.5.52 Within the basin, there is a drying out berth along the landward end of the inner face of the western pier and floating pontoons in the centre. The pontoons are accessed via a steel gangway positioned along the inner face of the west pier. Vessels use both sides of the seaward ends of the western pier for berthing and loading/unloading activities.

3.5.53 A dive survey was commissioned by OIC in 2015, which included a visual survey of all piles and an ultrasonic steel thickness survey of 10% of the piles. This survey highlighted loss of section (including holing) of a number of steel piles. Sacrificial anodes were being installed to the piles on the east pier during December 2018, as part of the OIC improvement works programme.

3.5.54 The entrance to the harbour was narrowed in 2017 with the construction of an additional caisson at the western pier. This reduced the width of the basin entrance to 19.8m and provided additional shelter. The level of the deck to the western pier was also raised by 900mm as part of these works. Despite the improvement works, south-westerly conditions are still known to affect the vessels berthing within the basin.

3.5.55 There is limited landside infrastructure associated with the ferry terminal. There is no designated car parking, with cars currently parking along the east and west piers. There are storage buildings and containers on the east pier. There is also a basic waiting room on the east pier with a toilet and telephone facilities, which were in fair condition.

4 How should North Ronaldsay and Papa Westray be served?

4.1 Overview

4.1.1 The critical network definition question in the context of Year 1 of this OBC is the future infrastructure solutions for North Ronaldsay and Papa Westray. As noted in the previous chapter, a Ro-Ro solution is proposed for both islands – the focus of this chapter and the next is therefore on identifying the preferred option solution for each. The islands are being considered together as the solution for one is intrinsically linked to the other.

4.1.2 The next section of this chapter summarises the 'Case for Change' for both islands, which is followed by consideration of the specific options for each island.

4.2 Summary of the Case for Change

4.2.1 The core building block of any business case is the 'case for change' which establishes the rationale for intervention and the set of problems and opportunities which the ultimate solution should address. The case for change with respect to the vessels was set out in Chapter 3. This section briefly recaps on the case for change established for both islands at SBC stage.

North Ronaldsay

4.2.2 The case for change at North Ronaldsay is almost wholly driven by the physical characteristics of the berth and the limitations which that imposes on the service. As has been noted, the berth at North Ronaldsay is exposed to wind and swell, and is also tidally restricted. The location, layout and orientation of the berth has the following implications:

- The vessel moves both horizontally and vertically on the berth, which makes crane-based operations more difficult and higher risk than if the vessel was more stable.
- The berth can only be accessed at certain states of the tide, which enforces the operation of a tidal timetable affecting the efficiency of vessel deployment across the network.

4.2.3 The resulting impacts of the above issues are as follows:

- The **reliability** of the service is very poor – analysis of operator performance data suggests that around one third of North Ronaldsay services are cancelled, with particular issues during the winter timetable. Unlike in similar islands such as Fair Isle or Foula, the absence of a dedicated (and island-based) vessel for North Ronaldsay means that there is no scope to operate alternative services when the weather and / or tides permit.
- The uncertainty over whether sailings will operate, particularly in winter when the island can go several weeks without a connection, creates problems in **supply-chain management**. Whilst charter flights can be and are used to plug gaps in the ferry service and ensure the continued provision of fresh produce, there are restrictions on what can be carried on the Britten Norman Islander aircraft, both in terms of weight and goods categorisation (e.g. fuel oil cannot be moved by air).
    - Examples of the above issue were provided by the North Ronaldsay Bird Observatory. They noted that, during the 2018 Christmas period, the island's charter air freight service was out of operation and the single weekly ferry sailing coincided with the Christmas and New Year bank holidays. As a result, there were no fresh food deliveries to the island over the Christmas period. Similarly, It was noted that on another recent occasion, there was no diesel delivery to the island over a four-week period.
- The vessel movement on the berth also makes **crane-based operations** highly challenging, particularly in terms of ensuring the application of safe operating practices.

Particular risks are the vessel pitching up / down as cargo is being lowered onto the pier deck or the vessel surging along the berth during cranage.

- The **sharing of a vessel** with other islands and the operation of the service around a **tidal window** means that around 8-9 hours have to be blocked off in the timetable of one vessel for a North Ronaldsay run, impacting the frequency and regularity of the service provided to the other islands. There is very little opportunity to make meaningful use of the vessel when not sailing to North Ronaldsay during this 8-9 hour period.

4.2.4 The issues associated with the exposure of the berth are compounded by the crane-based ship-to-shore interface. The requirement to crane goods means that turnaround times are far longer than would be the case with wheeled freight. The requirement to build-in this turnaround time to the timetable leads to a larger proportion of hours being blocked off than would be the case if the service was Ro-Ro. This again impacts on the level of service provided to the other islands.

4.2.5 In summary, the exposure of the berth and the challenges of Lo-Lo operations mean that the service delivered to North Ronaldsay does not meet the connectivity or capacity needs of the island, whilst also impacting on the other islands in the Outer North Isles network. Indeed, 80% (n=12) of North Ronaldsay respondents to the resident survey carried out for this study do not believe that the current air and ferry connections are sufficient to meet the island's current and future travel needs.

Papa Westray

4.2.6 The case for change for Papa Westray is very similar to that of North Ronaldsay, albeit the operational challenges are not quite as extreme.

4.2.7 The key issue is again the exposure of the berth to wind and swell, although the extent of that exposure and the tidal restrictions are less. This poses the same challenges around reliability and the requirement to block off time in the timetable to serve the island, again impacting on the other islands. It also has implications for the island supply-chain, but these are less extreme given the presence of the service to Westray, which can accommodate small manually handled freight.

4.2.8 The other element of the Papa Westray case for change is the impending life expiry of the passenger vessel which provides the connection with Westray, the MV *Golden Mariana*.

4.2.9 Having restated the case for change, the next part of this chapter considers the strategic choice which has to be made in determining the future form of infrastructure at North Ronaldsay and Papa Westray.

4.3 Infrastructure Solution - Strategic Choice

4.3.1 At present, the Outer North Isles fleet is in part defined by the requirement to provide Lo-Lo operations at North Ronaldsay and Papa Westray, with both the MV *Earl Sigurd* and MV *Earl Thorfinn* fitted with a vessel mounted crane to this end. Having reviewed the SBC, the OBC commences from the position that Lo-Lo based operations are obsolete and should thus be replaced by Ro-Ro in the next round of capital investment.

4.3.2 From the perspective of Papa Westray, there are two options for a future Ro-Ro ferry connection, either:

- Option 1: a year-round Ro-Ro vessel connecting Papa Westray with Westray (replacing the current seasonal foot-passenger service) with the current Kirkwall Lo-Lo service discontinued; or

- Option 2: development of a Papa Westray-Kirkwall Ro-Ro service, with a year-round foot-passenger service between Papa Westray and Westray operated by a new passenger vessel.

4.3.3 In both cases, there would be consequences for North Ronaldsay. Should Option 1 be progressed, the question would be how marine infrastructure at North Ronaldsay is developed to deliver a Ro-Ro service there in the context of the wider network. Should Option 2 be progressed, there are a range of options as to how the Ro-Ro service is delivered at North Ronaldsay and Papa Westray, given the scale of infrastructure work potentially required and the low volumes carried.

4.3.4 The components and implications of this strategic choice are summarised in the flowchart below:

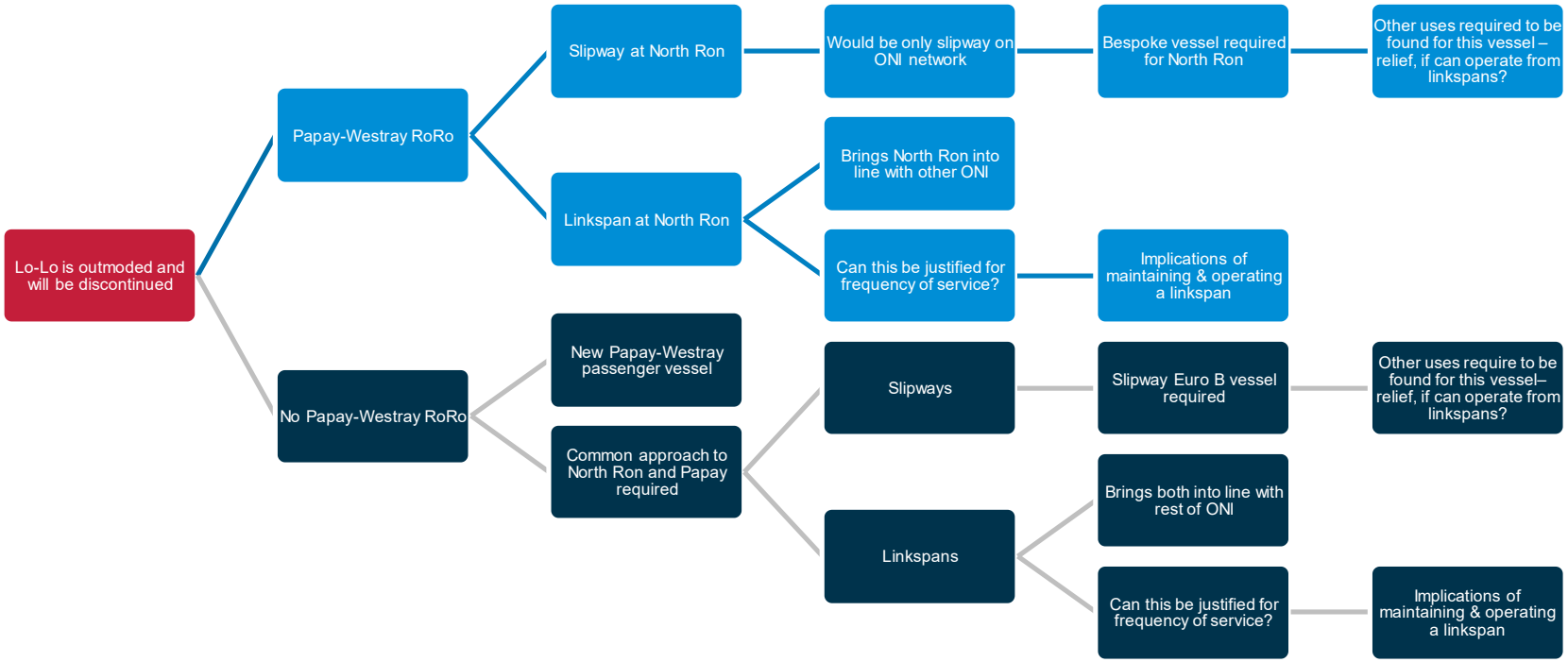


Figure 4.1: Future Infrastructure Solution for North Ronaldsay and Papa Westray – Strategic Choice

4.3.5 Should the decision be taken to progress with a **Papa Westray – Westray Ro-Ro service** (the light blue boxes in the above flowchart):

- Papa Westray would be removed from the main Outer North Isles network, with all traffic hubbed through Westray.
- The Ro-Ro solution at North Ronaldsay could be either a slipway or a linkspan.
  - A slipway would be lower cost and would also be simpler to maintain and operate. However, it would be the only slipway on the Outer North Isles network and would therefore potentially require a bespoke vessel. It is possible that this vessel could be used elsewhere on the network but would require the slipway vessel to interface with linkspans, which is operationally sub-optimal.
  - The provision of a linkspan would bring North Ronaldsay into line with the wider Outer North Isles network but would potentially represent an expensive infrastructure solution given the infrequent service operated there.

4.3.6 Should the decision be taken to progress with a **Papa Westray – Kirkwall Ro-Ro service** (the dark blue boxes in the above flowchart):

- A common solution would be developed for Papa Westray and North Ronaldsay. This could either be a slipway or a linkspan.
  - A slipway would again be a lower cost and the two islands would share a Euro B standard slipway vessel. Ideally this vessel could be used elsewhere on the network when not serving the above mentioned islands but, as previously noted, there are operational challenges surrounding the use of a slipway vessel on a linkspan.
  - With regards to a linkspan, the infrastructure at both ports could be developed to accommodate a small linkspan vessel (a lower cost solution) or for larger vessels used elsewhere on the Outer North Isles network, a higher cost solution but one which provides equivalence and interchangeability.

4.3.7 The above flowchart and commentary therefore identify how fundamental the **choice as to whether Papa Westray should be served by a Westray or Kirkwall Ro-Ro service is**. All other considerations stem from this decision, and the issues surrounding this choice form the basis of this chapter. The preferred option for North Ronaldsay, which will stem from this choice, is explored in Chapter 5.

4.3.8 The following sections now set out each of the options turn. In each case, the option is developed from the perspective of:

- Vessels;
- Infrastructure; and
- Cost to government.

4.4 Option 1: Papa Westray – Westray Ro-Ro Service

Vessel

4.4.1 As noted previously. the current foot-passenger service is operated by the 15m MV *Golden Mariana* passenger ferry. Built in 1973, she can carry circa 50 passengers and is an MCA Class VI / VIA vessel. A Ro-Ro vessel would be larger than this. For reference the smallest vehicle carrying vessel in the CMAL fleet is the MV *Carvoria* at 12m (carries one vehicle only).

4.4.2 As also previously noted, the Strategic and / or Socio-Economic Cases of an OBC do not typically establish the exact vessel to be used on a route. Nonetheless, whilst a preferred vessel

is not specified, it is necessary at this stage to determine a high level design vessel as the basis for scoping out the necessary infrastructure works.

4.4.3 Given the population of Papa Westray, the limited volume of goods moved and the role of air as the lifeline mode of passenger transport, a relatively small slipway Ro-Ro vessel would meet the needs of the route. A linkspan vessel and its accompanying infrastructure would therefore be disproportionate, and this option is not considered further.

4.4.4 Two design vessels have been considered and would be refined further if the Papa Westray – Westray Ro-Ro is progressed to 'Year 2' of this study. These are summarised in the table below:

Table 4.1: Papa Westray – Westray Ro-Ro Design Vessels

	Vessel 1	Vessel 2
Design Vessel	CMAL mid-1980s *Loch* Class	MV *Cromarty Queen*
Image[13]		
Ro-Ro Type	Double-ended	Single-ended
Length Overall	30.2m	17.25m
Beam	10.0m	6.5m
Draught	1.5m	1.4m
Speed	9kts	9kts
Classification	MCA Class VI / VIA	MCA Class V
Passenger Capacity	203	50
Vehicle Capacity	9-12	4

4.4.5 Vessel 1 is an example of one of the smaller *Loch* Class vessels (MV *Loch Riddon*) operated on short slipway routes on the west coast of Scotland. The vessel is double-ended and thus drive through. Vessel 2 is the MV *Cromarty Queen*, which was launched in 2010 to operate the short crossing between Cromarty and Nigg. She is approximately half the length of the MV *Loch Riddon* and can accommodate four cars. Whilst she is single-ended, there is a turntable on the vessel which prevents the need for reversing on or off.

4.4.6 Based on the above vessels, and to ensure a degree of future proofing, the harbour infrastructure options have been developed on the basis of a 30m length overall vessel.

Infrastructure: Papa Westray – Moclett

4.4.7 The figure below sets out the proposed slipway arrangement at Moclett on Papa Westray:

[13] Photograph sources: Vessel 1 – www.calmac.co.uk; and Vessel 2: www.sms-marine.co.uk

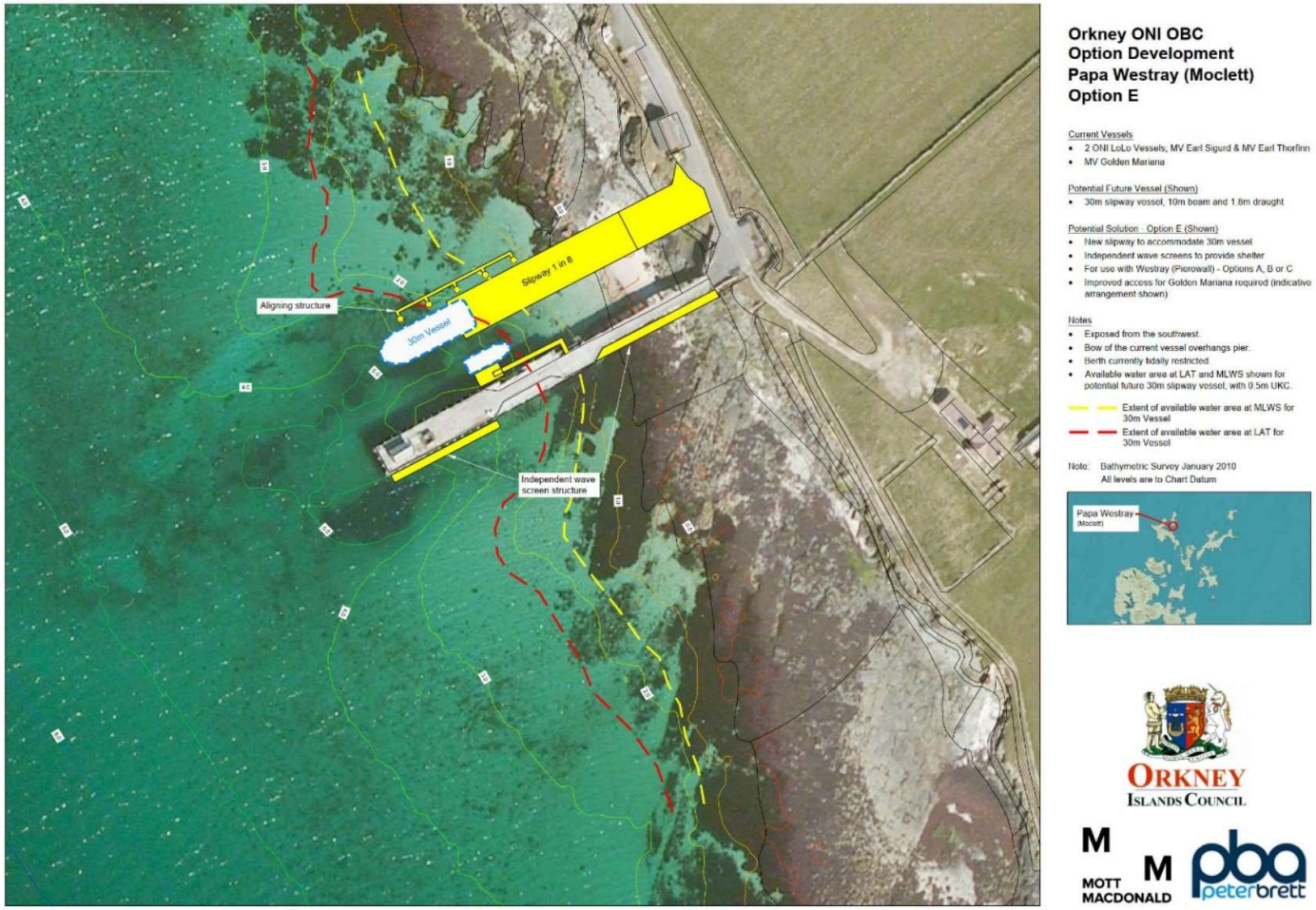


Figure 4.2: Proposed Slipway – Moclett, Papa Westray

4.4.8 The proposed infrastructure at Moclett would include:

- a 30m slipway at 1-in-8 gradient capable of accommodating both of the above specified design vessels;
- provision of an aligning structure allowing the vessel to maintain position on the berth; and
- independent wave screens on the south-east of the current pier to reduce motion on the berth.

Infrastructure: Westray – Pierowall

4.4.9 Unlike Moclett which is only used by ferries, Pierowall is an important local harbour in Westray and thus any slipway would need to be constructed with other harbour users in mind. To this end, three options have been developed for Pierowall, two within the existing harbour and one outwith it. These options are shown below:

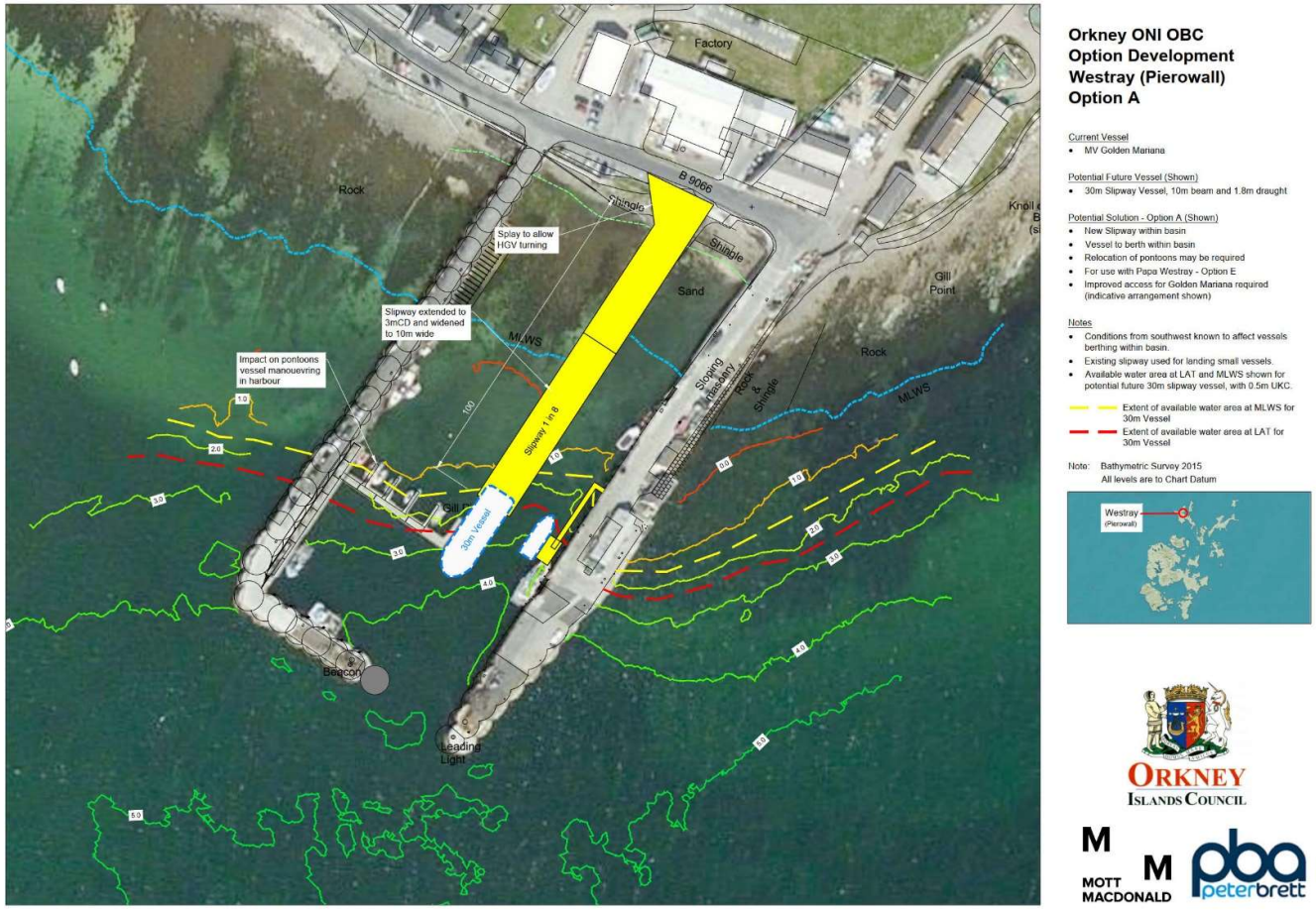


Figure 4.3: Proposed Slipway Option A – Pierowall, Westray

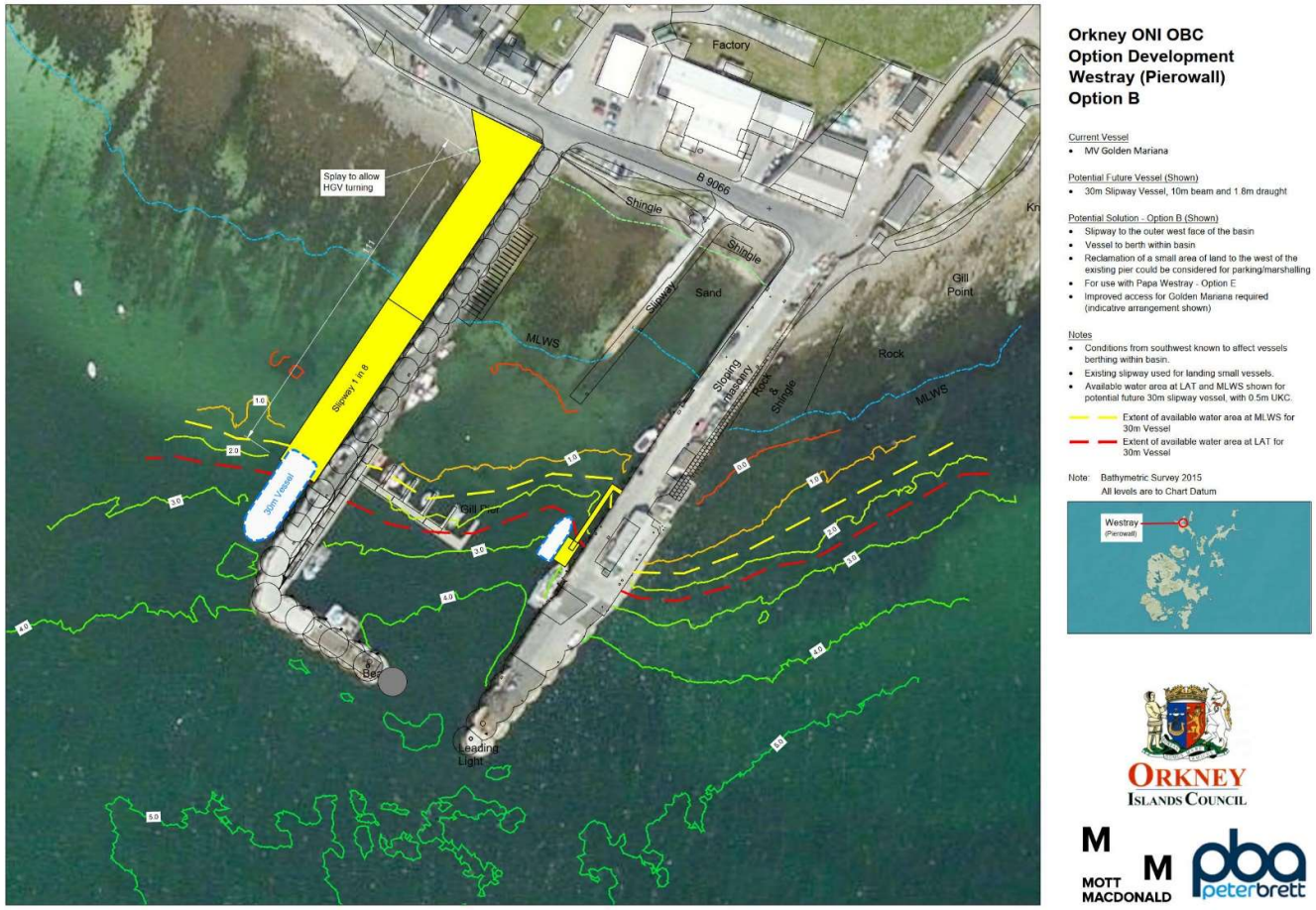


Figure 4.4: Proposed Slipway Option B – Pierowall, Westray

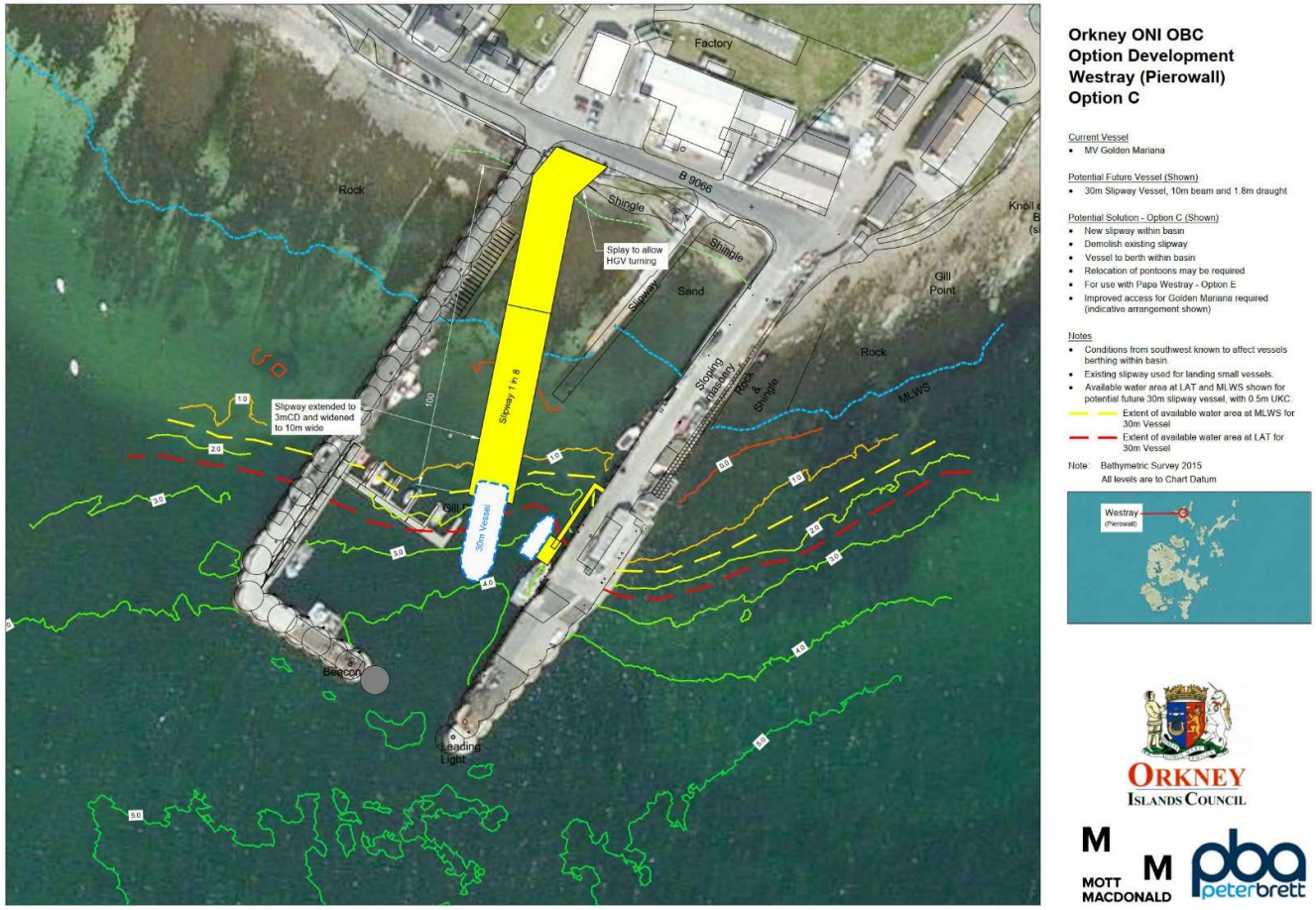


Figure 4.5: Proposed Slipway Option C – Pierowall, Westray

4.4.10 The following points should be noted in relation to the proposed infrastructure at Pierowall:

- Each of the options would provide a 30m slipway at 1-in-8 gradient capable of accommodating both of the above specified design vessels.
- For the two options within the harbour basin (Options A and C), the slipway would need to be of a significant length to provide the appropriate gradient and transition angle with the vessel ramp. This would have implications for the operation of the current harbour, most notably the location of the pontoons and use of the existing slipway in the harbour which would need to be demolished. Option C is particularly problematic in this respect as it effectively cuts the harbour in two, but it would provide a splay to facilitate HGV turning.
- Option B, the slipway to the north of the harbour basin, would not disrupt the operation of the current harbour but is less sheltered and would be more exposed to wave motion. A small amount of land reclamation would be required to provide an appropriate vehicle marshalling area.

4.4.11 If the preferred option for Papa Westray is a Ro-Ro connection to Westray, each of the options at Pierowall will require subsequent development and consultation with both other harbour users and the wider Westray community. It should be noted that there is a strong likelihood that options A and C would not be viewed favourably by the community due to their impact on harbour operations. For Option B, the impact of wave climate on service reliability would need to be carefully considered.

Cost to Government

4.4.12 As the SBC was covering 13 islands, the approach to costing was high-level, based on a 'vessel typology' and fixed sums for specific pieces of infrastructure (e.g. linkspans). The primary focus of option development at OBC stage has been to refine the options and build-up site specific costs based on required infrastructure and quantities (estimated at a high level).

4.4.13 All marine infrastructure cost estimates presented in this section and throughout this report have been developed using typical rates for similar work undertaken at remote Scottish locations. Cost breakdowns for all harbour infrastructure referenced in this report are provided in **Appendix A**.

Optimism Bias

4.4.14 There is a demonstrated, systematic tendency for project appraisers to be overly optimistic – this is known as Optimism Bias (OB), where costs are often under-estimated and benefits over-estimated. In order to account for this in appraisal, the H.M. Treasury *Green Book*, and in this case the STAG Technical Database, provide a set of factors by which costs should be scaled-up at different stages of the business case.

4.4.15 Table 13.4 of the STAG Technical Database sets out the OB adjustments for different types of project. **Marine infrastructure** is not specifically listed but is assumed to be under the 'Roads' category for the purposes of this appraisal. OB is not typically applied to new **ferries** as there are generally costs for comparable vessels and, in theory at least, the business case and procurement process should allow cost risks to be managed or transferred to shipyards and away from the public purse.

4.4.16 The STAG Technical Database recommends the application of 44% OB at SBC stage, reducing to 15% at OBC stage as costs become clearer. However, in marine civil engineering, a package of work is required to obtain greater cost certainty, including ground investigations and wave modelling. These are significant undertakings and are not typically pursued until 'detailed design' stage, which broadly aligns with Final Business Case. For this reason, **OB on marine infrastructure is retained at 44% in this OBC**.

Vessel

4.4.17 Obtaining an outline cost for vessels is difficult without engaging directly with yards or brokers. The cost depends on the position of the market at that time, the number of vessels being ordered, the specification and the amount of risk the buying party is willing to accept. The figures presented below are therefore an estimate based on recently ordered ferries (where costs have been available).

4.4.18 The equivalents to 'Design Vessel 1' were built in the mid-1980s and thus their construction costs are now well out of date. The recent hybrid *Loch* Class vessels (43.5m LOA) were built in Scotland between 2012 and 2016 at a cost of £10.0m-£12.3m each. The most recent diesel built *Loch* Class vessel was the MV *Loch Shira* (54.2m LOA), which was built in 2007 at a cost of £5.8m (approximately £8m in 2019 prices).

4.4.19 Given that 'Design Vessel 1' is significantly smaller at only 30.5m LOA, it is likely to that a modern diesel version would cost in the region of **£6m**.

4.4.20 The build cost of 'Design Vessel 2', the MV *Cromarty Queen* was not published and there is no immediately obvious comparator for this vessel. However, as part of the Fair Isle OBC undertaken by PBA and MML, estimated costs were worked-up for a small (linkspan) Ro-Ro vessel based on a Norwegian designed vessel, the MD240. This was estimated at £4m and would appear a reasonable equivalent, with the exception that this vessel was based on workboat classification. The new vessel would need a higher level of classification. For the purposes of this report we have based pricing assumptions on Euro B classification, but recognise that if the vessel was dedicated to the Westray – Papa Westray route a lower classification may be possible, however this could place restrictions on the flexibility of this vessel to serve other islands in the future. For estimating purposes, **£4.5m** is assumed.

Operating Costs

4.4.21 It is important to note at the outset that demand for a Westray Ro-Ro service is unknown as the service would provide a new level of connectivity both to Westray and the mainland. A set of simplifying assumptions has been used to estimate costs – these are as follows:

- Within the Orkney Ferries fleet, the MV *Eynhallow* - which serves Rousay, Egilsay and Wyre - is the nearest equivalent vessel to that proposed for Papa Westray. Her operating day is also similar to that being proposed for a Papa Westray – Westray Ro-Ro and thus her costs are a reasonable proxy for operating the service.
- The population of Papa Westray (90) is around one third (271) of Rousay, Egilsay and Wyre – annual freight revenue is therefore assumed to be 33% of that of the MV *Eynhallow*.
- A similar approach has been used to calculate passenger and vehicle fares. However, Rousay, Egilsay and Wyre is a commuter route and thus residents of these islands have a greater propensity to travel. Therefore, the *pro rata* revenue figure has been halved (i.e. 33% of MV *Eynhallow* fares revenue divided by two).

4.4.22 Using the above assumptions, the net additional operating cost of a year-round Papa Westray – Westray Ro-Ro service (when compared to the current passenger only service) would be in the region of **£410k per annum** in 2019 prices.

4.4.23 There would not be a significant direct cost saving associated with discontinuing the Papa Westray Lo-Lo service, but there would be a wider network benefit associated with those hours being recycled back into the timetable.

Harbour Infrastructure

4.4.24 Cost estimates (with and without OB) are provided for each option in the table below. These costs include materials, plant and labour, and an allowance for contractor preliminaries including mobilisation, contingency, and consultancy fees and consents.

Table 4.2: Papa Westray – Westray Ro-Ro, Infrastructure Costs

	Cost (£m)	Cost including OB (£m)
Papa Westray Slipway	£5.65	£8.14
Pierowall Slipway (Option A)	£3.35	£4.82
Pierowall Slipway (Option B)	£3.34	£4.81
Pierowall Slipway (Option C)	£3.35	£4.82

4.4.25 The total infrastructure cost is therefore in the region of **£13.5m** for appraisal purposes for any of these options.

4.5 Papa Westray – Kirkwall Ro-Ro

Vessels

4.5.1 Should the option of a Papa Westray – Kirkwall Ro-Ro be progressed, there are a range of possible vessel solutions which could be adopted. The challenge in the context of Papa Westray, and indeed North Ronaldsay, is delivering a reliable service with sufficient capacity, but at the same time ensuring a value for money solution given that the ferry service accounts for only around 5% of total passenger movements from the island.

4.5.2 Building on the above point, there are three broad vessel scenarios which could be pursued:

- **Vessel Scenario 1:**
  - A Ro-Pax **linkspan** vessel of a broadly similar length to the MV *Earl Sigurd* and MV *Earl Thorfinn*, circa 45m LOA.
  - A like-for-like replacement in terms of length would minimise the scale of harbour works at Papa Westray. However, given modern design standards, the vehicle carrying capacity would likely be slightly lower (albeit the *Earls* now tend to sail at less than their advertised car carrying capacity given that the average size of a car has increased since those vessels were built).
  - The 45m Ro-Ro vessel could be used at all other harbours on the ONI network and could additionally provide cover on the Houton – Lyness – Flotta route. However, it would offer a lower carrying capacity than the standard ONI design vessel and thus would be better utilised on the lower volume routes such as Eday and Stronsay rather than Sanday and Westray.
- **Vessel Scenario 2:**
  - Procure a Ro-Pax **slipway vessel** broadly equivalent to the Small Isles vessel MV *Lochnevis*, circa 50m LOA. Whilst this vessel would be slightly longer than the *Earls*, it would have a lower carrying capacity, circa 10-14 cars.
  - A vessel equivalent to MV *Lochnevis* would provide significant flexibility as it would be capable of operating from tidally constrained slipways and linkspans. A slipway arrangement would also be lower cost and easier to maintain than a linkspan. However, the vessel would need to be capable of supporting vehicular live loads when engaging with the Orkney linkspans. If practical, this would lead to a complex arrangement at the vessel ramp / linkspan interface (this point is explored in more detail in Chapter 5).
  - The key issues with a slipway vessel are the practicalities of a vessel ramp / linkspan interface and other uses of the vessel when not serving Papa Westray (and North Ronaldsay).
- **Vessel Scenario 3:**
  - This can be thought of as the **'Papa Westray-max'** option, whereby the ONI design vessel – a 65m LOA linkspan vessel – would serve the island.

- The key benefit of this option is that it would provide an entirely consistent fleet for the Outer North Isles, with all vessels interchangeable between all six islands. However, it would provide a much higher level of capacity than is needed and would also require the most significant harbour works.

Infrastructure: Papa Westray – Moclett

The figures below show high level general arrangement drawings for the required harbour works at Moclett to accommodate each of the three vessel scenarios outlined above.

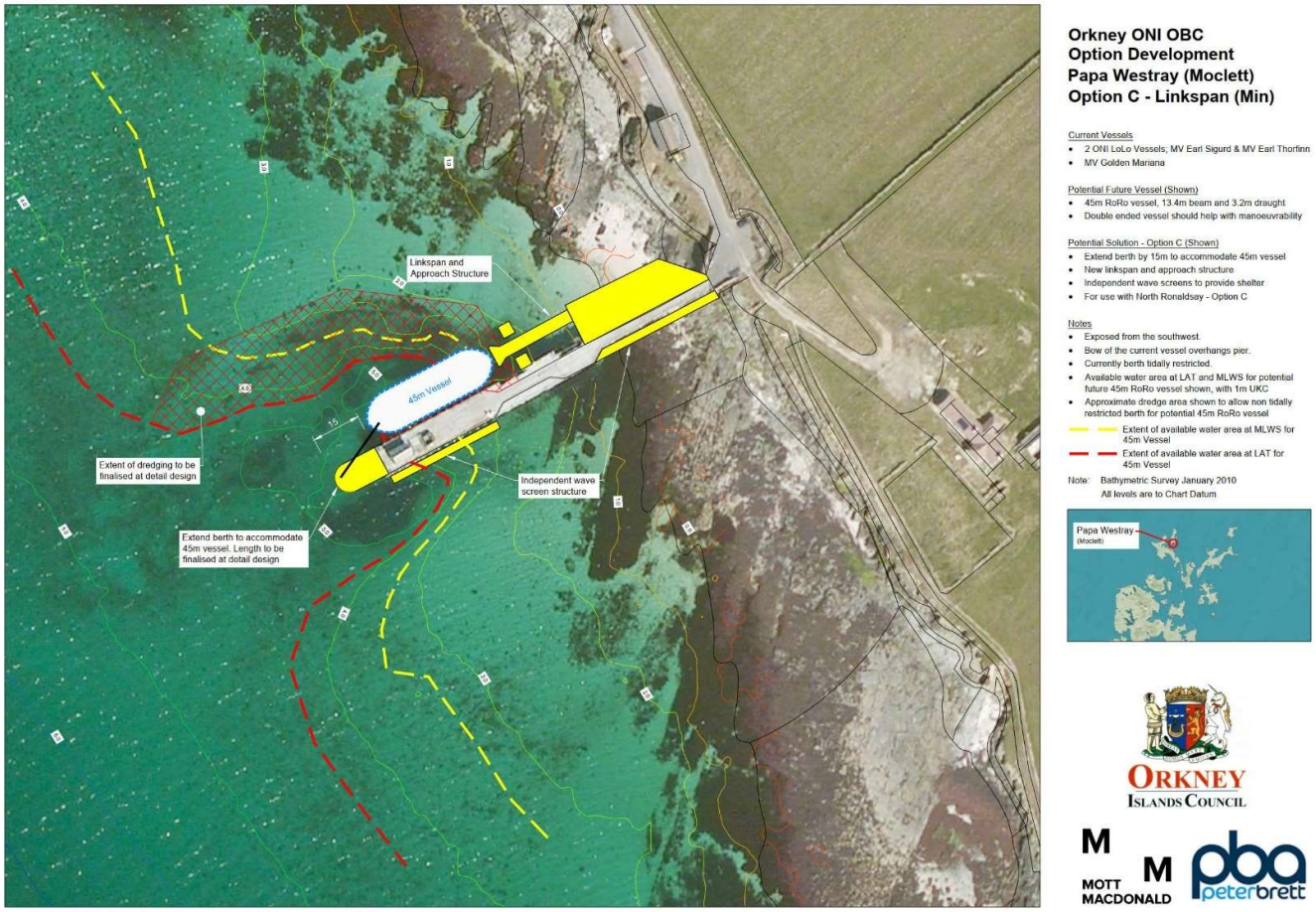


Figure 4.6: Infrastructure Works Required to Accommodate a 45m Linkspan Vessel (Vessel Scenario 1)

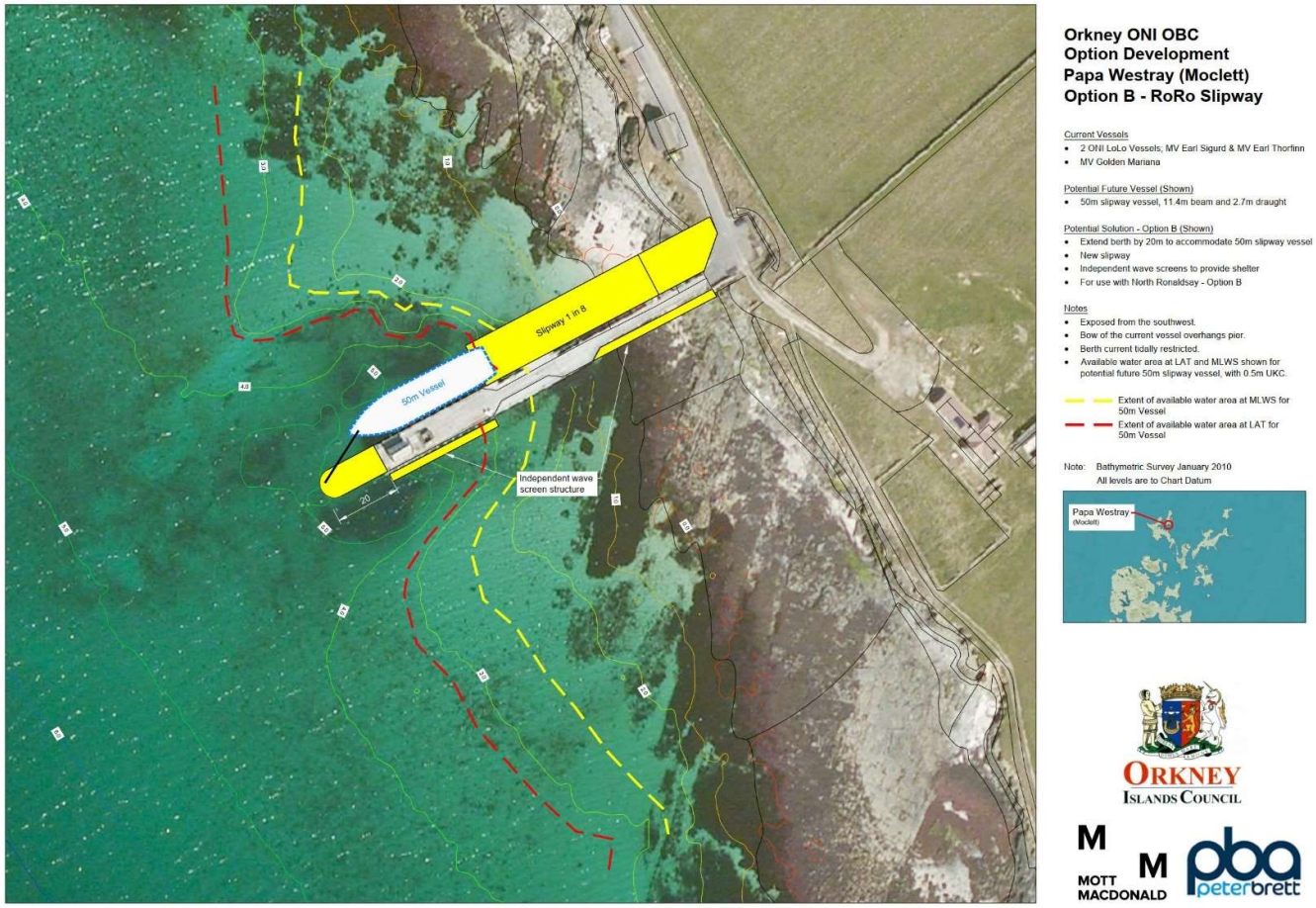


Figure 4.7: Infrastructure Works Required to Accommodate a 50m Slipway Vessel (Vessel Scenario 2)

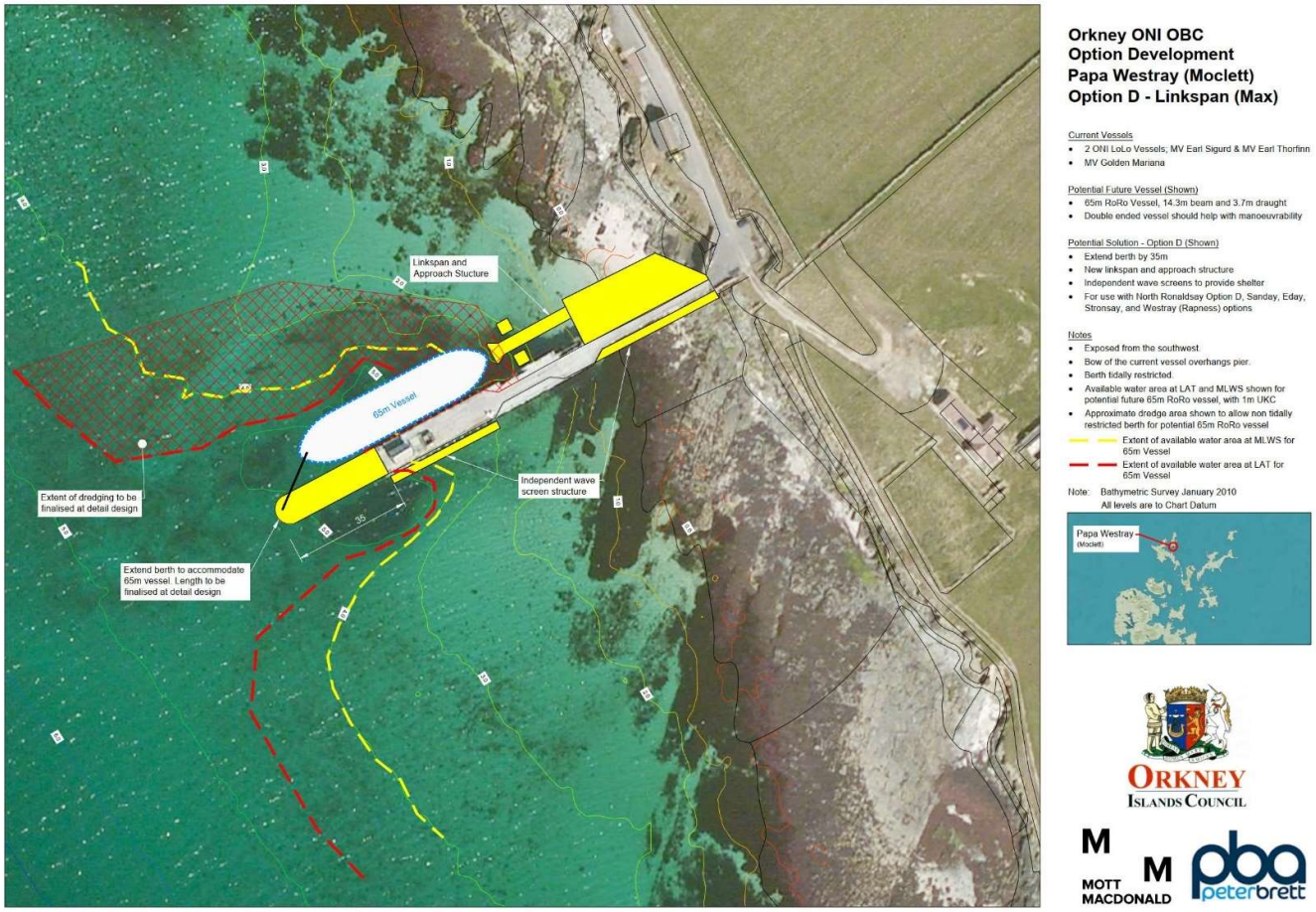


Figure 4.8: Infrastructure Works Required to Accommodate a 65m Linkspan Vessel (Vessel Scenario 3)

4.5.3 The following point should be noted in relation to the above general arrangement drawings:

- Accommodating a 45m linkspan vessel at Moclett would require a 15m extension to the berth together with a new linkspan and approach structure. Dredging would be required to accommodate the proposed vessel whilst an independent wave screen on the south-east side of the berth would reduce wave motion on the berth.
- The infrastructure required to accommodate a slipway vessel would be broadly similar to that for the 45m linkspan vessel, although the pier extension would need to be slightly longer to accommodate the length of slipway required to provide acceptable transition angles.
- Accommodating the 65m linkspan vessel at Moclett would require a more significant pier extension of circa 35m, as well as dredging to accommodate the larger vessel.

Infrastructure: Kirkwall

4.5.4 The proposed linkspan vessels could be accommodated on the current berth in Kirkwall, albeit some upgrades may be required (this will be considered in Year 2 of the OBC and will also need to take cognisance of the proposals in the Kirkwall Port Masterplan).

4.5.5 Subject to the practicality of the vessel ramp / linkspan interface, the slipway vessel could also work off the linkspan in Kirkwall. It could also potentially work off the slipway used by the MV *Shapinsay*, albeit it would need to work around the high frequency timetable of the Kirkwall – Shapinsay service.

Cost to Government

Vessels

4.5.6 In the context of this option, the vessel used to operate a Kirkwall Ro-Ro would be one of the proposed four ONI vessels. There is therefore no direct Ro-Ro vessel cost attached to this option.

4.5.7 A new passenger vessel to replace the MV *Golden Mariana* would however be required. In their 2015/16 budget planning, OIC allocated **£500k** for a replacement for this vessel. It is not possible to get an exact price for a new vessel without testing the market but the above figure does appear to be slightly low. An allocation of **£1m-£1.5m** is therefore included in this appraisal.

Operating Costs

4.5.8 There would be an increase in operating costs associated with running a year-round passenger only service to Westray. The Revenue OBC has estimated this cost at around **£75k per annum** in 2019 prices.

Harbour Infrastructure

4.5.9 The table below shows the cost of the infrastructure options for the different vessel scenarios.

Table 4.3: Papa Westray – Westray Ro-Ro, Infrastructure Costs

	Cost (£m)	Cost including OB (£m)
Vessel Scenario 1 – 45m Linkspan	£10.70	£15.41
Vessel Scenario 2 – 50m Slipway	£7.57	£10.90
Vessel Scenario 3 – 65m Linkspan	£12.50	£18.01

4.5.10 The key point to note from the above table is that the lowest cost option is by some margin the provision of infrastructure to accommodate a slipway vessel. Scaling Papa Westray to

accommodate the ONI design vessel would cost in the region of £18m for appraisal purposes, an increase of £7m over the slipway solution.

4.6 Papa Westray – Preferred Option

4.6.1 Having set out the infrastructure implications of the two option pathways for Papa Westray, this section defines a preferred option. The initial step is exploring the advantages and disadvantages of the two options when compared to the present day situation, which have been developed through desk-based analysis and community and stakeholder consultation.

Option 1: Papa Westray – Westray Ro-Ro

Advantages

Timetable and Service Provision

4.6.2 The provision of a year-round Ro-Ro service would offer several advantages for the Papa Westray community (and to a lesser extent those living in Westray). At present, a scheduled passenger service is operated in summer, reducing to a contracted school service in winter, as is shown in the table below:

Table 4.4: Moclett – Pierowall, Number of Return Connections

	Summer	Winter
	No. of Return Connections from Westray	
Monday	6	2
Tuesday	6	2
Wednesday	6	2
Thursday	5	2
Friday	4	2
Saturday	4	0
Sunday	3	0

4.6.3 As can be seen from the above table, winter ferry connectivity between the two islands is limited, and there is no service at the weekend. The primary advantage of a Papa Westray-Westray Ro-Ro option is therefore that it would provide **year-round connectivity to Westray**, which is a longstanding aspiration of the community. Indeed, 48% (n=26) of respondents to the Papa Westray household survey noted that seasonal operation is a 'major' factor in their using the Moclett – Pierowall service less frequently than they would like to. A further four respondents noted that this is a minor factor. Overall, this was by some margin the largest identified deterrent to greater use of the service.

4.6.4 Assuming the vessel is operated on a 'single crew day' (i.e. a maximum 14-hour day and 91-hours per week), this would offer an operating day of 13-hours on the basis of a seven-day service, or 12 hours assuming an hour for start-up and close down. Working on the basis of the above, 11 return services per day could be operated, with the service commencing at 07:00 and terminating at 19:00, with a one hour break for lunch. This could be scaled down slightly to 8-10 connections if specific sailings in the current timetable had to be maintained. It should be noted that an equivalent service could also be operated by a year-round passenger vessel.

4.6.5 The Moclett - Pierowall Ro-Ro service could, where practical, be timed to integrate with the Rapness (Westray) – Kirkwall service, providing Papa Westray with a **daily Ro-Ro connection to Orkney mainland**. This would also enable a **day trip** to be feasibly made between Papa Westray and the Orkney mainland in either direction. That said, the timetable would need to be

designed to ensure that the timings of the education-related sailings are protected as this is the main purpose of the service at present.

Reliability

4.6.6 The operator performance data show that around one in three Lo-Lo sailings to Papa Westray is disrupted. A combination of the conditions on passage and at the berth impact on the ability to operate the service reliably to timetable.

4.6.7 Converting Papa Westray's ferry link to Ro-Ro would significantly improve the reliability of the island's ferry-based connectivity to the mainland. The crossing between Moclett and Pierowall is shorter and more sheltered than the Kirkwall crossing, whilst a slipway vessel would experience fewer ship-to-shore interface issues than the current crane-based operation at Moclett.

4.6.8 Moreover, in the event that the service was disrupted for part of the day, it would be possible to restart the service if the weather improved due to the route being served by a dedicated vessel rather than one shared with five other islands. The shorter crossing would also assist in this respect.

Safety

4.6.9 As noted earlier in this report, craning goods at an exposed berth requires a high degree of risk management. In addition, passenger access to the vessel, particularly for those with mobility difficulties, is also less than ideal. A slipway-based Ro-Ro would fully address the risks associated with crane-based operation and also remove the longer-term risks attached to potential future changes in regulations or legislation.

Supply-Chain

4.6.10 The most fundamental change introduced by a year-round Ro-Ro would be the provision of a reliable **daily supply-chain** for Papa Westray.

4.6.11 The current supply needs of the island are almost wholly delivered by the Lo-Lo service from a goods hub on Kirkwall pier operated by Orkney Ferries. Goods for Papa Westray (and North Ronaldsay) are delivered into and consolidated in a small building equipped with refrigeration and a deep freeze. Goods are generally stored on pallets and lifted onto the vessel by crane. At Papa Westray the goods are craned onto the pier and received by an Orkney Ferries agent and / or harbour staff based on the island, to be held at a pier-based collection point. The overall volume is very small in absolute terms and this arrangement covers almost all inbound and outbound freight; every consumable of island life including fresh produce, building materials, paint, fuel, stationary, livestock and other supplies.

4.6.12 There is a well-used Community Cooperative supplied store on Papa Westray and if the Lo-Lo service is delayed, it is served via Westray, where a van delivers to the passenger ferry service and the supplies are moved as loose freight by hand. It is collected by the Co-op shopkeeper. Volumes are small so this arrangement is an effective workaround when the Lo-Lo service is disrupted.

4.6.13 A move to Ro-Ro would deliver an ability to receive fresh produce daily. The Westray haulier has indicated that it would either operate a dedicated vehicle if there was sufficient demand, or if smaller volumes, operate a consolidated vehicle to Westray and tranship for the sailing to Papa Westray. No substantive logistical issues were identified in the ability to service the island's freight needs from Westray.

4.6.14 The aggregated demand from the two islands would have to be considered, but predicting future volume based on current demand would be challenging. With few people and little industry on

Papa Westray, volumes are marginal compared to Westray so could be absorbed potentially with little real change in the number of vehicles moving.

4.6.15 Whilst a daily supply-chain would be beneficial for Papa Westray residents, some in the community have significant concerns over the **cost of these alternative haulage arrangements**, which are considered in more detail in the 'disadvantages' section below.

Vehicular Access

4.6.16 Vehicular access to / from Papa Westray is limited at present. If a resident or visitor wants to take their car on or off island, it has to be done using the crane on the Lo-Lo vessel. In addition, there is a weight limitation of circa 10 tonnes, whilst only items of limited dimensions can be handled. This limits the size of agricultural and building project plant & assemblies that can be transported, leading to a significant efficiency loss.

4.6.17 There is often a requirement to have an on-island and off-island vehicle – 46% of respondents to the resident survey noted that they either keep a second car at Kirkwall Airport (38%) or in Kirkwall town centre (8%). Whilst on-island cars do not require a MOT certificate and will tend to be older, there is nonetheless an expense associated with running two vehicles, particularly given that average wages in Papa Westray are likely to be lower than the Orkney and Scottish averages.

4.6.18 The development of a Ro-Ro service to Papa Westray would facilitate car-based travel to Westray and Orkney mainland. This could reduce / eliminate the need for a mainland car and would also allow Papa Westray residents to more readily access leisure and retail opportunities on both Westray and the mainland.

4.6.19 Whilst improved vehicular access would have benefits, it would also introduce risks around potential displacement of economic activity and an increase in vehicle numbers on Papa Westray – these issues will be covered in the next section considering potential disadvantages.

Social and Cultural Links

4.6.20 There is at present a degree of crossover between Papa Westray and Westray. For example, the island GP is shared with Westray and has a scheduled surgery on Papa Westray one day per week, whilst S1-S4 pupils travel daily to Westray Junior High School. However, the reduction in the service in winter limits the interaction between the two communities (although the air service continues to operate between the islands).

4.6.21 The Papa Westray resident survey asked respondents which activities / opportunities they miss out on by travelling to Pierowall by ferry less often than they would wish – the results are shown in the figure below.

Figure 4.9: In travelling to Pierowall by ferry less often than you'd like, what activities / opportunities are you missing out on?

4.6.22 Island residents have therefore identified a range of leisure purposes which they are missing out on due to the restrictions imposed by the ferry service (predominantly the reduced winter service). Connecting Papa Westray and Westray by Ro-Ro would facilitate the above trips – the resident survey found that a majority of residents would make an additional 1-3 trips per month by ferry to Westray. The above said, this benefit could also be delivered by a year-round passenger only ferry as proposed if the decision is taken to proceed with a Kirkwall Lo-Lo service (as long as there is connecting public / community transport).

Employment Opportunities

4.6.23 The provision of a Ro-Ro service to Westray could create new employment opportunities in two ways:

- Firstly, Figure 4.9 above shows that a small proportion of Papa Westray residents have noted that the current Moclett – Pierowall ferry service limits employment opportunities. Westray has a more developed economy and a larger public sector presence (e.g. education, health etc) than Papa Westray, and thus a year-round service could facilitate access to a greater range of employment opportunities for residents of Papa Westray.
  - It should again be noted that a year-round passenger only service would also facilitate this outcome (public transport permitting).
- Secondly, a Ro-Ro vessel would require a larger crew complement than the MV *Golden Mariana*, thus creating additional secure and comparatively well-paid employment. It is likely that the vessel would be based in Westray given that Pierowall Harbour provides a safe overnight berth, and thus the employment benefit would accrue mainly to Westray.

Network Benefits

4.6.24 There are two key 'network benefits' which would emerge from the provision of a Ro-Ro service between Papa Westray and Westray:

- The current time in the timetable allocated to Lo-Lo calls could be recycled back into the wider Outer North Isles timetable. This would equate to:
  - In summer:
    - Tuesday – approx. 7 hours

- Friday – approx. 1.5 hours (Westray - Papa Westray loop) plus 9 hours = 10.5 hours
- so approx. **17.5 hours** in total

- In winter:
  - Friday or Saturday: return to North Ronaldsay, so approx. 6-6.5 hrs;
  - Tuesday: approx. 1.5 hours (Westray - Papa Westray loop);
  - Friday: 4.0 hours (Papa Westray)
  - so approx. **12 hours** in total
- In Refit:
  - 4hr:15m (Friday Papa Westray) &
  - 9 hours (Saturday North Ronaldsay)
  - so approx. **13hr15m** in total.

- **Seating capacity** on the Papa Westray – Westray flights (both directions) is highly pressed, particularly during the summer months. Indeed, the Papa Westray resident survey highlighted capacity on both indirect and direct flights to Kirkwall as the main factor preventing residents from travelling by air as much as they would like to. The provision of a Ro-Ro service via Westray would reduce pressure on the air service, providing a new regular year-round passenger connection to Westray and the mainland, which could be used by residents and visitors.

Disadvantages

Supply-Chain

4.6.25 Whilst a Westray Ro-Ro service would offer a near daily supply-chain, there is concern amongst some residents that it would affect the current structure of the supply-chain, leading to an increase in freight costs which would undermine the critically important island shop.

4.6.26 At present, Orkney Ferries acts as the *de facto* haulier for Papa Westray. As previously noted, goods for the island are consolidated at the pier in Kirkwall, loaded onto the vessel by Orkney Ferries staff, craned-off on arrival in Moclett and then held at a collection point adjacent to the pier. Essential commodities such as oil are delivered free of charge, whilst the delivery price of other goods is based on a commodity specific rate card. The benefit of this for the community is that the costs of delivery are lower than would be the case if a third-party haulier had to be contracted and deliveries were charged on the basis of lane metre bandings.

4.6.27 Serving Papa Westray through Westray would fundamentally change the structure of this supply-chain. Most significantly, there would be a need to employ a haulage firm to collect freight from the Outer North Isles hub at Hatston; move it to the pier in Kirkwall; trans-ship it through Westray; and then deliver it to its final destination(s) on Papa Westray. It is highly unlikely that a viable Papa Westray haulier could be established, rather the freight would probably be moved by the main haulier for Westray. The charging of commercial haulage rates would increase the cost of each delivery to Papa Westray, impacting both on personal deliveries and goods for the island shop.

4.6.28 Orkney Ferries could not continue to act as the haulier due to the need to trans-ship through Westray. Even if a socio-economic case could be made for the operator providing this service at no cost to the Papa Westray public, it could give rise to State Aid issues as well as arguments around equity for the other islands.

Capacity

4.6.29 The Papa Westray community also raised concerns about vehicle capacity on the Rapness – Kirkwall ferry. The Rapness – Kirkwall route is the busiest of the Outer North Isles network and would need to be capable of accommodating all Westray and Papa Westray vehicle traffic (passenger carryings are rarely an issue). As a reminder, the current population of Westray is around 600 and there are around 90 residents of Papa Westray.

4.6.30 It is not possible to establish the exact capacity utilisation position on the Rapness – Kirkwall route due to the way the data are collected and reported. Key issues include:

- Different vessels can be used to operate the same sailing on different days – this is particularly important where there is a switch between the *Earls* and MV *Varagen*, as there is a marked difference in capacity between the vessels.
- The manner in which the data are recorded does not readily facilitate analysis at the sailing by-sailing level. Therefore, the average is likely to obscure to some extent – for example, the early morning outbound sailing from Kirkwall to Westray is likely to be very lightly used, whilst the 16:20 would be much busier.
- The stated capacity of the vessels (*Earls,* 22 cars and MV *Varagen* 28 cars) is likely to be an overstatement of their actual carrying capacity. All three vessels were built in the 1980s when average vehicle sizes were smaller – it is therefore likely that each vessel carries up to perhaps 25% fewer cars than their stated capacity.
- Commercial traffic is recorded by length band rather than incremental lane metre, and thus an average vehicle length has to be used which may under or overestimate the length of vehicles carried.
- The current vessels, and in particular the *Earls*, also have a deadweight capacity constraint, whereby there may be vehicle deck space which cannot be used because the vessel is carrying its maximum permitted weight.

4.6.31 Whilst bearing the above points in mind, an attempt has been made to record capacity utilisation on the Rapness – Kirkwall route. The calendar below shows **average daily available vehicle deck space** on the Rapness – Kirkwall service between April 2017 and March 2018:

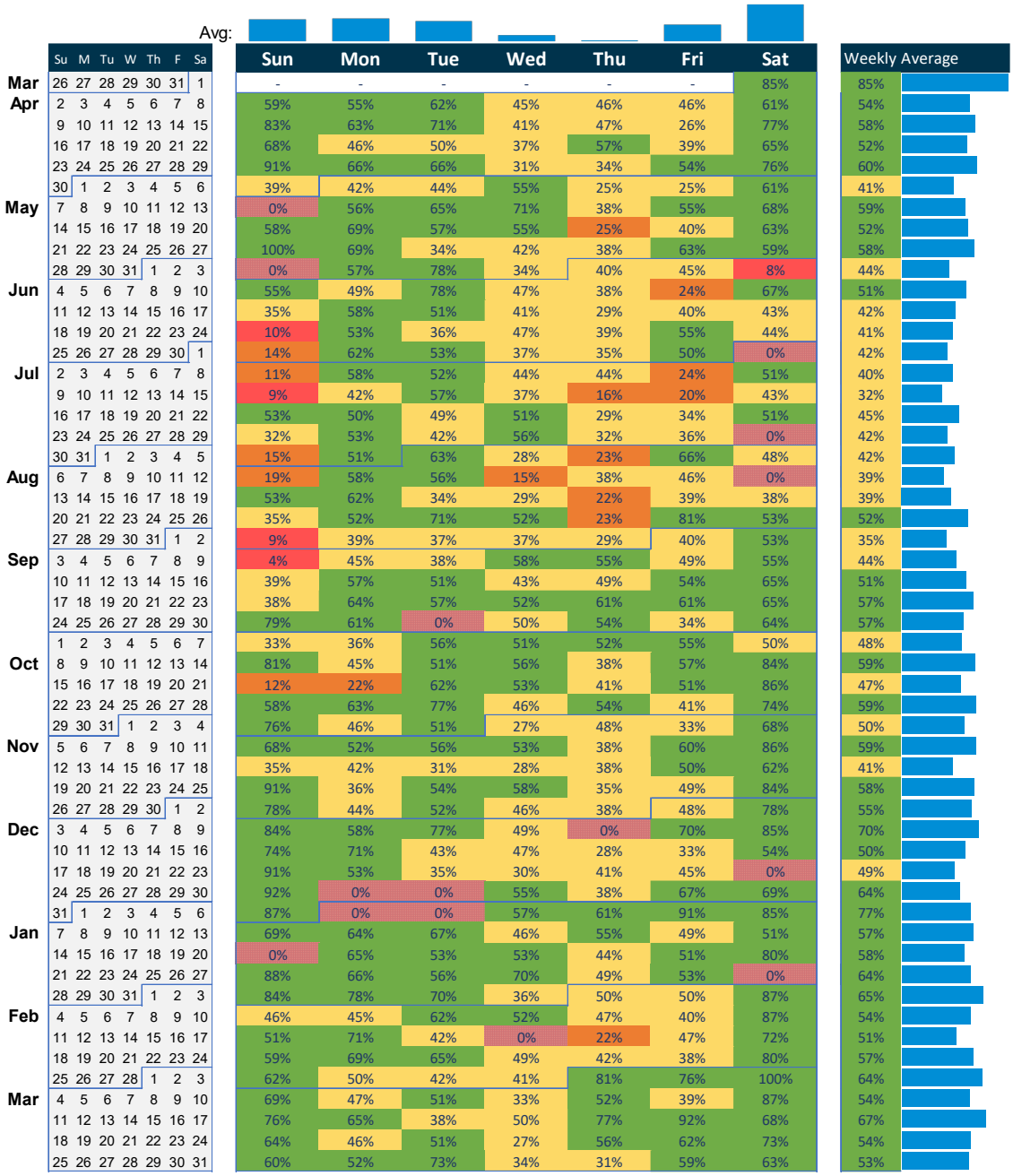


Figure 4.10: Rapness – Kirkwall, Average Daily Vehicle Deck Availability 2017/18

4.6.32 The above calendar shows that there would typically be sufficient capacity on the Rapness – Kirkwall route to accommodate any additional demand emanating from Papa Westray. As would be expected, capacity is most pressed during the summer months, although there are only a few occasions where no deck space is available across the day.

4.6.33 Wednesday and Thursday are typically the busiest weekdays, although the largest absolute number of high utilisation days is on a Sunday, where the service frequency is lower

4.6.34 The equivalent figure for Kirkwall – Rapness is shown below:

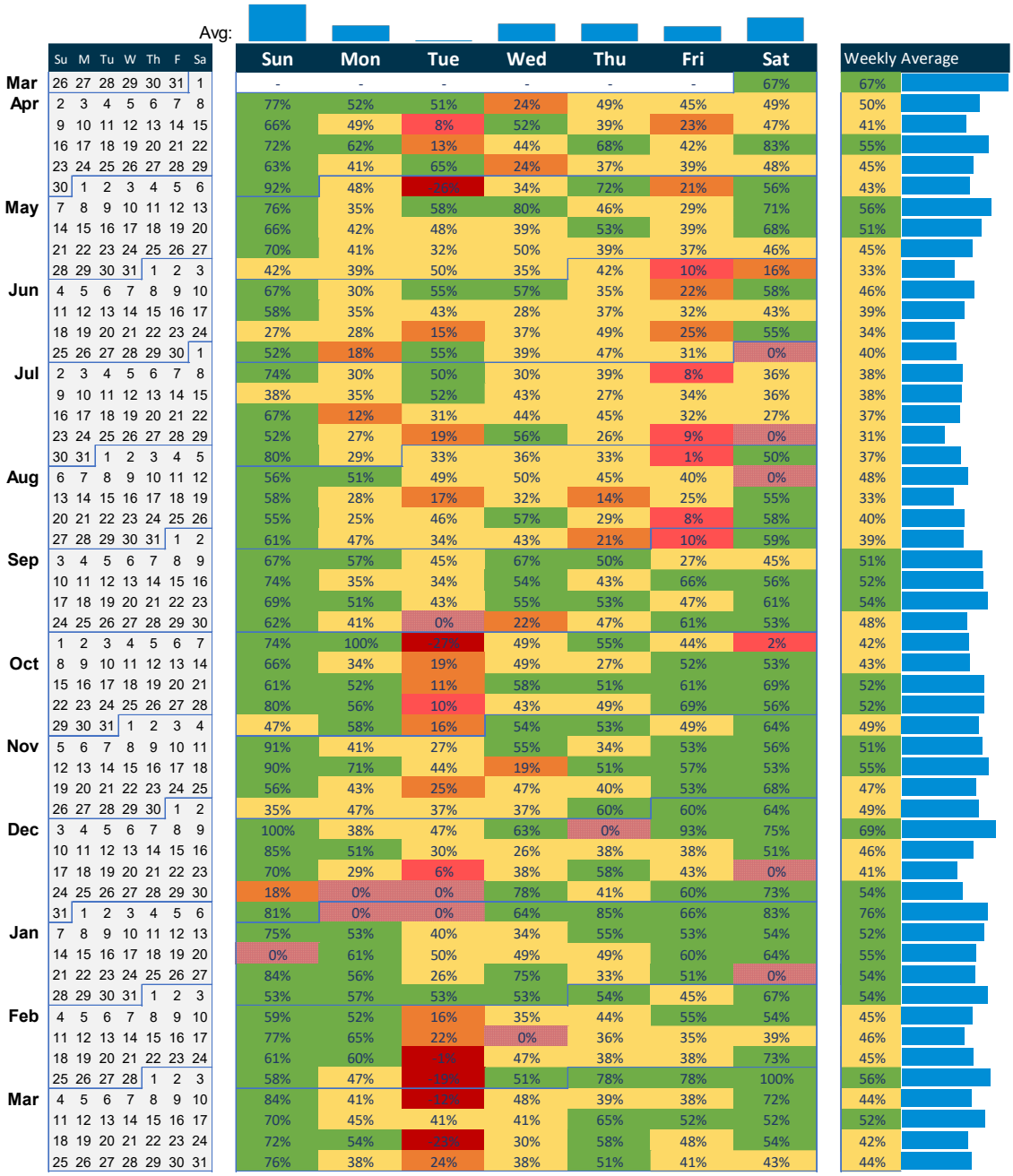


Figure 4.11: Kirkwall - Rapness, Average Daily Vehicle Deck Availability 2017/18

4.6.35 Again, the above availability calendar suggests that generated traffic from Papa Westray could generally be accommodated on the Kirkwall – Rapness service, albeit there is on average less deck space available on the 'to Westray' leg of the journey.

4.6.36 Tuesday is the most capacity constrained day of the week. In the winter and refit timetable period, this is the day when the service additionally calls at Papa Westray and hence one of the lower capacity *Earls* is used to operate the service. In the summer, Tuesday is the only weekday with two rather than three return crossings.

4.6.37 Overall, if taken at face value, there appears to be sufficient capacity on the Westray – Rapness ferry to accommodate the additional Papa Westray demand, particularly given the proposals for

the deployment of a larger vessel and potentially a longer operating day on that route. However, it should always be borne in mind that there are several weaknesses with the data and the availability calendars are likely to underestimate the actual level of utilisation for the reasons previously explained. Indeed, the ONI resident survey suggests that the availability analysis underestimates the capacity problem – it found that:

- 71% (n=120) of Westray respondents noted that there are particular sailings **to Kirkwall** on which they typically find it difficult to make a booking for a vehicle. The survey responses suggest that this is principally a problem during the refit period, although Monday morning and Friday evening were also cited as periods when it can be difficult to secure a booking.
- 69% (n=117) of Westray residents noted that there are particular sailings **from Kirkwall** on which they typically find it difficult to make a vehicle booking. As alluded to above, the 16:20 departure from Kirkwall is the most capacity constrained, particularly on Fridays and during the refit timetable.
- 91% (n=93) of Westray residents noted that being unable to book a vehicle on the ferry is preventing more frequent use of the service (major factor 70%, minor factor 21%).
- The stakeholder consultation in Westray also identified ferry capacity as being an issue, with a number of businesses noting that vehicle deck shortages on key sailings are impacting on visitors coming to the island and the export of finished goods. One accommodation provider explained that visitors had to book several weeks ahead to secure a vehicle booking, particularly on the 16:20 departure from Kirkwall.

4.6.38 If the option of a Papa Westray – Westray Ro-Ro is progressed to Year 2, further development of the capacity utilisation analysis will be required.

Double Fare

4.6.39 A flat fare structure is operated on all Outer North Isles routes, with equivalent passenger and vehicle fares charged for travel to / from Kirkwall across all six islands. Specific fares are not listed for the Moclett – Pierowall route, but it is assumed that this flat fare structure applies here also. The prospect of a double fare applied for journeys through Westray (i.e. a fare for Moclett – Pierowall and a fare for Rapness – Kirkwall) was identified as a significant concern in the community.

4.6.40 Whilst an understandable concern, it is important to note that the purpose of any investment identified through this business case is to address transport problems rather than create them. There is precedent from other land-bridge routes in Scotland where a fare is only charged on one part of the journey. For example, when travelling to the Scottish mainland from Jura, the Jura – Islay leg is free. Similarly, for those travelling between Unst and Shetland mainland, a fare is only charged on the Yell Sound leg of the route.

4.6.41 Whilst the double fare can be worked around, it is important to note that there would be a revenue cost to the public sector associated with zero fare passengers on the Moclett – Pierowall service which would have to be accounted for the in the cost to government analysis.

Potential Reduction in Connectivity

4.6.42 The reorientation of Papa Westray's ferry connection would result in the termination of the sea-based link to Kirkwall. The main issue with this is in relation to the cost of movement of freight as previously discussed, although it would also lead to a reduction in direct foot passenger accessibility to Kirkwall. It is well established that people prefer direct connections when travelling, and the journey to Kirkwall via Westray would require an additional two interchanges. That said, only 5% of journeys from Papa Westray are made using the Lo-Lo ferry (with 95% of trips being made by air) and thus this is a minor issue, particularly when set against the step-change in access to Westray.

4.6.43 More importantly, there is a fear within the community that improved ferry connections to Westray will lead to a reduction in the air service. As noted in relation to the double fare, the intention of this process is to improve services, and indeed the addition of a third aircraft will be considered in Year 2 of this work. This point was made and accepted in discussions with the Papa Westray community, but the concern remained that, over time, there would be a threat to the current level of the air service if travel patterns shifted towards the Westray ferry or there were demands for increased air services elsewhere.

4.6.44 For foot passengers, there would be a need to make a bus connection across Westray. At present, there is a scheduled summer bus service between Rapness and Pierowall, reducing to a demand responsive service in the winter timetable period. As this connection already exists, the only issue would therefore be the fare / additional cost to the passenger (or additional subsidy for the Council if Papa Westray passengers were carried free of charge, in keeping with the principle of no 'double-fare' for land-bridging through Westray).

Loss of Local Services

4.6.45 Papa Westray's current transport connections afford island businesses and public services a degree of insulation from competition and centralisation. Whilst there is year-round air access to Kirkwall and Westray, it is capacity constrained, whilst the reduction in the winter ferry service to Westray limits access to services on that island. There is a concern amongst some residents of Papa Westray community that a year-round Ro-Ro service would:

- strengthen the case for the centralisation of services which are considered integral to the viability of an island – e.g. health provision, primary school education, the local Minister etc;
- lead to retail leakage to Westray; and
- lead to retail leakage to Kirkwall, and in particular Tesco.

4.6.46 There are certainly examples of where the above outcomes have materialised elsewhere in Scotland. This has predominantly been for islands with good connectivity close to larger centres of population (e.g. Bressay). However, there are anecdotal examples of this from other island communities in Scotland, e.g. Coll and Tiree, Islay and Jura, Unst / Fetlar and Yell.

4.6.47 A year-round connection to Westray would potentially increase pressure for the centralisation of services, albeit this would be the case whether a year-round Ro-Ro or passenger only service. Graemsay and Flotta provide examples within Orkney of where there are few public services on island, rather they are delivered from a combination of Orkney mainland and Hoy. Other examples include Fetlar and Skerries in Shetland.

4.6.48 Retail leakage to Westray would likely be limited given that Papa Westray has a very successful island shop which offers a broadly equivalent range of products to those offered in the two shops on Westray. The risk of leakage to Orkney mainland would appear more significant in the event of a Westray Ro-Ro service being introduced. The ability to take a car to Kirkwall and stock-up on a range of goods which could be purchased less expensively, such as fuel, groceries and household items, could represent a threat to the island shop (although this threat could equally apply to Westray, where a retail presence remains).

Generated Traffic

4.6.49 The limited frequency of the current Lo-Lo service and the difficulties of moving a car means that there are very few vehicle movements on or off Papa Westray. The community expressed a concern that a Ro-Ro service would fundamentally change this, leading in particular to a significant increase (in the context of Papa Westray) in the number of car-based tourists / day-tripper trips from Westray to the island (and potentially motorhomes and caravans). The road infrastructure on the island would be ill-equipped to accommodate any significant increase in vehicle numbers, particularly larger / wider vehicles. Moreover, there are no facilities for motorhomes and caravans – this could be seen as a development opportunity for the

community, although it would clearly have to be managed within the capability of the existing infrastructure..

4.6.50 Again, whilst a valid concern, there are several examples from across Scotland where vehicle movements onto smaller islands is restricted even where there is a Ro-Ro service. For example, a permit system is used to limit vehicle movements to / from Iona and the Small Isles and it is envisaged that a similar system would be introduced in this context.

Construction / Operational Issues

4.6.51 The conversion of the Westray – Papa Westray route to Ro-Ro would give rise to a range of construction and operational challenges:

- As noted in Section 4.4, the construction of a slipway of appropriate gradient within Pierowall harbour would be problematic and would impact on the wider operation of the harbour.
- As this would be the only possible link, a relief Ro-Ro vessel would be required to operate the Papa Westray – Westray service during refit, whilst contingency arrangements would also be required in the event of a breakdown. The only vessels which could deliver this service at present are the MV *Eynhallow*, MV *Shapinsay* and potentially the MV *Thorsvoe*.

Summary

4.6.52 There are several advantages to introducing a Ro-Ro service between Papa Westray – Westray. These include the provision of a scheduled daily supply-chain; improved ferry service reliability and safety; closer integration between the two islands; and ONI network benefits from recycling hours back into the timetable.

4.6.53 There are also, however, several disadvantages to this option. Whilst a number of the disadvantages are largely perceived (e.g. a reduction in the air service) or could be worked around (e.g. the double fare and induced traffic), the implications for the Papa Westray supply-chain are regarded as the most significant. It is possible that island businesses and public services could be threatened in the long-run, albeit this may also be the case to a lesser degree with the provision of a year-round passenger service between the two islands.

Option 2: Papa Westray – Kirkwall Ro-Ro

4.6.54 This section considers the advantages and disadvantages of a Papa Westray – Kirkwall Ro-Ro service, supplemented by the introduction of a year-round passenger service to Westray. A number of the issues are similar to the Westray Ro-Ro and thus are not revisited in detail, rather they are cross-referenced where appropriate.

Advantages

Connectivity

4.6.55 The primary advantages of this option are that it would provide:

- Safe, more reliable and potentially more frequent vehicle access to Orkney mainland than at present.
- Year-round foot passenger connectivity to Westray.

4.6.56 Whilst the air service is always likely to provide the main mode of passenger transport to Orkney mainland, a Ro-Ro service would improve opportunities to use the ferry service when accessing the mainland, both for when a vehicle is required or when a seat cannot be secured on the aircraft. Note however that an overnight stay would always be required limiting the value of this improvement in connectivity.

Service Reliability

4.6.57 The introduction of Ro-Ro infrastructure at Moclett would put Papa Westray on an equivalent footing to most other islands in Scotland. Whilst the berth would remain exposed to some degree, dispensing with crane-based operations would provide a much more reliable and lower risk ship-shore interface and reduce turnaround times, benefitting the entire ONI network. It would allow direct delivery of various commodities by suppliers rather than having to split this into specialist containers, giving rise to additional manual handling and equipment maintenance.

4.6.58 Moreover, larger items of agricultural plant would have access to and from Papa Westray, providing both efficiencies and opportunities for business development. For example, the notable absence of larger community wind turbines would be addresses with improved access to the island by the plant and vehicles required for installation and maintenance.

4.6.59 The existing arrangements of handling livestock using Lo-Lo cattle boxes and then moving it into temporary pens on the vessel is becoming untenable and finding a workable solution with the current crane-based vessels has been challenging. Cattle transport vehicles, as used by the other ONI, would address this issue.

4.6.60 Whilst preferable to the current day situation, it should be noted that this option offers less flexibility than a Westray Ro-Ro as the vessel used would still be part of the wider ONI fleet and thus would offer fewer opportunities to work around weather windows or other disruption.

Safety

4.6.61 As noted earlier in this report, craning goods at an exposed berth is comparatively high risk. In addition, passenger access to the existing vessel, particularly for those with mobility difficulties, is also less than ideal. A Ro-Ro would fully address the risks associated with crane-based operation and also remove the longer-term risks attached to potential future changes in regulations or legislation.

Vehicular Access

4.6.62 The introduction of a Moclett – Kirkwall Ro-Ro service would, for the first time, provide a simple means of accessing Orkney mainland by car. This would increase opportunities for car-based travel to Orkney mainland and beyond.

4.6.63 It would also create opportunities for visitors to take their vehicle to Papa Westray although, as previously noted, this would likely have to be controlled by a permit system given the road infrastructure on the island. There would however be other opportunities for tourism development within the existing infrastructure, local electric bike or vehicle hire for example.

Disadvantages

4.6.64 The potential disadvantages with this option are broadly similar to the option of a Westray Ro-Ro service.

Supply-Chain

4.6.65 The adoption of Kirkwall Ro-Ro would also raise the prospect of a change in supply-chain arrangements as wheeled freight would be able to access the island. In this respect, Papa Westray could be served in a similar way to the other islands, with a haulier collecting goods from the Outer North Isles hub and driving them onto the ferry at Kirkwall. As previously noted, this would increase costs through introducing another party into the supply-chain and dispensing with the commodity specific rate card currently used for Papa Westray.

4.6.66 However, unlike with the Westray Ro-Ro option where Papa Westray could be served through its neighbouring island at a marginal cost to that haulier, there is no obvious source of haulage

services for Papa Westray alone. Given the low volumes and long sailing times, there is unlikely to be a viable commercial haulage market for Papa Westray. Note for example, that Eday, which has more than double the population of Papa Westray, cannot support its own haulier, despite the relatively large agricultural industry on that island. A community van could be operated but this would also likely be at a cost which would need to be recovered in the price of on-island goods.

4.6.67 Given the limited choice of haulage options for Papa Westray, there is a strong argument for the current arrangements to continue. Goods could be loaded onto the ferry at Kirkwall and discharged at Papa Westray using a forklift vehicle provided by Orkney Ferries. The only difference is that the cargo would be driven rather than lifted on and off of the ferry.

4.6.68 There is a clear precedent for this elsewhere. In the Small Isles, CalMac Ferries Ltd act as the *de facto* haulage firm for Canna, Eigg, Muck and Rhum. Vehicular traffic is prohibited from the Small Isles unless the vehicle owner holds a permit. Freight for the islands is deposited at Mallaig Harbour. CalMac consolidates this freight onto a van or, for larger pieces, a flatbed. Some containers and pallets are moved directly onto the deck using a forklift.

4.6.69 A similar situation occurs on the Sconser – Raasay route, whereby loose freight is delivered to Sconser slip before being consolidated onto a CalMac owned van. The van is then taken across on the ferry and the goods delivered to the intended recipients. This service is contractually mandated in the Clyde and Hebridean Ferry Services tender and is a legacy of the 1970s when CFL operated a haulage business.

4.6.70 An interesting point to note from the operations on the Small Isles and Sconser – Raasay is that even where freight is not initially presented in commercial vehicles, CFL consolidates the freight onto wheeled vehicles before shipping. This is driven by the operational schedule faced across the network, with CFL requiring a quick turnaround of the vessel in each port. There is not enough time to load and unload individual pieces of freight and CFL therefore almost has to act as the haulier, providing a groupage service for any freight presented.

4.6.71 In summary, whilst freight handling arrangements could be subject to change, there are clearly established precedents around Scotland of the operator providing freight groupage services in the context of a Ro-Ro service.

Connectivity

4.6.72 Whilst a Kirkwall Ro-Ro could, in the fullness of time offer an improved service frequency when compared to the present-day position, it is unlikely that there would be a daily Ro-Ro service. This option would therefore perpetuate an infrequent ferry service, particularly when compared to a high frequency Ro-Ro connection to Westray.

4.6.73 The above said, the air service is likely to remain the primary mode of passenger transport to Orkney mainland, whilst there would also be a year-round passenger service to Westray. The ferry service would fulfil a supply-chain role, which it could continue to do with a less than daily service frequency.

Retail Leakage

4.6.74 As noted in the previous section, improved connectivity and the introduction of Ro-Ro would facilitate improved access to the mainland, and thus could lead to a degree of retail leakage from Papa Westray. There is a particular risk associated with the Kirkwall Ro-Ro option as it would provide direct access to the retail opportunities in the town. Whilst a journey may not be made specifically to go to the shops, a car may be taken when on the mainland for other business, and the opportunity taken to e.g. do a grocery shop and fill-up with fuel. Again, however, the inability to make a day return trip mitigates this risk to some extent.

4.7 Appraisal

4.7.1 Having further developed the two prospective options for Papa Westray, this section updates and extends the appraisal of these options against the TPOs and STAG criteria.

Transport Planning Objectives

4.7.2 The table below reassesses the performance of each option against the TPOs. All options are compared against the present-day situation.

Table 4.5: Papa Westray Capital Options – Appraisal against Objectives

	Option 1: Westray Ro-Ro / discontinuation of the Kirkwall Lo-Lo service	Option 2: Kirkwall Ro-Ro with new year-round passenger service to Westray
Transport Planning Objective 1: *The capacity of the services should not act as a constraint to regular and essential personal, vehicular and freight travel between the island(s) and Orkney Mainland.*	✗	✓
Transport Planning Objective 2b: *Where an island does not have a 'commutable' combined ferry or air / drive / public transport / walk time to a main employment centre, the scheduled connections should permit at least a half day (e.g. 4 hours) in Kirkwall or Stromness 7-days a week, all year round.*	✓✓	✓
Transport Planning Objective 3: *The scheduled time between connections should be minimised to increase flexibility for passengers and freight by maximising the number of island connections across the operating day.*	✓✓	✓
Transport Planning Objective 4: *The level of connectivity provided should minimise the variation within and between weekdays, evenings, Saturdays and Sundays.*	✓✓	✓
Transport Planning Objective 5: *Where practical, islanders should be provided with links to onward strategic transport connections which minimise the number of off-island overnight stays on Orkney mainland or further afield.*	✓	✓

4.7.3 The following bullets summarise the key information from the table above:

- The Westray Ro-Ro option **(Option 1)** would record a minor negative in terms of capacity. Whilst it would significantly expand capacity on the Moclett – Pierowall route, there could be capacity issues on certain sailings on the Rapness – Kirkwall route. The adoption of a Kirkwall Ro-Ro service **(Option 2)** would expand capacity on the mainland connection and could comfortably accommodate all demand to and from the island.
- The provision of a high frequency Ro-Ro connection to Westray **(Option 1)** and integration with the Rapness service would improve time on Orkney mainland (and indeed Westray), whilst also minimising the gap between services and enhancing strategic connectivity. It would however involve a land-bridge, thus extending journey times to mainland. This would also be the case with **Option 2**, albeit the benefits would be more limited due to the service being less frequent.
- Both options would also reduce the variance in connectivity across the week and, even more importantly, would address the seasonal variation in connectivity to Westray at present.

STAG Criteria

4.7.4 This section briefly revisits and extends the appraisal of the options against the STAG criteria. In moving the appraisal beyond the SBC stage, the sub-criteria under each are considered here.

Environment

Table 4.6: Papa Westray Capital Options – Environment Sub-Criteria

	Option 1: Westray Ro-Ro / discontinuation of the Kirkwall Lo-Lo service	Option 2: Kirkwall Ro-Ro with new year-round passenger service to Westray
Noise & Vibration	-	-
Global Air Quality	✗	-
Local Air Quality	-	-
Water Quality, Drainage & Flood Defence	-	-
Geology	-	-
Biodiversity & Habitats	✗	✗
Landscape	-	-
Visual Amenity	-	-
Agriculture & Soils	-	-
Cultural Heritage	-	-
Overall Assessment	✗	-

4.7.5 The environmental implications of both options are likely to be minimal. There would in both cases be a minor negative in terms of biodiversity of habitats as there is a requirement for dredging and either a slipway or pier extension work. Nonetheless, the overall scale of the works is likely to be localised and the impacts short-term in nature.

4.7.6 **Option 1** would record a minor disbenefit in terms of global air quality as it would involve replacing a small passenger-only vessel with a larger Ro-Ro vessel thus likely increasing emissions (depending on the propulsion system used).

Safety

Table 4.7: Papa Westray Capital Options – Safety Sub-Criteria

	Option 1: Westray Ro-Ro / discontinuation of the Kirkwall Lo-Lo service	Option 2: Kirkwall Ro-Ro with new year-round passenger service to Westray
Accidents	✓	✓✓
Security	-	-
Overall Assessment	✓	✓✓

4.7.7 The Westray Ro-Ro **(Option 1)** would record a minor benefit as it would end the dependence on crane-based operations and the risks associated with that. A Kirkwall Ro-Ro **(Option 2)** would however record a slightly larger benefit as it would not generate the additional vehicle

kilometres associated with the land bridge through Westray, rather it would offer a point-to-point service, linking the island with Orkney mainland.

Economy

Table 4.8: Papa Westray Capital Options – Economy Sub-Criteria

	Option 1: Westray Ro-Ro / discontinuation of the Kirkwall Lo-Lo service	Option 2: Kirkwall Ro-Ro with new year-round passenger service to Westray
Transport Economic Efficiency (TEE)	✓	✓
Wider-Economic Impacts	✓	✓✓
Overall Assessment	✓	✓✓

4.7.8 The definition of 'Economy' benefits in the STAG guidance is not strictly relevant in the context of Papa Westray. TEE benefits are typically generated through journey time savings and, in the context of public transport, a higher frequency service which offers journey time benefits through reducing wait times. Wider-economic impacts only tend to be manifested in the largest schemes and reflect improvements in productivity and labour market impacts as a result of transport investment bringing places 'closer' together. The above table does identify TEE and WEI benefits for the options, but these have to be considered in the context of Papa Westray only. The key points of note are as follows:

- TEE benefits in this context would be derived through the provision of a year-round higher frequency service to both Westray and the mainland. The Westray Ro-Ro **(Option 1)** would offer minor TEE benefits through providing year-round vehicle-based access to Westray and beyond to Orkney mainland via Rapness. However, a negative impact of this option is that journey times on this route would be longer than on a direct Papa Westray – Kirkwall service.
- **Option 2** could offer an increase in direct connections to Kirkwall (i.e. improved frequency) and a reduction in the journey times associated with crane-based operations at either end of the crossing. It would however offer fewer opportunities to make a car-based journey to Kirkwall than if a land-bridge through Westray was established.
- The 'wider economic impacts' of each option have, to some extent, been explored through the previous discussion of the advantages and disadvantages. The Westray Ro-Ro **(Option 1)** would offer a daily supply-chain; improved ferry service reliability and safety; and closer integration between the two islands. A Kirkwall Ro-Ro would provide enhanced connectivity (particularly from a supply-chain perspective), reliability and vehicular access to Orkney mainland.

Integration

Table 4.9: Papa Westray Capital Options – Integration Sub-Criteria

	Option 1: Westray Ro-Ro / discontinuation of the Kirkwall Lo-Lo service	Option 2: Kirkwall Ro-Ro with new year-round passenger service to Westray
Transport Integration	✗	✓
Transport & Land-Use Integration	-	-
Policy Integration	-	-
Overall Assessment	-	✓

4.7.9 The key points from the above table are as follows:

- **Option 1**, the Westray Ro-Ro, would record a minor negative in terms of transport integration. Whilst it would increase the overall number of connections, it could also increase the dependence on car-based travel for those using the ferry to travel to Orkney mainland (depending on the public / community transport response on the Westray side of the crossing). The current point-to-point freight route would also be replaced by an indirect route through Westray.
- The Kirkwall Ro-Ro **(Option 2)** would record a minor benefit in terms of transport integration. As well as potentially improving foot passenger accessibility to Kirkwall, it would also improve the efficiency of the Papa Westray supply-chain through minimising the number of connections required in any delivery.

Accessibility & Social Inclusion

Table 4.10: Papa Westray Capital Options – Accessibility & Social Inclusion Sub-Criteria

	Option 1: Westray Ro-Ro / discontinuation of the Kirkwall Lo-Lo service	Option 2: Kirkwall Ro-Ro with new year-round passenger service to Westray
Community Accessibility	✓	✓✓
Comparative Accessibility	✓	✓✓
Overall Assessment	✓	✓✓

4.7.10 The key points from the above table are as follows:

- The Westray Ro-Ro **(Option 1)** would record a minor benefit in terms of community accessibility as it would enhance the coverage of the public transport network, providing year-round connectivity to Westray, Orkney mainland and beyond by car. It would also record a benefit in terms of comparative accessibility as it would address the difficulties faced by the mobility impaired when boarding the existing Lo-Lo ferry service.
- A Kirkwall Ro-Ro **(Option 2)** would offer a moderate benefit in terms of community accessibility as it would improve access to Kirkwall and provide year-round access to Westray. The benefit of this option over Option 1 is that it would better meet the needs of Papa Westray residents that do not own a car or wish to take their car on the ferry. For this reason, this option also scores more highly in terms of comparative accessibility.

Cost to Government

4.7.11 The table below summarises the outline cost to government of the two options. Given that the intention would be to deliver the preferred option within the same time period, all costs are reported in undiscounted 2019 prices.

Table 4.11: Comparative Cost to Government

	Option 1: Westray Ro-Ro / discontinuation of the Kirkwall Lo-Lo service	Option 2: Kirkwall Ro-Ro with new year-round passenger service to Westray
Vessel Costs	£4.0m - £6.0m	£1.0m-£1.5m
Harbour Infrastructure Costs	£13.0m[14]	£10.9m - £18.0m[15]
Additional Operating Costs	£410k per annum	£80k per annum

[14] £9.0m excluding optimism bias.

[15] £7.6m - £12.5m excluding optimism bias.

4.7.12 From a capital cost perspective, **Option 1** would cost in the region of £17m-£19m, which would be at the higher end of **Option 2** (circa £18m to accommodate the 65m LOA design vessel and procure a new passenger only vessel).

4.7.13 Whilst the capital costs of the two options are broadly similar, the annual operating costs of **Option 1** are some £300k per annum, a significant sum when viewed over 30-years (even when accounting for discounting).

4.8 Preferred Option

4.8.1 Having developed the analysis in detail, the project team internally identified the **preferred option** as the provision of a **Papa Westray–Kirkwall Ro-Ro service with a year-round passenger only connection to Westray**. The option of a Papa Westray – Westray Ro-Ro was discounted. The rationale underpinning the preferred option is as follows:

- There is little difference in the capital costs between the two options, whilst the operating costs of a Papa Westray–Westray Ro-Ro would make this option more expensive overall. This additional cost may have been justifiable if there was strong community support for the land-bridge option, but engagement at various points throughout the study found this not to be the case. In addition, it is well established that people prefer to avoid interchange when travelling.
- A year-round passenger-only service to Westray would provide many of the benefits of a Ro-Ro service in terms of e.g. access to services on Westray, connection to the Rapness ferry etc, assuming public / community transport is provided from Pierowall.
- A Papa Westray–Westray Ro-Ro would require the use of a haulier, which would increase the costs of bringing goods to the island, potentially threatening the viability of the island shop.
- Whilst a number of the disadvantages raised by Papa Westray residents are either perceived (e.g. a reduction in air services) or could be worked around (i.e. the double-fare or increased vehicle traffic on the island), it is clear from the engagement that a majority of local residents believe that reliance on a Westray-only ferry link would be detrimental to the island way of life which is highly valued locally.
- In contrast, there are several advantages to a Kirkwall Ro-Ro service, including the potential to continue with the current supply-chain arrangements, improved service reliability, potentially higher frequency in the future and the ability to more readily take a car to and from the island.

Public Acceptability

4.8.2 The future form of Papa Westray's transport connection has been a matter of longstanding debate within the local community. Therefore, whilst a survey and a programme of stakeholder consultation was undertaken to support the appraisal, it was also essential to objectively record the views of the wider Papa Westray community in relation to the proposed preferred option. This was especially important since the nature of the options evolved over the appraisal period, as has been set out previously. This was done through a public drop-in session held in Papa Westray on 24th June 2019. The event was attended by 26 island residents, with 40 residents completing the feedback form available on the evening and online.

Views on Preferred Option

4.8.3 Respondents to the feedback form were asked:

- *Do you think that the preferred option presented here [i.e. Kirkwall Ro-Ro with year-round Westray passenger service] would meet the ferry travel needs of you, your family and the Papa Westray community for the foreseeable future?*

4.8.4 Of the 40 respondents, 36 answered this question. Of those who responded, there was a clear majority **in favour of the preferred option** – 78% (n=28). The reasons for this included:

- A significant number of respondents expressed concern about the reorientation of the Papa Westray supply-chain, with the requirement to move to wheeled haulage through Westray. Whilst it was accepted that there are other islands around Scotland where such arrangements are in place, there was a strong belief that costs would increase and that the viability of the community shop would be threatened.
- The requirement for personal trips by ferry to route via Westray was also seen to be negative by a number of Papa Westray residents. The requirement for interchange, the need to make a journey across Westray and potential vehicle capacity issues on the Rapness – Kirkwall ferry were all cited as issues.
- Concerns were also expressed about reductions in the air service and the loss of local services should the current Kirkwall Lo-Lo service be replaced by a Ro-Ro connecting Papa Westray with Westray.
- Should the Kirkwall Ro-Ro service be progressed, the community is seeking the continuation of current freight arrangements, with Orkney Ferries managing their haulage arrangements (in line with previously cited precedents elsewhere). There is not however an aspiration for a significant enhancement in frequency, with a desire for 1-2 additional connections per week and an enhanced air service.
- There was a desire for the future Ro-Ro vessel to operate in 'Ro-Pax' mode – i.e. not operated as a freight service limited to 12-passengers. It should be noted that this is what is proposed for Papa Westray.
- A desire was also expressed through the consultation responses for a permit system (as per Iona and the Small Isles) to control vehicle movements onto the island

4.8.5 The preference of the other **eight** respondents was for a year-round Ro-Ro service between Papa Westray – Westray, with the Kirkwall calls being discontinued. The main reasons for this tended to reflect a concern that a reliable Kirkwall Ro-Ro could not be operated from Papa Westray and the potential opportunity to base and crew a Westray Ro-Ro from Papa Westray, providing employment opportunities.

4.8.6 It should be noted that, whilst the responses to the feedback form highlighted a clear preference for the Kirkwall Ro-Ro, the view of our team was that, at the exhibition itself, views on the preferred option appeared much more balanced.

4.9 Next Steps

4.9.1 Whilst the preferred option for Papa Westray's mainland link is a Ro-Ro service to Kirkwall, it is not possible to consider which of the proposed Ro-Ro infrastructure solutions set out in this chapter will be required, without first considering the solution for North Ronaldsay, as logically the islands would have consistent infrastructure. It is to North Ronaldsay, and the preferred Ro-Ro solution for the two islands combined, that we now turn.

5 Which Ro-Ro solution should be adopted for North Ronaldsay and Papa Westray?

5.1 Overview

5.1.1 Having identified a Kirkwall Ro-Ro as the preferred option for both North Ronaldsay and Papa Westray, this chapter considers the form which that Ro-Ro should take and the scale of the accompanying infrastructure.

5.2 Infrastructure Options

Vessels

5.2.1 As explained in the context of a Papa Westray – Kirkwall Ro-Ro service (Section 4.5), three vessels scenarios are being considered:

- **Vessel Scenario 1:** A **Ro-Pax linkspan** vessel of a broadly similar length to the MV *Earl Sigurd* and MV *Earl Thorfinn*, circa 45m LOA.
- **Vessel Scenario 2:** A **Ro-Pax slipway vessel** broadly equivalent to the Small Isles vessel MV *Lochnevis*, circa 50m LOA. Whilst this vessel would be slightly longer than the *Earls*, it would have a lower carrying capacity, circa 10-14 cars.
- **Vessel Scenario 3:** This can be thought of as the **'North Ronaldsay-max'** option, whereby the ONI design vessel – a 65m LOA linkspan vessel – would serve the island.

Infrastructure – Nouster, North Ronaldsay

The figures below show high level general arrangement drawings for the required harbour works at Nouster to accommodate each of the three vessel scenarios outlined above.

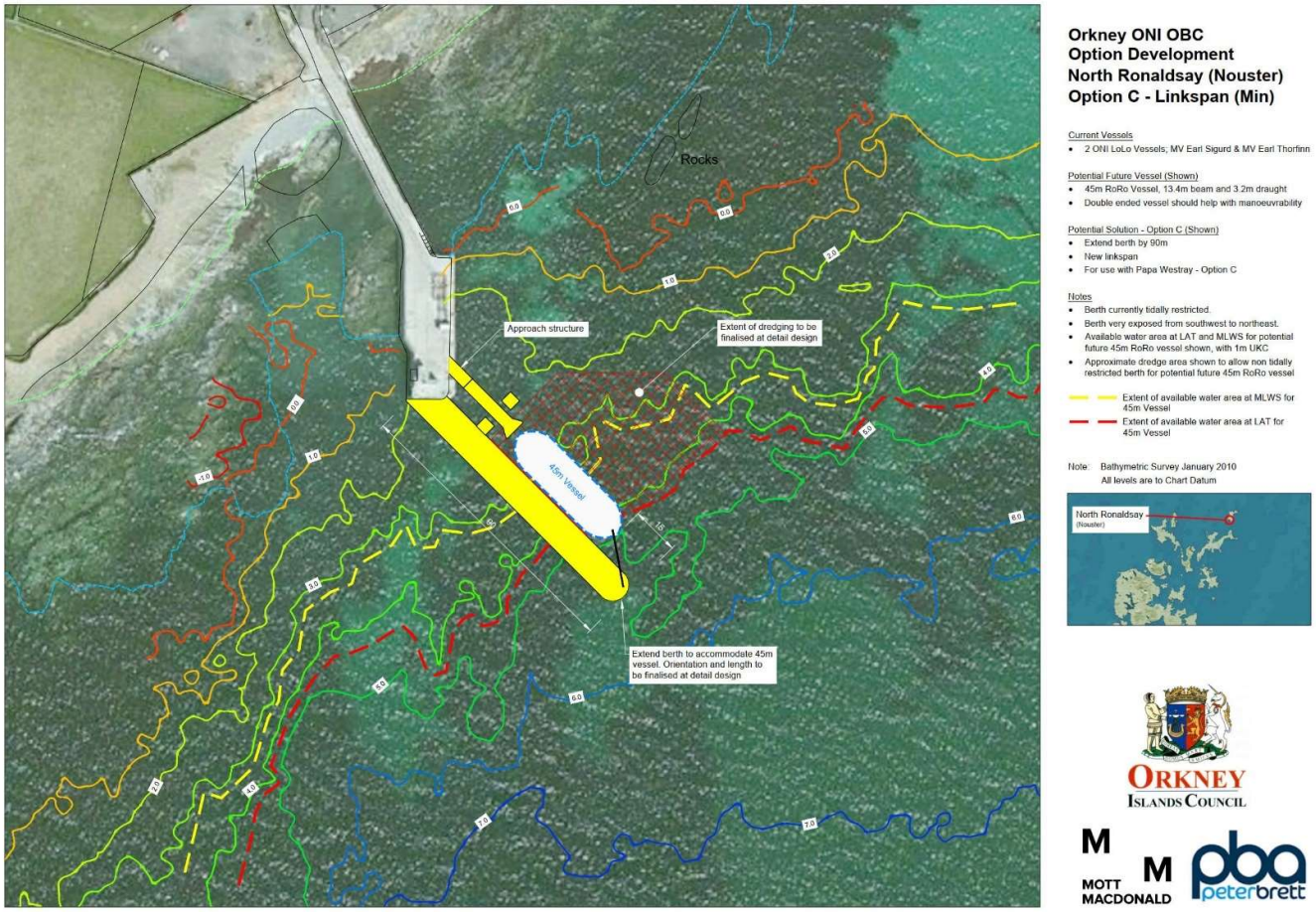


Figure 5.1: Infrastructure Works Required to Accommodate a 45m Linkspan Vessel (Vessel Scenario 1)

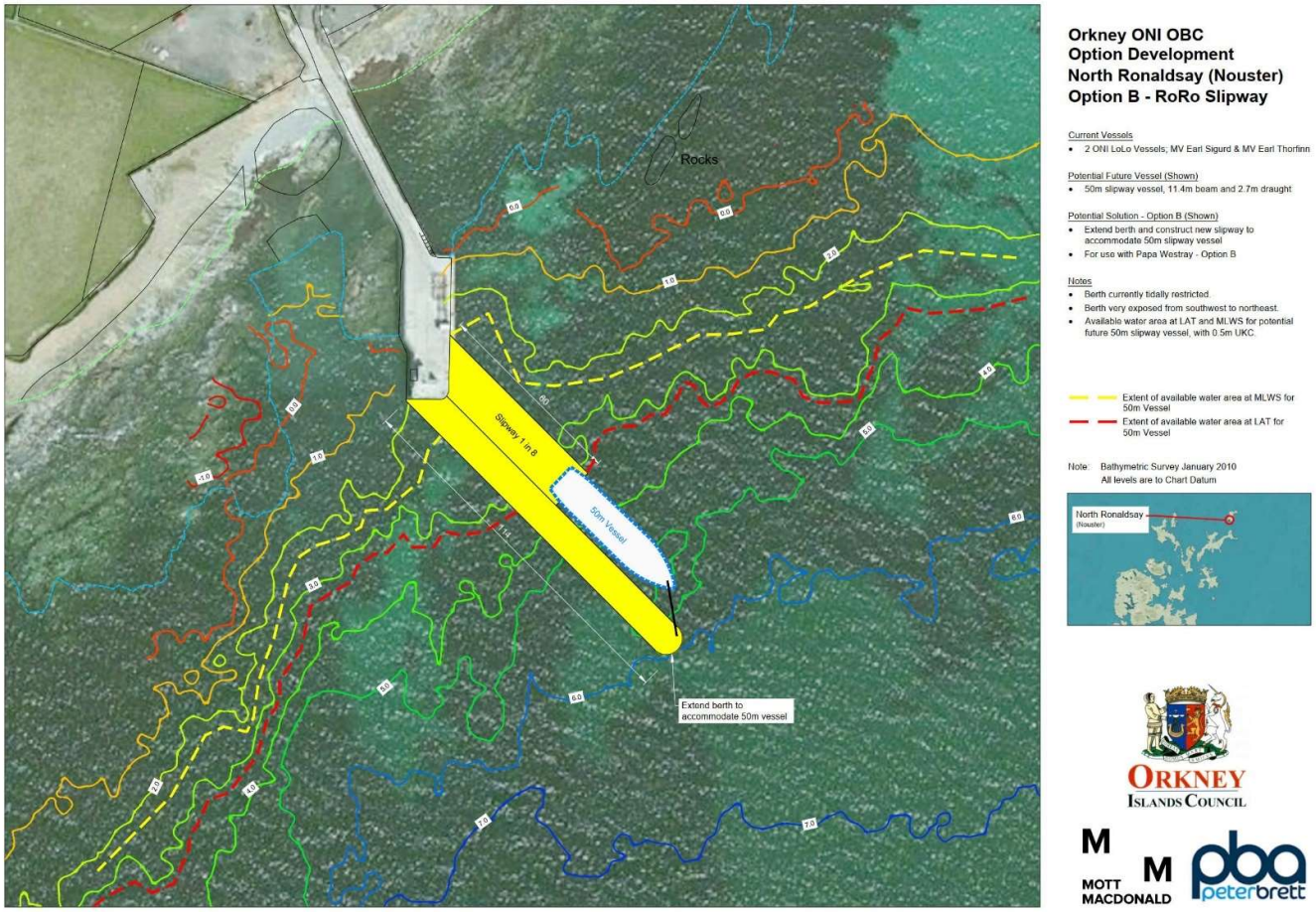


Figure 5.2: Infrastructure Works Required to Accommodate a 50m Slipway Vessel (Vessel Scenario 2)

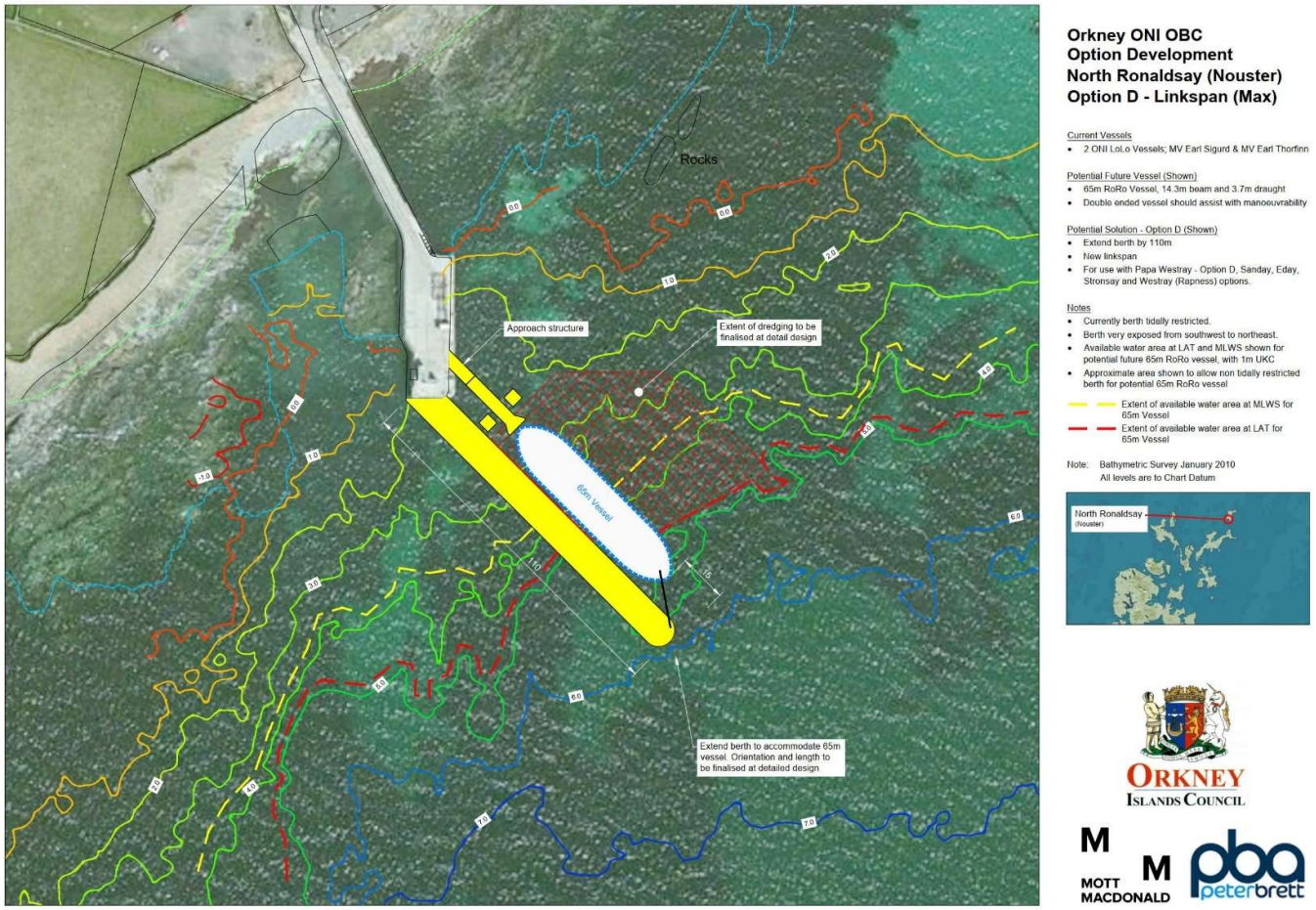


Figure 5.3: Infrastructure Works Required to Accommodate a 65m Linkspan Vessel (Vessel Scenario 3)

5.2.2 The following points should be noted in relation to the above general arrangement drawings:

- Irrespective of the solution pursued at North Ronaldsay, the exposure of the berth means that any solution is going to require significant harbour works to improve the conditions at the berth.
- Preliminary engineering indicates a 45m linkspan vessel would require a pier extension of 90m while a 50m slipway vessel or 65m linkspan vessel would both require a pier extension of circa 115m to improve shelter on the berth.
- Significant dredging would be required to accommodate the proposed linkspan-based design vessel.
- It is important to note that, whilst the introduction of Ro-Ro would significantly improve reliability at North Ronaldsay, the berth would continue to be exposed to wave motion. This could only be resolved by the construction of a breakwater, which it is estimated would cost circa £20m. However, given that the air service provides the lifeline mode of passenger transport from North Ronaldsay, with the ferry fulfilling a supply-chain role, the option of a breakwater is ruled out on value for money grounds.

North Ronaldsay - Cost to Government

5.2.3 The table below shows the cost of the infrastructure options for the different vessel scenarios.

Table 5.1: North Ronaldsay Ro-Ro Berth, Infrastructure Costs

	Cost (£m)	Cost including OB (£m)
Vessel Scenario 1 – 45m Linkspan	£12.5	£18.0
Vessel Scenario 2 – 50m Slipway	£9.9	£14.2
Vessel Scenario 3 – 65m Linkspan	£13.5	£19.5

5.2.4 The following points should be noted from the above table:

- The construction of a Ro-Ro berth at North Ronaldsay is, in all instances, more expensive than developing an equivalent berth at Papa Westray.
- Scaling North Ronaldsay to accommodate the ONI design vessel would cost in the region of £13.5m or £19.5m when optimism bias is included.

5.3 Preferred Option

5.3.1 To maximise operational efficiency, a common solution is required for North Ronaldsay and Papa Westray. This section therefore weighs up the merits of the three Ro-Ro options. It should be noted that the focus here is on how the options differ from an operational and cost perspective – an appraisal against the TPOs and STAG criteria is not undertaken as all of the options deliver the same broad outcomes (albeit the greater the scale of the investment, the greater the magnitude of the outcomes).

Cost to Government

5.3.2 The table below summarises the combined cost to government of each option across both sites:

Table 5.2: North Ronaldsay and Papa Westray Ro-Ro Berths, Combined Costs

	North Ronaldsay (£m)	Papa Westray (£m)	Total Cost (£m)	*Total Cost (£m) (including OB)*
Vessel Scenario 1 – 45m Linkspan	£12.5	£10.7	**£23.2**	***£33.4***

	North Ronaldsay (£m)	Papa Westray (£m)	Total Cost (£m)	*Total Cost (£m) (including OB)*
Vessel Scenario 2 – 50m Slipway	£9.9	£7.6	**£17.5**	***£25.1***
Vessel Scenario 3 – 65m Linkspan	£13.5	£12.5	**£26.0**	***£37.5***

5.3.3 The following points should be noted from the above table:

- The lowest cost option is a slipway, with a combined cost across both sites of around **£17.5m** (excluding optimism bias). This is **one-third** less than the cost of the 'max' option of providing infrastructure for a 65m linkspan vessel.
- The lowest cost linkspan option, for a 45m Ro-Ro vessel, would be around **£23.2m**, which is 10% reduction on the cost of the 'max' option.

Operational Factors

45m Linkspan Vessel

- A 45m linkspan vessel would have a slightly lower vehicle carrying capacity than the *Earls* but would nonetheless provide ample capacity for North Ronaldsay and Papa Westray.
- It could also be used interchangeably around the Outer North Isles network, albeit its lower capacity means it would be better deployed on the lower volume Eday and Stronsay routes.
- A key challenge with this option would be securing appropriate refit cover when the 45m vessel is in refit or out of service for any reason. With the other three ONI vessels being circa 65m LOA, they could not serve North Ronaldsay or Papa Westray.
    - This solution therefore depends on adequate refit cover from either:
        - the retention of one of the *Earls* or the MV *Varagen* in the short-term;
        - the use of one of the larger vessels in benign conditions;
        - the deployment of the MV *Thorsvoe* in freight mode (i.e. a maximum of 12-passengers), although it should be noted that she is almost 27-years old and approach obsolescence; and / or
        - chartering an appropriate vessel.

50m Slipway Vessel

5.3.4 The fundamental issue with the 50m slipway vessel would be the ship-shore interface on the ONI network. The vessel-linkspan interface adopted on the Orkney Ferries' network is fundamentally different to that generally found on the west coast of Scotland where the MV *Lochnevis* operates. In the Clyde & Hebrides network, the linkspans and their operating machinery carry their own self-weight plus all 'live-loads' - i.e. the weight of the vessel ramp plus the weight of the vehicles traversing the ramp and linkspan. This creates a simple vessel-linkspan interface and it is this design feature that allows a range of slipway vessels to use these linkspans e.g. the MV *Lochnevis* at Mallaig and Armadale (albeit this is widely acknowledged as being sub-optimal practice). As a result of this arrangement, the vessels maintain a safe distance from the seaward end of the linkspans and have longer ramps which span the gap and rest a safe distance onto the linkspans.

5.3.5 In contrast, it is the vessel which takes the 'live-load' on the Orkney Ferries network. The linkspan operating machinery has a much lower lift capacity and is used to set the height of the linkspan only i.e. the machinery carries the self-weight of the linkspan only. In operation, the seaward end of the linkspan rests on a bearing shelf on the vessel and hooks over a tooth mounted on that shelf; thus the vessel carries all live loads. Once the vessel is hooked onto the

linkspan a short "flap" is dropped down to bridge over the shelf/tooth arrangement and allow vehicular traffic.

5.3.6 This is an important differentiator as it effectively prevents slipway vessels from using the linkspans, particularly where a vessel with a lengthy ramp such as that on the MV *Lochnevis* is being considered. It is considered that development of such arrangements which would incorporate a bearing shelf and hook as well as the long ramps required to serve slipways would be impractical, particularly when coupled with requirements for an appropriate bow form and visor as required to serve the Outer North Isles. This effectively rules out the 'Small Isles solution' for North Ronaldsay and Papa Westray.

5.3.7 Further it should be noted that should a slipway only vessel solution be developed for North Ronaldsay and Papa Westray such a vessel would likely not be compatible with the existing slipway in Kirkwall, thus necessitating the development of a new slipway and associated marshalling etc.

5.3.8 The other main operational issue is refit, which would be more acute with this option. Whilst with the 45m linkspan option, one of the current vessels could be maintained and run off the linkspan, this would not be possible with a slipway. The service could potentially revert to Lo-Lo using one of the existing vessels during the refit period but this may come with its own challenges in terms of e.g. maintaining crew familiarity with the use of a crane etc; longevity of existing aged vessels which urgently need replaced; and the range of issues associated with handling of vehicles, plant and goods.

65m Linkspan Vessel

- The provision of infrastructure for a circa 65m vessel would provide complete interchangeability across the Outer North Isles fleet.
- A larger vessel would also be more reliable on passage, thus further improving the overall reliability of the service.

Preferred Option

5.3.9 Based on a combination of cost to government and operational considerations, **the preferred option is to operate the North Ronaldsay and Papa Westray service using a 45m linkspan vessel**, subject to suitable arrangements being identified for refit cover.

5.3.10 Whilst the 50m slipway vessel option would be lower cost, it would be technically challenging to deliver and would be a bespoke vessel that may not be easily used elsewhere on the network.

5.3.11 Building the infrastructure to accommodate a 65m Ro-Pax vessel would ensure complete interchangeability across the ONI fleet. However, the air service is the lifeline mode of transport for these islands, with the ferry service largely fulfilling a supply-chain role. To this end, the scale of investment required to accommodate a 65m Ro-Pax vessel is considered disproportionate.

5.4 Public Acceptability - North Ronaldsay

5.4.1 The North Ronaldsay event was attended by 8 island residents, with two residents completing the feedback form. Whilst the number of attendees at the event was relatively low, the discussion with those who did attend was very detailed and provided a clear set of views in relation to the preferred option.

Views on Preferred Option

5.4.2 The most important point of note in relation to North Ronaldsay is that the community has a long and strongly-held aspiration to improve both the reliability and frequency of the ferry service.

Central to this is the replacement of the current Lo-Lo operation with a Ro-Ro. The proposal to progress towards Ro-Ro was well-received by the community.

5.4.3 The preferred option identified by the study for North Ronaldsay is the deployment of a Kirkwall-based 45m Ro-Pax vessel to serve the new linkspan terminal. Whilst the conversion to Ro-Ro is welcomed, the community noted the following points in relation to the preferred option:

- Scaling the infrastructure to accommodate a 45m vessel, when the other three vessels in the fleet would be 65m, is considered to represent an inequitable solution. There is a desire amongst the community for the fleet to be fully interchangeable, capable of calling at all seven ports.
- Picking up on the above point, the preference is for a linkspan over a slipway in terms of the ship-shore interface.

6 Stronsay Harbour

6.1 Overview

6.1.1 Stronsay ferry terminal is located in the main settlement of Whitehall in the north of the island. When the Outer North Isles network was converted to Ro-Ro in the late 1980s, a number of the ferry terminals, including Sanday and Westray, were relocated to create a shorter route to both Kirkwall and the other islands. There were also proposals at this time for relocating Stronsay ferry terminal to the west of the island, but these were not taken forward.

6.1.2 The retention of Whitehall as the island's ferry terminal has created a number of challenges:

- The steaming time to Stronsay from Kirkwall, Eday and Sanday is longer than would be the case if the terminal was located in the west of the island. Each single leg takes 10-20 minutes longer (depending on destination) than would be the case if the terminal was in the west of island.
- As well as the impact on residents, the longer journey times to and from Stronsay also impacts on time available for the rest of the ONI network. A new terminal in the west of the island would allow these time savings to be recycled back into the Outer North Isles timetable.
- The berth at Whitehall is exposed to wind and wave motion from the north. The channel also requires dredging to maintain adequate under-keel clearance.
- The passage to and from the berth is exposed to easterly and south-easterly winds in Sanday Sound and the channel at Papa Stronsay.

6.1.3 Based on the above issues, and in planning for the future ONI network, the SBC identified a review of the location of Stronsay ferry terminal as a key 'network definition' task in the OBC.

6.2 Option Development

6.2.1 Options for a new harbour in the west of the island were developed at a high-level in the SBC. The first step in the OBC is therefore progressing these conceptual options, working towards a preferred 'west of Stronsay' option to be compared to the option of retaining the harbour in Whitehall.

Design Vessel

6.2.2 As explained earlier in this report, the proposal is to serve Eday, Sanday, Stronsay and Westray with the 65m LOA design vessel. All of the harbour general arrangement drawings are based on this design vessel so as to ensure a like-for-like comparison of options.

West of Stronsay Harbour – Options

6.2.3 At the outset of the OBC process, MML conducted a one-day site visit to Stronsay to further investigate potential sites for a new harbour in the west of the island. Three options were identified – the proposed locations are shown in the figure below and then explained in more detail.

Figure 6.1: Proposed New Harbour Sites in Stronsay

Option 1: New harbour in Huip Sound East

6.2.4 The key points of note in relation to this option are:

- It would provide a relatively short crossing to Eday and Sanday but would be more distant from Kirkwall for direct sailings.
- The new harbour would be located adjacent to Stronsay airfield. This would create a significant operational challenge as the harbour lights could interfere with air operations, particularly in the hours of darkness. Consultation with the Civil Aviation Authority would be required if this option was to be progressed.
- The proximity to the airfield also means that the harbour would have to be located in the south of the bay (i.e. to the north-west of the airstrip). This would move the harbour into the shallows and would also increase its exposure to the weather.
- Potential constraints on future development of the airfield or ferry terminal due to close proximity and interaction.

6.2.5 Due to the constraints noted above, this option was **not progressed** to drawing stage.

Option 2: New harbour in Linga Sound

6.2.6 The key points of note in relation to this option are:

- This option would offer significant journey time savings to Kirkwall, Eday and Sanday, more so than would be the case with Option 1.
- A new harbour at Linga Sound would also be more sheltered than a facility at Huip Sound, although it would be very exposed to westerlies.

- Whilst the wetside conditions are favourable, the landform at the proposed location is problematic, with a five metre cliff face. An extensive and costly cut and fill exercise would be required to arrange access to the marshalling area, quays etc.

6.2.7 Due to the constraints noted above, this option was **not progressed** to drawing stage.

Option 3: New harbour in lee of Linga Holm

6.2.8 The figure below shows the option of a new harbour in lee of Linga Holm:

Figure 6.2: New Harbour in lee of Linga Holm, Stronsay

6.2.9 The key points of note in relation to this option are:

- The proposed harbour would be located on currently undeveloped land – road and utilities infrastructure connecting to the site would need to be upgraded, whilst land ownership issues would also need to be resolved.
- A rock armour breakwater to the south would be required to provide shelter for any vessels on the berth. Dredging would also be required to provide a safe channel to the berth. The scale of the pier and breakwater would need to be confirmed through wave modelling.
- This option would offer significant journey time savings on routes to / from Kirkwall, Eday and Sanday, although they would be slightly less than in Option 2 given the need to navigate around Linga Holm.
- The landform at this site is much more favourable than with the other two options, and thus a harbour could be more readily located here. Linga Holm would also provide a degree of shelter from all wind directions and thus could also assist in improving reliability.
- The environmental baselining undertaken at SBC stage noted that Linga Holm is a breeding and hauling out ground for the common seal. However, the study has not identified any environmental designations at the site of the proposed berth.

Preferred Option

6.2.10 **Option 3 – new harbour in the lee of Linga Holm – is the preferred option.** As well as offering significant journey time savings, it is the most sheltered and also has a favourable landform.

6.2.11 The development of a new harbour in Huip Sound East (Option 1) is excluded from further consideration because of its proximity to the airfield, the weather-exposure of the site and the limited journey time savings on offer. Option 2, a new harbour at Linga Sound, is also excluded due to the unfavourable topography and exposure to westerlies.

Upgrade to Existing Berth – Whitehall

6.2.12 In the event that the ferry terminal is retained in Whitehall, upgrades will still be required to ensure that it is capable of accommodating a 65m LOA vessel – this will be referred to as **Option 4**. The figure below shows the proposed harbour works at Whitehall:

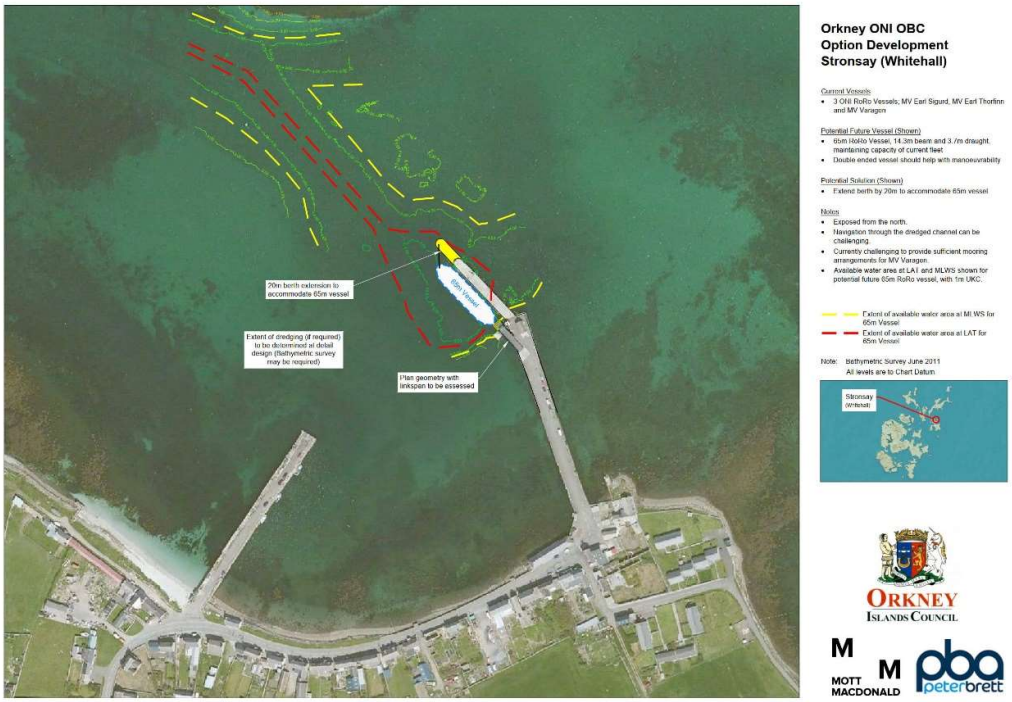


Figure 6.3: Proposed Harbour Works at Whitehall to Accommodate 65m LOA Vessel

6.2.13 Whilst a detailed condition survey has not been carried out at Whitehall, it is understood that the infrastructure has 20-25 years residual life subject to appropriate maintenance being carried out.

6.2.14 Therefore, the principal improvements required to make the berth capable of accommodating a 65m LOA vessel would be:

- A pier extension of circa 20 metres to accommodate the 65m vessel, together with upgrades to the fendering to accommodate the greater displacement of the larger vessel.
- Dredging would be required adjacent to the berth to provide a suitable area for vessel manoeuvring. Ongoing dredging of the channel would also be required at circa five year intervals (as is understood to be the current practice) to maintain sufficient under-keel clearance on the approach to the berth.

6.2.15 The infrastructure would have to be rebuilt at the point of life expiry, which is anticipated in the period 2040-2045.

6.3 West of Stronsay Harbour - Quantified Economic Benefits

6.3.1 As has been explained above, the relocation of Stronsay ferry terminal to the west of the island would reduce steaming times to Kirkwall, Eday and Sanday. There are two quantifiable economic benefits attached to this:

- In conventional transport appraisal, reductions in journey times generate social welfare benefits which can be monetised. These are known as **Transport Economic Efficiency (TEE)** benefits.
- Reduced journey times / lengths would also offer **fuel savings**, which is a financial rather than social welfare benefit.

6.3.2 The extent of the above benefits is calculated below.

Transport Economic Efficiency

6.3.3 The relocation of Stronsay ferry terminal to the west of the island would reduce journey times on all direct and indirect services to and from the island. The benefits would accrue to residents of Stronsay, Eday and Sanday, as well as all visitors to the island.

Passenger Numbers

6.3.4 In developing an estimation of the TEE benefits, it is first necessary to identify the number of passengers on each Stronsay sailing leg. This has been done using Orkney Ferries 2017 ticket sales data, with passenger numbers for each sailing permutation which calls at Stronsay shown below.

Table 6.1: Passenger numbers on services which call at Stronsay (2017)

Origin	Destination	Direct / Indirect	Passengers
Kirkwall	Stronsay	Direct	6,722
Stronsay	Kirkwall	Direct	7,355
Kirkwall	Eday	Via Stronsay	1,409
Kirkwall	Stronsay	Via Eday	5,197
Eday	Stronsay	Direct	209
Stronsay	Eday	Direct	593
Stronsay	Kirkwall	Via Eday	4,738
Eday	Kirkwall	Via Stronsay	1,399
Kirkwall	Sanday	Via Stronsay	946
Kirkwall	Eday	Via Stronsay, Sanday	234
Stronsay	Kirkwall	Via Sanday, Eday	536
Kirkwall	Stronsay	Via Sanday, Eday	447
Eday	Kirkwall	Via Sanday, Stronsay	183
Stronsay	Sanday	Direct	54
Sanday	Stronsay	Direct	27
Sanday	Kirkwall	Via Stronsay	618
Kirkwall	Stronsay	Via Sanday	58

Origin	Destination	Direct / Indirect	Passengers
Sanday	Kirkwall	Via Stronsay, Eday	160

6.3.5 The TEE benefits which accrue to an individual depend on whether they are travelling for leisure, commuting or business purposes – WebTAG[16] table A1.3.1 records the value of time for a commuter trip as £9.95 per hour; £4.54 for a leisure trip; and £19.27 for a business / in-work trip.

6.3.6 In terms of the split of carryings, 128 Stronsay residents responded to the ONI resident survey. Respondents were asked to indicate their primary travel purpose, of which:

- 8% (n=10) noted that their primary reason for using the ferry is "Travel to / from place of work" and "Travel to / from place of education" (i.e. commuting).
- 12% (n=15) noted their primary reason for using the ferry is "Business / Self-Employed / Employer's Business".
- 80% (n=103) responded that their primary reason for using the ferry is for leisure.

6.3.7 These proportions were used as a proxy for apportioning all trips to / from / calling at Stronsay between 'in-work' and 'non-work' trips.

Time Savings

6.3.8 Having set out the passenger numbers and identified the in-work / non-work split, the next step in the process is to set out the journey time reduction for all services to and from Stronsay. These are shown in the table below and are bi-directional:

Table 6.2: Time saving with new harbour in lee of Linga Holm

Origin	Destination	Current Time	New Time	Change
Kirkwall	Stronsay	95	78.1	16.9
Eday	Stronsay	35	19.6	15.4
Sanday	Stronsay	35	23.3	11.7

Value of Time Savings

6.3.9 Combining the travel time savings and the in-work / non-work split, the table below shows the value of time (VOT) benefits associated with relocating Stronsay ferry terminal:

Table 6.3: Value of time benefits with new harbour in lee of Linga Holm

Origin	Destination	Direct / Indirect	Current VOT 'Cost'	New VOT 'Cost'	VOT Benefit
Kirkwall	Stronsay	Direct	£71,217	£58,525	£12,692
Stronsay	Kirkwall	Direct	£77,923	£64,036	£13,887
Kirwall	Eday	Via Stronsay	£20,428	£15,352	£5,075
Kirkwall	Stronsay	Via Eday	£63,754	£54,848	£8,906
Eday	Stronsay	Direct	£816	£458	£358
Stronsay	Eday	Direct	£2,315	£1,298	£1,016
Stronsay	Kirkwall	Via Eday	£58,123	£50,004	£8,120
Eday	Kirkwall	Via Stronsay	£20,283	£15,244	£5,039

[16] WebTAG is the Department for Transport's Transport Appraisal Guidance.

Origin	Destination	Direct / Indirect	Current VOT 'Cost'	New VOT 'Cost'	VOT Benefit
Kirkwall	Sanday	Via Stronsay	£13,715	£10,692	£3,023
Kirkwall	Eday	Via Stronsay, Sanday	£3,914	£3,167	£748
Stronsay	Kirkwall	Via Sanday, Eday	£7,771	£7,070	£701
Kirkwall	Stronsay	Via Sanday, Eday	£6,979	£6,213	£766
Eday	Kirkwall	Via Sanday, Stronsay	£3,061	£2,476	£585
Stronsay	Sanday	Direct	£211	£140	£71
Sanday	Stronsay	Direct	£105	£70	£35
Sanday	Kirkwall	Via Stronsay	£8,960	£6,985	£1,975
Kirkwall	Stronsay	Via Sanday	£776	£700	£76
Sanday	Kirkwall	Via Stronsay, Eday	£2,587	£2,104	£483
		Total	**£362,938**	**£299,381**	**£63,557**

6.3.10 The table above shows that the annual VOT benefit associated with relocating Stronsay ferry terminal to the lee of Linga Holm is **£64K** per annum. The present value of benefits (PVB)[17] over a 60-year appraisal horizon is **£1.7m.**

Fuel Savings

6.3.11 The table below shows the fuel cost and consumption associated with each of the three vessels which operate to and from Stronsay:

Table 6.4: Outer North Isles Vessels – Fuel Characteristics (2017 Costs)

	MV *Earl Sigurd*	MV *Earl Thorfinn*	MV *Varagen*
Fuel Cost (£)	£213,849	£228,337	£209,408
Fuel (Litres)	671,934	689,260	635,155
Hours	3,036	3,012	3,001
Lt / H	221	229	212
£ / Lt	£0.32	£0.33	£0.33

6.3.12 As the vessels on the routes change each day, an average fuel consumption figure of 221 litres per hour has been used. The fuel savings are shown in the table below:[18]

Table 6.5: Fuel savings with new harbour in lee of Linga Holm

Origin	Destination	Direct / Indirect	Old Hours	New Hours	Hours Saved	Litres Saved	Fuel Saved
Kirkwall	Stronsay	Direct	589.00	484.03	104.97	23,157	£7,559
Stronsay	Kirkwall	Direct	517.75	425.48	92.27	20,356	£6,644
Kirwall	Eday	Via Stronsay	229.67	172.61	57.06	12,587	£4,109

[17] The present value of benefits (PVB) is a term used in cost-benefit analysis that refers to the discounted sum, or Present value, of a stream of benefits associated with a project or proposal.

[18] It should be noted that data provided by Orkney Ferries showed a number of route combinations which were operated but for which there were no ticket sales. These sailings would generate a fuel saving benefit, but no TEE benefit.

Origin	Destination	Direct / Indirect	Old Hours	New Hours	Hours Saved	Litres Saved	Fuel Saved
Kirkwall	Stronsay	Via Eday	403.33	346.99	56.34	12,430	£4,057
Stronsay	Kirkwall	Via Eday	421.67	362.76	58.91	12,995	£4,242
Eday	Kirkwall	Via Stronsay	309.83	232.86	76.98	16,981	£5,543
Kirkwall	Sanday	Via Stronsay	205.83	160.46	45.37	10,009	£3,267
Kirkwall	Eday	Via Stronsay, Sanday	212.50	171.90	40.60	8,956	£2,923
Stronsay	Kirkwall	Via Sanday, Eday	186.33	169.53	16.81	3,708	£1,210
Kirkwall	Stronsay	Via Sanday, Eday	105.00	93.48	11.52	2,542	£830
Eday	Kirkwall	Via Sanday, Stronsay	112.50	91.01	21.49	4,741	£1,548
Sanday	Kirkwall	Via Stronsay	119.17	92.90	26.27	5,795	£1,892
Kirkwall	Stronsay	Via Sanday	38.00	34.29	3.71	819	£267
Sanday	Kirkwall	Via Stronsay, Eday	24.17	19.65	4.52	996	£325
Kirkwall	Sanday	Via Eday, Stronsay	9.67	7.86	1.81	398	£130
Kirkwall	Eday	Via Sanday, Stronsay	25.83	21.32	4.52	996	£325
Stronsay	Eday	Via Sanday	78.83	62.03	16.81	3,708	£1,210
Stronsay	Kirkwall	Via Sanday	24.00	21.65	2.35	517	£169
Sanday	Eday	Via Stronsay	12.83	7.87	4.97	1,096	£358
Eday	Kirkwall	Via Stronsay, Sanday	5.17	4.26	0.90	199	£65
Eday	Stronsay	Via Sanday	41.25	32.46	8.79	1,940	£633
Eday	Sanday	Via Stronsay	5.83	3.58	2.26	498	£163
		Total	**3,678**	**3,019**	**659.21**	**145,424**	**£47,468**

6.3.13 The fuel saving associated with relocating Stronsay ferry terminal is **£47.5k** per annum, with the 60-year PVB being **£1.3m**. It should be noted that the fuel savings may only be nominal as the operating hours saved are likely to be deployed elsewhere on the network, whilst new vessels introduced during the appraisal period should also be more fuel efficient.

6.4 Appraisal

6.4.1 This section updates and extends the appraisal of the option for Stronsay ferry terminal against the TPOs and STAG criteria.

Transport Planning Objectives

6.4.2 The table below reassesses the performance of each option against the TPOs. All options are compared against the present-day situation.

Table 6.6: Stronsay Harbour Options – Appraisal against Objectives

	Option 3: New harbour in the lee of Linga Holm	Option 4: Retain and upgrade terminal in Whitehall
Transport Planning Objective 1: *The capacity of the services should not act as a constraint to regular and essential personal,*	✓✓	✓

	Option 3: New harbour in the lee of Linga Holm	Option 4: Retain and upgrade terminal in Whitehall
vehicular and freight travel between the island(s) and Orkney Mainland.		
Transport Planning Objective 2b: *Where an island does not have a 'commutable' combined ferry or air / drive / public transport / walk time to a main employment centre, the scheduled connections should permit at least a half day (e.g. 4 hours) in Kirkwall or Stromness 7-days a week, all year round.*	✓✓	O
Transport Planning Objective 3: *The scheduled time between connections should be minimised to increase flexibility for passengers and freight by maximising the number of island connections across the operating day.*	✓✓	O
Transport Planning Objective 4: *The level of connectivity provided should minimise the variation within and between weekdays, evenings, Saturdays and Sundays.*	O	O
Transport Planning Objective 5: *Where practical, islanders should be provided with links to onward strategic transport connections which minimise the number of off-island overnight stays on Orkney mainland or further afield.*	O	O

6.4.3 The following bullets summarise the key information from the table above:

- The development of a new harbour in the lee of Linga Holm **(Option 3)** would offer moderate benefits in terms of capacity, connectivity and frequency. The reduction in journey times offered by the relocation of the ferry terminal would facilitate an increased number of connections, for Stronsay and / or the Outer North Isles as a whole. This would deliver capacity through frequency and provide additional opportunities to access mainland services.
- The retention of the ferry terminal in Whitehall (Option 1) would have a largely neutral impact in terms of the TPOs. However, there would be a minor capacity benefit associated with the berth being able to regularly accommodate a larger vessel.

STAG Criteria

6.4.4 This section briefly revisits and extends the appraisal of the options against the STAG criteria. In moving the appraisal beyond the SBC stage, the sub-criteria under each heading will be considered here.

Environment

Table 6.7: Stronsay Harbour Options – Environment Sub-Criteria

	Option 3: New harbour in the lee of Linga Holm	Option 4: Retain and upgrade terminal in Whitehall
Noise & Vibration	✗	✗
Global Air Quality	✓	-
Local Air Quality	-	✗
Water Quality, Drainage & Flood Defence	✗	✗

	Option 3: New harbour in the lee of Linga Holm	Option 4: Retain and upgrade terminal in Whitehall
Geology	-	-
Biodiversity & Habitats	✗	✗
Landscape	✗✗	-
Visual Amenity	✗	-
Agriculture & Soils	✗	-
Cultural Heritage	-	-
Overall Assessment	✗✗	✗

6.4.5 It is important to note that the proposed harbour works at either site would be subject to a full Environmental Impact Assessment as part of the detailed design and subsequent consenting work.

6.4.6 **Option 3** would record a (indirect) minor positive in terms of global air quality as it would reduce the steaming time from Stronsay to Kirkwall, Eday and Sanday, thus reducing the emissions produced by the vessels. However, it should be noted that this benefit would be neutralised if the hours saved steaming to and from Whitehall are recycled back into the timetable and used for other connections.

6.4.7 Relocating the ferry terminal to the west of the island **(Option 3)** would however record a number of negative impacts. There would be short-term negative impacts associated with noise and vibration and water quality – these would be associated with the construction period only and could be mitigated to some degree. There would however be longer-term negative impacts on landscape, visual amenity and agriculture and soils associated with constructing a new ferry terminal on currently undeveloped land. Moreover, the need for initial and ongoing dredging would also record a minor negative in terms of biodiversity and habitats. Overall, this option would record a moderate negative, but there are not understood to be any environmental 'showstoppers'. The potential impacts on the common seals at Linga Holm would however need to be considered in more detail.

6.4.8 The retention of the terminal in Whitehall **(Option 4)** would have minor short-term negative impacts associated with construction noise, dust and water quality but these would be time limited and could be mitigated to some degree. There would be an ongoing negative environmental impact associated with the requirement to dredge the channel to the berth.

Safety

Table 6.8: Stronsay Harbour Options – Safety Sub-Criteria

	Option 3: New harbour in the lee of Linga Holm	Option 4: Retain and upgrade terminal in Whitehall
Accidents	✓	-
Security	✗	-
Overall Assessment	✓	-

6.4.9 The retention of the terminal in Whitehall **(Option 4)** would be neutral, as it represents a continuation of the current day situation.

6.4.10 Relocating the ferry terminal to the west of the island **(Option 3)**, would record a minor benefit in terms of the 'accidents' sub-criterion. Whilst Orkney Ferries fully complies with all safety legislation, the benefit of this option is that it would reduce the navigational risk associated with the narrow channel to the berth in Whitehall. Conversely, **Option 3** would record a minor negative in terms of the 'security' sub-criterion as it would relocate the facility from the village centre to a remote site on the west of the island – this could be a particular issue for foot passengers.

Economy

Table 6.9: Stronsay Harbour Options – Economy Sub-Criteria

	Option 3: New harbour in the lee of Linga Holm	Option 4: Retain and upgrade terminal in Whitehall
Transport Economic Efficiency (TEE)	✓✓	-
Wider-Economic Impacts	✓	-
Overall Assessment	✓✓	-

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

- The TEE benefits of relocating the ferry terminal to the west of the island **(Option 3)** are £64k per annum (£1.7m PVB) in value of time benefits and £47.5k (£1.3m PVB) in fuel savings (see Section 6.3).
- **Option 3** would also record a minor positive in terms of wider economic impacts through facilitating improved employment-to-business and business-to-business connectivity. It would also provide TEE and wider benefits for Sanday and Eday, which are both often served via Stronsay.
- The retention of the terminal in Whitehall **(Option 4)** would be neutral as it would broadly represent a continuation of the current day situation, albeit the route would benefit from additional capacity.

Integration

Table 6.10: Stronsay Harbour Options – Integration Sub-Criteria

	Option 3: New harbour in the lee of Linga Holm	Option 4: Retain and upgrade terminal in Whitehall
Transport Integration	✗	-
Transport & Land-Use Integration	✗	-
Policy Integration	-	-
Overall Assessment	✗	-

6.4.12 The key points from the above table are as follows:

- The construction of a new harbour in the lee of Linga Holm **(Option 3)** would record a minor transport integration disbenefit as it would diminish foot passenger access to the ferry. Whilst it is possible that a community bus service could be operated to and from the ferry terminal, it is likely that most residents would have to travel by car, either taking their vehicle onboard the ferry, getting dropped off or parking at the terminal. This is in contrast to the

current berth which is located in the heart of Whitehall and provides easy foot passenger access for those living in the village.

- **Option 3** would also record a minor negative in terms of land-use integration due to the relocation of the ferry terminal away from the main settlement. It would also create a gap site at the head of the current pier.

Accessibility & Social Inclusion

Table 6.11: Stronsay Harbour Options – Accessibility & Social Inclusion Sub-Criteria

	Option 3: New harbour in the lee of Linga Holm	Option 4: Retain and upgrade terminal in Whitehall
Community Accessibility	✓	-
Comparative Accessibility	✗	-
Overall Assessment	✓	-

6.4.13 The key points from the above table are as follows:

- **Option 3** would record a minor benefit in terms of community accessibility. Whilst Stronsay ferry terminal itself would be less accessible for those without access to a car (as noted in relation to transport integration above), the improved accessibility to mainland, Eday and Sanday would outweigh this negative. Moreover, community accessibility would also improve for residents of Eday and Sanday.
- Relocating the ferry terminal to the west of the island **(Option 3)** would however record a minor negative in terms of comparative accessibility, as it would be disadvantageous for the 'non-car available' segment of the community.

Cost to Government

6.4.14 The table below summarises the outline cost to government of the two options. Given that the intention would be to deliver the preferred option within the same time period, all costs are reported in undiscounted 2019 prices.

Table 6.12: Stronsay Harbour Options - Comparative Cost to Government

	Cost (£m)	Cost including OB (£m)
Option 3: New harbour in the lee of Linga Holm	£27.1	£39.1
Option 4: Retain and upgrade terminal in Whitehall	£2.7	£3.8

6.4.15 As can be seen from the above table, the cost of constructing a new ferry terminal in the lee of Linga Holm would significantly outweigh the benefits (circa £2.7m) and the cost of marginal improvements to the current pier. Whilst a full rebuild of the pier at Whitehall will eventually be required at a similar cost to Option 3, this is not anticipated for 20-30 years.

6.4.16 Both options would require ongoing dredging at circa five-year intervals to ensure that a safe navigable channel to and from the berth can be maintained.

Benefit Cost Ratio

6.4.17 A comparison of the 60-year PVB against the capital costs[19] (which are all assumed to be up-front) would yield a benefit-cost ratio for relocating Stronsay Harbour of **0.07**, or 7 pence of benefit for every £1 invested.

Public Acceptability

6.4.18 As part of the appraisal process, a resident survey was carried out across the Outer North Isles. In this survey, Stronsay respondents were specifically asked their views on whether the ferry terminal should be relocated to the west of the island. The figure below summarises the responses:

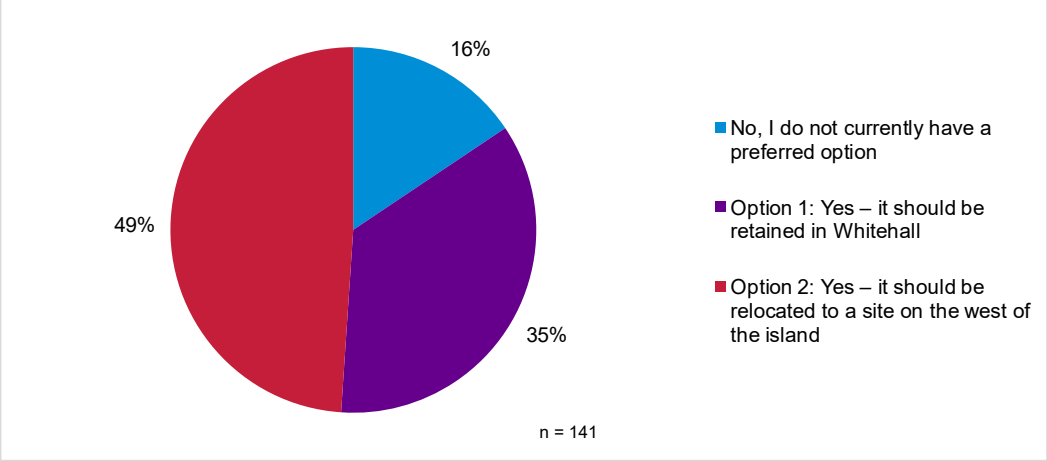


Figure 6.4: Do you have a preferred option for the future location of Stronsay ferry terminal?

6.4.19 The survey found that Stronsay residents favour relocating the ferry terminal to the west of the island (a margin of 57% to 43% if "Don't Knows" are excluded).

6.4.20 Of the 69 respondents which supported the relocation of the terminal, 63 provided their reasons. Of these:

- 15 people commented that the reduced journey time to Kirkwall would improve accessibility to Orkney mainland and would grow tourism on the island.
- 6 respondents noted that relocating the terminal would reduce the crossing time on indirect services, which would be of particular benefit during the refit period.
- Other comments included easier navigation onto the berth than is presently the case at Whitehall.

6.4.21 Of the 50 respondents which supported the retention of the ferry terminal in Whitehall:

- The majority of comments expressed concern about the impact on the village in terms of a loss of passing trade.
- The second most cited issue was the reduction in accessibility for foot passengers, particularly for those without access to a vehicle. It was also thought that this could increase the demand for taking a vehicle onto the ferry, giving rise to capacity pressures.

6.4.22 It should be noted that the wider ONI consultation exercise identified strong support for relocating the terminal amongst Eday and Sanday residents, as it would reduce journey times

[19] Maintenance costs are not included as they would be required at either site and are thus not a differentiator.

on indirect sailings, particularly during the refit period when a sailing can be shared between Eday, Sanday and Stronsay.

6.5 Preferred Option

6.5.1 The **preferred option** is to retain and upgrade the terminal in Whitehall **(Option 4)**.

6.5.2 Whilst there would be a wide range of benefits associated with relocating Stronsay ferry terminal to the west of the island, the cost of doing so significantly exceeds the benefits which would be generated and the cost of the alternative option.

6.5.3 The relocation of the ferry terminal should be **retained as a long-term option** when substantial expenditure is required at the current facility.

6.5.4 It should also be noted that the proposed four vessel solution for the Outer North Isles would reduce the impact of the longer steaming times to Stronsay through a reduction in indirect connections (and at least maintaining the current summer timetable during refit).

6.6 Public Acceptability of Preferred Option

6.6.1 The Stronsay public exhibition event was attended by 45 island residents, with 20 residents completing the feedback form.

Views on Preferred Option

6.6.2 Respondents to the feedback form were again asked:

- *Do you think that the preferred option presented here would meet the ferry travel needs of you, your family and the Stronsay community for the foreseeable future?*

6.6.3 Of the 20 completed feedback forms, 19 respondents answered this question. Of that subset, 11 respondents[20] (58%), including Stronsay Community Council, noted that they did not support the preferred option and believe that the terminal should be relocated to the west of the island. The reasons for this were overwhelmingly related to the shorter journey times on offer and the potential for additional connections. This view was also very strongly supported by Sanday and Eday Community Councils.

6.6.4 Of the eight respondents (42%) who wish to see the terminal remain in Whitehall, the primary reasons were maintaining foot passenger access to / from the ferry from the village and a belief that businesses would lose out on passing trade if the ferry terminal was relocated.

6.6.5 The proportion of responses in favour of and against the preferred option are almost identical to those identified in the household survey, thus providing a degree of validation to the findings of that research (albeit with a much smaller sample size).

[20] Note – one of the respondents was Sanday Community Council.

7 Eday and Westray Overnight Berths

7.1 Overview

7.1.1 The final 'network definition' question is whether secure, year-round overnight berths should be developed at Eday and Westray, which is a longstanding aspiration in both communities. Whilst these are separate questions (i.e. none, one or both overnight berths could be developed), the analysis in relation to both options is similar and thus they are considered together.

7.1.2 The ability to berth overnight in the isles facilitates a timetable which offers a mix of the first connection being to the island or from the island. Of the Outer North Isles harbours:

- Only **Sanday and Stronsay** offer year-round overnight berths.
- Overnighting in **Westray** is possible in calm conditions only.
- The pier at **Eday** is exposed and vessels cannot overnight there at any time.

7.1.3 The lack of available overnight berths in the isles is not a particular constraint at present. This is because the flexibility to lie overnight in the isles is currently limited – due to crew accommodation being below the waterline, each vessel is only permitted to overnight in the islands a **maximum of two nights per week**. However, the proposal to deploy four modern Ro-Pax vessels on the ONI network would address this issue, in that any future vessel with onboard accommodation would not have this restriction.

7.1.4 This chapter considers options and costs for developing year-round overnight berths in both islands. However, in 'Year 1' of this study (i.e. this report), a preferred option is not selected – the costs and benefits of these options are worked-up at this stage to assist in consideration of vessel specification in 'Year 2' (and in particular whether the vessels should have an accommodation block).

7.2 Case for Change – Summary

7.2.1 The 'case for change' in relation to both overnight berths was developed in some detail at the SBC stage and is summarised below for each island.

Eday

7.2.2 The case for an overnight berth at Eday can be summarised as follows:

- Eday has the fewest number of combined air and ferry connections across the week in all timetable periods. With only 16 connections per week (summer timetable), the island lags the other Outer North Isles and the Inner and South Isles where the direct and indirect crossing times are much shorter. Eday's low service frequency significantly disadvantages the island *vis a vis* other islands.
- The absence of a secure overnight berth means that Eday's first sailing of the day is always inbound from Kirkwall. The first outbound sailing does not depart Eday until 09:00 except on a winter Wednesday and Friday and a summer Friday. This restricts overall time on mainland for Eday residents, which have the least amount of time on Orkney mainland of all of the islands within the archipelago.
- The timing of the first departure from the island is a particular issue on a Monday because:
  - S3-S6 school children travelling to Kirkwall Grammar School must leave home and travel into town on the Sunday night. An early ferry would allow children to stay at home on Sunday night – consultation suggested that this is important in terms of retaining younger families in the island and encouraging in-migration.

- Agriculture is the primary industry on Eday – Kirkwall Mart sales are on Monday mornings and the first arrival into Kirkwall is often after the sale has started.

- Eday also has the shortest steaming time of the Outer North Isles to Kirkwall (circa 75 minutes) – the consultation and resident survey identified an aspiration amongst some (although this was by no means universal) in the community for a commuter and daily education service.
- At the SBC public exhibitions, Eday residents were asked what their 'Top 3' priorities would be if additional funding was made available to improve services. 'Earlier first sailings from Eday' was the most frequently identified priority, selected by just under 40% of respondents.

Westray

7.2.3 The case for an overnight berth at Westray can be summarised as follows:

- From a resident connectivity perspective, the vessel overnighting in Westray would maximise daily time on Orkney mainland, allowing residents to undertake personal and employers' business by ferry. This capability currently exists for both Sanday and Stronsay, which are lower population islands than Westray and has been identified as an important objective by the Westray Development Trust.
- From a visitor connectivity perspective, the 07:00 / 07:20 departure (with the associated check in time) from Kirkwall to Westray is considered to be too early for tourists or visiting tradespeople (some of which charge anti-social hours premiums).
- An island-based vessel would assist in addressing the capacity issues on the route by better aligning the timetabled services to demand. This is particularly the case in the winter timetable period when inbound demand to Westray is heavily concentrated on the 16:20 departure from Kirkwall, which is also the only option for residents returning to the island from a day visit.
    - This issue is amplified by the concentration of freight on the 16:20 departure from Kirkwall. Very little freight uses the morning service to Westray because it would require operators and businesses to deploy staff earlier and at overtime rates, increasing the cost of business. With regards to fresh produce and retail, this means that goods arrive at the end of the trading day, so anything 'fresh' has lost 24-hours before it is sold.
    - The timetable issues are also thought to be the reason for the Council waste vehicles being block-booked all year round on the 16:20 ex Kirkwall service on a Tuesday, returning on a Wednesday at 09:00. This consumes vehicle-deck space which could be used by Westray residents.
- Agriculture is the primary sector in Westray – an island-based vessel would be a significant positive for this industry in terms of meeting the needs of farmers getting stock to the Monday mart:
    - At present, one option is to ship livestock on Thursday / Friday for the Monday sales, which attracts mart and lairage costs for the weekend, whilst cattle lose 'condition' (and therefore potential value).
    - The alternative option available is to ship on the Monday 09:00 departure from Westray, meaning cattle reach the auction later in the day. This has disbenefits as it means missing the prime sale window where bigger buyers are active (they tend to get the afternoon flights back to the mainland). It also potentially misses the window to get the sale completed and into the NorthLink lairage and livestock cassettes for the Monday evening sailing to Aberdeen. This is perceived as having a negative impact on Westray farmers.
- From a strategic connectivity perspective, it would also allow Westray residents to access the NorthLink Pentland Firth 'middle sailing' during the periods of the year in which it operates.

- Consultation and the resident survey did uncover some aspirations for a commutable service, but this was fairly limited given the 85-minute crossing time.
- The overnighting of a ferry in Westray is a longstanding aspiration of the community:
  - At the SBC public exhibitions, attendees were asked to rank their 'Top 3' priorities if additional funding was made available to improve services. 'Earlier first sailings from Westray' and 'first sailing from the island' were the most frequently identified priorities, both selected by around 35% of respondents.
  - There were also very strong views expressed on this issue in the resident survey – 33% (n=44) of Westray respondents feel that the current air and ferry connections are not sufficient to meet the needs of the community. A further 59% (n=80) feel that they are, but that they could be improved. A common response cited across both categories was a need for a vessel to overnight in the island and allow for an early morning arrival into Kirkwall, which the survey found would be largely for carrying out personal business).

7.2.4 It should be noted that many of the aspirations in the context of both Westray and Eday could be delivered by a **Kirkwall-based vessel(s) operating a longer day**. This would negate the need for overnight berths and the challenges associated with recruiting an appropriately qualified crew.

7.3 Option Development

7.3.1 This section sets out the technical solutions for the development of overnight berths at both Eday and Westray.

Eday (Backaland)

Technical Solution

7.3.2 The current pier at Backaland is orientated towards the north and is thus exposed to wind and wave motion both from that direction and from the east (there are limited wave screens on the eastern face of the suspended deck, but these are considered to be largely ineffective).

7.3.3 Whilst the pier at Eday is appropriate for daily berthing, the lack of shelter means that a vessel could not berth there overnight.

7.3.4 The technical solution for an overnight berth at Eday is shown in the figure below:

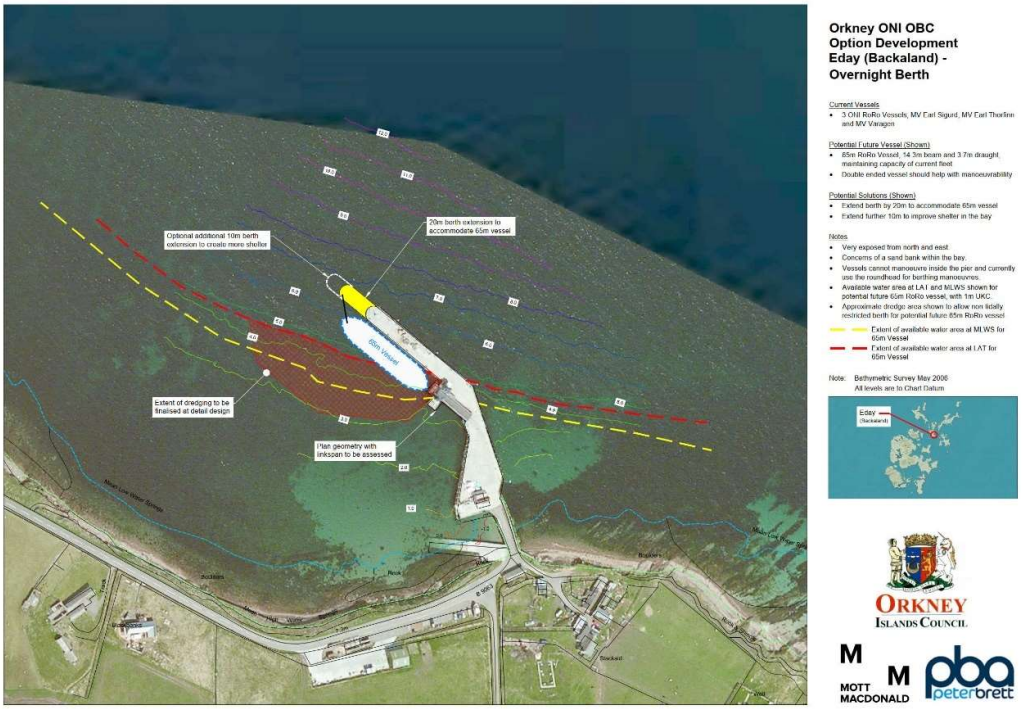


Figure 7.1: Eday (Backaland) Overnight Berth – Technical Solution

7.3.5 Irrespective of whether the berth at Backaland is used for overnighting, any increase in the size of the vessel serving Eday would require the lengthening and repair of the current infrastructure. Therefore, to accommodate a 65m LOA ferry on the berth, an extension to the solid, sheet piles finger pier of circa 20m, together with dredging would be required. A further 10m extension is however recommended to improve shelter for overnighting. The final extent of the extension works to provide shelter for overnighting should be confirmed by wave modelling. Further, it is assumed that an appropriate shore-to-ship power supply would be required to support overnighting of the ferry, such that it is not running its own engines / generators overnight.

Cost

7.3.6 The cost of developing a secure year-round overnight berth is shown in the table below:

Table 7.1: Eday (Backaland) Overnight Berth – Cost

	Cost (£m)	Cost including OB (£m)
Extend berth by 20m to accommodate 65m LOA vessel	£2.8	*£4.1*
Extend berth by a further 10m to provide additional shelter	£3.6	*£5.1*
Total	**£6.4**	***£9.2***

Westray (Rapness)

Technical Solution

7.3.7 The ferry can currently overnight in Rapness in calm conditions. At present, the only timetabled overnighting in Westray is on a Sunday during the summer timetable. However, the berth is highly exposed to south-easterly winds which can affect manoeuvrability onto and off of it.

Moreover, waves from a south-westerly direction reflect around and / or reflect off rock to the north, creating wave motion and surging on the berth – this is particularly the case in westerly swells.

7.3.8 The technical solution for an overnight berth at Westray is shown in the figure below:

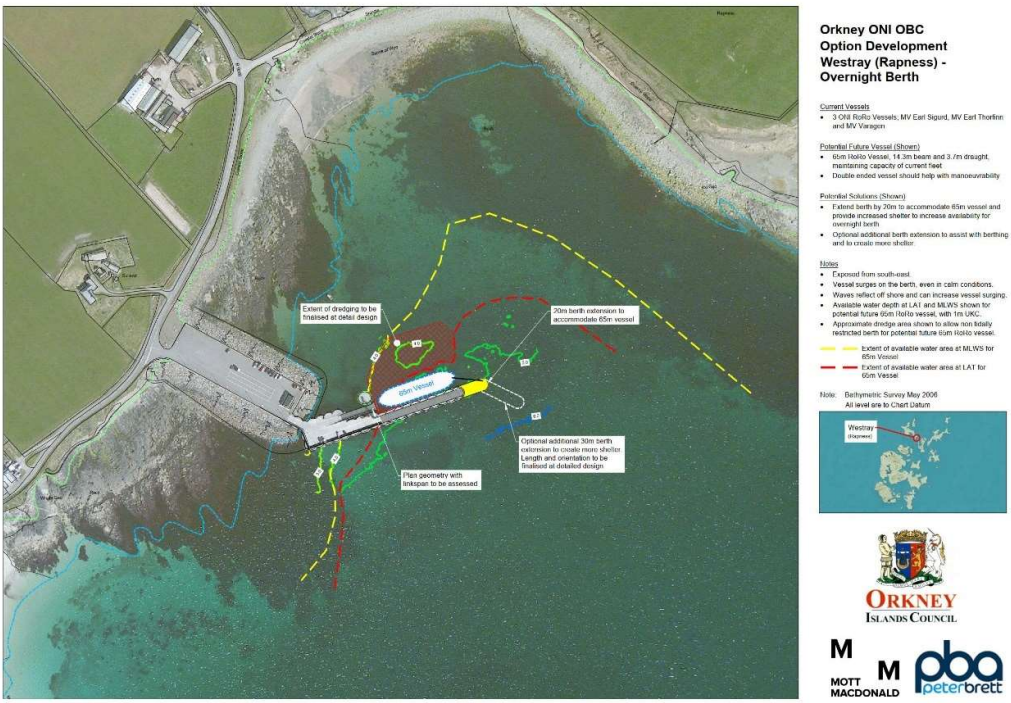


Figure 7.2: Westray (Rapness) Overnight Berth – Technical Solution

7.3.9 Initial analysis suggests that the extension of the current solid, sheet-piled berth by circa 20m (the yellow section in the above plan) could provide shelter to accommodate a 65m LOA vessel on the berth overnight. Wave modelling and berthing simulations would be required to confirm this. It should be noted that an alternative option considered was to recess the linkspan by 20m, but this option was rejected because it would lead to a significant service outage.

7.3.10 An optional 30m dog-leg (the white hashed section in the above plan) could be added to the end of the pier to assist with berthing and create additional shelter.

7.3.11 A breakwater could be constructed to provide additional shelter. However, given the width of the bay, this would be a substantial structure and is thus likely to be unaffordable. It is therefore not considered further.

Cost

7.3.12 The cost of developing a secure year-round overnight berth is shown in the table below:

Table 7.2: Westray (Rapness) Overnight Berth – Cost

	Cost (£m)	Cost including OB (£m)
Extend berth by 20m to accommodate 65m LOA vessel	£2.1	*£3.0*
30m dog-leg extension to provide additional shelter	£4.3	*£6.2*

	Cost (£m)	Cost including OB (£m)
Total	**£6.4**	***£9.2***

7.4 Option Appraisal

7.4.1 This section updates and extends the appraisal of the options for overnight berths at Eday and Westray against the TPOs and STAG criteria.

Transport Planning Objectives

7.4.2 The table below reassesses the performance of each option against the TPOs. All options are compared against the present-day situation.

Table 7.3: Eday and Westray Overnight Berths – Appraisal against Objectives

	Overnight berth at Eday	Overnight Berth at Westray
Transport Planning Objective 1: *The capacity of the services should not act as a constraint to regular and essential personal, vehicular and freight travel between the island(s) and Orkney Mainland.*	-	✓
Transport Planning Objective 2b: *Where an island does not have a 'commutable' combined ferry or air / drive / public transport / walk time to a main employment centre, the scheduled connections should permit at least a half day (e.g. 4 hours) in Kirkwall or Stromness 7-days a week, all year round.*	✓✓	✓
Transport Planning Objective 3: *The scheduled time between connections should be minimised to increase flexibility for passengers and freight by maximising the number of island connections across the operating day.*	-	-
Transport Planning Objective 4: *The level of connectivity provided should minimise the variation within and between weekdays, evenings, Saturdays and Sundays.*	-	-
Transport Planning Objective 5: *Where practical, islanders should be provided with links to onward strategic transport connections which minimise the number of off-island overnight stays on Orkney mainland or further afield.*	✓	✓

7.4.3 The following bullets summarise the key information from the table above:

- The provision of overnight berths in Eday and Westray would not change the number of connections across the week, rather the timing of those connections across the day would change. To this end, this option would do little for TPO1 (capacity), TPO3 (frequency) and TPO4 (weekday / weekend service variation). The one exception is that Westray would record a minor capacity benefit through a spreading of the demand currently concentrated on the 16:20 service from Kirkwall.
- Eday would record a moderate connectivity benefit (TPO2) through the provision of a longer day on mainland (although time on island would be reduced) and the ability for school children to travel into Kirkwall on a Monday morning. Westray would also record a benefit, although given that its air connectivity is better, the scale of this benefit is considered to be marginally less.
- Overnighting a vessel in Eday and Westray would allow residents of both islands to reliably access the NorthLink 'middle' sailing on the days in which it operates. More importantly, an early Monday morning connection into Kirkwall would allow livestock sold at the marts to make it into the lairage for the Monday evening NorthLink departure to Aberdeen.

STAG Criteria

7.4.4 This section briefly revisits and extends the appraisal of the options against the STAG criteria. In moving the appraisal beyond the SBC stage, the sub-criteria under each heading will be considered here.

Environment

Table 7.4: Eday and Westray Overnight Berths – Environment Sub-Criteria

	Overnight berth at Eday	Overnight Berth at Westray
Noise & Vibration	✗	✗
Global Air Quality	-	-
Local Air Quality	-	-
Water Quality, Drainage & Flood Defence	✗	✗
Geology	-	-
Biodiversity & Habitats	✗	✗
Landscape	-	-
Visual Amenity	-	-
Agriculture & Soils	-	-
Cultural Heritage	-	-
Overall Assessment	✗	✗

7.4.5 The marine civil engineering works required to deliver overnight berths at Eday and Westray would have minor negative environmental impacts although these would be short-term, and associated principally with the construction works.

7.4.6 There would be minor noise impacts associated with construction. However, there are few residential or business properties adjacent to either Backaland or Rapness and thus such impacts would be minimal. There would also be minor water quality and biodiversity impacts associated with the dredging in the development of both berths.

Safety

Table 7.5: Eday and Westray Overnight Berths – Safety Sub-Criteria

	Overnight berth at Eday	Overnight Berth at Westray
Accidents	✓	✓
Security	-	-
Overall Assessment	✓	✓

7.4.7 A by-product of the provision of overnighting capability would be longer berths at both Backaland and Rapness. This would provide additional shelter on the berth and a more secure berthing arrangement when loading and discharging. This would reduce marine risk and thus record a minor benefit in terms of the 'accidents' sub-criterion.

Economy

Table 7.6: Eday and Westray Overnight Berths – Economy Sub-Criteria

	Overnight berth at Eday	Overnight Berth at Westray
Transport Economic Efficiency (TEE)	-	-
Wider-Economic Impacts	✓	✓
Overall Assessment	✓	✓

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

- As the provision of overnight berths would not impact on frequency or journey times, there would be no TEE impacts.
- There would however be minor wider economic impacts associated with improved productivity, particularly for the agriculture sector, and supply-chain efficiencies.

Integration

Table 7.7: Eday and Westray Overnight Berths – Integration Sub-Criteria

	Overnight berth at Eday	Overnight Berth at Westray
Transport Integration	✓	✓
Transport & Land-Use Integration	-	-
Policy Integration	-	-
Overall Assessment	✓	✓

7.4.9 The provision of overnight berths in Eday and Westray would be broadly neutral in the context of the 'Integration' criterion. There would be a minor positive transport integration impact associated with being able to access the NorthLink middle sailing when it is in operation.

Accessibility & Social Inclusion

Table 7.8: Eday and Westray Overnight Berths – Accessibility & Social Inclusion Sub-Criteria

	Overnight berth at Eday	Overnight Berth at Westray
Community Accessibility	✓✓	✓
Comparative Accessibility	✓	-
Overall Assessment	✓✓	✓

7.4.10 The key points from the above table are as follows:

- From a community accessibility perspective, the provision of an overnight berth in both Eday and Westray would be positive. This is because it would extend the length of daily time on mainland for residents of both communities, the benefit being larger in Eday because of its comparatively poor air service.
- Eday residents would also record a minor benefit in terms of comparative accessibility. In particular, there would be a benefit for school children (and their families) who would be able to have a full weekend at home before travelling back into Kirkwall on the Monday morning.

Cost to Government

7.4.11 The cost to government of the proposed berths is set out in Section 7.3. In Year 2 of the study, the balance of these capital costs against the service-based measures for delivering the aspirations of the Eday and Westray communities will be considered.

Public Acceptability

7.4.12 The provision of overnight berths in Eday and Westray would record a high level of public acceptability in both communities As well as addressing the respective transport problems identified in the 'case for change', the overnight berths would provide maximum flexibility allowing the timetable to be shaped by community aspirations (albeit this would need to be balanced by the aspirations of other communities in the ONI).

7.5 Next Steps

7.5.1 This chapter has established options and outline costs for overnight berths at both Eday and Westray. As explained at the outset of this chapter, a preferred option is not identified at this stage, as the question is a wider one taking in vessel design and timetable options.

7.5.2 To this end, an early step in Year 2 will be to hold a workshop which will arrive at a preferred output specification for the new vessels. This will specifically consider whether the vessels should have an accommodation block onboard, which would be essential if the vessels are to lie in the isles.

7.5.3 Stemming partly from the vessels decision, a preferred option will be defined as to whether overnight berths should be progressed at either Eday or Westray.

8 Conclusions and Next Steps

8.1 Conclusions

8.1.1 Year 1 of the Outer North Isles OBC has considered and identified a preferred option relating to a set of 'network definition' questions, namely the future infrastructure solutions for North Ronaldsay and Papa Westray; whether Stronsay ferry terminal should be relocated to the west of the island. Further, this Year 1 has considered the options for overnight berths at Eday and Westray, but has not, at this stage, determined a preferred option in this regard.

8.1.2 The recommended preferred options from Year 1 are as follows:

- Papa Westray should be served by a new Ro-Ro service operating between Moclett and Kirkwall, initially at least on the current timetable, which would be gradually expanded as new vessels come into the fleet. The option of a Papa Westray – Westray Ro-Ro service has been excluded from further consideration. A year-round Papa Westray – Westray foot-passenger service should be introduced.
- The berth at North Ronaldsay should be converted to Ro-Ro. The shoreside infrastructure at both North Ronaldsay and Papa Westray should be built to accommodate a small Ro-Pax ferry (circa 45m) operating from linkspans.
- Stronsay ferry terminal should be retained in Whitehall. The possibility of relocating the terminal to a site in the west of the island in the lee of Linga Holm should be retained as a long-term option which should be revisited when significant works are required at Whitehall.
- The options for overnight berths in Eday and Westray are taken forward for further consideration and a decision early in Year 2 of the OBC.

8.1.3 The above package of options has the following vessel implications:

- The decision as to whether to include an accommodation block on the new vessels will be considered early in Year 2 of the work. This will shape the decisions around the proposed Eday and Westray overnight berths.
- The Outer North Isles network will be served by four Ro-Pax ferries, three vessels of circa 65m LOA and one vessel of 45m LOA. The latter vessel will primarily serve North Ronaldsay and Papa Westray but will also provide connections on lower volume routes to Eday and Stronsay.
- None of the new vessels will be built with an onboard crane. To this end, at least one of the *Earls* will have to be retained until the Ro-Ro conversions of North Ronaldsay and Papa Westray are delivered. However, given their age and condition, this could only be a very short-term option.

8.2 Next Steps – Year 2

8.2.1 Having defined the network to be served in this report, Year 2 will go on to define the service to be operated to the six islands. This will involve:

- Developing both the air and ferry capacity and connectivity requirements of all six islands. This will be done on the basis of the current length of ferry crew day and on an extended operating day, which could be provided if additional revenue funding is secured (which would also tie into considerations around overnight berths for Eday and Westray).
- In defining the network in Year 1, a set of design vessels has been used which broadly retain / marginally increase the vehicle carrying capacity of the current tonnage. These design vessels will require gradual refinement as capacity requirements and the cost of supporting infrastructure upgrades become clearer.

- Through an iterative process, the infrastructure requirements at all six ONI harbours will be further developed to reflect the emerging preferred vessel solution.
- The case for a third aircraft will also be considered and, if progressed, the study will consider how it should be deployed.
- A set of illustrative Outer North Isles air and ferry timetables will be developed as part of a 'Network Plan' for the islands.
- The 'Network Plan' will be presented to communities and Members to obtain views and thereafter gradually refined.

8.2.2 The final 'Network Plan' will form the capital ask for the Outer North Isles.

9 Addendum to Year 1 Report

9.1 Overview

9.1.1 Chapters 1-8 of this report reflect the position reached by Summer 2019. The emerging preferred option package - summarised in Section 8.1 – was presented to communities, stakeholders, Orkney Islands Council Members and the Minister for Energy, Connectivity and the Islands, Paul Wheelhouse MSP, in June 2019. The feedback from the engagement process was incorporated into the reporting in the previous chapters.

9.1.2 Whilst the Year 1 reporting resolved the network definition questions, there remained a number of uncertainties at the time of reporting which could only be resolved through refining the vessel specification and future crewing arrangements. To this end, a workshop attended by OIC, Orkney Ferries, HITRANS, HIE and PBA / MML was held at the outset of Year 2 to resolve outstanding Year 1 questions and finalise the parameters within which the future network should be planned.

9.1.3 This chapter therefore reports on the key outputs of this workshop and their implications for Year 2 tasks, and in particular the development of timetable options.

Year 2 Inception Workshop

9.1.4 The Year 2 Inception workshop was held on Monday 28th October 2019 at Orkney Marine Services office in Scapa. The key themes explored were as follows:

- outline vessel specification (and harbour implications);
- vessel overnighting arrangements;
- crewing; and
- timetable structure.

9.1.5 The key points from the discussion in relation to each of the above themes are set out below.

Pierowall – Moclett Vessel

9.1.6 It should be noted that further to the completion of the Year 1 draft reporting, OIC has indicated that it is directly pursuing a replacement for the MV *Golden Mariana*, which will run ahead of this business case process. Replacement options for this vessel will therefore not form part of the Year 2 work.

9.2 Outline Vessel Specification

9.2.1 To briefly recap, the focus of Year 1 was predominantly on resolving a set of landside infrastructure questions. From a vessels perspective, the key challenge was developing a vessel solution for North Ronaldsay and Papa Westray which was proportionate to the needs of those islands whilst at the same time providing maximum flexibility within the wider Outer North Isles Fleet.

9.2.2 Following a review of potential design vessel options, the choice was narrowed down to two potentially workable options.

- **Option 1:** 1 * circa 45m LOA Ro-Pax linkspan vessel for North Ronaldsay and Papa Westray (also serving the other four islands) and 3 * circa 65m LOA Ro-Pax linkspan vessels for the Eday, Sanday, Stronsay and Westray. This vessel mix is dependent on securing appropriate **refit cover** for the North Ronaldsay and Papa Westray vessel – **if this could not be provided**, the preferred vessel mix was…

- **Option 2:** 2 * circa 45m LOA and 2 * circa 65m LOA Ro-Pax linkspan vessels.

9.2.3 The discussion at the Year 2 workshop concluded that:

- There are no workable long-term solutions for covering refit at North Ronaldsay and Papa Westray if these islands were served by a *single* 45m LOA vessel. Whilst freight flights can provide for some of the supply-chain needs of the islands, they cannot meet the full range of needs and thus a reliable scheduled ferry service is required. Therefore, **Option 1 is discounted from further consideration** – i.e. the future fleet either has to offer four standard vessels or a dual fleet with two vessels in two different size categories.
- A solution where 2 * 45m LOA vessels is provided may not provide sufficient network-wide capacity, although this remains to be established through the Year 2 work.
- A further option of 4 * circa 50m-55m LOA vessels could provide a further viable solution.

9.2.4 The working vessel mix assumptions to be taken forward to Year 2 are:

- 2 * circa 45m LOA Ro-Pax linkspan vessels and 2 * circa 65m LOA Ro-Pax linkspan vessels; or
- 4 * circa 50-55m LOA Ro-Pax linkspan vessels which would provide complete interchangeability and minimise harbour works.
- The maximum draught of the fleet will be determined by Stronsay Channel, as this is effectively the lowest common denominator in relation to this parameter, and where maintenance dredging is not desirable.
- Proposed vessel speed is 12 knots at 85% maximum continuous revs.
- It is anticipated that the vessels will use a greener fuel, although the exact fuel type would be determined at Final Business Case through liaison with vessel designer(s) / shipyard(s) – see below.
- The hull form will be dependent on advice from naval architects but it is anticipated at this stage that the vessels will have a traditional hull form (monohull) with a bulbous bow.

9.2.5 The harbour general arrangement drawings will be based on the above broad vessel specifications.

Key Point: The broad vessel specifications which will be taken forward into the Year 2 work are (i) 2*45m and 2*65m LOA Ro-Pax linkspan vessels; or (ii) 4*50m-55m LOA Ro-Pax linkspan vessels. This will be subject to review as the Year 2 vessel capacity, demand, connectivity and timetable analysis progresses.

When is vessel specification finalised?

9.2.6 An important question which is likely to arise when consulting with Members and the public is when the exact vessel specification will be finalised, and it is therefore worth briefly explaining this here. Key points here are as follows:

- At the Socio-Economic Case stage of the OBC (i.e. this work), 'design vessels' are used as the basis of costing and identifying the scope, scale and cost of harbour works required to accommodate them. The vessel specification is not typically advanced much beyond this at this stage.
- At the Commercial Case stage of the OBC, initial consideration is given to how the vessels will be procured, and the extent to which the buying party wishes to influence the overall design. There are a wide range of options, ranging from providing a full design for yards to bid against to an 'output specification', which sets out key design parameters the buyer wants incorporated in the vessel (e.g. length overall, speed, fuel type etc) but leaves it to yards to come forward with ideas on how best to deliver this.

- The updated Commercial Case in the Final Business Case (FBC) will confirm a preferred option in terms of how the new vessels are specified. The extent of the design at FBC stage will depend on the procurement route chosen and who the buying party is.

9.3 Vessel Overnighting Arrangements

9.3.1 There are two related questions with respect to future vessel overnighting arrangements:

- Should vessels overnight in Kirkwall, the isles or a combination of the two?
- Should future vessels have an onboard accommodation block?

9.3.2 Each of these questions is now explored in turn.

Overnight Location

9.3.3 To recap, the current overnighting arrangement for the Outer North Isles vessels is as follows:

- All three vessels have onboard crew quarters. However, as this accommodation is below the waterline, the crew can only be rostered to remain onboard a maximum of two nights per week. This issue would be resolved with any new tonnage and there are no other hard constraints preventing the crew remaining onboard overnight.
- The vessels can lie overnight at Kirkwall, Sanday & Stronsay year-round and in Westray in the summer only. The vessels cannot overnight at Eday, North Ronaldsay or Papa Westray at present.
- For a vessel to lie overnight at Westray in winter and Eday year-round, overnight berths would be required at both ports. These were costed in the Year 1 work as follows:
  - Eday: £9.2m (inclusive of 44% optimism bias)
  - Westray: £9.2m (inclusive of 44% optimism bias)
  - The cost of providing secure year-round overnight berths at North Ronaldsay and Papa Westray would be prohibitive and it is envisaged that these islands will always be served by a Kirkwall (or Westray for Papa Westray) based vessel.
- The current timetable is structured as far as possible to provide a combination of the first sailing being inbound to the island and outbound from the island.
- Only a small number of the current crew compliment are Outer North Isles residents.

9.3.4 The Year 1 OBC set out the technical solution, cost and benefits of overnight berths at Eday and Westray, but deferred a decision on whether they should be progressed or otherwise until the Year 2 workshop. Having explored these issues further, the Year 2 workshop concluded that

- Given the cost of delivering year-round overnight berths at Eday & Westray and the existence of alternative means of delivering an early first sailing from both islands, **these projects will not be progressed**.
- The focus will be on developing crewing and timetabling solutions which facilitate the desired early morning departure from these islands (see Section 9.4).

Key Point: Overnight berths at Eday and Westray will not be considered further in Year 2. Crewing and timetabling solutions which facilitate the desired early morning departures from Eday and Westray will however be an important component of the analysis.

Onboard Accommodation

9.3.5 Having confirmed that year-round overnight berths will not be provided for Eday and Westray, the next issue is whether the current practice of overnighting in Stronsay & Sanday and in Westray in the summer should be continued and / or be expanded, or whether the service should become entirely Kirkwall-based. From a feasibility perspective, the key question is whether the new vessels should be built with an onboard accommodation block.

9.3.6 The obvious benefit of incorporating an accommodation block within the vessel design is that it provides maximum flexibility, allowing the vessels to lie at and operate from any harbour which can safely accommodate them. The major downside is that it adds to the overall size and complexity of the vessel design, with knock-on implications for the scope and scale of associated landside infrastructure works. This in turn makes the overall funding case weaker, particularly when considered in the context of six harbours (seven if Kirkwall is included) and four vessels.

9.3.7 On balance, it was concluded that a full accommodation block should not be incorporated within any future tonnage, with crew therefore living ashore. However, around four cabins would be included - as well as allowing for watch duties, this would allow island-based crew members who currently live aboard to continue doing so (subject to operational requirements).

9.3.8 It therefore follows that the vessels would be **Kirkwall-based** with a crewing-led solution being used to maintain / enhance the timetable. Whilst the desire for island-based crews is well understood, it is highly unlikely that suitably qualified staff could be recruited from the current or future island populations. Unlike the Inner and South Isles routes, which operate within categorised waters, the Outer North Isles lie within waters classified as 'open sea' and thus the vessel crew require a much higher level of certification than on, for example, the MV *Hoy Head* or MV *Eynhallow*. Indeed, senior crew would require certification to the level of Standards of Training, Certification and Watchkeeping (STCW), which entails significant sea-time on a qualifying vessel. Moreover, as the vessels often overnight in different locations, an accommodation block would still be required for when a crewman is away from their home island.

9.3.9 A potential hybrid solution would be to have shore-based overnight accommodation on the islands where the vessel can overnight (Sanday, Stronsay and Westray). Whilst this would facilitate the vessel lying in these islands, it is unlikely to be popular with the crew and may make recruitment and retention more difficult (this point could though be explored with the relevant trade unions and remains on the table as a future option, should this ever be deemed necessary).

Key Point: The new fleet will not incorporate a full crew accommodation block. The crew will be predominantly shore-based and the vessels will overnight in Kirkwall.

9.4 Crewing

9.4.1 In order to progress the ONI network towards the RSM service level, reduce the impact of the vessel refit period, and provide early morning connections from the isles, a revision to the current crewing model may be required.

9.4.2 At present, all three ONI vessels work on the basis of two crews (with cover for leave, sickness etc) working on a two-weeks on, two-weeks off basis. The proposition agreed at the workshop is to progress towards a position where there are three crews for one or more of the new vessels working on the basis of a 'shift' system, which will deliver a 16-18 hour operating day. This would nominally involve crew working one week of dayshifts, one week of backshifts and having one week off, although other models could potentially be explored and developed.

9.4.3 This crewing model would provide significant flexibility and the Year 2 analysis will determine to how many, if any of the four new vessels that this would need to apply to provide the required / desired level of connectivity.

9.4.4 The parallel Revenue OBC identified broad costs for scaling up the current vessels to a shift operation. These costs will be used as the starting point for the costing analysis in Year 2.

Key Point: The crewing model for the new fleet will be designed include the option of facilitatimg a 16-18 hour operating day on one or more of the vessels.

9.5 Ferry Timetable Structure

9.5.1 One or more indicative timetables for the ONI ferry network will be worked-up in the Year 2 analysis. The following principles will be applied (although not limited to):

- Depending on connectivity requirements, one or more vessels may operate on the basis of a 16-18 hour day.
- The refit timetable will provide a level of connectivity at least equivalent to the current summer timetable.
- Eday, Sanday, Stronsay and Westray will be progressed towards the RSM service level, albeit the exact level of connectivity will be dependent on the balance of costs and benefits.
- North Ronaldsay and Papa Westray will have an enhanced service, with circa 2-3 connections to Kirkwall per week.
- Eday, Sanday, Stronsay and Westray will benefit from early morning connections to Kirkwall on at least some days of the week – the number of these early morning sailings will be determined through the Year 2 analysis. On these mornings, the outbound 'dead-leg' from Kirkwall may be used as a dangerous goods run.
- The indicative ferry timetables will be combined with those for the air service (2 and 3-aircraft variants) to provide an overall integrated timetable.

9.6 Next Steps – Year 2 Scope

9.6.1 Working on the basis of the network defined in Year 1, the Year 2 work will:

- develop the capacity and connectivity requirements (air & ferry) of all six islands;
  - this will be done on the basis of (i) the current length of ferry crew day; (ii) an extended crew day, which could be provided if additional revenue funding is secured; and (iii) deployment of a third aircraft;
- establish the appropriate vessel mix and required vehicle carrying capacity;
- further develop the infrastructure requirements at all ONI harbours to reflect the emerging preferred vessel solution;
- consider the requirement for a third aircraft and, if progressed, how it should best be used.
- develop a set of outline illustrative timetables;
- further develop capital and operating costs; and
- establish the preferred ONI Network Plan and consult on this with Members and communities.

Appendix A Harbour Infrastructure Capex

			VESSEL	TOTAL (PRELIMS 25% & FEES 10%)	Comments
SANDAY (LOTH)					
		10m extension	65m RoRo	£1,417,625	Have used Daggri for 65m RoRo
EDAY (BACKALAND)					
		20m extension	65m RoRo	£2,823,296	
		Further 10m extension	65m RoRo	£3,567,542	
STRONSAY					
		Whitehall 20m extension*	65m RoRo	£2,659,250	*to confirm cost of maintenance dredging on approach to Whitehall (allowance of £500,000 included)
		Location in Lee of Lingaholm (NEW)	65m RoRo	£27,137,749	
WESTRAY (RAPNESS)					
		20m extension	65m RoRo	£2,089,450	
		Further 30m extension	65m RoRo	£4,300,725	
WESTRAY (PIEROWALL)					
		Slipway in basin	30m Slipway	£3,348,125	
		Slipway to west	30m Slipway	£3,341,250	
		Slipway within basin (at an angle)	30m Slipway	£3,348,125	
PAPA WESTRAY					
A		45m LoLo vessel, wave screens and 15m extension	45m LoLo	£4,708,974	Have used Earls for 45m LoLo vessel
B		50m slipway vessel, wave screens, 20m extension and slipway	50m Slipway	£7,566,630	Have used Lochnevis for 50m slipway vessel
C		**45m RoRo vessel, wave screens, 15m extension, linkspan and approach**	45m RoRo	£10,698,681	Have used PK261 for 45m RoRo vessel
D		65m RoRo vessel, wave screens, 35m extension, linkspan and approach	65m RoRo (NEW)	£12,503,923	
E		25m slipway vessel, wave screens and slipway	30m Slipway	£5,654,000	
NORTH RONALDSAY					
A		45m LoLo vessel, 15m berth extension	45m LoLo	£2,543,379	
B		50m slipway vessel, 120m berth extension and slipway	50m Slipway	£9,887,991	
C		**45m RoRo vessel, 100m berth extension and linkspan**	45m RoRo	£12,508,069	
D		65m RoRo vessel, 120m berth extension and linkspan	65m RoRo	£13,538,506	

Sanday Ferry Terminal

Extend existing berth by 10m to accommodate 65m vessel

Assume current berth is in good condition and does not require major repair works
Excludes any land/seabed purchase or lease arrangements
Excludes investigations and surveys
Excludes linkspan refurbishment

Item		Quantity	Unit	£/unit	Item Cost	Notes
Extension to Berthing Structure						
Quay Wall	Assume sheet pile length 16m	35	m	£12,000	£420,000	Deck level +5m, bed level -7m, rock 1m below bed, toe 2m into rock
Infill behind quay wall		1200	m^3	£55	£66,000	Assumed Bed Level -7mCD & +5mCD deck level
Reinforced concrete deck slab		100	m^2	£450	£45,000	Based on A&M
Pier Fendering		16	no.	£20,000	£320,000	Replace existing fenders and additional 2 at extension
Pier Furniture					£50,000	Allowance
Electrical works					£50,000	Allowance
			SubTotal of Construction Works		**£951,000**	
Mobilise Floating Plant					£100,000	
Preliminaries	25% of Sub Total of Construction Works				£237,750	
			Construction Works Total		**£1,288,750**	
Consultancy Fees and Consents	10% of Construction Cost				**£128,875**	
				Total	**£1,417,625**	

Eday Ferry Terminal
Extend berth by 20m to accommodate 65m vessel

Assume current berth is in good condition and does not require major repair works
Excludes any land/seabed purchase or lease arrangements
Excludes investigations and surveys

Item			Quantity	Unit	£/unit	Item Cost	Notes
Extension to Berthing Structure							
Quay Wall	Assume sheet pile length 16.2m		55	m	£12,000	£660,000	Deck level +4.7m, bed level -6.5m, stiff clays (assume piles driven 5m into bed)
Infill behind quay wall			2139.2	m^3	£55	£117,656	Assumed Bed Level -6.5mCD & +4.7mCD deck level
Reinforced concrete deck slab			191	m^2	£450	£85,950	Based on A&M, quantity from CAD
Pier Fendering			19	no.	£20,000	£380,000	Assuming same spacing as existing & no. of fenders at West face of Old Berth taken from photos
Cathodic protection to existing piles			1	no.	£320,000	£320,000	Based on £2000/anode
Pier Furniture						£50,000	Allowance
Electrical works						£50,000	Allowance
Dredging and disposal (m^2 CAD)		3500	2975	m^3	£60	£178,500	Assumed soft dredging to 4.7mcD, approx 0.85m average depth to be dredged
Replace timber fendering on berth in basin	*Optional as existing in very poor condition*		24	no.	£3,800	£91,200	Based on Tiree Cost Estimate
				SubTotal of Construction Works		**£1,933,306**	
Mobilise Floating Plant	(Increase for dredging)					£150,000	Allowance
Preliminaries	25% of Sub Total of Construction Works					£483,327	
				Construction Works Total		**£2,566,633**	
Consultancy Fees and Consents	10% of Construction Cost					**£256,663**	
				Total		**£2,823,296**	

Eday Ferry Terminal
Extend berth by further 10m to accommodate 65m vessel

Assume current berth is in good condition and does not require major repair works
Excludes any land/seabed purchase or lease arrangements
Excludes investigations and surveys

Item			*Quantity*	*Unit*	*£/unit*	*Item Cost*	*Notes*
Extension to Berthing Structure							
Quay Wall	*Assume sheet pile length 16.2m*		*75*	*m*	*£12,000*	*£900,000*	*Deck level +4.7m, bed level -6.5m, stiff clays (assume piles driven 5m into bed)*
Infill behind quay wall			*3203.2*	*m^3*	*£55*	*£176,176*	*Assumed Bed Level -6.5mCD & +4.7mCD deck level*
Reinforced concrete deck slab			*286*	*m^2*	*£450*	*£128,700*	*Based on A&M, quantity from CAD*
Pier Fendering			*29*	*no.*	*£20,000*	*£580,000*	*Assuming same spacing as existing & no. of fenders at West face of Old Berth taken from photos*
Cathodic protection to existing piles			*1*	*no.*	*£320,000*	*£320,000*	*Based on £2000/anode*
Pier Furniture						*£50,000*	*Allowance*
Electrical works						*£50,000*	*Allowance*
Dredging and disposal (m^2 CAD)		3500	2975	m^3	£60	£178,500	Assumed soft dredging to 4.7mcD, approx 0.85m average depth to be dredged
Replace timber fendering on berth in basin	*Optional*		*24*	*no.*	*£3,800*	*£91,200*	*Based on Tiree Cost Estimate*
				SubTotal of Construction Works		***£2,474,576***	
Mobilise Floating Plant	(Increase for dredging)					£150,000	*Allowance*
Preliminaries	*25% of Sub Total of Construction Works*					*£618,644*	
				Construction Works Total		***£3,243,220***	
Consultancy Fees and Consents	*10% of Construction Cost*					***£324,322***	
				Total		***£3,567,542***	

Stronsay Ferry Terminal

Extend existing berth by 20m to accommodate 65m vessel

Assume current berth is in good condition and does not require major repair works
Excludes any land/seabed purchase or lease arrangements
Excludes investigations and surveys
Excludes dredging
Excludes linkspan refurbishment

Item		Quantity	Unit	£/unit	Item Cost	Notes
Extension to Berthing Structure						
Quay Wall	Assume sheet pile length 16.5m	52	m	£12,000	£624,000	Deck level +5m, bed level -5m, rock 4.5m below bed, toe 2m into rock
Infill behind quay wall		1700	m^3	£55	£93,500	Assumed Bed Level -5mCD & +5mCD deck level
Reinforced concrete deck slab		170	m^2	£450	£76,500	Based on A&M
Pier Fendering		23	no.	£20,000	£460,000	Replace existing fenders and additional 8 at extension
Pier Furniture					£50,000	Allowance
Electrical works					£50,000	Allowance
Dredging and disposal (m^2 CAD)		1	no.	£500,000	£500,000	Allowance, TBC by OIC and ongoing maintenance cost
				SubTotal of Construction Works	**£1,854,000**	
Mobilise Floating Plant					£100,000	
Preliminaries	25% of Sub Total of Construction Works				£463,500	
				Construction Works Total	**£2,417,500**	
Consultancy Fees and Consents	10% of Construction Cost				**£241,750**	
				Total	**£2,659,250**	

Stronsay Ferry Terminal
New Location in Linga Sound to accommodate circa 65m RoRo vessel.

Excludes investigations and surveys

Item		Quantity	Unit	£/unit	Item Cost	Notes
Landside Operations						
Terminal Building		1	No.	£150,000	£150,000	Allowance
Paving incl. lighting and drainage	Area of reclaimed land (CAD)	5100	sq m	£100	£510,000	
Berthing Structure						
Quay Wall	Assume sheet pile length 16.5m	180	m	£12,000	£2,160,000	Deck level +5m, bed level -5m, rock assumed 4.5m below bed, toe driven 2m into rock
Infill behind quay wall		11300	m^3	£55	£621,500	Assumed Bed Level -5mCD & +5mCD deck level
Reinforced concrete deck slab	Area of berthing structure (CAD)	1130	m^2	£450	£508,500	Based on A&M
Pier fendering	From CAD	25	no.	£20,000	£500,000	
North face - rock infill		8085	cu m	£40	£323,400	220m length, 0mCD to -3mCD
North face - primary armour		2970	cu m	£90	£267,300	220m length, 0mCD to -3mCD
North face - secondary armour		2640	cu m	£65	£171,600	220m length, 0mCD to -3mCD
South face - rock infill		4102	cu m	£40	£164,080	140m length, 0mCD to -1.5m CD
South face - primary armour		1733	cu m	£90	£155,970	140m length, 0mCD to -1.5m CD
South face - secondary armour		1523	cu m	£65	£98,995	140m length, 0mCD to -1.5m CD
Pier Furniture					£100,000	Allowance
Linkspan						
Linkspan Support Structures		1	na	£1,500,000	£1,500,000	
New Linkspan Deck		1	na	£1,000,000	£1,000,000	CMAL Linkspan Strategy report
Transport and install new deck		1	na	£250,000	£250,000	
Mechanical Costs		1	na	£400,000	£400,000	
Breakwater						
Breakwater - rock infill		39000	cu m	£40	£1,560,000	320m length, 0mCD to -4mCD, 2x volume plus core centre
Breakwater - primary armour		9120	cu m	£90	£820,800	320m length, 0mCD to -4mCD, 2x volume
Breakwater - secondary armour		8160	cu m	£65	£530,400	320m length, 0mCD to -4mCD, 2x volume
Wetside Operations						
Land Reclamation (imported fill)	5100	17850	cu m	£40	£714,000	From CAD: infill from -2mCD to +5.0m CD, approx 3.5m average height to be reclaimed
Dredging and disposal (m^2 CAD)	64000	96000	m^3	£60	£5,760,000	Assumed soft dredging to 4.7mcD, approx 1.5m average depth to be dredged
Supporting Infrastructure						
Allowance for Electical Substation Upgrades		1	no.	£500,000	£500,000	
Allowance for Local Road Upgrades		0.75	km	£1,000,000	£750,000	Allowance of £1,000,000 per km
Allowance for Extending Utilities		1	no.	£100,000	£100,000	
			SubTotal of Construction Works		**£19,616,545**	
Mobilise Floating Plant	(Increase for dredging)				£150,000	Allowance
Preliminaries	25% of Sub Total of Construction Works				£4,904,136	
			Construction Works Total		**£24,670,681**	
Consultancy Fees and Consents	10% of Construction Cost				£2,467,068	
			Total		**£27,137,749**	

Westray (Rapness) Ferry Terminal

Extend berth by 20m to accommodate 65m vessel

Assume current berth is in good condition and does not require major repair works
Excludes any land/seabed purchase or lease arrangements
Excludes investigations and surveys

Item			Quantity	Unit	£/unit	Item Cost	Notes
Extension to Berthing Structure							
Quay Wall	Assume sheet pile length 17.6m		56	m	£12,000	£672,000	Deck level +5.6m, bed level -5m, rock 5m below bed, toe 2m into rock
Infill behind quay wall			2120	m^3	£55	£116,600	Assumed Bed Level -5mCD & +5.6mCD deck level
Reinforced concrete deck slab			200	m^2	£450	£90,000	Based on A&M
Pier Fendering			17	no.	£20,000	£340,000	Assuming same spacing as existing
Pier Furniture						£50,000	Allowance
Electrical works						£50,000	Allowance
Dredging and disposal (m^2 CAD)		2700	1350	m^3	£60	£81,000	Assumed soft dredging to 4.7mcD, approx 0.5m average depth to be dredged
				SubTotal of Construction Works		**£1,399,600**	
Mobilise Floating Plant	(Increase for dredging)					£150,000	Allowance
Preliminaries	25% of Sub Total of Construction Works					£349,900	
				Construction Works Total		**£1,899,500**	
Consultancy Fees and Consents	10% of Construction Cost					**£189,950**	
				Total		**£2,089,450**	

Westray (Rapness) Ferry Terminal

Extend berth by 50m to accommodate 65m vessel

Assume current berth is in good condition and does not require major repair works
Excludes any land/seabed purchase or lease arrangements
Excludes investigations and surveys

Item			Quantity	Unit	£/unit	Item Cost	Notes
Extension to Berthing Structure							
Quay Wall	Assume sheet pile length 17.6m		116	m	£12,000	£1,392,000	Deck level +5.6m, bed level -5m, rock 5m below bed, toe 2m into rock
Infill behind quay wall			5300	m^3	£66	£349,800	Assumed Bed Level -5mCD & +5.6mCD deck level
Reinforced concrete deck slab			500	m^2	£450	£225,000	Based on A&M
Pier Fendering			43	no.	£20,000	£860,000	Assuming same spacing as existing
Pier Furniture						£50,000	Allowance
Electrical works						£50,000	Allowance
Dredging and disposal (m^2 CAD)		2700	1350	m^3	£60	£81,000	Assumed soft dredging to 4.7mcD, approx 0.5m average depth to be dredged
				SubTotal of Construction Works		**£3,007,800**	
Mobilise Floating Plant	(Increase for dredging)					£150,000	Allowance
Preliminaries	25% of Sub Total of Construction Works					£751,950	
				Construction Works Total		**£3,909,750**	
Consultancy Fees and Consents	10% of Construction Cost					**£390,975**	
				Total		**£4,300,725**	

Westray (Pierowall) Ferry Terminal

Option A - Slipway within basin to accommodate 25m slipway vessel

Assume current berth is in good condition and does not require major repair works
Excludes any land/seabed purchase or lease arrangements
Excludes investigations and surveys

Item		Quantity	Unit	£/unit	Item Cost	Notes
Construction of Slipway						
Demolish existing		1	no.	£5,000	£5,000	
Slipway		1	no.	£2,000,000	£2,000,000	Based on previous cost estimate exercises
Allowance for Local Road Realignment		1	no.	£250,000	£250,000	From A&M
Allowance for improved access to Golden Mariana		1	no.	£100,000	£100,000	Allowance
			SubTotal of Construction Works		**£2,355,000**	
Mobilise Floating Plant					£100,000	
Preliminaries	25% of Sub Total of Construction Works				£588,750	
			Construction Works Total		**£3,043,750**	
Consultancy Fees and Consents	10% of Construction Cost				**£304,375**	
			Total		**£3,348,125**	

Westray (Pierowall) Ferry Terminal

Option B - Slipway to west of basin to accommodate 25m slipway vessel

Assume current berth is in good condition and does not require major repair works
Excludes any land/seabed purchase or lease arrangements
Excludes investigations and surveys
Excludes dredging and/or relocation of pontoons

Item		Quantity	Unit	£/unit	Item Cost	Notes
Construction of Slipway						
Slipway		1	no.	£2,000,000	£2,000,000	Based on previous cost estimate exercises
Allowance for Local Road Realignment		1	no.	£250,000	£250,000	
Allowance for improved access to Golden Mariana		1	no.	£100,000	£100,000	Allowance
			SubTotal of Construction Works		**£2,350,000**	
Mobilise Floating Plant					£100,000	
Preliminaries	25% of Sub Total of Construction Works				£587,500	
			Construction Works Total		**£3,037,500**	
Consultancy Fees and Consents	10% of Construction Cost				**£303,750**	
			Total		**£3,341,250**	

Westray (Pierowall) Ferry Terminal

Option C - Slipway at an angle within basin to accommodate 25m slipway vessel

Assume current berth is in good condition and does not require major repair works
Excludes any land/seabed purchase or lease arrangements
Excludes investigations and surveys
Excludes dredging and/or relocation of pontoons

Item		Quantity	Unit	£/unit	Item Cost	Notes
Construction of Slipway						
Demolish existing		1	no.	£5,000	£5,000	
Slipway		1	no.	£2,000,000	£2,000,000	Based on previous cost estimate exercises
Allowance for Local Road Realignment		1	no.	£250,000	£250,000	From A&M
Allowance for improved access to Golden Mariana		1	no.	£100,000	£100,000	Allowance
			SubTotal of Construction Works		**£2,355,000**	
Mobilise Floating Plant					£100,000	
Preliminaries	25% of Sub Total of Construction Works				£588,750	
			Construction Works Total		**£3,043,750**	
Consultancy Fees and Consents	10% of Construction Cost				**£304,375**	
			Total		**£3,348,125**	

North Ronaldsay Ferry Terminal

Option A - Extend existing berth by 15m to accommodate 45m LoLo vessel

Assume current berth is in good condition and does not require major repair works
Excludes any land/seabed purchase or lease arrangements
Excludes investigations and surveys

Item		Quantity	Unit	£/unit	Item Cost	Notes
Extension to Berthing Structure						
Quay Wall		40	m	£12,000	£480,000	Deck level +4.46m, bed level -3.5m
Infill behind quay wall		1440.76	m^3	£55	£79,242	Bed Level -3.5mCD & +4.46mCD deck level
Reinforced concrete deck slab		181	m^2	£450	£81,450	Based on A&M
Pier Fendering		17	no.	£20,000	£340,000	Assuming 5m spacing & 7no. At Roundhead
Pier Furniture		1	no.	£50,000	£50,000	Allowance
Electrical works		1	no.	£50,000	£50,000	Allowance
Dredging and disposal (m^2 CAD)	5330	7728.5	m^3	£60	£463,710	Assumed soft dredging to 3.9mcD, approx 1.45m average depth to be dredged
			SubTotal of Construction Works		**£1,544,402**	
Mobilise Floating Plant	(Increase for dredging)				£150,000	Allowance
Preliminaries	25% of Sub Total of Construction Works				£386,100	
Factor for exposed site	15% of Sub Total of Construction Works				£231,660	
			Construction Works Total		**£2,312,163**	
Consultancy Fees and Consents	10% of Construction Cost				**£231,216**	
			Total		**£2,543,379**	

North Ronaldsay Ferry Terminal

Option B - Extend berth with new slipway to accommodate 50m vessel (Loch Nevis)

Assume current berth is in good condition and does not require major repair works
Excludes any land/seabed purchase or lease arrangements
Excludes investigations and surveys

Item		Quantity	Unit	£/unit	Item Cost	Notes
Extension to Berthing Structure						
Quay Wall		240	m	£12,000	£2,880,000	Deck level +4.46m, bed level -4m
Infill behind quay wall		8579	m^3	£55	£471,845	Bed Level -4mCD & +4.46mCD deck level
Reinforced concrete deck slab		1150	m^2	£450	£517,500	Based on A&M
Pier Fendering		19	no.	£20,000	£380,000	Assuming 5m spacing & 7no. At Roundhead
Pier Furniture		1	no.	£50,000	£50,000	Allowance
Electrical works		1	no.	£50,000	£50,000	Allowance
Slipway		1	no.	£2,000,000	£2,000,000	Based on A&M
			SubTotal of Construction Works		**£6,349,345**	
Mobilise Floating Plant					£100,000	
Preliminaries	25% of Sub Total of Construction Works				£1,587,336	
Factor for exposed site	15% of Sub Total of Construction Works				£952,402	
			Construction Works Total		**£8,989,083**	
Consultancy Fees and Consents	10% of Construction Cost				**£898,908**	
				Total	**£9,887,991**	

North Ronaldsay Ferry Terminal

Option C - Extend berth with linkspan to accommodate 45m RoRo vessel (PK261)

Assume current berth is in good condition and does not require major repair works
Excludes any land/seabed purchase or lease arrangements
Excludes investigations and surveys

Item		Quantity		Unit	£/unit	Item Cost	Notes
Extension to Berthing Structure							
Quay Wall			200	m	£12,000	£2,400,000	Deck level +4.46m, bed level -3.5m
Infill behind quay wall			7562	m^3	£40	£302,480	Bed Level -3.5mCD & +4.46mCD deck level
Reinforced concrete deck slab			950	m^2	£450	£427,500	Based on A&M
Pier Fendering			20	no.	£20,000	£400,000	Assuming 5m spacing & 7no. At Roundhead
Pier Furniture			1	no.	£50,000	£50,000	Allowance
Electrical works			1	no.	£50,000	£50,000	Allowance
Dredging and disposal (m^2 CAD)		2250	2250	m^3	£60	£135,000	Assumed soft dredging to 4.2mcD, approx 1m average depth to be dredged
Linkspan			1	no.	£3,000,000	£3,000,000	Based on A&M
Linkspan Approach Structure			1	no.	£1,250,000	£1,250,000	
			SubTotal of Construction Works			**£8,014,980**	
Mobilise Floating Plant	(Increase for dredging)					£150,000	Allowance
Preliminaries	25% of Sub Total of Construction Works					£2,003,745	
Factor for exposed site	15% of Sub Total of Construction Works					£1,202,247	
			Construction Works Total			**£11,370,972**	
Consultancy Fees and Consents	10% of Construction Cost					**£1,137,097**	
				Total		**£12,508,069**	

North Ronaldsay Ferry Terminal

Option D - Extend berth with linkspan to accommodate 65m RoRo vessel

Assume current berth is in good condition and does not require major repair works
Excludes any land/seabed purchase or lease arrangements
Excludes investigations and surveys

Item		Quantity		Unit	£/unit	Item Cost	Notes
Extension to Berthing Structure							
Quay Wall			220	m	£12,000	£2,640,000	Deck level +4.46m, bed level -4m
Infill behind quay wall			9729	m^3	£55	£535,095	Bed Level -4mCD & +4.46mCD deck level
Reinforced concrete deck slab			1150	m^2	£450	£517,500	Based on A&M
Pier Fendering			20	no.	£20,000	£400,000	Assuming 5m spacing & 7no. At Roundhead
Pier Furniture			1	no.	£50,000	£50,000	Allowance
Electrical works			1	no.	£50,000	£50,000	Allowance
Dredging and disposal (m^2 CAD)		2875	4025	m^3	£60	£241,500	Assumed soft dredging to 4.7mcD, approx 1.4m average depth to be dredged
Linkspan			1	no.	£3,000,000	£3,000,000	Based on A&M
Linkspan Approach Structure			1	no.	£1,250,000	£1,250,000	
				SubTotal of Construction Works		**£8,684,095**	
Mobilise Floating Plant	(Increase for dredging)					£150,000	Allowance
Preliminaries	25% of Sub Total of Construction Works					£2,171,024	
Factor for exposed site	15% of Sub Total of Construction Works					£1,302,614	
				Construction Works Total		**£12,307,733**	
Consultancy Fees and Consents	10% of Construction Cost					**£1,230,773**	
				Total		**£13,538,506**	

Papa Westray Ferry Terminal

Option A - Extend existing berth by 15m to accommodate 45m LoLo vessel

Assume current berth is in good condition and does not require major repair works
Excludes any land/seabed purchase or lease arrangements
Excludes investigations and surveys

Item		Quantity		Unit	£/unit	Item Cost	Notes
Extension to Berthing Structure							
Quay Wall			53	m	£12,000	£636,000	Deck level (ASSUMED) +4.5m, bed level -5m
Infill behind quay wall			1301.5	m^3	£55	£71,583	Bed Level -5mCD & +4.5mCD deck level
Reinforced concrete deck slab			137	m^2	£450	£61,650	Based on A&M
Pier Fendering			24	no.	£20,000	£480,000	Assuming Existing are to be Replaced, 5m Spacing at Extension & 7no. At Roundhead
Pier Furniture			1	no.	£50,000	£50,000	Allowance
Electrical works			1	no.	£50,000	£50,000	Allowance
Wave screens			1	no.	£1,500,000	£1,500,000	Allowance
Dredging and disposal (m^2 CAD)		1690	1690	m^3	£60	£101,400	Assumed soft dredging to 3.9mcD, approx 1m average depth to be dredged
					SubTotal of Construction Works	**£2,950,633**	
Mobilise Floating Plant	(Increase for dredging)					£150,000	Allowance
Preliminaries	25% of Sub Total of Construction Works					£737,658	
Factor for exposed site	15% of Sub Total of Construction Works					£442,595	
					Construction Works Total	**£4,280,886**	
Consultancy Fees and Consents	10% of Construction Cost					**£428,089**	
					Total	**£4,708,974**	

Papa Westray Ferry Terminal

Option B - Extend berth with new slipway to accommodate 50m vessel (Loch Nevis)

Assume current berth is in good condition and does not require major repair works
Excludes any land/seabed purchase or lease arrangements
Excludes investigations and surveys

Item		Quantity	Unit	£/unit	Item Cost	Notes
Extension to Berthing Structure						
Quay Wall		47	m	£12,000	£564,000	Deck level (ASSUMED) +4.5m, bed level -5m
Infill behind quay wall		1738.5	m^3	£55	£95,618	Bed Level -5mCD & +4.5mCD deck level
Reinforced concrete deck slab		183	m^2	£450	£82,350	Based on A&M
Pier Fendering		25	no.	£20,000	£500,000	Assuming Existing are to be Replaced, 5m Spacing at Extension & 7no. At Roundhead
Pier Furniture		1	no.	£50,000	£50,000	Allowance
Electrical works		1	no.	£50,000	£50,000	Allowance
Wave screens		1	no.	£1,500,000	£1,500,000	Allowance
Slipway		1	no.	£2,000,000	£2,000,000	Based on A&M
			SubTotal of Construction Works		**£4,841,968**	
Mobilise Floating Plant					£100,000	
Preliminaries	25% of Sub Total of Construction Works				£1,210,492	
Factor for exposed site	15% of Sub Total of Construction Works				£726,295	
			Construction Works Total		**£6,878,755**	
Consultancy Fees and Consents	10% of Construction Cost				**£687,875**	
			Total		**£7,566,630**	

Papa Westray Ferry Terminal

Option C - Extend berth with linkspan to accommodate 45m RoRo vessel (PK261)

Assume current berth is in good condition and does not require major repair works
Excludes any land/seabed purchase or lease arrangements
Excludes investigations and surveys

Item		Quantity	Unit	£/unit	Item Cost	Notes
Extension to Berthing Structure						
Quay Wall		37	m	£12,000	£444,000	Deck level (ASSUMED) +4.5m, bed level -5m
Infill behind quay wall		1301.5	m^3	£55	£71,583	Bed Level -5mCD & +4.5mCD deck level
Reinforced concrete deck slab		137	m^2	£450	£61,650	Based on A&M
Pier Fendering		24	no.	£20,000	£480,000	Assuming Existing are to be Replaced, 5m Spacing at Extension & 7no. At Roundhead
Pier Furniture		1	no.	£50,000	£50,000	Allowance
Electrical works		1	no.	£50,000	£50,000	Allowance
Wave screens		1	no.	£1,500,000	£1,500,000	Allowance
Dredging and disposal (m^2 CAD)	2770	3047	m^3	£60	£182,820	Assumed soft dredging to 4.2mcD, approx 1.1m average depth to be dredged
Approach Structure					£1,000,000	Allowance for open piled RC approach
Linkspan		1	no.	£3,000,000	£3,000,000	Based on A&M
				SubTotal of Construction Works	**£6,840,053**	
Mobilise Floating Plant	(Increase for dredging)				£150,000	Allowance
Preliminaries	25% of Sub Total of Construction Works				£1,710,013	
Factor for exposed site	15% of Sub Total of Construction Works				£1,026,008	
				Construction Works Total	**£9,726,074**	
Consultancy Fees and Consents	10% of Construction Cost				**£972,607**	
				Total	**£10,698,681**	

Papa Westray Ferry Terminal

Option D - Extend berth with linkspan to accommodate 65m RoRo vessel

Assume current berth is in good condition and does not require major repair works
Excludes any land/seabed purchase or lease arrangements
Excludes investigations and surveys

Item		Quantity		Unit	£/unit	Item Cost	Notes
Extension to Berthing Structure							
Quay Wall			88	m	£12,000	£1,056,000	Deck level (ASSUMED) +4.5m, bed level -5m
Infill behind quay wall			3562.5	m^3	£55	£195,938	Bed Level -5mCD & +4.5mCD deck level
Reinforced concrete deck slab			375	m^2	£450	£168,750	Based on A&M
Pier Fendering			29	no.	£20,000	£580,000	Assuming Existing are to be Replaced, 5m Spacing at Extension & 7no. At Roundhead
Pier Furniture			1	no.	£50,000	£50,000	Allowance
Electrical works			1	no.	£50,000	£50,000	Allowance
Wave screens			1	no.	£1,500,000	£1,500,000	Allowance
Dredging and disposal (m^2 CAD)		4900	6860	m^3	£60	£411,600	Assumed soft dredging to 4.7mcD, approx 1.4m average depth to be dredged
Approach Structure						£1,000,000	Allowance for open piled RC approach
Linkspan			1	no.	£3,000,000	£3,000,000	Based on A&M
				SubTotal of Construction Works		**£8,012,288**	
Mobilise Floating Plant	(Increase for dredging)					£150,000	Allowance
Preliminaries	25% of Sub Total of Construction Works					£2,003,072	
Factor for exposed site	15% of Sub Total of Construction Works					£1,201,843	
				Construction Works Total		**£11,367,203**	
Consultancy Fees and Consents	10% of Construction Cost					**£1,136,720**	
				Total		**£12,503,923**	

Papa Westray Ferry Terminal
Option E - Slipway to accommodate 25m Slipway Vessel

Assume current berth is in good condition and does not require major repair works
Excludes any land/seabed purchase or lease arrangements
Excludes investigations and surveys

Item		Quantity	Unit	£/unit	Item Cost	Notes
Extension to Berthing Structure						
Wave screens		1	no.	£1,500,000	£1,500,000	Allowance
Slipway		1	no.	£2,000,000	£2,000,000	Based on A&M
Allowance for improved access to Golden Mariana		1	no.	£100,000	£100,000	Allowance
			SubTotal of Construction Works		**£3,600,000**	
Mobilise Floating Plant					£100,000	
Preliminaries	25% of Sub Total of Construction Works				£900,000	
Factor for exposed site	15% of Sub Total of Construction Works				£540,000	
			Construction Works Total		**£5,140,000**	
Consultancy Fees and Consents	10% of Construction Cost				**£514,000**	
				Total	**£5,654,000**	

Appendix B Vessel Load Factors

The load factor analysis presented in the main body of the report summarised the headlines in terms of the number of high utilisation sailings. This appendix provides some additional underlying detail.

How full were the boats?

Using the load factor calculation process set out in the body of the report, it is possible to calculate sailing-by-sailing vessel load factors. To present this information visually, we have employed the use of 'box and whisker' plots.

The box and whisker diagrams that follow show the distribution of sailings' individual vehicle deck load factors by day of week across the three timetable seasons. These box and whisker diagrams include load factors (i.e., how full the vehicle deck is) for every sailing with recorded carryings across the 2017-2018 timetable period. Taking each component of the diagram in turn:

- Each point represents the load factor of an individual sailing.
- Each sailing is then allocated to one of four quartiles, with an equal number of sailings in each quartile.
- Those points below the box represent the least busy quarter of sailings, whilst those above the box represent the busiest quarter of sailings.
- The box, therefore, covers the 'middle' two quarters, with the horizontal line within the box representing the median load factor. The 'X' in the box is the mean load factor.
- The short horizontal lines at the top and bottom of the chart (i.e., the whiskers), represent either the maximum or minimum load factor.
    - Note that points above or below these lines as classed as 'outliers' in this statistical approach.
- So, the higher on the chart and the shorter the 'box', the more sailings there are where the ferry is close to capacity.
- It should be noted that, on some sailings, the load factor may exceed 100%. This is due to the composition of traffic on the ferry and the arrangement on the deck – in the event, for example, that a sailing is dominated by smaller than average cars, it may be possible to board more cars than the vessel's theoretical capacity, which is based on an average car length.

With respect to the analysis that follows, due to the intricacies of the Eday>Stronsay>Sandy timetable permutations, all sailings have been grouped together across these routes. Also, it should be noted that the load factors have been calculated based on individual legs to represent the busiest leg – i.e., on sailings from Kirkwall to Eday via Sanday, the load factor for Kirkwall to Eday will include traffic that is going to Sanday.

EDAY > STRONSAY > SANDAY

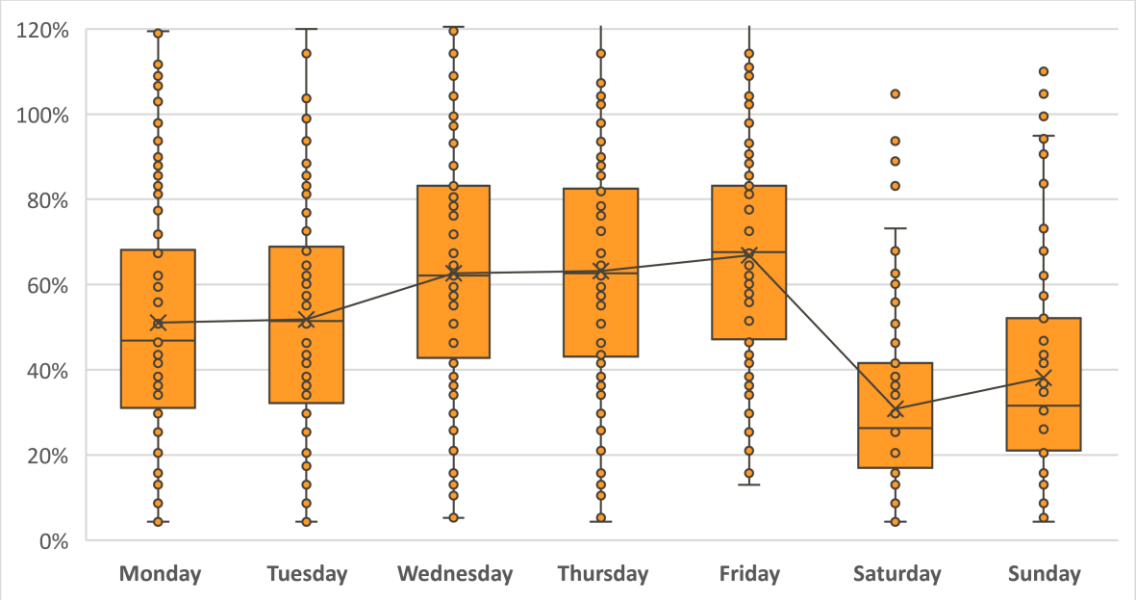


Figure B1: Eday > Stronsay > Sanday Summer Timetable Load Factors

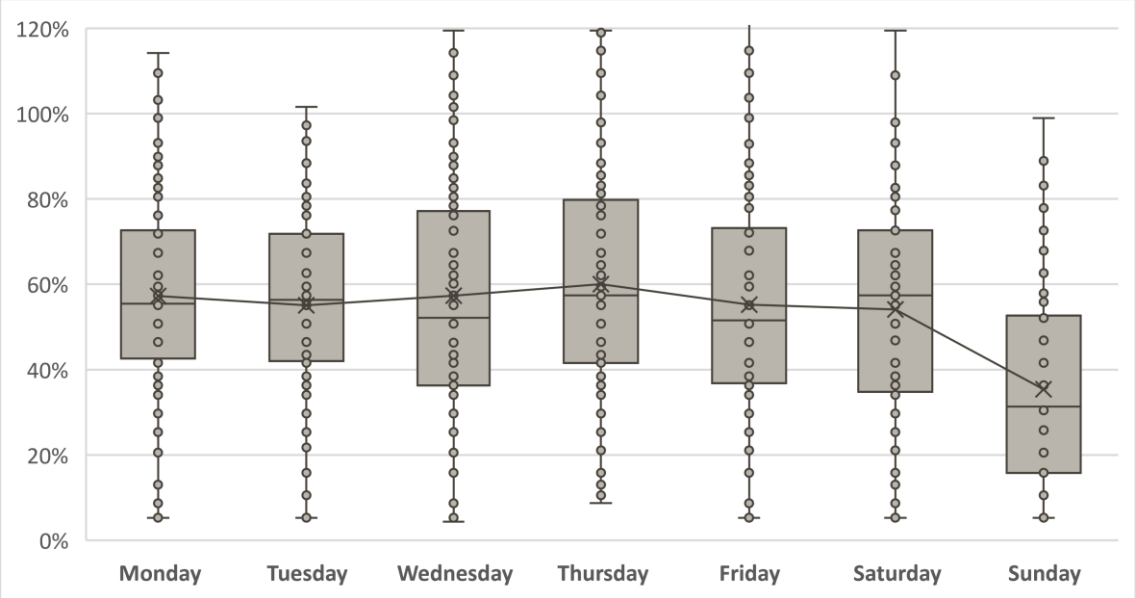


Figure B2: Eday > Stronsay > Sanday Winter Timetable Load Factors

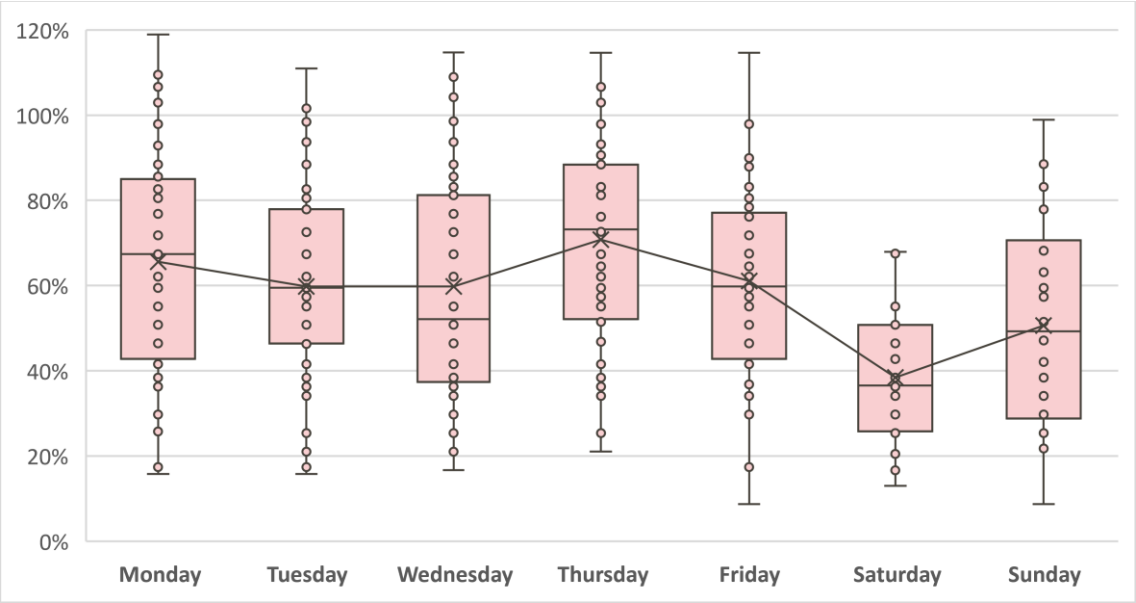


Figure B3: Eday > Stronsay > Sanday Refit Timetable Load Factors

The key point of note from the above charts is that the median load factor is relatively constant across the week but rarely much higher than 60%. Whilst the figures suggest that there are certain sailings which are full or close to full, capacity overall cannot, based on the figures provided by Orkney Ferries, be considered a major problem across all sailings.

Westray > Papa Westray

The equivalent analysis for the Westray / Papa Westray route is presented below:

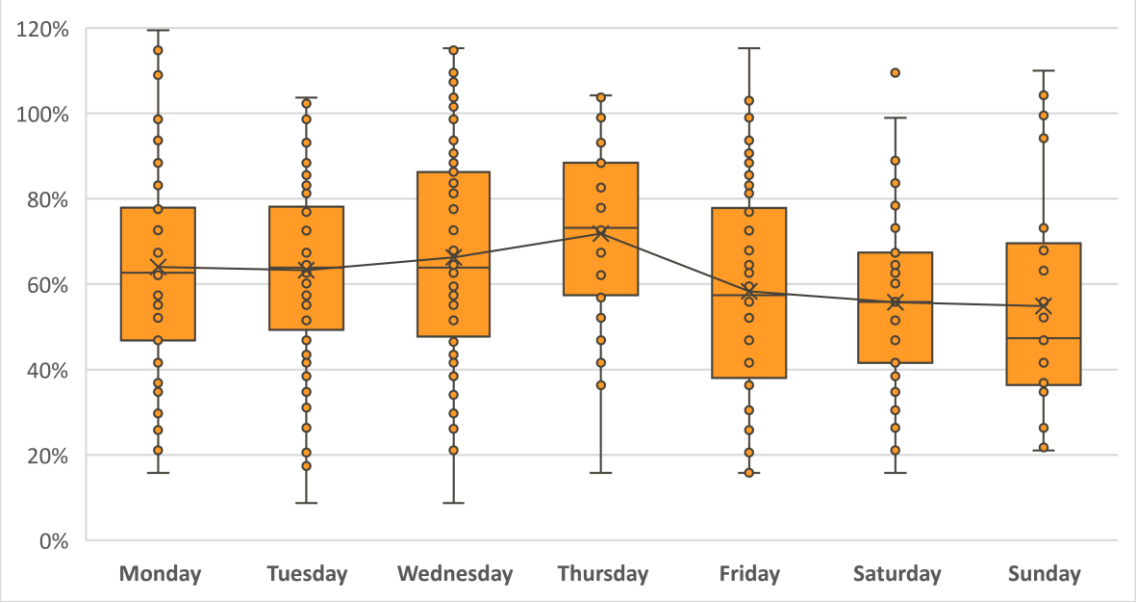


Figure B4: Westray > Papa Westray Summer Timetable Load Factors

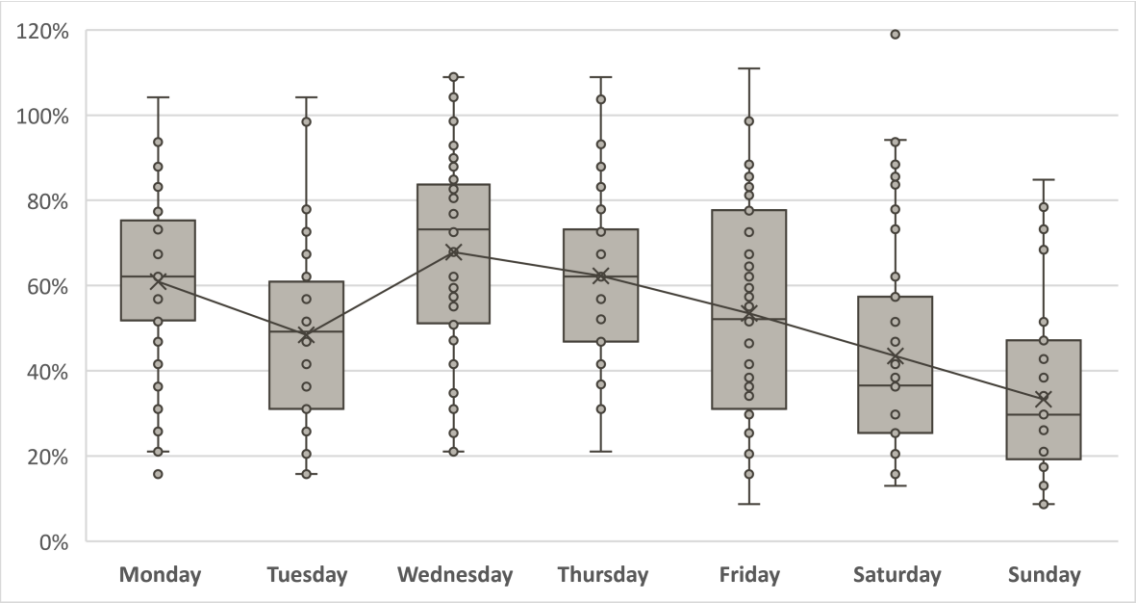


Figure B5: Westray > Papa Westray Winter Timetable Load Factors

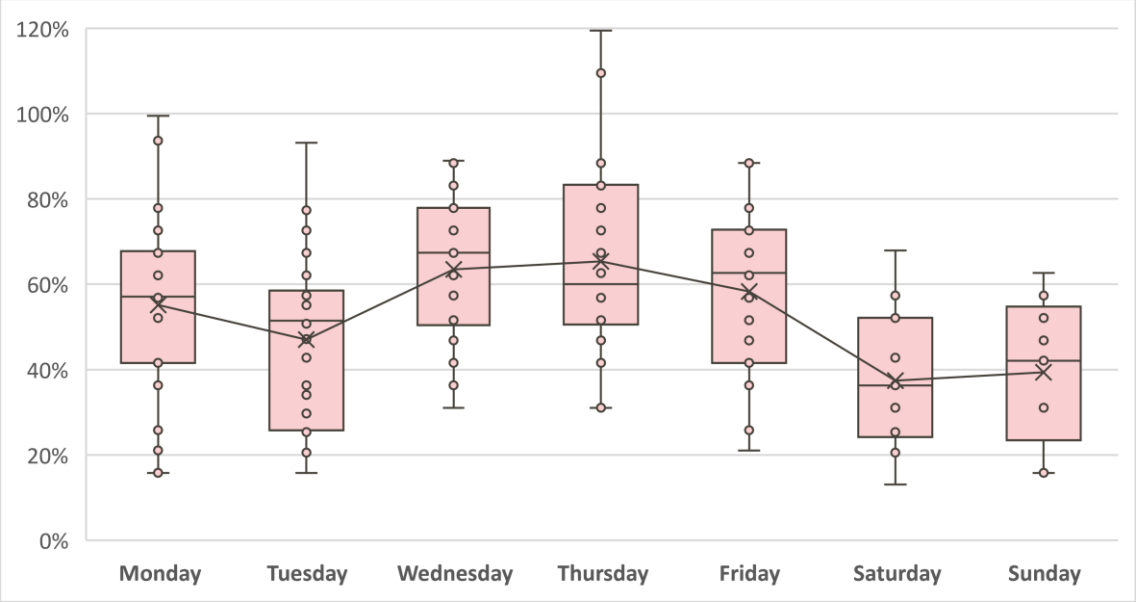


Figure B6: Westray > Papa Westray Refit Timetable Load Factors

The picture on the Westray route is broadly similar, where median utilisation is generally around the 60% mark, albeit there are certain days of the week where this gets closer to 70%.

Appendix C Illustrative Timetables

Kirkwall – Eday

SUMMER / WINTER	05:00 – 09:00	09:00 – 13:00	13:00 – 17:00	17:00 – 21:00	21:00 – 00:00
Monday	FERRY, PLANE	FERRY	FERRY		
Tuesday		FERRY	FERRY x2		
Wednesday	FERRY, PLANE	FERRY	FERRY, PLANE		
Thursday		FERRY	FERRY x2		
Friday		FERRY		FERRY x2	FERRY
Saturday		FERRY		FERRY	FERRY
Sunday		FERRY		FERRY	

REFIT	05:00 – 09:00	09:00 – 13:00	13:00 – 17:00	17:00 – 21:00	21:00 – 00:00
Monday	FERRY	FERRY x2, PLANE		FERRY	
Tuesday		FERRY		FERRY	
Wednesday		FERRY x2, PLANE	PLANE x2	FERRY	
Thursday		FERRY x2		FERRY x2	
Friday	FERRY	FERRY		FERRY	
Saturday	FERRY			FERRY	
Sunday		FERRY		FERRY x2	

Kirkwall - North Ronaldsay

SUMMER / WINTER	05:00 – 09:00	09:00 – 13:00	13:00 – 17:00	17:00 – 21:00	21:00 – 00:00
Monday	PLANE	PLANE		PLANE	
Tuesday	PLANE	FERRY, PLANE		PLANE	
Wednesday	PLANE		PLANE		
Thursday	PLANE	FERRY	PLANE	PLANE	
Friday	PLANE		PLANE	PLANE	
Saturday		FERRY, PLANE	PLANE x3		
Sunday		PLANE		PLANE	

REFIT	05:00 – 09:00	09:00 – 13:00	13:00 – 17:00	17:00 – 21:00	21:00 – 00:00
Monday	PLANE	PLANE	PLANE		
Tuesday	PLANE		FERRY, PLANE		
Wednesday	PLANE		PLANE		
Thursday	PLANE		PLANE x2		
Friday		FERRY, PLANE	PLANE x2		
Saturday		PLANE	PLANE		
Sunday			PLANE		

Kirkwall - Papa Westray

SUMMER / WINTER	05:00 – 09:00	09:00 – 13:00	13:00 – 17:00	17:00 – 21:00	21:00 – 00:00
Monday	PLANE	PLANE		PLANE	
Tuesday	PLANE	FERRY PLANE		PLANE	
Wednesday	PLANE		PLANE		
Thursday	PLANE	FERRY	PLANE	PLANE	
Friday	PLANE		PLANE	PLANE	
Saturday		FERRY PLANE	PLANE x3		
Sunday		PLANE		PLANE	

REFIT	05:00 – 09:00	09:00 – 13:00	13:00 – 17:00	17:00 – 21:00	21:00 – 00:00
Monday	PLANE	PLANE	PLANE		
Tuesday	PLANE		FERRY PLANE		
Wednesday	PLANE		PLANE		
Thursday	PLANE		PLANE x2		
Friday		FERRY PLANE	PLANE x2		
Saturday		PLANE	PLANE		
Sunday			PLANE		

Kirkwall – Sanday

SUMMER / WINTER	05:00 – 09:00	09:00 – 13:00	13:00 – 17:00	17:00 – 21:00	21:00 – 00:00
Monday	FERRY	FERRY PLANE	FERRY PLANE		
Tuesday	PLANE	FERRY	FERRY x2 PLANE		
Wednesday	FERRY	FERRY	FERRY		
Thursday		FERRY PLANE	FERRY x2 PLANE		
Friday	FERRY PLANE		FERRY PLANE	FERRY	
Saturday		FERRY PLANE		FERRY	FERRY
Sunday		FERRY		FERRY PLANE	

REFIT	05:00 – 09:00	09:00 – 13:00	13:00 – 17:00	17:00 – 21:00	21:00 – 00:00
Monday		FERRY PLANE	PLANE	FERRY	
Tuesday	PLANE	FERRY	PLANE	FERRY	
Wednesday	FERRY	FERRY PLANE	PLANE	FERRY	
Thursday	PLANE	FERRY	FERRY		
Friday		FERRY PLANE	PLANE	FERRY	
Saturday		FERRY PLANE		FERRY	
Sunday			PLANE	FERRY	

Kirkwall – Stronsay

SUMMER / WINTER	05:00 – 09:00		09:00 – 13:00		13:00 – 17:00		17:00 – 21:00		21:00 – 00:00	
Monday	FERRY x2		FERRY	PLANE	FERRY			PLANE		
Tuesday	FERRY	PLANE	FERRY		FERRY	PLANE				
Wednesday	FERRY	PLANE	FERRY x3			PLANE				
Thursday		PLANE	FERRY		FERRY x2	PLANE				
Friday	FERRY	PLANE	FERRY			PLANE	FERRY		FERRY	
Saturday	FERRY			PLANE			FERRY		FERRY	
Sunday			FERRY				FERRY	PLANE		

REFIT	05:00 – 09:00		09:00 – 13:00		13:00 – 17:00		17:00 – 21:00		21:00 – 00:00	
Monday	FERRY		FERRY	PLANE		PLANE	FERRY			
Tuesday			FERRY	PLANE		PLANE	FERRY			
Wednesday	FERRY		FERRY	PLANE		PLANE	FERRY			
Thursday	FERRY			PLANE						
Friday	FERRY					PLANE	FERRY			
Saturday			FERRY	PLANE			FERRY			
Sunday						PLANE	FERRY			

Appendix D General Arrangement Drawings

Orkney ONI OBC
Option Development
Eday (Backaland) -
Berth for Design RoRo Vessel

Current Vessels

- 3 ONI RoRo Vessels; MV Earl Sigurd, MV Earl Thorfinn and MV Varagen

Potential Future Vessel (Shown)

- Design RoRo Vessel, 14.3m beam and 3.7m draught, maintaining capacity of current fleet

Potential Solutions (Shown)

- Extend berth by 20m to accommodate Design RoRo Vessel
- Extend further 10m to improve shelter in the bay
- Capital dredge to 5.7mCD to give maintained depth of 4.7mCD
- Assume 1 in 12 slope for long-term stability of bed material

Notes

- Very exposed from north and east.
- Concerns of a sand bank within the bay.
- Vessels cannot manoeuvre inside the pier and currently use the roundhead for berthing manoeuvres.
- Available water area at LAT and MLWS shown for potential future Design RoRo vessel, with 1m UKC.
- Approximate dredge area shown to allow non tidally restricted berth for potential future Design RoRo vessel.

Extent of available water area at MLWS for Design RoRo Vessel

Extent of available water area at LAT for Design RoRo Vessel

Note: Bathymetric Survey May 2006
All levels are to Chart Datum

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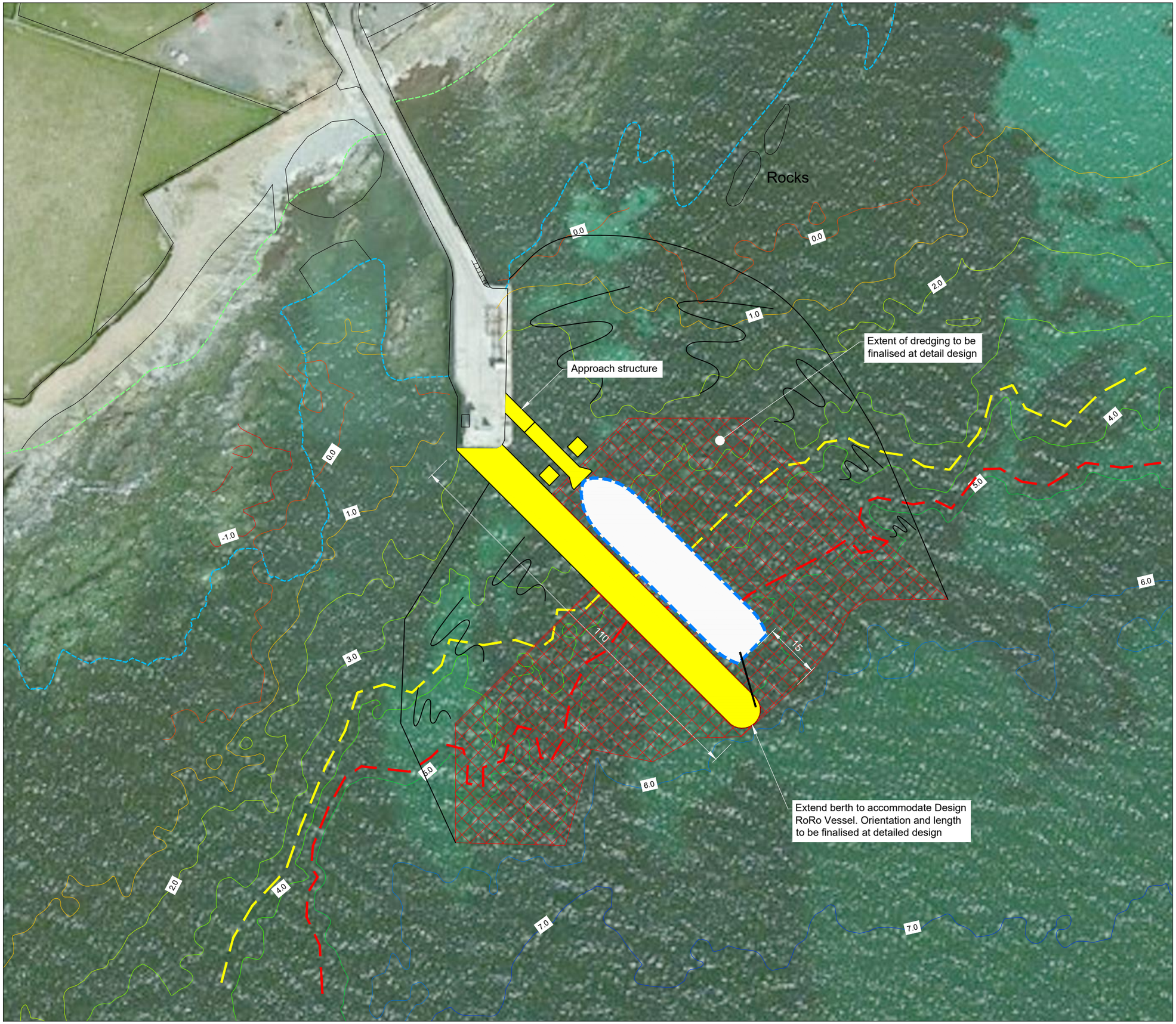
Orkney ONI OBC
Option Development
North Ronaldsay (Nouster)
Option D - Linkspan for Design RoRo Vessel



Current Vessels

- 2 ONI LoLo Vessels; MV Earl Sigurd & MV Earl Thorfinn

Potential Future Vessel (Shown)

- Design RoRo Vessel, 14.3m beam and 3.7m draught

Potential Solution - Option D (Shown)

- Extend berth by 110m
- New linkspan
- For use with Papa Westray - Option D, Sanday, Eday, Stronsay and Westray (Rapness) options.
- Capital dredge to 5.7mCD to give maintained depth of 4.7mCD
- Assume 1 in 12 slope for long-term stability of bed material

Notes

- Currently berth tidally restricted.
- Berth very exposed from southwest to northeast.
- Available water area at LAT and MLWS shown for potential future Design RoRo vessel, with 1m UKC
- Approximate area shown to allow non tidally restricted berth for potential Design RoRo vessel

Extent of available water area at MLWS for Design RoRo Vessel

Extent of available water area at LAT for Design RoRo Vessel

Note: Bathymetric Survey January 2010
All levels are to Chart Datum

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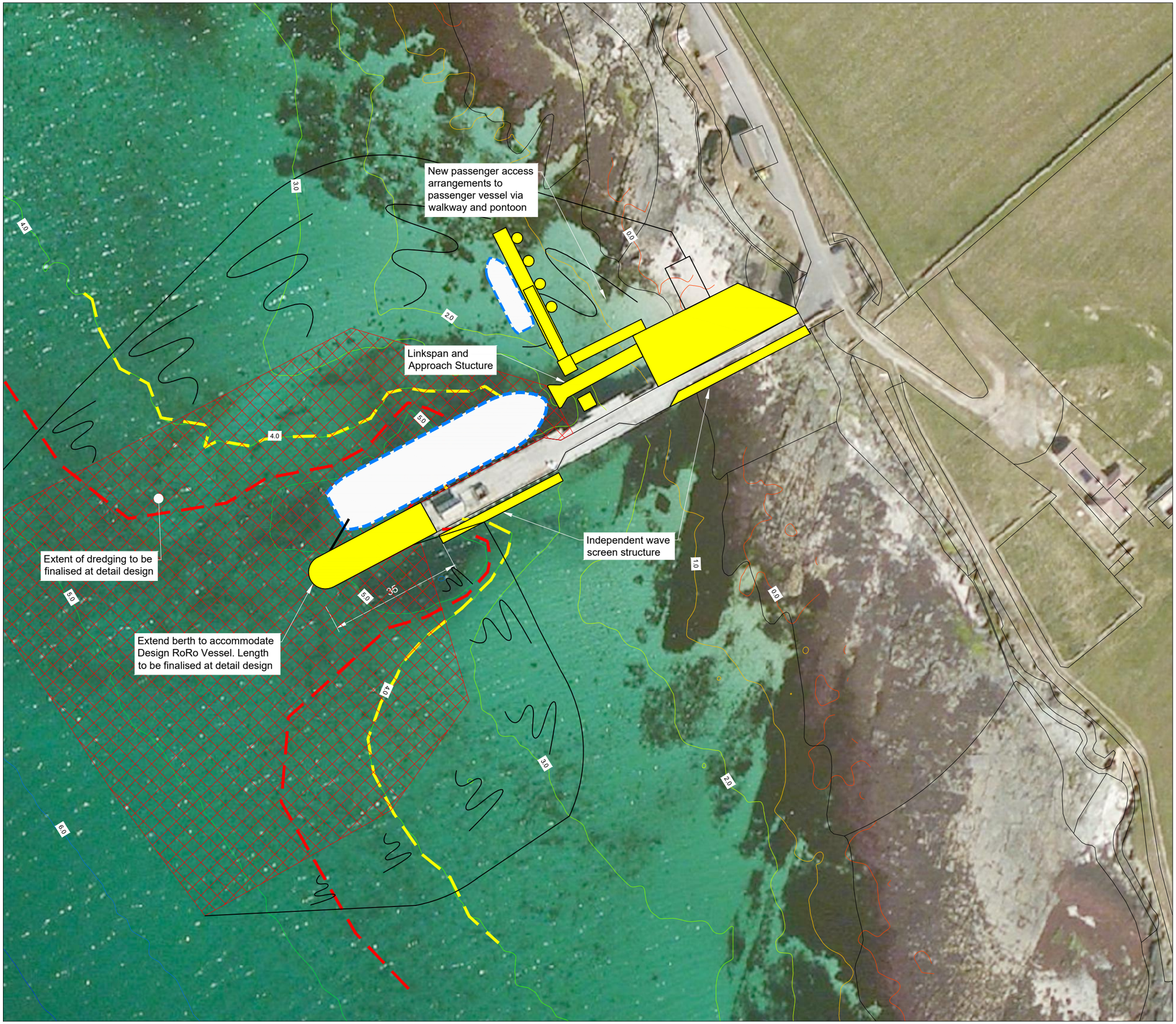
Orkney ONI OBC
Option Development
Papa Westray (Moclett)
Option D - Linkspan for Design RoRo Vessel and Passenger Service



Current Vessels

- 2 ONI LoLo Vessels; MV Earl Sigurd & MV Earl Thorfinn
- MV Golden Mariana

Potential Future Vessel (Shown)

- Design RoRo Vessel, 14.3m beam and 3.7m draught
- 22m Passenger Vessel, 6m beam and 1m draught

Potential Solution - Option D (Shown)

- Extend berth by 35m
- New linkspan and approach structure
- Independent wave screens to provide shelter
- For use with North Ronaldsay Option D, Sanday, Eday, Stronsay, and Westray (Rapness) options
- New passenger access for MV Nordic Sea
- Capital dredge to 5.7mCD to give maintained depth of 4.7mCD
- Assume 1 in 12 slope for long-term stability of bed material
- New passenger access to passenger vessel via walkway and substantial RC or steel box pontoon to resist wave climate. Solid quay if pontoons not suitable.

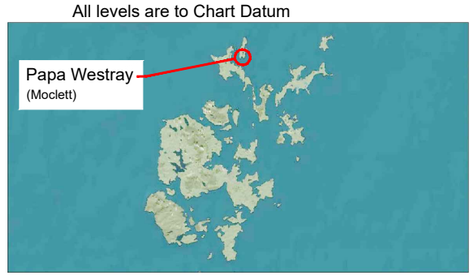
Notes

- Exposed from the southwest.
- Bow of the current vessel overhangs pier.
- Berth tidally restricted.
- Available water area at LAT and MLWS shown for potential future Design RoRo vessel, with 1m UKC
- Approximate dredge area shown to allow non tidally restricted berth for potential Design RoRo vessel

Extent of available water area at MLWS for Design RoRo Vessel

Extent of available water area at LAT for Design RoRo Vessel

Note: Bathymetric Survey January 2010
All levels are to Chart Datum



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Orkney ONI OBC Option Development Sanday (Loth) - Linkspan for Design RoRo Vessel

Current Vessels

- 3 ONI RoRo Vessels; MV Earl Sigurd, MV Earl Thorfinn and MV Varagen

Potential Future Vessel (Shown)

- Design RoRo Vessel, 14.3m beam and 3.7m draught, maintaining capacity of current fleet

Potential Solution (Shown)

- Extend berth by 10m to accommodate Design RoRo vessel noting navigation / vessel manouvring space limits length of extension

Notes

- Current on the outer berth up to 5kn.
- Exposed from the west.
- Vessel surges on the berth.
- Berthing manoeuvres not consistent.
- When tide permits vessels occasionally turn shoreward of the linkspan.
- Available water area at LAT and MLWS shown for potential future Design RoRo vessel, with 1m UKC.

Extent of available water area at MLWS for Design RoRo Vessel

Extent of available water area at LAT for Design RoRo Vessel

Note: Bathymetric Survey August 2015
All levels are to Chart Datum

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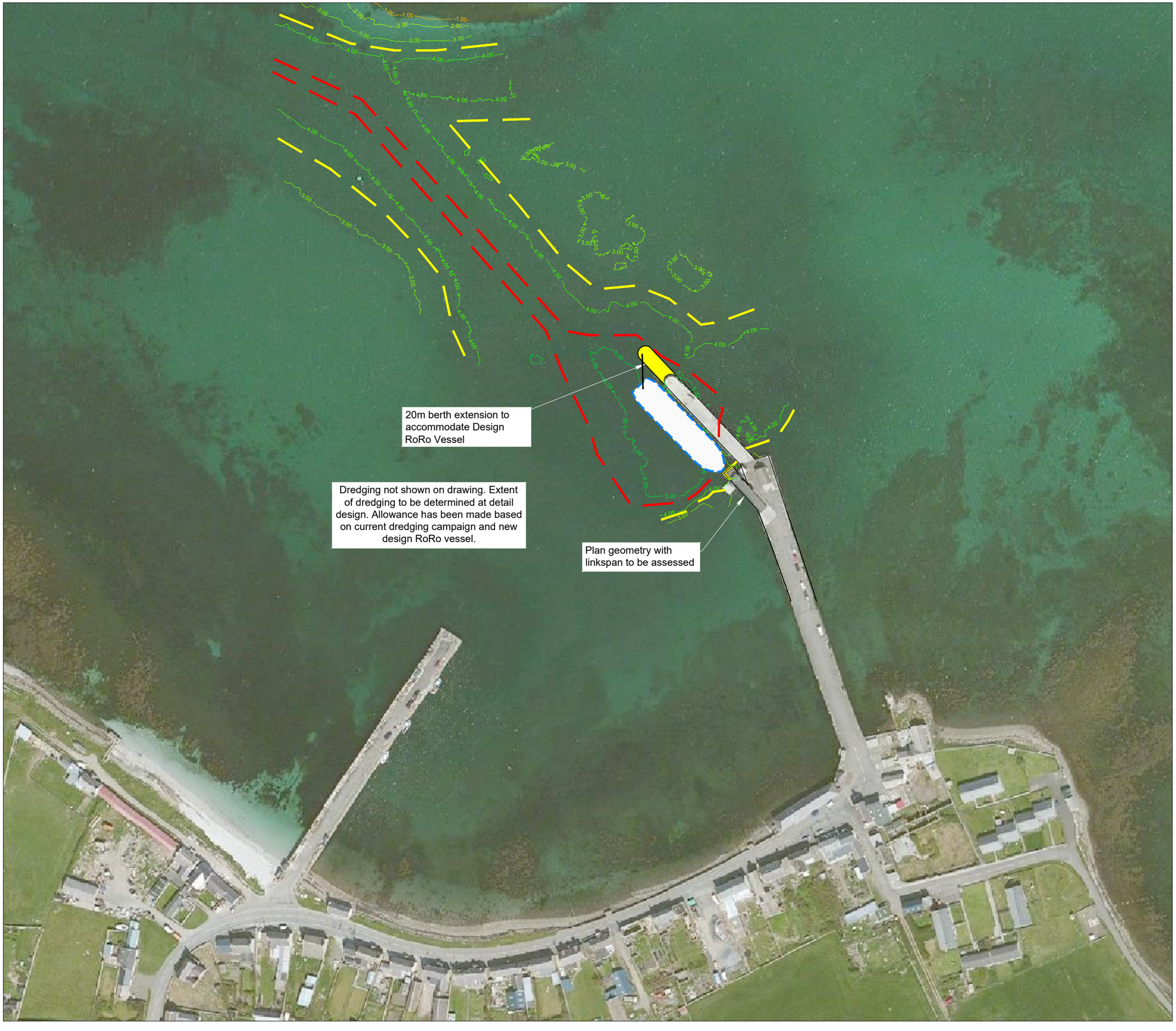
Orkney ONI OBC
Option Development
Stronsay (Whitehall) - Linkspan for Design RoRo Vessel



Current Vessels

- 3 ONI RoRo Vessels; MV Earl Sigurd, MV Earl Thorfinn and MV Varagen

Potential Future Vessel (Shown)

- Design RoRo Vessel, 14.3m beam and 3.7m draught, maintaining capacity of current fleet

Potential Solution (Shown)

- Extend berth by 20m to accommodate Design RoRo vessel
- Capital dredge to 5.7mCD to give maintained depth of 4.7mCD

Notes

- Exposed from the north.
- Navigation through the dredged channel can be challenging.
- Currently challenging to provide sufficient mooring arrangements for MV Varagen.
- Available water area at LAT and MLWS shown for potential future Design RoRo vessel, with 1m UKC.

Extent of available water area at MLWS for Design RoRo Vessel

Extent of available water area at LAT for Design RoRo Vessel

Note: Bathymetric Survey June 2011
All levels are to Chart Datum

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Orkney ONI OBC
Option Development
Westray (Rapness) -
Berth for Design RoRo Vessel

Current Vessels

- 3 ONI RoRo Vessels; MV Earl Sigurd, MV Earl Thorfinn and MV Varagen

Potential Future Vessel (Shown)

- Design RoRo Vessel, 14.3m beam and 3.7m draught, maintaining capacity of current fleet

Potential Solutions (Shown)

- Extend berth by 20m to accommodate Design RoRo vessel and provide increased shelter.
- Optional additional berth extension to assist with berthing and to create more shelter.
- Capital dredge to 5.7mCD to give maintained depth of 4.7mCD

Notes

- Exposed from south-east.
- Vessel surges on the berth, even in calm conditions.
- Waves reflect off shore and can increase vessel surging.
- Available water depth at LAT and MLWS shown for potential future Design RoRo vessel, with 1m UKC.
- Approximate dredge area shown to allow non tidally restricted berth for potential future Design RoRo vessel.

Extent of available water area at MLWS for Design RoRo Vessel

Extent of available water area at LAT for Design RoRo Vessel

Note: Bathymetric Survey May 2006
All level are to Chart Datum

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Orkney ONI OBC
Option Development
Westray (Pierowall)
Passenger Service

Current Vessel
- MV Golden Mariana

Potential Future Vessel (Shown)
- 22m Passenger Vessel, 6m beam and 1m draught

Potential Solution (Shown)
- New passenger access for MV Nordic Sea
- For use with Papa Westray Option D
- New passenger access arrangements to passenger vessel via walkway and pontoon

Notes
- Conditions from southwest known to affect vessels berthing within basin.
- Existing slipway used for landing small vessels.

Note: Bathymetric Survey 2015
All levels are to Chart Datum

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Appendix E Ferry Terminal Infrastructure Capital Costs

		CAPEX reported in 2019	CAPEX 2021 (New Rates)	*Increase of*	With OB @44%
SANDAY (LOTH)					
10m extension	30 PCU RoRo	*£1,417,625*	£1,609,916	*13.56%*	£2,318,279.04
EDAY (BACKALAND)					
20m extension	30 PCU RoRo	*£2,823,296*	£4,339,619	*53.71%*	£6,249,050.73
STRONSAY					
Whitehall 20m extension	30 PCU RoRo	*£2,659,250*	£4,869,695	*83.12%*	£7,012,360.08
Location in Lee of Lingaholm (NEW)	30 PCU RoRo	*£27,137,749*	£31,725,332	*16.90%*	£45,684,478.29
WESTRAY (RAPNESS)					
20m extension	30 PCU RoRo	*£2,089,450*	£4,050,922	*93.88%*	£5,833,327.64
WESTRAY (PIEROWALL)					
Improved passenger access	Nordic Sea		£851,210	*N/A*	£1,225,742.36
PAPA WESTRAY					
35m extension and linkspan, wave screens and passenger access	30 PCU RoRo and Nordic Sea	*£12,503,923*	£17,903,886	*43.19%*	£25,781,596.23
NORTH RONALDSAY					
120m berth extension and linkspan	30 PCU RoRo	*£13,538,506*	£17,393,651	*28.48%*	£25,046,857.79

Eday Ferry Terminal

Extend berth by 20m to accommodate 30 PCU vessel

Assume current berth is in good condition and does not require major repair works
Excludes any land/seabed purchase or lease arrangements
Excludes investigations and surveys

Item			Quantity	Unit	£/unit	Item Cost	Notes
Extension to Berthing Structure							
Quay Wall	Assume sheet pile length 16m		55	m	£15,300	£841,500	*Deck level +4.7m, bed level -6.5m, stiff clays (assume piles driven 5m into bed)*
Infill behind quay wall			2139.2	m^3	£70	£149,744	*Assumed Bed Level -6.5mCD & +4.7mCD deck level, 191 m2*
Reinforced concrete deck slab			95.5	m^3	£700	£66,850	*Area from AutoCAD, 191m^2 x 500mm depth*
Pier Fendering			19	no.	£21,900	£416,100	*Assuming same spacing as existing & no. of fenders at West face of Old Berth taken from photos*
Cathodic protection to existing piles			160	no.	£2,200	£352,000	*Based on £2200/anode*
Pier Furniture			20	m	£1,000	£20,000	*Allowance per metre length of quay wall for ladders, handrails, life saving equipment, etc.*
Electrical works			20	m	£1,000	£20,000	*Allowance per metre length of quay wall for lighting of pier extension and connection to existing power source*
Soft dredging and disposal		6309	13915	m^3	£66	£912,292	*Assumed 70% dredging will be soft bed material, slope 1 in 12 profile to 5.7m below CD*
Rock dredging and disposal			5963	m^3	£66	£390,982	*Assumed 30% dredging will be rock, slope 1 in 12 profile to 5.7m below CD*
Replace timber fendering on berth in basin	(Optional as existing in very poor condition)		24	no.	£4,200	£100,800	*Based on Tiree Cost Estimate*
Maintenance	*See maintenance workbook*						
			SubTotal of Construction Works			**£3,270,268**	
Mobilise Floating Plant	(Increase for dredging)					£109,300	*Allowance*
General Mob/Demob						£75,000	*Allowance for general mob / demob of cabins, equipment etc.*
Preliminaries	15% of Sub Total of Construction Works					£490,540	
			Construction Works Total			**£3,945,108**	
Consultancy Fees and Consents	10% of Construction Cost					£394,511	
			Total			**£4,339,619**	

North Ronaldsay Ferry Terminal

Option D - Extend berth with linkspan to accommodate 65m RoRo vessel

Assume current berth is in good condition and does not require major repair works
Excludes any land/seabed purchase or lease arrangements
Excludes investigations and surveys

Item		Quantity	Unit	£/unit	Item Cost	Notes
Extension to Berthing Structure						
Quay Wall	Assume sheet pile length 10.5m	240	m	£12,000	£2,880,000	*Deck level +4.46m, bed level -4m, , assume bed is rock, toe 2m into rock.*
Infill behind quay wall		8883	m^3	£70	£621,810	*Bed Level -4mCD & +4.46mCD deck level, 1050m2*
Rock Preparation		240	m	£3,000	£720,000	*Allowance per metre length of quay wall for bed preparation for piling works*
Reinforced concrete deck slab		525	m^3	£700	£367,500	*Area from AutoCAD, 1050m^2 x 500mm depth*
Pier Fendering		25	no.	£21,900	£547,500	*Assuming 5m spacing & 7no. At Roundhead*
Pier Furniture		110	no.	£1,000	£110,000	*Allowance per metre length of quay wall for ladders, handrails, life saving equipment, etc.*
Electrical works		110	no.	£1,000	£110,000	*Allowance per metre length of quay wall for lighting of pier extension and connection to existing power source*
Soft dredging and disposal		15310	m^3	£66	£1,003,805	*Assumed 70% dredging will be soft bed material, slope 1 in 12 profile to 5.7m below CD*
Rock dredging and disposal		6562	m^3	£130	£853,008	*Assumed 30% dredging will be rock, slope 1 in 12 profile to 5.7m below CD*
Linkspan						
Linkspan Approach Structure		1	no.	£1,365,900	£1,365,900	*Allowance for linkspan approach structure*
Linkspan Support Structures		1	no.	£1,639,100	£1,639,100	*Allowance for linkspan support structures based on MATC*
New Linkspan Deck		1	no.	£1,092,700	£1,092,700	*Allowance for new linkspan deck based on MATC*
Transport and install new deck		1	no.	£273,200	£273,200	*Allowance for transportation and installation based on MATC*
Mechanical Costs		1	no.	£437,100	£437,100	*Allowance for mechanical costs based on MATC*
Maintenance	*See maintenance workbook*					
				SubTotal of Construction Works	**£12,021,623**	
Mobilise Floating Plant	(Increase for dredging)				£109,300	*Allowance*
General Mob/Demob					£75,000	*Allowance for general mob / demob of cabins, equipment etc.*
Preliminaries	15% of Sub Total of Construction Works				£1,803,243	
Factor for exposed site	15% of Sub Total of Construction Works				£1,803,243	
				Construction Works Total	**£15,812,410**	
Consultancy Fees and Consents	10% of Construction Cost				£1,581,241	
				Total	**£17,393,651**	

Papa Westray Ferry Terminal

Option D - Extend berth with linkspan to accommodate 65m RoRo vessel

Assume current berth is in good condition and does not require major repair works
Excludes any land/seabed purchase or lease arrangements
Excludes investigations and surveys

Item		Quantity	Unit	£/unit	Item Cost	Notes
Extension to Berthing Structure						
Quay Wall	Assume sheet pile length 11.5m	88	m	£13,100	£1,152,800	*Deck level (ASSUMED) +4.5m, bed level -5m, assume bed is rock, toe 2m into rock.*
Infill behind quay wall		3135	m^3	£70	£219,450	*Bed Level -5mCD & +4.5mCD deck level*
Rock Preparation		88	m	£3,000	£264,000	*Allowance per metre length of quay wall for bed preparation for piling works*
Reinforced concrete deck slab		165	m^3	£700	£115,500	*Area from AutoCAD, 330m^2 x 500mm depth*
Pier Fendering		29	no.	£21,900	£635,100	*Assuming Existing are to be Replaced, 5m Spacing at Extension & 7no. At Roundhead*
Pier Furniture		35	no.	£1,000	£35,000	*Allowance per metre length of quay wall for ladders, handrails, life saving equipment, etc.*
Electrical works		35	no.	£1,000	£35,000	*Allowance per metre length of quay wall for lighting of pier extension and connection to existing power source*
Wave screens		1	no.	£1,639,100	£1,639,100	*Allowance*
Soft dredging and disposal	14200	26476	m^3	£66	£1,735,869	*Assumed 70% dredging will be soft bed material, slope 1 in 12 profile to 5.7m below CD*
Rock dredging and disposal		11347	m^3	£130	£1,475,097	*Assumed 30% dredging will be rock, slope 1 in 12 profile to 5.7m below CD*
Linkspan						
Linkspan Approach Structure		1	no.	£1,000,000	£1,000,000	*Allowance for linkspan approach structure, wider than conventional approach structure*
Linkspan Support Structures		1	no.	£1,639,100	£1,639,100	*Allowance for linkspan support structures based on MATC*
New Linkspan Deck		1	no.	£1,092,700	£1,092,700	*Allowance for new linkspan deck based on MATC*
Transport and install new deck		1	no.	£273,200	£273,200	*Allowance for transportation and installation based on MATC*
Mechanical Costs		1	no.	£437,100	£437,100	*Allowance for mechanical costs based on MATC*
Improved Access						
Pontoon and ancillary works		1	no.	£576,113	£576,113	*Based on Malakoff quote for Aith Pontoon (24m) - removed prelims*
Gangway		1	no.	£53,303	£53,303	*Allowance for gangway - removed prelims*
Maintenance	*See maintenance workbook*					
		SubTotal of Construction Works			**£12,378,431**	
Mobilise Floating Plant	(Increase for dredging)				£109,300	*Allowance*
General Mob/Demob					£75,000	*Allowance for general mob / demob of cabins, equipment etc.*
Preliminaries	15% of Sub Total of Construction Works				£1,856,765	
Factor for exposed site	15% of Sub Total of Construction Works				£1,856,765	
		Construction Works Total			**£16,276,260**	
Consultancy Fees and Consents	10% of Construction Cost				£1,627,626	
		Total			**£17,903,886**	

Sanday Ferry Terminal
Extend existing berth by 10m to accommodate 30 PCU vessel

Assume current berth is in good condition and does not require major repair works
Excludes any land/seabed purchase or lease arrangements
Excludes investigations and surveys
Excludes linkspan refurbishment

Item		Quantity	Unit	£/unit	Item Cost	Notes
Extension to Berthing Structure						
Quay Wall	Assume sheet pile length 15m	35	m	£14,800	£518,000	*Deck level +5m, bed level -7m, rock 1m below bed, toe 2m into rock*
Infill behind quay wall		1200	m^3	£70	£84,000	*Assumed Bed Level -7mCD & +5mCD deck level, area 100m2*
Rock Preparation		35	m	£3,000	£105,000	*Allowance per metre length of quay wall for bed preparation for piling works*
Reinforced concrete deck slab		50	m^3	£700	£35,000	*Area from AutoCAD, 100m^2 x 500mm depth*
Pier Fendering		16	no.	£21,900	£350,400	*Replace existing fenders and additional 2 at extension*
Pier Furniture		10	m	£1,000	£10,000	*Allowance per metre length of quay wall for ladders, handrails, life saving equipment, etc.*
Electrical works		10	m	£1,000	£10,000	*Allowance per metre length of quay wall for lighting of pier extension and connection to existing power source*
Maintenance	*See maintenance workbook*					
			SubTotal of Construction Works		**£1,112,400**	
Mobilise Floating Plant					£109,300	*Allowance*
General Mob/Demob					£75,000	*Allowance for general mob / demob of cabins, equipment etc.*
Preliminaries	15% of Sub Total of Construction Works				£166,860	
			Construction Works Total		**£1,463,560**	
Consultancy Fees and Consents	10% of Construction Cost				£146,356	
			Total		**£1,609,916**	

Stronsay Ferry Terminal

Extend existing berth by 20m to accommodate 65m vessel

Assume current berth is in good condition and does not require major repair works
Excludes any land/seabed purchase or lease arrangements
Excludes investigations and surveys
Excludes dredging
Excludes linkspan refurbishment

Item		Quantity	Unit	£/unit	Item Cost	Notes
Extension to Berthing Structure						
Quay Wall	Assume sheet pile length 16.5m	52	m	£15,800	£821,600	*Deck level +5m, bed level -5m, rock 4.5m below bed, toe 2m into rock*
Infill behind quay wall		1700	m^3	£70	£119,000	*Assumed Bed Level -5mCD & +5mCD deck level, 170m2*
Rock Preparation		52	m	£3,000	£156,000	*Allowance per metre length of quay wall for bed preparation for piling works*
Reinforced concrete deck slab		85	m^3	£700	£59,500	*Area from AutoCAD, 170m² x 500mm depth*
Pier Fendering		23	no.	£21,900	£503,700	*Replace existing fenders and additional 8 at extension*
Pier Furniture		20	m	£1,000	£20,000	*Allowance per metre length of quay wall for ladders, handrails, life saving equipment, etc.*
Electrical works		20	m	£1,000	£20,000	*Allowance per metre length of quay wall for lighting of pier extension and connection to existing power source*
Soft dredging and disposal (m2 CAD)		99,475	m^3	£20	£1,989,500	*Assumed 100% dredging will be soft bed material, slope 1 in 12 profile to 5.7m below CD. Rate reduced to £20/m3 due to quantity of material*
Maintenance	*See maintenance workbook*					
			SubTotal of Construction Works		**£3,689,300**	
Mobilise Floating Plant					£109,300	*Allowance*
General Mob/Demob					£75,000	*Allowance for general mob / demob of cabins, equipment etc.*
Preliminaries	15% of Sub Total of Construction Works				£553,395	
			Construction Works Total		**£4,426,995**	
Consultancy Fees and Consents	10% of Construction Cost				£442,700	
			Total		**£4,869,695**	

Stronsay Ferry Terminal

New Location in Linga Sound to accommodate circa 65m RoRo vessel.

Excludes investigations and surveys

Item		Quantity	Unit	£/unit	Item Cost	Notes
Landside Operations						
Terminal Building		1	No.	£163,900	£163,900	*Allowance for small terminal building with waiting room and toilet facilities*
Paving incl. lighting and drainage	Area of reclaimed land (CAD)	5100	sq m	£100	£510,000	*Allowance for paving including lighting and drainage at any area of reclaimed land, calculate area from AutoCAD*
Berthing Structure						
Quay Wall	Assume sheet pile length 16.5m	180	m	£15,800	£2,844,000	*Deck level +5m, bed level -5m, rock assumed 4.5m below bed, toe driven 2m into rock*
Infill behind quay wall		11300	m^3	£70	£791,000	*Assumed Bed Level -5mCD & +5mCD deck level, area 1130m2*
Rock Preparation		180	m	£3,000	£540,000	*Allowance per metre length of quay wall for bed preparation for piling works*
Reinforced concrete deck slab	Area of berthing structure (CAD)	565	m^3	£700	£395,500	*Area from AutoCAD, 1130m² x 500mm depth*
Pier fendering	From CAD	25	no.	£21,900	£547,500	
North face - rock infill		8085	cu m	£44	£355,740	*220m length, 0mCD to -3mCD*
North face - primary armour		2970	cu m	£100	£297,000	*220m length, 0mCD to -3mCD*
North face - secondary armour		2640	cu m	£71	£187,440	*220m length, 0mCD to -3mCD*
South face - rock infill		4102	cu m	£44	£180,488	*140m length, 0mCD to -1.5m CD*
South face - primary armour		1733	cu m	£100	£173,300	*140m length, 0mCD to -1.5m CD*
South face - secondary armour		1523	cu m	£71	£108,133	*140m length, 0mCD to -1.5m CD*
Pier Furniture		115	m	£1,000	£115,000	*Allowance per metre length of quay wall for ladders, handrails, life saving equipment, etc.*
Electrical works		115	m	£1,000	£115,000	*Allowance per metre length of quay wall for lighting of pier extension and connection to existing power source*
Wave wall		82.5	cu m	£700	£57,750	*Assume 1.0m high wall and 0.5m width along length of reclaimed area*
Linkspan						
Linkspan Support Structures		1	no.	£1,639,100	£1,639,100	*Allowance for linkspan support structures based on MATC*
New Linkspan Deck		1	no.	£1,092,700	£1,092,700	*Allowance for new linkspan deck based on MATC*
Transport and install new deck		1	no.	£273,200	£273,200	*Allowance for transportation and installation based on MATC*
Mechanical Costs		1	no.	£437,100	£437,100	*Allowance for mechanical costs based on MATC*
Breakwater						
Breakwater - rock infill		39000	cu m	£44	£1,716,000	*320m length, 0mCD to -4mCD, 2x volume plus core centre*
Breakwater - primary armour		9120	cu m	£100	£912,000	*320m length, 0mCD to -4mCD, 2x volume*
Breakwater - secondary armour		8160	cu m	£71	£579,360	*320m length, 0mCD to -4mCD, 2x volume*
Wetside Operations						
Land Reclamation (imported fill)	5100	17850	cu m	£44	£780,207	*From CAD: infill from -2mCD to +5.0m CD, approx 3.5m average height to be reclaimed*
Soft dredging and disposal	84435	113379	m^3	£20	£2,267,580	*Assumed 70% dredging will be soft bed material, slope 1 in 12 profile to 5.7m below CD. Rate reduced to £20/m3 due to quantity of material*
Rock dredging and disposal		48591	m^3	£130	£6,316,830	*Assumed 30% dredging will be rock, slope 1 in 12 profile to 5.7m below CD*
Supporting Infrastructure						
Allowance for Electical Substation Upgrades		1	no.	£546,400	£546,400	*Allowance for local upgrades to electrical substation at a new terminal*
Allowance for Local Road Upgrades		0.75	km	£1,092,700	£819,525	*Allowance for local road upgrades at a new terminal*
Allowance for Extending Utilities		1	no.	£109,300	£109,300	*Allowance for extending utilities at a new terminal*
Navigational Buoys to Mark Channel		4	no.	£12,000	£48,000	*Allowance for 4 buoys*
Maintenance	*See maintenance workbook*					
			SubTotal of Construction Works		**£24,919,053**	
Mobilise Floating Plant	(Increase for dredging)				£109,300	*Allowance*
General Mob/Demob					£75,000	*Allowance for general mob / demob of cabins, equipment etc.*
Preliminaries	15% of Sub Total of Construction Works				£3,737,858	
			Construction Works Total		**£28,841,211**	
Consultancy Fees and Consents	10% of Construction Cost				£2,884,121	
			Total		**£31,725,332**	

Westray (Rapness) Ferry Terminal

Extend berth by 20m to accommodate 65m vessel

Assume current berth is in good condition and does not require major repair works
Excludes any land/seabed purchase or lease arrangements
Excludes investigations and surveys

Item			Quantity	Unit	£/unit	Item Cost	Notes
Extension to Berthing Structure							
Quay Wall	Assume sheet pile length 18m		56	m	£16,400	£918,400	*Deck level +5.6m, bed level -5m, rock 5m below bed, toe 2m into rock*
Rock Preparation			56	m	£3,000	£168,000	*Allowance per metre length of quay wall for bed preparation for piling works*
Infill behind quay wall			2120	m^3	£70	£148,400	*Assumed Bed Level -5mCD & +5.6mCD deck level, 200m2*
Reinforced concrete deck slab			100	m^3	£700	£70,000	*Area from AutoCAD, 200m^2 x 500mm depth*
Pier Fendering			17	no.	£21,900	£372,300	*Assuming same spacing as existing*
Pier Furniture			20	m	£1,000	£20,000	*Allowance per metre length of quay wall for ladders, handrails, life saving equipment, etc.*
Electrical works			20	m	£1,000	£20,000	*Allowance per metre length of quay wall for lighting of pier extension and connection to existing power source*
Soft dredging and disposal		13604	10925	m^3	£66	£716,276	*Assumed 70% dredging will be soft bed material, slope 1 in 12 profile to 5.7m below CD*
Rock dredging and disposal			4682	m^3	£130	£608,673	*Assumed 30% dredging will be rock, slope 1 in 12 profile to 5.7m below CD*
Maintenance	*See maintenance workbook*						
			SubTotal of Construction Works			**£3,042,049**	
Mobilise Floating Plant	(Increase for dredging)					£109,300	*Allowance*
General Mob/Demob						£75,000	*Allowance for general mob / demob of cabins, equipment etc.*
Preliminaries	15% of Sub Total of Construction Works					£456,307	
			Construction Works Total			**£3,682,656**	
Consultancy Fees and Consents	10% of Construction Cost					£368,266	
					Total	**£4,050,922**	

Westray (Pierowall) Ferry Terminal
Option C - Improved access to passenger service

Assume current berth is in good condition and does not require major repair works
Excludes any land/seabed purchase or lease arrangements
Excludes investigations and surveys
Excludes dredging and/or relocation of existing pontoons

Item		Quantity	Unit	£/unit	Item Cost	Notes
Improved Access						
Pontoon and ancillary works		1	no.	£576,113	£576,113	*Based on Malakoff quote for Aith Pontoon (24m) - removed prelims*
Gangway		1	no.	£53,303	£53,303	*Allowance for gangway - removed prelims*
Maintenance	*See maintenance workbook*					
			SubTotal of Construction Works		**£629,415**	
Mobilise Floating Plant					£25,000	*Allowance*
General Mob/Demob					£25,000	*Allowance for general mob / demob of cabins, equipment etc.*
Preliminaries	15% of Sub Total of Construction Works				£94,412	
			Construction Works Total		**£773,827**	
Consultancy Fees and Consents	10% of Construction Cost				£77,383	
				Total	**£851,210**	

Item	Unit	2018 £/unit	2021 £/unit	*Notes*
Pier Extension				
Quay Wall - Pile length 10m	m	£11,000	£12,000	*Assume toe 2.0m into rock, perimeter from AutoCAD*
Quay Wall - Pile length 11m	m	£11,500	£12,600	*Assume toe 2.0m into rock, perimeter from AutoCAD*
Quay Wall - Pile length 12m	m	£12,000	£13,100	*Assume toe 2.0m into rock, perimeter from AutoCAD*
Quay Wall - Pile length 13m	m	£12,500	£13,700	*Assume toe 2.0m into rock, perimeter from AutoCAD*
Quay Wall - Pile length 14m	m	£13,000	£14,200	*Assume toe 2.0m into rock, perimeter from AutoCAD*
Quay Wall - Pile length 15m	m	£13,500	£14,800	*Assume toe 2.0m into rock, perimeter from AutoCAD*
Quay Wall - Pile length 16m	m	£14,000	£15,300	*Assume toe 2.0m into rock, perimeter from AutoCAD*
Quay Wall - Pile length 17m	m	£14,500	£15,800	*Assume toe 2.0m into rock, perimeter from AutoCAD*
Quay Wall - Pile length 18m	m	£15,000	£16,400	*Assume toe 2.0m into rock, perimeter from AutoCAD*
Prepation of Rock	m		£3,000	*Allowance for preparation of rock*
Infill behind quay wall	m^3	£55	£70	*Area from AutoCAD x depth*
Reinforced concrete deck slab	m^3	£650	£700	*Area from AutoCAD x 500mm depth*
New pier fendering	no.	£20,000	£21,900	*BS6349 guidance for fender spacing 0.15 x shortest vessel length*
Replace timber fendering	no.	£3,800	£4,200	*Allowance per timber fender pile, including fixings, spacing 0.15 x vessel length*
Pier Furniture	m	£1,000	£1,000	*Allowance per metre length of quay wall for ladders, handrails, life saving equipment, etc.*
Electrical works	m	£1,000	£1,000	*Allowance per metre length of quay wall for lighting of pier extension and connection to existing power source*
Allowance for demolition of pierhead	no.	£100,000	£100,000	*Location specific - will depend on area to be demolished and form of construction*
Wave Screens	no.	£1,500,000	£1,639,100	*Allowance*
Breakwater				
Rock infill	m^3	£40	£44	*Calculate volume of rock infill over length of breakwater*
Secondary armour	m^3	£65	£71	*Calculate volume of secondary armour over length of breakwater*
Primary armour	m^3	£90	£100	*Calculate volume of primary armour over length of breakwater*
Slipway				
Demolish Existing	no.	£5,000	£5,500	*Allowance for demolition of existing structure*
Allowance for new slipway	no.	£2,000,000	£2,185,500	*Allowance for new slipway*
Increase width of existing slipway	m^3	£650	£700	*Assume any extension would be reinforced concrete*
Linkspan				
Allowance for linkspan support structures	no.	£1,500,000	£1,639,100	*Allowance for linkspan support structures based on MATC*
Allowance for new linkspan deck	no.	£1,000,000	£1,092,700	*Allowance for new linkspan deck based on MATC*
Allowance for transportation and installation	no.	£250,000	£273,200	*Allowance for transportation and installation based on MATC*
Allowance for mechanical costs	no.	£400,000	£437,100	*Allowance for mechanical costs based on MATC*
Allowance for linkspan approach structure	no.	£1,250,000	£1,365,900	*Allowance for linkspan approach structure*
Allowance for open pile approach structure	no.	£1,000,000	£1,092,700	*Allowance for linkspan approach structure*
Upgrade Terminal Infrastructure				
Increase Pier Deck Level	m^3	£650	£700	*Assume RC deck, calculate volume of concrete from AutoCAD*
Concrete wave wall	m^3	£650	£700	*Assume RC wave wall, 1m height, 0.5m wide, calculate length from AutoCAD*
Cathodic Protection	no.	£2,000	£2,200	*Assume £2000 per anode*
Allowance for upgrading marshalling area	no.	£2,000	£2,200	*Assume £2000 per car bay, allowance for repainting of bays, signage etc.*
Allowance for Electical Substation Upgrades	no.	£500,000	£546,400	*Allowance for local upgrades to electrical substation at a new terminal*
Allowance for Local Road Upgrades	km	£1,000,000	£1,092,700	*Allowance for local road upgrades at a new terminal*
Allowance for Local Road Realignment	no.	£250,000	£273,200	*Allowance for local road realignment at a new terminal*
Allowance for Extending Utilities	no.	£100,000	£109,300	*Allowance for extending utilities at a new terminal*
Terminal Building	no.	£150,000	£163,900	*Allowance for small terminal building with waiting room and toilet facilities*
Paving incl. lighting and drainage for reclaimed land	m^2	£100	£100	*Allowance for paving including lighting and drainage at any area of reclaimed land, calculate area from AutoCAD*
Improved Access to Golden Mariana	no.	£100,000	£109,300	*Allowance*
Wetside Operations				
Land Reclamation	m^3	£40	£44	*Assume imported fill, calculate volume from AutoCAD*
Dredging and disposal	m^3	£60	£66	*Assumed soft dredging, calculate colume from AutoCAD*
Rock dredging	m^3		£130	*Assumed rock dredging, where rock anticipated close to seabed*
Allowance for installation leading lights	no.	£5,000	£5,500	*Allowance for installtion of 2no. posts and cabling*
Maintenance				
See separate workbook				
Mobilisation				
Mobilise Floating Plant	no.	£100,000	£109,300	*Allowance for mob / demob of floating plant*
Mobilise Floating Plant (with dredging)	no.	£150,000	£109,300	*Allowance for mob / demob of floating plant with dredging*
General Mob/Demob	no.		£75,000	*Allowance for general mob / demob of cabins, equipment etc.*
Preliminaries	15% of Sub Total of Construction Works			
Consultancy Fees and Consents	10% of Construction Cost			
Pontoon				
Pontoon and ancillary works			£768,150	*Based on Malakoff quote for Aith Pontoon (24m)*
Gangway			£71,070	
			637500	*remove prelims*

Capital Dredge

	Volume m3		Soft 70%	Rock 30%
Stronsay Whitehall (2010)	7,500	500000	5250	2250
Stronsay Whitehall	99,475			
Stronsay New	161,970		113379	48591
Sanday	N/A			
Eday	19,878		13915	5963
Westray	15,607		10925	4682
Papa Westray	37,823		26476	11347
North Ronaldsay*	21,872		15310	6562

Appendix F Ferry Terminal Infrastructure Maintenance Costs

	Maintenance Cost at Intervals						
Item	**5**	**10**	**15**	**20**	**25**	**30**	***Comments***
Dredging		£500,000		£500,000		£500,000	*Rates are based on Stronsay info, however the quantities are site specific - see Dredging Volumes tab*
Annual general maintenance allowance	£2,500	£2,500	£2,500	£2,500	£2,500	£2,500	*Miscellaneous items, life rings, lighting, etc.*
Fenders		£25,000		£25,000		£25,000	*Notional figure to replace one fender every 5 years*
Cathodic protection							*Year 20, replace anodes £2000/anode, every 3m*
Paint linkspans				£250,000			*Pro rata for Orkney, based on SIC and T&C*
Linkspan machinery maintenance	£5,000	£5,000	£5,000	£5,000	£5,000	£5,000	*Cylinders, greasing, £1000/year*
Linkspan machinery refurbishments				£50,000			*Pro rata for Orkney, based on SIC and T&C*
Pontoon pile maintenance				£20,000			*Minimum 2 piles, cleaning and painting*
Pontoon maintenance				£50,000			*Assume steel pontoons, cleaning, painting and CP*
Surface repairs to slipways			£20,000			£20,000	*Surface repairs only*
Dive inspections - ALL, every 5 years	£10,000	£10,000	£10,000	£10,000	£10,000	£10,000	*General visual inspection every 5 years*
White Lining		£5,000		£5,000		£5,000	*Allowance for marshalling / car parking*
Paint top of sheet pile walls				2000 /m			*Year 20, paint above mid tide, cleaning and painting, £2000/m*
Replacement of handrails				100/m			*Year 20, allowance for replacement of habdrails, £100/m*
Patching to blacktop			£10,000			£10,000	*Allowance for patch repairs to turning areas*
Buoy and sinker				£12,000			*Based on info from OIC*
Lights for above	£1,000	£1,000	£1,000	£1,000	£1,000	£1,000	*Based on info from OIC*
Chains for above		£1,000		£1,000		£1,000	*Based on info from OIC*

Eday Ferry Terminal - Extend existing berth by 20m

	Maintenance Cost at Intervals						
Item	**5**	**10**	**15**	**20**	**25**	**30**	***Comments***
Dredging		£652,333		£652,333		£652,333	*Based on Dredging Volumes Tab Calculation*
Annual general maintenance allowance	£2,500	£2,500	£2,500	£2,500	£2,500	£2,500	*Miscellaneous items, life rings, lighting, etc.*
Fenders		£25,000		£25,000		£25,000	*Notional figure to replace one fender every 5 years*
Cathodic protection				£36,667			*Year 20, replace anodes £2000/anode, every 3m on extensions only*
Paint linkspans				£250,000			*Pro rata for Orkney, based on SIC and T&C*
Linkspan machinery maintenance	£5,000	£5,000	£5,000	£5,000	£5,000	£5,000	*Cylinders, greasing, £1000/year*
Linkspan machinery refurbishments				£50,000			*Pro rata for Orkney, based on SIC and T&C*
Pontoon pile maintenance							*Minimum 2 piles, cleaning and painting*
Pontoon maintenance							*Assume steel pontoons, cleaning, painting and CP*
Surface repairs to slipways							*Surface repairs only*
Dive inspections	£10,000	£10,000	£10,000	£10,000	£10,000	£10,000	*General visual inspection every 5 years*
White Lining		£5,000		£5,000		£5,000	*Allowance for marshalling / car parking*
Paint top of sheet pile walls				£110,000			*Year 20, paint above mid tide, cleaning and painting, £2000/m*
Replacement of handrails							*Year 20, allowance for replacement of handrails, £100/m*
Patching to blacktop			£10,000			£10,000	*Allowance for patch repairs to turning areas*
Buoy and sinker							*Based on info from OIC*
Lights for above							*Based on info from OIC*
Chains for above							*Based on info from OIC*

North Ronaldsay Ferry Terminal - Extend existing berth by 110m, Linkspan

	Maintenance Cost at Intervals						
Item	**5**	**10**	**15**	**20**	**25**	**30**	***Comments***
Dredging		£707,433		£707,433		£707,433	*Based on Dredging Volumes Tab Calculation*
Annual general maintenance allowance	£2,500	£2,500	£2,500	£2,500	£2,500	£2,500	*Miscellaneous items, life rings, lighting, etc.*
Fenders		£25,000		£25,000		£25,000	*Notional figure to replace one fender every 5 years*
Cathodic protection				£160,000			*Year 20, replace anodes £2000/anode, every 3m on extensions only*
Paint linkspans				£250,000			*Pro rata for Orkney, based on SIC and T&C*
Linkspan machinery maintenance	£5,000	£5,000	£5,000	£5,000	£5,000	£5,000	*Cylinders, greasing, £1000/year*
Linkspan machinery refurbishments				£50,000			*Pro rata for Orkney, based on SIC and T&C*
Pontoon pile maintenance							*Minimum 2 piles, cleaning and painting*
Pontoon maintenance							*Assume steel pontoons, cleaning, painting and CP*
Surface repairs to slipways							*Surface repairs only*
Dive inspections	£10,000	£10,000	£10,000	£10,000	£10,000	£10,000	*General visual inspection every 5 years*
White Lining		£5,000		£5,000		£5,000	*Allowance for marshalling / car parking*
Paint top of sheet pile walls				£480,000			*Year 20, paint above mid tide, cleaning and painting, £2000/m*
Replacement of handrails							*Year 20, allowance for replacement of handrails, £100/m*
Patching to blacktop			£10,000			£10,000	*Allowance for patch repairs to turning areas*
Buoy and sinker							*Based on info from OIC*
Lights for above							*Based on info from OIC*
Chains for above							*Based on info from OIC*

Papa Westray Ferry Terminal - Extend existing berth by 35m, Linkspan, Wave Screen and Passenger Access

	Maintenance Cost at Intervals						
Item	**5**	**10**	**15**	**20**	**25**	**30**	***Comments***
Dredging		£1,322,600		£1,322,600		£1,322,600	*Based on Dredging Volumes Tab Calculation*
Annual general maintenance allowance	£2,500	£2,500	£2,500	£2,500	£2,500	£2,500	*Miscellaneous items, life rings, lighting, etc.*
Fenders		£25,000		£25,000		£25,000	*Notional figure to replace one fender every 5 years*
Cathodic protection				£58,667			*Year 20, replace anodes £2000/anode, every 3m on extensions only*
Paint linkspans				£250,000			*Pro rata for Orkney, based on SIC and T&C*
Linkspan machinery maintenance	£5,000	£5,000	£5,000	£5,000	£5,000	£5,000	*Cylinders, greasing, £1000/year*
Linkspan machinery refurbishments				£50,000			*Pro rata for Orkney, based on SIC and T&C*
Pontoon pile maintenance				£20,000			*Minimum 2 piles, cleaning and painting*
Pontoon maintenance				£50,000			*Assume steel pontoons, cleaning, painting and CP*
Surface repairs to slipways							*Surface repairs only*
Dive inspections	£10,000	£10,000	£10,000	£10,000	£10,000	£10,000	*General visual inspection every 5 years*
White Lining		£5,000		£5,000		£5,000	*Allowance for marshalling / car parking*
Paint top of sheet pile walls				£176,000			*Year 20, paint above mid tide, cleaning and painting, £2000/m*
Replacement of handrails				£20,000			*Year 20, allowance for replacement of handrails, £100/m*
Patching to blacktop			£10,000			£10,000	*Allowance for patch repairs to turning areas*
Wave screen general maintenance				£15,000			*Maintenance repairs by divers*
Buoy and sinker							*Based on info from OIC*
Lights for above							*Based on info from OIC*
Chains for above							*Based on info from OIC*

Sanday Ferry Terminal - Extend existing berth by 10m

	Maintenance Cost at Intervals						
Item	**5**	**10**	**15**	**20**	**25**	**30**	***Comments***
Dredging							*Based on Stronsay info*
Annual general maintenance allowance	£2,500	£2,500	£2,500	£2,500	£2,500	£2,500	*Miscellaneous items, life rings, lighting, etc.*
Fenders		£25,000		£25,000		£25,000	*Notional figure to replace one fender every 5 years*
Cathodic protection				£23,333			*Year 20, replace anodes £2000/anode, every 3m on extensions only*
Paint linkspans				£250,000			*Pro rata for Orkney, based on SIC and T&C*
Linkspan machinery maintenance	£5,000	£5,000	£5,000	£5,000	£5,000	£5,000	*Cylinders, greasing, £1000/year*
Linkspan machinery refurbishments				£50,000			*Pro rata for Orkney, based on SIC and T&C*
Pontoon pile maintenance							*Minimum 2 piles, cleaning and painting*
Pontoon maintenance							*Assume steel pontoons, cleaning, painting and CP*
Surface repairs to slipways							*Surface repairs only*
Dive inspections	£10,000	£10,000	£10,000	£10,000	£10,000	£10,000	*General visual inspection every 5 years*
White Lining		£5,000		£5,000		£5,000	*Allowance for marshalling / car parking*
Paint top of sheet pile walls				£70,000			*Year 20, paint above mid tide, cleaning and painting, £2000/m*
Replacement of handrails							*Year 20, allowance for replacement of handrails, £100/m*
Patching to blacktop			£10,000			£10,000	*Allowance for patch repairs to turning areas*
Buoy and sinker							*Based on info from OIC*
Lights for above							*Based on info from OIC*
Chains for above							*Based on info from OIC*

Stronsay (Whitehall) Ferry Terminal - Extend existing berth by 20m

	Maintenance Cost at Intervals						
Item	**5**	**10**	**15**	**20**	**25**	**30**	***Comments***
Dredging		£2,340,580		£2,340,580		£2,340,580	*Based on Dredging Volumes Tab Calculation*
Annual general maintenance allowance	£2,500	£2,500	£2,500	£2,500	£2,500	£2,500	*Miscellaneous items, life rings, lighting, etc.*
Fenders		£25,000		£25,000		£25,000	*Notional figure to replace one fender every 5 years*
Cathodic protection				£34,667			*Year 20, replace anodes £2000/anode, every 3m on extensions only*
Paint linkspans				£250,000			*Pro rata for Orkney, based on SIC and T&C*
Linkspan machinery maintenance	£5,000	£5,000	£5,000	£5,000	£5,000	£5,000	*Cylinders, greasing, £1000/year*
Linkspan machinery refurbishments				£50,000			*Pro rata for Orkney, based on SIC and T&C*
Pontoon pile maintenance							*Minimum 2 piles, cleaning and painting*
Pontoon maintenance							*Assume steel pontoons, cleaning, painting and CP*
Surface repairs to slipways							*Surface repairs only*
Dive inspections	£10,000	£10,000	£10,000	£10,000	£10,000	£10,000	*General visual inspection every 5 years*
White Lining		£5,000		£5,000		£5,000	*Allowance for marshalling / car parking*
Paint top of sheet pile walls				£104,000			*Year 20, paint above mid tide, cleaning and painting, £2000/m*
Replacement of handrails							*Year 20, allowance for replacement of handrails, £100/m*
Patching to blacktop			£10,000			£10,000	*Allowance for patch repairs to turning areas*
Buoy and sinker				£12,000			*Based on info from OIC*
Lights for above	£1,000	£1,000	£1,000	£1,000	£1,000	£1,000	*Based on info from OIC*
Chains for above		£1,000		£1,000		£1,000	*Based on info from OIC*

Stronsay (New) Ferry Terminal

	Maintenance Cost at Intervals						
Item	**5**	**10**	**15**	**20**	**25**	**30**	***Comments***
Dredging		£3,914,880		£3,914,880		£3,914,880	*Based on Dredging Volumes Tab Calculation*
Annual general maintenance allowance	£2,500	£2,500	£2,500	£2,500	£2,500	£2,500	*Miscellaneous items, life rings, lighting, etc.*
Fenders		£25,000		£25,000		£25,000	*Notional figure to replace one fender every 5 years*
Cathodic protection				£120,000			*Year 20, replace anodes £2000/anode, every 3m on extensions only*
Paint linkspans				£250,000			*Pro rata for Orkney, based on SIC and T&C*
Linkspan machinery maintenance	£5,000	£5,000	£5,000	£5,000	£5,000	£5,000	*Cylinders, greasing, £1000/year*
Linkspan machinery refurbishments				£50,000			*Pro rata for Orkney, based on SIC and T&C*
Pontoon pile maintenance							*Minimum 2 piles, cleaning and painting*
Pontoon maintenance							*Assume steel pontoons, cleaning, painting and CP*
Surface repairs to slipways							*Surface repairs only*
Dive inspections	£10,000	£10,000	£10,000	£10,000	£10,000	£10,000	*General visual inspection every 5 years*
White Lining		£5,000		£5,000		£5,000	*Allowance for marshalling / car parking*
Paint top of sheet pile walls				£360,000			*Year 20, paint above mid tide, cleaning and painting, £2000/m*
Replacement of handrails							*Year 20, allowance for replacement of handrails, £100/m*
Patching to blacktop			£10,000			£10,000	*Allowance for patch repairs to turning areas*
Buoy and sinker				£12,000			*Based on info from OIC*
Lights for above	£1,000	£1,000	£1,000	£1,000	£1,000	£1,000	*Based on info from OIC*
Chains for above		£1,000		£1,000		£1,000	*Based on info from OIC*

Westray (Rapness) Ferry Terminal - Extend existing berth by 20m

	Maintenance Cost at Intervals						
Item	**5**	**10**	**15**	**20**	**25**	**30**	***Comments***
Dredging		£1,176,567		£1,176,567		£1,176,567	*Based on Dredging Volumes Tab Calculation*
Annual general maintenance allowance	£2,500	£2,500	£2,500	£2,500	£2,500	£2,500	*Miscellaneous items, life rings, lighting, etc.*
Fenders		£25,000		£25,000		£25,000	*Notional figure to replace one fender every 5 years*
Cathodic protection				£37,333			*Year 20, replace anodes £2000/anode, every 3m on extensions only*
Paint linkspans				£250,000			*Pro rata for Orkney, based on SIC and T&C*
Linkspan machinery maintenance	£5,000	£5,000	£5,000	£5,000	£5,000	£5,000	*Cylinders, greasing, £1000/year*
Linkspan machinery refurbishments				£50,000			*Pro rata for Orkney, based on SIC and T&C*
Pontoon pile maintenance							*Minimum 2 piles, cleaning and painting*
Pontoon maintenance							*Assume steel pontoons, cleaning, painting and CP*
Surface repairs to slipways							*Surface repairs only*
Dive inspections	£10,000	£10,000	£10,000	£10,000	£10,000	£10,000	*General visual inspection every 5 years*
White Lining		£5,000		£5,000		£5,000	*Allowance for marshalling / car parking*
Paint top of sheet pile walls				£112,000			*Year 20, paint above mid tide, cleaning and painting, £2000/m*
Replacement of handrails							*Year 20, allowance for replacement of handrails, £100/m*
Patching to blacktop			£10,000			£10,000	*Allowance for patch repairs to turning areas*
Buoy and sinker							*Based on info from OIC*
Lights for above							*Based on info from OIC*
Chains for above							*Based on info from OIC*

Westray (Pierowall) - Improved Access to Passenger Vessel

	Maintenance Cost at Intervals						
Item	**5**	**10**	**15**	**20**	**25**	**30**	***Comments***
Dredging		*£500,000*		*£500,000*		*£500,000*	*Based on Stronsay info*
Annual general maintenance allowance	£2,500	£2,500	£2,500	£2,500	£2,500	£2,500	*Miscellaneous items, life rings, lighting, etc.*
Fenders		*£25,000*		*£25,000*		*£25,000*	*Notional figure to replace one fender every 5 years*
Cathodic protection				*£37,333*			*Year 20, replace anodes £2000/anode, every 3m on extensions only*
Paint linkspans				*£250,000*			*Pro rata for Orkney, based on SIC and T&C*
Linkspan machinery maintenance	*£5,000*	*£5,000*	*£5,000*	*£5,000*	*£5,000*	*£5,000*	*Cylinders, greasing, £1000/year*
Linkspan machinery refurbishments				*£50,000*			*Pro rata for Orkney, based on SIC and T&C*
Pontoon pile maintenance				£20,000			*Minimum 2 piles, cleaning and painting*
Pontoon maintenance				£50,000			*Assume steel pontoons, cleaning, painting and CP*
Surface repairs to slipways							*Surface repairs only*
Dive inspections	*£10,000*	*£10,000*	*£10,000*	*£10,000*	*£10,000*	*£10,000*	*General visual inspection every 5 years*
White Lining		*£5,000*		*£5,000*		*£5,000*	*Allowance for marshalling / car parking*
Paint top of sheet pile walls				*£112,000*			*Year 20, paint above mid tide, cleaning and painting, £2000/m*
Replacement of handrails				*200/m*			*Year 20, allowance for replacement of handrails, £200/m*
Patching to blacktop			*£10,000*			*£10,000*	*Allowance for patch repairs to turning areas*
Buoy and sinker							*Based on info from OIC*
Lights for above							*Based on info from OIC*
Chains for above							*Based on info from OIC*

Capital Dredge

	Volume m3		Soft 70%	Rock 30%
Stronsay Whitehall (2010)	7,500	£500,000	5250	2250
Stronsay Whitehall	99,475			
Stronsay New	161,970		113379	48591
Sanday	N/A			
Eday	19,878		13915	5963
Westray	15,607		10925	4682
Papa Westray	37,823		26476	11347
North Ronaldsay*	21,872		15310	6562

Representative rate per cube, maintenance dredging in softs £67 /m^3

Representative rate per cube, maintenance dredging in softs (large quantities, i.e. Stronsay) £40 /m^3

Maintenance dredging calculation

Plan main dredge area from CAD	* depth of 1m	Plan area side slope	* depth of 0.5m	Total volume	Total Maintenance Cost	
	0		0	0	£0	£0
34830	34830	47369	23684.5	58,515	£2,340,580	£2,341,000
84435	84435	26874	13437	97,872	£3,914,880	£3,915,000
	0		0	0	£0	£0
6309	6309	6952	3476	9,785	£652,333	£652,000
13604	13604	8089	4044.5	17,649	£1,176,567	£1,177,000
14200	14200	11278	5639	19,839	£1,322,600	£1,323,000
7168	7168	6887	3443.5	10,612	£707,433	£707,000

Appendix 2

Orkney Inter-Island Transport Study

Rousay, Egilsay and Wyre Ferry – Outline Business Case

On behalf of Orkney Islands Council

ORKNEY ISLANDS COUNCIL

Project Ref: 41029 | Date: September 2021

Registered Office: Buckingham Court Kingsmead Business Park, London Road, High Wycombe, Buckinghamshire, HP11 1JU
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Document Control Sheet

Project Name: Orkney Inter-Island Transport Study

Project Ref: 41029

Report Title: Rousay, Egilsay and Wyre Ferry – Outline Business Case

Date: 23rd September 2021

	Name	Position	Signature	Date
Prepared by:	Stephen Canning Mary Cairns	Senior Associate Maritime Civil Engineer	Stephen Canning	15/09/21
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Approved by:	Dr Scott Leitham	Director, Transport Planning	Scott Leitham	23/09/21
For and on behalf of Stantec UK Limited				

Revision	Date	Description	Prepared	Reviewed	Approved
vFinal	14/01/2022	Final Report	Stephen Canning	Scott Leitham	Scott Leitham

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Executive Summary

Orkney Islands Council (the Council) funds lifeline[1] transport connections to 13 islands across the archipelago. These connections are delivered through a combination of air and ferry services which have been supported in both capital and revenue terms by the Council over many years. Ferry services are operated by Orkney Ferries, an arms-length company of the Council, whilst Loganair provides the Outer North Isles air service under contract to the Council. These services all represent a net-cost to the Council.

In 2014 Orkney Islands Council, through the 'Our Islands Our Future' initiative, began a dialogue with the Scottish Government on establishing some principles for the 'Fair Funding' of Orkney's inter-island transport services and infrastructure. The basis of these discussions was that the financial burden upon the Council in providing inter-island transport is disproportionate.

Scottish Government accepted in principle that a 'Fair Funding' position needed to be established and, to inform that, Orkney Islands Council and the Highlands and Islands Transport Partnership (HITRANS) agreed to undertake studies, now in the form of business cases, to establish and appraise the service and infrastructure requirements for inter-island transport over a 30-year planning horizon.

In October 2015, the Council, in partnership with HITRANS and Highlands and Islands Enterprise (HIE), commissioned the Orkney Inter-Island Transport Study (OIITS), with a view to developing and appraising options for the future of the inter-island transport services. The output of the study was the development of a Strategic Business Case (SBC), which established the 'case for change' and identified a set of capital and revenue options which, if delivered, would in-part or in-full address the identified transport problems.

In parallel to the SBC, the Council, together with HITRANS, HIE, Shetland Islands Council and ZetTrans established a Fair Funding Group with Transport Scotland intended to explore the wider question of roles and responsibilities, and in accordance with a nationally recognised approach and references in terms of other lifeline services. An early output from this group was the agreement of additional Scottish Government funding which contributed towards partially and then latterly fully offsetting the deficit revenue funding. However, there is no commitment beyond this period for further capital or revenue funding.

The Strategic Business Case (SBC) was completed in Autumn 2016 and set out a range of capital and revenue options for all 13 islands connected by the air and ferry services, together with a timeline for progressing specific elements of the SBC to Outline Business Case (OBC) stage. One of the priorities emerging from the SBC was the development of an OBC for new vessels and supporting infrastructure for Rousay, Egilsay and Wyre (REW). To this end, the Council, in partnership with HITRANS and HIE, commissioned Stantec (formerly Peter Brett Associates), Mott MacDonald Ltd (MML) and ProVersa Ltd to develop a *Rousay, Egilsay and Wyre Outline Business Case* up to and including the Strategic and Socio-Economic Cases

What is the case for change?

The 'case for change' in REW – i.e., the **Strategic Case** – was developed in the SBC and confirmed in this OBC. It can be defined as follows:

- MV *Eynhallow* is an **ageing vessel** for which parts are becoming harder to source and for which life extension is becoming less economic.
- **Vehicle-deck capacity** is constrained on peak sailings, whilst the vessel also has a limited **deadweight** capacity of 40 tonnes.

[1] As defined on page 53 of the *Scottish Ferries Plan 2013-22*.

- The vessel also has a **vehicle height restriction**, limiting the vehicles which can be carried, with wider implications for fleet deployment across the Inner and South Isles (it should though be noted that there is a short-term workaround in place for this).
- MV *Eynhallow* is a **reverse-on** vessel, which can be difficult for those not accustomed to it and also slows down turnaround.

As this is a capital OBC, it is focused on the above stated 'case for change'. There are however also two key service-related issues on the route:

- The absence of a **winter Sunday** sailing, although additional Scottish Government funding has recently been allocated to provide this in at least the short-term
- The provision of a timetable which falls far short of the implied **frequency and length of operating day** expressed in the Transport Scotland Routes and Services Methodology and indeed more generally when benchmarked against comparable islands / island groups.

Is there a vehicle-deck capacity problem on the route?

The SBC engagement and survey highlighted vehicle-deck capacity on the ferry as being one of the most significant problems on the route. Analysis of Orkney Ferries' carryings data found that:

- Passenger and car carryings on the REW route have been stable over the last decade (2009-19). Combined CV and bus traffic diminished significantly between 2011 and 2012 but has been broadly stable since then.
- The REW route demonstrates a high degree of seasonality, with 54% of all car carryings in 2017/18 being between May and September, with 13% of annual car carryings being in August.
- Around 15% of total sailing legs on the REW route had a vehicle deck capacity utilisation in excess of 85% (and 10% of sailings greater than 90%) in 2017-18. These sailings were effectively full. However, this is likely to be a significant under-estimate of the overall number of high utilisation sailings due to the multi-leg nature of the route and the deadweight limitation of MV *Eynhallow* (40 tonnes).
- Almost all high utilisation sailings (i.e., with a vehicle deck load factor >85%) are on the Tingwall – Rousay / Rousay – Tingwall legs (combined 20% of all annual sailings on this part of the route). As almost all sailings call at Rousay as their last port of call inbound and first port of call outbound, this capacity utilisation problem directly impacts on all three islands. It is important to note that, for those making a day return trip (e.g., commuters, tradespeople), the ability to secure a vehicle space on both the outbound and return trip is essential. If a booking cannot be secured on either of these legs, the journey cannot be made by taking a car.
- The highest utilisation sailings tend to be consistently clustered around the same subset of services. This is particularly the case with the morning departures from Rousay and Tingwall. The 14:10 departure from Rousay is also frequently a high utilisation, caused by commercial vehicles returning to Orkney mainland.
- The resident survey provides potential evidence of 'forced car ownership', whereby a proportion of REW residents keep a second car at Tingwall to ensure certainty of travel with their vehicle when required. Whilst the cost of fares is a bigger factor, this nonetheless points to the desire for additional capacity amongst island residents.
- Just over one tenth of resident survey respondents noted that they typically choose not to travel if they cannot secure a vehicle booking on their preferred sailing – this implies a social welfare loss for these individuals. Whilst 89% would still make the journey, either on a different day, sailing or in a different way, the barrier to making the journey which they choose implies a disbenefit / inconvenience for those individuals.

The carryings and capacity utilisation analysis has highlighted that there are vehicle capacity issues associated with the current REW service. The limited vehicle carrying capacity of MV

Eynhallow together with her deadweight limitations impose a low ceiling on the number of vehicles that can be carried. The evidence suggests that vehicle capacity pressures are experienced in both the 'from' and 'to' REW directions and across the day for different reasons.

It is evident from the analysis that there is at least some suppressed demand for vehicle carryings. This translates into:

- some residents believing it necessary to own and maintain an island and mainland vehicle, which for some is a form of 'forced car ownership' and thus a transport inequality; and
- residents not making journeys they would like to make or doing so in a way that is not their preference.

How are the REW services used?

In order to inform the required service for the three islands, an extensive research and stakeholder engagement programme (including an island-resident survey) was undertaken in 2019 to establish how the REW ferry service is used and problems / challenges associated with it. Two areas were considered: (i) economy and service delivery; and (ii) personal travel.

Economy and Service Delivery

- The combined population of Rousay, Egilsay and Wyre has been in decline, with numbers falling from 365 to 271 over the period 1991-2011, a reduction of 35% (the forthcoming 2022 Scottish Census will provide a more complete picture of the long-term trend given the level of aggregation of more recent small area statistics). Data from HIE suggests that the permanent population of Wyre is now down to nine.[2]
- The employment base for Rousay, Egilsay and Wyre differs with the latter two dominated by agriculture and on-island working and the former having a wider industrial base which includes tourism and significant off-island commuting.[3] Rousay also acts as a service centre for the other two islands, hosting for example the primary school and GP practice.
- Overall, car ownership in REW is higher than the Scottish and Orcadian averages, with just 16% of households without access to a vehicle.[4] It is also notable that the proportion of households with two or more cars or vans (38%) marginally exceeds the Orcadian average of 36% and significantly exceeds the Scottish average of 27%. This likely reflects the common practice of maintaining an island and mainland car to offset the costs of ferry travel.
- Of the three islands, only Rousay has a primary school. There is currently one child travelling daily from Egilsay (none from Wyre) – whilst this arrangement broadly works, it can either lead to a long day for a young child (off-island 07:10-16:50) or a truncated school day if they travel in later. The ferry service is also important in bringing teaching staff to Rousay.
- There is a well-established practice for children travelling from the islands to Kirkwall Grammar School. Time travelling is minimised, although the 'commute' time still makes for a long day.
- Rousay has an on-island medical practice, with GP cover on a Monday, Wednesday and Friday. Egilsay and Wyre residents have to travel to Rousay to access the medical practice and thus incur the additional cost and time of doing so. Residents from all three islands will have to make periodic trips to Balfour Hospital in Kirkwall. The ferry service is also essential in facilitating travel to the isles for the GP and the two nurse practitioners, none of whom are resident in the island group.
- REW has an efficient supply-chain for day-to-day consumables, with a haulage solution derived within the length-based fares tariff. Bulk haulage services are provided by an off-

[2] OIITS Economic Baseline & Future Planning Horizon (Peter Brett Associates, 2015), p.44.

[3] OIITS Economic Baseline & Future Planning Horizon (Peter Brett Associates, 2015), p.46.

[4] OIITS Economic Baseline & Future Planning Horizon (Peter Brett Associates, 2015), p.48.

island firm and it is these movements which can most regularly encounter deadweight-based constraints on the ferry service. Egilsay and Wyre can encounter higher costs due to the need to buy goods in smaller quantities due to the absence of bulk deliveries for some products.

- Veterinary services are essential in REW given the prominence of the archipelago's agricultural sector. Whilst the ferry service does facilitate these services at present, the absence of Sunday sailings to date, together with the frequent inability to get a vehicle space on the ferry for short notice appointments during summer, impacts on the service which can be delivered.

Personal Travel

Personal travel behaviour was defined largely through an island resident survey, supplemented by stakeholder consultation. There were 126 responses to the survey.

- The resident survey found that the majority of REW residents work or study within the island group, in part due to the prevalence of the agricultural sector in these islands. However, just short of a third of respondents travel to Orkney mainland for work, of which the majority go to Kirkwall.
- Travel from REW to Orkney mainland is very frequent, with the average resident making around two trips per week. There is a significant subset of residents who travel several times per week, highlighting the commuter nature of the route. Kirkwall is by some distance the dominant destination, with 85% of frequency weighted trips always / mostly to Kirkwall.
- When weighted for journey frequency, travel for employment, education and business accounts for 58% of all main journey purposes. There is in particular a strong travel-to-work / education market on the route, with one third of respondents stating this as their main travel purpose. Around one third of all of other travel is for shopping.
- Whilst inter-island travel is much less frequent than travel to Orkney mainland, it is nonetheless fairly common for both work and leisure related purposes.
- Almost two thirds of survey respondents noted that the current ferry and timetable does meet all of their travel requirements and means that they travel to Orkney mainland less often than they otherwise would. The main non-fares limitations are imposed by the length of the operating day and a lack of vehicular capacity on the ferry at peak times. As a consequence, REW residents are missing out on employment, education / training and leisure opportunities on Orkney mainland.
- Three quarters of survey respondents noted that the ferry service prevents people on Orkney mainland from visiting their island as often as they would wish to, or from providing goods and services. The main impacts identified were fewer opportunities for friends and family to visit, high costs of service provision and the delivery of goods and limitations on island tourism.
- Across all three islands, the current ferry and timetable is considered inadequate in meeting the current and future needs of the communities. There is a majority view that improved connectivity to Orkney mainland would make each island a more attractive place to live and bring up families in the future.

What options were considered to address the identified problems?

The capital options emerging from the SBC and considered in this OBC were as follows:

- **Option 1:** Replace MV *Eynhallow* with one larger vessel
- **Option 2:** Replace MV *Eynhallow* with two 'like-for-like'[5] vessels

[5] 'Like-for-like' in this context is considered as providing an equivalent capacity to the MV *Eynhallow*. It should however be noted that modern vessel construction / stability rules may increase the displacement over and above that of the current vessel, and thus 'like-for-like' in this context may imply a materially larger vessel.

- **Option 3:** Supplement Option 2 with a passenger only vessel

It should be noted that, <u>regardless of the preferred option selected, it is assumed that the Ro-Ro vessel (or main vessel if there are two) will operate a 16-18 hour day, up to 7-days per week, year-round</u>. This is the preferred option emerging from the Revenue OBC and should align with the preferred capital option identified through this OBC. In this respect, any two-vessel solution would involve one vessel operating a 16-18 hour day (the 'shift boat') and the second vessel operating a 'standard' day broadly equating to the current timetable (the 'day' boat)

The service to **Gairsay** will also be continued on the current basis. This could either be done through retaining MV *Eynhallow* or MV *Shapinsay* as spares in the longer-term or through the provision of a purpose-built slipway to accommodate the vessel(s) solution emerging from this OBC.

Is there a case for a passenger vessel?

The SBC identified as an option the supplementing of the primary Ro-Ro vessel with a passenger only vessel, either to provide a direct connection to Kirkwall or to act as a feeder service from Egilsay and Wyre to Rousay. The decision to retain this option at SBC stage was marginal and, to this end, ahead of full option development at OBC stage, we revisited the case for a supplementary passenger vessel. This screening exercise concluded **that a passenger only vessel should not be considered further** for the following reasons:

- The obvious advantage of a passenger only vessel would have been to provide a direct service from REW to Kirkwall, reducing the need to take the car on the ferry or maintain a second vehicle at Tingwall. However, on further review, the journey time would be long, even compared to travelling as a passenger on the ferry to Tingwall and taking the bus, whilst there could also be reliability and passenger comfort issues associated with the crossing. This solution would appear disproportionate when compared to an enhanced Ro-Ro and connecting bus services at Tingwall.
- Given the relative populations of the three islands, it is highly likely that the passenger only vessel would be based in and would operate from Rousay. There would therefore be interchange issues for Egilsay and Wyre passengers, and by extension a potential reduction in Ro-Ro services, which would not be publicly acceptable. Indeed, this was the concept of the feeder passenger service, which was a deeply unpopular option at SBC stage.
- The cost saving from one small Ro-Ro vessel plus a passenger vessel compared to a single larger Ro-Ro vessel would be minimal. The negligible cost benefits would be set against the limited benefits on offer.
- There are low levels of public interest in this option and indeed clear opposition to it in some quarters.

What could the vessels look like for each option?

In order to develop a concept of what the service could look like, 'design vessels' were established. It should however be noted that the design vessel is only intended to assist in sizing the infrastructure and a bespoke business case and procurement would be adopted for any future REW vessel(s).

- The 'design vessel' for Option 1 is based on the current CMAL hybrid *Loch* Class vessels. This design vessel was chosen as it offers just over double the capacity of MV *Eynhallow* and thus is a good example of a larger vessel.
- The 'design vessel' for Option 2 is based on the older and smaller style of CMAL *Loch* Class vessels. This class has been chosen because it offers an equivalent stated PCU capacity (and likely actual PCU capacity) to MV *Eynhallow* and can therefore be considered "like-for-like" from a capacity perspective

Table A: Design vessels – main particulars

Parameter	Option 1	Option 2
Passenger Certificate	EU Class C	MCA Class VI/VIA
Length Overall (m)	43.5	30.2
Beam (m)	12.2	10
Draught (m)	1.73	1.5
Speed (kts)	9	9
Ramp Configuration	Double-ended, through and through	Double-ended, through and through
Passenger Capacity	150	203
Vehicle Capacity (PCUs)	22	10
Crew	4	4

How do options perform against the TPOs and STAG Criteria?

To complete the Socio-Economic Case, the appraisal of the options against the TPOs and STAG criteria (including sub-criteria) was revisited.

Transport Planning Objectives

Table B below reassesses the performance of the preferred option package against the TPOs using the following notation:

✓✓✓ - major positive

✓✓ - moderate positive

✓ - minor positive

O - neutral

× - minor negative

×× - moderate negative

××× - major negative

Table B: Appraisal against TPOs

	Option 1: 1* larger vessel	Option 2: 2*LfL vessels
Transport Planning Objective 1: *The capacity of the services should not act as a constraint to regular and essential personal, vehicular and freight travel between the island(s) and Orkney Mainland.*	✓✓✓	✓✓
Transport Planning Objective 2a: *Where an island has a 'commutable' combined ferry or drive / public transport / walk time to a main employment centre (e.g., 80 minutes), the scheduled connections provided should reliably facilitate commuting.*	✓✓✓	✓✓✓
Transport Planning Objective 3: *The scheduled time between connections should be minimised to increase flexibility for passengers and freight by maximising the number of island connections across the operating day.*	O	✓✓✓
Transport Planning Objective 4: *The level of connectivity provided should minimise the variation within and between weekdays, evenings, Saturdays and Sundays.*	O	O

	Option 1: 1* larger vessel	Option 2: 2*LfL vessels
Transport Planning Objective 5: *Where practical, islanders should be provided with links to onward strategic transport connections which minimise the number of off-island overnight stays on Orkney mainland or further afield.*	**O**	**O**

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

- Both options make a strong contribution to the TPOs overall. By addressing the capacity issues, either through a larger vessel or increased frequency, REW residents would be able to travel more readily between the isles and Orkney mainland, something the resident survey identified significant suppressed demand for. It would also make travel to the island group for employment, service delivery and tourism easier and more cost effective.
- From a capacity perspective, **Option 1** would record a marginally larger benefit as the capacity would be concentrated on a single sailing which could be scheduled to align with peak demand. Moreover, a larger vehicle deck would provide greater flexibility in the arrangement of traffic on that deck, reducing instances of where, for example, a single commercial vehicle uses much of the capacity on a sailing. There would also be extra evening capacity with Option 1, as the two-vessel service under Option 2 would reduce to a single vessel when the 'day-boat' is tied up for the evening. **Option 2** would nonetheless provide more than double the current capacity on the route.
- Both options would make a major contribution to the commutability of the island group. The larger single vessel **(Option 1)** would provide increased certainty of travel with a vehicle, whereas the two vessels **(Option 2)** would allow peak loads to be spread by doubling peak frequency.
- **Option 2** would clearly deliver a major positive benefit in terms of frequency. Assuming the second vessel was a 'day vessel' (e.g., 06:50-19:15 as per the current vessel), daytime connections would be doubled, with additional early morning and late evening services provided by the shift vessel. Moreover, a two-vessel fleet could allow different models for serving the three islands to be explored, providing a few direct services to / from Egilsay for example, thus reducing journey times and capacity challenges.
- The capital options would not in their own right impact on TPO4 or TPO5. However, when combined with the revenue measures to extend the sailing day and week, they would ensure greater certainty of supply for those travelling at the weekend or travelling to / returning from the Scottish mainland (or beyond).

STAG Criteria

Table C below provides an equivalent appraisal against the STAG criteria

Table C: Appraisal against STAG criteria

	Option 1	Option 2
Environment	✓✓	✓
Safety	✓✓	✓
Economy	✓✓	✓✓✓
Integration	✓	✓
Accessibility and Social Inclusion	✓✓	✓✓

The following points are of note from the above table:

- The primary benefit of this investment from an **environmental** perspective is that the hydrocarbon fuelled MV *Eynhallow* would be retired (unless retained for relief / refit cover) and replaced by one or two modern vessels (depending on the preferred option) which it is

assumed will be zero (tailpipe) emission. This being the case, there would be a 'major' benefit in terms of global air quality. That said, there may be a minor short-term disbenefit if additional vehicle kilometres are generated as a result of increased capacity / frequency, albeit that disbenefit should reduce over time as hydrocarbon fuelled vehicles are phased out. Option 2 would score less well in the event that an overnight berth was developed at Tingwall for the second vessel.

- There is no obvious differentiator between the options in terms of **safety**. **Option 1** would provide the obvious benefit of a larger deck space for marshalling traffic, but the flip side of this is that it would lead to more traffic marshalling on the quayside and thus a larger health and safety risk.
- Both options would generate highly positive **economic** benefits. In theory, **Option 2** would provide the larger benefits from a 'Transport Economic Efficiency' perspective, as it reduces the 'generalised journey time' through increasing frequency. The realisation of these additional benefits would however be dependent on the two smaller vessels being able to deliver sufficient capacity when required, particularly at peak times.
- The new vessel(s) and larger capacity offered, when combined with revenue measures to extend the sailing day / week, would offer significant **wider economic benefits** through improving connectivity. The resident survey demonstrated that there is suppressed demand for resident travel for a variety of purposes because of the current connectivity, whilst visiting the isles is also more challenging. The resident surveys suggests that, for the majority of residents, these trips would be weekly / monthly, but there is a significant subset who would make 3-7 additional journeys per week, suggesting that they may take-up employment on the mainland.
- From a **transport integration** perspective, **Option 1** would record a minor benefit through providing increased certainty of supply (i.e., capacity) for those wishing to take a car on the ferry. **Option 2** would do likewise and could improve overall integration if additional buses were provided to meet the extra sailings. Both options, when combined with the revenue measures, would also record a minor benefit in terms of **transport and land-use integration**. Increased capacity and frequency would more fully integrate the economies of the isles, and REW to Orkney mainland. This would be positive in terms of reducing the cost of the movement of goods, service delivery and activities such as e.g., housebuilding. However, it should be noted that transport is a 'two-way street' and improved connectivity could lead to increased mainland competition and a risk of service centralisation.
- In terms of **community accessibility** – i.e., connectivity – both options record benefits. The benefits associated with **Option 2** would likely be greater given the increase in frequency, so long as the vehicle carrying capacity of the ferries could accommodate demand. It should be noted that accommodating the smaller vessels associated with **Option 2** could also make it easier to serve Gairsay, or at the very least reduce the cost of infrastructure associated with doing so.
- From the **comparative accessibility** perspective, both options would improve physical accessibility onboard the vessel, thus representing an improvement on the facilities on MV *Eynhallow*. **Option 1** records a marginally greater benefit as the additional capacity may reduce the requirement for a subset of island residents to leave a car on the mainland.

Overall, it is evident from the appraisal against the TPOs and STAG criteria that both options would be highly beneficial for REW. Indeed, in many respects, they offer the same outcomes but in a different way; **Option 1** through capacity and **Option 2** through frequency.

What is the cost to government of the options?

Capital Costs

New vessels

It is not possible to accurately determine the capital costs of the new vessel(s) at this stage. Vessel(s) costs will only become clear following the design process, which is undertaken

subsequent to this OBC. The vessel costs will vary in response to the procurement approach adopted (and in particular the extent of risk sharing), buyer requirements and market conditions.

However, given that the design vessels used in this study are currently operating in Scottish waters, there is at least some precedent in terms of potential costs:

- The design vessel for **Option 1** is based on the recent fleet of CMAL hybrid electric *Loch* Class vessels. The most recently launched vessel from this series was the MV *Catriona* (2017), which cost **£12.3m**. This cost is likely to be closer to **£15m-£17m** in current prices.
- The design vessel for **Option 2** is based on the late 1980s *Loch* Class series (although any such vessel would be built to modern design standards). There is little value in inflating the costs of these vessels directly from their 1980s build price given the developments in vessel design and the shipbuilding market since then. However, based on the recent costs of the Option 1 design vessel, a cost of **£8m-£10m** per vessel does not appear unreasonable.

Ferry terminal infrastructure

The ferry terminal infrastructure costs for each option are summarised in Table D below:

Table D: REW ferry infrastructure capital costs

Option	CAPEX – 2021 (£m)	CAPEX – 2021 (£m), 44% OB
Option 1	£20.3	£29.2
Option 2 – both vessels Rousay-based	£15.9	£22.9
Option 2 – 1-vessel Rousay-based, 1-vessel Tingwall-Based	£21.9	£31.5

Operating Costs

Ferry operational costs

Based on high-level design vessel operating costs, single-year and 30-year costs (in 2021 prices) of the two options are presented in Table E below.

Table E: Options – Single and 30-year operating costs, rounded to nearest £'000 (2021 prices)

	Option 1: 1* larger vessel	Option 2: 2*LfL vessels	Difference (Option 1 – Option 2)
Annual operating costs – single-year	£1,790,000	£2,010,000	*-£220,000*
Annual operating costs – 30-years	£53,550,000	£60,130,000	*-£6,580,000*

It can be seen from the above table that **Option 1** offers lower operating costs - circa **£220k per annum** and almost **£6.6m** when considered in cash terms **over 30-years**. Assuming fares revenue with both options is likely to be similar, **Option 1** is therefore the lower cost option

What is the preferred option?

The **preferred option is Option 1: Replace MV *Eynhallow* with one larger vessel.** Allied with the revenue measure, this option would provide significant additional capacity over a daily 16-18 hour day.

There is little to differentiate the options from an appraisal perspective – both options improve the level of service, one through capacity and the other through frequency. The differences are primarily financial and operational, as follows:

- From a capital cost perspective, the difference between the two options is marginal if both vessels overnight in Rousay, although more significant if the second vessel lies at Tingwall.

However, to run a two-boat service on a shift-boat / day-boat basis will require three additional crews to be found in Rousay, which would be very challenging (although there would be an opportunity to ferry crew in from the mainland on the shift boat to work on the day boat, so this issue may not be insurmountable).

- **Option 1** does however offer significantly lower operating costs – by circa £220k per annum or £6.6m over a 30-year period in cash terms.
- There would also be a potential requirement to run additional bus services to connect with the extra ferries under Option 2, which would further add to its cost.

Conclusions

This OBC has identified a preferred option for the future development of the REW ferry services, including Gairsay. The primary components of this option package are as follows:

- The REW network will be operated by a single larger and double-ended through and through ferry with a target capacity of circa 22 PCUs. The vessel will be Rousay-based, offering a significant increase in capacity whilst also removing the need to reverse onto the ferry. The exact size, specification and cost of the new vessel will however be determined through the outline and detailed design processes, which follow on from this OBC.
- The working assumption is that, parallel to this OBC, the Revenue OBC measure of additional funding to extend the operating day to 16-18 hours per day, up to 7-days per week will be progressed. This is integral to the delivery of Option 1 and has been assumed throughout the business case.
- The ferry terminal infrastructure works will cost around £20.3m in undiscounted 2021 prices, or £29.2m when optimism bias is accounted for. Operating costs will be circa £1.8m per annum, an increase of around £1m per annum on current operating costs, reflecting the larger vessel and longer operating day.
- There is broad community support for the preferred option, although Egilsay residents do have a preference for the two-vessel solution (Option 2).
- It is clear overall that the cost of capital replacement (and scaling up services as per the Revenue OBC) will be significant, both in terms of the capital costs of the vessels and ferry terminal infrastructure and, to a lesser extent, the revenue costs associated with expanding the operational envelope. This expenditure is however required to provide REW with something approaching an equitable service provision when compared to benchmarks elsewhere in Scotland, particularly in the context of the Routes and Services Methodology.
- The preferred option package aligns well with the Transport Planning Objectives and STAG criteria and would provide a significant increase in capacity for each island, the major issue outwith the level of fares identified through the resident survey and consultation.

It is important to note that the provision of additional capacity (combined with lower fares) will lead to additional vehicle kilometres. This would work against both the Scottish Government's target to reduce car kilometres by 20% by 2030 and the Sustainable Transport and Sustainable Investment Hierarchies set out in the National Transport Strategy 2. This has been a fundamental tension within this study, balancing the requirement to reduce car-based travel generally, against the needs of island residents, for whom car-based travel is essential and on occasions the only option available. In parallel to delivering this OBC, the Council should therefore consider complimentary measures which could reduce the demand for car-based travel such as cheaper combined ferry and bus tickets and opportunities for car clubs etc.

Next Steps

This report has confirmed the Strategic and developed the Socio-Economic Cases for the REW Outline Business Case.

Commercial, Financial and Management Cases

A combination of the Strategic and Socio-Economic Cases effectively define **what** is to be delivered. The next step in the process is the preparation of the Commercial, Financial and Management Cases, which define **how** it will be delivered – i.e., how will the preferred option be funded, procured, delivered and managed / operated.

Responsibility for the development of the **Commercial, Financial and Management Case** elements of the OBC currently rests with the Council. The contents of these cases will depend on the outcomes of the aforementioned *Fair Funding* discussions.

The addition of the Commercial, Financial and Management Cases completes the OBC phase.

Final Business Case

The Final Business Case (FBC) is an updated version of the OBC following outline and detailed design. Everything on which the OBC is based is revisited at this stage. In this context, detailed design and costing of infrastructure will require to be incorporated, together with a procurement strategy for engaging with shipyards for the build of new vessels.

The output of the FBC should be a preferred option with a detailed plan for financing the investment and a strategy for procuring, delivering and managing the outputs of that investment.

1 Introduction

1.1 Overview

1.1.1 Orkney Islands Council (the Council) funds lifeline[6] transport connections to 13 islands across the archipelago. These connections are delivered through a combination of air and ferry services which have been supported in both capital and revenue terms by the Council over many years. Ferry services are operated by Orkney Ferries, an arms-length company of the Council, whilst Loganair provides the Outer North Isles air service under contract to the Council. These services all represent a net-cost to the Council.

1.1.2 In 2014 Orkney Islands Council, through the 'Our Islands Our Future' initiative, began a dialogue with the Scottish Government on establishing some principles for the 'Fair Funding' of Orkney's inter-island transport services and infrastructure. The basis of these discussions was that the financial burden upon the Council in providing inter-island transport is disproportionate.

1.1.3 Scottish Government accepted in principle that a 'Fair Funding' position needed to be established and, to inform that, Orkney Islands Council and the Highlands and Islands Transport Partnership (HITRANS) agreed to undertake studies, now in the form of business cases, to establish and appraise the service and infrastructure requirements for inter-island transport over a 30-year planning horizon.

1.1.4 In October 2015, the Council, in partnership with HITRANS and Highlands and Islands Enterprise (HIE), commissioned the Orkney Inter-Island Transport Study (OIITS), with a view to developing and appraising options for the future of the inter-island transport services. The output of the study was the development of a Strategic Business Case (SBC), which established the 'case for change' and identified a set of capital and revenue options which, if delivered, would in-part or in-full address the identified transport problems.

1.1.5 In parallel to the SBC, the Council, together with HITRANS, HIE, Shetland Islands Council and ZetTrans established a Fair Funding Group with Transport Scotland intended to explore the wider question of roles and responsibilities, and in accordance with a nationally recognised approach and references in terms of other lifeline services. An early output from this group was the agreement of additional Scottish Government funding which contributed towards partially and then latterly fully offsetting the deficit revenue funding. However, there is no commitment beyond this period for further capital or revenue funding.

1.1.6 The Strategic Business Case (SBC) was completed in Autumn 2016 and set out a range of capital and revenue options for all 13 islands connected by the air and ferry services, together with a timeline for progressing specific elements of the SBC to Outline Business Case (OBC) stage. One of the priorities emerging from the SBC was the development of an OBC for new vessels and supporting infrastructure for Rousay, Egilsay and Wyre (REW). To this end, the Council, in partnership with HITRANS and HIE, commissioned Stantec (formerly Peter Brett Associates), Mott MacDonald Ltd (MML) and ProVersa Ltd to develop a *Rousay, Egilsay and Wyre Outline Business Case* up to and including the Strategic and Socio-Economic Cases

1.2 Business Case Context

1.2.1 This section sets out the approach taken to the development of the business case and specific considerations in relation to business case preparation in this context.

Transport Scotland Business Case Guidance

1.2.2 As funding dialogue has been ongoing with the Scottish Government, the OBC has been undertaken in accordance with the *Guidance on the Development of Business Cases* (Transport Scotland, 2016). This guidance is based on the H.M. Treasury *Green Book* and is similar to the

[6] As defined on page 53 of the *Scottish Ferries Plan 2013-22*.

Department for Transport guidance, *The Transport Business Case*. The guidance sets out three main stages which need to be completed in developing a compliant business case:

- Stage 1 - Scoping: Strategic Business Case (SBC) – analyses a variety of options which tackle the problems, issues and objectives identified;
    - *The SBC was completed and signed off in Autumn 2016 (see below).*
- Stage 2 – Planning: Outline Business Case (OBC) – identifies the Preferred Option(s) and establishes how that option(s) should be funded, managed and delivered; and
- Stage 3 – Procurement: Final Business Case (FBC) – undertaken during procurement phase.

1.2.3 Within each 'stage' of the business case, there are five 'cases', which provide a structured approach to detailing each component of the overall proposition. These are as follows:

- **Strategic Case:** Defines the case for change / rationale for intervention and identifies a shortlist of options which could deliver the project-specific and wider policy objectives.
- **(Socio)[7] Economic Case:** Assesses the options to determine their value for money in terms of economic, social and environmental benefits and costs.
- **Financial Case:** The Financial Case involves undertaking a full financial appraisal of the preferred option, based on resource accounting and budgeting principles, including information on funding, budgeting over the life of the project and scheme cash flow.
- **Commercial Case:** The Commercial Case provides evidence on the commercial viability of a proposal and the procurement strategy that will be used to engage the market.
- **Management Case:** Details the project management plans, outlining the framework for managing risk, benefits realisation and post-project evaluation.

1.2.4 The focus on each 'case' varies by stage of the business case – this is highlighted in the figure below, with the size of the box showing the emphasis placed on that component of the business case at each stage of the process.

[7] The Economic Case is referred to as the Socio-Economic Case by Transport Scotland. This subtlety reflects a desire to more fully reflect wider social and economic factors alongside the traditional estimation of value for money determined by a benefit-cost ratio and net present value.

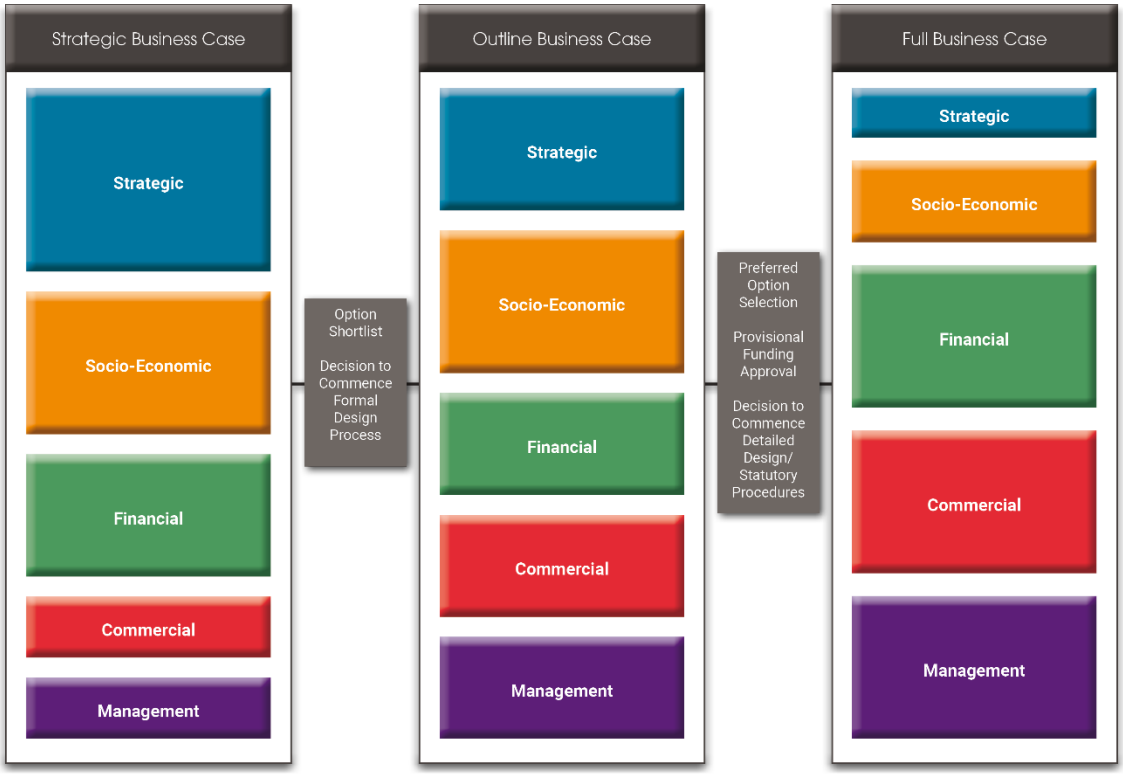


Figure 1.1: Business Case Stages

1.2.5 This report updates and confirms the **Strategic Case** established in 2016 and further develops the **Socio-Economic Case** of the OBC. The Commercial, Financial and Management Cases are being considered separately by the Council under the 'Fair Funding' workstream.

1.3 SBC Reporting

1.3.1 The SBC was published in late 2016 and the appraisal papers can be found on the HITRANS website. In the interests of brevity, this report does not include detailed background information - reference should be made to the above papers if such information is required.

1.4 Scope of OBC Socio-Economic Case

1.4.1 It is important to note at the outset that a business case in the context of small island communities differs from that which would typically be associated with for example, a road or rail scheme in mainland Scotland.

1.4.2 The Socio-Economic Case partly involves revisiting the assessment against the STAG criteria undertaken in the SBC and, where practical, monetising the social welfare benefits and comparing them to the cost to government to establish a benefit-cost ratio. However, the conventional means of monetising benefits (e.g., journey time savings, reduced accidents, wider economic impacts associated with e.g., enhanced productivity and labour market efficiency etc) does not always easily transfer to island related studies, since the objectives of any scheme are not generally focused on issues like travel time savings or reducing accidents.

1.4.3 The focus here is instead very much on access to services and social inclusion, and in particular the extent to which transport connections define the economy, supply-chain, service provision etc in Rousay, Egilsay and Wyre. Analysis of benefits is therefore more qualitative, setting out how an intervention could address one or more transport problems which in turn are impacting

on the life and / or economy of each island. This is entirely consistent with the approach taken for Transport Scotland business cases in this context.

1.4.4 The principal development of the SBC within the Socio-Economic Case at OBC stage is the refinement of options to arrive at a 'preferred option'. The OBC Socio-Economic Case develops the SBC options and, based on evidence obtained through desk-based analysis, surveys and stakeholder engagement, arrives at the aforementioned preferred option.

1.5 Report Structure

1.5.1 This report consists of a further eight chapters, as follows:

- **Chapter 2** reviews the SBC to ensure that the conclusions remain current (i.e., it confirms the Strategic Case).
- **Chapter 3** reviews and comments upon the current vessel and shoreside infrastructure.
- **Chapter 4** sets out current ferry capacity and forecast demand on the REW route, informing both design vessels and timetables.
- **Chapters 5 and 6** establish the role of the REW ferry service in meeting the supply-chain, essential service delivery and personal travel needs of the three islands.
- **Chapter 7** sets out the detailed option development, further developing the options presented in the SBC.
- **Chapter 8** updates the appraisal of the remaining options against the Transport Planning Objectives, STAG criteria and cost to government, ultimately deriving a preferred option.
- **Chapter 9** sets out the study conclusions and next steps.

2 Review of the Strategic Business Case

2.1 Overview

2.1.1 The first step in developing this OBC, and the purpose of this chapter, is to review and where appropriate update the SBC, taking account of any changes which have occurred since its submission. This chapter therefore updates and confirms the Strategic Case. As the SBC was only completed in autumn 2016, this is a relatively light touch exercise.

Scope of Review

2.1.2 The scope of this review is as follows:

- Review the **Transport Planning Objectives** set in the SBC process.
- Review the **capital investment timeframe** set in the SBC.
- Revisit the **options emerging from the SBC** to determine whether they continue to remain appropriate.
- Set out any changes in the **wider environment** since the SBC was published, which may have an impact on the study.

2.2 Transport Planning Objectives

2.2.1 A key challenge in the development of the OBC is ensuring that the outcomes align with the processes outlined in the Scottish Transport Appraisal Guidance (STAG) and the Transport Scotland business case guidance.

2.2.2 The Transport Planning Objectives (TPOs) established in the SBC / STAG were systematically developed to reflect the transport problems and opportunities associated with the inter-island transport services. The problems and opportunities were in turn rooted in a wide-ranging baselining exercise. In developing this section, we have reviewed the evidence developed at SBC stage to confirm whether the TPOs remain relevant.

2.2.3 The TPOs relevant to the REW route are set out below. For each objective, a restatement of the main transport problems and opportunities is provided:

- **Transport Planning Objective 1:** The capacity of the services should not act as a constraint to regular and essential personal, vehicular and freight travel between the island(s) and Orkney Mainland.
    - A shortage of capacity creates uncertainty of travel, or an actual barrier to travel. This is particularly the case on this route which is used for regular travel for employment, education and personal business. Capacity issues take the form of both a shortage of car deck lane metres and significant deadweight limitations on the primary vessel the MV *Eynhallow*, which has a stated capacity of 10 cars / 40 tonnes. Passenger capacity is understood to rarely be an issue.
- **Transport Planning Objective 2a:** Where an island has a 'commutable' combined ferry or drive / public transport / walk time to a main employment centre (e.g., 80 minutes), the scheduled connections provided should reliably facilitate commuting.
    - There is significant outbound travel-to-work and education from REW to Orkney mainland, predominantly Kirkwall. Whilst the timetable broadly facilitates commuting, this is only on a 'standard' 09:00-17:00 day, whilst there is a limited winter Saturday service and no winter Sunday service. This limits the range of jobs which an REW resident can access and is some way off the benchmark for a 'commutable' service suggested in the Routes and Services Methodology (RSM).

- **Transport Planning Objective 3:** The scheduled time between connections should be minimised to increase flexibility for passengers and freight by maximising the number of island connections across the operating day.
    - A frequent and reliable service is essential in facilitating personal and business travel to and from the island group.
- **Transport Planning Objective 4:** The level of connectivity provided should minimise the variation within and between weekdays, evenings, Saturdays and Sundays.
    - The absence of a winter Sunday sailing has been a longstanding issue raised by communities in the three islands. As well as limiting employment, personal business and social trips to / from the isles, it also adds significantly to the cost of trips to the Scottish mainland for those either arriving back in Orkney on a Saturday evening or a Sunday and for REW residents which need to be on an early Monday flight or ferry to the Scottish mainland. This requires up to two-nights off-island accommodation and associated spend, a key issue when average wages are comparatively low.
- **Transport Planning Objective 5:** Where practicable, islanders should be provided with links to strategic onward transport connections without the need for an overnight stay on Orkney mainland.
    - Despite the close proximity of REW to Orkney mainland, residents cannot catch the first flights to Aberdeen, Edinburgh or Inverness, although they can catch the first Glasgow and Sumburgh flights. Residents also cannot catch the first Pentland Firth departures, although they can catch the 11:50 Pentland Ferries departure and 11:00 NorthLink departure from Stromness, which operates during peak timetable only. Evening integration is poorer – the last ferries of the evening from the Scottish mainland coupled with the flights from Aberdeen, Edinburgh and Inverness arrive after the last departure of the REW ferry. The issue with winter Sundays is also highlighted in TPO4 above.

2.2.4 Our review of the TPOs set at the SBC stage largely confirms that they continue to reflect the transport problems and opportunities faced by the three islands.

2.3 Capital Investment Timeframe

2.3.1 The REW vessel, MV *Eynhallow*, entered service in 1987. Whilst she has served the REW route well over the years, she is now 34-years old, which is beyond the nominal retirement date of 30-years for ferries identified in the *Scottish Ferries Plan 2013-22*.

2.3.2 More pressingly, however, is the fact that the vessel is no longer suitable for the demands of the route. Her vehicle deck (10 cars) and deadweight capacity (40 tonnes) are limited and impose a constraint on travel on the route, whilst a recent issue with the conveyance of commercial vehicles (see Section 2.6) means that an alternative vessel deployment was required for a period. A combination of her age and limitations means that a replacement of the MV *Eynhallow* is urgently required. Given that the process of developing a business case, securing funding, tendering and constructing a vessel will take several years, there is a pressing requirement to identify and progress her replacement. This OBC is the first step in that process.

2.3.3 As the REW route is operated by a slipway vessel, the shoreside infrastructure is relatively simple when compared to the linkspan routes on the Outer North Isles and Houton – Lyness – Flotta. It is also in serviceable condition, and thus the focus of this OBC will primarily be on making the case for a new vessel(s), with ferry terminal improvement proposals tailored to fit that vessel(s).

2.3.4 Once the OBC is complete and the preferred vessel solution and associated harbour infrastructure details are known, the anticipated timescales for vessel design, procurement, construction and sea trials can be confirmed. An immediate replacement programme is nonetheless required given the age of the vessel and the restrictions upon it.

2.4 Case for Change Summary

2.4.1 In making a case for any new transport investment in Scotland, there is a requirement to develop a 'case for change'. The 'case for change' in REW can be defined as follows:

- MV *Eynhallow* is an **ageing vessel** for which parts are becoming harder to source and for which life extension is becoming less economic.
- **Vehicle-deck capacity** is constrained on peak sailings, whilst the vessel also has a limited **deadweight** capacity.
- The vessel also has a **vehicle height restriction**, limiting the vehicles which can be carried, with wider implications for fleet deployment across the Inner and South Isles (it should though be noted that there is a short-term workaround in place for this).
- MV *Eynhallow* is a **reverse-on** vessel, which can be difficult for those not accustomed to it and also slows down turnaround.

2.4.2 As this is a capital OBC, it is focused on the above stated 'case for change'. There are however also two key service-related issues on the route:

- The absence of a **winter Sunday** sailing, although additional Scottish Government funding has recently been allocated to provide this in at least the short-term.
- The provision of a timetable which falls far short of the implied **frequency and length of operating day** expressed in the RSM and indeed more generally when benchmarked against comparable islands / island groups.

2.4.3 These service issues have been considered in the parallel Revenue OBC (see Section 2.5) and it is therefore essential that the capital solution delivered is capable of facilitating the proposed expansion in the service.

2.5 Options Emerging from the SBC

2.5.1 The SBC shortlisted a set of ferry-related capital and revenue options for further consideration.

SBC Capital Options

2.5.2 The capital options emerging from the SBC were as follows:

- **Option CO2:** Replace MV *Eynhallow* with one larger vessel
- **Option CO3:** Replace MV *Eynhallow* with two 'like-for-like'[8] vessels
- **Option CO4:** Supplement Option CO2 with a passenger only vessel

2.5.3 Given the capacity challenges on the route (which will be further detailed in Chapter 4), the option of a replacing MV *Eynhallow* with a single like-for-like vessel in terms of capacity was ruled out (**Option CO1** in the SBC).

2.5.4 Our review of the SBC suggests that the vessel options remain appropriate. The decision points for this OBC therefore are:

- whether the REW route should be served by one or two vessels; and

[8] 'Like-for-like' in this context is considered as providing an equivalent vehicle carrying capacity to tMV *Eynhallow*. It should however be noted that modern vessel construction / stability rules may increase the displacement over and above that of the current vessel, and thus 'like-for-like' in this context may imply a materially larger vessel.

- if it should be served by two vessels, whether this should be two Ro-Pax[9] ferries or one Ro-Pax vessel supplemented by a passenger only vessel.

Do Nothing

2.5.5 The SBC was undertaken within the framework of the Scottish Transport Appraisal Guidance (STAG). There is however a subtle difference between a STAG and a business case in how options are developed. In a STAG context, once the 'case for change' has been accepted, the focus is on developing and appraising options which will address the transport problems and opportunities – there is therefore no 'Do Nothing'. In a business case, the 'Do Nothing' is explicitly recognised[10] as an option if all of the 'Do Something' options prove to be unviable.

2.5.6 In the context of this OBC, the 'Do Nothing' would involve ongoing minimal maintenance of MV *Eynhallow* to maintain the service. This would risk additional restrictions being placed on the vessel over time and, ultimately, her withdrawal from service at some point in the future when she cannot be economically maintained. As this is clearly not a practical option given the shortage of spare tonnage in Orkney (and the age of that tonnage), this option is not considered in any further detail in the OBC.

SBC Revenue Options and the Revenue OBC

2.5.7 Whilst capital investment is required on the REW route, several of the problems identified through the SBC (and restated above) related more to a requirement for additional revenue funding to expand services. In order to work towards delivering the TPOs, the SBC therefore recommended a phased increase in service levels - this recommendation was progressed into a Revenue OBC, which was completed in Summer 2019.

2.5.8 The Revenue OBC noted that delivery of the RSM 'model' service on the REW route cannot be achieved through revenue measures (as a single vessel could not make enough crossings) alone and would require the deployment of additional capital. However, it was noted that scaling up to a full RSM service would have a disproportionate cost. The focus of the Revenue OBC for this route was therefore on identifying measures which would reduce the disparity between the 'current' and 'model' service and, more importantly, address the evidenced problems and opportunities in each island.

2.5.9 The preferred option for REW is to adopt a **shift system on the current vessel**, which would offer a 16-18 hour day and would significantly enhance employment opportunities and access to education for each of these islands, allowing island residents to take-up a wider range of jobs. A perhaps more transformational effect would be to enhance the attractiveness of each island as a place to live – as well as being able to access a range of employment opportunities, island residents could more readily engage in the cultural activities on Orkney mainland, whilst enjoying the benefits of island life. This could be a fundamental change in terms of both retaining people (and particularly young families) in each island and in attracting new families to the islands. It would also facilitate improved access for tourists.

2.5.10 The Revenue OBC was focused on the immediate term, identifying options which could be delivered using current tonnage. However, the principle of a 16-18 hour day will be factored into the consideration of capital options within this OBC, as follows:

- Should the OBC find in favour of a single vessel solution, it is assumed that this vessel will work a 16-18 hour day.
- Should it find in favour of a two-vessel solution, it is assumed that at least one of these vessels will operate a 16-18 hour day.

[9] A passenger and vehicle carrying ferry.

[10] See *The Transport Business Case* (Department for Transport, 2013), p.14.

2.6 Changes in the Wider Environment

2.6.1 As the SBC was completed in late 2016, there have been some changes in the wider environment which this OBC will need to take account of.

Funding

2.6.2 In terms of **funding**, the Scottish Government Budget for financial years 2018/19, 2019/20 and 2020/21 provided additional revenue funding to Orkney Islands Council to address a proportion of its deficit from operating ferry services. This was topped-up to full funding of the deficit for financial year 2021/22, with additional monies provided to introduce year-round Sunday sailings on the Inner and South Isles routes and reduce fares across the network (see below).

2.6.3 It is however our understanding that, at present, there is no commitment to additional funding beyond this financial year (i.e., FY2021/22) and therefore any capital solution(s) emerging from this OBC remain predicated on the availability of funding from either central or local government.

Fares

2.6.4 As noted above, the additional funding for FY2021/22 included monies to reduce fares across the Orkney Ferries network. The new fares were introduced on 14th June 2021 and offer a discount of 38% on the standard passenger and car fares. For the REW route:

- The adult passenger fare has reduced from **£4.55** to **£2.82**
- The car fare has reduced from **£14.40** down to **£8.93**
- The discount on pre-paid books of 50 tickets has been retained, although the validity period has reduced from 500 days to 365 days. The price of these books has been held at their previous price meaning the price difference between standard fares and pre-paid books has narrowed significantly.

2.6.5 This represents a major reduction in the walk-up / drive-up fare for travelling on the REW route. It should however be noted that:

- The new fares are subject to review post-implementation, and in particular in response to the post-COVID-19 world.
- Whilst the reduction in the headline fare is significant, it is still less than the previous reduction associated with the 50-ticket book, which many regular ferry users will hold. The actual reduction in fares will therefore be less than the headline 38% reduction (discounted books are 24% cheaper than the new walk-up fare), albeit the differential between the standard and discounted ticket prices has narrowed significantly and the discounted ticket books still also need to be paid up-front.
- The impact of the new fares is unlikely to fully bed down until at least 2022. The impact of COVID-19 restrictions until late July 2021 (and some ongoing restrictions around foreign travel, physical distancing and the wearing of face coverings) followed by the staycation effect will mean that 2021 will be an atypical year. Moreover, it is unlikely that island residents will make permanent changes to their travel behaviour until the new fares system is settled / finalised.

2.6.6 The preferred option emerging from this report was defined in **October 2020** and consulted on with Members and the public throughout the first half of 2021. It therefore reflects the pre-reduction fares position, which is the only practical approach. However, the solution will need to be revisited at FBC stage as the impacts of the new fares system crystallise. The most significant impact will likely be increased car use from less frequent ferry users, given the near 40% reduction in car fares. This clearly has the potential to impact on vehicle deck capacity requirements.

COVID-19

2.6.7 The onset of the COVID-19 pandemic and associated lockdowns from March 2020 led to an immediate change in short-term travel behaviour and could potentially impact on long-term demand for ferry services. There are four potential impacts for Rousay, Egilsay and Wyre:

- At present, there are significant levels of daily commuting on the REW route. Evidence from across the UK suggests that, where a person works in a 'location independent' job, there will be a reduced propensity towards daily commuting. This will put **downward pressure** on travel demand.
- Similarly, there are daily flows of children travelling from the islands to Kirkwall Grammar (15 in 2019), plus one child travelling from Egilsay to Rousay for primary school. The pandemic-related lockdowns introduced mass home schooling for the first time and there could at the margin be a move towards this for some children in the longer-term, particularly given that such a model of education is more widely practiced in Orkney than elsewhere. Whilst this would also put **downward pressure** on travel demand, any such impact is likely to be **very marginal** given that the majority of children will return to school full-time.
- On the other side of the equation, the reduced need for location independent employees to live physically close to their place of work may lead to a growth in demand for rural and island property. Anecdotal evidence from estate agents[11] suggests that this effect is prevalent across the UK, including in Orkney. Reduced need for daily commuting may address one of the historic barriers to island-life and could grow the population in REW. This would put an **upward pressure** on travel demand.
- Restrictions on international travel have resulted in a surge in domestic tourism, particularly in rural areas and the islands of Scotland. It is possible that this effect may be short-lived as the restrictions on international travel ease. However, there may remain a long-term requirement for testing etc. that will act as a deterrent to travelling abroad, whilst a proportion of the UK market has been introduced to domestic holidays which they would not previously have considered (and may wish to repeat). If sustained, this would put an **upward pressure** on travel demand.

2.6.8 As with the change in fares, the long-term behavioural impact of COVID-19 on travel behaviour will not be fully understood for some time yet. This OBC has to work on the basis of pre-pandemic travel, partly because much of the work was undertaken pre / during COVID and partly because there is as yet no firm evidence of what the pandemic could mean for REW. However, the Final Business Case should incorporate research and analysis to validate or update the preferred option based on any permanently observed changes in travel behaviour.

MV *Eynhallow* Vehicle Restrictions

2.6.9 In late 2019, the Maritime and Coastguard Agency (MCA) imposed a vehicle height restriction on MV *Eynhallow* to ensure that the vessel complies with rules in relation to bridge visibility. This restriction significantly compromised the service which could be offered by this vessel and she was temporarily withdrawn from service. When this happened, MV *Shapinsay* was moved to the REW route with the relief ferry MV *Thorsvoe* taking over the Shapinsay run. This left Orkney Ferries without a relief vessel (outwith MV *Eynhallow*) further weakening the resilience of the fleet. However, it is understood that a temporary 'crow's nest' has been fitted to MV *Eynhallow* as a workaround and this problem has thus been addressed in the immediate term.

Rousay – Egilsay Fixed Link

2.6.10 The SBC appraised a fixed link between Rousay and Egilsay as a standalone option. The delivery of such a connection would remove the need to serve Egilsay and release circa 40

[11] For example - https://www.heraldscotland.com/news/homenews/19446619.revealed-scots-house-price-boom-hotspots-fuelled-covid-craving-open-spaces/

minutes back into the timetable for each scheduled Egilsay rotation. This time could be used to strengthen the service to Rousay and Wyre.

2.6.11 The option of a fixed link was rejected as a standalone scheme in the SBC due to the then technical uncertainty and potentially high costs of this connection to a very small community. However, it also noted that should an alternative source of funding emerge in the future, this proposal could be revisited.[12]

2.6.12 As part of the OBC process, the Council has indicated that the Orkney Harbours Masterplan is now actively considering the provision of a fixed link between Rousay and Egilsay. To this end, all options identified within this OBC will be future proofed as far as possible against the delivery of any such fixed link.

Gairsay

2.6.13 The island of Gairsay, which lies to the south of Wyre and east of Tingwall, hosts a single family. Whilst the island is not served by a scheduled Orkney Ferries service, there is an agreement in place for MV *Eynhallow* to visit the island several times each year to assist with the movement of plant and livestock. This connection is essential to the sustainability of the island.

2.6.14 As a strategic study, the SBC did not specifically consider Gairsay. However, at OBC stage, it will be important to ensure that the emerging preferred option can continue to deliver the service to this island.

2.7 Conclusion

2.7.1 This review has demonstrated that the findings of the SBC stand in terms of the TPOs and options progressed. It is though important to note that almost four years have passed since the completion of the SBC during which time much has changed. However, the one thing that has not is the need to replace the vessel - MV *Eynhallow* is now 34-years old and, in the short-term at least, is subject to a significant operational restriction. This reinforces the 'case for change', further emphasising the need to quickly work towards a fit-for-purpose replacement for MV *Eynhallow*.

[12] OIITS Options Appraisal Report (Orkney Islands Council, 2016), p. 162.

3 Review of Current Infrastructure

3.1 Overview

3.1.1 This chapter briefly profiles the current assets and operational practices in the delivery of the REW service, providing context for the subsequent option development process.

3.2 Vessels

Vessel Characteristics

3.2.1 As noted in Chapter 2, the REW service is operated by MV *Eynhallow*, with MV *Shapinsay* providing refit and relief cover. The key characteristics of these vessels are summarised in the table below:

Table 3.1: Main parameters of MV *Eynhallow* and MV *Shapinsay*

Parameter	MV *Eynhallow*	MV *Shapinsay*
Passenger Certificate	MCA Class VI/VIA	MCA Class IV
Length Overall (m)	28.8	35.0
Beam (m)	7.0	9.0
Draught (m)	1.5	1.45
Speed (kts)	10.5	9.5
Ramp Configuration	Bow ramp only	Bow ramp only
Passenger Capacity	50 winter / 95 summer	91
Vehicle Capacity (PCUs)	10 cars or 40 tonnes	16 cars
Crew	4	4

3.2.2 As can be seen from the above table, MV *Eynhallow* and MV *Shapinsay* are broadly similar vessels, although the latter is slightly larger. The key differences are that:

- The lengthening of MV *Shapinsay* in 2011 has given her a significantly larger carrying capacity relative to MV *Eynhallow*. It should though be noted that the carrying capacity of both vessels is now likely to be less than the stated capacity given the growth in the size of the average car since the vessels entered service.
- Both vessels continue to operate under the MCA classification system. MV *Shapinsay* has a higher classification and thus does not have the same restriction in winter passenger numbers as MV *Eynhallow*.
- MV *Shapinsay* has a raised bridge deck and thus is not subject to the same vehicle height limitation as that temporarily imposed on MV *Eynhallow*.
- MV *Shapinsay* is one knot slower than MV *Eynhallow* and it is understood that she can struggle to maintain the Egilsay component of the timetable when the tide is running against her in Egilsay Sound.

Vessel Condition

3.2.3 MV *Eynhallow* was built in 1987 and is 34 years old. She is a monohull vessel with a bow ramp only and is categorised as a Class VI/VIA under the MCA categorisation system. MV *Shapinsay* was built in 1988. She is also a monohull vessel with a bow ramp and is categorised as a Class IV under the MCA categorisation system.

3.2.4 Both Ro-Ro vessels operate from a network of slipways using bow ramps for vehicular and pedestrian access. It is understood that MV *Eynhallow* can be challenging to manoeuvre at the

slipways due to lack of sufficient power from the engines. She has two main engines and fixed pitch propellors. She does not have a bow thruster. The Vessel Master is often required to approach the terminal infrastructure at considerable speed to ensure alignment of the vessel ramp with the slipway.

3.2.5 Car carrying capacity is an issue for both vessels. Contrary to the vessel specification, the Orkney Ferries booking system for MV *Eynhallow* currently permits use by **eight** standard cars, or nine small cars. The booking system for MV *Shapinsay* currently permits use by thirteen cars.

3.2.6 MV *Eynhallow* and MV *Shapinsay* undergo annual refits, which typically cover maintenance and servicing of the engines, gearboxes, rudders, propellors, tanks, hydraulics, etc. The value of recent annual refit services has varied from £70,000 to £90,000 for MV *Eynhallow*, and from £80,000 up to £185,000 for MV *Shapinsay*. As these vessels continue to get older, refit costs will increase.

3.2.7 It is understood that additional works to MV *Eynhallow* to improve visibility for crew from the vessel bridge were completed in 2020. A 'crow's nest' was installed, at an approximate cost of £250,000.

3.3 Operational Practice

Vessel Base

3.3.1 MV *Eynhallow* overnights in Rousay and operates with an exclusively Rousay-based crew. The harbour in Rousay provides shelter from the prevailing westerly conditions, however the deck level of the pier at Rousay is low and the vessel belting can lie above the pier deck, making it challenging for crew access.

3.3.2 During refit, MV *Shapinsay* also overnights in Rousay and operates with a Rousay-based crew. However, she does not berth within the harbour, rather she berths outside the southern finger pier, where Yokohama fenders are installed temporarily to absorb berthing energies.

3.3.3 Provision of sufficient mooring for either vessel to allow overnight berthing at Tingwall, Egilsay or Wyre is unlikely due to lack of shelter at Tingwall and Wyre and insufficient water depths at Egilsay.

Cargo Handling

3.3.4 As a Ro-Ro slipway route, all freight is wheeled, moving on commercial vehicles, vans and privately owned trailers.

Crewing

Crew Arrangements

- MV *Eynhallow* operates with a crew of four at any one time. There are therefore two crews of four (eight crew in total), all of whom live on the island.
- Each crew works two-weeks on, two-weeks off with three weeks of rostered leave.

Scheduled Working Hours

- As the Rousay, Egilsay and Wyre route operates wholly within categorised waters, Merchant Shipping Notice (MSN) 1876 Working Time: Inland Waterways Regulations 2003 as Amended applies, the key provisions of which are outlined in **Appendix A**.
- The start-up period for MV *Eynhallow* is 30 minutes before the first scheduled departure each morning. The operating day ends 15 minutes after the vessel is moored in its overnight berth.

3.3.5 The table below sets out the working arrangements for the crew of MV *Eynhallow*. The table is based on the winter 2018/19 and summer 2019 timetables.

Note – the timetables suggest a slightly longer start-up and close down time than the Table of Shipboard Working Arrangements.

Table 3.2: Rousay, Egilsay and Wyre – Hours of Operation

	Summer			Winter		
	Crew Start	**Crew Finish**	**Operating Day**	**Crew Start**	**Crew Finish**	**Operating Day**
Monday	06:20	19:30	13:10	06:20	19:30	13:10
Tuesday	06:20	19:30	13:10	06:20	19:30	13:10
Wednesday	06:20	19:30	13:10	06:20	19:30	13:10
Thursday	06:20	19:30	13:10	06:20	19:30	13:10
Friday	06:20	19:30	13:10	06:20	19:30	13:10
Saturday	06:20	19:30	13:10	06:20	19:30	13:10
Sunday	08:15	18:40	10:25	-	-	-
Total			***89:25***			***79:00***

3.3.6 Table 3.2 clearly highlights the application of the seasonal hours allowance within the legislation, with weekly operating hours in the summer being in the region of 89 hours per week, reducing to 79 hours in the winter months.

3.3.7 Table 3.3 below sets out the annualised position for this route:

Table 3.3: Rousay, Egilsay and Wyre – Annual Hours

	Summer Timetable	**Winter Timetable**
Weekly Hours	89:25	79:00
Weeks of Operation	20	32
Total Hours by Season	1,788:20	2,528:00
Total Annual Hours	4,316:20	
Total Hours per Crew	2,158:10	
Average Weekly Hours	41:30	
Average Working Week	83:00	

3.3.8 The following points should be noted from the above table:

- The total hours operated by the crew on this route is close to but within the maximum permitted operating hours. Each crew works 2,158 hours per year, set against a regulatory maximum of 2,304 hours.
- In order to accommodate the current summer timetable of 89 hours per week, the winter timetable is reduced to 79 hours, so as to remain within the annualised 84-hour average week permitted. This is why there has historically been no Sunday service in the winter (albeit additional Scottish Government funding has been provided to expand the crew complement for the winter 2021/22 timetable period).
- It should therefore be noted that **there is no scope to operate additional sailings with the current crew either in summer or winter** without a continuation of the additional crew resource made available for the winter 2021/22 timetable.

3.4 Current Infrastructure

3.4.1 This final section provides an overview of the current landside infrastructure at Tingwall, Rousay, Egilsay and Wyre, considering both characteristics and conditions. The first section considers the existing infrastructure and its condition and the second section the operating practices when using that infrastructure

Existing Infrastructure and Condition

3.4.2 The table below provides a summary of the main characteristics of the ferry berth at each of the four harbours.

Table 3.4: Existing infrastructure – summary of key characteristics

	Depth at REW Berth	Berth Length	Slipway Details (all 1 in 8 gradient)
Rousay	1.0 to 5.0m below CD[13]	33m from slipway toe (1.0m below CD) to end of pier	12m wide x 42m length
Egilsay	1.0 to 3.0m below CD	20m from slipway toe (1.0m below CD) to end of pier	12m wide x 40m length
Wyre	0.7 to 2.0m below CD	36m from slipway toe (0.7m below CD) to end of pier	9m wide at the toe x 46m length
Tingwall	1.5 to 3.0m below CD	53m from slipway toe (1.5m below CD) to end of pier	10m wide x 43m length

Rousay

3.4.3 An annotated image of Rousay ferry terminal is shown below:

[13] CD = chart datum, which is the water level surface serving as the origin of depths displayed on a nautical chart.

Figure 3.1: Rousay ferry terminal

3.4.4 Based on record information, the slipway and eastern finger pier were constructed in the late 1980s. MV *Eynhallow* overnights on the western side of the finger pier. The concrete slipway is 12m wide by 42m long and is set at a gradient of 1 in 8. Based on a visual topside inspection, the slipway is in fair condition with minor concrete defects noted on the surface. There is a notch of concrete missing from the south-western toe of the slipway, which is visible from the vessel deck. The condition of the full length of the slipway and the presence of any scour is unknown.

3.4.5 The finger pier to the east of the slipway is approximately 3m wide and is of solid concrete construction over its full length of 75m. In relation to the tidal levels at the harbour, the level of the finger pier deck appears to be low and is known to be awash when large waves coincide with high tides, particularly during inclement westerly and south-westerly conditions. There is a concrete kerb along the full length of the finger pier deck, except for locations where mooring bollards or ladders are present. The concrete kerb is in poor condition, with damage including missing sections of concrete and reinforcement visible at several locations along the length. There are nine mooring bollards on the finger pier, which are in poor condition. The mooring bollards are showing signs of corrosion and a number have missing fixings. There are no fenders along either berth of the finger pier. Mooring ropes are stored on the finger pier deck.

3.4.6 The date of construction of the older, western pier is unknown. The berths along this pier are currently used by small fishing vessels and leisure craft. The structure appears to have been extended several times, with the form of construction changing over its length. The original, 'T-shaped' masonry pier extends from an area of hardstanding for an approximate length of 35m. Movement of masonry blocks and evidence of re-pointing are visible on all vertical faces. There are a set of curved masonry access steps built into the outer face of the original pier and there is a narrow, steep slipway on the eastern face. The deck of the masonry pier has been topped with asphalt, which is poorly finished. There are timber cope beams present on the edges of the original masonry pier and pedestrian handrails along the length of this section of pier, which are in fair condition.

3.4.7 Seaward of the masonry pier, there is an 'L-shaped' concrete structure which extends beyond that pier for a length of 30m. The form of construction on the western side of the pier looks to be solid concrete over the length, and the width of the deck at this location is approximately 5m. The eastern section of the structure looks to be a suspended concrete deck with wave walls to provide shelter from southerly conditions. There are additional access steps to the inner harbour and pedestrian handrails along the inner faces of this berth.

3.4.8 Movement of the deck, separation of construction joints and cracking is visible across this section of the pier. It is anticipated that these defects are as a result of differential settlement across the structure due to the various forms of construction. There is one Yokohama floating fender on the seaward face of the south pier, which is the overnight berth used for MV *Shapinsay* during refit timetable. The western pier structure provides a degree of shelter at the slipway berth from westerly conditions, however southerly and south-westerly conditions are known to disrupt to sailings to and from Rousay. It is understood that prevailing conditions at Rousay harbour are from the south-east.

3.4.9 There are five lighting columns along the length of the eastern finger pier and three along the length of the western masonry and concrete pier.

3.4.10 Along the landward edge of the harbour, there is a rock armour revetment to dissipate wave energy and limit overtopping onto the car park and marshalling area, which is known to be awash during inclement weather. There is a concrete toe beam along the length of the rock armour revetment.

3.4.11 The landside infrastructure associated with Rousay ferry terminal includes a small car park with marshalling area for ten cars and a waiting room with a telephone and toilet facilities. The waiting room is understood to be in fair condition, although it was not inspected on our site visit.

3.4.12 The car-park can be over-utilised at peak sailing times. The car park and marshalling area have a concrete surface and there are a number of cracks visible across the car park marshalling area surfaces. Waves overtop the car park during unfavourable conditions. There are a number of items, including fishing equipment, stored across the car park.

3.4.13 There are no historic topside or dive inspections available for this site.

Egilsay

3.4.14 An annotated image of Egilsay ferry terminal is shown below:

Figure 3.2: Egilsay ferry terminal

3.4.15 The harbour and approach to Egilsay are routinely dredged by the Council. The width of the dredged channel is narrow, at approximately two times the beam of MV *Eynhallow*. The approach channel to Egilsay harbour is not marked.

3.4.16 Based on record information, the approach structure, slipway and western pier were constructed in the late 1980s. An additional finger pier alongside the east of the slipway was constructed in the late 1990s. The slipway is approximately 12m wide, 40m long and is set at a gradient of 1 in 8. Based on a visual topside inspection, the slipway is in fair condition with minor concrete defects noted on the surface. The condition of the full length of the slipway and the presence of any scour is unknown.

3.4.17 The newer finger pier alongside the east of the slipway is 3m wide and is of solid concrete construction along its full 70m length. In relation to the tidal levels at the harbour, the level of the finger pier deck appears to be low and is known to be awash at high tides. There is a metal kerb that runs along the full length of the pier on both sides, which is in good condition. There are several surface cracks noted along the concrete deck. There are six mooring bollards on the finger pier and two at the head of the slipway. The mooring bollards are in fair condition, with some corrosion noted. There are no fenders on either side of the finger pier. There is damage to the western vertical concrete face of the finger pier likely due to impact from the vessel during berthing.

3.4.18 The western pier provides a degree of shelter at the slipway and within the harbour from westerly conditions; however, the slipway is exposed from south-westerly round to south-easterly conditions which can disrupt sailings to and from Egilsay. The swell inside the harbour is also known to cause disruption to sailings.

3.4.19 The concrete approach structure to the pier from the shore is approximately 90m long and 5m wide. The approach structure appears to be built directly onto rock, which is visible at low tide along the length. There is a concrete kerb along the length of the approach structure on both sides. Handrailing is bolted to the concrete kerb which looks to be in good condition. The level of the approach structure deck appears to be low and is known to be awash at high tides. The joint between the concrete approach and the asphalt road on the island is in fair condition.

3.4.20 From the seaward end of the approach structure, the western pier continues for a length of approximately 100m. The width of the western pier is also approximately 5m and extends to 14m wide at the pier head. Handrailing runs along both sides of the western pier and is fixed to the concrete kerb until the location where the pier head widens. From this point, handrailing is present on the western side only and a timber cope is present along the inner face. The handrailing is in fair condition, with corrosion of fixings noted. The timber cope is in poor condition, it is weathered, and surface damage is noted along its length. The concrete deck of the western pier is in fair condition with surface cracking noted at the pier head. The deck is currently used for storage of fishing equipment.

3.4.21 There are concrete steps which provide access from the pierhead into the inner harbour. The topside of the steps looks to be in fair condition, however, the handrail which is fixed to the harbour wall is in poor condition with heavy corrosion noted in the intertidal zone. The mooring bollards and mooring rings on the western pier are also heavily corroded. Fenders are not present on the western pier or the pierhead.

3.4.22 There are two lighting columns on the eastern finger pier and two on the western pier. The life rings across the harbour are in poor condition.

3.4.23 The landside infrastructure associated with Egilsay ferry terminal includes a small area for informal car parking and a waiting room landward of the approach structure. The waiting room can be accessed by a concrete ramp which is in good condition. The car park surface is loose stone and parking bays are not marked. There are public waste and recycling facilities located within the car park which are protected by a concrete wall.

3.4.24 Marshalling of vehicles takes place at the end of the approach structure, at the head of the slipway. The marshalling area is not clearly signposted and marshalling bays are not marked. The area is too small to safely turn vehicles and HGVs are often required to reverse down the approach structure and onto the vessel. There are a number of items, including fishing equipment, stored across the harbour site.

3.4.25 There are no historic topside or dive inspections available for this site.

Wyre

3.4.27 An annotated image of Wyre ferry terminal is shown below:

Figure 3.3: Wyre ferry terminal

3.4.28 Based on record information, the slipway and finger pier were constructed in the late 1980s. The concrete slipway is 3.5m wide at the head and widens to 9m wide at the toe. It is 46m in length and is set at a gradient of 1 in 8. It is understood that the slipway was widened in 2010. Based on a visual topside inspection, the slipway is in fair condition, but with notable gaps visible at construction joints towards its lower end. The condition of the full length of the slipway and the presence of any scour is unknown.

3.4.29 Wyre harbour is known to be shallow and has a rocky bed. Based on anecdotal evidence, it is understood that construction debris and dredged rock remain within the harbour from previous construction activities and seaweed and marine growth are building up within the harbour. Wyre harbour is not dredged by the Council and can be tidally constrained during strong westerly conditions, as the current vessels lack power to remain in position on the slipway.

3.4.30 The finger pier to the west of the slipway is approximately 3m wide and is formed of a suspended concrete deck supported by 15 concrete columns with wave screens present between piers. The finger pier is approximately 110m in length. The concrete deck is showing signs of deterioration and there are gaps visible on the deck surface between the pre-cast concrete bays. There is a concrete kerb that runs along the length of the pier on both sides, which is in good condition. Pedestrian handrails are present along the western edge of the structure. These are in poor condition and are heavily corroded along their length.

3.4.31 There are 11 timber fenders present along the berthing face of the finger pier. One fender looks to be missing at the seaward extent of the finger pier, closest to the pier head. Four of the timber fenders have steel mooring caps which allow the vessel to be tied to the fenders. Overall, the fenders on the finger pier are in fair condition.

3.4.32 At the seaward end of the finger pier, there is a pierhead which provides a degree of shelter at the slipway from north-westerly conditions. At this location, the pier measures approximately 9m wide, over a length of 15m and is of similar form of construction to the finger pier. At the interface between the finger pier and the pierhead, defects are noted on the concrete deck and cables are exposed. The deck of the pierhead is constructed from in-situ concrete slabs and considerable gaps are present at the construction joints. There is a concrete kerb and pedestrian handrailing along the inner face of the pier head. Both are in fair condition.

3.4.33 On the inner face of the pierhead, there are concrete access steps to the inner harbour which are in poor condition, with spalled concrete and corrosion of handrails noted. Timber fenders are present on the inner face of the pierhead, supported by a steel frame which is suspended from the concrete deck. Timber strips are also fixed to the seaward edge of the access steps. The timber fenders and steel frames are in poor condition, with heavy corrosion of steelwork noted. On the south-east corner of the pierhead, there are small, extruded rubber fenders fixed to the concrete wall. The pierhead deck is currently used for storage of materials. Small fishing vessels and pleasure craft are known to berth against the pierhead.

3.4.34 There are mooring bollards and mooring rings present along the finger pier and pierhead. These are in poor condition and are heavily corroded with missing fixings.

3.4.35 There are wave screens installed along the length of the finger pier and pier head. The wave screens are constructed from precast concrete units. The location of the wave screens alternates between the eastern and western sides of the finger pier. The wave screens do not extend the full height of the structure and appear to be in fair condition.

3.4.36 There are four lighting columns along the length of the finger pier and two lighting columns on the pier head.

3.4.37 The landside infrastructure associated with Wyre ferry terminal includes a small waiting room with toilet facilities. There is no clearly defined marshalling area or car parking. There are several items stored across the harbour site, including fishing equipment. There is a small community garden opposite the waiting room, close to the head of the slipway.

3.4.38 There are no historic topside or dive inspections available for this site.

Tingwall

3.4.40 An annotated image of Tingwall harbour is shown below:

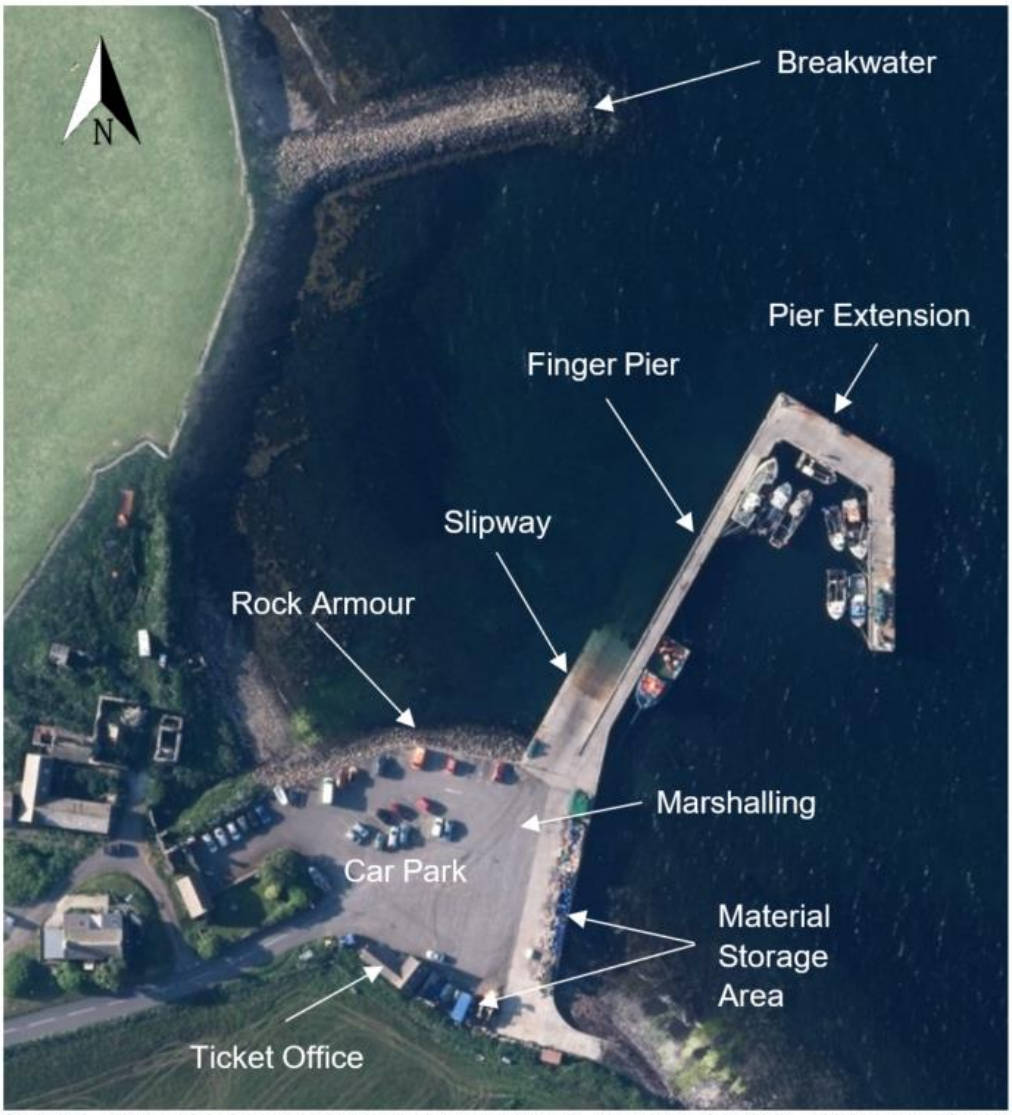


Figure 3.4: Tingwall ferry terminal

3.4.41 Based on record information, the slipway and finger pier were constructed in the late 1980s. In the late 1990s, the finger pier was extended eastwards, to create a basin which provides shelter from northerly and easterly conditions. There is a rock armour breakwater to the north of the harbour, which is approximately 75m in length, which provides a degree of shelter from northerly conditions at the slipway.

3.4.42 The concrete slipway is 10m wide, 43m long and is set at a gradient of 1 in 8. Based on a visual topside inspection, the slipway is in a fair condition, but with notable gaps visible between the construction joints of the concrete deck slabs. Minor concrete defects are noted to the topside of the concrete retaining wall on the western side of the slipway. The condition of the full length of the slipway and the presence of any scour is unknown.

3.4.43 The finger pier to the east of the slipway is approximately 3m wide and 75m long. The pier extension is tied into the seaward end of the finger pier and extends towards the east, then south to create a basin. From record drawings, the original finger pier is mass concrete, with a concrete kerb that runs along the full length of the pier deck on either side, except for locations

where bollards or ladders are present. The kerb is in fair condition, with minor defects noted along its length and one instance of exposed reinforcement.

3.4.44 Gaps are noted between construction joints on the vertical faces of the finger pier. The concrete deck of the finger pier is in fair condition, with a number of surface cracks noted. The mooring bollards and mooring rings are in fair condition, with minor corrosion noted. One of the ladders on the eastern face has a missing grip rail. There is a winch on the eastern side of the finger pier, close to the end of the slipway, which appears in good condition. There is a service trench within the deck of the original finger pier which runs towards the pier extension which is in fair condition with surface cracking noted. Fenders are not present along either berth of the finger pier.

3.4.45 The pier extension ties into the end of the original pier and forms an 'L-Shape', creating a basin for small fishing vessels and pleasure craft. The extension is approximately 70m in length, 8m wide on the northern leg and reduces to 5.25m wide on the eastern leg. It is constructed from a sheet piled wall with tide rods and wailing beams, crushed stone fill, concrete deck and capping beam. The concrete deck and capping beam are in good condition with no major defects noted. There is a metal kerb along the perimeter of the pier extension which is in good condition with some minor corrosion noted. The ladders and mooring bollards on the pier extension are in good condition. The section of handrailing at the interface between the original pier and the extension is in good condition. Cathodic protection is visible on the steel sheet piled wall; however, the extent of cathodic protection system has not been inspected in detail. Fenders are not located on the pier extension. The deck is used for storage of fishing equipment.

3.4.46 There are two lighting columns on the pier extension and two on the finger pier at the entrance to the berth. The bolts for the lighting columns at the pier extension are heavily corroded.

3.4.47 The landside infrastructure associated with Tingwall ferry terminal includes a car park, marshalling area and a ticket office. The ticket office is accessed via a concrete ramp or steps which appear to be in good condition. Much of the car park is formed from a bitmac surface which is in good condition, with clearly marked parking bays. Towards the west of the car park, the surfacing is loose stone and the parking bays are not clearly marked. There is defined marshalling for nine cars and one HGV. Fishing equipment and storage containers are located to the east of the marshalling area, along the eastern edge of the site on a concrete deck which has a number of large cracks visible.

3.4.48 There are six lighting columns located across the car park and marshalling area.

3.4.49 At the seaward limit of the car park, there is rock armour revetment to dissipate wave energy and limit overtopping onto the car park and marshalling area, which can be awash and is known to cause damage to vehicles in the car park during inclement weather.

3.4.50 The rock armour breakwater to the north of the harbour is approximately 75m in length. The breakwater is constructed from three layers of rock ranging from 100mm to 450mm in diameter.

3.4.51 There are no topside or dive inspections available for this site and the condition of the rubble breakwater was not inspected.

Current Operations

Rousay

3.4.52 The vessels operate from a concrete slipway which is orientated north-west to south-east. There is a concrete finger pier to the east of the slipway which the vessel rests against whilst at the slipway and when berthing overnight. There are no fenders located on either side of the finger pier and the vessel belting regularly contacts the structure during loading, unloading and berthing operations.

3.4.53 There are no tidal restrictions at the berth for the current vessels, however the deck level of the finger pier is too low and is known to be awash at high tides or higher waves, particularly during

challenging westerly and south-westerly conditions. The low level of the finger pier can prove challenging for vessel crew should they have to access or egress the vessel or tend lines during such conditions.

3.4.54 A degree of shelter for the vessel from south-westerly conditions is provided by the pier to the west. This pier is irregular in shape and provides a number of shorter berths of varying lengths which are used by small fishing or pleasure craft. During the refit timetable, MV *Shapinsay* berths overnight along the southern face of the western pier, where Yokohama floating fenders are temporarily installed to protect the vessel and the berth. When berthing overnight, MV *Shapinsay* is positioned with her bow facing into the prevailing weather conditions.

3.4.55 There is insufficient water area for the current vessels to manoeuvre within the harbour. They will position themselves within the channel and directly approach the slipway at Rousay in all conditions. Once discharge / loading is complete, the vessel will reverse out of the harbour and into the channel.

3.4.56 Whilst operating on the slipway, the power remains on in order to hold the bow of the vessel in position on the ramp. Typically, the vessel is not tied up during loading and unloading operations and the terminal is unmanned. Depending on the prevailing conditions, the vessel will either make contact with her front-end belting against the western side of the finger pier and rotate toward the pier in order to align with the slipway or, in calmer conditions, she will not make contact with the finger pier.

3.4.57 Pedestrian access to and from the vessel is via the slipway.

Egilsay

3.4.58 The current vessels operate from a concrete slipway which is orientated north to south. There is a narrow, concrete finger pier along the east side the slipway, which the vessel can berth against during unloading and loading operations. There is a wider concrete finger pier to the west of the harbour which provides a degree of shelter to the slipway from conditions from the south-west round to the north. There are no fenders located on either side of the finger pier and the vessel belting regularly contacts the east pier during unloading and loading operations.

3.4.59 The approach channel to Egilsay harbour is routinely dredged to minimise tidal constraints and there is a shallow reef noted close to the harbour entrance. The width of the dredged channel is approximately two times the beam of the current vessel, which can be challenging for Masters who have to commit to the approach and use the vessel power and speed to overcome any side wind etc. The entrance to the harbour is narrow due to the orientation of the return wall on the western pier. Similar to Rousay, the deck level of the piers and approach structure at Egilsay harbour appear to be low and are known to be awash at high tides and in poor conditions.

3.4.60 The vessel follows the narrow, dredged channel to make a direct approach to the slipway. Depending on tidal conditions, the vessel will either make contact with her front-end belting against the western side of the finger pier or, in calmer conditions, she will not make contact with the finger pier. The ramp is fully lowered, and the vessel power remains on for unloading and loading operations. The harbour is unmanned and typically the vessel is not tied up when operating at the slipway. On departure from the berth, the vessel will pull straight back within the dredged channel until clear of the end of the harbour entrance and in sufficient water depth before manoeuvring.

3.4.61 Whilst at the berth, the piers on either side of the slipway provide a degree of shelter from easterly and westerly conditions. It is not anticipated that the eastern face of the finger pier is used for ferry berthing, due to limited water depths. Berthing on the western pier is only available at the pierhead, where pillar bollards and concrete access steps are located. The inner face of the western pier is sloped and not suitable for berthing.

3.4.62 Both the current and the relief vessels can have issues getting into the berth in south-westerly round to south-easterly conditions, leading to a number of aborted or cancelled sailings. The swell inside the harbour is also known to cause disruption.

3.4.63 During the site inspection it was observed that larger vehicles such as lorries can experience difficulties when loading and unloading with regards to clearance and the transition angles (either the vessel ramp to the slipway or slipway to the level surface on the pier).

3.4.64 Pedestrian access to and from the vessel is via the slipway.

Wyre

3.4.65 The current vessels operate from a concrete slipway which is orientated south-east to north-west. The slipway is considerably wider at the toe than at the head. There is a finger pier with a suspended deck to the west of the slipway, with wave screens which provide a degree of shelter on the slipway during westerly conditions. The return on the pier head provides a degree of shelter from the north-west. There are timber fenders on the finger pier along the length of the slipway berth.

3.4.66 Wyre harbour is known to be tidally constrained for the current vessels, with occasional propeller damage reported. The harbour is not dredged, and the vessel appears to clear her own approach within the harbour. Due to the orientation of the slipway and the close proximity of the return structure at the seaward end of the finger pier, the vessel rarely contacts the finger pier. Instead, she sits at an angle within the harbour during unloading and loading operations, i.e., the vessel does not rest against the finger pier. Once unloaded and reloaded, the vessel backs directly away from the slipway before turning.

3.4.67 The level of the slipway head and finger pier deck appears to be higher at Wyre than the levels at Egilsay and Rousay. Overtopping waves are not known to occur as frequently.

3.4.68 The vessel manoeuvres outwith the harbour and approaches the slipway at considerable speed. The ramp is lowered and the power remains on for unloading and loading operations. On departure, the vessel pulls back until clear of the pier head before manoeuvring.

3.4.69 A degree of shelter for the vessel from westerly and north westerly conditions is provided by the concrete suspended deck finger pier, pier head and wave screens.

3.4.70 The relief vessel, MV *Shapinsay,* is known to have issues manoeuvring to the berth, particularly in south-westerly conditions, which can lead to aborted or cancelled sailings.

3.4.71 Pedestrian access to and from the vessel is via the slipway.

3.4.72 The harbour also supports fishing activities, i.e., fish farm.

Tingwall

3.4.73 The current vessels operate from a concrete slipway which is orientated south-west to north-east. There is a concrete finger pier to the east of the slipway which the vessel can berth against during unloading and loading operations. The finger pier provides a degree of shelter from southerly and easterly conditions. From the seaward end of the slipway berth, the finger pier extends to the east, then returns to the south to create a small basin for the berthing of work boats, fishing vessels and leisure craft. There are no fenders on either side of the concrete finger pier and the vessel belting regularly contacts the pier during unloading and loading operations. Whilst operating on the slipway, the vessel power remains on in order to hold the bow of the vessel in position on the ramp. The vessel is not tied up during loading and unloading operations.

3.4.74 The berth at Tingwall is not known to be tidally constrained for the current vessels.

3.4.75 There is a rubble breakwater to the north-west of the pier, which is approximately 80m long. The breakwater provides a degree of shelter on the final approach to the berth and at the slipway; however, sailings to Tingwall are known to be cancelled in northerly conditions.

3.4.76 The current vessels do not typically manoeuvre within the harbour area between the slipway and the breakwater. The vessels position themselves north of the harbour and directly approach the slipway at Tingwall in all conditions. On departure, the vessels pull back until clear of the finger pier before manoeuvring.

3.4.77 Pedestrian access to and from the vessel is via the slipway.

Gairsay

3.4.78 The occasional sailings to Gairsay are generally operated by MV *Eynhallow*, which calls at a rubble slipway at Millburn Bay four or five times per year, typically on a Sunday. It is understood that other slipway vessels within the Orkney Ferries fleet could also be used at Millburn Bay.

3.4.79 It is recommended that the Council consider whether other vessels within the fleet could be used to support occasional services to Gairsay in the future, or whether the shoreside infrastructure at Millburn Bay would need to be improved to accommodate new vessels.

3.5 Next Steps

3.5.1 Having profiled the infrastructure and operation of the service from the Council and Orkney Ferries perspectives, the following chapters consider the service from the customer perspective. This includes analysis of carryings and capacity utilisation, service delivery and use of the ferry by island residents and visitors.

4 Carryings and Capacity Utilisation

4.1 Overview

4.1.1 The REW route facilitates travel for a range of purposes including employment, education, personal business, leisure and tourism. The SBC identified vehicle capacity on the ferry as being a constraint on travel to and from the island group, particularly in the summer months. This chapter therefore briefly profiles the available carryings and capacity utilisation data for the route.

4.1.2 In order to inform this analysis, Orkney Ferries provided one full year – 1st April 2017 to 31st March 2018 – of sailing-by-sailing carryings data. Whilst helpful in providing disaggregated insights into the route, the way in which the data were recorded made it challenging to process and analyse sailing-by-sailing information in the way we would usually do on a study of this nature. Some key insights could however be drawn from the data.

4.2 Carryings

Carryings Trend

4.2.1 In 2019, the REW route carried around 58,000 passengers, 10,500 cars and a combined 4,700 commercial vehicles (CVs) and buses[14]. Figure 4.1 shows total passenger, car and combined CV and bus carryings on the route, indexed to 2009:

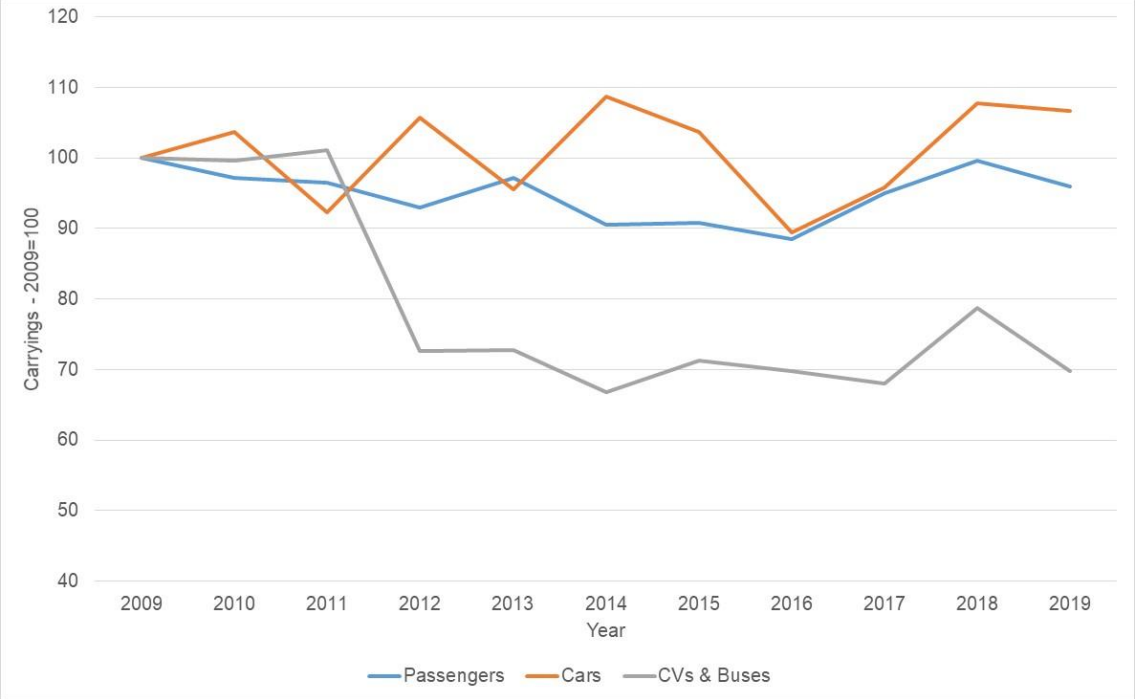


Figure 4.1: REW route carryings, 2009=100 (Source: Scottish Transport Statistics)

4.2.2 The main points to note from the above figure are as follows:

- Whilst there have been variations between years, passenger and car carryings have remained stable overall, within plus or minus 10% of the 2009 value.
- Combined CV and bus carryings reduced significantly between 2011-12 but have remained fairly consistent since then. In absolute terms, this was a reduction of around 2,000 CVs

[14] Scottish Transport Statistics (Transport Scotland, 2020), Table 9.16.

per annum. The cause of this reduction is not immediately clear but, with such small carryings overall, could relate to the completion of a major project on one of the islands or the demise of a single haulier for example.

Key Point: Passenger and car carryings on the REW route have been stable over the last decade (2009-19). Combined CV and bus traffic diminished significantly between 2011 and 2012 but has been broadly stable since then.

Distribution of carryings across the year

4.2.3 The REW route demonstrates a high-level of seasonality, as is illustrated in the figure below:

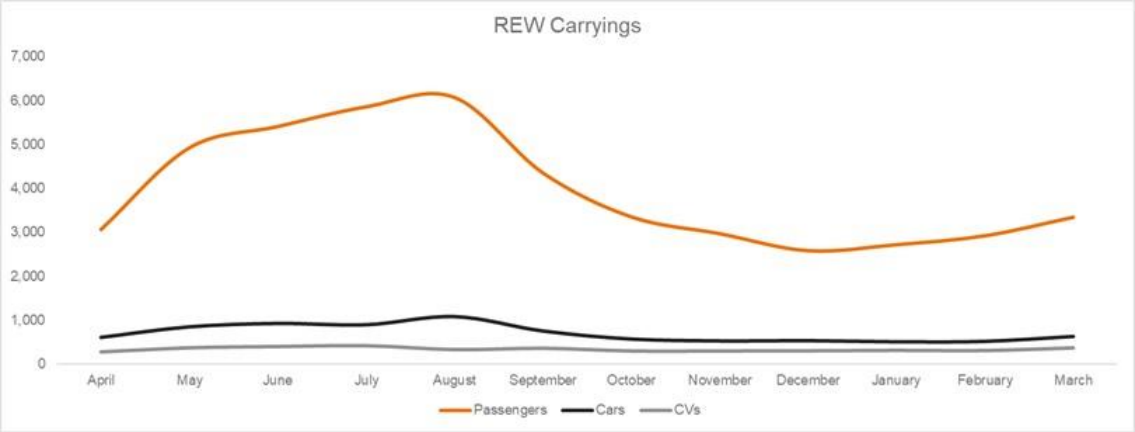


Figure 4.2: REW carryings by month, 01/04/17 – 31/03/18 (Source: Orkney Ferries)

4.2.4 As can be seen from the figure, carryings are skewed towards the summer months, with 54% of all car carryings in 2017/18 being between May and September. August is the peak month (6,076 passengers, 1,076 cars and 334 CVs), accounting for 13% of annual car carryings in 2017/18. The reasons for this are likely to be twofold:

- The short crossing, ability to make a day return trip and relatively low fares means that this island group is attractive to tourists in the summer month, particularly Rousay with its concentration of Neolithic sites.
- The absence of Sunday sailings in the winter timetable period, which typically runs from October to May, constrains the weekend resident and leisure travel market. This is likely to have a lesser impact in dampening winter carryings than tourism in boosting summer carryings.

Key Point: The REW route demonstrates a high degree of seasonality, with 54% of all car carryings in 2017/18 being between May and September, with 13% of annual car carryings being in August.

4.3 Capacity Utilisation

4.3.1 A key question in determining the design vessel(s) is whether it / they would provide sufficient capacity over its / their lifetime (assumed 30 years) to meet the needs of the REW route. If not, it can be argued that the vessel(s) may act as a constraint in the growth of the economy of the three islands and the sustainability of these communities therein. It should be noted that, when referring to capacity in this context, it is meant as **vehicle capacity** as this is much more frequently constrained than passenger capacity. **Deadweight capacity** is also an issue. This section considers the present-day situation whilst future projections are analysed in the next section.

Load factor analysis

Determining a commercial vehicle PCU factor

The calculation of ferry vehicle deck utilisation is not an exact science. It is dependent on the quality of the underlying data and the assumptions used to calculate the 'load factor' on each sailing. The following section sets out how we have calculated the vehicle deck utilisation / load factor in the context of the Rousay, Egilsay and Wyre route.

- Using the sailing-by-sailing carryings data provided by Orkney Ferries, all vehicles recorded as cars / vans etc under 5.5m in length are assumed as 1 passenger car unit (PCU)[15].
- Commercial Vehicles (CVs) are typically captured in length bands. However, the sailing-by-sailing data provided for REW only provided total CVs. In terms of PCU values for CVs, these are normally expressed as 2.2 or 2.9 PCUs.
    - To determine the correct PCU factor for REW, information from the stakeholder engagement on types of vehicles carried on the ferry, supported by using the CV carryings data from the ONI network, identified that most CVs consist of agricultural vehicles and larger CVs, therefore, 2.9 was selected as the PCU factor.

High-utilisation sailings

4.3.2 From the carryings data provided, it is evident that there are capacity problems on the REW route at peak times. For the period 1st April 2017 to 31st March 2018, 727 sailing legs (15% of total sailing legs) recorded a vehicle deck utilisation greater than 85%, with 513 (10% of total sailings) recording a vehicle deck utilisation of greater than 90%. Given the capacity of MV *Eynhallow*, these sailing legs can be considered effectively full. This is however likely to be an underestimate of the capacity problem for two reasons:

- As a multi-leg service, it only takes the vessel to be full to capacity on one leg of the journey to frustrate demand on subsequent legs which would otherwise have space. For example, a motorist wishing to travel to Egilsay may not be able to secure a booking because the Tingwall – Rousay leg is full, even though the subsequent Rousay – Egilsay leg has capacity.
- The 40-tonne deadweight limitation on MV *Eynhallow* will mean that there will be occasions where weight rather than lane meterage is the constraining factor on a sailing. Such sailings are not systematically recorded at present.

Key Point: Around 10% of total sailing legs on the REW had a vehicle deck capacity utilisation in excess of 90% in 2017-18. These sailings were effectively full. However, this is likely to be a significant under-estimate of the overall number of high utilisation sailings due to the multi-leg nature of the route and the deadweight limitation of MV *Eynhallow*.

Which sailing legs have the highest utilisation?

4.3.3 The figure below shows the number of sailings with a vehicle deck utilisation greater than 85% by sailing leg:

[15] A passenger car unit (PCU) is a means of equating all vehicles to a standard 'car' – i.e., using an 'average' car length definition and converting all other vehicles to a multiple of this average.

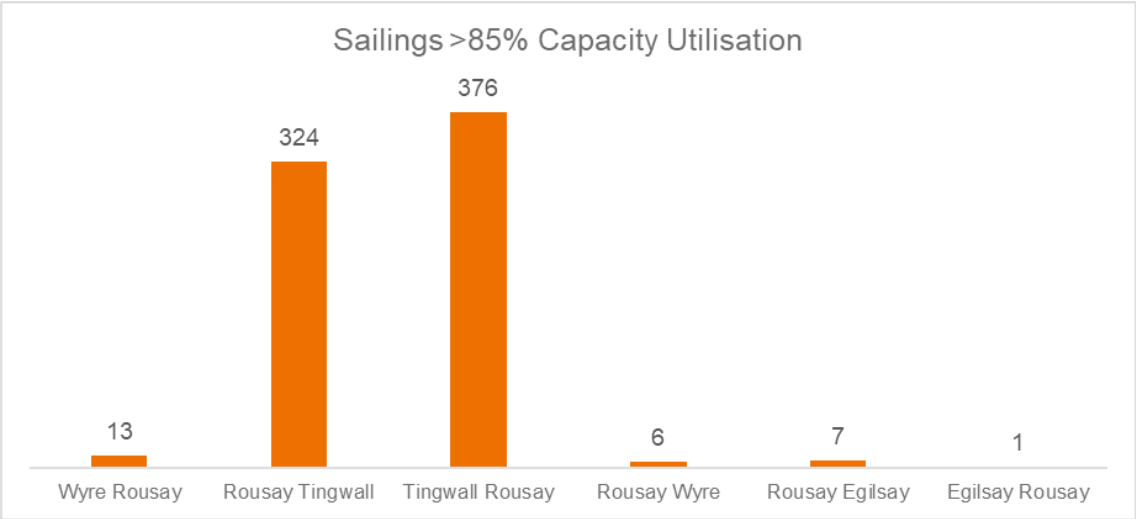


Figure 4.3: Number of sailings with vehicle deck utilisation >85% by route leg, 2017-18 (Source: Orkney Ferries)

4.3.4 It is evident from the figure above that almost all high utilisation sailings occur on the Rousay – Tingwall and Tingwall – Rousay sailing legs. In total, 20% of all sailings on each individual leg record a utilisation over 85%. This is particularly significant because the Tingwall – Rousay connection (in both directions) is the trunk component of the route – i.e., almost all other sailings route via Rousay to Tingwall, Egilsay and Wyre. This therefore demonstrates the previously explained effect whereby excess demand on that part of the route impacts negatively on prior / subsequent sailing legs.

Key Point: Almost all high utilisation sailings (i.e., with a load factor >85%) are on the Tingwall – Rousay / Rousay – Tingwall legs (combined 20% of all annual sailings on this part of the route). As almost all sailings call at Rousay as their last port of call inbound and first port of call outbound, this capacity utilisation problem directly impacts on all three islands.

When are the busiest sailings?

4.3.5 Figures 4.4 shows the vehicle deck utilisation by sailing time:

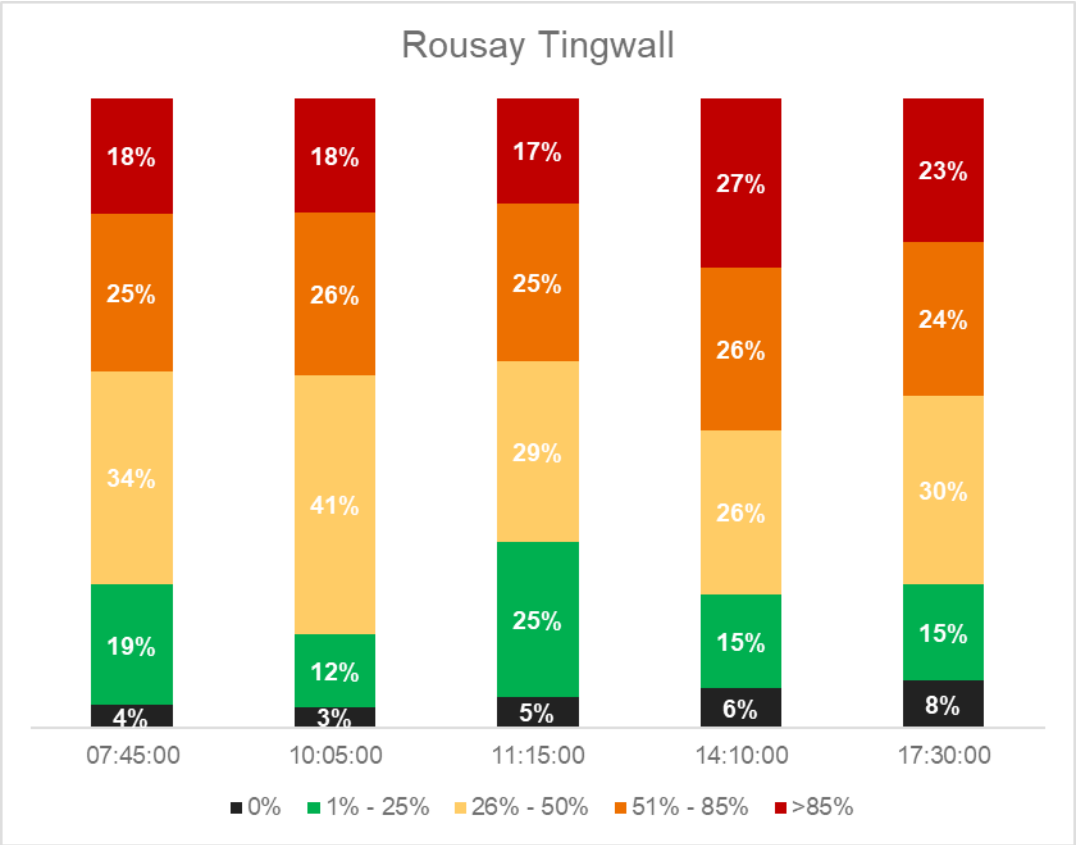


Figure 4.4: % of Rousay – Tingwall sailings with vehicle deck utilisation by sailing time, 2017-18 (Source: Orkney Ferries)

4.3.6 The main points from the above figure are as follows:

- The 07:45 sailing is the one primarily used for commuting and travel to education, so is regularly under pressure. Similarly, the 10:05 and 11:15 are the sailings most likely to be used by island residents travelling to Kirkwall for personal business or leisure reasons.
- The 14:10 service is the dominant sailing for CVs returning to Orkney mainland from Rousay. This utilisation figure shows that, despite the relatively small numbers of route CVs in absolute terms, the limited capacity of MV *Eynhallow* means that even small volumes of commercial traffic can give rise to capacity problems.
- The 17:30 sailing is the last outbound sailing of the day and most commonly used by tourists and tradespeople returning to Orkney mainland. It is also likely to be the sailing used by Rousay residents on a Saturday evening when making an onward journey to the Scottish mainland on the early Monday flights / ferries.

4.3.7 Figure 4.5 shows the equivalent information for the Tingwall – Rousay leg:

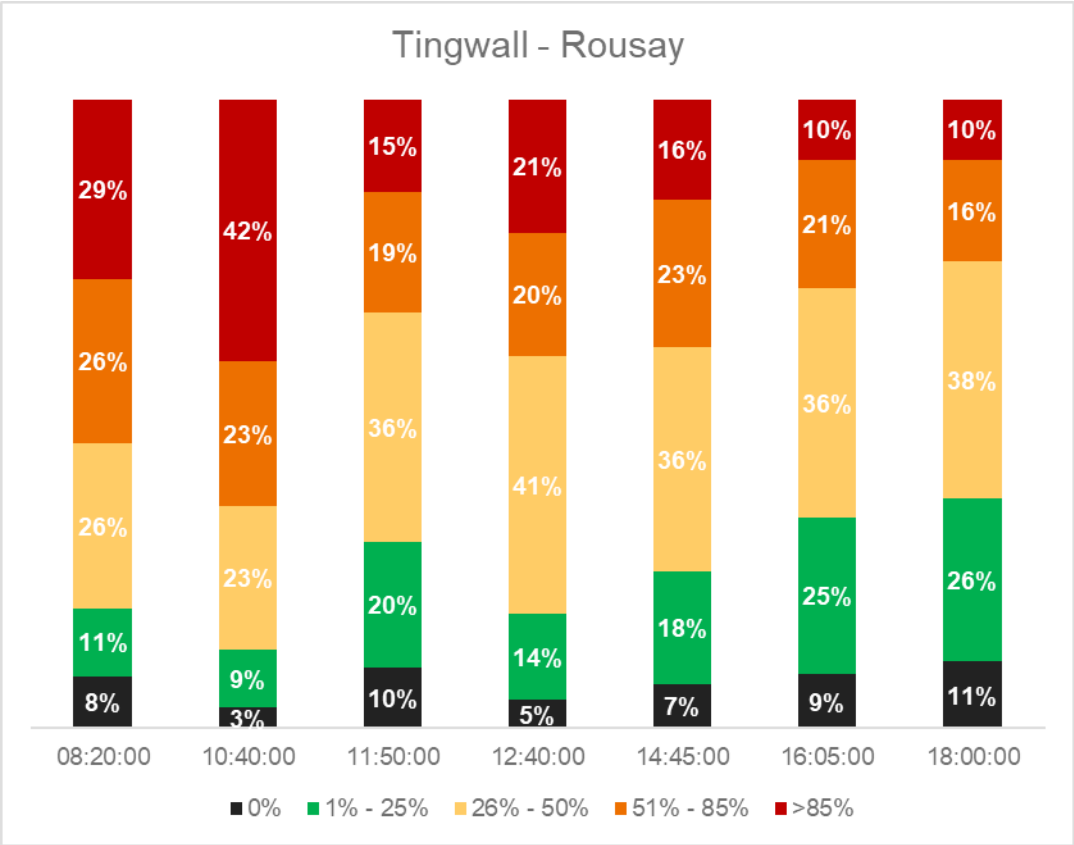


Figure 4.5: % of Tingwall - Rousay sailings with vehicle deck utilisation by sailing time, 2017-18 (Source: Orkney Ferries)

4.3.8 The key points in relation to the above figure are as follows:

- There is a more even distribution of high utilisation sailings across the day, with demand less clustered around specific sailings.
- The two exceptions to this are the 08:20 and 10:40 departures. The earlier of these sailings will be used by those travelling to work in the islands, particularly visiting tradespeople. The 10:40 is the main 'to isles' service used by freight, highlighting again the impact that freight traffic can have on the route.

Key Point: The highest utilisation sailings tend to be consistently clustered around the same subset of services. This is particularly the case with the morning departures from Rousay and Tingwall and the 14:10 departure from Rousay, which are the main freight sailings.

Key Point: It is important to note that, for those making a day return trip (e.g., commuters, tradespeople), the ability to secure a space on both the outbound and return trip is essential. If a booking cannot be secured on either of these legs, the journey cannot be made by taking a car.

4.4 Resident Survey

4.4.1 Given the prevalence of capacity issues on this route, the resident survey asked questions about the issue and key points of response are set out here.

Car ownership

4.4.2 It is relatively common practice in some islands to have an island-based car and also leave a car on the mainland. The survey found that 29% (n=2 in Egilsay, n=1 in Wyre and n=33 in

Rousay) of survey respondents keep a vehicle on Orkney mainland and travel as a foot passenger on the ferry.

4.4.3 There are various reasons for this including savings on ferry fares and concerns over certainty of travel due to vehicle deck capacity. In the context of REW, 38% (n=20) of those who keep a car on mainland do so because it can be difficult to regularly book a space for their car on the ferry when they wish to travel. This points towards an inequality faced by a subset of island residents, whereby they face the costs of buying and running a second vehicle to ensure certainty of travel. Moreover, it poses a challenge for Orkney Ferries and the Council at Tingwall, where our site visit identified that the car park is often busy or full, and this can impact on space availability for visitors and the smooth functioning of the ferry terminal area and surrounding road network.

4.4.4 Whilst capacity is clearly identified as a factor in second car ownership, it is important to note that 62% of respondents do this because it is cheaper than paying regular ferry fares. The recent fares reductions are likely to have done little to impact on this given that most of these users will be in receipt of 50-journey ticket books and will therefore not see any reduction.

Key Point: The survey provides evidence of 'forced car ownership', whereby a proportion of REW residents keep a second car at Tingwall to ensure certainty of travel with their vehicle when required. Whilst the cost of fares is a bigger factor, this nonetheless points to the desire for additional capacity amongst island residents.

Booking when travelling with a vehicle

4.4.5 Respondents were also asked whether they typically book a place on the ferry when travelling with a vehicle – the responses are summarised in the figure below:

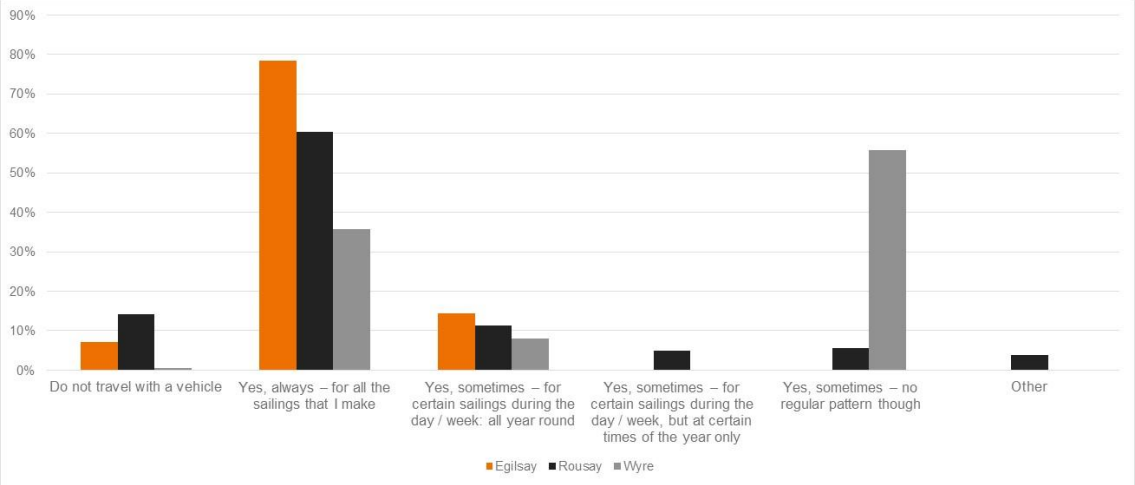


Figure 4.6: When travelling with a vehicle, do you typically book a place on the ferry? (n=126)

4.4.6 The main points of note from the above figure are as follows:

- Tellingly, no respondents noted that they never make a booking on the ferry when travelling with a vehicle. This indicates local awareness of the capacity pressures on the route. However, it also highlights that residents can face difficulties when trying to make a trip with a vehicle at short notice, in particular bearing in the mind the need to secure a booking in both directions.
- The requirement to book a vehicle when travelling to / from Egilsay is particularly notable. 78% (n=10) noted that they book on every sailing. This is in part due to the routing of all sailings to Tingwall via Rousay, but there is also anecdotal evidence to suggest that, at least historically, bookings were made on all request sailings to ensure that those sailings are provided. It is not clear whether this practice continues.

- The responses suggest that, despite the route seasonality, island residents expect to encounter capacity problems year-round and thus almost always book on the ferry when travelling with a vehicle. It is also worth noting that this is likely to be an administratively burdensome exercise for regular travellers.

Key Point: The majority of island residents will almost always book on the ferry when travelling with a vehicle. This highlights their awareness of capacity challenges and their concern about potentially not getting a space on the sailing of their choice.

Sailing times

4.4.7 In order to validate the carryings data by sailing time, respondents to the survey were asked about sailings on which they sometimes cannot travel with a vehicle due to lack of space on the ferry.

From or via Rousay to Tingwall

4.4.8 89% of respondents to the survey (n=172) noted that there are sailings from or via Rousay to Tingwall on which they sometimes cannot get a booking. The responses by sailing are summarised in the figure below:

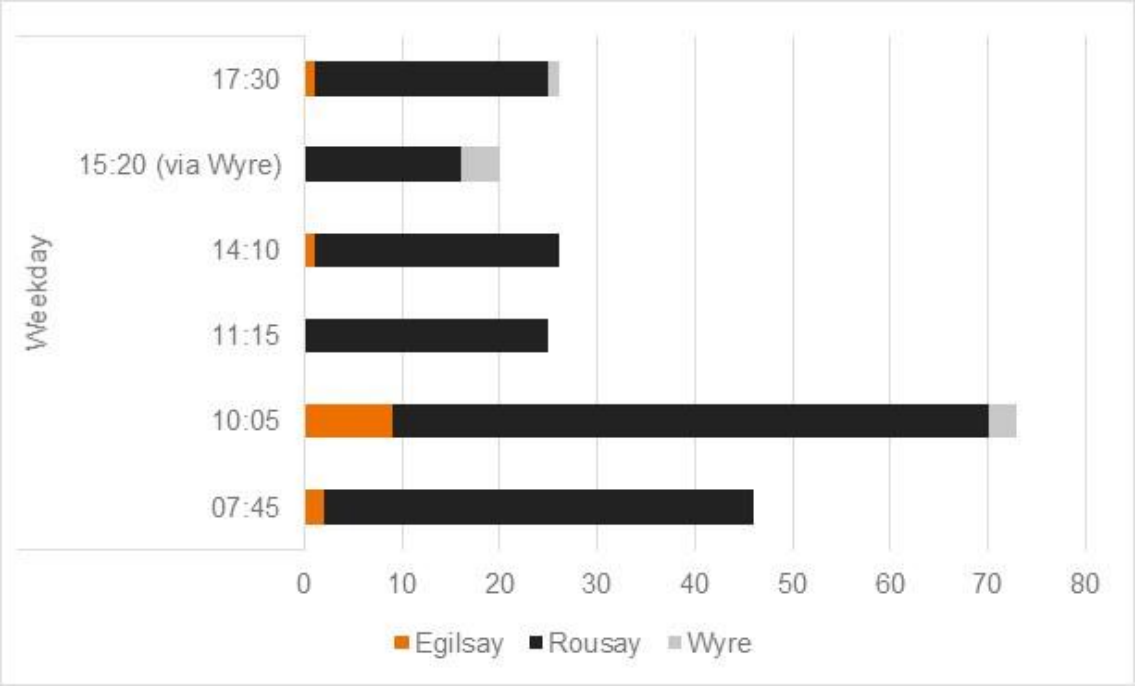


Figure 4.7: Are there sailings from or via Rousay to Tingwall on which you sometimes cannot travel with a vehicle due to lack of space on the ferry (n=multiple response question)

4.4.9 The survey responses highlight the morning sailings *ex* Rousay as being those which residents most frequently find it difficult to secure a vehicle booking on. This aligns with the carryings data to some degree in that the 07:45 and 10:05 departures are identified as relatively frequent high utilisation sailings.

4.4.10 The survey responses place much less emphasis on the 14:10 and 17:30 departures *ex* Rousay, which the data suggest show the largest number of high utilisation sailings. This is likely because these sailings are more lightly used by island residents and more heavily used by freight (the 14:10) and visitors and tradespeople returning to Orkney mainland (the 17:30).

4.4.11 Whilst not shown graphically here, the 10:05 sailing is also identified in the survey as frequently capacity constrained on a Saturday and, to a lesser extent, a Sunday.

Key Point: The survey data broadly align with the carryings data and highlight that the morning sailings ex Rousay (the 07:45 and 10:05) are those which residents find it most difficult to secure a booking on. Whilst the carryings data highlight the 14:10 and 17:30 ex Rousay sailings as having the most instances of a >85% load factor, this is driven by freight (14:10) and visitors / tradespeople returning to Orkney mainland (17:30)

Tingwall to or via Rousay

4.4.12 84% of respondents to the survey (n=161) noted that there are sailings to or via Rousay from Tingwall which they sometimes cannot travel on with a vehicle due to lack of space on the ferry. The responses by sailing are summarised in the figure below:

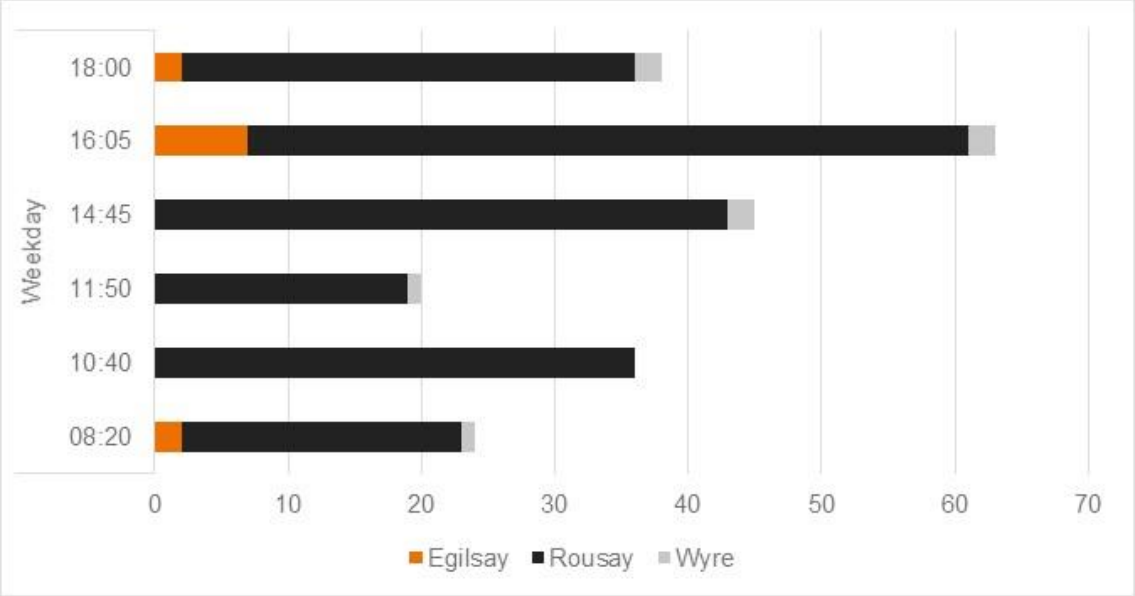


Figure 4.8: Are there sailings from Tingwall to or via Rousay on which you sometimes cannot travel with a vehicle due to lack of space on the ferry (n=multiple response question)

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

- As with the carryings data, the survey suggests that there is a more even distribution of 'problem' sailings across the day in terms of capacity.
- The above said, the 16:05 is by some distance the most problematic sailing, primarily because it will be the most used sailing by REW residents returning from personal business / leisure trips to Orkney mainland. The 18:00 is also a busy sailing as it is that which many commuters return on, and it is this subset of the market is where the island and mainland car arrangement is likely to be most dominant.
- The 08:20 and the 10:40 are identified in the carryings data as those which most frequently have a load factor exceeding 90%. Capacity issues on these sailings are identified less prominently through the survey, which again highlights the challenges with inbound visitors / tradespeople (08:20) and freight (10:40).
- The 16:05 and 18:00 on a Saturday and, to a lesser degree, a Sunday (not shown) are the busiest weekend sailings, further highlighting that the inbound morning sailings during the weekday are dominated by tradespeople and haulage.

Key Point: As with the 'from Rousay' direction, the survey data broadly align with the carryings data, highlighting the later sailings being the most under pressure from the perspective of island residents (who will be returning from employment, education and personal business trips to Orkney mainland).

What do residents do when they cannot get a vehicle booking?

4.4.14 In order to further understand the impact of vehicle capacity problems on the REW route, survey respondents were asked what they typically do when they cannot secure a vehicle booking on their preferred sailing. The responses are summarised in the figure below:

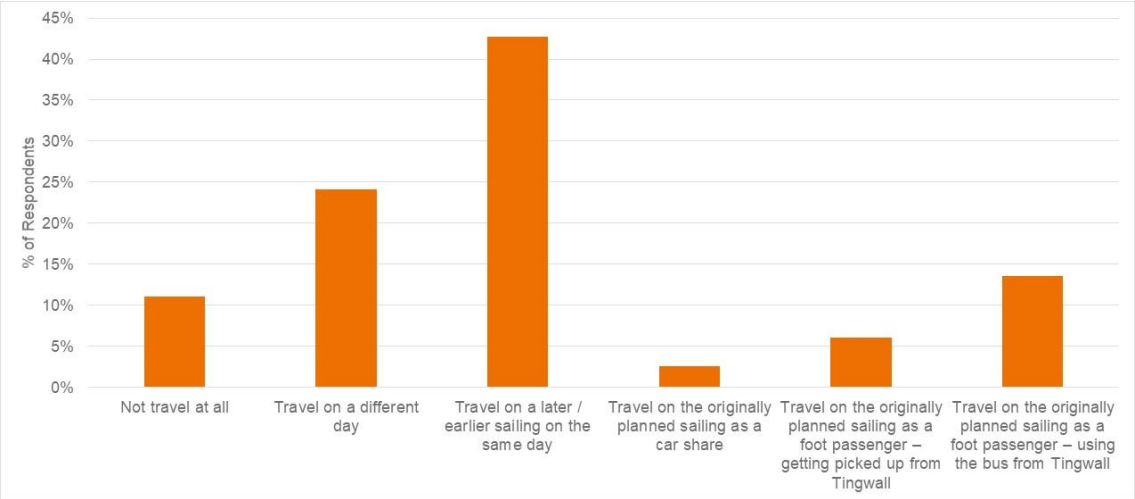


Figure 4.9: if you cannot get your vehicle onto your preferred sailing, what do you usually do? (n=multiple response question)

Note: the three islands have been grouped as the response types were similar.

4.4.15 The main points of note from the above figure are as follows:

- The majority of respondents (89%, n=177) noted that they would still make the journey. However, this means that 11% (n=22) of respondents decide against travelling. Given that they would have been making the journey for a reason (i.e., they would derive a benefit from it), this implies a social welfare loss for these individuals. A further 24% (n=48) would make the journey on a different day, which at the very least implies a degree of inconvenience.
- Of those who would still make the journey, 43% (n=85) would travel on a later or earlier sailing on the same day. The other 23% (n=44) would travel on the same sailing as a car share or foot passenger, either getting picked-up or taking the bus from Tingwall. Whilst those who would still make the journey on the same day would not necessarily miss out on their planned activities, there is an implied disbenefit / inconvenience from not being able to travel as they wished to.

Key Point: Just over one tenth of respondents noted that they typically choose not to travel if they cannot secure a vehicle booking on their preferred sailing – this implies a social welfare loss for these individuals. Whilst 89% would still make the journey, either on a different day, sailing or in a different way, the barrier to making the journey which they choose implies a disbenefit / inconvenience for those individuals.

4.5 Summary

4.5.1 The carryings and capacity utilisation analysis has highlighted that there are vehicle capacity issues associated with the current REW service. The limited vehicle carrying capacity of MV *Eynhallow* together with her deadweight limitations impose a low ceiling on the number of

vehicles that can be carried. The evidence suggests that vehicle capacity pressures are experienced in both the 'from' and 'to' REW directions and across the day for different reasons.

4.5.2 It is evident from the analysis that there is at least some suppressed demand for vehicle carryings. This translates into:

- some residents believing it necessary to own and maintain an island and mainland vehicle, which for some is a form of 'forced car ownership' and thus a transport inequality; and
- residents not making journeys they would like to make or doing so in a way that is not their preference.

4.5.3 Whilst the survey was focused on residents, it is likely that these capacity issues are a deterrent to visitors also.

4.5.4 Whilst it is acknowledged that the direction of national and local policy is not to facilitate unrestrained car growth, car travel is often essential in islands, allowing residents to undertake multiple activities on a single trip to Orkney mainland and for a single ferry fare. This is evidenced by the decision of some households to own and maintain two cars. It is therefore important that this OBC caters for at least some growth in vehicular capacity on this route.

5 Economy and Service Delivery

5.1 Overview

5.1.1 In considering ferry-related investment in Rousay, Egilsay and Wyre, it is important to consider the island economies and societies which any future vessels will be serving. This chapter profiles the economy of the three islands and the delivery of key services such as education and health, providing a context within which options can later be considered.

5.1.2 It should be noted that extensive profiling of Rousay, Egilsay and Wyre was undertaken at the SBC stage. Rather than repeat that analysis, there are various cross-references within this summary chapter.

It should be reiterated that the information in this section relates to the position as at mid-2019.

5.2 Socio-Economic Headlines

5.2.1 In developing the initial case for investment in the SBC, one of the early tasks undertaken was to baseline the economy of all 13 islands in-scope, including Rousay, Egilsay and Wyre. This section recaps on the key headlines from that baselining report.

5.2.2 It is important to bear in mind that developing a socio-economic profile of small islands – particularly islands the size of Egilsay and Wyre - using published data is highly challenging for two reasons:

- **Spatial definition:** the range of data available reduces as the level of spatial disaggregation increases. In addition, where spatially disaggregate data are produced, this is commonly at the datazone level. Whilst suitable for larger islands, in many cases, a single datazone can cover one or more smaller islands as well as a section of the mainland. In these cases, data have to be presented at the Census Output Area level to isolate the island (and are often aggregated to avoid any personally identifiable information).
- **Lag:** it can take several years for some secondary data to be gathered, compiled or estimated, especially at sub-local authority level, the Census being a good example of this. It therefore means that key data are often significantly dated. In the context of these three islands, the Census will in many cases be the main source of empirical data but is now over ten years old.

5.2.3 Moreover:

- Economic output / productivity will be significantly understated as the data do not generally take account of family, voluntary and community work, which is integral to small island communities, particularly those the size of Egilsay and Wyre.
- In a similar vein several island residents will fulfil multiple jobs.
- Communities of this nature are also generally fragile and a single major change can have a significant impact on the likes of employment and population. As Output Area data are from 2011, a number of changes will have occurred in all three islands - we have attempted to account for this through using local datasets and consultation with key stakeholders in this and the following sections.

Key Headlines

- The combined population of Rousay, Egilsay and Wyre has been in decline, with numbers falling from 365 to 271 over the period 1991-2011, a reduction of 35% (the forthcoming 2022 Scottish Census will provide a more complete picture of the long-term trend given the level of aggregation of more recent small area statistics). Data from HIE suggests that the

permanent population of Wyre is now down to nine.[16] The extent to which improved connectivity to Orkney mainland could assist in reversing this trend is a key consideration for this study.

- The island group also has an ageing population. The proportion of residents in the 16-64 age category declined from 64% to 59% between 1991 and 2011. Similarly, the proportion of the population in the 0-16 bracket declined from 24% to 20% over the same period.[17]
- Economic activity rates on Rousay, Egilsay and Wyre are below that of Orkney as a whole and there are a reasonably high number of retirees living within the island group.[18]
- The employment base for Rousay, Egilsay and Wyre differs with the latter two dominated by agriculture and on-island working and the former having a wider industrial base which includes tourism and significant off-island commuting.[19] Rousay also acts as a service centre for the other two islands, hosting for example the primary school and GP practice.
- Home working is the most common option in terms of travel-to-work followed by driving, which likely reflects on-island agricultural and service work and commuting. In common with the majority of other Scottish islands, there has been an increase in home working over consecutive Census periods and this can be expected to increase in the 2022 Census.[20]
- Overall, car ownership in REW is higher than the Scottish and Orcadian averages, with just 16% of households without access to a vehicle.[21] It is also notable that the proportion of households with two or more cars or vans (38%) marginally exceeds the Orcadian average of 36% and significantly exceeds the Scottish average of 27%. This likely reflects the common practice of maintaining an island and mainland car to offset the costs of ferry travel.
- In terms of broadband, Rousay has ADSL Max connectivity which is located on the island. Egilsay and Wyre also have ADSL Max but are served from Rousay, so connection speeds are slower due to their distance from the exchange. Broadband data suggest that the median download speed on Egilsay is 1.1Mbps, on Wyre is 3.4Mbps and on Rousay ranges from 2.3Mbps to 8.1Mbps – these are very slow speeds. There are no committed improvements to the current broadband connectivity.[22] This is an issue for any resident working on Orkney mainland who could realistically work from home some or all of the time, as this generally depends on a high quality and stable broadband connection. The consequence of this is that, for those residents whose employer is off-island, there is generally a physical need to travel to their place of work, increasing pressure on the ferry service (and which may also restrain the trend increase in home working witnessed elsewhere in Scotland).

5.3 Education

Nursery and Primary Education

5.3.1 Rousay has an on-island nursery and primary school. There are no schools on Egilsay and Wyre, with Egilsay Primary School having been formally closed in 2010.

5.3.2 The school on Rousay is staffed by 3 teachers (two of whom are job share). None of the teachers are resident on the island and therefore travel in on a daily basis.

5.3.3 There is currently:

- one child enrolled in the nursery; and

[16] OIITS Economic Baseline & Future Planning Horizon (Peter Brett Associates, 2015), p.44.
[17] OIITS Economic Baseline & Future Planning Horizon (Peter Brett Associates, 2015), p.45.
[18] OIITS Economic Baseline & Future Planning Horizon (Peter Brett Associates, 2015), pp. 45-46
[19] OIITS Economic Baseline & Future Planning Horizon (Peter Brett Associates, 2015), p.46.
[20] OIITS Economic Baseline & Future Planning Horizon (Peter Brett Associates, 2015), p.48.
[21] OIITS Economic Baseline & Future Planning Horizon (Peter Brett Associates, 2015), p.48.
[22] OIITS Economic Baseline & Future Planning Horizon (Peter Brett Associates, 2015), p.49.

- nine children enrolled in the primary school (eight from Rousay and one from Egilsay)

5.3.4 The one child from Egilsay commutes by ferry on a daily basis. Previous consultation suggests that the ferry timetable does not readily support school travel. The first departure from Egilsay is at 07:10 arriving into Rousay at 07:40 – this is considered too early a start from Egilsay and too early arriving into Rousay. The child thus travels on the 09:30 departure from Egilsay, arriving into Rousay at 10:00, and is thus late for school each day (with classes starting at 09:15[23]). Similarly, school finishes at 15:05, with the return ferry to Egilsay not until 16:35, a significant layover for younger children, especially in winter when it is already dark by the time they finish school.

5.3.5 The child travelling from Egilsay is also entitled to an adult escort, a paid position funded by the Council. It is understood that the escort is only paid for the time in which they are accompanying the child. This leads to significant downtime for that individual as there is insufficient time to make a further return trip to Egilsay between drop-off and pick-up.

Key Point: Of the three islands, only Rousay has a primary school. There is currently one child travelling daily from Egilsay (none from Wyre) – whilst this arrangement broadly works, it can either lead to a long day for a young child (off-island 07:10-16:50) or a truncated school day if they travel in later. The ferry service is also important in bringing teaching staff to Rousay.

Secondary Education

5.3.6 There are also 15 secondary school children who travel on a daily basis to Kirkwall Grammar School (KGS), 13 from Rousay and two from Egilsay. The choice of KGS is largely historical, with the journey to Stromness Academy just as straightforward but no REW children go there.

5.3.7 Children of secondary school age travel daily by ferry to Tingwall, with a 30-minute onward bus connection to Kirkwall. These children travel on the 07:10 from Egilsay and the 07:45 from Rousay, returning on the 16:05 from Tingwall. The timetable works relatively well for secondary school children, although it is a long-day for them – for example, an Egilsay child departing at 07:10 and not arriving back to the island until 16:50.

5.3.8 It is understood that children have a 'host' family on the mainland who will accommodate them in the event that the ferry service is disrupted and children cannot get back to the isles.

Key Point: There is a well-established practice for children travelling from the islands to Kirkwall Grammar School. Time travelling is minimised, although the 'commute' time still makes for a long day.

5.4 Health

5.4.1 Rousay, Egilsay and Wyre are served by a single GP practice on Rousay. A nurse practitioner model is used – there are two nurse practitioners who provide 24/7 cover on Rousay, although neither is permanently resident on the island. The Dounby GP (Orkney mainland) visits the island on a Monday and Friday morning and all day on a Wednesday.

5.4.2 All other hospital appointments are at Balfour Hospital in Kirkwall (or Aberdeen Royal Infirmary for specialist services).

5.4.3 Whilst these arrangements are understood to provide appropriate clinical care, Egilsay and Wyre are amongst only a small number of Scottish islands where there is not an on-island medical practice. Residents of these islands therefore have an additional cost of accessing medical care, together with long layovers between ferries in Rousay.

[23] http://www.aroundrousay.co.uk/rousayprimaryschool.shtml

5.4.4 The Air Ambulance is used for medical emergencies across all three islands.

Key Point: Rousay has an on-island medical practice, with GP cover on a Monday, Wednesday and Friday. Egilsay and Wyre residents have to travel to Rousay to access the medical practice and thus incur the additional cost and time of doing so. Residents from all three islands will have to make periodic trips to Balfour Hospital in Kirkwall. The ferry service is also essential in facilitating travel to the isles for the GP and the two nurse practitioners, none of whom are resident in the island group.

5.5 Waste Management

5.5.1 As with several islands in Orkney, the waste collection service for REW is operated on a contract basis by Rousay Deliveries. Each island is allocated black bags, one wheelie bin for black bag storage and two recycling bins for storing recycling before taking it to a 'bring site'.[24]

5.5.2 The waste collection day for all three islands is on a Thursday. Rousay Deliveries use the ferry service to collect from Egilsay and Wyre on a Wednesday (see below) and Rousay on the Thursday and then consolidate and move the waste to Chinglebraes Waste Transfer Station at St Ola on the mainland on a Friday. Waste collection therefore forms part of the wider supply-chain movements to and from the island.

Key Point: Waste management on the isles is coordinated within the wider island supply-chain rather than as a standalone operation.

5.6 Supply-Chain

5.6.1 The majority of day-to-day haulage traffic to and from the island group is undertaken by Rousay Deliveries, which operates a fleet of two pick-up and two 5m trailer vehicles. As with other routes in Orkney, the commercial vehicle tariff structure, which is based on incremental half lane metres for vehicles longer than 5m in length, drives the choice of vehicle. Rousay Deliveries previously operated larger vehicles but now operates this smaller fleet to reduce costs to the company and customers.

5.6.2 Goods for REW are consolidated at the Outer North Isles distribution hub at Hatston, brought to Rousay and then generally delivered on-island using an electric vehicle. General freight is picked-up three days per week (Monday, Wednesday and Friday), with the vehicles generally travelling out on the 07:45 sailing from Rousay and returning on the 10:40 from Tingwall, although the haulier will come back later if need be.

5.6.3 Egilsay and Wyre are served on a Wednesday, with their waste collection providing a backload for the return to Rousay.

5.6.4 Bulk deliveries (e.g., agricultural products) and cattle floats are provided by an Orkney mainland-based haulier. It is these larger movements which are most likely to encounter weight-based constraints when using the ferry service.

5.6.5 There are also high-levels of self-haulage in REW, which is common in islands with a large agricultural sector. Many residents own a trailer on which they will move both business and personal goods.

5.6.6 Consultation with the community in Egilsay and Wyre found that certain bulk deliveries are not provided to these islands, coal for example. They therefore need to be purchased in more expensive bag form and taken back on the ferry. This can involve residents having to take a car to Rousay, thus further adding to their overall cost of living.

[24] https://www.orkney.gov.uk/Service-Directory/R/your-household-collection-service-isles.htm

Key Point: REW has an efficient supply-chain for day-to-day consumables, with a haulage solution derived within the length-based fares tariff. Bulk haulage services are provided by an off-island firm and it is these movements which can most regularly encounter deadweight-based constraints on the ferry service. Egilsay and Wyre can encounter higher costs due to the need to buy goods in smaller quantities due to the absence of bulk deliveries for some products.

5.7 Contractors

5.7.1 As REW is close to Orkney mainland and has a relatively frequent service, contractors (e.g., utility companies) will typically travel to each island in own company vehicles.

5.7.2 However, it should be noted that the stakeholder consultation identified the additional costs of commercial service provision (e.g., tradespeople) to Egilsay and Wyre due to the stand down time between ferries on these islands.

5.8 Veterinary Services

5.8.1 As previously noted, REW has a significant agricultural sector and thus the provision of veterinary services is essential. This entails both visits to the isles and also island farmers bringing their animals into Kirkwall.

5.8.2 Consultation with a Kirkwall-based veterinary practice identified regular travel to REW, with visits to Rousay every 2-4 weeks and slightly less frequently to Egilsay and Wyre. In addition to these regular calls, vets will make *ad hoc* visits to the isles for emergency appointments.

5.8.3 Unlike the Outer North Isles where any visit by ferry is effectively a day's work, the higher frequency of the REW service does allow for shorter appointments, meaning less veterinary time is wasted, especially for more urgent cases. Nonetheless, it was noted through the consultation that the absence of winter Sunday sailings can leave clients with animals in distress as no access to vets or medicines is available without very costly private boat hires (this will to some extent be addressed by the commencement of winter Sunday sailings from the winter 2021/22 timetable).

5.8.4 Ideally, when travelling to one of the isles, the vet will take their vehicle to ensure that they can take as much equipment and medicines to the appointment as possible. However, it was noted by a practice that, during the summer, it can be difficult to secure a vehicle space on the ferry for short-notice journeys, a point borne out by the carryings and utilisation data (again bearing in mind that a booking is likely required in both directions). In such instances, the vet is limited to the equipment and medicines which they can carry by hand.

Key Point: Veterinary services are essential in REW given the prominence of the archipelago's agricultural sector. Whilst the ferry service does facilitate these services at present, the absence of Sunday sailings to date, together with the frequent inability to get a vehicle space on the ferry for short notice appointments during summer, impacts on the service which can be delivered.

5.9 Summary

5.9.1 This chapter has summarised the socio-economic headlines, supply-chain and the delivery of public services in REW, exploring the extent to which the ferry service shapes these factors. Overall, whilst there are constraints with the ferry service at present, particularly in terms of capacity and frequency, it broadly facilitates the functioning of an effective island supply-chain, education system and health delivery.

5.9.2 The above said, much of what occurs today has developed around the ferry connection which exists, and it is evident that efficiency could be improved with a new vessel and an enhanced timetable.

6 Personal Travel

6.1 Overview

6.1.1 Having set out the role of the ferry service in facilitating service delivery and the supply-chain of the three islands, this chapter considers how it facilitates personal travel by island residents. It is the final step in piecing together the volume and type of demand on the REW ferry service, informing the development of options in Chapter 7.

6.1.2 The narrative which follows predominantly draws upon a programme of engagement with the ONI communities incorporating:

- outcomes from telephone consultations with island transportation representatives at the outset of the SBC process (autumn 2015);
- feedback from the SBC public exhibition events (summer 2016), including from the 'exit questionnaires' provided at those events;
- stakeholder consultation undertaken at the outset of the OBC process (early 2019); and
- an island resident survey which explored use of the current ferry services (2019).

6.2 Resident Survey

6.2.1 The resident survey was issued to Rousay, Egilsay and Wyre residents in mid-2020. It was a web-based survey (with paper survey back-up) and was open to all island residents over the age of 16. The response rates are shown in Table 6.1:

Table 6.1: Outer North Isles Resident Survey Responses

	No. of Responses	Adult Population at 2011 Census[25]	Response as % of Population
Rousay	108	216	50%
Egilsay	12	26	46%
Wyre	6	29[26]	21%

6.2.2 The percentage response rates are higher than those typically obtained in surveys of this nature (often single figure percentages), and thus there can be a degree of confidence that the findings are broadly representative of the population of each island and REW as a whole (as at 2020).

Place of Work

6.2.3 In order to understand and contextualise travel behaviour, respondents to the survey were asked where their place(s) of work / education are – this is summarised in Figure 6.1 below:

[25] Note – for Egilsay and Wyre, the adult population is combined due to the small number of people living on each island. To this end, the overall population has be used,

[26] Actual permanent resident population is now understood to be nearer 9.

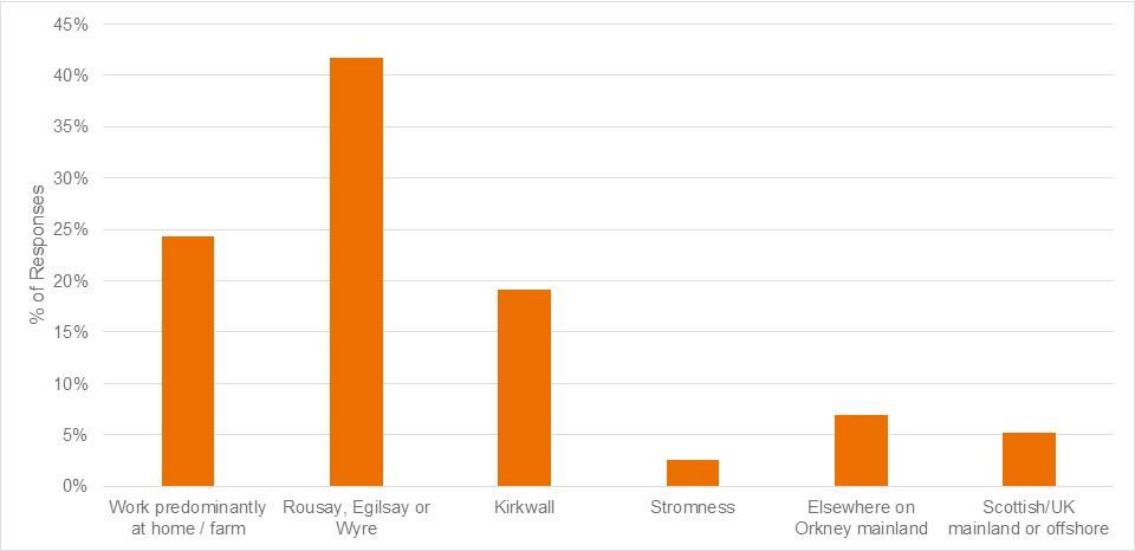


Figure 6.1: Where is your place(s) of work / education? (n=multiple response question)

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

- Despite the commuter flows from REW, it is notable that the majority of residents work on-island. This in part reflects the strength of the agricultural sector in the three islands but also jobs related to other services on the islands.
- 29% of respondents (n=33) did however note that they work / study on Orkney mainland, with Kirkwall being the dominant destination, with 66% (n=22) of the 33 respondents who work / study on Orkney mainland going to Kirkwall. This highlights the importance of providing a commutable service to the mainland as well as the bus link to Kirkwall.
- 5% (n=6) of the respondents work on the Scottish / UK mainland or offshore. The historic absence of a winter Sunday sailing is likely to have been problematic for these residents if they required to make a Sunday or early Monday morning journey to their place of work.

Key Point: The majority of REW residents work or study within the island group, in part due to the prevalence of the agricultural sector in these islands. However, just short of a third of respondents travel to Orkney mainland for work, of which the majority go to Kirkwall.

6.3 Frequency of Travel

6.3.1 In building up a profile of travel patterns, respondents were asked how frequently they typically travelled to Orkney mainland prior to the COVID-19 pandemic:

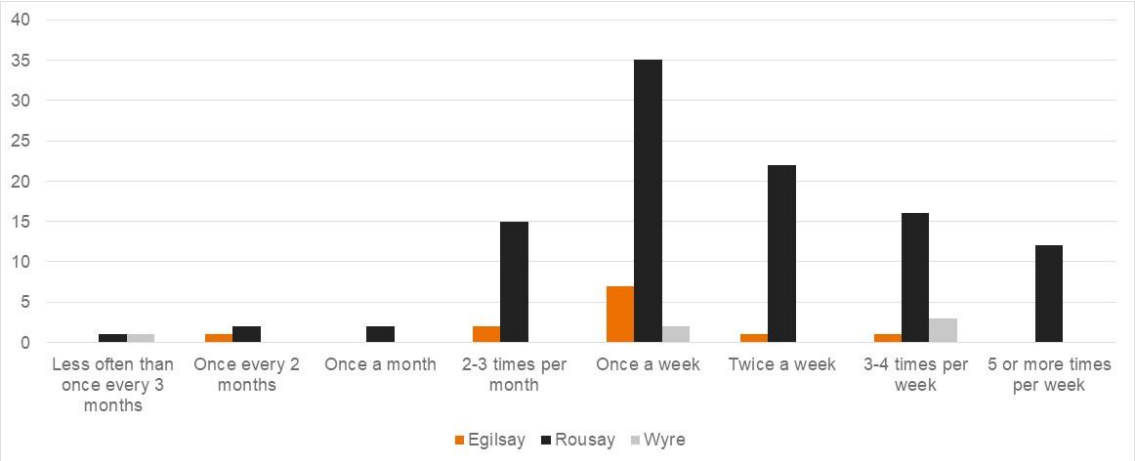


Figure 6.2: Before the COVID-19 pandemic, approximately how often did you typically travel to Orkney mainland? (n=123)

6.3.2 The main points from the above figure are as follows:

- Given proximity to Orkney mainland, trip making is very frequent, as would be expected. Working on the basis of the midpoint of the frequency ranges, **the average REW resident travels to Orkney mainland around twice per week**.
- There is however a significant subset of residents who travel several times per week. This highlights the commuter nature of the route, particularly for those living in Rousay where the journey times are shortest and the connections are typically direct.

6.3.3 A subsequent question confirmed that almost all travel is to Kirkwall – when weighted for journey frequency, 85% of trips are always / mostly to Kirkwall, with a further 10% making an equal number of trips between to Kirkwall and Stromness.

Key Point: Travel from REW to Orkney mainland is very frequent, with the average resident making around two trips per week. There is a significant subset of residents who travel several times per week, highlighting the commuter nature of the route. Kirkwall is by some distance the dominant destination, with 85% of frequency weighted trips always / mostly to Kirkwall.

6.4 Mode of Travel

6.4.1 The survey found that, when journey responses were weighted for trip frequency, there is a relatively even balance between those who mostly or always travel with a car (37%, n=86) and those who mostly or always travel as a foot passenger (38%, n=88). Around a quarter of respondents (n=57) sometimes travel as a foot passenger and sometimes travel with a car.

6.4.2 Whilst Chapter 4, which examined carryings and capacity utilisation, identified the importance of vehicle carrying capacity, it is evident that there is also a sizeable foot passenger market. Foot passengers make their onward journey using the number 6 bus, which is timed to connect with the ferry service and will wait up to 15 minutes for late arrivals.[27] The relatively large foot passenger market highlights both the importance of the bus service to Kirkwall as well as the informal car share arrangements which currently exist.

6.4.3 It should be noted that, based on the responses to the vehicle capacity questions, the balance could be expected to tip in favour of taking a car onboard the ferry if capacity is expanded.

Key Point: There is at present an even balance between those who mostly or always travel with a car and those who mostly or always travel as a foot passenger. This highlights the importance of the bus connection to Kirkwall and the informal car share arrangements which exist. That said, the balance could be expected to move in favour of taking a car if capacity constraints on the route were addressed.

6.5 Journey Purposes

6.5.1 The resident survey asked respondents what their main and other purposes were for using the ferry service.

Main Purpose

6.5.2 The figure below shows main journey purpose for the three islands combined, weighted by journey frequency:

[27] https://tiscon-maps-stagecoachbus.s3.amazonaws.com/Timetables/North%20Scotland/Highlands/Orkney%20Guide%20from%20Monday%2016th%20August.pdf

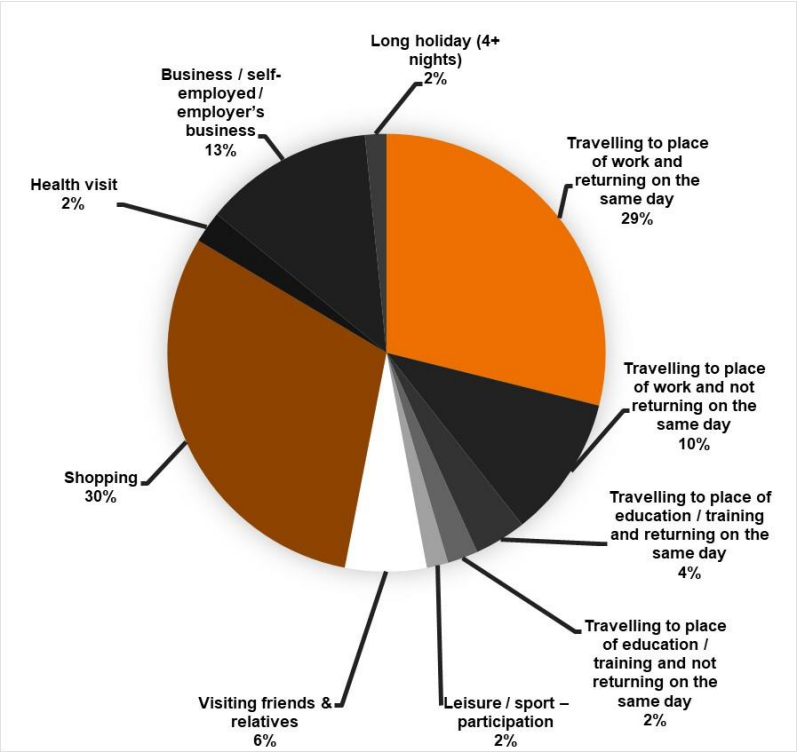


Figure 6.3: What is typically your main reason for travelling to Orkney mainland? (n=126) – responses weighted by frequency of travel

6.5.3 The main points of note from the above figure are as follows:

- The commuter nature of the REW route is evident from the main journey purposes stated. 33% of trips are either travelling to work or education and returning on the same day. A further 12% are travelling for work or education and not returning on the same day, whilst 13% are travelling for business / self-employed / employer's business.
- Around one third of all other travel is for shopping, with other combined personal business and leisure purposes accounting for a combined 12%.
- There is a wider range of main travel purposes for Rousay residents compared to those of Egilsay and Wyre (not broken down in the chart). This likely reflects the larger population and the shorter journey times and direct connections to and from Rousay.

Key Point: When weighted for journey frequency, travel for employment, education and business accounts for 58% of all main journey purposes. There is in particular a strong travel-to-work / education market on the route, with one third of respondents stating this as their main travel purpose. Around one third of all of other travel is for shopping.

Other Purposes

6.5.4 The figure below shows other journey purposes for the three islands combined. Note that these purposes are not weighted by frequency because there are multiple reasons cited for travelling to Orkney mainland:

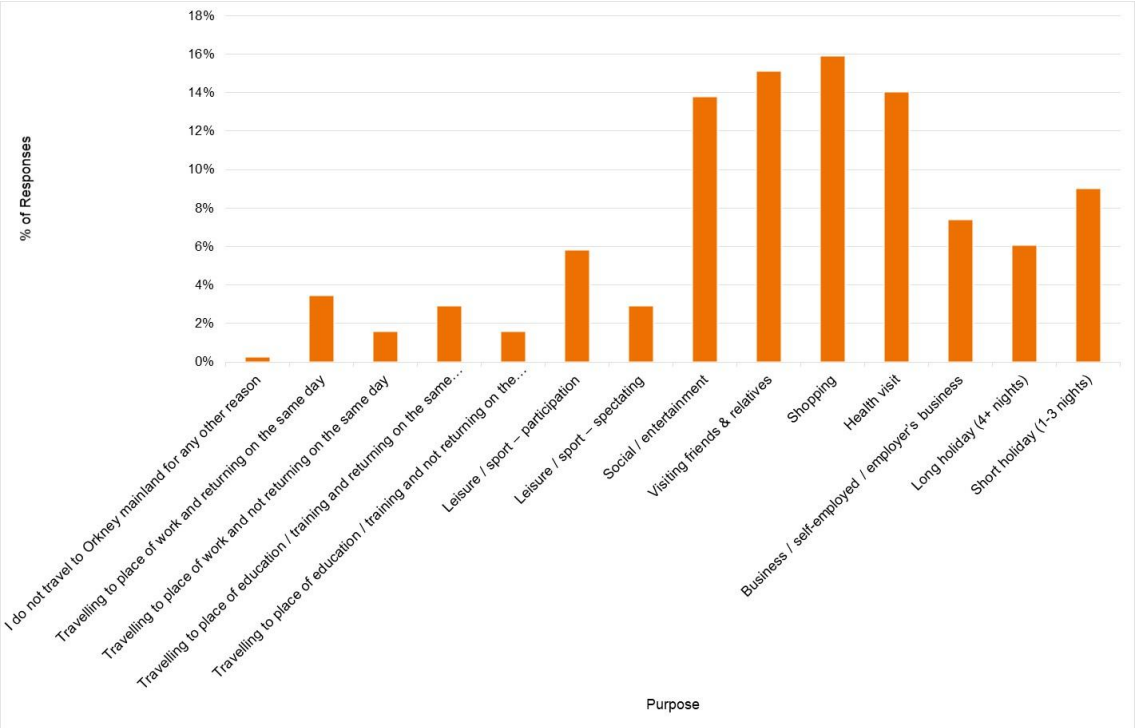


Figure 6.4: For what other reasons do you typically travel to Orkney mainland? (n=multiple response)

6.5.5 Outwith the dominant journey purposes of travel to work / education / business and shopping, use of the REW route is highly diverse and heavily focused on personal business and leisure activities.

6.6 Inter-Island Travel

6.6.1 Whilst the majority of journeys made by island residents on the ferry are to Orkney mainland, it is important to bear in mind that inter-island travel is a feature of the REW route. As explained in Chapter 5, Rousay plays an important role as a service and employment centre for the island group, but there are also historic family and other links between the three islands. The resident survey therefore asked a set of questions around inter-island travel, the responses to which are briefly summarised here.

6.6.2 The frequency of travel between the islands is much lower than travel to Orkney mainland, which is to be expected. Key headlines are as follows:

- 28% (n=32) of all respondents (and 31%, n=30 in Rousay) never travel between the isles. A further 47% travel between the islands less than monthly.
- However, a quarter of island residents (n=56) make an inter-island journey once a month or more frequently, with 13% (n=30) travelling once a week or more frequently. There is therefore a reasonable level of inter-island travel and indeed 11% of Rousay respondents noted that they travel once a week or more frequently.

6.6.3 The reasons for undertaking inter-island trips are diverse. There is again a relatively strong travel-to-work flow with 13% (n=23 – 18 people from Rousay, 3 from Egilsay and 2 from Wyre) travelling for this purpose. It is likely that most of the travel-to-work movements from Rousay will be trade related rather than a daily commute in the conventional sense. The dominant travel purposes are however leisure related, including 'social and entertainment' and 'visiting friends and relatives. Health is also an important category, particularly for Egilsay and Wyre residents travelling to the GP practice on Rousay.

Key Point: Whilst inter-island travel is much less frequent than travel to Orkney mainland, it is nonetheless fairly common for both work and leisure related purposes.

6.7 Travel to Education

6.7.1 The survey identified 20 school age children:

- 3 children in early years / pre-school
- 10 children at primary school
- 7 children at secondary school

6.7.2 The survey also recorded 4 children in Rousay who are not yet at school.

Primary School

6.7.3 The only use of the ferry for primary school travel (in 2019) was by a single child from Egilsay travelling to Rousay (as explained in Chapter 5).

6.7.4 Whilst the ferry provides an effective link for school travel, it is important to note that children from Egilsay and Wyre have fewer opportunities to participate in extra-curricular activities and socialise with other children.

Secondary School

6.7.5 Whilst only seven respondents noted that they had children in secondary school (n=1 Egilsay, n=6 Rousay), a slightly wider subset of the sample (n=13) provided a view on their satisfaction with travel to secondary school. The survey found that slightly fewer people are satisfied (n=4) as dissatisfied (n=5), with four respondents recording a neutral score. Overall therefore, it appears that the secondary school travel arrangements broadly work for REW, although there is considered room for improvement.

6.8 Overall Views of Transport Connections

Travelling to Orkney Mainland

6.8.1 65% (n=76, n=6 Egilsay, n=66 Rousay and n=4 Wyre) of survey participants responded that *"the current ferry and timetable does not meet all my travel requirements – it prevents me from travelling to Orkney mainland as often as I'd like and / or stops me doing all the things I'd like to do there".*

6.8.2 These respondents were then asked which elements of the ferry service prevented them from travelling to Orkney mainland as frequently as they wish to. The responses to this question are summarised in the figure below – note that considerations around fares / cost of travel were excluded from the survey as these were subject to a separate piece of work.

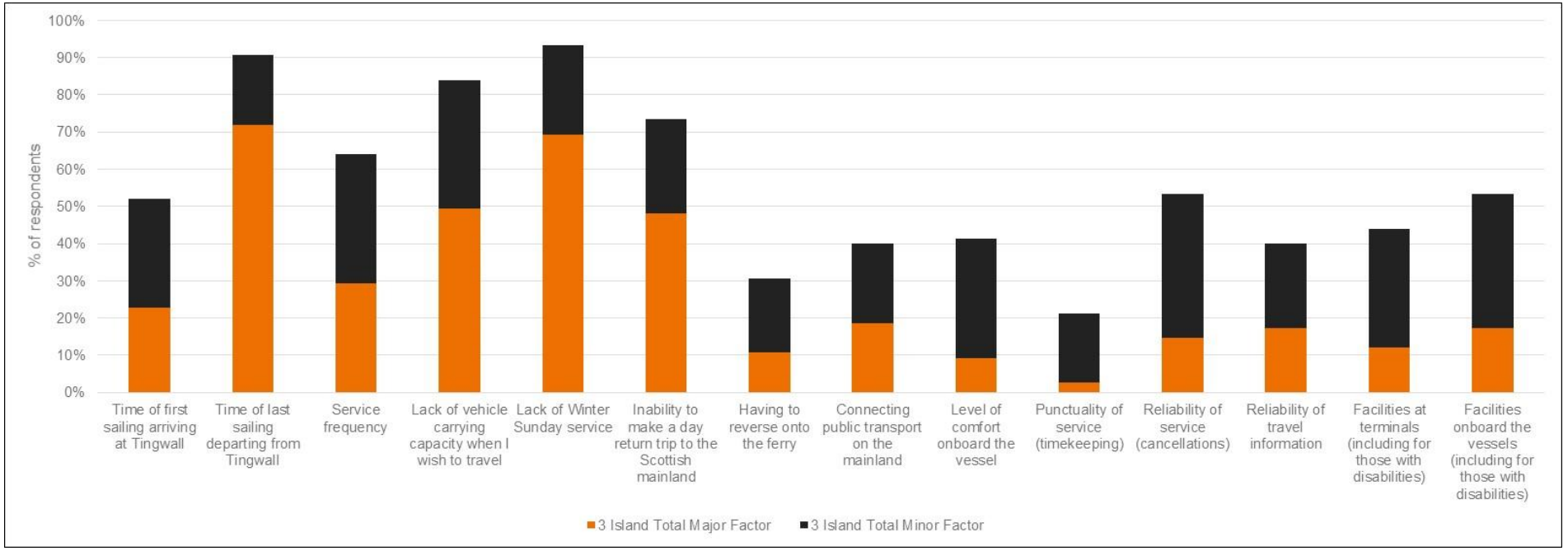


Figure 6.5: How big a factor is each of the following in preventing you from doing everything you'd like to do on Orkney mainland - Major / Minor Factor (n=75)

- The primary concerns of island residents relate to the timetable. In particular, the timing of the last departure from Tingwall (18:00) is identified as a major constraint as it imposes a firm cap on time on mainland (latest departure from Kirkwall would be just after 17:00). The absence of a winter Sunday sailing is also identified as a significant limitation on the service, albeit this has now been addressed in at least the short-term.
- With the first arrival into Tingwall being 08:20 and the last departure 18:00, it is not possible to make a day return trip to the Scottish mainland. This compares to islands in Shetland such as Bressay, Yell and Whalsay, where a (albeit short) day return trip is more readily achievable.
- Outwith the timetable related issues, the availability of vehicle carrying capacity is clearly identified as a factor limiting use, supporting the earlier analysis on carryings and capacity utilisation.
- There are a range of other limiting factors, including onboard and at terminal facilities, but timetable and capacity are by some distance the most significant problems identified.

6.8.3 In order to understand the economic and societal impacts of people travelling to Orkney mainland less often than they would like, respondents were asked what activities they are missing out on. This is summarised in the figure below:

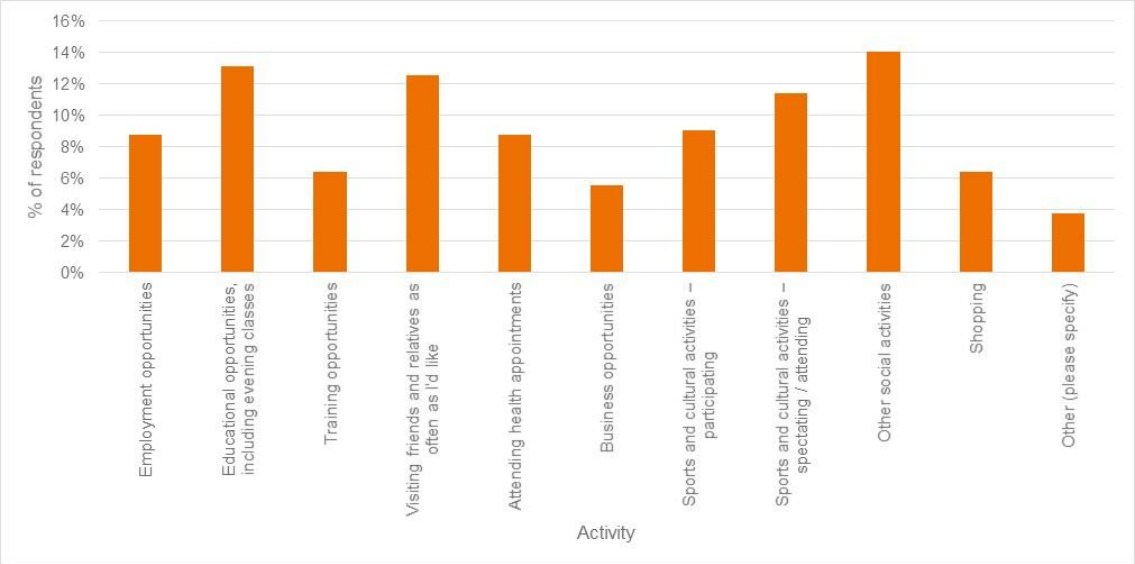


Figure 6.6: In doing less on Orkney mainland than you'd like, what activities / opportunities are you currently missing out on? (n=multiple response)

6.8.4 The above figure shows that REW residents are missing out on both economic and social opportunities as a result of travelling less often than they would like. Importantly, 9% of respondents noted that they are missing out on employment opportunities. The stakeholder consultation identified two issues in relation to access to employment:

- There is very limited access to shift-based employment, with the ferry timetable limiting island residents to jobs with a typical 09:00-17:00 day. Examples cited included work in social care and hospitality.
- Linked to the above, it was noted that certain mainland employers (e.g., Tesco and Lidl) often advertise posts with start times of 08:00 or 08:30, which REW residents cannot access due to the first sailing not arriving into Tingwall until 08:20.

6.8.5 Education and training opportunities are also considered to be limited, with the consultation highlighting access to extra-curricular activities as being a particular issue. The ferry service also limits access to social events, including visiting friends and relatives and sports and cultural activities. An overnight stay will often be required either in a hotel or relying on staying with family or friends.

6.8.6 Whilst a new vessel(s) will not address these issues in its own right (except for providing additional vehicular capacity), combining this with a crewing solution to extend the day would address the majority of barriers to travel on the REW route.

Key Point: Almost two thirds of survey respondents noted that the current ferry and timetable does meet all of their travel requirements and means that they travel to Orkney mainland less than they otherwise would. The main non-fares limitations are imposed by the length of the operating day and a lack of vehicular capacity on the ferry at peak times. As a consequence, REW residents are missing out on employment, education / training and leisure opportunities on Orkney mainland.

Visitors to the islands

6.8.7 Whilst the survey was focused on resident travel, three quarters of respondents (n=87, n=10 Egilsay, n=74 Rousay and n=3 Wyre) noted the ferry and timetables prevent people on Orkney mainland from visiting their island as often as they would wish to, or from providing goods and services. Those who identified this problem were asked how it impacted upon them, with the findings shown in the figure below (split by island as there are some important differences between them):

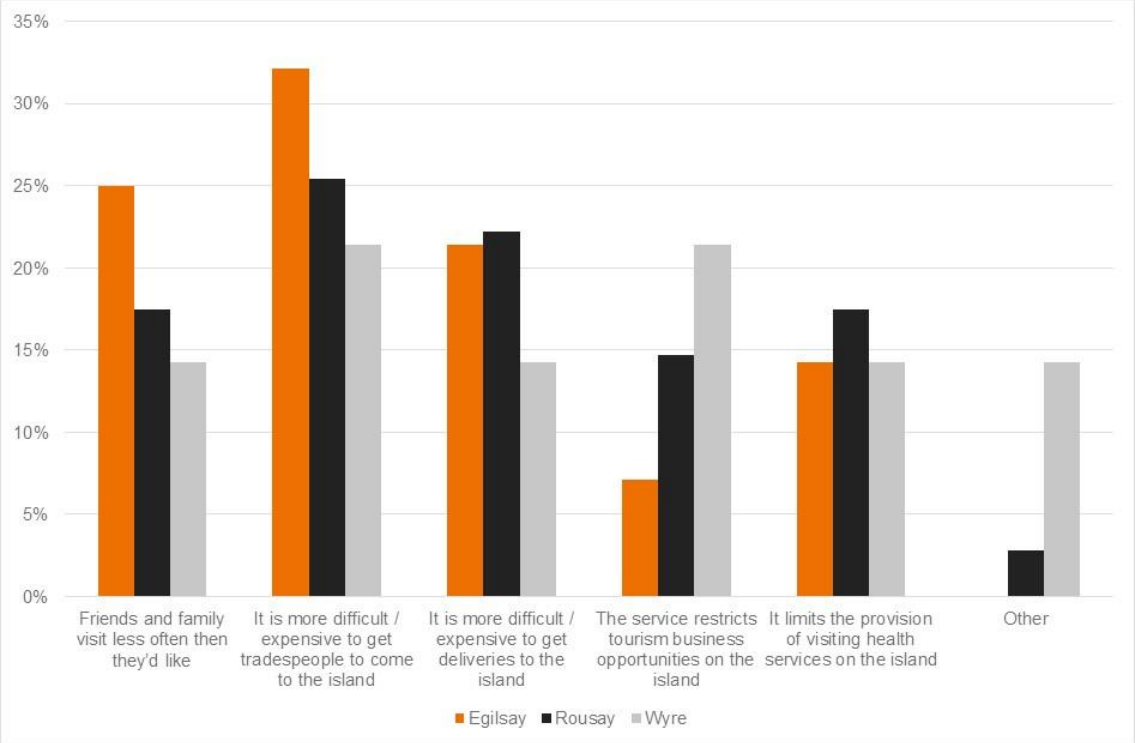


Figure 6.7: How does this [people / tradespeople being prevented from visiting as often as they would like] impact you? (n=multiple response)

6.8.8 The main points from the above figure are as follows:

- A significant proportion of residents across all islands note that friends and family visit less often than they would like. This point was specifically picked-up in the consultation with regards to Egilsay, where it was noted in the stakeholder consultation that the weekend is a particular problem for those visiting.
- Cost is also an important issue, with all three islands highlighting that it can be difficult / expensive to get tradespeople to come the island and to get deliveries to the islands. This came through strongly in the stakeholder consultation for Egilsay and Wyre in particular.
- The ferry service is also considered to limit tourist visits to the islands, particularly in Wyre.

Key Point: Three quarters of survey respondents noted that the ferry service prevents people on Orkney mainland from visiting their island as often as they would wish to, or from providing goods and services. The main impacts identified were fewer opportunities for friends and family to visit, high costs of service provision and the delivery of goods and limitations on island tourism.

Day-to-day needs and long-term sustainability

6.8.9 The survey concluded with three general questions about the ferry service now and in the future – these were:

- *Overall, do you think that the current ferry and timetables from your home island are sufficient for you and your family's day-to-day needs now and in the future?*
- *Overall, do you think that the current ferry and timetables from your home island are sufficient to ensure the long-term sustainability of your island as a community?*
- *Do you think that improved connectivity between your island and Orkney mainland would make it a more attractive place to live and bring up families in the future?*

6.8.10 The responses to these questions are summarised by island in the table below:

Table 6.2: Day-to-day needs and long-term sustainability

	Day-to-day needs[28]		Long-term sustainability of island community[29]		Improved connectivity[30]	
	Yes	*No*	*Yes*	*No*	*Yes*	*No*
Egilsay	42%	58%	33%	67%	75%	25%
Rousay	23%	77%	25%	75%	90%	10%
Wyre	40%	60%	40%	60%	89%	11%

6.8.11 The key points form the above table are as follows:

- Across the three islands, there is a majority view that the current ferry and timetables are insufficient for they and their family's day-to-day needs in the future. Despite having the best service of the three islands in terms of the number of connections, over three quarters of Rousay residents responded negatively.
- There is also a view across the three islands that the current ferry and timetables are inadequate to ensure the long-term sustainability of each island community. This view again came through particularly strongly in Rousay.
- There is a majority view that improved connectivity to Orkney mainland would make each island a more attractive place to live and bring up families in the future.

Key Point: Across all three islands, the current ferry and timetable is considered inadequate in meeting the current and future needs of the communities. There is a majority view that improved connectivity to Orkney mainland would make each island a more attractive place to live and bring up families in the future.

6.9 What are the priorities of communities?

6.9.1 As part of the public engagement component of the SBC, respondents to the public exhibition feedback form were asked to identify what their 'Top 3' service improvement priorities would be in the event that additional funding was made available. Whilst not a comprehensive record of community views, the survey outputs provide a useful cross-reference for the option development and appraisal process and are thus repeated below.

6.9.2 There were 23 completed questionnaires across the three islands, almost all of which were from Rousay residents. The top priority for residents was **Sunday services**, a reflection of the then

[28] Egilsay (n=12), Rousay (n=94) and Wyre (n=5)

[29] Egilsay (n=12), Rousay (n=94) and Wyre (n=5)

[30] Egilsay (n=10), Rousay (n=86) and Wyre (n=4) – all excluding "Don't knows".

absence of Sunday connections in the winter timetable. A **longer operating day** incorporating **earlier first sailings and later evening services** were the other most frequently cited desired improvements.

6.10 Next Steps

6.10.1 This and the previous two chapters have set out how the REW route is used from the perspective of island residents and visitors, the supply-chain and for service delivery. This profile, together with the capacity analysis and demand forecasts, will be fed into the detailed option development in Chapter 7.

7 Detailed Option Development

7.1 Overview

7.1.1 Having evidenced the usage of the REW ferry service and the problems associated with it, this chapter further develops the remaining capital options ahead of their final appraisal and selection of a preferred option. To recap, the capital options progressed from the SBC were as follows:

- **Option CO2:** Replace MV *Eynhallow* with one larger vessel *(now Option 1)*
- **Option CO3:** Replace MV *Eynhallow* with two 'like-for-like'[31] vessels *(now Option 2)*
- **Option CO4:** Supplement Option CO2 with a passenger only vessel *(now Option 3)*

7.1.2 For ease of reference, these options will now be referred to as Options 1-3, as noted in the brackets at the end of each option.

7.1.3 It should be noted that, regardless of the preferred option selected, it is assumed that the Ro-Ro vessel (or main vessel if there are two) will operate a 16-18 hour day, up to 7-days per week, year-round. This is the preferred option emerging from the Revenue OBC and should align with the preferred capital option identified through this OBC. In this respect, any two-vessel solution would involve one vessel operating a 16-18 hour day (the 'shift boat') and the second vessel operating a 'standard' day broadly equating to the current timetable (the 'day' boat)

7.1.4 The service to **Gairsay** will be continued on the current basis. This could either be done through retaining MV *Eynhallow* or MV *Shapinsay* in the longer-term or through the provision of a purpose-built slipway to accommodate the vessel(s) solution emerging from this OBC.

7.2 Is there a case for a passenger vessel?

7.2.1 The SBC identified as an option the supplementing of the primary Ro-Ro vessel with a passenger only vessel, either to provide a direct connection to Kirkwall or to act as a feeder service from Egilsay and Wyre to Rousay. The decision to retain this option at SBC stage was marginal as it had little public support but, in keeping with the guidance, we did not believe that there was sufficient evidence to exclude it at that stage, and thus it was retained for further examination.

7.2.2 To this end, ahead of full option development at OBC stage, we revisited the case for a supplementary passenger vessel. This screening exercise concluded **that a passenger only vessel should not be considered further** for the following reasons:

- The obvious advantage of a passenger only vessel would have been to provide a direct service from REW to Kirkwall, reducing the need to take the car on the ferry or maintain a second vehicle at Tingwall. However, on further review, the journey time would be long, even compared to travelling as a passenger on the ferry and taking the bus, whilst there could also be reliability and passenger comfort issues associated with the crossing. This solution would appear disproportionate when compared to an enhanced Ro-Ro and connecting bus services at Tingwall.
- Given the relative populations of the three islands, it is highly likely that the passenger only vessel would be based in and would operate from Rousay. There would therefore be interchange issues for Egilsay and Wyre passengers, and by extension a potential reduction in Ro-Ro services, which would not be publicly acceptable. Indeed, this was the

[31] 'Like-for-like' in this context is considered as providing an equivalent capacity to the MV *Eynhallow*. It should however be noted that modern vessel construction / stability rules may increase the displacement over and above that of the current vessel, and thus 'like-for-like' in this context may imply a materially larger vessel.

concept of the feeder passenger service, which was a deeply unpopular option at SBC stage.

- The cost saving from one small Ro-Ro vessel plus a passenger vessel compared to a single larger Ro-Ro vessel would be minimal. The negligible cost benefits would be set against the limited benefits on offer.
- There are low levels of public interest in this option and indeed clear opposition to it in some quarters.

Key Point: The option of a passenger-only vessel to supplement a Ro-Ro vessel has been ruled out ahead of the main OBC option development process. There are few benefits and little public interest in this option.

7.3 Design Vessels

7.3.1 It is important to note that vessel design, hull form, fuel type etc are not confirmed in the OBC, although early principles can be established and the procurement approach defined through the Commercial Case. Nonetheless, 'design vessels' are required as the basis for sizing and costing the infrastructure and appraising the options – these are set out in this section.

When is the vessel specification finalised?

7.3.2 As noted above, at the Socio-Economic Case stage of the OBC (i.e., this work), 'design vessels' are used as the basis of costing and identifying the scope, scale and cost of harbour works required to accommodate them. The vessel specification is not typically advanced much beyond this at this stage.

7.3.3 At the Commercial Case stage of the OBC, initial consideration is given to how the vessels will be procured, and the extent to which the buying party wishes to influence the overall design. There are a wide range of options, ranging from the two extremes of providing a full design for yards to bid against to an 'output specification', which sets out key design parameters the buyer wants incorporated in the vessel (e.g., length overall, speed, fuel type etc) but leaves it to naval architects and shipyards to come forward with ideas on how best to deliver this.

7.3.4 The updated Commercial Case in the Final Business Case (FBC) will confirm a preferred option in terms of how the new vessels are specified. The extent of the design at FBC stage will depend on the procurement route chosen and who the buying party is.

Design Vessels

7.3.5 To recap, the *Eynhallow* has:

- a stated PCU capacity of 10, albeit in practice this is now closer to an actual capacity of 6-8 PCUs. The vessel also has a deadweight capacity of 40 tonnes; and
- a bow ramp only, with a requirement to reverse onto the vessel.

Option 1: Replace MV *Eynhallow* with one larger vessel

7.3.6 The 'design vessel' for Option 1 is based on the current CMAL hybrid *Loch* Class vessels. This design vessel was chosen as it offers just over double the capacity of MV *Eynhallow* and thus is a good example of a larger vessel. It should however be noted that the design vessel is only intended to assist in sizing the infrastructure and a bespoke business case and procurement would be adopted for any future REW vessel. An example of a CMAL hybrid *Loch* Class vessel – the MV *Lochinvar* - is shown in the picture below:

Figure 7.1: MV *Lochinvar* at Lochaline (Credit: Stephen Canning)

7.3.7 The main particulars of this vessel type are summarised in the table below:

Table 7.1: Option 1 design vessel – main particulars[32]

Parameter	Design Vessel
Passenger Certificate	EU Class C
Length Overall (m)	43.5
Beam (m)	12.2
Draught (m)	1.73
Speed (kts)	9
Ramp Configuration	Double-ended, through and through
Passenger Capacity	150
Vehicle Capacity (PCUs)	22
Crew	4

Option 2: Replace MV *Eynhallow* with two 'like-for-like' vessels

7.3.8 The 'design vessel' for Option 2 is based on the older and small style of CMAL *Loch* Class vessels. This class has been chosen because it offers an equivalent stated PCU capacity (and likely actual PCU capacity) to MV *Eynhallow* and can therefore be considered "like-for-like" from a capacity perspective. Again, this design vessel has only been used for the purpose of sizing the infrastructure and a bespoke business case and procurement would be adopted for any future REW vessel. Examples of this vessel class - MV *Loch Linnhe* and MV *Loch Riddon* - are shown in the picture below:

[32] https://www.shipsofcalmac.co.uk/ships-1/Lochinvar

Figure 7.2: MV *Loch Linnhe* and MV *Loch Riddon* at Largs (Credit: Stephen Canning)

7.3.9 The key characteristics of this vessel type are summarised in the table below:

Table 7.2: Option 2 design vessel – main particulars[33]

Parameter	Design Vessel
Passenger Certificate	MCA Class VI/VIA
Length Overall (m)	30.2
Beam (m)	10
Draught (m)	1.5
Speed (kts)	9
Ramp Configuration	Double-ended, through and through
Passenger Capacity	203

[33] https://www.shipsofcalmac.co.uk/ships-1/Loch-Riddon

Parameter	Design Vessel
Vehicle Capacity (PCUs)	10
Crew	4

7.4 Infrastructure Specification

7.4.1 Working from the design vessels set out, ferry terminal infrastructure specifications have been developed and costed for each option – these are set out below. Note that larger versions of the general arrangement drawings are presented in **Appendix B**.

Option 1: Replace MV *Eynhallow* with one larger vessel

7.4.2 The infrastructure design associated with Option 1 assumes a continuation of the current day operational practices, with a single vessel operating the service and overnighting in Rousay. The ferry terminal infrastructure upgrades required to support this at each terminal are set out in a general arrangement drawing with supporting commentary below, with costs detailed thereafter.

Rousay

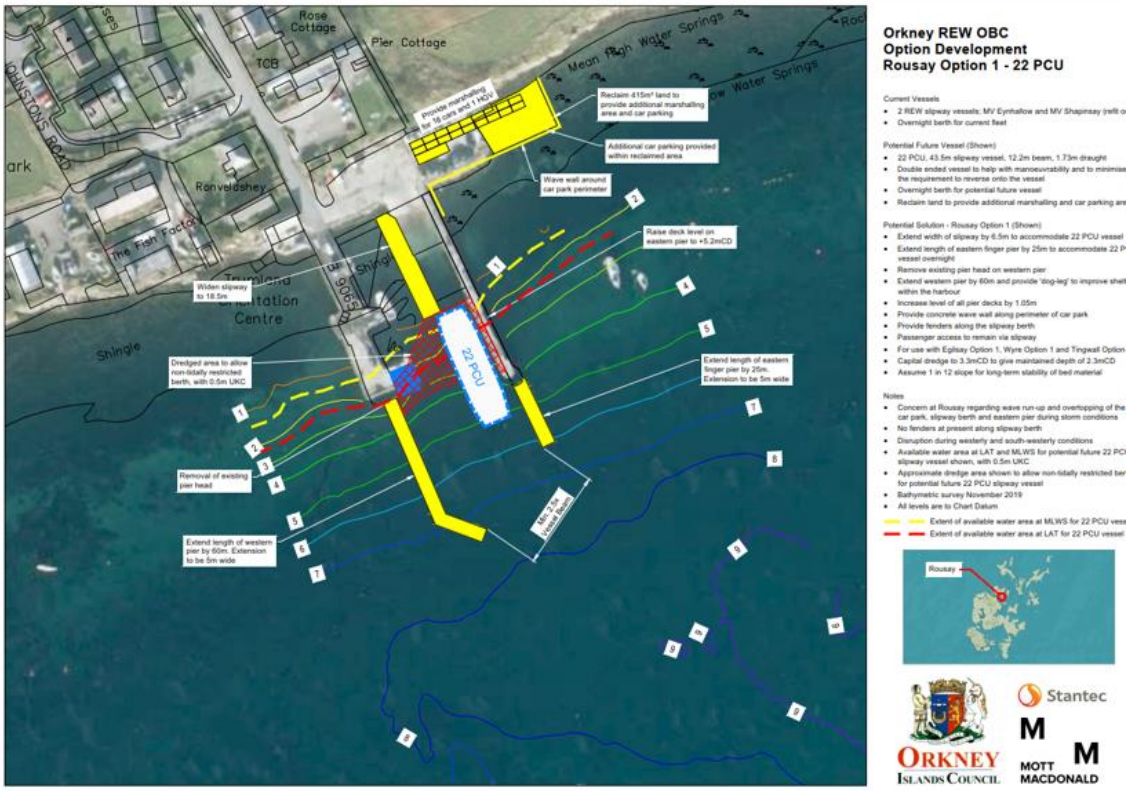


Figure 7.3: Option 1 – Rousay general arrangement

7.4.3 In order to accommodate a 22 PCU vessel at Rousay, the following infrastructure upgrades are recommended:

- Widen the slipway and extend both piers to provide a berth suitable for overnighting and to improve shelter in the harbour
- Raise the deck level of the eastern pier, as this currently overtops during storm conditions

- Dredging within the harbour,
- Land reclamation to provide additional car parking and marshalling facilities (18 cars plus one commercial vehicle, or circa 22-23 PCUs)

Egilsay

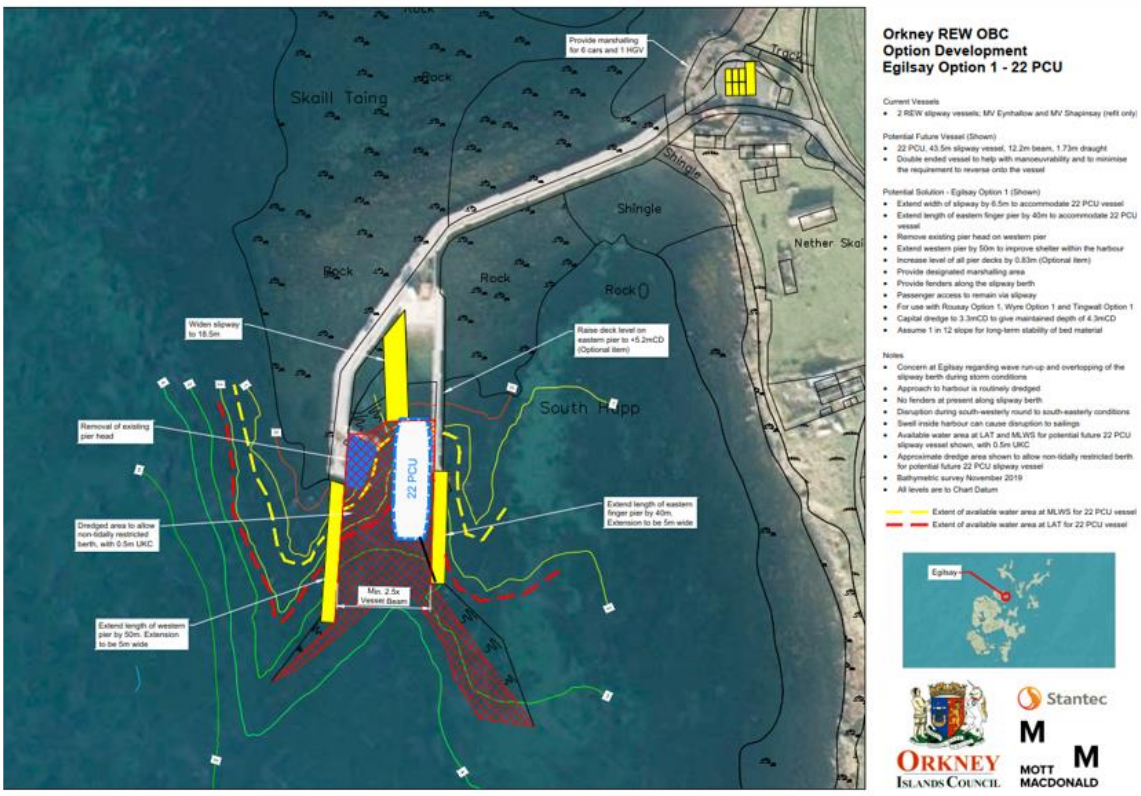


Figure 7.4: Option 1 – Egilsay general arrangement

7.4.4 In order to accommodate a 22 PCU vessel at Egilsay, the following infrastructure upgrades are recommended:

- Widen the slipway and extend both piers to improve shelter in the harbour
- Raise the deck level of the eastern pier, as this currently overtops during storm conditions
- Remove the existing pier head to widen the approach to the slipway
- Dredging within the harbour and the approaches
- Provide clearly marked marshalling bays on existing land near the terminal building

Wyre

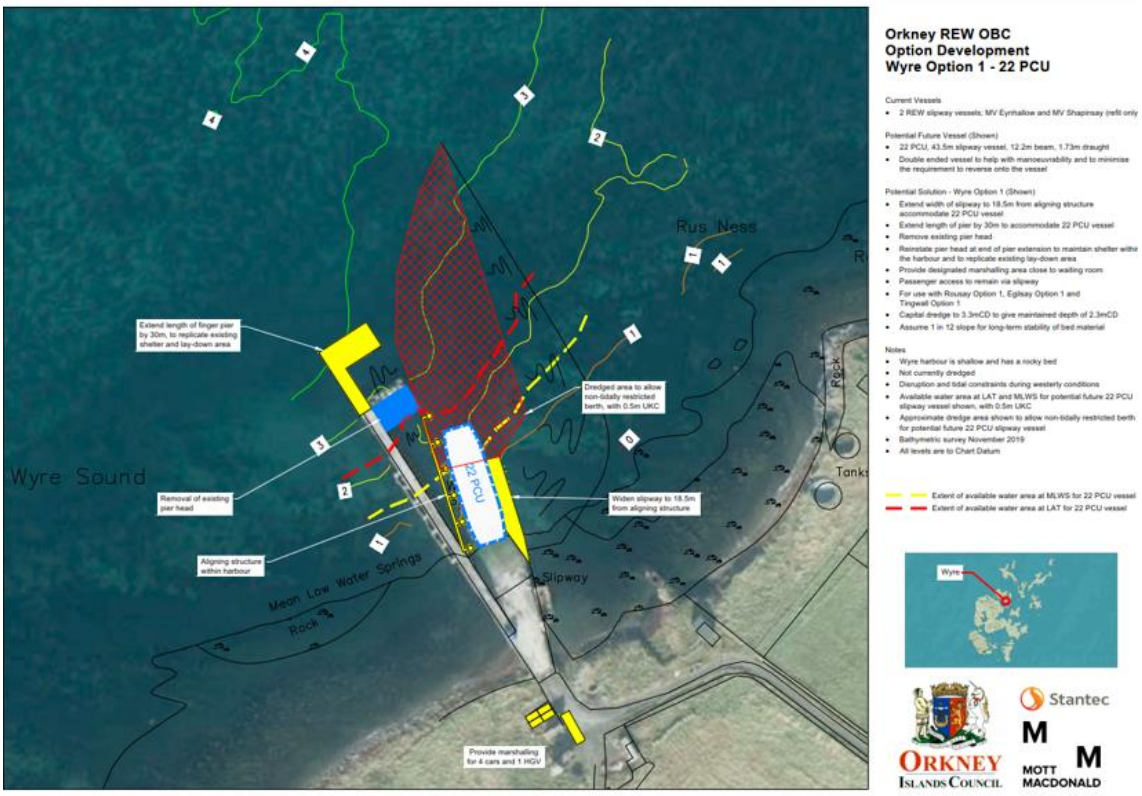


Figure 7.5: Option 1 – Wyre general arrangement

7.4.5 In order to accommodate a 22 PCU vessel at Wyre, the following infrastructure upgrades are recommended:

- Widen the slipway and extend the finger pier to provide additional water area for manoeuvring of the vessel and to replicate the existing shelter at the harbour
- Remove the existing pier head as part of the extension works above
- Provide an aligning structure within the harbour for the 22 PCU vessel to berth against
- Dredging within the harbour and the approaches
- Provide clearly marked marshalling bays on existing land near the terminal building

Tingwall

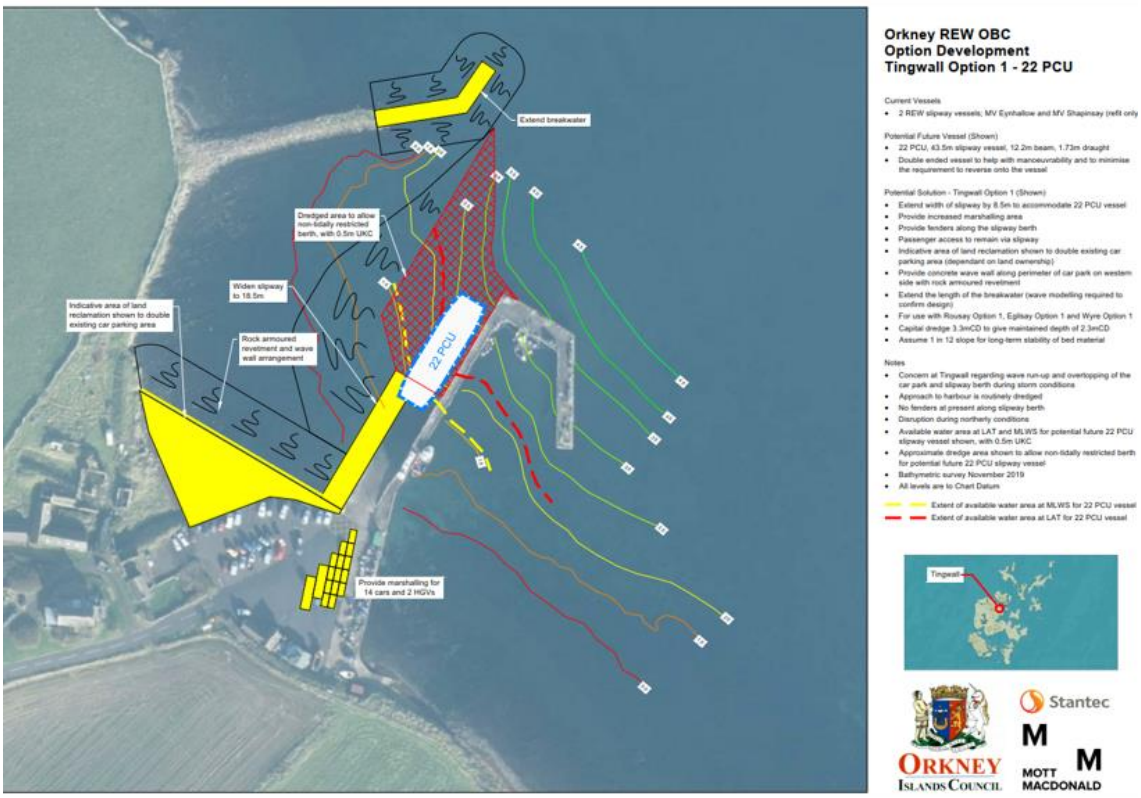


Figure 7.6: Option 1 – Tingwall general arrangement

7.4.6 In order to accommodate a 22 PCU vessel at Tingwall, the following infrastructure upgrades are recommended:

- Widen the slipway and extend the breakwater to the north to improve shelter at the berth
- Dredging within the harbour and the approaches
- Reclaim land to increase parking provision. This includes a rock armoured revetment and wave wall arrangement to prevent overtopping of the car park
- Improve traffic management including provision of clearly marked marshalling bays on existing land near the terminal building

Refit Cover and Relief

7.4.7 As **Option 1** is a single vessel (as at present), it is assumed that relief cover would continue to be provided by MV *Shapinsay*. This would result in a slight reduction in PCU capacity during the refit period (6 PCUs fewer based on the current stated PCU capacity of MV *Shapinsay*), albeit the revenue measures would provide 2-3 additional sailings per day compared to at present. The infrastructure would also likely be capable of accommodating any future slipway vessel introduced on the Shapinsay run, sized as it would be for a larger vessel.

7.4.8 It may however be more challenging for this single larger vessel to serve Gairsay without infrastructure investment on that island. The Gairsay service would therefore likely be provided by MV *Shapinsay* in the short-term, or MV *Eynhallow* if she is retained as a spare.

Cost

7.4.9 The table below summarises the capital cost of the above noted ferry terminal infrastructure works, with a detailed cost breakdown provided in **Appendix C**. These costs are presented with and without optimism bias[34], which is applied at 44%.

Table 7.3: Option 1 ferry terminal infrastructure costs

	CAPEX – 2021 (£m)	CAPEX – 2021 (£m), 44% OB
Rousay	£6.7	£9.6
Egilsay	£5.9	£8.5
Wyre	£4.1	£5.9
Tingwall	£3.6	£5.2
Total	**£20.3**	**£29.2**

Option 2: Replace MV *Eynhallow* with two 'like-for-like' vessels

7.4.10 In a two-vessel scenario, the key question is where the second vessel should overnight. There are two options:

- The second vessel could overnight in Rousay, but this would require a Rousay-based crew to be found. Alternatively, with the primary vessel operating on a 'shift' basis, the crew could be brought in to operate the second ferry, the 'day boat'.
- Alternatively, the second vessel could overnight in Tingwall and be crewed from the mainland.

7.4.11 The choice of where to base the second vessel would be addressed through the design and FBC process should Option 2 be identified as the preferred option. For the purposes of this OBC, general arrangement drawings are presented as follows:

- both vessels overnighting at Rousay; and
- one vessel overnighting at Rousay and one vessel overnighting at Tingwall.

7.4.12 The ferry terminal infrastructure upgrades required to support this at each terminal are set out in a general arrangement drawing with supporting commentary below, with costs detailed thereafter.

Rousay

7.4.13 The single overnight berth solution for Rousay is shown in the figure below:

[34] Optimism bias is applied to costs in a business case to reflect the systematic tendency to under-estimate costs. Whilst optimism bias is typically reduced at OBC stage, the actual costs of marine civil engineering work cannot be developed with significant additional certainty until design work is undertaken, which is subsequent to this OBC. Optimism bias is therefore retained at 44%, the upper bound for standard civil engineering projects – see H.M. Treasury *Supplementary Green Book Guidance – Optimism Bias*, p. 2.

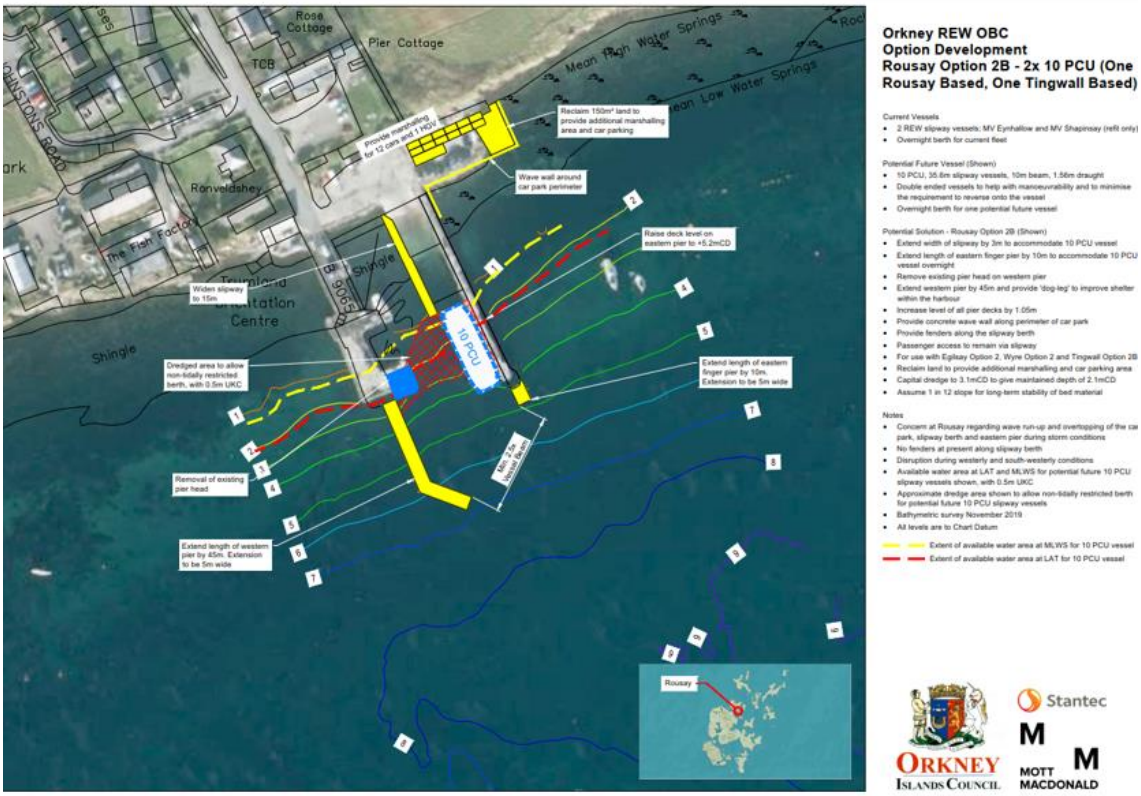


Figure 7.7: Option 2 – Rousay general arrangement, single overnight berth

7.4.14 To accommodate one new 10 PCU vessel at Rousay, the following infrastructure upgrades are recommended:

- Widen the slipway and extend both piers to provide a berth suitable for overnighting and to improve shelter in the harbour, including removal of the western pier head
- Raise the deck level of the eastern pier, as this currently overtops during storm conditions
- Dredging within the harbour
- Land reclamation to provide additional car parking and marshalling facilities

7.4.15 The two overnight berth solution for Rousay is shown in the figure below:

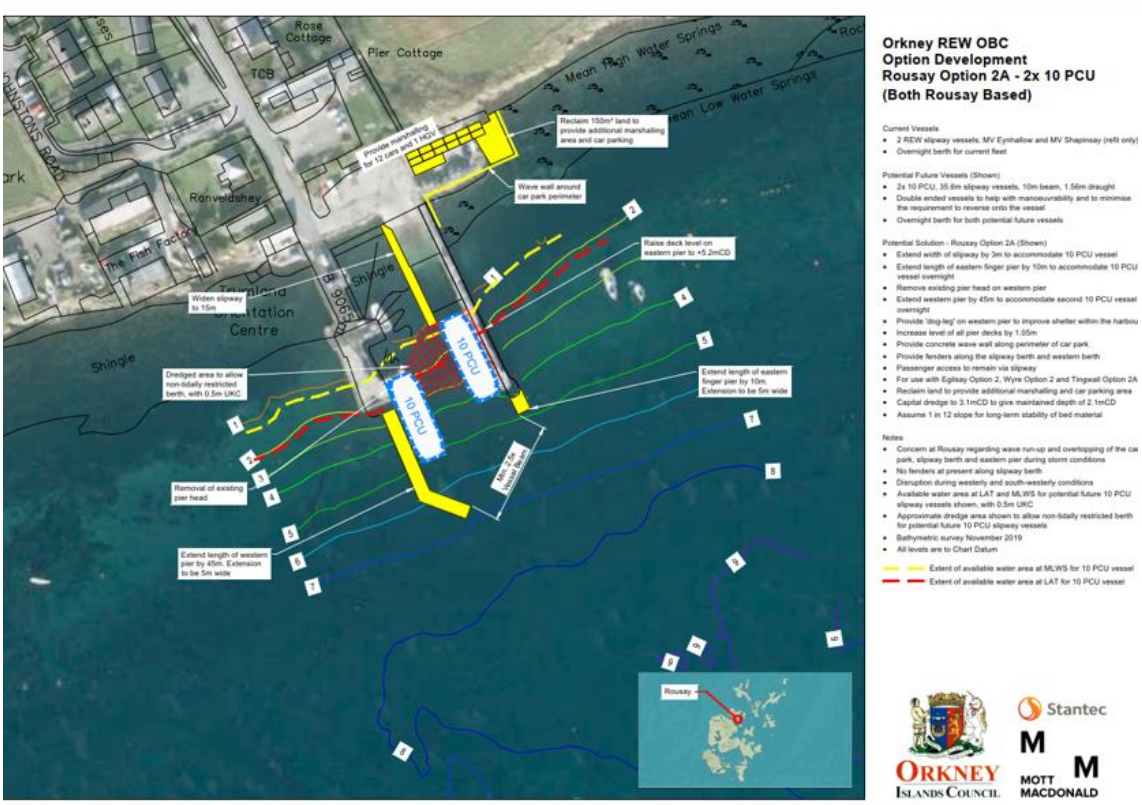


Figure 7.8: Option 2 – Rousay general arrangement, double overnight berth

7.4.16 To accommodate two new 10 PCU vessels at Rousay, the following infrastructure upgrades are recommended:

- Widen the slipway and extend both piers to provide a berth suitable for overnighting and to improve shelter in the harbour, including removal of the western pier head to provide an overnight berth for second vessel
- Raise the deck level of the eastern pier, as this currently overtops during storm conditions
- Dredging within the harbour
- Land reclamation to provide additional car parking and marshalling facilities

Egilsay

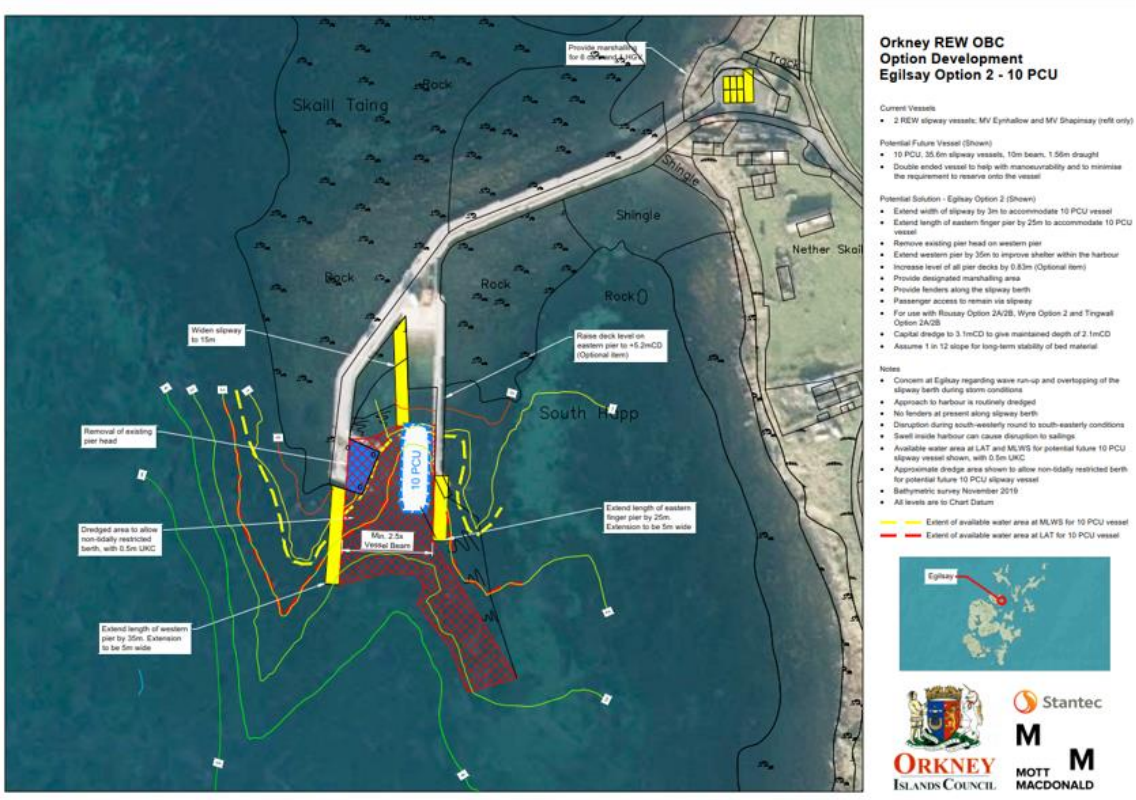


Figure 7.9: Option 2 – Egilsay general arrangement

7.4.17 To accommodate a new 10 PCU vessel at Egilsay, the following infrastructure upgrades are recommended:

- Widen the slipway and extend both piers to improve shelter in the harbour, including removal of the existing pier head
- Raise the deck level of the eastern pier, as this currently overtops during storm conditions
- Dredging within the harbour and the approaches
- Provide clearly marked marshalling bays on existing land near the terminal building

Wyre

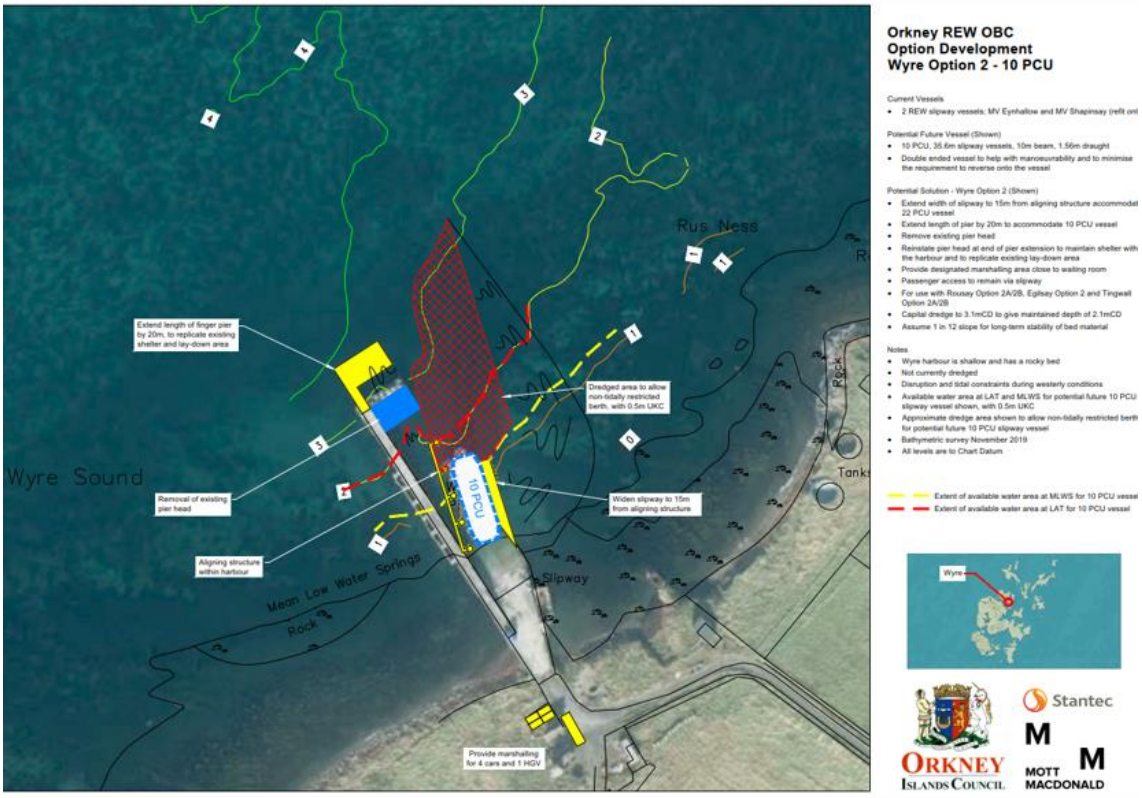


Figure 7.10: Option 2 – Wyre general arrangement

7.4.18 To accommodate a new 10 PCU vessel at Wyre, the following infrastructure upgrades are recommended:

- Widen the slipway and extend the finger pier to provide additional water area for manoeuvring of the vessel and to replicate the existing shelter at the harbour
- Remove the existing pier head as part of the extension works above
- Provide an aligning structure within the harbour for the 10 PCU vessel to berth against
- Dredging within the harbour and the approaches
- Provide clearly marked marshalling bays on existing land near the terminal building

Tingwall

7.4.19 The general arrangement drawing for Tingwall without an overnight berth (i.e., if both vessels overnight in Rousay) is shown below:

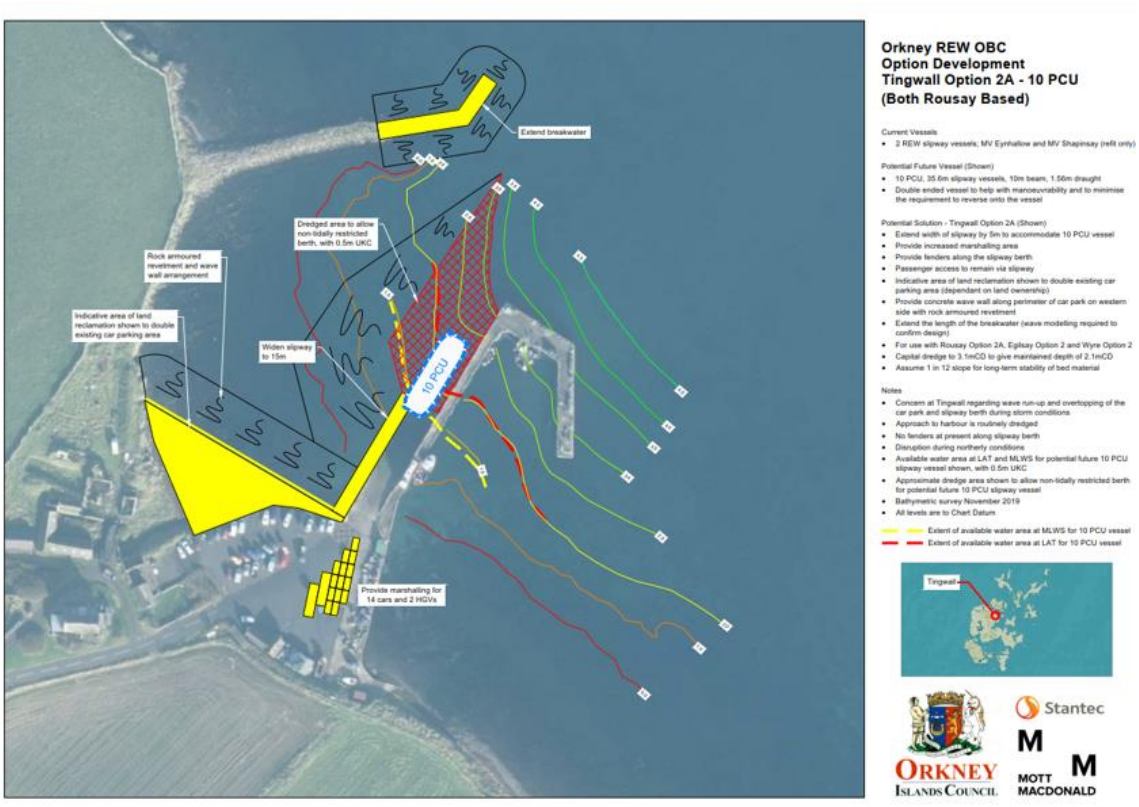


Figure 7.11: Option 2 – Tingwall general arrangement, no overnight berth

7.4.20 In order to accommodate berthing of a new 10 PCU vessel at Tingwall, the following infrastructure upgrades are recommended:

- Widen the slipway and extend the breakwater to the north to improve shelter at the berth
- Dredging within the harbour and the approaches
- Land reclamation to increase parking provision. This includes a rock armoured revetment and wave wall arrangement to prevent overtopping of the car park
- Improve traffic management including provision of clearly marked marshalling bays on existing land near the terminal building

7.4.21 The figure below shows the equivalent Tingwall drawing with an overnight berth included:

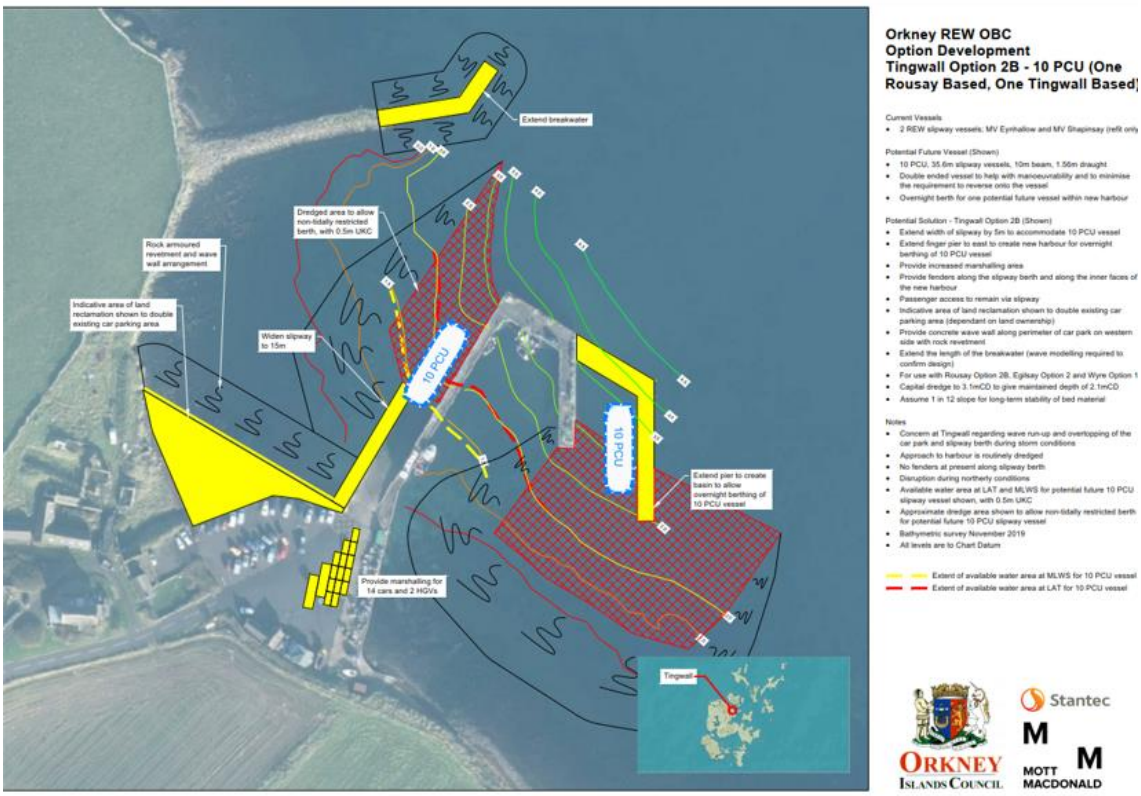


Figure 7.12: Option 2 – Tingwall general arrangement, with one overnight berth

7.4.22 In order to additionally accommodate a 10 PCU vessel overnight at Tingwall, the following infrastructure upgrades are recommended:

- Widen the slipway and extend the breakwater to the north to improve shelter at the berth
- Extend the finger pier to the east to create a new basin for overnight berthing of a new 10 PCU vessel
- Dredging within the existing harbour, new basin, and the approaches
- Land reclamation to increase parking provision. This includes a rock armoured revetment and wave wall arrangement to prevent overtopping of the car park
- Improve traffic management including provision of clearly marked marshalling bays on existing land near the terminal building

Refit and Relief Cover

7.4.23 The addition of a second vessel to the REW route in **Option 2** means that it could be self-relieving, albeit PCU capacity would reduce to its current level (although the revenue measures would provide 2-3 additional rotations across the day). Alternatively, the vessel not at refit could be swapped with MV *Shapinsay* during the refit period to provide a larger capacity vessel on the REW route for a period (assuming a 10 PCU vessel is sufficient for Shapinsay – this would need to be confirmed).

7.4.24 As these vessels would be smaller than that presented in Option 1 (likely more akin to the size of MV *Shapinsay*), they may be better able to serve Gairsay.

7.4.25 It is also worth noting that a two-vessel solution would improve the overall resilience of the slipway-based routes in Orkney (Shapinsay and REW), purely through the introduction of an additional vessel to the slipway fleet.

Cost

7.4.26 The table below summarises the capital cost of the above noted ferry terminal infrastructure works, with a detailed cost breakdown provided in **Appendix C**. Two sets of costs are included, one set where both vessels overnight in Rousay and the latter where one vessel overnights in Rousay and one in Tingwall. These costs are presented with and without optimism bias, which is applied at 44%.

Table 7.4: Option 2 ferry terminal infrastructure costs

	CAPEX – 2021 (£m)	CAPEX – 2021 (£m), 44% OB	CAPEX – 2021 (£m)	CAPEX – 2021 (£m), 44% OB
	Both vessels Rousay-based		***1-vessel Rousay-based, 1-vessel Tingwall-based***	
Rousay	£5.0	*£7.2*	£4.8	*£6.9*
Egilsay	£4.3	*£6.2*	£4.3	*£6.2*
Wyre	£3.2	*£4.6*	£3.2	*£4.6*
Tingwall	£3.4	*£4.9*	£9.6	*£13.8*
Total	**£15.9**	***£22.9***	**£21.9**	***£31.5***

7.5 Next Steps

7.5.1 This chapter has further developed the technical particulars and costs of the two options. These options are now reassessed against the Transport Planning Objectives and STAG criteria, with a preferred option to be progressed identified at the conclusion of the appraisal exercise.

8 Options Appraisal and Preferred Option

8.1 Overview

8.1.1 The SBC (2016) incorporated a high-level appraisal of all potential options for serving REW against the Transport Planning Objectives (TPOs) and STAG criteria. This chapter therefore revisits and updates the SBC appraisal, using it to identify a preferred option. Feedback from the public engagement on the preferred option is also set out.

8.1.2 It is important to recap here that **regardless of the preferred option selected, it is assumed that the Ro-Ro vessel (or main vessel if there are two) will operate a 16-18 hour day, up to 7-days per week, year-round.** Any two-vessel solution would involve one vessel operating a 16-18 hour day (the 'shift boat') and the second vessel operating a 'standard' day broadly equating to the current timetable (the 'day' boat). By way of illustration as to what this approach could deliver, the current **6** rotations per day from Rousay to Tingwall would, assuming a similar service / calling pattern, increase to:

- **Option 1**: **circa 8-9 rotations from the island group to Tingwall per day** depending on the agreed length of the operating day.
- **Option 2: circa 14-15 rotations from the island group to Tingwall per day**– effectively Option 1 plus the current timetable

8.2 Transport Planning Objectives

8.2.1 Table 8.1 below reassesses the performance of the options against the TPOs. In keeping with the STAG guidance, the following notation is used:

✓✓✓ - major positive

✓✓ - moderate positive

✓ - minor positive

O - neutral

x - minor negative

xx - moderate negative

xxx - major negative

Table 8.1: Appraisal against TPOs

	Option 1: 1* larger vessel	Option 2: 2*LfL vessels
Transport Planning Objective 1: *The capacity of the services should not act as a constraint to regular and essential personal, vehicular and freight travel between the island(s) and Orkney Mainland.*	✓✓✓	✓✓
Transport Planning Objective 2a: *Where an island has a 'commutable' combined ferry or drive / public transport / walk time to a main employment centre (e.g., 80 minutes), the scheduled connections provided should reliably facilitate commuting.*	✓✓✓	✓✓✓
Transport Planning Objective 3: *The scheduled time between connections should be minimised to increase flexibility for passengers and freight by maximising the number of island connections across the operating day.*	O	✓✓✓

	Option 1: 1* larger vessel	Option 2: 2*LfL vessels
Transport Planning Objective 4: *The level of connectivity provided should minimise the variation within and between weekdays, evenings, Saturdays and Sundays.*	**O**	**O**
Transport Planning Objective 5: *Where practical, islanders should be provided with links to onward strategic transport connections which minimise the number of off-island overnight stays on Orkney mainland or further afield.*	**O**	**O**

8.2.2 The main points of note from the above table are as follows:

- Both options make a strong contribution to the TPOs overall. By addressing the capacity issues, either through a larger vessel or increased frequency, REW residents would be able to travel more readily between the isles and Orkney mainland, something the resident survey identified significant suppressed demand for. It would also make travel to the island group for employment, service delivery and tourism easier and more cost effective.
- From a capacity perspective, **Option 1** would record a marginally larger benefit as the capacity would be concentrated on a single sailing which could be scheduled to align with peak demand. Moreover, a larger vehicle deck would provide greater flexibility on the arrangement of traffic on that deck, reducing instances of where, for example, a single commercial vehicle uses much of the capacity on a sailing. There would also be extra evening capacity with Option 1, as the two-vessel service under Option 2 would reduce to a single vessel when the 'day-boat' is tied up for the evening. **Option 2** would nonetheless provide more than double the current capacity on the route.
- Both options would make a major contribution to the commutability of the island group. The larger single vessel **(Option 1)** would provide increased certainty of travel with a vehicle, whereas the two vessels **(Option 2)** would allow peak loads to be spread by doubling peak frequency.
- **Option 2** would clearly deliver a major positive benefit in terms of frequency. Assuming the second vessel was a 'day vessel' (e.g., 06:50-19:15 as per the current vessel), daytime connections would be doubled, with additional early morning and late evening services provided by the shift vessel. Moreover, a two-vessel fleet could allow different models for serving the three islands to be explored, providing a few direct services to / from Egilsay for example thus reducing journey times and capacity challenges.
- The capital options would not in their own right impact on TPO4 or TPO5. However, when combined with the revenue measures to extend the sailing day and week, they would ensure greater certainty of supply for those travelling at the weekend or travelling to / returning from the Scottish mainland (or beyond).

8.3 STAG Criteria

8.3.1 This section undertakes further appraisal of the shortlisted options against the five STAG criteria and respective sub-criteria. The appraisal of options is relative to the current day position.

Environment

8.3.2 The table below summarises the appraisal of the preferred option package against the 'Environment' sub-criteria:

Table 8.2: Appraisal against Environment sub-criteria

	Option 1: 1* larger vessel	Option 2: 2*LfL vessels
Noise and Vibration	**O**	**O**

	Option 1: 1* larger vessel	Option 2: 2*LfL vessels
Global Air Quality	✓✓✓	✓✓✓
Local Air Quality	O	O
Water Quality, Drainage and Flood Defence	x	xx
Geology	O	O
Biodiversity and Habitats	x	xx
Landscape	O	x
Visual Amenity	O	x
Agriculture and Soils	x	x
Cultural Heritage	O	O
Overall Assessment	✓✓	✓

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

- The primary benefit of this investment from an environmental perspective is that the hydrocarbon fuelled MV *Eynhallow* would be retired (unless retained for relief / refit cover) and replaced by one or two modern vessels (depending on the preferred option) which it is assumed will be zero (tailpipe) emission. This being the case, there would be a 'major' benefit in terms of global air quality. That said, there may be a minor short-term disbenefit if additional vehicle kilometres are generated as a result of increased capacity / frequency, albeit that disbenefit should reduce over time as hydrocarbon fuelled vehicles are phased out.
- There would be several short-term environmental disbenefits associated with upgrades to the four ferry terminals, impacts on habitats and water quality for example. However, these disbenefits would be short-term and subject to the identification of appropriate mitigations through the consenting process.
- The exception to the above is the potential negative landscape and visual amenity impacts of **Option 2** if an overnight berth is developed at Tingwall as it requires the development of an additional sheltered basin to the east. Moreover, the dredge requirement for the overnight berth would have a negative impact on biodiversity and habitats.
- The reduction in emissions associated with a zero (tailpipe) emission vessel(s) means that both options score positively from an environmental perspective overall, but **Option 1** scores marginally better as it has no longer-term impacts associated with the terminal infrastructure.

Safety

8.3.4 The table below summarises the safety benefits associated with the two options:

Table 8.3: Appraisal against Safety sub-criteria

	Option 1: 1* larger vessel	Option 2: 2*LfL vessels
Accidents	✓✓	✓
Security	O	O
Overall Assessment	✓✓	✓

8.3.5 It is important to note that Orkney Ferries complies with all relevant maritime regulations and thus 'safety' in this context relates to boarding the ferry by means of reversing on. It was clear from both the stakeholder engagement and the survey that the requirement to reverse onto the ferry presents a risk that does not exist on most other routes in Scotland, particularly for visitors

not accustomed to such a manoeuvre. The deployment of a through and through ferry / ferries will therefore provide a safety benefit in both cases.

8.3.6 There is no obvious differentiator between the options in terms of safety. **Option 1** would provide the obvious benefit of a larger deck space for marshalling traffic, but the flip side of this is that it would lead to more traffic marshalling on the quayside and thus a larger health and safety risk.

8.3.7 Whilst not a safety issue *per se*, there would be reduced navigational risk to Orkney Ferries associated with the deployment of a double-ended vessel(s) as it would remove the need to reverse off of the berth and into the channel before turning. It is also likely that new modern vessel(s) would be more powerful than MV *Eynhallow*.

Economy

8.3.8 The definition of 'Economy' benefits in the STAG guidance is not strictly relevant in the context of REW. TEE benefits are typically generated through journey time savings and, in the context of public transport, a higher frequency service which offers journey time benefits through reducing wait times. Wider-economic impacts only tend to be manifested in the largest schemes and reflect improvements in productivity and labour market impacts as a result of transport investment bringing places 'closer' together. The table below does identify TEE and WEI benefits for the options, but these have to be considered in the context of REW only, where connectivity is more important than the journey time itself.

Table 8.4: Appraisal against Economy sub-criteria

	Option 1: 1* larger vessel	Option 2: 2*LfL vessels
Transport Economic Efficiency (TEE)	✓✓	✓✓✓
Wider-Economic Impacts	✓✓	✓✓
Overall Assessment	✓✓	✓✓✓

8.3.9 Both options would generate highly positive economic benefits, both in terms of TEE and WEI. In theory, **Option 2** would provide the larger benefits from a TEE perspective, as it reduces the 'generalised journey time' through increasing frequency. The realisation of these additional benefits would however be dependent on the two smaller vessels being able to deliver sufficient capacity when required, particularly at peak times.

8.3.10 The new vessel(s) and larger capacity offered, when combined with revenue measures to extend the sailing day / week, would offer significant WEI (in the context of REW) through improving connectivity. The resident survey (see Chapter 6) demonstrated that there is suppressed demand for resident travel for a variety of purposes because of the current connectivity, whilst visiting the isles is also more challenging.

8.3.11 As part of the resident survey, respondents were asked how much more, if at all, they would use the ferry if their concerns with the service were addressed. The results are summarised in the figure below:

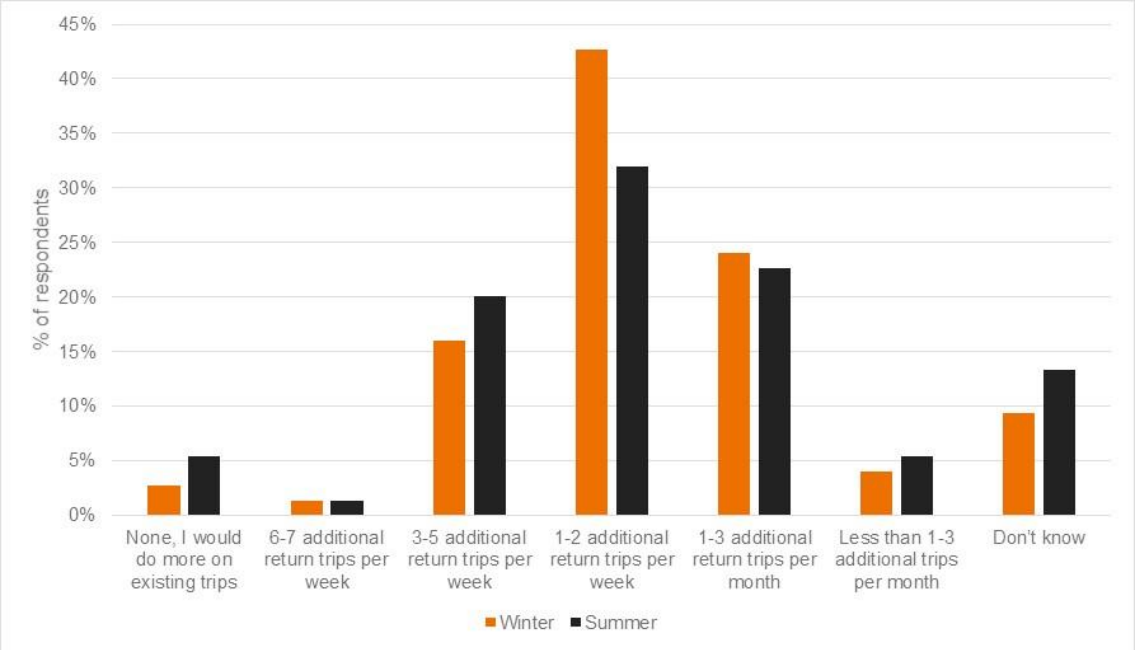


Figure 8.1: If your concerns with the ferry service were addressed, how much more, if all, do you think you would use the ferry service in winter / summer (n=75)

8.3.12 The above figure demonstrates that there is stated suppressed demand for additional resident ferry travel, and thus an improved vessel(s) and service would generate economic (social welfare) benefits (assuming that additional journeys are being made because those making them derive a benefit from doing so). For the majority of residents, these trips would be weekly / monthly, but there is a significant subset who would make 3-7 additional journeys per week, suggesting that they may take-up employment on the mainland. This being the case, there would be a direct economic benefit to REW from increased income to the isles.

8.3.13 It should be noted that the survey suggests that 39% of respondents (n=29) would make these journeys by taking a car onboard, with a further 36% (n=27) responding that they would make these additional journeys through a combination of vehicle and foot passenger trips. Furthermore, 28% (n=32) also noted that if a larger drive through ferry was provided, they would take their car more often (16% sometimes / 12% all the time). It is therefore clear that the new vessel(s) will need to provide sufficient capacity to accommodate current demand and potential future growth.

Integration

8.3.14 The performance of the respective options in terms of the 'Integration' sub-criteria is set out in the table below:

Table 8.5: Appraisal against Integration sub-criteria

	Option 1: 1* larger vessel	Option 2: 2*LfL vessels
Transport Integration	✓	✓
Transport and Land-Use Integration	✓	✓
Policy Integration	✓	✓
Overall Assessment	✓	✓

8.3.15 The key points from the above table are as follows:

- From a **transport integration** perspective, **Option 1** would record a minor benefit through providing increased certainty of supply (i.e., capacity) for those wishing to take a car on the ferry. **Option 2** would do likewise and could improve overall integration if additional buses were provided to meet the extra sailings.
- Both options, when combined with the revenue measures, would also record a minor benefit in terms of **transport and land-use integration**. Increased capacity and frequency would more fully integrate the economies of the isles, and REW to Orkney mainland. This would be positive in terms of reducing the cost of the movement of goods, service delivery and activities such as e.g., housebuilding. However, it should be noted that transport is a 'two-way street' and improved connectivity could lead to increased mainland competition and a risk of service centralisation as has happened in some of the Shetland Islands, Bressay for example.
- Improving the service to REW would also deliver against a range of policies intended to sustain, promote and develop island communities.
- It is however important to note that, from a **policy integration** perspective, the provision of additional capacity (combined with lower fares) will lead to additional vehicle kilometres (as evidenced by the resident survey) and thus would work against the Scottish Government's target to reduce car kilometres by 20% by 2030 (assumed to be from the 2020 level but this has not yet been specified)[35], albeit any such impact would be marginal in absolute terms. It also does not align with the Sustainable Transport and Sustainable Investment Hierarchies set out in the National Transport Strategy 2, which imply that the provision of new capacity aimed at the private car should only go ahead after other avenues are exhausted (demand management measures for example).[36] This is a fundamental tension within this study, balancing the requirement to reduce car-based travel generally against the needs of island residents, for whom car-based travel is essential and on occasions the only option available.

Accessibility and Social Inclusion

8.3.16 The performance of the two options in terms of the 'Accessibility and Social Inclusion' sub-criteria is set out in the table below:

Table 8.6: Appraisal against Accessibility and Social Inclusion sub-criteria

	Option 1: 1* larger vessel	Option 2: 2*LfL vessels
Community Accessibility	✓✓	✓✓✓
Comparative Accessibility	✓✓	✓
Overall Assessment	✓✓	✓✓

8.3.17 The key points from the above table are as follows:

- In terms of community accessibility – i.e., connectivity – both options record benefits. The benefits associated with **Option 2** would likely be greater given the increase in frequency, so long as the vehicle carrying capacity of the ferries could accommodate demand.
- It should be noted that accommodating the smaller vessels associated with **Option 2** could also make it easier to serve Gairsay, or at the very least reduce the cost of infrastructure associated with doing so.
- From the comparative accessibility perspective, both options would improve physical accessibility onboard the vessel, thus representing an improvement on the facilities on MV *Eynhallow*. **Option 1** records a marginally greater benefit as the additional capacity may reduce the requirement for a subset of island residents to leave a car on the mainland.

[35] https://www.transport.gov.scot/our-approach/environment/mission-zero-for-transport/

[36] https://www.transport.gov.scot/media/47052/national-transport-strategy.pdf - pp. 42-44.

Indeed, 17% (n=5) respondents to the resident survey noted that, if a larger drive though ferry was introduced, they would no longer leave a car on the mainland. Whilst only a small number overall, the provision of a larger ferry would reduce the inequality of 'forced car ownership' faced by some island residents at present.

- It should be noted that neither option would deliver fully Equalities Act compliant solutions, as the slipway gradients at 1 in 8 would remain steeper than the 1 in 12 maximum gradient recommended in published guidance. There would therefore be a question for the vessel design stage as to whether a longer vessel ramp should be included to allow for a more gently sloping slipway in future, providing improved access to the vessel from the shore.

Summary

8.3.18 Overall, it is evident from the appraisal against the TPOs and STAG criteria that both options would be highly beneficial for REW. Indeed, in many respects, they offer the same outcomes but in a different way; **Option 1** through capacity and **Option 2** through frequency. The options therefore have to be seen within the context of their value for money, and the next section therefore explores the cost to government.

8.4 Cost to Government

8.4.1 There are three components to the cost to government in this context – the:

- **capital cost** of **new vessel(s)** and supporting **ferry terminal infrastructure**
- ongoing **maintenance costs** for the **ferry terminal infrastructure**
- The increase in **operational costs** associated with Option 2, where a second vessel is added to the REW run.

8.4.2 Each of the above costs is considered in turn.

8.4.3 It should be noted that, in a typical business case, all costs are presented in discounted 2010 prices. This approach allows for all costs to be presented in a common price base and equates future year costs and benefits to their value in the present day (i.e., their 'present value'). The purpose of converting costs to a present value is to allow comparability between options where their costs and benefits accrue at different points in time. However, as the options in this OBC would be delivered at the same time and with an equivalent temporal profile, all costs are presented in undiscounted 2021 prices.

Capital Costs

New vessels

8.4.4 It is not possible to accurately determine the capital costs of the new vessel(s) at this stage. Vessel(s) costs will only become clear following the design process, which is undertaken subsequent to this OBC. The vessel costs will vary in response to the procurement approach adopted (and in particular the extent of risk sharing), buyer requirements and market conditions.

8.4.5 However, given that the design vessels used in this study are currently operating in Scottish waters, there is at least some precedent in terms of potential costs:

- The design vessel for **Option 1** is based on the recent fleet of CMAL hybrid electric *Loch* Class vessels. The most recently launched vessel from this series was the MV *Catriona* (2017), which cost **£12.3m**. This cost is likely to be closer to **£15m-£17m** in current prices.
- The design vessel for **Option 2** is based on the late 1980s *Loch* Class series (although any such vessel would be built to modern design standards. There is little value in inflating the costs of these vessels directly from their 1980s build price given the developments in vessel

design and the shipbuilding market since then. However, based on the recent costs of the Option 1 design vessel, a cost of **£8m-£10m** per vessel does not appear unreasonable.

Ferry terminal infrastructure

8.4.6 Ferry terminal infrastructure costs were presented in Chapter 7 and summarised below for completeness:

Table 8.7: REW ferry infrastructure capital costs

Option	CAPEX – 2021 (£m)	CAPEX – 2021 (£m), 44% OB
Option 1	£20.3	£29.2
Option 2 – both vessels Rousay-based	£15.9	£22.9
Option 2 – 1-vessel Rousay-based, 1-vessel Tingwall-Based	£21.9	£31.5

Operating Costs

Ferry terminal maintenance

8.4.7 To provide an indication of whole life costs, MML has developed a set of maintenance costs for the three island Ro-Ro terminals and Tingwall. These maintenance costs are worked up from a standard set of rates and are included in **Appendix D**.

Ferry operational costs

8.4.8 Whilst the new vessel(s) will be built to modern standards, it is unlikely that the number of crew required for any single vessel will change significantly from MV *Eynhallow* (4 crew currently). In addition, whilst new vessels will likely offer some cost efficiencies associated with e.g., modern engines and hull design and low / zero carbon propulsion, they will also be larger, so there is unlikely to be any significant changes in operating costs either way. This would be confirmed through the outline and detailed design stage.

8.4.9 Given the absence of actual operating cost data for the design vessels, for the purpose of this analysis:

- The design vessel for **Option 1** is assumed to have the cost profile of **MV *Hoy Head***, which has a similar PCU carrying (24 PCUs for MV *Hoy Head* versus 22 PCUs for the design vessel).
- The design vessel for **Option 2** is assumed to have the cost profile of **MV *Eynhallow*** given their equivalent stated vehicle carrying capacities.

8.4.10 In undertaking the Revenue OBC, Orkney Ferries provided operating costs by vessel for the period Financial Year (FY) 2013/14 – FY2017/18. These costs can be taken as a reasonable proxy for the route which they ply given that will generally operate on that route all-year round except during refit. The table below summarises:

- the average annual operating costs associated with MV *Hoy Head* and MV *Eynhallow*;
- the annual operating costs if each vessel operated a 16-18 hour day, as per the Revenue OBC recommendation;
- it should be noted that all costs have been uprated to August 2021 prices by applying the Retail Prices Index (RPI) inflation figure from August 2017

Table 8.8: Design vessels' annual operating costs, August 2021 prices, rounded to nearest £10,000 (Source: Orkney Ferries)

	MV *Eynhallow* / Option 2 Design Vessel	MV *Hoy Head* / Option 1 Design Vessel
Annual operating costs	£820,000	£1,220,000
Annual operating costs – 16-18 hour day	£1,190,00	£1,790,000

8.4.11 Based on the design vessel operating costs set out in Table 8.8, single-year and 30-year costs (in 2021 prices) of the two options are presented in Table 8.9 below.

Table 8.9: Options – Single and 30-year operating costs, rounded to nearest £'000 (2021 prices)

	Option 1: 1* larger vessel	Option 2: 2*LfL vessels	Difference (Option 1 – Option 2)
Annual operating costs – single-year	£1,790,000	£2,010,000	*-£220,000*
Annual operating costs – 30-years	£53,550,000	£60,130,000	*-£6,580,000*

8.4.12 It can be seen from the above table that **Option 1** offers lower operating - circa **£220k per annum** and almost **£6.6m** when considered in cash terms **over 30-years**. Assuming fares revenue with both options is likely to be similar, **Option 1** is therefore the lower cost option

8.5 Preferred Option

8.5.1 The **preferred option is Option 1: Replace MV *Eynhallow* with one larger vessel.** Allied with the revenue measure, this option would provide significant additional capacity over a daily 16-18 hour day.

8.5.2 As previously noted, there is little to differentiate the options from an appraisal perspective – both options improve the level of service, one through capacity and the other through frequency. The differences are primarily financial and operational, as follows:

- From a capital cost perspective, the difference between the two options is marginal if both vessels overnight in Rousay, although more significant if the second vessel lies at Tingwall. However, to run a two-boat service on a shift-boat / day-boat basis will require three additional crews to be found in Rousay, which would be very challenging (although there would be an opportunity to ferry crew in from the mainland on the shift boat to work on the day boat, so this issue may not be insurmountable).
- **Option 1** does however offer significantly lower operating costs – by circa £220k per annum or £6.6m over a 30-year period in cash terms.
- There would also be a potential requirement to run additional bus services to connect with the extra ferries under Option 2, which would further add to its cost.

8.6 Public Acceptability

8.6.1 The final step in the appraisal process was the testing of the preferred option with the public. This would conventionally be done through a public exhibition in each of the islands but unfortunately COVID-19 related restrictions on indoor gatherings prevented such exhibitions taking place. To this end, an entirely web-based programme of engagement was undertaken, with the study exhibition boards being hosted online by the Council and respondents asked to complete an online survey in MS Forms.

8.6.2 The preferred option package was presented to Orkney Islands Council Members at a Members' Seminar on Tuesday 12th January 2021.

Public Survey

8.6.3 There were 18 responses to the public survey, all of which were from Rousay residents (a written response was provided for Egilsay – see below – but no responses were received from Wyre). The response rate accounts for 8% of the Rousay population. Overall, there is widespread satisfaction with the preferred option - key points emerging from the survey are as follows:

- 89% of respondents (n=16) noted that the preferred option set out in the engagement material would provide sufficient connectivity for their personal / family's day-to-day needs now and in the future.
- An identical proportion (89%, n=16) also noted that the preferred option would provide sufficient connectivity to ensure the long-term sustainability of Rousay as a community.
- The net satisfaction with the preferred option is +15 (i.e., n=5 very satisfied, n=11 satisfied and n=1 dissatisfied).

8.6.4 The responses to the open-ended comments were also positive about the preferred option. There is however a desire to ensure that fares do not increase to reflect this investment.

8.6.5 In relation to the response where dissatisfaction was expressed, this related to a desire for a two-vessel service, with a trunk Rousay – Tingwall route and a second vessel acting as a feeder for Egilsay and Wyre.

Written Responses

8.6.6 Whilst there was widespread support for the preferred option in Rousay, Egilsay Community Council provided a written response noting the following points in support of **Option 2**, the two-vessel solution:

- Whilst improvements to the infrastructure at Egilsay are welcomed, there is local concern that a substantially larger vessel will have difficulty accessing the pier year-round, but particularly in winter. Our work to-date does suggest that the infrastructure will be able to accommodate the proposed design vessel, but this will in any case be further developed in the outline and detailed design. The Master of MV *Eynhallow* did though consider this feasible and improvements to infrastructure to accommodate the larger vessels have been reflected in the proposals.
- A significantly larger vessel is not considered necessary to meet the needs of the Egilsay market and thus the additional infrastructure funding is considered unnecessary. That said, the cost of buying and operating a second vessel would exceed the costs of upgrading the infrastructure at Egilsay.
- The potential for additional connections in a two-vessel scenario are considered to be of greater benefit to Egilsay than the additional capacity. It is also considered that this would be advantageous in terms of resilience and ensuring that a suitable vessel is available during refit.

9 Conclusions and Next Steps

9.1 Conclusions

9.1.1 This OBC has identified a preferred option for the future development of the REW ferry services, including Gairsay. The primary components of this option package are as follows:

- The REW network will be operated by a single larger and double-ended through and through ferry with a target capacity of circa 22 PCUs. The vessel will be Rousay-based, offering a significant increase in capacity whilst also removing the need to reverse onto the ferry. The exact size, specification and cost of the new vessel will however be determined through the outline and detailed design processes, which follow on from this OBC.
- The working assumption is that parallel to this OBC, the Revenue OBC measure of additional funding to extend the operating day to 16-18 hours per day, up to 7-days per week will be progressed. This is integral to the delivery of Option 1 and has been assumed throughout the appraisal.
- The ferry terminal infrastructure works will cost around £20.3m in undiscounted 2021 prices, or £29.2m when optimism bias is accounted for. Operating costs will be circa £1.8m per annum, an increase of around £1m per annum on current operating costs, reflecting the larger vessel and longer operating day.
- There is broad community support for the preferred option, although Egilsay residents do have a preference for the two-vessel solution (Option 2).
- It is clear overall that the cost of capital replacement (and scaling up services as per the Revenue OBC) will be significant, both in terms of the capital costs of the vessels and ferry terminal infrastructure and, to a lesser extent, the revenue costs associated with expanding the operational envelope. This expenditure is however required to provide REW with something approaching an equitable service provision when compared to benchmarks elsewhere in Scotland, particularly in the context of the Routes and Services Methodology.
- The preferred option package aligns well with the Transport Planning Objectives and STAG criteria and would provide a significant increase in capacity for each island, the major issue outwith the level of fares identified through the resident survey and consultation.

9.1.2 It is important to note that the provision of additional capacity (combined with lower fares) will lead to additional vehicle kilometres. This would work against both the Scottish Government's target to reduce car kilometres by 20% by 2030 and the Sustainable Transport and Sustainable Investment Hierarchies set out in the National Transport Strategy 2. This has been a fundamental tension within this study, balancing the requirement to reduce car-based travel generally against the needs of island residents, for whom car-based travel is essential and on occasions the only option available. In parallel to delivering this OBC, the Council should therefore consider complimentary measures which could reduce the demand for car-based travel such as cheaper combined ferry and bus tickets and opportunities for car clubs etc.

9.2 Next Steps

9.2.1 This report has confirmed the Strategic and developed the Socio-Economic Cases for the REW Outline Business Case.

Commercial, Financial and Management Cases

9.2.2 A combination of the Strategic and Socio-Economic Cases effectively define **what** is to be delivered. The next step in the process is the preparation of the Commercial, Financial and Management Cases, which define **how** it will be delivered – i.e., how will the preferred option be funded, procured, delivered and managed / operated.

9.2.3 Responsibility for the development of the **Commercial, Financial and Management Case** elements of the OBC currently rests with the Council. The contents of these cases will depend on the outcomes of the aforementioned *Fair Funding* discussions.

9.2.4 The addition of the Commercial, Financial and Management Cases completes the OBC phase.

Final Business Case

9.2.5 The Final Business Case (FBC) is an updated version of the OBC following outline and detailed design. Everything on which the OBC is based is revisited at this stage. In this context, detailed design and costing of infrastructure will require to be incorporated, together with a procurement strategy for engaging with shipyards for the build of new vessels.

9.2.6 The output of the FBC should be a preferred option with a detailed plan for financing the investment and a strategy for procuring, delivering and managing the outputs of that investment.

Appendix A Merchant Shipping Notice 1876

As the REW operates exclusively within Category D waters, it is subject to the regulations applied in MSN 1876. The key provisions of this legislation are as follows:

- 'Working time' relates to:
  - Any period, including overtime, during which an employee is working.
  - Any period during which an employee is receiving training.
  - Any additional period which is to be treated as working time for the purpose of these Regulations under a relevant agreement.
- Maximum working time is defined as follows – working hours should not exceed:
  - 14 hours in any 24-hour period.
  - 84 hours in any seven-day period.
  - Working time over a full year (i.e., any 52 week period) should not exceed 2,304 hours.
- The employer must ensure that any employee does not work more than 48 hours for any seven-day period, averaged over 52 weeks (i.e., annualised hours).
- In terms of rest periods, workers must have at least:
  - 10 hours in each 24-hour period, of which at least six hours are uninterrupted; and
  - 84 hours in any seven-day period.
- Workers are entitled to 4 weeks of paid leave in each leave year, and also up to 1.6 weeks of additional leave in respect of public holidays (subject to an overall maximum of 28 days).
- Section 17 of MSN 1876 does however make provision for seasonal work, thus facilitating differential summer and winter timetables, as is common with ferry operations across Scotland:
  - A season is defined as no more than 9 consecutive months in any 12-month period in which activities are tied to certain times of the year as a result of external circumstances such as weather conditions or tourist demand.

Appendix B General Arrangement Drawings

Appendix C Ferry Terminal Infrastructure Capital Costs

Appendix D Ferry Terminal Infrastructure Maintenance Costs

Appendix 3

Orkney Inter Island Transport Study

Outer North Isles (ONI) Outline Business Case

Elected Members Seminar

Monday 17 January 2022

ORKNEY ISLANDS COUNCIL

ORKNEY ISLANDS COUNCIL
Marine Services & Transportation

ONI - Outline Business Case Seminar Focus

Transport Scotland Business Case Guidance

Transport Planning Objectives

Outline Business Case

Timetable Principles

Crewing

Vessel overnighting and accommodation

Capacity

Infrastructure Costs

Papa Westray Connectivity

Stronsay Harbour

Accessibility

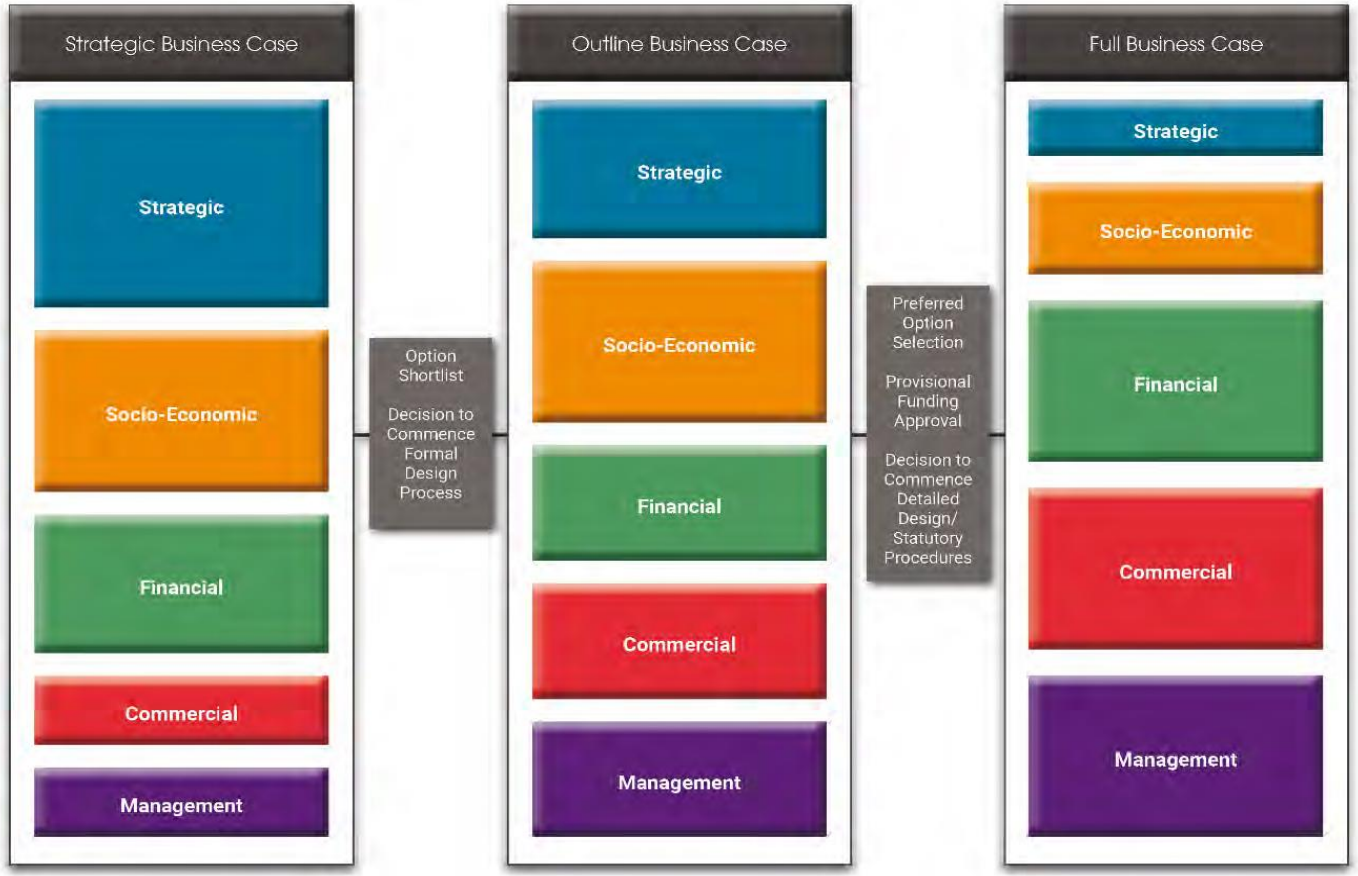
Inter Island Air Service

Key issues

Transport Scotland Business Case Guidance

Securing investment in transport infrastructure in Scotland requires a 'business case' to be made in three stages:

- **Strategic Business Case (SBC):** develops and considers a range of options to meet an identified set of transport needs.
- **Outline Business Case (OBC):** Determines a preferred option and outlines the means by which it should be funded, procured and delivered.
- **Final Business Case (FBC):** undertaken at the point of procurement – refines business case and finalises the funding, procurement and delivery mechanisms.



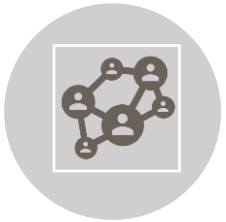
Transport Planning Objectives

The **capacity of services should not act as a constraint** to regular and essential personal, vehicular and freight travel between the island and Orkney mainland.

Where an island does not have a 'commutable' combined ferry or air/car/public transport/walk time to a main employment centre, the scheduled connections should permit at least a **half-day (e.g. 4 hours) in Kirkwall or Stromness 7-days a week, all year round.**

The scheduled **time between connections should be minimised** to increase flexibility for passengers and freight by maximising the number of island connections across the operating day.

The **level of connectivity** provided should minimise the variation within and between weekdays, evenings, Saturdays and Sundays.



Where practicable and realistic, islanders should be provided with **links to strategic onward connections** without the need for an overnight stay on Orkney mainland.

Outline Business Case

Phase 1 report confirmed the Strategic Case which included the rationale for a **four** passenger and vehicle **Ro-Pax vessel** (of equal size for interchangeability) and a three aircraft solution.

The key Outer North Isles decisions were as follows:

- The berth at North Ronaldsay should be converted to **Ro-Ro**.
- Papa Westray should be served by a new **Ro-Ro** service operating between Moclett and Kirkwall, initially on the current timetable, which would be gradually expanded as new vessels come into fleet.
- Stronsay ferry terminal should be **retained in Whitehall** (long-term option to relocate in the lee of Linga Holm).
- **Overnight berths** should not be developed at Eday and Westray (Kirkwall based vessels operating a longer day).
- A full **accommodation block** on the vessels is **not required** as the majority of crew are shore-based (recruitment issues in isles).

Phase 2 defines the broad service to be operated to the six islands through further development and completion of the **socio-economic** case.

Timetable Principles

The OBC considers an enhancement of services, both in terms of the length of operating day and service frequency, based on the Routes and Services Methodology (RSM) *(subject to increase in revenue budget).*

The main principles are as follows:-

Timetable structure should facilitate a **consistent year-round timetable.**	Exception to the above is **during refit** where the service will reduce to three vessels. The equivalent to the **current summer timetable or winter timetable** would then be in operation.	**Eday, Sanday, Stronsay and Westray** will be capable of delivering **three return connections** per day Monday to Saturday (two x return Sunday) with early evening Kirkwall departures on a Friday and Saturday.	**Direct connections** where possible unless for freight reasons.	**Consistent daily departure** and arrival times with the exception of an earlier start on Mondays for connection to school, mart etc (13:00-14:30).	**Early afternoon departure on Fridays** for education purposes as well as a possible **later evening departure** (18:30 – 20:00)	**Saturday - Standard three rotations** but last departure between 18:30 – 20:00.	**Sunday – mid morning and early evening rotation**, retaining link for education purposes.

Crewing – Outer North Isles

In order to deliver an increased operating day and frequency, alternative crewing options must be considered.

The recommended option is a **single crew with a combination** of **standard and split shifts** (providing a maximum of 364 sailing hours per week).

In providing an extended operating day on a Friday and Saturday whilst accommodating sufficient crew rest time it is recommended that each vessel completes **one** island return trip, then has a **four-hour rest** period, then completes a further **two island return trips**.

Introducing the full package of enhancements would cost around **£3.4m per annum in additional revenue funding (£3.2m of front line costs and £200k of back office costs)**. This however includes the Sunday winter services which were introduced in the South Isles during 2021/22.

Vessel Overnighting and Accommodation

Currently, the vessels can overnight at Kirkwall, Sanday, Stronsay and Westray during the summer only. As the current crewing quarters is below the waterline, they can only be rostered to remain onboard a maximum of **two nights per week**. The benefits of overnight berthing in Eday and Westray was considered as part of the OBC.

The overnighting issue is resolved with new tonnage (4 x vessels) and with a longer operating day, services can **start and end in Kirkwall**. **Overnight berthing** in **Eday** and **Westray** is **not recommended** and has not been considered further in the OBC.

Whilst the concept of crew living and working on the islands is desirable, and operated across the inner and south isles, this remains an ongoing challenge for the Outer North Isles where almost all senior certificated crew are mainland based. It is proposed that a small accommodation block of around 5 beds would be considered to accommodate any staff that are isles based whilst on duty however, a **full sized accommodation block is not recommended** in the new ONI vessels.

Capacity

The capacity analysis carried out by the consultants confirms that, on occasions, **vehicle deck capacity can be a problem on the ONI routes**. This is generally at peak sailings times i.e. first and the last sailing.

17% of sailings on the Eday-Sanday-Stronsay route combination and 15% on Westray demonstrate a **vehicle-deck utilisation of greater than 90%.**

Westray accounts for the **largest traffic**, with **42%** of all passenger traffic and **39%** of all vehicular traffic across the ONI network.

During the period 2009/10 to 2017/18, there has been a very **modest growth** in passenger and vehicle carryings.

The recommendations from the report are for **4 equal sized vessels** to operate the ONI with a carrying capacity of approximately 28 PCU and a vessel size in the region of **65m** (Earls = 22 PCU Varagen = 28 PCU).

Infrastructure Costs

The consultants are unable to determine the capital costs of the four proposed vessels at this stage. This will only become clear following the design process which is undertaken at the Final Business Case stage. The FBC stage will consider vessel design and propulsion in detail.

The ferry terminal infrastructure capital cost estimates are outlined below excluding maintenance costs. *Note: The costs below do not include the cost of an additional linkspan in Kirkwall which would be beneficial to the ONI operation. This will be considered in more detail in the Harbour Masterplan.*

Infrastructure Works	Capital Costs (2021)	Capital Costs plus 44% OB (2021 prices)
Eday	£4.3m	£6.3m
North Ronaldsay	£17.4m	£25.1m
Papa Westray	£17.9m	£25.8m
Sanday	£1.6m	£2.3m
Stronsay	£4.9m	7m
Westray	£4.1m	£5.8m
Total	**£50.2m**	**£72.3m**

ONI operational ferry costs expected to increase from £5.8m to **£8m** per annum due to additional tonnage, additional connections and direct services.

Inter Island Air Service current cost is £1.33m per annum, expected to increase to **£1.75m** if adding third aircraft.

Papa Westray Connectivity

The OBC preferred option is to upgrade to Ro-Ro at Papa Westray to improve community accessibility to employment, business, personal services and leisure opportunities. It will also improve accessibility to the isles for business, service delivery and tourist travel.

The OBC recommends the continuation of a limited service direct to Kirkwall on the current timetable of two sailings per week, possibly increased to three (although further consideration is required around this).

In addition to the freight sailing direct to Kirkwall, the passenger service to Pierowall would be retained and the life-line service to mainland Orkney for passengers would remain by air.

Papa Westray Connectivity Further Consideration

Papa Westray link to Westray onwards to Kirkwall to provide additional frequency? → Ro-Ro Linkspan proposed for interchangeability across the network and reliability reasons. → Link to Rapness or Pierowall? → Type of vessel required (ideally consistent with type of vessel for inner/south isles).

Crewing of larger vessel between Papa Westray and Westray? → Would this vessel be used for North Ronaldsay? → Would this change the 4 x 65m vessel requirement for ONI? → How would this affect the service currently provided by air?

Revised fare structure for Papa Westray and North Ronaldsay? → Responsibility around freight if there is no haulier on the island? → Cost of haulage if this has not previously been met by the island?

Implications for North Ronaldsay?

How would North Ronaldsay be served if Papa Westray was served by a smaller vessel?

Would you still require 4 x 65m vessels for the ONI or would this reduce to 3 + smaller vessel (consistent with Inner/South isles fleet)?

Infrastructure should still accommodate a vessel up to 65m to allow for interchangeability of fleet.

Could the sailings/resilience to North Ronaldsay increase/improve as any non sailing could be easily accommodated on another day compared with current timetabling issues.

Stronsay Harbour

Stronsay Harbour – currently located in main settlement of Whitehall. Sanday and Westray ferry terminals were relocated in the 1980's to create a shorter route however this was not taken forward in Stronsay due to split views within the community.

OBC recommends retention of terminal in Whitehall as the timetable requirements can be met through the use of four vessels.

The cost of relocating the terminal would be significant due to marine infrastructure works, land acquisition, construction of access road, remediation of current site at Whitehall and need for public bus service if terminal is moved from the main settlement area.

Stronsay Harbour Further Consideration

Steaming time to Stronsay from Kirkwall, Eday and Sanday is longer than would be the case if the terminal was located in the west of the island.

Consider creating a shorter point to point on environmental/ efficiency grounds?

Berth at Whitehall is exposed to wind and wave motion from the north.

Passage to/from the existing berth is exposed to easterly and south-easterly winds in Sanday Sound and the channel at Papa Stronsay.

Existing channel at Whitehall requires regular dredging to maintain adequate under-keel clearance.

Feasibility of new tonnage serving via Whitehall?

Relocation would produce fuel savings across the ONI network and increased capacity within the timetable.

Accessibility

The ONI vessels are no longer fit for purpose and progressing to procurement stage is now urgently required in conjunction with talks with Scottish Government over funding.

A key factor of the existing ageing fleet is the lack of accessibility for people with restricted mobility.

The vessels have steep stairways and raised thresholds.

The allocated space on the Earl Sigurd/Thorfinn for people unable to use the steep stairs is unsatisfactory as only a few seats close to the car deck in a draughty corridor are available.

On the MV Varagen, a stair climber chair can be used to access the passenger lounge however, this is not a dignified or comfortable option therefore most remain in their vehicles for the crossing.

For those unable to go over the raised thresholds they stay in the vehicle (whilst the deck is locked) with no access to toilet facilities (during refit time this could be for 3+ hours).

Inter Island Air Service

- The Inter Island Air Service plays an essential role in conveying itinerant teachers to and from the isles and pupils to secondary school.
- Life-line service to North Ronaldsay and Papa Westray.
- Essential for GP service, particularly Eday, North Ronaldsay and Papa Westray as well as key service for vets, banking etc.
- Fast, effective service for the community (although capacity is limited particularly during term time).
- OBC considers a third aircraft which could provide up to 600 additional hours of flight time.
- The additional frequency could be achieved in the short term at relatively low cost (£1.33m to £1.75m for 3rd aircraft/increase in service) .
- The OBC considers splitting out the double drops as a means to provide additional capacity/service however this disadvantages Eday.
- Officers would propose that the third aircraft could be used to provide a similar service to Eday as Sanday, Stronsay and Westray and fewer shared flights to North Ronaldsay and Papa Westray (further work around timetabling required).

Key Issues

The ONI vessels are no longer fit for purpose and progressing to procurement stage is now urgently required in conjunction with talks with Scottish Government over funding.

The existing ONI vessels are **not accessible** to those with restricted mobility due to steep stairways and raised thresholds. The space for people with restricted mobility is not satisfactory as they either need to sit in their own vehicles with no access to toilet facilities (whilst the deck is locked) or they sit in a very draughty corridor area for the duration of the sailing.

Crewing accommodation is below the water line which restricts the timetable at present (maximum 2 nights). Current shared accommodation has also resulted in reduced timetables during the Covid pandemic as there has been no overnighting.

The vessels are unable to perform to original specifications and **reliability** is a factor as these vessels are now over 30 years old.

Replacement parts for the ONI is problematic (and expensive) and new engines on the existing fleet have been considered to retain the existing level of service however this is less than ideal given the accessibility issues and general age of fleet.

Whilst the proposed **timetable improvements** could in part be introduced with the existing tonnage, it is not recommended to work these vessels harder as this will result in reliability issues. The enhancement of services is therefore limited whilst the existing fleet are in service.

Following further consideration of the options for Stronsay Harbour and Papa Westray connectivity (outcome of these will influence size, number and type of ONI fleet), progression to Final Business Case/ **procurement stage** for these vessels is now **urgently required**.